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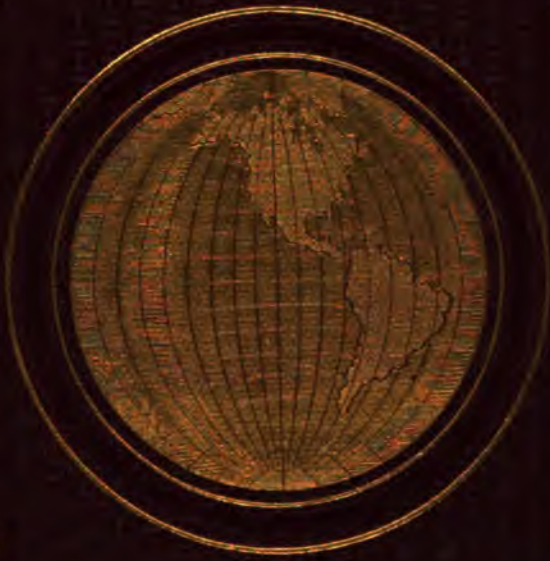
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Pass'over, as it appears in Jewish history, is a great annual festival celebrated in commemoration of the deliverance of the Israelites from the bondage of Egypt. The name was derived from the destroying angel's *passing over* (Heb. *pesach*) the houses of the Israelites, when he slew the first-born of the Egyptians. At the first institution of the P. each family was to take a lamb or kid under a year old, and kill it on the afternoon (between noon and darkness) of the 14th of the month Nisan; the blood was to be sprinkled on the two side-posts and the lintel of the door, as a sign for the destroying angel; and the animal was to be roasted whole, and eaten that night, with unleavened bread and bitter herbs. The festival was to continue for seven days, during which unleavened bread alone was to be eaten, because the people had to pack up and depart from Egypt in such haste that the dough in their kneading-troughs was not leavened (Exod. xii.). In the instructions for the perpetual observance of the festival there is one important variation from this—namely, that the males were to appear annually for the observance of the P. at the national sanctuary, where the paschal animals were to be slain, and the blood sprinkled on the altar (Deut. xvi. 1-8). Such is the historical account given of what some critics hold to be a compound of two festivals—both pre-Mosaic, and pointing to the primitive Nature-worship which they believe to have prevailed among all the Semitic tribes, according to which the first-fruits of the harvest, as well as of man and beast, belonged to the deity. The festival of Unleavened Bread was observed at the spring equinox, when the first-fruits of the new year (Nisan was the first month) were presented to Jehovah; the first ears of barley being partly offered on the altar and partly ground into flour and baked into sacrificial (and necessarily unleavened) bread (Exod. xxiii. 14-19, Lev. xxiii. 4-14). The Paschal sacrifice (Aram. *pascha*, Heb. *pesach*, passover, exemption) was connected with the redemption of the first-born (see CIRCUMCISION), who, as well as the first-born of cattle, had formerly all been dedicated to Jehovah (Exod. xiii. 11-13, xxii. 29-30, xxiv. 18-20). See Ewald's *Antiquities of Israel* (Eng. trans. 1876), Kuenen's *Religion of Israel* (Eng. trans. 1875).

Pass'port is a warrant entitling the person named therein to enter and travel in a foreign country, and to be protected by its laws. For a British subject the best P. is that of the Secretary of State for Foreign Affairs, which costs two shillings, and is good for life. Except in Russia, Turkey, Greece, and Portugal a P. is no longer required, but such a voucher is still occasionally useful in other Continental countries.

Passy, a western suburb of Paris, on the N. bank of the Seine, near Auteil, and separated by the fortifications from the Bois de Boulogne. It was an outlying village till 1860, and has now a pop. of about 13,200. There are here celebrated mineral springs.

Pas'ta, Giuditt'a, a great operatic singer, born of a Jewish family near Milan in 1798, was educated under the *maestro da capello* of Como Cathedral, and subsequently at the Conservatorio of Milan. After obtaining a considerable name in Italy, she appeared at the Italian Opera House at Paris in 1823, and during ten successive years was one of the leading operatic favourites in London, Paris, and Vienna, shining particularly in the grander and more tragical rôles, such as Medea, Norma, and Semiramide. Her voice was a rich and sweet mezzo-soprano of extensive compass, her style and intonation pure, and her expression and gesture in admirable taste. After thirty years of retirement, she died at her villa, Lake Como, April 1, 1865.

Paste, a term loosely applied to substances so diverse that no general definition could be framed to embrace the whole. Properly it indicates substances prepared with water or other liquid till they attain a soft plastic or semi-gelatinous condition, and the fundamental form of P. is the flour P. used as an adhesive material for paper, and by shoemakers, paperhangers, and other artificers. It is made by boiling common flour with water to a perfectly smooth consistence, and it is made of a different degree of consistence according to the purposes to which it is applied. Flour P. may be preserved from moulding by the addition of a minute proportion of carbolic acid or a few drops of any essential oil or camphor; and the addition of a little alum increases at once its adhesive properties and tends to preserve it. Several substances used as food and in confectionery are also, owing to their consistency, called pastes. Thus we have pastry, anchovy and other fish pastes, almond P., and numerous fruit pastes, jujubes, &c.; and in pharmacy a great number of medicated pastes (the *pâtes* of the French) are prepared by mixing gum arabic, sugar, and the requisite medicinal agent into a stiff P. which when dried assumes the form of jujube. Further, numerous other medicated pastes are prepared for external application, and there are depilatory pastes, corn pastes, shaving pastes, tooth pastes, and many others. Polishing P. again embraces a distinct variety of substances used for burnishing and polishing metallic surfaces, and furniture polishes are also sold under the name of P. Further, the term is applied to the material or body of porcelain or pottery ware in contradistinction to glazes and surface colours, and under the name of P. is also indicated the glass or 'strass' used as the basis of imitation precious stones. See GLASS.

Pastille, or **Pastil**, a small cone of odoriferous material prepared for burning to diffuse a pleasing odour in apartments or for the purpose of fumigating. Pastilles are made of a combination of numerous perfumes with gum benzoin, styrax, olibanum, or other sweet-scented gum resin. Mouth or breath pastilles—small pills made of a tough consistency—are highly

aromatic. They dissolve slowly in the mouth, leaving a persistent aromatic odour. They are principally used by smokers.

Pas'to, a town of Colombia, S. America, on a fertile plain among the Andes, 8500 feet above the sea, and 150 miles N.E. of Quito. Its inhabitants, 8000 in number, are mostly Indians and mestizoes engaged in agriculture, cattle rearing, and the transit trade with Quito.

Pas'tor, a genus of *Insectorial* birds, belonging to the Conirostral section of the order, and to the *Sturnina* or starling sub-family. They have a straight bill, the groove in which the nostrils are placed being covered with feathers. The second quill is the longest, and the tarsi are scaled in a transverse fashion. The tail is even. Of this genus the rose-coloured pigeon (*P. roseus*), a rare English species, but common in India, is a good example. Its length is about 8 inches. It has a crest of jet black feathers, and the neck, tail, and wings are also black. The back, breast, and sides are rosy pink. The crest appears to be developed in its third year. The name 'pastor' has been given to the genus because the bird frequents sheepfolds and cattlefields.

Pas'toral (in Music), a simple melody of a P. style, usually in $\frac{3}{8}$ time. The term is also applied to music intended to depict P. scenes and incidents.

Pastoral Letter. The first pastoral letters were those in the New Testament addressed to Timothy and Titus, and called Pastoral Epistles, because they abounded with instruction regarding the oversight of the Church and other duties of the Christian ministry, as well as for the churches themselves. The name was afterwards applied to similar letters written by bishops to the clergy and laity under their jurisdiction, either regularly or on special occasions. In the Anglican Church the regular P. L. is superseded by the modern Episcopal 'charge.' In non-Episcopal churches the name is given to an address from a minister to his flock, or from the ministers collectively to the laity of the Church.

Pastoral Poetry is strictly the poetry of shepherd (Lat. *pastor*) life—of those whose daily employment is to tend flocks and herds. Its elements are simple. Milton, referring to the shepherds who watched by night, and sat 'simply chatting in a rustic row' on the Plains of Bethlehem, suggests the range of the speculations and aspirations of pastoral tribes—and thus points out the limits of the subjects properly within the compass of P. P. :—

'Perhaps their loves or else their sheep
Was all that did their silly thoughts so busy keep.'

The oldest representations we have of the poetic character of pastoral life are to be found in the books of the Old Testament, which describe the shepherd life of the patriarchs. But in these the poetry is not the element of first importance. It is there because it belongs to that mode of life, not because the narrative is artistically shaped or moulded to bring it into prominence. Hellas is the land which first gave birth to P. P. in the classic sense of the term. Theocritus (q. v.) is the earliest and the greatest name in this kind of literature. It would be a mistake to suppose that P. P., like pastoral life, belongs to the infancy of a nation. On the contrary, it is often the outcome of a late and languid civilisation, and always paints pictures of a rural life imagined rather than observed. Theocritus flourished at a period (about the middle of the 3d c. B. C.) subsequent to the great age of Hellenic culture, long after the Hellenes had achieved their greatest triumphs in literature and the arts, and indeed well within that period when idyllic simplicity and innocence had completely vanished from the land. Virgil's *Bucolics*, though instinct, like those of Theocritus, with a genuine feeling for the charm and grace, the innocency and sweetness, of country life, were written when Rome was parting with even the last forms of its antique simplicity. The unreality or artificial character of P. P. increased the further the world departed from the classic times. To trace the history of this unreality through the middle ages would be vain. We may here note that on the revival of learning in the 15th and 16th centuries, P. P. reappeared with the other forms of ancient art, sometimes in a dramatic form. Tasso and Guarini among the Italians, Ronsard and Vauquelin among the French, were noted for their skill in

this kind of composition, while in England some of the finest Elizabethan workmanship is shown in this department. Spenser's *Shepherd's Calendar*, Fletcher's *Faithful Shepherdess*, Marlowe's *Passionate Shepherd's Invitation*, with Raleigh's *Reply*, and Browne's *Britannia's Pastorals*, are among the *memorabilia* of English literature. Gay's *Shepherd's Week* is a delightful and genuine work, but perhaps the best English pastoral in existence, because the one which combines poetic art with the greatest truth to nature, is the *Gentle Shepherd* of Allan Ramsay (q. v.). Amid the hard realities of modern life, P. P. has evaporated, and the pastoral feeling now finds expression only in isolated passages of Wordsworth, Tennyson, and other meditative poets.

Pastoral Staff. See CROSIER.

Pastoral Theology, in a sense, might be regarded as synonymous with practical theology, or the art of applying in the ministry the knowledge acquired in the purely scientific departments of theology; but considered apart, as a special object of study, is that which treats of all the duties and of all the kinds of activity to which the pastor is called. The elements of P. T. thus depend on the conception formed of the spiritual office in the Church. A pastor in the Evangelical Churches is defined as combining in his person all the offices of the priest and prophet of the Old Testament, and of all the different orders of ministry in the primitive Church; and his duties may be divided into the three provinces of worship, teaching—including preaching and catechising—and care of souls. See Vinet's *Theologie Pastorale* (Eng. trans. 2d ed. Edinb. 1855).

Pas'try consists of articles of fancy bread, of which 'paste' is the principal ingredient. The paste is prepared by making a soft flexible dough of flour, in which a weight of butter equal to the flour is enveloped, and the whole rolled out to a thin cake. The cake is folded into two and again rolled out, and the alternate folding and rolling are continued till the whole becomes a mass of exceedingly thin alternate layers of flour dough and butter. During the process of baking such a paste, the vapours disengaged from the butter partly break up the doughy material into fine flakes or laminæ which absorb the melted butter, and form a rich friable paste with a pleasing appearance and taste. P. so prepared is used with jellies, mince meat, &c., and a modification of it less rich in butter is used for the crust of pies, &c.

Pas'tures, as denoted by the derivation of the word from Lat. *pasco*, 'to feed,' are fields or tracts of open land, the herbage of which is eaten off as it grows by the farmer's stock. They may be divided into those that are natural, and those that are laid down by the cultivator, and the latter subdivided into permanent, and such as are subject to a rotation of crops or alternate husbandry. The natural P. consist of ground that has been under grass from time immemorial, and include the richest descriptions, as well as the poorest. The best are used for feeding heavy oxen; those inferior are often grazed by dairy stock; whilst the hillsides and downs are usually devoted to sheep. All good P. grow a very mixed herbage, varying according to locality, soil, altitude, exposure, climate, and other circumstances: it is therefore necessary in forming P. to keep in view peculiarities that present themselves in the constitution and surroundings of the land, as likely to affect the growth of certain species or varieties of plants that may be used for sowing.

Common of Pasture, in English law, is the right of feeding one's cattle on the land of another. What are hence called *commonable* beasts are horses, oxen, kine, and sheep. *Not commonable* are goats, hogs, and geese. In Scotland pasture is a known rural Servitude (q. v.), under which the proprietor of the dominant tenement is entitled to pasture a certain number of his cattle on the grass grounds of the servient tenement. In both countries the right may be constituted by grant or by prescription.

Patago'nia, the most southerly portion of the mainland of S. America, has a length from 38° to 53° S. lat. of fully 1000 miles, and an estimated breadth of 480 miles. Its total area is about 350,000 sq. miles, whilst its population probably does not exceed 6500. P. is divided from the Argentine Republic on the N. by the Rio Negro, and is bounded on the W. by Chili and the Pacific, on the E. by the Atlantic, and on the S. by the

Strait of Magellan. Its shores are greatly indented, the E. coast forming a number of large bays, of which the principal are the Gulfs of San Matias and St. George, while the W. coast consists of several archipelagoes of islands and a number of peninsulas, all of which are mountainous and densely wooded, much resembling the coast of Norway or that of the S.W. portion of New Zealand. (See CHILDE and CHONOS ARCHIPELAGO.)

P. is traversed throughout its whole length by the great chain of the Cordilleras, which divides it into two districts of widely different character. That on the W. side of the range is a very narrow strip of wooded, mountainous country, with an exceedingly humid climate; while the E. side consists of bare, rolling plains devoid of trees, and with a very dry climate. These plains near the coast are desert wastes, strewn with rocks, seamed by ravines, and bearing only a struggling vegetation of scanty coarse grass, thistle clumps, and incense bushes. The tract between the Chupat and Chico rivers is especially desolate, and the Indians declare it to be impassable. The geological formation of the plains of P. is different from that of the Pampas (q. v.) of the Argentine Republic, consisting as it does of a series of Tertiary formations rising one above the other in terraces as regular as steps, and covered with a shingle bed of porphyry pebbles. Near the base of the Cordilleras the Tertiary formation is overlaid with basalt, and the country is hilly, clothed with grass, and capable of cultivation. On the slopes of the Cordilleras themselves, trees grow thickly, and some of the valleys are surpassingly lovely. Volcanoes are common in the main range, and traces of volcanic action are abundant elsewhere. The principal rivers have all an easterly course, and named from N. to S. they are:—The Rio Negro (q. v.), Chupat, Desire, Chico, and Santa Cruz. They flow in deep gorges and are all exceedingly rapid, but are navigable by vessels of light draught and sufficient steam-power almost to the base of the Andes. In March 1877, Moreno found that the Santa Cruz had risen 63 feet, with a channel in places a mile wide, and a current running 15 miles an hour. He pronounces this river navigable by steamers drawing 12 feet of water. Shallow salt lakes, called *salinas*, are very common in P., but the only large lakes are those of Viedma, Coluguape, Argentine, and San Martin. The first is 30 miles long, with a maximum breadth of 10 miles.

The climate of P., except in the sheltered valleys of the Andes, is exceedingly trying, its leading feature being the prevalence of strong piercing winds, before which in winter no human being can stand on the bleak plains. In the S. snow, sleet, or rain falls almost daily, and Mr. Musters sums up the character of the climate of this region as consisting of 'a hard winter and a bad spring.' Farther N. scarcely any rain falls, but the plains are buried in snow in winter. Notwithstanding the rigours of its climate, however, the animal life of P. is considerable. Independent of herds of wild horses and cattle which roam in the northern districts in the Andean valleys, the fauna includes the guanaco, puma, wild cat, gama (a kind of deer), armadillo, skunk, fox, wolf (*Canis jubatus*), and great numbers of rodents, besides two kinds of ostrich, the condor, three kinds of hawk, an ibis, and (in the N.W.) the flamingo and rose-coloured spoon-bill. The reptiles and insects are few and unimportant, with the exception of a large fly. The fossil remains of P. are numerous and interesting, but little is as yet known regarding them.

The Tehuelches, or Patagonian aborigines, are a tribe of Horse Indians, inhabiting the portion of the country to the E. of the Cordilleras. They are divided into two great sections, inhabiting respectively the N. and S. portions of the country. The members of these two divisions speak the same language and intermarry, but nevertheless preserve their clannish distinctions. Between the Rio Negro and Chupat rivers are the Penck or Pampas Indians, speaking a different language from the Tehuelches. In the N.W. are the Warrior or Manzanero Indians, who resemble the Araucanians, and are more civilized than the other tribes named, keeping sheep and cattle, cultivating maize, and building houses. The stories of ancient travellers regarding the extraordinary stature of the Patagonians have been found to be exaggerations, with some basis of fact. According to Musters, the average height of the men would appear to be about 5 feet 10 inches, and of the women 5 feet 6 inches. Moreno declares, from actual measurement, that 'these people are, without doubt,

the tallest of all the races on the globe.' They are exceedingly muscular, and the development of their arms and chests is especially remarkable. Their complexion is a reddish-brown, and the features good, the eyes being bright and intelligent, the nose usually aquiline and shapely, the teeth superb, and the expression, when not near the settlements, lively and good-humoured. No hair is allowed to grow on the face, and that of the head, which the men wear fully as long as the women, is dressed with much care. The clothing of the men consists of a *chiripa*, or under-garment round the loins, over which is worn a large mantle of guanaco skins, the fur of which is worn inside, while the outside is painted, and the garment is thus both warm and waterproof. Skin boots are worn when riding, but the head is generally left uncovered. The women wear a skin mantle similar to that of the men, and beneath it a loose calico or stuff saque, extending from the shoulders to the ankles. Both sexes smear their faces, and frequently their bodies, with paint, as a preservative against the effects of the dry and cutting winds. The ornaments worn are usually silver or bead necklaces, very large square earrings, and silver spurs or stirrups. The Tehuelches bathe daily in cold water, but in spite of their cleanliness are unable to get rid of vermin. They almost live in the saddle, yet are capable of great pedestrian feats. Their arms consist of guns, revolvers, swords, daggers, and a long heavy lance, used only when on foot. In hunting they use the Lasso (q. v.), *bolas*, and *bola perdida* ('lost ball'). The *bolas* consist of three balls of metal, or of stone covered with leather, connected by long hide thongs, and are thrown either so as to entangle the legs of an animal, and so check its flight, or so as to strike it on the head, and kill or stun it. The *bola perdida* consists of a single ball of similar construction, but with a sharp point, and when once thrown is not picked up again, whence its name. It was the original weapon of the Tehuelches, before the introduction of firearms. Suits of chain armour, or padded skin coats, studded with silver, are still worn in battle to some extent, though going out of use. The *toldos*, or dwellings, of the Tehuelches, are movable huts made of guanaco skins stretched upon stakes. The morals of the race are remarkably pure for savages, and though polygamy exists it is practically confined to the chiefs. The women enjoy social equality with the men, and wife-beating is unknown. Both parents evince a deep and tender affection for their children. The Tehuelches believe in the existence of a good spirit, but their *cultus* consists principally in the exorcism or propitiation of evil demons, the chief of whom is called the Gualichu. Their superstitions in this respect are very strong, and 'doctors,' or 'medicine-men,' consequently exercise great influence among them. Musters estimates the total number of the Tehuelches at only 1500, and as they are decreasing by war, intemperance, and smallpox, they will soon be extinct.

The ownership of P., S. of the Santa Cruz River, is a matter of dispute between Chili and the Argentine Republic, and the latter also claims the rest of the country. There is a Chilean colony at Punta Arenas, in the Strait of Magellan, and there are Argentine settlements at Patagones (formerly called El Carmen), at the mouth of the Rio Negro, and at Santa Cruz. Patagones has a very mixed population of about 2000. On the Chupat river, 40 miles from its mouth, there is a Welsh colony, which had a population of 690 in February 1876. Its inhabitants have at various times narrowly escaped starvation, but there is now regular communication with Buenos Ayres. In 1875 the Chupat settlement exported to that city wheat, skins, and ostrich feathers to the value of £7306. The site of the colony is fertile but almost rainless, rendering artificial irrigation indispensable. The river is navigable, but has a shallow bar entrance. In 1875 a Scotch colony, consisting of 140 families, was planted at Port Desire, under the auspices of the Argentine Government.

The first European who visited P. was Magellan, who landed at Port St. Julian (49° 30' S. lat.) in 1520, and explored the coast as far as Santa Cruz, in 50° S. Two months after landing at the former place they were visited by some of the natives, who wore rough boots made of hide. These boots left very large foot-prints on the sand, on which account the Spaniards nicknamed their wearers *Patagones*, or 'large feet,' whence the name P. Of subsequent explorers, the chief were:—Sir Francis Drake in 1578; Sarmiento in 1579 and 1581; Cavendish in 1586; Narborough in 1669; Faulkner about 1750; Byron and Wallis in 1760; the brothers Viedma in 1780, and Fitzroy and Darwin in 1834. In 1869–70 Commander Musters, R.N.,

travelled throughout the entire length of the country, and has given the best account as yet published of its character and inhabitants. The latest explorers have been Lieutenant Fulberg in 1873 and Señor Moreno in 1877, the former of whom was in the service of the Argentine government. See *At Home with the Patagonians*, by G. C. Musters (Lond. 1871); *La P. y las Tierras Australes*, by Vicente G. Quesada (Buenos Ayres, 1875); *Report to the Minister of Foreign Affairs at Buenos Ayres* by F. P. Moreno, published in the *Geographical Magazine* for 1877.

Patap'sco, a river of Maryland, U.S., has a S. and S.-E. course of eighty miles, and enters Chesapeake Bay by a fine estuary, on which stands Baltimore. In its upper course it is very rapid, affording excellent water-power.

Patchouli is a famed scent procured from *Pogostemon Patchouli*, a perennial herb of the natural order *Labiata*, native of the mountain districts of India and the Malay Peninsula. It grows to the height of two feet, with a habit something like that of mint, having broad oval leaves of some four inches in length; and from the stem tops, with their leaves and dense spikes of small purplish-white flowers, the perfume is derived by extracting the volatile they contain. The dry leaves in a powdered state are made up into small packets, and kept amongst clothes as a preservative against moths: they are also used for scenting certain tobaccos. To some people the odour of P. is disagreeable, but in the East, under the name of poucha-pot, and now in Europe, since its introduction in 1844, it is an established popular perfume. Prior to its importation as an article of commerce, it was a recognised test of the Cashmere shawls—the genuine article being always scented with P. The genus *Pogostemon* contains other species—all natives of tropical Asia—but they do not possess any qualifications of interest.

Patée Cross. See MALTESE CROSS.

Patella, a genus of Gasteropodous Mollusca, represented by the common Limpet (q. v.) (*P. vulgata*) and by allied species. It forms the type of a family (*Patellidae*) distinguished by the conical form of the shell, which is a simple cone, and which does not exhibit the spiral arrangement characteristic of such Gasteropodous shells as those of the whelks. The remaining characters of the family and genus are these; the apex of the shell is turned forward, the 'foot' being as large as the mantle; the gills are in the form of plumes lodged in the mantle cavity, or (as in limpets) as a series of delicate processes surrounding the body.

Patella, the 'knee cap' or 'knee pan,' a small bone found in man in front of the knee-joint, and destined for the protection of that articulation. It may be absent in some quadrupeds (e.g., wombat), and it is very small in bats and seals. It is large in some birds (e.g., grebe), and it is wanting in frogs and tortoises. The P. exemplifies what is known to anatomists as a *sesamoid bone*—that is, it is not developed from cartilage as an ordinary bone of the skeleton, but is found within a tendon—that of the *quadriceps extensor muscle* of the thigh. In man it is flat and triangular in shape. Its anterior surface is convex and rough, its under surface smooth and oval. The *ligamentum patella* is attached to its *apex* or lower margin. In structure, the P. is composed of cancellated bony tissue. It is developed from a single centre, and makes its appearance about the third year of life.

Injuries and Diseases of the P.—The P. may be fractured in two main forms. The ordinary form is transverse, and is commonly caused by the action of the great extensor muscle, the bone being snapped before the patient falls to the ground; but it sometimes occurs that a transverse fracture is produced by direct violence. Fracture of the P. is accompanied by laceration of the fibrous tissues covering the bone; and, in proportion to the laceration, the upper fragment is liable to be separated from the lower by the action of the quadriceps extensor at the moment of the accident. After the accident, the patient is almost or entirely unable to extend the limb; a depression is felt between the two fragments, and there may be considerable swelling and effusion into the knee. The foot and leg should be placed on a straight splint properly padded, bringing down the upper fragment of the P. as near the lower as possible. This is often difficult, owing to the persistence of effusion in the joint; but the parts may be brought into juxtaposition by the use of

Malgaigne's hooks, which, however, should not be applied till all active effusion has subsided. The upper fragment may sometimes be drawn downwards by the action of bandages or strapping applied to the skin over its upper end. The union is generally ligamentous; and, as a general rule, the patient ought to be kept in bed for six weeks, and for six weeks longer the limb should be kept in a splint which will not allow of any bending. *Compound fracture of the P.* is a very severe accident, usually accompanied by other injuries to the articulation, and requiring amputation of the limb.

Pat'en (Lat. *patina*, a dish) is the plate used for holding the bread in the sacrament of the Eucharist.

Pa'tent Laws. The two main conditions of a patent are, first, that the invention on account of which it is granted be useful and new, and, secondly, that the patentee furnish a specification of it sufficiently clear to enable the public to have the benefit of it as fully and as cheaply at the end of the period of the patent as the patentee has during its currency. Hence, if the description, plan, or model of any new invention be unintelligible to those engaged in the business to which it relates, the patent cannot be maintained. There of course must ever remain the difficulties of defining what *is* a new invention, and of whether or not an imitation is an infringement. By 5 and 6 Will. IV. c. 83, amended by 2 and 3 Vict. c. 67, an attempt was made to obviate some of the defects of the P. L., and better to secure the rights of inventors and discoverers. Formerly, an inadvertent claim of novelty regarding any part of an invention, however trivial a part, if shown to be incorrect, was fatal to the patent. This defect has been obviated, and a patentee who finds that he has been anticipated in any portion of his invention may now disclaim that portion, and retain his exclusive privilege in the remainder. The Act gives power to the Crown, on the recommendation of the Privy Council, to extend the term of a patent from fourteen to twenty-one years. In 1852 the P. L. were further amended, and the facilities for obtaining letters patent for inventions extended. Under the Act, a commission is constituted, and empowered to make regulations, which are to be laid before Parliament. The commission is required to report to Parliament annually. Under the Act, every petition for the grant of letters patent, and the declaration required to accompany it, must be left at the office of the commissioners, and along with these a statement in writing, signed by or on behalf of the applicant, describing the nature of the invention. The application is then to be referred to one of the law officers of the Crown, who may call a scientific person to his assistance, at the expense of the applicant. The law officer may then give a certificate of allowance, and thereupon provisional protection is extended to the invention for six months. The letters patent must be taken out before expiration of the six months, or the inventor loses his right to them. They are valid over the United Kingdom, Channel Islands, and the Isle of Man; but fees must be paid for recording the patent in the Court of Chancery (q. v.) in Scotland. The following are the principal stamp duties now payable in place of the sums under the Act of 1852:—Petition, certificate of notice to proceed, warrant for letters patent, sealing of letters patent, specification, application for disclaimer—£5 each; certificate of record of notice of objections and caveat against disclaimer—£2 each. At the end of the third year of the patent £50 must be paid, and £100 at the end of the seventh. Besides these expenses there will be others incurred to the law officers of the Crown, in the event of opposition, both by the applicant and opponent. 22 Vict. c. 13 provides for inventions regarding *instruments or munitions of war*, which may be assigned to the Secretary of State for War, who will certify to the commissioners for patents that such inventions will be kept secret. A Royal Commission on the P. L. made its report in 1864, and there have been later committees of inquiry, but the evidence given and the opinions expressed upon it are so conflicting, that to base any view on authority is clearly impossible. The general opinion seems to be that some reform is required, but what the reform ought to be is the subject of endless divergence. Some advocate total abolition of patent rights.

Paterculus, O. Velleius, a Roman historian, born about 19 B.C., served in the army under Tiberius, by whom he was made prætor in 14 A.D., and is supposed to have died shortly after 30 A.D. The work by which he is known bears the title *C.*

Velleii Paterculi Historia Romana ad M. Vinicium Cos Libri II., and is a compendium of the chief events in universal history from the fall of Troy till A. D. 30. The first printed edition was published at Basel in 1520 from the only manuscript of the work then extant, in which the first seven and a half chapters were wanting, and which has since been lost. The best editions are those of Rhunken (Leyd. 1789), and Orelli (Leips. 1835).

Pater Noster (Lat. 'our father'), the first two words of the Lord's Prayer, are sometimes used as a name for the whole prayer. In the primitive Church the use of this prayer was only permitted to believers; the Catechumens (q. v.) were not permitted to say 'our father' till they had first made themselves sons by regeneration in the water of baptism; from which it received the name of 'the prayer of the faithful.' Hence it was learned immediately before baptism, and used at baptism as well as at the Eucharist, at morning and evening services in churches, and in private devotions, from which it received the name of 'the daily prayer.' In short it was often used as the conclusion of all prayers, and in the Apostolic Constitutions (q. v.) was directed to be used three times a day, probably in honour of the Trinity. It was in this way that the P. N. came to be the foundation of the Rosary (q. v.).

Paterson, a city of New Jersey, U.S., on the Passaic river, which here forms a fall 100 feet high, affording excellent water-power, 13 miles N. of Newark, and 16 N.W. of New York by rail. It has 35 churches, 2 orphan asylums, 2 daily and 3 weekly newspapers. Silk is extensively manufactured, there being twenty-five firms engaged in that industry; and on this account P. has been called the 'Lyons of America.' The chief other manufactures are machinery, paper, carpets, and cotton and linen goods. Pop. (1870) 33,579.

Paterson, William, was born in the parish of Tinwald, Dumfriesshire, in 1658, and is stated to have embraced a missionary life in the W. Indies, from which he deviated to that of a buccaneer. By 1688, however, he is known in honourable connection with commerce, the banking schemes which he submitted to the merchants of London having issued in the projection of the Bank of England. It is in his connection with the Darien Scheme (q. v.) that he lives as a figure of historical importance. By dint of natural eloquence and the repetition of an argument which promised to make Scotland, if her parliament sanctioned the establishment of a trading company at Darien, 'the general storehouse for tobacco, sugar, cotton, hides, and timber,' P. pushed the scheme into execution. It was a ruinous failure, and he came back to Scotland in a condition of insanity. He was afterwards returned to the first united Parliament for the Dumfries burghs, and in 1715 the sum of £18,241 was voted as indemnity for his loss in the disastrous transaction. 'There is not,' says Lord Macaulay, 'the least reason to believe that he was dishonest. Indeed, he would have found more difficulty in deceiving others had he not begun by deceiving himself. His faith in his own schemes was strong even to martyrdom, and the eloquence with which he illustrated and defended them had all the charm of sincerity and enthusiasm.' He died 22d January 1719. See Bannister's *W. P.* (1858), and Pagan's *Birthplace of W. P.* (1865).

Pathán, the same as Afghan, a name commonly used throughout India for men of Afghan descent who have settled in that country, especially for the Rohillas (q. v.), or for those who have entered the British military service. According to the general census, 1868-72, they number 1,841,693 throughout British India, being most numerous in the N.W. Provinces, the Punjab, and Oude.

Pathological or Morbid Anatomy is that department of medical science which treats of the changes produced by disease in the solids and fluids of the body, and is a record of facts from which it is possible to ascertain the conditions under which morbid changes or new formations in the body have taken place. The progress of P. A. is therefore, in great measure, a record of the history of medicine; but ordinary dissections alone have long since ceased to furnish us with facts before unknown. The great advances made in P. A. within recent years have been in consequence of greatly increased physical aids to the senses; and organic chemistry, the microscope, the ophthalmoscope, the clinical thermometer, the graphic method, and such like instruments, are continually opening up new fields of in-

quiry. The province of P. A. is to detect the changes which have taken place during the course of diseases in the structure of the tissues and organs of the body; and to demonstrate the exact seat of local alterations established during the progress of disease. P. A. is merely a section of pathology, contributing to practical medicine the solid material from which to construct a basement without having the power to erect a perfect edifice, as Professor Vogel has well remarked. See Vogel's *Pathological Anatomy of the Human Body*, Jones and Sieveking's *Manual of Pathological Anatomy*.

Pathology (Gr. *pathos*, 'suffering,' hence 'disease,' and *logos*, a 'discourse') treats of the origin, development, growth, and decay of new products or formations which are the elementary constituents of structural or organic lesions. As a science it is of modern origin. The investigation and elucidation of the cause, nature, and course of those changes which are detected and demonstrated by the morbid anatomist constitute the main objects of the science of P. The difference between pathological anatomy and P. is put by Professor Aitken of Netley thus—'The morbid anatomist finds a lesion or change for what ought to be the natural structure, appearance, or condition of a part. The pathologist seeks to connect such lesions with signs and symptoms during life, that the practical physician may suggest a remedy to the disease, and that the nosologist may give it a name, distinguishing characters, and a place in his classification.'

Patmos (mod. Patino and Patmosa) is a bare, rocky island in the Ægean Sea, about 28 miles in circumference, which under the Roman emperors was used as a place of banishment, and which now contains about 4000 to 5000 inhabitants. About halfway up the hill on which the only town in the island is built is shown a natural grotto in the rock, in which tradition affirms St. John wrote the Apocalypse (cf. i. 9). High over all stands the celebrated monastery of 'John the Divine,' dating from the 12th c., and now occupied by 50 monks and containing a considerable library.

Patna, the chief town of the district and division of the same name in Bengal, British India, and the commercial capital of Behar, on the right or S. bank of the Ganges, opposite the confluence of the Gunduck, 331 miles by rail N.W. of Calcutta, and 623 miles S.E. of Delhi. Pop. (1872) 158,900, including 38,729 Mohammedans. P. is the sixth largest city in India. The military cantonment of Dinapore, 6 miles to the W., has an additional pop. of 42,084. The seat of the civil administration is called Bankipore, a western suburb; the native town is locally known as Azimabad. P. is undoubtedly an ancient city. It has been identified with Pataliputra, the capital of the Emperor Sandracottus, visited by the Greek historian Megasthenes about 300 B.C., and by him called Palibothra. Shortly afterwards it was the seat of a Buddhist council, assembled by the great Asoka. There are no ancient ruins. The chief buildings are the *Gola* or storehouse, built in 1786 as a protection against famine, which was never made use of till the famine of 1874, the Government opium-stores, the Roman Catholic church, and several mosques. P. College, founded in 1862 in connection with the Calcutta University, was attended in 1874 by 92 pupils, at a cost to Government of £3286. The Temple School of Medicine was opened in 1874. In modern history P. is noted for the massacre of the British prisoners by the Nawaub Meer Cossim in 1763, for the Mutiny at Dinapore in 1857, when the Sepoys went off securely into Shahabad, and for the trial of the Wahabee rebels in 1864. The Mohammedan ceremony of the Mohurrum is annually celebrated with great pomp. The trade of P. is very great both by river and rail. It is the great emporium on the Ganges between Cawnpore and Calcutta, where the agricultural produce of the surrounding country is received by water, to be despatched by rail to the seaboard. In 1876-77 the registered imports were valued at £4,161,000, including cotton goods £1,217,000, salt £390,000, sugar £274,000, and timber £98,000. The exports were valued at £3,090,000, including indigo £789,000, oil-seeds £532,000, hides £185,000, saltpetre £156,000, wheat £82,000, rice £74,000, and other food-grains £96,000. The manufactures are the Government monopoly of opium, cotton and silk weaving, gold and silver lace, leather, glass, rose-water, &c. Spirits are distilled annually to the amount of 1,000,000 gallons. The district of P., which is bordered by the Ganges and the Soane, has an area of 2101 sq. miles; pop. (1872) 1,559,638. The soil is fertile; but the

'P. rice' of commerce is to a great extent a re-export. Besides rice, the crops are gram, barley, wheat, Indian-corn, and oil-seeds. The towns are Behar, Futwa, Barh, and Mokameh. See General Cunningham's *Ancient Geography of India* (vol. i. Lond. 1871).

Patois, a French word of unknown origin, is used to denote a local dialect when it has either ceased to have, or has never had a *literature*, but exists only in the everyday speech of rustics. It may have its quaint and naive peculiarities, but it has neither eloquence nor dignity. Thus, the English of the Somerset peasants is strictly a P., while the English of the Lowland Scotch peasants is not, because it continues to be a vehicle of literature. When it ceases to be that, it too will become a P. See Littré, *Histoire de la Langue Française* (2 vols. 1862), and Cocheris, *Origine et Formation de la Langue Française* (1872).

Paton, Sir Joseph Noel, a distinguished Scottish artist, born at Dunfermline in 1823, was engaged for sometime as a pattern designer, and afterwards studied at the Royal Scottish Academy and the Royal Academy of London. His undoubted power as a draughtsman manifested itself at an early date, and his 'Spirit of Religion' (cartoon) bore off a premium of £200 at the Westminster Hall competition (1845). His 'Quarrel' and 'Reconciliation' of Oberon and Titania, are splendid illustrations in colour of well-known incidents in *Midsummer Night's Dream*, and are the property of the Royal Scottish Academy. Among his other works are the 'Dead Lady' (1854), 'Pursuit of Pleasure' (1855), 'In Memoriam' (1857), 'The Dowie Dens of Yarrow' (1860), 'The Temptation' (1876), and 'Life or Death' (1878). Probably his most truly artistic productions are his outline drawings in illustration of the works of Shakespeare, Shelley, Coleridge, Aytoun, &c. He was appointed Queen's Limner for Scotland in 1865, and was knighted in 1867. He is the author of a volume of graceful verse called *Poems by a Painter* (1861).—**Waller H. P.**, younger brother of the preceding, is well known for his careful and picturesque, though somewhat mannered representations of Scottish scenery. He shows great delicacy of manipulation, but is scarcely true in colour, and the effect though brilliant is somewhat monotonous. Among his best-known landscapes are 'Entrance to Glencoe,' 'Bass Rock from Canty Bay,' 'Evening on Loch Striven,' and 'In Lochaber,' all of which were exhibited in the Royal Scottish Academy in 1877, and are favourable specimens of his style.

Patras (*Patrassa*; Turk. *Baliabadra*), a fortified seaport in the W. of Greece, and capital of the nomarchy of Achaia and Elis, on a gulf of the same name, near the entrance to that of Corinth. The most important trading town of Greece, it is a beautiful city, with regular streets and extensive arcades, and has a mole, which was being lengthened (1877) by French engineers at a cost of £65,000. A strong citadel stands on the old Acropolis. P. has various slight industries, including the manufacture of cotton-twist and soap, and exports currants (in 1876 70,000 tons, 53,556 to Great Britain) tobacco, cotton, olive oil, figs, cocoons, &c. In 1876 exports by British vessels alone amounted to £818,100, and the imports to £226,150. Of the 389 vessels of 138,477 tons that entered the port in 1873, 156 were Greek, 142 English, and 31 Italian. The imports are mainly cottons, iron, coals, coffee, sugar, codfish, and petroleum. Recently the cultivation of currants has been greatly promoted by the sale of government lands in all the plains of the Peloponnesus. There are gas-works at P., but the town is still lit by petroleum lamps. Pop. (1870) 16,641. P., the ancient *Patra*, is the only one of the twelve Achæan cities still existing. In A.D. 347, there was an archbishop of P. at the Council of Sardica. The city was sold to the Venetians in 1408, was taken by the Turks in 1446, recovered by the Venetians in 1533, but shortly afterwards again taken by the Turks, who held it till the revolution of 1821-27.

Pat'ria Potes'tas is a term used to denote the power of Roman citizens over their children. By the laws of the twelve tables the father had power of life and death over his offspring. He could expose them when infants, and their legitimacy depended upon his acceptance of them. He could sell or resign them, instead of paying the damage which he had incurred through their fault. They could neither contract marriage nor do anything else of importance without his consent. But when he did permit his daughter's marriage, his paternal rights as to her

were destroyed, and she became equally with her own daughters the *filia familias* of her husband. A son could acquire no property but with his father's consent; and even when that was granted, his acquisitions were called *peculium*, the term applied to the portion of a slave. The P. P. yielded to the son's official dignity, but revived when that ceased, extending even over grandchildren and great-grandchildren, and ceasing only when extinguished by natural or civil death, or by the ceremony of emancipation. In no modern nation of Europe has the law given anything like the same scope to paternal power. Somewhat greater authority is given to the father in France than in England. In neither country does it extend beyond majority. See PARENT AND CHILD, AGE.

Pa'triarch (Gr. *patriarchês*, the father or chief of a race, or 'chief-father') is the name given to the common ancestor from whom clans or tribes of people have supposed themselves to be descended, in order to account for the closeness of their connection; e.g., the different *Mac*s in the Scottish Highlands, or the *Beni, Bani*, among the Arabs, both meaning sons of so and so. National historians, gazing back into the dim ages of a remote antiquity, are fond of reducing the events of primitive times to an unnatural and unhistorical symmetry, by representing tribes or groups of tribes as individuals or families. Thus the Greeks or Hellenes traced back their origin to a certain Hellen, the son of Deucalion and Pyrrha, whose sons Dorus and Æolus, and his grandsons Achæus and Ion, were the patriarchs of the four Greek tribes.

In Jewish history, the name of P. is applied to the ten descendants of Adam down to Noah (Gen. v.), who are called the Antediluvian patriarchs; to Noah's descendants down to Terah (Gen. xi.); and particularly to the immediate progenitors of the Israelites, Abraham, Isaac, Jacob, and Jacob's twelve sons, the last of whom are specially spoken of as the twelve patriarchs (*cf.* Acts vii. 8, Heb. vii. 4). The title of P. is even in a way applied by St. Paul to the Almighty, as the father of the whole human race (Eph. iii. 14, 15). After the destruction of Jerusalem the name was applied to two governors or heads of the Jews dispersed throughout the Roman and Persian Empires, one of whom had his residence at Tiberias, the other at Babylon.

In the hierarchy of the Christian Church, a P. was a dignitary ranking next to the Pope. In the course of the development of the hierarchy it came to be recognised that the bishop of the chief city of a region, or Metropolitan (q. v.), ranked above an ordinary bishop. Then, on the same principle, the bishop of the chief town of the larger provinces of the Roman Empire was elevated above the other metropolitans. Such were the Bishops of Rome, Constantinople, Alexandria, and Antioch, who received the title of Exarch, Archbishop (which was afterwards equivalent to metropolitan, and, shortly before the Council of Chalcedon (451), that of P., which in the 4th c. had been applied to bishops generally. Ephesus and Cæsarea had the honour for a time of ranking as patriarchates, but had to fall back and make way for Jerusalem. In the West the bishops of Carthage, Justiniana, Prima, Aquileia, and Canterbury held the rank of P., which in fact was simply that of archbishop, with an accession of power and jurisdiction. See Bingham's *Antiquities* (2d ed. 1726), Morin's *De Patr. Origine* (1686).

Patriar'chal Cross, in Heraldry, a cross formed by an upright shaft crossed by two horizontal bars, of which the upper is the shorter.

Patricians (Lat. 'father's children') under the early kings were the original burgesses of Rome (the *populus Romanus*), and were so called because all of illegal or illegitimate birth were excluded from their community, and in the eye of the law were regarded as having no fathers (*patres*). The P. were divided into *gentes* (see GENTES), and these again into *familia*, each of which had its slave and *clientela*, composed of freedmen and foreign refugees. With the rise of a free *plebs* under Ancus Marcius, and its investiture with political rights by Servius Tullius, the P. became an aristocracy of birth, divided into the *patres majorum gentium* (the immemorial nobility) and the *patres minorum gentium* (the immigrant Ramnes, Tities, and Luceres). In the struggle that ensued the great magistracies were one by one thrown open to the plebeians, intermarriage was legalised, the powers of the *Comitia Curiata* were transferred to the

Comitia Centuriata, and in the 3d c. B.C. we find patrician and plebeian standing on an almost perfect political equality, the only exclusive offices retained by the patriciate being those of flamen and interrex (see PLEBBIANS and NOBILITY). Under the emperors the only distinguishing badge of a patrician was a peculiar kind of shoes (*mulla*), tied with four strings, and adorned with a *lunula*. Since the reign of Constantine *patricius* was a personal title, arbitrarily conferred, as well on Roman citizens as on foreign princes—Odoacer, for instance. Pope Stephen IV. granted the title to Pippin, as protector of Rome and the Holy See (754); and it was borne by Karl the Great up to his coronation as emperor. See vol. i. of Mommsen's *Römische Geschichte*, and Freeman's *Comparative Politics* (Lond. 1873).

Patrick, St., the Apostle of Ireland, was born about 387, of Christian parents, at Bonavem Tabernie, a village identified by tradition with Kilpatrick in Dumbartonshire, but of which we only know for certain that it was situated in a part of the Roman province in Britain that was exposed to the incursions of the Scots. He was already ordained deacon when in his sixteenth year he was carried captive to Ireland, and there for six years employed in tending sheep. Restored to his native country by escape in a pagan vessel, he was led by a divine call (*circa* 414) to form the design of evangelising the land of his captivity. Accordingly, having taken priest's orders, he sailed for Ireland, where for many years he laboured with small success. In his forty-sixth year he was consecrated bishop, and himself ordained many clerics, who, according to the Catalogue of the Saints, were 'all bishops, famous and holy, 350 in number, and founders of churches.' He probably died in 458, and his festival falls on March 17th. The scanty incidents in the life of the historic St. Patrick are gathered from his *Epistola ad Caroticum* and the *Confessio*, written shortly before his death, rude Latin documents, which Skene accepts as 'undoubtedly genuine.' In these we meet with no mention of the earlier mission of Palladius, or of the metropolitan jurisdiction of the church of Armagh; nor, though St. P. speaks of the multitudes converted, does he imply that Ireland as a nation adopted Christianity, a circumstance which tallies with our knowledge that no Christian monarch ruled in Tara till 513. Of legendary memoirs of St. P. there is a continuous series from the 7th to the 12th c., the oldest of them being the *Annotations of Bishop Tirechan*. See the Lives of him by J. H. Todd (Dubl. 1863) and Miss Cusack (Kenmare, 1877), and vol. ii. of Skene's *Celtic Scotland* (Edinb. 1877).

Patrick, Order of St., an Irish order of knighthood, instituted by George III. in 1783, to include fifteen knights, under the sovereign, a prince of the blood royal, and the Lord-Lieutenant of Ireland, the latter of whom should be *ex-officio* 'grand master' of the order. In 1833 the number of knights was extended to thirty-three.

Patristians (Lat. *pater*, 'father,' and *passus*, 'suffered'), the name given to an obscure sect of Christians who appear to have originated in the 2d c. They were in some sense anti-Trinitarians; at least, they are said to have held that whatever is ascribed to any of the Three Persons of the Godhead in Scripture is really true only of the 'One Principle.' Hence their proper name 'Monarchians,' and hence also their nickname of P., by which it was sought to fasten upon them the notion that when Jesus suffered on the cross, it was also the Father that was crucified.

Patroclus, the comrade of Achilles (q. v.), whom he followed to the siege of Troy. There, clad in Achilles' armour, he met his death at the hands of Hector and Euphorbus. Achilles avenged his fall, consumed his body on a funeral pyre, and was afterwards buried under the same mound with him.

Patrol, (1) a march made at night-time through the streets of a garrison town by a small body of soldiers commanded by a subaltern or non-commissioned officer, to insure order and apprehend suspicious persons or truant soldiers; (2) detachments of soldiers acting as watchmen in besieged fortresses or as communicators with outposts.

Patronage, Ecclesiastical. As he who erected a temple to any pagan god had the right of designating the priests who should officiate in it, so, when Christianity was established as the state religion of the Roman Empire, whoever built a church and

made provision by endowment for the support of its clergy acquired, for himself and his heirs, the right of appointing those clergy, subject, however, to their examination and approval by the bishop of the diocese. Bishops founding a church in the diocese of another bishop had this right by a decree of the first Council of Orange (Arausio), 441, repeated in the second Council of Arles (452), but by laws of Justinian (541 and 555), and a decree of the ninth Council of Toledo (655), it was granted to all founders. This came into operation especially when dioceses were divided into parishes, and was doubtless intended as an inducement to landholders to build churches on their property. As regards the bishops, by the laws of Justinian it was enacted that they be elected by the clergy and the chief men of a diocese. In the old Roman Empire the emperor had a voice in the appointment of bishops in the most important cities. The princes of the new Roman Empire of the Franks, however, thought that they were entitled to as much in the case of all bishops, to whom such large revenues and important political privileges were intrusted. The clergy, who sought to obtain bishoprics through the influence of the princes, helped to confirm them in this belief. Thus the ancient practice fell entirely into disuse, and the power of the princes grew into the prerogative of nominating the bishop, whom the clergy had simply to accept. The right of P. granted to laymen was intended as a guarantee that the endowments they conferred on the church would not be abused by the clergy, but, on the other hand, the right itself was liable to be greatly abused. The princes bestowed the bishoprics arbitrarily on their favourites or those who made them tempting gifts, or sold them openly to the highest bidder. Hence, of course, it often happened that unsuitable and unworthy persons were nominated. A similar course was followed by inferior patrons in disposing of parish offices, whilst the latter also were apt to regard the clergy as their retainers, and to seek to make them independent of the bishops. Full proof of the prevalence of these abuses is found in the laws passed by councils of the Church, especially between the middle of the 6th c. and the end of the 9th c., against the laity recommending unsuitable men for the priestly office for the sake of gain. An ordinance of the fifth Council of Paris (615) re-enacting free ecclesiastical elections was confirmed by King Hlothar II., and Karl the Great also restored the theory, but in practice it was not always acted upon. By a decree of the third Council of Valence (855) the share of the monarch in episcopal elections took the form of granting permission on request to the clergy and the community of a diocese to make a canonical election. The asking of this permission was intended by the Church to be a mere formality, but when there was a desire on the part of the monarch to encroach, and no one bold enough to withstand him, he had little difficulty in making more of his right than was intended. Hence the right of investiture of bishops (*i.e.*, by the presentation of a staff and ring), which the monarchs claimed, was continually abused as before; the benefices were bestowed on their favourites, or made a matter of traffic. The bishops who obtained their benefices by simony indemnified themselves by the sale of the inferior benefices in their gift. And the worst offenders of all were the Popes. The mischief reached its height in the 11th and 12th centuries. Boniface IX., who was raised to the Popedom by simony when a boy of twelve (1033), made a rule 'that none should obtain the more important ecclesiastical offices without first advancing a sum of money equal to the income of the first year, the so-called *anuales*;' and notwithstanding the attempted reform of Gregory VII., in the beginning of the 15th c. the Roman Curia had the P. of nearly all the higher benefices in the Church. But in the 15th c. these claims of the Pope began to be vigorously opposed by the various European princes, and one after another wrested from him the P. of the benefices within their dominions. This was most thoroughly done in England. Edward III. made a beginning, and already under Henry VII. the undisputed right of nominating to all the bishoprics belonged to the sovereign; and thus it has remained.

The Church of Scotland since the Reformation has always been peculiarly jealous of any interference on the part of the state, and the rights of lay patrons have always been kept as far as possible at a minimum. By an Act of Parliament passed in 1567 a patron had no further power than simply recommending a candidate. According to the First Book of Discipline (q. v.) the right belonged to every congregation of choosing their own minister; and the Second Book of Discipline (1578) condemned lay P. as an evil which had sprung from the Pope and the corrup-

tion of the canon laws. This was all changed by the Parliament of 1584, which abolished Presbyterianism, but when the 'Black Acts' of that year were repealed in 1592, P. seems to have been restored to the same position in which it was placed in 1567. By an Act passed in 1690 the Act of 1592 was re-enacted, with an interpretation, however, which virtually superseded the patrons. In 1711 the famous Act of Queen Anne was passed, by which the rights of patrons were restored. The question now slumbered for a century, but the opposition to P. again attained a white heat in 1834, when the Veto Act was passed by the General Assembly, according to which the veto of the majority of a congregation was a sufficient ground for the rejection of a patron's nominee. P., however, still remained a burning question, till it became the occasion (1843) of the Disruption which gave rise to the Free Church (q. v.). In 1874 it was abolished by Act of Parliament, and the right of electing a minister was vested in congregations. See Bingham's *Antiquities* &c. (2d ed. 1726), Stillingfleet's *Orig. Brit.* (1685), Neander's *Geschichte d. Christl. Rel. u. Kirche* (Eng. trans. 1858), Ranke's *History of the Popes* (Eng. trans. 1847), *Autobiog. and Diary of James Melville* (Pitcairn ed. Edin. 1842).

Patronymics (Gr. *patēr*, 'father,' and *onoma*, 'name'), names derived from those of parents or ancestors, are common amongst all Aryan and Semitic races. They may be simple genitives, as Pauli, William's; derivatives, as Atrides, Briseis; or formed by the prefix or affix of a word signifying 'son,' as Heb. *Barabbas* and *Benhadad*, Gael. *Macdonald* and *O'Brian*, Cymr. *Ap Richard*, Norman *Fitz Urse*, Eng. *Johnson*. Many of our surnames were originally P., disguised, it may be, by the wear of time; e.g., Evans, Dixon, Price (Ap Rhys), Powell (Ap Hoel), Pugh (Ap Hugh), Bevan (Ap Evan), &c.

Pattens (Fr. *patin*, 'a clog,' 'a high-heeled shoe'), a name applied so early as the 14th c. to wooden shoes, and used in the 17th and 18th centuries to denote the sandals or shoes of wood, having iron rings on the soles, worn by ladies during wet weather. These are still common in country parts of England.

Patteson, John Coleridge, D.D., born in London, April 1, 1827, passed from Eton to Balliol College, Oxford, gained a Merton fellowship (1850), and was ordained to the curacy of Alphington (1852). In 1854 he accompanied Bishop Selwyn to New Zealand, where he laboured as a missionary till 1861, when he was consecrated Bishop of Melanesia. The next ten years of his life were spent in cruising among the islands that formed his diocese, in efforts for their improvement, and above all in striving to check the kidnapping of natives to supply the Queensland labour market. This infamous traffic caused his death, for landing in Santa Cruz, he was murdered by the infuriated natives, September 20, 1871. See Miss Yonge's *Life of Bishop P.* (2 vols. Lond. 1874).

Patti, Adeli'na Mari'a Clorin'da, one of the most gifted of operatic singers, was born in Madrid, March 19, 1843. She received her training under her brother-in-law, Maurice Strakosch, and sang in public at the age of eight in New York. In 1861 she obtained an engagement at the Royal Italian Opera, Covent Garden, where she made her first appearance as Anima in *La Sonnambula* on 14th May 1861, and where she still appears regularly during the London season. The brilliant success she then achieved has since been followed by magnificent triumphs in all the leading capitals of Europe. Her youthful and charming appearance, and arch, coquettish manner was admirably suited for such rôles as Zerlina in *Fra Diavola*, Rosina in the *Il Barbiere di Siviglia*, and Norina in *Don Pasquale*, and it was in the lighter operas that she earned her earliest laurels. Of late years, while her fine and pure soprano voice has increased in mellowness and richness of tone, she has assumed with success the highest impersonations on the lyric stage. As Juliet in *Romeo e Giu-lietta*, and Catterina in *L'Etoile du Nord*, she has never had a rival. She is as popular in the concert-room as in the theatre. The fact that on the Handel Festival of 1877 at the Crystal Palace the largest audience for the first time assembled on the selection day was undoubtedly due to her appearance. As much as £400 is frequently paid her for a single performance. She married the Marquis de Caux in 1868, from whom she obtained a judicial separation in 1877.—**Carlotta P.**, sister of the preceding, born in 1840, is a favourite concert-singer. She has a soprano voice of extra-

ordinary height (extending to G sharp in alto), and of great flexibility.

Pau, the chief town of the department of Basses-Pyrénées, France, on the river Gave-de-P., a tributary of the Adour, 67 miles E.S.E. of Bayonne by rail. It is a well-built town on the edge of a plateau overlooking the beautiful valley of the Gave, and its mild and healthy climate attracts many invalids. The finest squares are La Comédie and La Place Royale, the latter with a bronze statue of Henri IV. of France. The most striking building is the Castle, said to have been founded by Gaston de Foix in 1363, in which Henri IV. was born, and which was the prison of Abd-el-Kadr in 1848. Among the other conspicuous buildings of P. are the palace of justice, the museum, and the new theatre of white marble. P. has a library with 20,000 vols., a Lyceum (formerly a Jesuit College), a school of design, a lunatic asylum, and several charitable institutions. A University, founded here in 1724, was suppressed at the Revolution. The chief industries of the place are turning, flax-spinning, dyeing, cutlery, and the manufacture of canvas, leather, carpets, chocolate, &c. P. has a great trade in Jurançon wine, produced in its vicinity, in corn, marble, lime, tin, leather, skins, paper, resin, and building timber. Pop. (1872) 27,300. P. was the birthplace of Bernadotte (see KARL XIV.). Not far from P. lies the little town of Lescaur, which has a cathedral with the tombs of Marguerite of Valois, Catharine of Navarre, Jeanne d'Albret, and other princely persons of the House of Béarn.

Fauchon'ti or **Paul'ey Tree**, are respectively the Malay and Tamul names for *Isonandra acuminata*, a large E. Indian tree brought under the notice of the British Government in 1857 by Dr. H. Cleghorn as likely to prove of considerable economic value. It has a close affinity to *I. gutta*—the gutta-percha tree of commerce—yielding, like it, a non-conducting gum elastic. The trunk rises to an immense height without branching, and the hard, tough wood proves useful in carpentry, &c. It is common in the densely-wooded tracts of Coorg and the Cochin territories.

Paul'er, Ernst, composer and pianist, was born at Vienna, December 21, 1826. A son of the great Mozart was among his teachers. While Director of Music at Mainz (1847-51), he composed several works, including the operas *Don Riego* and the *Masques Rouges*, and several concertos for the pianoforte. Since 1851, in which year he was received with enthusiasm at the London Philharmonic Concerts, he has principally resided in England. His opera *La Fiancée* was produced at Mannheim in 1861. P. gave six lectures with musical illustrations in chronological order at Willis' Rooms in 1864, and is well known throughout the country as a lecturer and pianist. He has published many sonatas, tarantellas, vales, songs, &c., among his most popular pieces being *Pensées Fugitives* (1854), two Hungarian melodies for the pianoforte (1865), *Recollections of Meyerbeer* (six transcriptions, 1867). He has arranged and edited the works of many classic composers: Beethoven's *Overtures* (1856) and *Symphonies* (1868); Weber's *Complete Pianoforte Works* (1872); *The Schumann Album* (1872); Chopin's *Nocturnes, Mazurkas, and Vales* (1872-74); 32 *Songs*, and the *Complete Pianoforte Works of Schubert* (1874); *The Complete Works of Mozart* (1874), &c. P. is the author of a primer on the *Pianoforte* (Novello, Ewer, & Co. 1878).

Paul, the great Apostle of the Gentiles, was a native of Tarsus in Cilicia (Acts xxii. 3), born probably two or three years after Christ, of pure Jewish stock (Phil. iii. 5), a Pharisee (Acts xxvi. 5), and a Roman citizen (xxii. 25-8). The turning point of his life was his conversion, which took place at Damascus, whither he had gone as a persecutor of the Christians, and in consequence of the remarkable occurrence which took place on the road (Acts ix.). But the life and work of this remarkable man, who fills so important a place in the history of the early Church, can only be properly understood if the relation in which he stood to the Apostles be remembered. The religion of Jesus, as it was understood and taught by the Apostles who took up the Master's ministry and carried on the work, was simply a reform of Judaism. Their distinctive doctrines were that Jesus was the Messiah (q. v.), that he had risen from the dead, and would soon return to establish His kingdom, to overthrow the Roman dominion, and exalt the Jewish nation; being at the same time zealous in their recognition of the Jewish law, which, however,

was repudiated by the converts from among the Hellenistic or Greek-speaking Jews. Now, as a citizen of Tarsus, and a disciple of the liberal-minded Gamaliel (q. v.; Acts xxii. 3), P. must have had much in common with these Hellenistic converts, but his education in the Rabbinical school at Jerusalem must have superficially strengthened his attachment to Judaism; and being at the time hot-headed, impulsive, and blindly zealous, he held a liberal theology in an illiberal spirit. Thus it happened that he was a ringleader in a persecution which seems to have been directed solely against the Hellenists, for the Apostles were residing at Jerusalem unmolested all the time. But it was quite natural, according to the bent of his mind, and as a consequence of his direct antagonism to the Hellenists, that after his conversion he should belong to that party. At any rate, from the time when he began to preach, he continued at variance with the Judaizing party (cf. Acts vi. 1, Gal. i. 2). At Antioch, where he and Barnabas—a Hellenist—began to preach, the disciples received and accepted the name 'Christians,' that is, they virtually made a declaration that it was unnecessary to become Jews. The Apostles thereupon sent emissaries to Antioch to counteract this teaching, and these taught the brethren, 'Except ye be circumcised after the manner of Moses, ye cannot be saved' (Acts xv. 1). In consequence of the commotion caused by this disagreement, P. and Barnabas were sent to Jerusalem to confer with the Apostles about this question. The result of the conference was that an agreement was made by which P. was to preach to the heathen, while the Apostles confined their ministrations to the circumcised Jews. Accordingly P., in company with Silas, made a second missionary journey in Asia Minor, and then passed over into Europe, visiting the cities of Philippi, Thessalonica, Berea, Athens, and Corinth, but everywhere rejected and persecuted by the Jews. After a journey to Jerusalem and Antioch he arrived at Ephesus, where he was better received by a society of Jews who had been baptized with John's baptism, in other words, who had learned to esteem personal righteousness above ceremonial observances, and were therefore more prepared to receive the teaching of P. On his return to Jerusalem, however, after making another tour through Macedonia and Greece, the Jewish persecution again broke out, in connection with which it is a very significant circumstance that the apostolic Church was at this time also entirely unmolested. P. is denounced to the authorities, and only saved from death by an appeal to Cæsar, in consequence of which he had to be removed as a prisoner to Rome, where all trace of him is lost (Acts xvi.—xxviii.).

From this brief survey it appears that during the whole time of his ministry P. stood apart from the Apostles, by whom his claim to the apostleship was not admitted, knowing as little of their doctrine as he did of themselves (cf. Gal. i. 17–23), and teaching in opposition to them that Judaism was abrogated by Christianity. It is just as clear that the whole Christianity of the West, that is, of Christendom, emanated from him alone. The doctrinal teaching of P. is best seen in the Epistle to the Romans. It is generally assumed that the 'Brethren at Rome' were Christians. Some, however, are of opinion that they were a society of Jews, holding the religious philosophy of Philo (q. v.) of Alexandria, who had introduced the conception of the Platonic Logos into Jewish thought, and who had visited Rome about twenty years before P. addressed his epistle to the brethren there. Now, like the author of the Fourth Gospel, P., who had become acquainted with Philo through Gamaliel, in defining the nature and office of Christ, uses the identical epithets which Philo applies to the Logos (see Jacob Bryant's *Sentiments of Philo Jud. Concerning the Logos*); but, like Bryant also, he goes one step beyond Philo in identifying the Logos with an actual person, Jesus. In this way it is explained how, while the religion of Jesus became extinct on purely Jewish territory, it took root and flourished among the Hellenistic communities, for whom it was an easy process to exchange the speculative Logos for the more definite conception of a personal Christ. It thus appears that, while P. was all along, practically at least, unrecognised by his Jewish brethren, the legitimate Apostles of Christianity, he was by far the most eminent Apostle of which Christianity can boast. He was the first real intellectual exponent of the religion of Jesus as a universal religion; and at the same time the great prophet of absolute religion, that is, of religion divested of Church usages and rites. His mighty influence in the foundation of Christianity has indeed been acknowledged, while all the time he has been misunderstood and

credited with opinions which he never held. When his character comes to be read in a truer light, and his teaching to be better understood, he will be more highly revered even than he is. See Smith's *Dictionary of the Bible* (1863), Conybeare and Howson's *Life and Epistles of St. Paul* (Lond. 1853), Reuss's *Hist. de la Theol. Chret.* (3d ed. Strasb. 1864), Baur's *Paulus* (Eng. trans. Lond. 1873), Zeller's *Apostelgeschichte* (Eng. trans. Lond. 1875), Pfeiderer's *Paulinismus* (Eng. trans. Lond. 1877).

Paul, the name of five Popes.—**P. I** (757–767) succeeded his brother Stephen II. He was a moderate and pious pontiff, and a close ally of Pippin, the Frankish king.—**P. II** (Pietro Barbo) succeeded Pius II. in 1464. He failed to keep the promises made at his election, viz., to restore the ancient discipline of the Church and to summon a general council within eight years; accordingly, to appease the cardinals, he granted them the distinction of the purple robe and the red hat. In 1466 he excommunicated and preached a crusade against Georg Podiebrad, who favoured the Hussites. In 1469 he made a league with the republic of Venice against Ferdinand I. of Naples, and fortified his frontier towards Abruzzo. He died in 1471.—**P. III** (Alessandro Farnese), born at Canino in 1468, entered on his pontificate in 1534. He devoted himself mainly to the overthrow of 'heresy,' and to the internal reform of the Church. He summoned a general council in 1536, which met at Trent in 1545. He appears at first to have had an honest desire to reconcile the Protestants to the Church, but he refused to sanction the concessions made at the Diet of Ratisbon in 1541 by Cardinal Contarini, and in 1546, from fear of the political predominance of Karl V., he refused to aid him in his decisive measures for the extirpation of heresy, which led to the emperor's independent promulgation of the second Interim (q. v.), and may be said to have saved Protestantism in Germany. P. favoured the Jesuits, and issued a bull of deposition against Henry VIII. of England in 1538. A sagacious and far-seeing man, he did much to heal the wounds of the Church after the great schism, and seldom has any Pope been so beloved by the Romans. He died 10th Nov. 1549.—**P. IV** (Giovanni Pietro Caraffa), born at Capriglio, in Naples, 1476, was elected in 1555 in spite of the opposition of the Imperial party. Animated by a patriotic love of Italy and a peculiar hatred against Karl V. as the oppressor of his native Naples, he lent all his influence to destroy the Spanish power in Italy and allied himself to the French, but their defeat at St. Quentin by the Duke of Alva in 1557 destroyed all his hopes and obliged him to make peace with Philip II., to whose religious scruples alone he owed the safety of his capital. From this time until his death, 18th August 1559, he laboured with great zeal to purify the Church, and with this view vigorously set in motion the Inquisition both in Italy and Spain, and originated the Index Expurgatorius (q. v.). But his severity had made him so unpopular with his subjects, that his death was the signal for a revolt at Rome, in which all his statues were broken by the mob.—**P. V** (Camillo Borghese), born at Rome in 1552, was created a cardinal in 1596, and succeeded Leo XI. in 1605. He found himself at once engaged in a struggle with Venice, which had always been indifferent to the lofty pretensions of the Papacy. P. claimed the right of managing the tithes and of being supreme judge in all ecclesiastical causes, and laid the republic under an interdict, which, however, was resisted vigorously. The temporising of the Jesuits led to their expulsion from Venice, nor were they permitted to return after the compromise which was effected by the mediation of Henri IV. of France. P. showed his fondness for the Jesuits also in defending Suarez from the wrath of the French parliament on account of the publication of his book *Défense de la Foi Catholique*. In 1617 he renewed the ordinance of Sixtus IV. on the Immaculate Conception of the Virgin, but declined to make it an article of faith, and showed the same moderation in the case of Galileo, condemning his decisive tone in maintaining an opinion contrary to Scripture, but allowing him to hold it as an astronomical hypothesis. He died 28th Jan. 1621. See Ranke's *Die Röm. Päpste, ihre Kirche und ihr Staat im 16 und 17 Jahrh.*, and Artaud de Montor's *Hist. des Souv. Pont. Romains*.

Paul I., Petrovitch, Emperor of all the Russias, son of the Emperor Peter III. and the Empress Catharine II., was born 1st October 1754. His parents inhumanly denied him all affection; his father sought to exclude him from the

succession, and even after the latter was assassinated and Catharine was firmly seated on the throne, he was debarred from every action that could form his mind for empire, and surrounded by persons who watched his every step. This treatment changed his frank and open character to one of harshness and distrust. His education was intrusted to the famous statesman Count Panin, of whom he was a close friend till his death. In 1762 P. inherited from his father the Gottorp part of Holstein, which in 1773 was yielded to Denmark in exchange for the Grafdoms of Oldenburg and Delmenhorst. On his mother's death (1796) P. ascended the throne, and began his reign with clemency, taking mild revenge on his father's murderers (see ORLOFF), and freeing Kosciusco from prison. But the French Revolution, and the liberal ideas it diffused throughout Europe, filled him with disgust and fury. He instituted a strict censorship of the press and examination of all foreigners travelling in Russia; established a formidable secret police; demanded the most scrupulous and severe discipline in the army; banished great numbers to Siberia; forbade round hats and all French fashions; compelled the soldiers to use hair-powder and wear long queues; and forced his nobles when they met him to leave their carriages and kneel before him. P. took part in the second great coalition against the French Republic, and sent Suvaroff and Korsakoff with 100,000 men to Switzerland and Italy in 1798-99. But he soon became distrustful of Germany, and yet more so of England, especially as the latter would not resign to him the island of Malta, after P., who saw in the Knights of Malta a support for kingly power, had allowed himself to be appointed Grand Master of the Order, though he belonged to the Greek Church, and the Pope objected to the choice. He laid embargo on all English ships in Russian ports, and in 1801 concluded with Denmark and Sweden the 'Armed Neutrality' to counteract England's superiority at sea. The English fleet that did battle at Copenhagen Roads was to have gone on to Kronstadt, but the sudden death of the Emperor changed the situation. His despotic rule and rash policy had made him very unpopular among all classes, and a conspiracy was formed to take his life. On the night of the 23d-24th March 1801, the conspirators, headed by General Count Pahlen, governor of St. Petersburg, the brothers Suboff, and Generals Bennigsen and Uvaroff, entered his bed-chamber, and ordered him to sign a declaration of abdication. P. refused, and a scuffle ensued, in which either Nikolas Suboff or Bennigsen strangled him with a scarf. Pahlen opened the window, proclaimed the Emperor's death, and made the troops drawn up near the palace swear allegiance to Alexander I. P. was twice married: in 1773 to Wilhelmine of Hessen-Darmstadt (in the Greek church called Natalia Alexievna), who died childless; in 1776 to Sophie Dorothea Auguste of Würtemberg (called Maria Feodorovna), who died 1828, and by whom he had four sons, Alexander I., Constantine, Nikolas I., and Michael (1798-1849), and six daughters, of whom Catharine (1788-1819) became Queen of Würtemberg, by marriage with King Wilhelm I., and Anna (1795-1865) Queen of the Netherlands, by marriage (1816) with King Wilhelm II. See *Leben Paul's I.* (Frankf. 1804).

Paul, Vincent de. See VINCENT DE PAUL.

Paulding, James Kirk, an American writer and humorist, was born in Pleasant Valley, New York, U.S., August 22, 1779. His father was a farmer, of Dutch extraction. After supplementing a meagre education by a course of self-instruction, P. went to New York about 1800, and in 1807 began his literary career in company with his brother-in-law, Washington Irving, with whom he wrote a series of satirical papers, entitled *Salmagundi*. In 1813 he produced *The Lay of a Scotch Fiddle*, a burlesque of Scott's *Lay of the Last Minstrel*, and the year after published *The United States and England*, a reply to some articles in the *Quarterly Review*, which gained him in 1814 the post of Secretary to the Board of Navy Commissioners. He was secretary to the United States Navy (1838-41), and for twelve years was navy agent in New York, during the whole of which period he was a prolific writer. P. died at Hyde Park, near New York, April 6, 1860. His best works are *Letters from the South* (1817); *John Bull in America* (1824); *The New Pilgrim's Progress* (1828); *Tales of a Good Woman* (1829); *The Dutchman's Fireside* (1831); *Westward Ho!* (1832); *Life of Washington Irving* (1835); *The Old Continental* (1846).

Paul'drons, in armour, were plates introduced early in the 15th c. to protect the shoulders. They sometimes had pass-guards, or ridges to ward off the blow of a lance, attached.

Pauli, Georg Reinhold, a German historian, was born at Berlin, May 25, 1823, and studied at the universities of Berlin and Bonn. He came to England in 1847 to prosecute historical researches in the Scotch and English libraries, and from 1849 to 1852 held the post of private secretary to Baron Bunsen, then Prussian ambassador at the English court. Returning to Bonn (1855), he was successively appointed Professor of History at Rostock (1857), at Tübingen (1859), at Marburg (1867), and at Göttingen (1870), his removal from Tübingen being due to an attack on the Würtemberg Government, published by him in the *Preussische Jahrbücher* (August 1866). P. is author of *König Alfred und seine Stellung in der Geschichte Englands* (Berl. 1851; Eng. trans. 1852), a continuation of Lappenberg's *Geschichte Englands* (vol. iii.-v. Gotha, 1853-58), *Bilder aus Altengland* (Gotha, 1860; 2d ed. 1876; Eng. 1861), *Geschichte Englands seit den Friedensschlüssen von 1814 und 1815* (3 vols. Leips. 1864-73), *Simon von Montfort* (Tüb. 1867; Eng. 1876), *Aufsätze zur Englischen Geschichte* (Leips. 1869). P. has also edited with great care and critical acumen Gower's *Confessio Amantis* (Lond. 3 vols. 1857).

Pauli'cians, a sect of Christians, founded by a reformer, Constantine, who appeared near Samosata about 660. Thinking that in the Epistles of St. Paul he had discovered the dualistic ideas—the opposition between flesh and spirit—with which, as a member of some Gnostic (probably Marcionite) sect, he was imbued, he desired, while preserving his dualism, to revive a pure Pauline Church. Under like-minded successors of Constantine the sect spread in Asia Minor, although exposed to continual persecution as Manichæans. Their peculiar principles were dualism, attaching extraordinary value to the authority and Epistles of St. Paul (from which they derived their name), and the rejection of all externalities in religion. About 800 the persecution against them was so bitter that many of them fled into the Saracen territory, where, at the town of Argauum, they formed a frontier settlement which was troublesome to the Byzantine Empire till they were subdued by the Emperor Basil (871), and a great part of them transplanted to the neighbourhood of Philippopolis in Thrace. Here they enjoyed religious liberty, and were almost an independent State, but their power was crushed by the Emperor Alexius Comnenus (1081-1118), by whom the heresy was outwardly, although not in reality, extinguished. They survived under the guise of the Euchite monks, who at this time (1116) became known under the Slavonic form of their name, Bogomili (q. v.). See Gieseler's *Lehrbuch der Kirchengeschichte* (Eng. trans. 1855), Neander's *Gesch. der Christl. Rel. und Kirche* (Eng. trans. 1858).

Paulinus, a follower of Augustine, the first missionary to the English, is memorable as the chief agent in the conversion of the Northumbrians to Christianity during the reign of Eadwine (q. v.). The story of the great debate among the Northumbrian witan is one of the immortal passages in Bede. In 625 P. became Archbishop of York. On the overthrow of Eadwine at Hatfield, 633 A.D., by the combined forces of Penda, the heathen king of Mercia, and Cadwallon the Welsh prince, P. left the North and returned to Kent, where he was made Bishop of Rochester, and where he died, 10th October 644. The restoration of Christianity in Northumbria was due to the zeal of Iona (see AIDIN), and not of Canterbury. Bede's *Hist. Eccl. Gent. Angl.* (Moberly's ed., Macmillan & Co., 1869); Green's *History of the English People* (Macmillan & Co., 1877).

Paulinus, Lucius Æmil'ius, surnamed Macedon'icus, a distinguished Roman general, son of the consul of the same name that fell at Cannæ, was born about 229 B.C. In 193 he was appointed proconsul of the province of Further Spain, where he waged a war against the Lusitani, in which he was ultimately victorious. In 182 he was associated in the consulship with Cn. Baebius Tamphilus. When above sixty years of age, he was elected consul a second time 168, and intrusted with the command of an army in the war against Perseus, King of Macedonia, whom he completely defeated near Pydna on the 22d June of that year. P. arrived in Italy in 167, and was honoured with one of the most splendid triumphs Rome had ever seen. His successes, however, were greatly embittered

by the loss of his two sons, one of whom died only five days before, and the other three days after his triumph. P. died B.C. 160. He was declared by a contemporary to be 'one of the few Romans of that age to whom one could not offer money.' See Plutarch's *Life of Æ. P.*

Paul's Cathedral, St., London, the grandest Protestant church in the world, lies in the heart of the City, on a site associated with an ecclesiastical building from an early time in the history of Christianity. It is stated that two successive churches existed on the spot before the year 610, when under the reign of Æthelberht, King of Kent, Melitus, the first Bishop of London, was appointed, and a structure reared which lasted till 1083. Old St. Paul's, built between that date and the year 1315, was a noble and imposing building, 690 feet in length, 130 in breadth, with a spire ascending to a height of 520 feet. At one time it was divided into 76 chantry chapels, employing the services of 200 priests. The sum of £104,330 was paid in repairing it in the reign of Charles I. It perished in the great fire of 1666. (See Sir W. Dugdale's *History of St. Paul's Cathedral*, (2d ed., 1658). The present Cathedral was built 1675-1710, under one architect, Sir Christopher Wren, and one master-mason, Thomas Strong. The expense, amounting to £747,954 2s. 9d., was met partly by public subscription, and partly by a small duty on coals. Wren was thwarted in his original plan of encircling the building with a large triangular piazza, and his magnificent work is hemmed round by irregular buildings, the best, but by no means an adequate approach, being from Ludgate Hill. The exterior of the building, with its massive dome, towering above the giant city, is hardly unfamiliar even to those who have not seen it. The material is Portland stone. The ground plan is in the form of a Latin cross, with a projection on each side of the western extremity. A handsome flight of grey granite steps ascends from the statue of Queen Anne to the western or grand entrance, under a double portico of coupled columns, the lower Corinthian, the upper Composite in style, surmounted by a pediment graced by a number of sculptures, and having the clock and belfry towers on either side. The other entrances in the north and south transepts are semicircular, under porticos with six Corinthian columns. The apex or eastern end is semicircular and plain in style. There are really three domes; an inner, an outer, and an intermediate one of brick. From the two outside galleries of the dome a magnificent view of the city and surrounding country can be obtained. The dome is crowned by the stone lantern, ball, and cross. The length of the cathedral from E. to W. is 500 feet, the extreme width 250 feet, the exterior diameter of the dome 189 feet, and the circumference of the whole building 2292 feet. The height from the foundation to the cross is 404 feet, or from the level of the street 360 feet. The charge for a visit to every part of the building is 3s., but the body of the church is always open to the public, and the payment of 6d. admits to the galleries. The lofty vaulting of the interior of the central area (an octagon formed by eight massive piers, four 40 feet wide, the others 28), is sublime in effect, and the dome has a most graceful appearance, its height being equal to its diameter and one half. The whole vault consists of 24 cupolas. The dividing of the nave into a middle and two side aisles, though usual in cathedrals, is injurious to the general effect. The choir is 165 feet long. The marble pulpit is a fine specimen of polychromatic art. Great improvements of late years have been made in the decoration of the church, and particularly of the choir, and several fine stained-glass windows have been given. The organ, which formerly stood over the entrance to the choir, has been removed to the side, thus giving an uninterrupted view from E. to W., while the altar has been enlarged. Along each side of the choir are fifteen stalls, superbly carved by Grinling Gibbons, sculptor to George I. In the centre of the N. range is the Lord Mayor's stall, opposite to which is that of the Bishop of London. At the extremity of the S. range is the episcopal throne. Choral service is performed twice every week-day, at ten in the morning and three in the afternoon, and three times on Sundays, sermons being preached on holydays and every Wednesday and Friday in Lent. A morning service is held daily in the Morning Chapel at the W. of the building, which has recently been elegantly decorated with fine marble work and elaborate marble pavement. Among the annual special services, the sermon in May on behalf of the

sons of the clergy, and the assemblage of charity children on the first Thursday in June may be mentioned. The latest great historical service was the national thanksgiving for the recovery of the Prince of Wales in May 1872. The earliest monument erected in the building was that to John Howard (1796). There are now 64 monuments, 29 of which are to military and 19 to naval heroes. The public expense of those to Sir R. Abercromby, the Marquis of Cornwallis, Earl Howe, Lord Nelson, and Lord Rodney, amounted in each case to £6300. In the crypt, a vast vault divided like the body of the cathedral into three parts, lie the remains of some of our most famous artists, Wren, Reynolds, Lawrence, Turner, Landseer, &c., of cathedral dignitaries, and of the Duke of Wellington, Lord Nelson, and others of the illustrious departed. Many objects of interest remain which space fails to describe, the geometrical staircase of 90 steps hanging together without visible support, the great bell, weighing 11,474 lbs., originally cast in the reign of Edward I., the whispering gallery with its acoustical wonders, the paintings in the eight compartments of the dome by Sir J. Thornhill representing events in the life of St. Paul, the mosaic pictures of Isaiah and St. Matthew by Salviati in the spandrels of the dome, the library, which contains 9000 volumes and some ancient manuscripts, &c. The members of the cathedral consist of the dean, 4 canons residentiary, 30 prebendaries, 12 minor canons, and 6 vicars choral.

Paulus, Ægina'ta, a celebrated Greek medical writer, was born at Ægina in the 7th c. A.D. Nothing is known regarding him except that he travelled and practised in several countries. His great and only extant work has no exact title, but is commonly called *De Re Medica Libri Septem*. Of these seven books, which are chiefly a compilation from former writers, the sixth, relating to surgery and the treatment of fractures and dislocations, is the most valuable. The seventh book contains an account of the properties of various medicines. According to Suidas he wrote several other works; and the Arabic authorities, who held him in great veneration, ascribe to him two treatises, *De Mulierum Morbis* and *De Puerulorum Vivendi Ratione atque Curatione*. There are three Latin translations of his great work, the last by Cornarius appearing at Basel in 1556. An English translation by Francis Adams was published in three vols. (Lond. 1846-48).

Paulus, Hein'rich Eberhard Gottlob, an eminent German theologian, and a leader of the Rationalistic school which flourished about the beginning of this century, was born 1st September 1761, at Leonberg, near Stuttgart. Having distinguished himself at Tübingen University as a student of the Semitic languages, he made a tour through the principal libraries of Germany, Holland, England, and France, under the patronage of the Baron von Palm. In 1789 the friendship of Griesbach procured him the chair of Oriental Languages at Jena, which he held till the death of Döderlein in 1792, when he became Professor of Theology in his place. In 1811 he was appointed to the chair of Exegesis and Church History at Heidelberg, a position he occupied till old age forced him to retire in 1844. P. died at Heidelberg, 10th August 1851. P. thought that the superhuman origin claimed for Christianity was mainly a superstition, and laboured to prove that the miracles were in no sense real. His crude rationalism was never formidable, and vanished before the subtle and suggestive scepticism of Strauss. His chief works are *Sammung der Merkwürdigsten Reisen in dem Orient* (Jena, 7 vols. 1792-1803); *Philologisch-Kritischer und Historischer Commentar über das Neue Testament* (Leips. 4 vols. 1800-4); *Leben Jesu* (Heidlb. 2 vols. 1828); and *Exegetisches Handbuch über die drei ersten Evangelien* (Heidlb. 3 vols. 1830-33). See P.'s *Skizzen aus meiner Bildungs und Lebens Geschichte* (Heidlb. 1839); and Reichlin-Meldeg's *P. und seine Zeit* (Stuttg. 2 vols. 1853).

Paulus Diaconus (so called from being deacon at Aquileia) was born at Friuli about 730, was educated at Pavia, and became private secretary to Desiderius, King of the Lombards, and tutor to his daughter. For his pupil he wrote his *Historia Romana*, which was an enlargement of Eutropius (q. v.), but contains nothing not found in other writers. It was very popular during the Middle Ages, and numerous MSS. exist. In 781 he was in the monastery of Monte Casino, but is found soon after in the Frankish kingdom assisting Karl the Great with his educational reforms. For him he compiled his *Homiliarium*

Paupers.—About 757, P. returned to Meina, Greece, where he died in 777. Of his other works, the chief were his *Hist. Langue-dardian* and *Gesta Regum Romanorum*. See a critical life of P. De la Motte as an introduction to a collected edition of his writings by Prof. Dr. Felix Dahn, Leipzig, 1875.

Paumbaum *Palaui*, a town in the district of Malava, Madras Presidency, Brit. India, on the N.W. extremity of the island of Ponnawaram, which runs out towards Ceylon to form Adam's Bridge across Paik Straits. Pop. (1871) with the adjacent town of Rameswaram, 9467. P. has given its name to the narrow channel by which coasting craft avoid the circuit of Ceylon. Since 1822 this channel has been under the care of Government; by coarctation it has been deepened 14 feet, and a lighthouse has been erected. P. is annually used by 2100 native vessels, with an aggregate tonnage of 174,000.

Paupers. See POOR-LAWS.

Pausanias, the son of Cleombrotus, and regent of Sparta for his cousin Pleistarchus, at the head of the allied Greeks defeated the Persians at the battle of Plataea (479 B.C.), and afterwards marched on Thebes, which he forced to give up the heads of the Persian party. In 477 he subdued the greater part of Cyprus and captured Byzantium—successes that inflated his vanity and led him to form the design of making himself master of Greece. He entered into treasonable negotiations with Xerxes, assumed the dress and manners of a Persian, and awakened such dissatisfaction and alarm that the ephors recalled him to Sparta. Placed on his trial and acquitted, he at once resumed his schemes, even inciting the Helots to revolt by holding out the hope of liberty. Accident revealed the plot, and P. was forced to take refuge in the temple of Athene Chalcidicus, on the Spartan acropolis. The populace built up the door, his mother assisting in the task, and then stripping off the roof, left him to a lingering death (*circa* 468). See Thirlwall's *History of Greece* (vol. ii.).—**P.**, a Greek geographer who flourished in the latter half of the 2d c. A.D. and published an itinerary, *Periplus of the Hællas*, in ten books, from which we gather that he was a native of Lydia, and had travelled through Greece, Asia Minor, Egypt, Libya, and Italy. This work is mainly devoted to a description of works of art, but it is also our chief authority for the topography of ancient Greece. Its style, based on that of Herodotus, is distinguished by carelessness and obscurity, defects that are most apparent in the first book. The *editio princeps* was printed by Aldus (Ven. 1516), and there are recent editions by Dindorf (Par. 1845) and Schubart (2 vols. Leips. 1838-39), and translations into English by Thomas Taylor (3 vols. 1794), into German by Schubart (9 vols. Stuttg. 1857-66), and into French by Clavier (6 vols. Par. 1814).

Pave'ment is a street or roadway surface specially prepared with stones or blocks of wood or other material built together, or of a covering of asphalt or cement. P. in towns originally consisted of large rounded boulders rudely set together, in the necessarily wide interstices of which all kinds of filth lodged. Such a P., originally not very level, soon became very uneven owing to the unequal support the rough blocks had, and the street was quickly cut up into ruts and ugly depressions. This kind of P. was followed by an improved form, in which un-squared blocks of whinstone, granite, &c., were packed into a rough rubble causeway; examples of such a P. are common at the present day in second-rate streets. To Mr. Telford, the eminent engineer, is due the credit of first suggesting and introducing pavements of properly squared and dressed blocks set upon a thick foundation of broken stones. In 1824 Telford recommended for certain London streets dressed stones of three classes, as follows:—

	Width.	Depth.	Length.
For Streets of First Class,	6 to 7½ in.	10 in.	11 to 13 in.
Second do.,	5 to 7 in.	9 in.	9 to 12 in.
Third do.,	4½ to 6 in.	7 to 8 in.	7 to 11 in.

For first-class pavements the size of the 'sets' or blocks was gradually reduced from these measurements till in 1840 3-inch granite sets with a depth of 9 inches were adopted, and that now forms the standard for P. of the best quality. Wood P. of a rude kind has been known in Russia for several centuries, and in various countries plans for forming P. of wood have been suggested. In all cases the blocks of wood are placed on end, with the fibre of the wood in a vertical position. Wood P. on Carey's

plan was introduced in London in 1841, and some of it continues to the present day; but that which has met most extensive favour is the 'Improved Wood P.' introduced from the United States under Newcomb's patent. It is now in very general use in London, where it was introduced in 1871, and in Edinburgh, Glasgow, Birmingham, and other great towns there are many examples of it. According to the most recent method of laying this P. a bed of sand or dry earth is prepared and formed to the outline of the street. Above this is put a thin bed of concrete, over which is placed a layer of lath-boards, which have been previously steeped in tar, and on this boarding the wooden sets or blocks, 3½ in. wide, are placed. The joints between the courses, about ½ in. wide, are filled for half their depth with residual asphalt, and above that they are filled to the top with a grouting of gravel and lime rammed hard home. Asphalt P. is made in many ways, and is now much employed both for foot-paths and carriage-ways. There are two kinds of asphalt—natural and artificial—in use. The principal natural asphalts used for P. are Val de Travers and Linnær. Val de Travers P. is made first by pulverizing the natural rock by heat, spreading the powder over a prepared concrete surface while it is still hot, and compressing it with heated irons into a homogeneous mass. It is usually made from 2 to 2½ inches thick. Val de Travers Mastic P. and Linnær P. are prepared by melting the natural asphalt with the addition of a little bitumen, mixing the fluid mass with dry shingle, and spreading it evenly over a prepared concrete bottom. In addition to these, and the P. made from the asphalt of gas-tar, there are a great number of other asphaltic P. compositions. Among other varieties of P. deserving of notice is the concrete P. introduced by Mr. Mitchell, of Inverness, a piece of which laid in George IV. Bridge, Edinburgh, has yielded most satisfactory evidence of its durability, cleanliness, and economy. Foot-pavements are best composed of large broad flagstones, about 3 inches in thickness, carefully laid on a well-rammed foundation, and kept in their places by the kerb stone which confines and separates both flagging and P. The flagstones mostly used are obtained from Old Red measures in the neighbourhood of Arbroath and similar deposits in Caithness, Cromarty, and Nairn. In many English towns flagstones of a durable quality from the Millstone Grit series of Carboniferous rocks are used for foot P., and other coal measure sandstones find similar employment, although they are more friable and porous, thus retaining wet and damp for a long time after rain.

Pavia. See HORSE-CHESTNUT.

Pavia, a city of N. Italy, on the River Ticino, 3 miles above its junction with the Po, and 23 miles S. of Milan by canal and railway. The river is here navigable by steamboats. P. is a fine old town, with wide streets and strong walls, but there remain only nine of the hundred towers which gave it the name of *Città di Cento Torri*. A covered bridge, 708 feet long, built in 1351, connects P. with the suburb of Borgo Ticino. From this extends in a straight line N. to the Porta di Milano the finest street in P., named the Corso Vittorio Emanuele. The finest churches are the cathedral (begun in 1484, and still unfinished), in the splendid chapel of which were deposited, prior to October 1842, the ashes of St. Augustine; San Michele, a noble Romanesque building (11th c.); S. Maria del Carmine (1375), a fine brick edifice; S. Maria Coronata (1492), with fine paintings; and San Pietro, now a ruin, from which the remains of Boethius (q. v.) and the superb monument to St. Augustine have been transferred to the cathedral. The university of P., traditionally the oldest in Europe, is said to have been begun by Karl the Great, but was really first 'constituted' in 1361 by Galeazzo Visconti. It has thirteen colleges, with the three faculties of law, medicine, and philosophy, rich natural history collections, a botanic garden, a library of 175,000 volumes, and in 1874-75 had 619 students and 51 professors. P. is the seat of a bishop, has a hospital and lyceum, a school of art with a picture gallery and splendid collection of more than 5000 engravings. The old castle, built 1360-69 by the Visconti, is now a barrack. In the neighbourhood is the famous Carthusian monastery, Certosa di Pavia (q. v.). P. has a great annual fair, and considerable trade in wine, corn, silk, rice, coffee, and Parmesan cheese. Pop. (1874) 29,618. P., the ancient *Ticinum* (afterwards *Papia*, whence the modern name), was from 568 to 774 the capital of the Lombard kings. Taken by Otto I. in 951, it was the steady ally of the Emperors during the Guelph and

Ghibelline wars. Near it, in 1525, was fought the famous battle of P., in which François I. was defeated and taken prisoner by the Emperor Karl V. It subsequently came under Milan, with which, in 1756, it fell to Austria. In 1796, and again in 1848, it was the theatre of a revolt. In 1859 it became part of the kingdom of Italy.

Pavon'idæ, the peacock family, distinguished from other Rasorial birds by the large tail-coverts of the males. See **PEACOCK**.

Pawn (*pan*, from Sansk. *parna* = a leaf), the aromatic leaf of the *Piper betel* or *Chavica betel*, which is universally chewed by the natives of India, acting as a carminative and antacid tonic. It is rolled round a few small pieces of the *Arca* or *supari* nut, with a little caustic lime, a few heads of spice, and sometimes a little catechu. Inclosed in gold paper, it forms a common present to guests, &c. The European term 'betel' is derived from the Bengali *bira*, a corruption of the Sanskrit *vitika*. Its cultivation, which is monopolised by a special caste, is highly remunerative, though a large initial outlay is required on the *burnj* or P. garden, which is a kind of leafy hothouse.

Pawn'broking. The Roman law regarding *Pignus*, or pledge, in many respects resembled that of England regarding P. But the Roman term was much more comprehensive, embracing matter which the law of England deals with under the terms *Lien* (q. v.), *Mortgage* (q. v.), and some others. *Pignus* could be created by judicial sentence; as, by decree of the prætor empowering a creditor to take his debtor's goods in security. There was also among the Romans a *Tacita Hypotheca* which existed by law (*ipso jure*) independent of the consent of parties. Thus, legatees and *fideicommissarii* (see **FIDEICOMMISSUM**) had a *tacita hypotheca* over that portion of the *hereditas* from which the legacies and *fideicommissum* were payable. The pledgee was bound to restore a *pignus* on payment of the debt for which it had been given. The Roman system appears to have been very gradually developed; and it cannot be shown that any branch of it ever took the exact form of the modern P. This, however, we find to have existed in mediæval times among the wealthy traders of Florence. It is supposed, indeed, that the badge of the business—the three balls—owes its origin to the armorial bearings of the Medici. In England, we find that P. was carried on by the Italian traders of Lombard Street in the times of the earlier Plantagenets. In the reign of Edward I., a statute gave a message to these traders on the site of the busy Lombard Street of to-day. In the reigns of James I. and Charles I., the goldsmiths were in the habit of lending on pawn. Various efforts have been made at home and abroad to work the charitable and commercial principles of P. into harmony, but these have not been successful. In one instance, during the commercial panic of 1825, by the failure of a *Mont de Piété*, a capital of £400,000 was lost. Similar endeavours in Ireland were equally unsuccessful.

Law in Great Britain regarding Pawnbrokers.—The Act 35 and 36 Vict. c. 93 consolidates previous Acts relating to P. in Great Britain, but it does not extend to Ireland. The provisions of the Act extend to keepers of all shops for the purchase or sale of goods, when there is an understanding, expressed or implied, that these may be redeemed or repurchased on stated terms. No provision of the Act applies to a loan of above £10, or to the pledge on which such loan is made, nor to the pawnbroker or pawner in relation to such loan. A pawnbroker must keep certain books and documents, and on taking a pledge in pawn, a ticket must be given, on which must be printed certain specified provisions of the Act. There are schedules annexed to the Act specifying rates of profit and charges. Every pledge is to be redeemable within a year and seven days, after which a pledge for a loan of 10s. or less becomes the property of the pawnbroker. A pledge for a loan of above 10s. is then to be sold by public auction under stated regulations. The holder of the pawn-ticket for such a loan may, any time within three years from the date of the auction, inspect the entry of sale, which must be made in the pawnbroker's book; and when the pledge appears to have been sold for more than the amount of the loan and the profit due at the date of sale, with necessary costs and charges, the pawnbroker must on demand being made pay the surplus to the holder of the ticket; but if various pledges have been sold on account of various loans to the same person, and

the book shows a deficit on one transaction and a surplus on another, the pawnbroker may set off the one against the other, and he is thus liable only to pay the balance, if any. A special contract may, however, be made with regard to a loan of above £2. The holder of the pawn-ticket is presumed to be the person entitled to redeem the pledge, and the ticket must be delivered when redemption is required. Provision is made in the event of the ticket being lost or destroyed. It is an offence under the Act for a pawnbroker to take an article in pawn from any one appearing to be intoxicated, or apparently under twelve years old, or on Sunday, or on other specified holiday. Conviction of fraud, or of knowingly taking stolen goods, may, if the court thinks fit, be punished by forfeiture of licence.

Pawnees, a tribe of American Indians, hereditary enemies of the Dakotas, formerly occupying Central Nebraska. They are superior physically to most Indians of the Plains, and at one time numbered 2000 warriors, but have been greatly reduced by wars with the Sioux. They removed to the Indian Territory (q. v.) in 1875.

Pawtucket, a town in Rhode Island, U.S., about 4 miles above Providence, with which it is connected by a horse railway, has twelve churches, a library, and one newspaper. The river has here a fall of 50 feet, affording immense water-power to the town, one of the chief places in New England for the production of machinery and cotton fabrics. Pop. (1870) 6619.

Pax (Lat. 'peace') was a goddess of peace worshipped by the ancient Romans, in whose honour a festival was celebrated annually on the 30th April. In the Christian Church the P. was a small tablet of silver, ivory, or other material, by means of which the kiss of peace used to be circulated through a congregation. In primitive times it was the practice for Christians to give each other a kiss of peace in their assemblies for worship. But as this practice was sometimes abused, the P. was introduced, which was first kissed by the officiating minister, by him handed to the deacon, and by the latter to the people, who all kissed it in turn.

Paxo, one of the Ionian Islands, 10 miles S. of Corfu, rises in a solitary peak, 900 feet high, and produces better olive oil than any other member of the group. Area, 10 sq. miles; pop. 5287. The chief village is Porto Gajo, or St. Nicola. To the S.E. is the sterile islet of Antipaxo.

Paxton, Sir Joseph, architect and landscape-gardener, was born of humble parents at Milton-Bryant, in Bedfordshire, in 1803. He was employed as a gardener at Chiswick by the Duke of Devonshire, who, appreciating his ability, removed him to Chatsworth, where he became director of the beautiful gardens, which were modelled from his designs, the grand conservatory which covers an acre of ground being also his production. He designed the buildings for the Great Exhibition of 1851, and the Crystal Palace at Sydenham, which, in its graceful outline, fairy-like appearance, and splendid proportions, remains a lasting monument to his genius. He also laid out the grounds in a charming manner. P. received the honour of knighthood in 1851, and sat in the House of Commons for Coventry, as a Liberal, from 1854 till his death, June 8, 1865. He was editor for some years of *Paxton's Magazine of Gardening*, and published a number of horticultural and botanical works.

Paymaster. In the army, a P., who is usually an ex-military officer, is attached to each battalion of infantry, regiment of cavalry, and brigade of artillery. His duties include the payment of officers, and of the men through the captains of their companies, troops, and batteries, and the supervision of the regimental accounts. His intrusions are checked at the War Office, to which he furnishes quarterly pay lists. He has the rank of captain, with 12s. 6d. a day on joining, and his pay is increased by 2s. 6d. a day every five years, till after twenty years' service it amounts to 22s. 6d., when he has the rank of major. Officers called control paymasters are attached to military districts. In the Royal Navy the P. (called purser till the year 1844) has charge of the provisions and stores, as well as the payment of the ships' crews. His pay on joining is 14s., with the standing of lieutenant, and increases at intervals of three years, till it amounts to 33s., after twenty-seven years' service, with the rank of captain.

... the Treasury Re-
... the year 1782, the
... of the large sums
... of the Forces having

... in office in the Lord
... of the ancient
... sergeant, acting as clerk to
... in the infantry, to 2s. 11d.
... increased by 6d. a day after three

... the largest town in Bolivia,
... of the same name, is situated on
... 12,000 feet above the sea-level,
... W. long. It was founded in 1548,
... until after the battle
... in 1824, when its name was changed
... La Paz is intersected by many ravines,
... some fine buildings, the chief of which are
... the cathedral, the latter being a splendid
... La Paz is very healthy, and the town
... as a sanatorium by Chilians and Peruvians suffering
... It has a large transit traffic, and is the emporium
... Pop. (according to the *Almanach*
... 70,372.

Pea (Old Eng. *pis*, Lat. *pisum*, Gr. *pson*, from *ptissō*, 'I winnow' or 'husk.' The word P. is erroneously formed, as the 's' (seen in pease) is not the sign of the plural, but belongs to the root). In its restricted rendering P. is the English name for the small genus *Pisum*, represented by the well known esculent *P. sativum*, of which there are two varieties, called respectively the garden P. and the field P., together with an immense number of sub-varieties as the result of cultivation. The native country of the species is unknown, but it is supposed, from its ancient cultivation, to be indigenous to the S.E. of Europe and Western Asia. Into Britain it would appear to have been introduced through France and Holland early in the 16th c.; fully a hundred years however elapsed before it was grown and appreciated as a table vegetable. During the period of its cultivation for this purpose, particularly within the present century, few vegetables have become more improved, both as regards quality, earliness, and productiveness. Some of the varieties scarcely exceed a foot in height, whilst others, if allowed to attach themselves by their tendrils to stakes, climb fully 8 feet. For obtaining successive crops of the P. through the summer months, various plans are adopted by gardeners. There are indeed so many good kinds, both early and late, and so many different modes of culture, that it is almost an impossibility to state any particular selection, or say what culture it is best to adopt. Tall varieties are no longer necessary, inasmuch as there are many excellent dwarf sorts; but when there is plenty of ground and sticks for disposal, some of the former may be grown with advantage, as they generally continue in bearing longer than the latter. But in small gardens the dwarfs are always the best, as they do not shade other crops. For the 'P. sticks' the tops of trees or underwood is used, and there is none better than horn-beam. The most suitable soil is a rich friable loam, and where it is found to be deficient in calcareous matter, lime or chalk should be added. For general purposes the best manure is that of the horse and cow, with a little admixture of soot to keep away worms. If prolongation of bearing is desired, the pods should not be gathered indiscriminately, but the oldest should be removed as often as they become fit for use, for one allowed to ripen will weaken the bearing power of the plant more than many young ones. Slugs, snails, and an insect called the P. Weevil (q. v.) are the principal enemies that attack the P. whilst it is

young. There is also a maggot which works mischief inside the pod. (See P.-BEETLE.) Rats and mice are apt to ferret the seed out of the ground as soon as sown, and birds of various kinds are very destructive, especially after the pods are beginning to fill. In the 'Sugar P.' the inner tough filmy lining of the pod is absent; the young legume of these may therefore be used like kidney-beans. Formerly, varieties of the grey P. were almost exclusively grown as a field crop; now, several that range under the garden P. have been introduced into field culture. The seeds when ripe vary from round to an irregular shape, and differ in colour also. If the outer membranous coat is removed, they become split pease, and are used in the making of one of the most economical and nutritious articles of diet, called P.-soup. The *haulm* or straw of the plant is highly esteemed as fodder. In India the natives use the seeds parched and ground, mixed with wheat flour. Before the spread of the potato, the P. also formed a great part of the food of the working-classes in England. Their flesh-forming character depends upon the large proportion they contain of the albuminoid called Legumin (q. v.) or vegetable casein; this exists as 1 part against 2½ of starch, instead of 1 to 5 in wheat, and 1 to 10 in rice, suggesting therefore that the P. should be generally used with other foods rich in starch, sugar, fat, oil, or non-nitrogenous nutrients. A second species of *Pisum* (*P. Aucheri*) occurs in Alpine elevations of the Taurus. The genus itself is chiefly distinguished from *Lathyrus* (q. v.) by certain differences in the formation of its style, and to the latter belong the sweet P. and the everlasting P., whilst the wood or heath P. will be found referred to as *L. macrorrhizus*, under the sub-genus *Orobus*. The grain or chick P. is a species of *Cicer* (q. v.), and the important article of diet in India called the cajan P. is often termed the Pigeon P. (q. v.).

Pea-Beetle (*Bruchus pisi*), a species of *Coleoptera* (q. v.), so named from the habit of its larvæ to feed upon peas. It is found in N. America and in S. Europe. The length of the mature insect is about a quarter of an inch; its colour is black, varied with white and yellow spots.

Pea-body, George, D.C.L., an American philanthropist, was born of poor parents, at Danvers, Massachusetts, 18th February 1795. After receiving a scanty education he was apprenticed at the age of eleven to a grocer in Newburyport. He afterwards removed to Georgetown, where he became partner in a mercantile business. In 1815 he removed to Baltimore, and soon afterwards opened branch houses at New York and Philadelphia. In 1838 he settled in London, where he established a banking-house in 1843, and amassed a large fortune. In 1852 P. aided Mr. Grinnell in fitting out Dr. Kane's Arctic Expedition to the extent of \$10,000, and in the same year he founded an Educational Institute in his native town with \$20,000, afterwards increasing the total endowment to \$200,000. During a visit to the United States in 1857, P. gave \$300,000 for the foundation of a scientific and literary institute at Baltimore, the endowment of which he subsequently increased to \$1,000,000. In 1862 he crowned his munificence by a gift of \$2,500,000 to build lodging-houses for the poor in London. During another visit to the United States in 1866, he endowed two chairs, one of archæology at Harvard College, and one of physical science at Yale College, with a sum of \$150,000 each, established a 'Southern educational fund' of \$2,100,000, and devoted \$200,000 to other public purposes. Queen Victoria offered him a baronetcy, and on his declining, presented him with her portrait; while the Corporation of London conferred on him the freedom of the City, and erected a statue of him in the Royal Exchange, which was unveiled July 23, 1869, by the Prince of Wales, during the absence of P. on his last visit to the United States. While there, he gave \$150,000 to found a museum at Salem, Massachusetts; \$60,000 to Washington College, Virginia; \$50,000 for an institute at North Danvers; \$300,000 to Phillips Academy, Andover; \$25,000 to Kenyon College, Ohio, and \$20,000 to the Maryland Historical Society. In the previous year P. had endowed a school of art at Rome. He died at London, November 4, 1869. His remains, after receiving funeral honours in Westminster (November 12), were conveyed to America in a British man-of-war, and buried in his native town, now called Peabody. By his will, several other large sums were left to various institutions, and the remainder, amounting to about \$5,000,000, to his relatives. P. was unquestionably the most generous and bene-

ficent philanthropist of his time. The sum total of his wise charities reaches an almost fabulous figure.

Peace, Articles of the, in English law. On sufficient cause being shown, justices of the peace have authority to compel any one to find security to keep the peace towards another. It must be stated on oath before a magistrate by the person making the complaint that the person against whom he complains has used threatening language towards himself or some member of his family. This is called *Articles of the Peace*, and, if satisfied that the complaint is true, it is the duty of the magistrate to oblige the offender to give his bond with securities to keep the peace for a period not exceeding a year, and failing his doing so, to commit him for a period to prison. The effects of the sureties may be seized in payment of the bond, in the event of contravention of its stipulations.

Peace, Offences against the Public. These offences are either such as are a direct breach of the public peace, or an indirect breach by tending to make others break it. Such an offence is Felony (q. v.), or a Misdemeanour (q. v.), according to its magnitude. Challenge to fight by word or letter is an indictable offence, punishable by fine or imprisonment. It is also a misdemeanour to endeavour to provoke any one to send a challenge; but using opprobrious epithets towards a man—as calling him a liar or a *cheat*—will not of themselves prove an intention to provoke a challenge. Persons fighting in a public place are guilty of *affray*, which is punishable by fine or imprisonment. An affray ought to be suppressed by bystanders; and by the common law, as laid down by Chief-Justice Tindal, on trial of the Bristol rioters, 2d January 1832, every private person may lawfully endeavour, without warrant or sanction of the magistrate, to suppress a riot, and, in case of dangerous riot, he may even arm himself to suppress it. It will, however, be more discreet and safer for a private person under such circumstances to act subordinately to the legal authorities. (See MEETINGS, SEDITIOUS.) Any one appearing in public armed, with intent to commit a felonious act, is punishable under the Vagrant Act as 'a rogue and vagabond.' Military training without the requisite legal sanction is prohibited. To accuse or threaten to accuse any one verbally, or to send or deliver a letter accusing or threatening to accuse any one of a crime punishable by death or penal servitude, is a crime which may render the criminal liable to penal servitude for life.

Peach (Fr. *pêche*, Ital. *pesco* and *persico*, 'belonging to Persia') is the name given to the velvety-fruited forms of *Prunus Persica* (until recently called *Amygdalus Persica*), while the Nectarine includes the smooth-fruited varieties, though it is not uncommon for each to occur on the same bough. It seems almost certain that the tree is originally indigenous in China, where its cultivation has been traced back to the 10th c. B.C. It must, however, have been early introduced into Northern India and Persia, in both of which countries it is now found apparently wild. The expedition of Alexander is probably what made it known to Theophrastus, B.C. 322, who speaks of it as a Persian fruit, and from that country it was introduced into Europe about the commencement of the Christian era. It is recorded as being cultivated in England towards the middle of the 16th c., and it is now grown in all moderately warm countries, such as the United States, Australia, New Zealand, &c. In such climates as the S. of France, the P.-trees ripen their fruit very well as standards, but in Britain it is almost always planted against a south-facing wall or transferred to the orchard-house. Though most extensively grown in the United States, from want of attention to grafting, protection, pruning, &c., the bulk of the fruit obtained is of an inferior quality. A good P. has the skin thin, of a bright red colour on its sun-exposed surface; the flesh firm, thick, and full of high-flavoured juice, and the stone of small size. As such, for a dessert fruit, it ranges in estimation next to the grape and pine-apple. It also makes a delicious preserve, and when plentiful, the pulp is sometimes fermented and a spirit distilled from it. The skin contains prussic acid, and should be removed before the fruit is eaten; the leaves, flowers, and kernel also contain this poison. What is known as the Flat P. was introduced from China about thirty-five years ago. The garden varieties of the P. and nectarine are now very numerous; some of the best are Chanoellor, Rivers, Royal George, and Noblisse of the first, and Elruge, Downton,

and Violette Hativé of the latter. The heart-wood of the P. is brown, compact, even-grained, and smooth to work.

Peach Wood is another name for Nicaragua wood, of which the best description is that known commercially as Lima wood. It is the product of *Casalpina echinata*, a S. American species of this useful genus. For dyeing purposes it is extensively employed in the production of red and peach colour. The annual import to Britain is about 7000 tons.

Peacock (the first syllable, 'Pea,' is a corruption of Old Eng. *pava*, from Lat. *pavo*, Gr. *taòs*, named from the harsh cry of the bird), a genus of *Gallinaceous* or *Rasorial* birds, belonging to the family *Pavonida* (q. v.). The common P. is the *Pavo cristatus* of ornithologists, and is noted for the characteristic 'tail' and hues of the male birds, the tail consisting of the upper tail-coverts, which are very long. The feathers are beautifully marked at their tips with rounded spots of golden green, and have a metallic lustre. The body plumage is also similarly tinted, but the females are dressed in sober brown, only the neck being glossed with green. The P. has a crest. The female has been known in old age, when its reproductive powers have become diminished, to assume the gorgeous colours of the male. The voice is harsh and unmusical. The P. is found wild in India, where P.-shooting is a favourite sport. The nest, which is rudely constructed, is situated on the ground. The hen in a wild state produces from twenty-five to thirty eggs or more. The period of incubation varies from twenty-five to thirty days. The eggs are white, with dark spots. The young of both sexes are at first alike in appearance, the tail of the male bird first appearing about the third year of life. The P. has been celebrated from the most ancient times. It was sacred to Juno, and according to the Greek myth, the metallic spots on the tail were the eyes of Argus, placed there by the Queen of Heaven herself. The Romans regarded the bird as a table luxury, and high prices were paid for it by the ancient epicures. Other species are the Japan P. (*P. javanicus* or *spicifer*), and the Iris P. (*P. Thibetanus*), also known as the Thibet P. and Chinese P.-pheasant.

Peacock, Thomas Love, born at Weymouth, October 13, 1785, was educated at Englefield, in Berkshire, and in 1801 commenced a course of independent reading at the British Museum. He went to Flushing as under-secretary to Sir Home Popham (1809), held an appointment at the India House (1819-56), and died at Shepperton, January 23, 1866. He was author of the poems *Palmyra* (1806) and *The Genius of the Thames* (1812), and of the novels *Headlong Hall* (1816), *Nightmare Abbey* (1818), *Crochet Castle* (1831), and *Gryll Grange* (1860). The lyrical beauty and fine comedy of his novels have charmed, as Shelley says, 'the chosen spirits of the time,' but their strain is 'too learned for a shallow age,' and their covert satire, disregard of plot, and strange blending of the Pantagruelic and Johnsonian elements, have rendered them *caviare* to the multitude. See H. Cole's edition of his collected works, with a memoir by his grand-daughter, and a preface by Lord Houghton (Lond. 1875).

Pea-Crab, the popular name for a genus (*Pinnotheres*) of *Decapodous* crustaceans, having small and rounded bodies. They are found within the shells of mussels, pinnæ, and allied molluscs, and seem to be perfectly normal tenants of the shells. Pliny's opinion of the relations of the P.-C. and its molluscan host was that the crab warned the mollusc of approaching danger. Probably the condition is simply one of *commensalism*, or one in which the crab depends for shelter upon the mollusc, without subsisting, like a true parasite, on the tissues of its host. *P. pisum* is a common species occurring within the *Modiola* or common horse-mussel of our coasts. Its average diameter is half an inch.

Pea-Maggot, the name applied to the larva or caterpillar of a small moth (*Tortrix pisi*) belonging to the family *Tortricida*, or that of the leaf-rolling moth. It inhabits the pod, and destroys the peas.

Pear (Old Eng. *peru*, Fr. *poire*, Lat. *pirus*) is a fruit-tree closely related to the apple, medlar, and quince, the whole belonging to the genus *Pyrus* (q. v.), it being distinguished as *P. communis*. In its natural state it grows as a shrub

or tree with branches more or less 'spinescent, leaves ovate-oblong obtusely serrated, flowers white in corymbose cymes, fruit more or less top-shaped, with a slender stalk. It is widely distributed as a native in Europe, extending eastwards to the mountains of Asia Minor, the Caucasus, and Persia. In England, also, perhaps, it is indigenous, though, as generally met with in hedges and copses, this is not the case. To Norway it does not reach in a wild state, and its cultivation in that country stops 120 miles south of the apple. From an early period it has been grown for its fruit, for Pliny tells us that the varieties known to the Romans were numerous. It would appear also to have been long known to the people of Himalayan India. Some suppose that it was brought into use in Britain by the Romans during their occupation, while others hold that it was actually introduced by them. It is now extensively cultivated in most temperate countries, the horticulturists' art at the present time having furnished an immense series of improved varieties, rendering it one of the most delicious fruits. France and Belgium have led the way in this respect, but England now claims a head position, and excepting perhaps the jargonelle, the French specialties have gradually been replaced by superior kinds. Naturally, the P. grows in a poorer and drier soil than the apple, but to produce large crops of excellent fruit it requires, like the apple, a deep loamy soil on a good subsoil. Very often it is trained on walls and espaliers, and it is usual to graft or bud it on stocks raised from seed of the wild-plant, or if a dwarf growth is required, upon quince stocks. Besides being a dessert fruit, the P. is used for baking, stewing, compôtes, and marmalades, or is sometimes pared or dried. From the expressed juice, when fermented, perry is made. The leaves will dye yellow. (An essence employed for flavouring the sweetmeats called 'P.-drops' is an artificial composition of amylic acetate in spirit.) The light compact wood is used for turnery, tool-handles, picture-frames, &c.

The fruit of *P. nivalis*—the snow P. of mid and south Europe—becomes soft and edible through exposure to the snow. *P. variolosa*, common in many parts of the Himalayas, produces a fruit which is eaten, like the medlar, when it is half rotten. It yields, too, a hard, compact, and durable wood of a brown colour and fine grain, used for a variety of purposes. See AVOCADO P. and PRICKLY P. See Field's *P.-Culture*, and Quinn's *P.-Culture for Profit*.

Pearl (Old Eng. *pearl* and *parl*, Fr. *perle*, Ital. *perla*, Lat. *perula* (7th cent., found in Isidore of Seville), a diminutive of *pirum*, 'a pear,' so called from the shape of the gem) is the substance formed by the *Mantle* (q. v.) or shell-making membrane of certain *Lamellibranchiate* molluscs. The mantle has the power of forming in mollusca at large the *nacre* or 'mother-of-pearl' layer. This nacre consists of layers of a delicate iridescent substance, which is broken up into fine lines, and thus serves to refract the light, and to produce the exquisite play of colours that marks the interior of a shell. In certain shells (e.g., those of the pure P.-Oyster (q. v.), and of the P.-Mussel) the quality of the nacre is such, that when deposited around some foreign body it gives origin to what is known as a 'pearl.' The nucleus or beginning of this 'pearl' is found to consist of a grain of sand, or some particle of solid matter which has found its way beneath the mantle of the animal, and which has been coated over by the mantle with the nacreous or P.-secretion. That the formation of P. is purely accidental, is an idea supported by the fact that 'artificial' pearls may be obtained from common molluscs by placing foreign bodies within the mantle-lobes, when the animals will cover them with a pearly deposit. The Chinese are known to introduce within the shells of a freshwater mussel or *Unio* little metal images of Buddha, which are in due time coated over with a nacreous layer, and present a pearly picture of the deity held in the highest veneration. Linnæus also put this idea into practical shape when he suggested to the Swedish Government that by boring a hole through the shell of the P. mussels, and by introducing grains of sand into the shell, pearls might be produced.

The chief P.-fisheries are those of Ceylon, carried on in the Gulf of Manaar. Others exist in the Persian Gulf, at Panama, in the W. Indies, &c. The P.-fishing season opens in February, and lasts for one or two months. The boats are each manned by about twenty men, the divers being Tamils, and occasionally Moors. The fishing begins at daybreak, on a signal

being given by the firing of a gun. The divers in each boat are divided into two sets of five each; one gang resting while the other is employed. Each man is provided with a sinking weight or stone, weighing about 30 or 40 lbs. The usual depth to which these men descend is about 9 or 10 fathoms, but they may touch bottom at 12 or 13 fathoms. A signal cord accompanies each diver, who grasps his nostrils with his left hand, and descends carrying a net-basket, wherein the oysters are placed. From 30 to 60 seconds are the periods during which the divers remain below water, and a single diver descends several times daily. The sharks which frequent the coasts of Ceylon occasionally seize the divers, who carry a short knife for protection against their finny enemies. The oysters are piled on shore to die and putrefy, the process of forcibly opening them, by which the pearls might be injured, being thus avoided. They are next thrown into sea-water, and then carefully examined for pearls. Some are found loose, others need to be forcibly detached from the shells; the former are the more valuable. After being cleaned, the shells are split for the sake of the *nacre*, which, as imported in the finest ('silver-lipped') state, is a valuable commodity; it is used for inlaying. The less valuable kinds of nacre are the 'bastard white' and 'bastard black.' The P.-fisheries are under the control of the Government of Ceylon, and may be let to speculators. In 1797 the produce was valued at £144,000, and in 1798 at £194,000. At present the annual value of the fisheries does not exceed £20,000. The modern fisheries of the Persian Gulf are situated at Khareek and around the island of Bahrein: The Bahrein fisheries during the 16th c. were valued at 500,000 ducats annually, and in recent times they have been not less productive. Pearls vary according to the nature of the ground, the food of the animal, and other causes. The finest are called *virgin pearls* or *paragons*; *mill-pearls* is the name given to those which are large, and do not pass through any sieve in which there are more than eighty holes. Others are *vivada pearls* and *seed pearls*, the latter constituting the small specimens which pass through sieves with numerous holes, and which are sold by weight or measure. The most famous P. of which history makes mention is the one swallowed by Cleopatra, and which was valued at £80,000. Julius Cæsar presented the mother of M. Brutus with a gem worth £48,000. Philip II. of Spain possessed a Panama P., said to be worth £4000; and the 'Pilgrim P.' of Moscow, valued at an enormous sum, weighs 24 carats, and is diaphanous. The largest P. known at the present day is in the collection of Mr. Beresford Hope. It is pear-shaped, 2 inches deep, and 4½ inches in circumference, weighing 3 oz. Pearls are also obtained from the mussels of Scotch rivers. Great numbers were obtained between 1760-64, after which the fisheries fell into decline, but were revived in 1860. Those of the Tay, Earn, and Isla are especially noted. Scotch pearls range in value up to £25, but rarely reach that sum, though one set in gold and valued at £500 was shown in the Dublin Exhibition of 1865. The Conway in Wales, and several streams in the N. of Ireland, also yield these gems.

Artificial Pearls.—Excellent imitation pearls are extensively manufactured for necklaces and numerous other decorative purposes. They are composed of an exceedingly thin globule of glass open at two extremities, and coated internally with a substance possessing a fine pearly lustre obtained from the scales of the Bleak (*Alburnus lucidus*). The glass which gives the best result has an opaline lustre, and to remove its glassy aspect the blown pearls are submitted to hydrofluoric acid vapours. Artificial pearls are chiefly manufactured in Paris, but they are also made in Saxony, though of an inferior quality. Among Eastern nations, the Chinese excel in these imitations, but they attach the nacreous substance to the surface of the globules, a practice in which they are followed by the Italians.

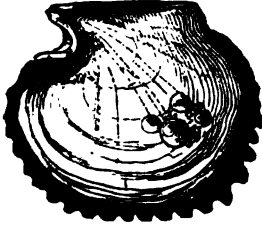
Pearl, a river of Mississippi, U.S., which, after a generally southward course of about 250 miles, flows through Lake Borgue into the Mississippi Sound at the boundary line between Louisiana and Mississippi. Its navigation is much impeded by sandbanks, and the river in the southern part of its course frequently overflows its banks.

Pearl Ashes. See POTASH.

Pearl Barley. See BARLEY.

Pearl Mussel. See MUSSEL.

Pearl Oyster (*Melegrina margaritifera*), a species of *Lamellibranchiate Mollusc* belonging not to the oyster family (*Ostracida*), but to the *Aviculida*.



Ceylon Pearl Oyster.

present in the common oyster.

Pearly Nautilus. See NAUTILUS.

Pearson, John, an English prelate, born at Snoring rectory in Norfolk, 12th February 1612, passed from Eton to King's College, Cambridge, graduated M.A. (1639), and taking orders, received a prebend of Salisbury and the rectory of Thorington in Suffolk (1640). Ejected by the Parliamentary visitors, he became minister of St. Clement's, Eastcheap (1650), and there delivered a course of sermons published in 1658 under the title *Exposition of the Apostles' Creed*. At the Restoration he was created rector of St. Christopher's, London, D.D., by royal mandate, Prebendary of Ely, Archdeacon of Surrey, and Master of Jesus College, Cambridge. A year later P. obtained the Margaret professorship of divinity and sat in the Savoy Conference; in 1663 he became Master of Trinity College, and in 1673 was consecrated Bishop of Chester, where he died, 16th July 1686. P.'s great work on the Creed is calm, laborious, and acute; at once apologetic and polemical, it displays a profound knowledge of patristic theology; in Bentley's words, 'its very dross is gold.' The best edition is Dr. Burton's (6th ed. Oxf. Clar. Press, 1870). Among his other writings are *Golden Remains of the Ever Memorable Mr. John Hales of Eton* (1658); *Vindicia Epistolaram S. Ignatii* (1672), and *Annales Cyprianici* (1684). P.'s *Opera Posthuma Chronologica* were edited by Dodwell (Lond. 1688), and his *Minor Theological Works* by Churton, with a memoir prefixed (2 vols. Oxf. 1844).

Peasant War (Ger. *Bauernkrieg*). The oppression to which the peasant class was subjected in the later middle ages by the privileged classes and the government many times and in various countries led to revolts marked by fearful cruelty on both sides; but the name P. W. is especially applied to the rebellion which broke out in 1525 in South Germany, and soon spread throughout all the neighbouring lands of Central Germany. Already in the beginning of the century revolutionary leagues had been formed among the peasantry. These were 'Der Bundschuh' in the Rhinelands in 1502, and 'Der Bund des Armen Konrad' in Würtemberg in 1514, whose chief objects were the abolition of villenage, the diminution of tithes and taxes, and the liberty of hunting. A misunderstanding of Luther's movement towards reform in the Church supplied fuel to the old discontent; men longed to be freed from ecclesiastical as well as civil oppression, and Luther's teachings on the freedom of the mind and the corruption of the Church were interpreted to the ignorant by fanatics like Karlstadt and Thomas Münzer (q.v.) to mean that all temporal and spiritual authority was henceforth at an end, that all men's lot should now be equal, and 'lords and castles no longer be endured.' The rising began at Kempten on New Year's Day, 1525, and quickly spread to Tirol, over the districts between Bodensee and the Danube, and the lands on the Rhine and Main as far as Lothringen and Thüringen. The nobles could at first make little opposition, and many joined the rebel ranks by choice or by compulsion. On Easter Day they drew up twelve articles, moderate enough to win the approval of many of the cities. Luther saw ground for their claims, and urged the princes to treat with the people; but when success led them to frenzied cruelty, he raised his voice for order, and, condemning the revolt as unchristian, bade the rebels be cut down without mercy. The leaders of the peasants were Wendelin Hippler, organiser of the movement, Florian Geyer, Götz von Berlichingen, and Jäcklein Rohrbach, who 16th April 1525 stormed

Weinsberg, and massacred the Graf von Helfenstein and seventy knights. In May and June the peasants were gradually overpowered. The princes and nobles ranged themselves under the Landgraf Philipp of Hessen, who inflicted a crushing defeat at Frankenhäusen in Thüringen, 15th May 1525. Georg Truchsess von Waldburg had a like success (2d June) at Königshofen on the Tauber, and in the Allgau the rebellion was speedily repressed by Georg Frundsberg. The struggle now ceased, but the peasants had henceforth to submit to greater cruelty and a harder yoke, the effects of which have not even yet wholly disappeared. For the history of the P. W. in detail see the works of Sartorius (1795), Oechsle (1830), Burckhardt (2 vols. 1832), Wachsmuth (1834), Bensen (1840), Zimmermann (2d ed. 3 vols. 1856-57), Cornelius (1862), and Schreiber (1864).

Pea-Stone. See PISOLITE.

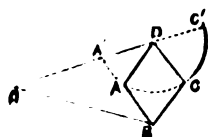
Peat or **Turf** consists of vegetable matter in a more or less advanced condition of decay. P. forms large superficial bogs or hags (Turbaries), and is found widely disseminated throughout the world in positions and climates which favour its formation and accumulation. The principal condition necessary for the growth of P. is abundant moisture, for in the presence of a humid atmosphere the substance is found to accumulate at once in low-lying marshes, and on the sides and tops of hills, in the chilly highlands of Scotland and Sweden, and on the tropical plains of Bengal. The vegetation which goes to the formation of P. under these widely different conditions is quite dissimilar, but the result is the same. The plants which in Europe chiefly contribute to the formation of P. are species of *Sphagnum*, a genus of mosses. P. 'mosses' or bogs in mountainous tracts seldom exceed 4 feet in thickness, but in low grounds they vary exceedingly; and in Ireland they have been found 60 feet in thickness. P. also varies greatly in respect of the rate at which it tends to accumulate; and as an example of rapid growth, an instance is quoted in Ireland where a railway passes through a cutting in which a 15 feet P. deposit exists on a site covered with water 30 years previously. P. being a substance in course of formation presents all gradations of texture, specific gravity, and chemical composition from (speaking of European P.) a light, brown, matted mass of vegetable fibre up to a dense black compact homogeneous body, retaining scarcely any visible trace of vegetable structure. The chemical changes which P. undergoes in its elaboration are supposed to result in the liberation of marsh gas and carbonic acid, and in the formation of water by the union of hydrogen with the oxygen of the air. The result is that as compared with the composition of the *Sphagnum* from which the peaty matter is formed, P. shows a steady increase in its percentage of carbon, the oxygen present correspondingly decreases, while the hydrogen appears to follow no fixed law. The following figures show composition, excluding water and ash, of (1st) a light brown surface P., and (2d) a black compact old P. of high quality:—

	No. 1.	No. 2.
Carbon.....	52.38	61.02
Hydrogen.....	7.03	5.77
Oxygen, with nitrogen.....	40.59	33.21

In many counties where coal is not practically obtainable, P. is a valuable source of ordinary domestic fuel, and this is notably the case in Ireland, Holland, Westphalia, Bavaria, France, and Italy. In Ireland nearly 2,000,000 acres—about one-seventh of the area of the island—are covered with P., and the utilisation of the material is there a question of great importance, as much with the view of clearing land for profitable agriculture as for rendering the P. itself a source of profit. In the highlands and islands of Scotland P. is also the staple fuel of the inhabitants. The ordinary preparation of 'peats' for domestic use is a simple operation. The peats are cut generally in horizontal slices into pieces like large bricks by means of a specially constructed P. spade (called in Ireland a 'slane'), which has two cutting edges set at right angles to each other. As the peats are cut they are carried on barrows to a convenient spot and piled on edge for drying, a process which occupies a time varying with the nature of the weather. During the drying process they are once or twice turned, and with complete air-drying the P. retains from 10 to 26 per cent. of water. The presence of this amount of water, the general looseness and consequent bulkiness of P., and its friability are most serious obstacles to its usefulness as fuel, and it is really only available in the immediate

...is cheap, and other...
 ...generally serviceable, and...
 ...but hitherto little per-
 ...To improve it as...
 ...the latest and most...
 ...of Mr. Clayton. His process...
 ...after which the material is...
 ...by means of revolving cutting...
 ...within a cylinder. The...
 ...to thoroughly break up the cellular...
 ...and thus liberate the fixed moisture of the...
 ...is delivered in a con-...
 ...it is cut into suitable lengths, and...
 ...where it sets into an exceedingly hard com-...
 ...During the years 1873-74, when the price of coal...
 ...numerous companies were formed to work...
 ...patent, but these all collapsed on the fall in the price...
 ...of coal. A charcoal is to some extent made from P., and used...
 ...for smelting a high class of...
 ...and charcoal being entirely free from sulphur. Attempts...
 ...were made in Ireland about 1840 to distil...
 ...from P., but these entirely...
 ...by Sir James...
 ...to establish a similar industry...
 ...also ended in failure.

Peaucellier Cell, a particular form of link work, so named after its discoverer—a French engineer, by which circular motion is transformed into true rectilinear motion. It consists of six links, four of which form a rhombus.



To two opposite joints of this rhombus two equal links are attached, and the other extremities of these are united at a common joint as shown in the figure. With centre D and radius DA or DC describe a circle. Then, since O A C are necessarily in the same straight line for every position of the linkage, the rectangle O A'. O C' = (O D - D A) (O D + D A) = a constant quantity, and therefore the product (O A'. O C') is constant. From this it may be proved by simple geometry that if A is made to describe a circle which passes through O, the point C will describe a straight line perpendicular to the line joining O with the centre of the circle (A). If A describe any other circle, C will also describe a circle. It has other interesting properties, and has suggested a method for obtaining a force varying inversely as the square of the distance, and thus representing elliptic motion.

Pea-weevil, a name given to certain beetles which destroy peas, beans, and other like crops. It is also given to the 'Pea-beetle' (q. v.) and its larvæ. The P.-W. is represented by such small beetles as the *Sitona lineata* and *S. crinita*, which do not attain a greater length than a quarter of an inch.

Pe'ba (*Tatusia peba* or *T. septemcinctus*), a species of Armadillo (q. v.) found in Guinea, Brazil, and Paraguay, and which may attain a length of thirty inches. The colour is a brownish-black. The flesh is tender and palatable.

Pebble (Old Eng. *pebol*, allied to Dan. *peble*, 'to flow with a bubbling sound'), a term used by lapidaries for an ornamental stone, chiefly of the chalcedonic group, but also including rock-crystal, from which the 'P. lenses' of spectacles are made; any water-rolled stone on a sea-beach or in a river-bed. The so-called 'Scottish pebbles' are banded agates, obtained chiefly in Perthshire. Agates, or pebbles proper, are wrought into a great variety of ornamental forms; the chief place of the manufacture is Oberstein in Germany, and the supplies of the raw materials are obtained in Uruguay and Brazil.

Pec'ary (*Dicotyles*), a genus of *Suida* or swine found in S. America. The tail is represented by a mere tubercle, and the hind feet are three-toed. A peculiar odoriferous gland exists in the back-region, and the upper canine teeth project downwards, and are not prominent. The incisor teeth number 4 above and 6 below, and there are 12 molars in each jaw. Of the P. the common collared P. or Tajaçu (*D. torquatus* or *Tajaçu*) is the

best known: it attains a length of 3 feet, and is of a brown colour, with a white stripe across the neck. The P. is noted for a habit of attacking other animals by congregating in immense numbers. It feeds on roots, grain, &c., and also on animal food. A second species is the white-lipped P. (*D. labiatus*), which is larger and fiercer than the Common P. The colour in the white-lipped P. is brown, striped with grey. It has a white patch on both jaws.

Pe-chi-li. See CHI-LI.

Peck (a form of *pack*), a British measure of capacity containing 2 imperial gallons, and equal to the fourth part of a bushel. It is equivalent to 554.548 cubic inches.

Pe'cock, Reginald, born about 1395 in Wales, entered Oriel College, Oxford, of which he became fellow (1417). Ordained priest (1421), he received the mastership of Whittingdon College, along with the rectory of St. Michael-in-Riola (1431), was consecrated Bishop of St. Asaph (1444), and translated to the see of Chichester (1449). P. wrote in English several treatises against the Lollards, in which, however, he himself fell into heresy on the questions of infallibility, transubstantiation, and liberty of conscience. Accordingly, he was cited and condemned by the Archbishop of Canterbury (1457), and in spite of a recantation at Paul's Cross in the presence of 20,000 persons, was deprived of his see, and confined in the abbey of Thorney, Cambridgeshire, where he died about 1460. The best known of P.'s writings, *Repressor of over much Blaming of the Clergy* (1449), has been edited, with an Introduction, by Mr. C. Babington (2 vols. Lond. 1860).

Pe'cos, a river of New Mexico and Texas, rises near Santa Fé, and after a generally S.S.E. course of 800 miles flows into the Rio Grande del Norte. In summer it is dry throughout the greater part of its length.

Pec'ten (Lat. 'a comb') or **Scall'op**, a genus of *Lamelli-branchiate* molluscs belonging to the *Ostracida* or oyster family, in which there are no hinge-teeth, and only a single adductor muscle. The mantle-lobes are separate throughout their whole extent. The shell is nearly circular, its apex being represented by a straight line. Externally, it is fluted with rounded longitudinal elevations. The common P. or scallop is the *P. varius*, the shells of which were worn of old in the hats of pilgrims. These shells swim through the water occasionally by the sudden closure of their valves, and the consequent ejection of water. Other species are the *P. islandicus*, *P. purpuratus*, *P. foliaceus*, *P. maximus*, &c.

Pec'tinibranchia'ta, a division of *Gasteropodous* molluscs, in which the gills or *branchiæ* are of comb-like shape. This division is not generally used in the modern classification of the group. Its members have been included under the sub-class *Branchifera*, and under various orders (*Siphonostomata* and *Holostomata*) of the latter group. The sexes are individualised. Tentacles and eyes are present, and the shell varies greatly in conformation. Whelks, cone-shells, volutes, periwinkles, &c., represent the group.

Pec'uliars, Court of. See ECCLESIASTICAL COURTS.

Pec'ulium, in Roman law, was that property which a slave, or a *filius familias*, could acquire with his master's or father's consent. It might be acquired in war, or in exercise of public duty, or of the liberal arts, or derived from a stranger, or from the father.

Ped'al, a projecting piece of wood or metal attached to certain musical instruments to be pressed by the feet in order that particular effects may be produced. One P. in the piano-forte prolongs while the other softens the sound. The keys of the part of the organ containing the longest pipes are worked by pedals. The effect of the pedals of a harp is to sharpen or flatten the pitch of the strings.

Pedalia'ceæ is now placed as a sub-order of *Bignoniaceæ* (q. v.), from which it differs by having parietal placentæ and wingless seeds. There are about a dozen genera, e.g., *Sesamum* (q. v.), *Uncaria* (see GRAPPLE-PLANT), and *Martynia*, of which *M. fragrans*, a Mexican annual, is grown in gardens.

Ped'alpoint. See ORGANPOINT.

Pedee', Great, a river which is formed in N. Carolina, U.S., by the union of the Rocky and Yadkin rivers, and after

a S.S.E. course of about 350 miles, flows through S. Carolina into the Atlantic at Winyaw Bay. It is navigable to the falls at Cheraw, 150 miles from its mouth. Its chief tributary is the Little P., which also rises in N. Carolina.

Pedestal (Fr. *pidestal*, from Lat. *pes, pedis*, 'foot,' and Old Fr. *estal*, 'place,' 'posture,' cf. Old High Ger. *stat*), in architecture, the base of a column, statue, or other upright work, consisting of three parts, the base, the die, and the cornice.

Pedestrianism, taken in its most general meaning, is the art of walking, running, or otherwise engaging in foot exercise. With the development of artificial and more speedy means of transit, P., as a mode of travelling, has fallen greatly into disuse, and consequently in the present day the word is understood nearly always to mean what might be distinguished as *professional* P. Just as we have our professional cricketers, oarsmen, swimmers, boxers, &c., so have we our professional pedestrians. The most popular and most prevalent form of P. is foot-racing, which has always held a high position as a training exercise amongst nations where athletics were practised. (See ATHLETICS, OLYMPIC GAMES, &c.) For short races under half a mile speed is a great desideratum, but for long stretches of several miles speed is not of such importance as staying power. In 1861 various long races were held between Deerfoot, a Seneca Indian, and English and other champions. In these competitions the Indian showed to advantage, running 12 miles in 65 minutes 5 seconds. He was beaten, however, in 1863 by White, who ran 10 miles in 52 minutes 14 seconds. In walking feats we have another phase of P., which within the last few years has excited considerable attention. The famous journeys of Powel, Barclay, and Manks have been excelled by the pedestrian triumphs of Weston, O'Leary, and Gale. In 1788 Richard Powel walked from London to York and back, a total distance of 400 miles in 140 hours. Captain Barclay, in 1809, undertook to walk 1000 miles in 1000 successive hours, and won in accomplishing his task a large wager. This feat was repeated with similar success by Richard Manks, a native of Warwickshire, in 1850. In 1876 the feats of E. P. Weston, the American pedestrian, attracted general attention. In 48 hours (on February 15 to 17) he accomplished 180 miles 668 yards—a distance never before covered in the same time—and (starting 23 December) 460 miles in 33 minutes less than 144 hours.

Pedetes, a genus of *Rodent* quadrupeds belonging to the Jerboa family, represented by the spring haas or jumping hare (*Helayms* or *P. Capensis*) of S. Africa. The species just mentioned attains a length of 1½ feet. Its hind legs are much longer than the fore-limbs; and its hinder feet have four toes, while its fore-feet have five. The tail is very long. The colour of the animal is a warm brown. The P. will leap from 20 to 30 feet at a bound.

Pedicellariæ are certain peculiar bodies of minute size found adhering to the outer surface of such Echinoderms as sea-urchins, star-fishes, and the like. They consist essentially of a stalk, at the upper extremity of which two or three jaws are formed, which are continually in motion. The P. are allied to the *Avicularia* or 'birds-head processes,' seen on the exterior of *Polyzoa* (q.v.). Their exact nature is still a matter of doubt.

Pedicellina, a genus of 'social' *Polyzoa* (q.v.), somewhat resembling moss, and consisting of a series of organisms united together by root-like processes. They are found in the sea, are of soft consistence, and the tentacles are arranged in a horse-shoe or crescentic shape. *P. echinata* is a familiar species.

Pedicularis (from the pedicle being supposed to encourage lice in sheep, hence the English name of louse-wort) is a genus of about 100 species of *Scrophulariaceæ*, natives of N. temperate regions. Two species are common in Britain, namely, *P. palustris*, an annual plant found in bogs and marshes, and *P. sylvatica*, a perennial mixing in the turf of damp pastures and heaths. *P. sceptrum-Carolinum*, a yellow-flowered species of N. Europe, was so named by Rudbeck from its sceptre-like habit of growth, and in honour of Karl, King of Sweden. None of the species appear to be in cultivation or to possess special uses.

Pediculus. See LOUSE.

Pedigrees (variously derived from *pedes graduum, par degrés*, or *pied-de-grue*, 'crane's foot,' alluding to the shape),

genealogical tables showing the origin of a family and the relationship of its members one to another, were formerly often drawn in the shape of a tree springing from the founder's breast, like the familiar Jesse windows of English churches. The method, however, now generally adopted gives them thus:—

John Noakes = Mary, dau. of Thomas Styles.

Edward Charles, *d. s. p.*

Here *dau.* signifies 'daughter,' and *d. s. p.* (*sine prole*), 'died without offspring;' other frequent contractions being *s.* for 'son,' *h.* for 'heir,' *v. p.* (*vita patria*), for 'in his father's lifetime,' &c. The importance of authentic P. in questions of inheritance, alike in law and history, is easily intelligible, and need not be dwelt on here. But the question why men, apart from any practical considerations, should set a high value on long-traced P., and whether that value is reasonable, deserves consideration. The question is really one of hereditary genius. If a pedigree shows that a man's forefathers possessed a higher than the ordinary culture, that his family has produced great warriors, statesmen, or ecclesiastics, then, granting the doctrine of hereditary genius, that man may justly prize his heritage. If, on the other hand, a Newcome's pedigree begins with a Norman barber, whose sons kept on the business still, its possessor has no more cause to vaunt himself upon its length than an ass on the extension of his ears. But, as a rule, long P. imply gentleness of birth, and gentleness of birth as high culture as the times admitted of. The man who sneers at 'pride of birth' will very likely be the first to boast that his horse's sire won the Derby, or that his greyhound came of the same stock as 'Master Magrath.' The merits of the question are quaintly brought out by Dame Juliana Berners, who in the *Book of St. Albans* (15th c.) speaks of the murderer Cain and all his race as 'churis,' but of Shem's 'gentlemanly' line, culminating in Mary, 'princess of coat-armour.' Nowhere were P. so important as in France, where up to the Revolution no one could be presented at Versailles unless he could prove 400 years of gentility, and where Chateaubriand had to send in his pedigree for examination before he was allowed to hunt with the king. Some of our greatest nobles would fare but badly did such a test precede a modern drawing room. It is true that Grimaldi, in his *Origines Genealogica*, analysed the peerage of 1828, and discovered that of 249 noblemen 35 'laid claim' to having traced their descent beyond the Conquest, 110 prior to 1300, and 43 prior to 1500. But a better authority, Sir Harris Nicolas, fixing as his standard of pretension the having been of baronial or knightly rank in the reign of Elizabeth, found that only one-third of the body were entitled to it. The Wars of the Roses played tremendous havoc with our ancient houses, and Dugdale says that out of the 270 families treated of in the first volume of his *Baronage* (1675) scarce eight continued to his day. Indeed, many modern P. are almost as ridiculous as Chesterfield's, commencing 'Adam de Stanhope = Eve de Stanhope,' or the Welshman's, half way down which came the creation of the world. Yet, if Wardour Street genealogies are contemptible, a genuine pedigree compiled from registers and historic documents is interesting and instructive. The man who knows that his grandfather trailed a pike at Naseby or lifted a cow from a Southern lord, will read with keener pleasure Carlyle's *Cromwell*, or Scott's *Minstrelsy of the Scottish Border*, than he who thanks God that he knows not who was his grandfather. 'Happy,' says Jean Paul, 'is the man who can trace his lineage ancestor by ancestor, and cover hoary time with a green mantle of youth;' and we see Franklin, the great liberal, going down to the out-of-the-way English village from which his yeoman ancestry was sprung. See GENEALOGY; C. Roberts, *Calendarium Genealogium* (2 vols. Lond. 1865); and G. Burnett, *Popular Genealogist, or the Art of Pedigree-Making* (Edinb. 1865).

Pediment (Ital. *frontispizio*) is a term used in classical architecture to denote the triangular space formed by the termination of the roof above the portico. It consists of three parts, the *tympanium*, or plane face, which is often decorated with sculpture, the *cornice*, which skirts it, and the *acroteria*, small pedestals for statues at the feet and apex of the P.

Pédipalpi or **Arthrogas'tra**, an order of higher *Arachnida* (q.v.), represented by the scorpions, &c. In this group the *maxillary palpi*, or organs of touch appended to the lesser jaws,

are large, and are converted into nipping-claws or *chela* similar to those seen in the lobster, &c. They are frequently mistaken for the first pair of legs. The abdomen is segmented, and consists of twelve joints. The mandibles are also converted into *chela*. The tail is terminated by a poison-fang and poison-gland.

Pedlars. See HAWKERS AND PEDLARS.

Pedometer (Gr. 'a foot-measurer'), an instrument for recording the distance travelled by a pedestrian or horseman. Payne's P., patented 1831, is generally used in Great Britain on account of its simplicity and compactness. It closely resembles a watch in appearance. The motion of a lever or pendulum, which vibrates at each pace or step of the wearer, is transmitted through a train of wheels to an index placed over a figured dial. This P. requires to be regulated to the person using it, if it does not correctly record a *known* distance. See ODOMETER.

Pedro I., Don, commonly called **The Cruel**, King of Castile and Leon, 1350-69, son of King Alfonso XI. and Maria, daughter of King Alfonso IV. of Portugal, was born at Burgos, 30th August 1334. His education was neglected, and he early became the slave of violent passions and an unbridled will. He had already married privately Donna Maria de Padilla, when in 1353 he was persuaded by his mother to marry Blanche, daughter of Pierre de Bourbon, and sister of the Queen of France. His elevation of Padilla's relations to the highest offices estranged his early favourite, Don Juan de Albuquerque, who, fearing for his life, fled to Portugal. P. now imprisoned Blanche, procured a divorce from an assembly of hishops, and married Donna Juana Fernandez, widow of Don Diego de Haro, and sister of Don Fernando Perez de Castro. In a few months she also was divorced, and soon after there broke out an insurrection, headed by Enrique de Trastamara, an illegitimate son of P.'s father by Leonora de Guzman. Aided by the influence of the Pope, it proved too powerful for P., who consented to take back Blanche, his former queen, and mitigate his oppressive rule. In 1361 Blanche was poisoned at Xeres, and Donna de Padilla having died soon afterwards, P. obtained from the Cortes a recognition of the legitimacy of her children. Enrique, joined by the Kings of Aragon and Navarre, and the redoubtable Bertrand du Guesclin, entered Castile in 1366. P. fled from Burgos to Seville, and soon Enrique was acknowledged king throughout Castile. P. took refuge in Portugal, whence he passed to Coruña, where he embarked for Bayonne in 1366. Edward the Black Prince, who had formed an alliance with P. in 1363, marched from Gascony in 1367 through Roncesvalles and the kingdom of Navarre, and entered Castile at the head of 30,000 men. On the 3d April he completely defeated Enrique of Najera on the Ebro. The lordship of Biscay, which P. had promised to his ally as a reward, he finally refused, and the English prince leaving the country in disgust, P. reverted to his former cruelty. He was assassinated 23d March 1369, at the town of Montiel, by Enrique, who was immediately proclaimed King of Castile.

Pedro I. de Alcântara, Dom, Emperor of Brazil and King of Portugal, second son of João VI., King of Portugal, was born at Lisbon, 12th October 1798. He was carried by his parents to Brazil (1807) in their flight thither on the invasion of their country by Napoleon; and after his father was recalled (1820) to Portugal by the Cortes, P. became (22d April 1821) regent of Brazil, which had been declared a kingdom in 1815. Having proclaimed the independence of the country on the 7th September 1822, on the 1st December he was crowned 'Constitutional Emperor.' Though he gained general favour by granting a liberal constitution, he had to repress several local insurrections before his rule was firmly established, and not till 1825 was the independence of Brazil recognised by Portugal. On his father's death, P. succeeded (10th March 1826) to the Portuguese crown as P. IV., but the Brazilian jealousy of a connection with Portugal induced him (2d May) to resign that kingdom to his daughter, Donna Maria de Gloria, reserving to himself the regency during her minority. P.'s brother, Dom Miguel, whom he had appointed regent in February 1828, seized the crown on the 25th of the following June. An insurrection broke out (6th April 1831), and P. abdicated (7th April) the throne of Brazil in favour of his son, Dom P. II. He imme-

diately embarked for France, and in February, with a small army under General Saldanha, began the struggle against his usurping brother, which ended in Dom Miguel being reduced to yield the crown to Donna Maria (23d September, 1833). P. now set himself vigorously to work for the restoration of order, and strengthened the government by a close alliance with England and France. Again appointed regent by the Cortes, 23d August 1834, he died at Lisbon on the 24th of September following.—**P. II. de Alcântara, Dom,** Emperor of Brazil, son of the above, was born at Rio de Janeiro, 2d December 1825. He ascended the throne (7th April 1831) on the abdication of his father, and ruled at first (till September 1835) under a triumvirate government, then (till September 1837) under the regency of Diego Antonio Feijo, and afterwards of Pedro Araujo de Lima. In July 1840 he was declared of age by the Chamber of Deputies, and on the 23d of that month undertook the government. He was crowned on the 18th July 1841, and on September 4, 1843, married Theresa Christina Maria (born 14th March 1822), daughter of Francisco I., King of the Two Sicilies. From this marriage sprang two sons, who died in infancy, and two daughters, (1) Izabel, the Crown-Princess and heiress-presumptive to the throne (born 29th July 1846, and married 15th October 1864 to Prince Louis of Orléans, Comte d'Eu); and (2) Leopoldina (born July 13, 1847), married December 15, 1864, to Prince August of Sachsen-Koburg-Gotha, and died February 7, 1871. The early years of P.'s government were much disturbed by popular revolts, and after these by foreign wars against the dictator Rozas of Buenos-Ayres (1851-52), the Republic of Uruguay (1854-55, and again 1864-65), and, finally, President Lopez of Paraguay (1865). Since securing peace on a permanent footing P. has devoted his reign to the constitutional government and internal improvement of Brazil (q. v.), and is one of the most enlightened and popular monarchs of his time.—**P. V. de Alcântara, Dom,** King of Portugal, son of Queen Maria II. de Gloria, by Ferdinand, Duke of Sachsen-Koburg-Gotha-Kohary, was born at Lisbon, 16th September 1837. On the 15th November 1853, he ascended the throne while yet a minor, and on the 16th September 1855 received full kingly power. In 1858 he married the Princess Stephanie Frederika Wilhelmine Antonie of Hohenzollern-Sigmaringen. He died 11th November 1861. See PORTUGAL, and his Biography by Schelhorn (1866).

Peduncle (in Zoology) applied to the fleshy, muscular stalk of such fixed animals as the Barnacle (q. v.), or to the stalks of the compound eyes of such crustaceans as lobsters, &c.—In Botany, see FLOWER and INFLORESCENCE.

Peebles, an ancient royal burgh of Scotland, and capital of Peeblesshire, is situated on the N. bank of the Tweed, 27 miles S. of Edinburgh, and 7 miles N.W. of Innerleithen by rail. It lies amid hills, and the exquisite beauty of its surroundings, as well as the purity of the air and the excellent fishing (salmon and trout) to be had in its neighbourhood, make it a favourite resort for summer visitors. At Soonhope, Venlaw, within a few minutes' walk of the P. railway station, a hydro-pathic establishment was commenced (1878) which must increase the attractions of one of the most romantic localities in Scotland. The town contains six churches, and a public library of 15,000 volumes, which forms part of the 'Chambers' Institution'—a gift to the town by William Chambers, the eminent publisher, who is a native of the place. Within recent years the woollen manufactures carried on here and at Innerleithen have become important. In 1877-78 the annual value of real property was £8685, exclusive of railways. Pop. (1871) 2631. In early times P. was a seat of the Scottish kings, and had a royal castle and chapel. A church and monastery for the Trinity Friars was built here in 1260 by Alexander III., and in 1357 the town was made a royal burgh by David II. It is still governed by a provost and town council, under a charter granted by James VI. P. has a choice place in Scottish poesy as the scene of that sprightly and humorous sketch of rustic pastimes known as *Peebles to the Play*, variously ascribed to James I. and James V. of Scotland.

Peeblesshire, an inland county in the S.E. of Scotland, is bounded N. and N.E. by Edinburghshire, E. by Berwickshire, S.E. by Selkirkshire, S.W. by Dumfriesshire, and W. by Lanarkshire. Area, 227,869 acres; pop. (1871) 12,330. The surface is hilly,

the chief peaks being the Hart Fells (2790), Dollar Law (2790), and Broad Law (2740), while there are many others above 2000 feet. The principal streams are the Tweed, and its tributaries the Eddleston, Leithen, Quair, Manor, and Lyne. The chief geological formations are the Old Red Sandstone and the Carboniferous. The soil of the valleys is fertile, and is excellently cultivated, while the high districts afford good pasture. In 1876 there were 10,979 acres under corn crops, 6599 under green crop, 13,675 under clover and grasses under rotation, and 10,480 of permanent pasture. There were also 1113 horses, 6495 cattle, and 196,720 sheep. The total valued rent for 1877-78 was £125,820, exclusive of railways, which were valued at £31,099. The principal mineral obtained is lead ore, and there are quarries of slate, limestone, and freestone. The manufactures of P. are almost entirely confined to the towns of Peebles and Innerleithen. The chief villages are Linton, Carllops, and Skirling. See Chambers's *History of P.* (Edinb. 1864).

Peel, a small seaport of the Isle of Man, on the western coast, 10½ miles N.N.W. of Douglas, has a harbour formed by a jetty 1200 feet long, and is the chief station of the island herring fishery. On an islet 100 yards N. of the town stand the ruins of St. Germain's cathedral (1245), and of the castle of the Earls of Derby, immortalised in Scott's *Peveril of the Peak*. Pop. (1871) 3513.

Peel, Sir Robert, an English manufacturer, was born near Lancaster, 25th April 1750. Entering the cotton-spinning trade on the back of Arkwright's invention, he rapidly made a fortune, purchased estates in different counties of England, was a large contributor to the 'Loyalty Loans,' and an ardent volunteer, became a baronet in 1800, represented Tamworth in Parliament for many years, and before he died employed at his works as many as 15,000 workmen. He died at Drayton Manor, Staffordshire, 3d May 1830.—**Sir Robert P.**, son of the preceding, was born near Bury, Lancashire, 5th February 1788. He was educated at Harrow and Christ Church, Oxford, where he took the degree of B.A. in 1808 with almost unprecedented distinction. In 1809 he was returned to Parliament in the Tory interest for Cashel, and immediately applied himself vigorously to getting up the work of the House. He became Under Secretary for the Colonies in 1811, and Secretary for Ireland in 1812. The latter post he held for six years, earning the cordial hatred of the Irish by his police organisation and his relentless bias against the Catholics. In 1817 P. was returned for the University of Oxford, and his parliamentary reputation began, meanwhile, to increase as his aptitude for finance became more and more apparent. In 1819 he was appointed chairman of the Bank Committee, and brought in a bill for limiting the circulation of paper money and resuming a system of cash payments. In 1822 he took the place of Lord Sidmouth at the Home Office and in an administration which included the semi-liberal Canning was distinguished for his defence of the strictest canons of Toryism. To fiscal matters generally, and the question of the currency in particular, he continued to devote much attention. In 1827 he retired from the Cabinet over which Canning then presided, though on many questions his opinions were ripening slowly towards Liberalism. Returning to place with the Duke of Wellington, his altered political attitude was now shown in respect to the Corporation and Test Acts. In March 1829 he astounded his party and alienated his friends by introducing an Emancipation Bill for the Catholics. It was supported by the Whigs and carried through by a triumphant majority; but P. paid the penalty of his act by forfeiting his seat at Oxford. In 1830 he succeeded to his father's baronetcy and estates, and in the same year, while the question of reform began to be pressed, the Ministry fell. The Reform Bill of 1831 seemed to him far too great a stride in the direction of democracy, and he opposed it all through its career. Under the new Act he was returned to Parliament for Tamworth (1833), on which occasion he made his famous enunciation of principles, explaining that he was the blind partisan of no system, but that under changed circumstances he abandoned old maxims and measures in order to bring himself into harmony with the times. He became Prime Minister towards the end of 1834, but being defeated in division on three separate occasions he retired (April 1835). While in opposition, though he continued to vigorously oppose the Liberal Ministry, more than once he was found in the same lobby. After the general election of 1841 P. was

asked to form a cabinet, the Conservative party in the country having been increased by the desire to have the fiscal difficulties, which had accumulated under the Liberals placed in the hands of P. The corn-law agitation had also begun, and as Lord J. Russell only promised the half measure of a moderate fixed duty upon corn, while P. declared his preference for a sliding scale, the latter received strong Conservative support, and the former merely 'the cold and languid preference of the radical and free-trade parties.' In February 1842 he brought forward his proposal for dealing with the corn laws amid much excitement. The sliding scale was maintained and improved, but the duties were lowered and the artifices attendant on the old scale rendered impossible. His measure was described by Macaulay as one 'which pleases nobody, which nobody asks for, and which nobody thanks him for.' The same year he set himself to make good the financial deficiency left by his predecessors, and even to obtain a surplus. He accomplished it by the imposition of an income and property tax, acquiescence in which was purchased by the reduction or abolition of burdensome taxes on 750 out of 1200 articles subject to customs duties. By 1846 P.'s opinions on the corn laws had undergone an entire change, and at the opening of the session, amidst the general vituperation of his party, he declared himself a convert to free trade. The attack made upon him by Disraeli was that statesman's first step to acknowledged power. In June P. retired from office, and won the esteem of all impartial observers by his moderation under attack, his indifference to power, and his anxiety to give honour to whom it was due in connection with free trade. Practically he was now a Whig, and often voted with that party. On June 29, 1850, he was thrown from his horse while riding in Hyde Park, and three days later died of the injuries sustained. P. was a proud, shy man, a conscientious thinker, true to his convictions, though slow in forming them, and an easy and even voluble speaker. 'Of all the men I ever knew,' said the Duke of Wellington, 'he had the greatest regard for truth.' He was an Englishman of the highest character, if not of the highest genius, and his memory is still profoundly revered by his countrymen. See Lord Dalling and Bulwer, *Life of Sir Robert P.* (Lond. 1874), and Doubleday, *Political Life of Sir Robert P.* (Lond. 2 vols. 1856). See *Memoirs by Sir Robert P.*, published by Earl Stanhope and the Right Hon. Edward Cardwell (2 vols. Lond. 1857).—**William Yates P.**, brother of the preceding, born 3d August, 1789, at Bury, educated at Cambridge, studied law and became a barrister, was returned to Parliament in 1817, and sat till 1852. He served as an Under-Secretary of State (1828), and Lord of the Treasury (1834-35). His death occurred in June 1858.—**Jonathan P.**, brother of the preceding, born 17th October 1799, entered the army and rose to the rank of major-general. From 1841 to 1846 he acted as inspector-general of artillery, and during 1858-59 he was War Minister under Lord Derby. In 1866 he was called to the same post, but retired March 1867, owing to a difference in connection with the Reform Bill.—**The Right Hon. Sir Lawrence P.**, cousin of the preceding, was born in 1799, educated at Cambridge, called to the bar of the Middle Temple, filled the post of Advocate-General at Calcutta, became Chief-Justice of the Supreme Court, and (1855) Vice-President of the Legislative Council at Madras. In 1871 he became one of the paid members of the Judicial Committee of the Privy Council.—**The Right Hon. Sir Robert P., G.O.B., M.P.**, eldest son of the late Sir R. P., was born May 4, 1822, educated at Harrow and Christ Church, Oxford, became attaché to the British Embassy at Madrid from June 1844 till May 1846, when he became secretary to the British Legation in Switzerland, and was appointed chargé d'affaires, a post from which he retired in 1850. In that year he succeeded to his father's fortune and title, and was returned for Tamworth as a Liberal. From 1855 to 1857 he acted as a Lord of the Admiralty, and from 1861 to 1865 as Chief Secretary for Ireland. He was present at the coronation of Alexander II. in 1865 on a special mission, and in the same year became a Privy Councillor. P. is a lively but rather diffuse speaker: on Irish and international subjects, however, he is always listened to with respect. During the debate upon the war vote (February 1878) he both spoke and voted with the Conservative party.

Peole, George, an English dramatist and poet, belonged to a good Devonshire family. Born, according to Dyce, about 1552-53, he studied at Broadgates Hall (now Pembroke Col-

Pearl, a gemstone, is a small, round, white, lustrous, spherical body, which is formed in the shell of a pearl oyster, and is composed of a substance called nacre. It is highly valued for its beauty and durability. In the East, pearls are highly prized, and are often used in jewelry. In the West, they are less valued, but still highly prized. The largest pearl ever found was the Pearl of the Indies, which was discovered in 1668. It was a large, round, white pearl, and was valued at 300,000 francs. The pearl trade is one of the most important in the East, and is carried on by the Dutch, the Portuguese, and the English. The pearl oyster is found in the Indian Ocean, the Pacific Ocean, and the Mediterranean Sea. The pearl oyster is a bivalve, and is found in shallow waters. It is a very sensitive creature, and is easily killed by pollution and overfishing. The pearl oyster is a very important part of the marine ecosystem, and its protection is essential for the future of the pearl trade.

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god Chrysaor, when her head was struck off by Perseus. The name P. was given him because he first appeared near the sources (*pēgai*) of Oceanus. He is said to have mounted to heaven, and dwelt in the palace of Zeus, whom he served as the bearer of fire and thunder. With the assistance of P., Belleophon (q. v.) slew the Chimæra, and conquered (according to Pindar) the Amazons and Solymi; but on attempting to ascend to heaven on his back, he became giddy and fell to the earth, while P. pursued his flight alone to the abode of the immortals. According to another legend, when Mount Helicon, hearing the singing of the Muses, began to rise heavenward with delight, P. stopped its rising by giving it a kick, and from the hoof-mark there arose Hippocrene, the fountain of the Muses, and the source of inspiration. On account of this P. has been represented in modern writings as the horse of the Muses, a character in which he was unknown to the ancients.

Pegu, a province of British Burmah, lying between Arracan and Tennasserim, and occupying the entire valley of the Irrawaddy river from Prome downwards. Area, 27,390 sq. miles. Pop. (1872) 1,662,058. It contains the capital, Rangoon, and the port Bassein. It also includes the rice swamps and the navigation of the Irrawaddy, and forms the most populous and wealthy portion of Burmah. The inhabitants are now mostly composed of Mughls or Burmese proper, who are Buddhists, and the hill tribe of Karens (q. v.), of whom many have been converted to Christianity. The native Peguese, called also Talaings or Muns, had been either exterminated by the Burmese kings or driven S. into Tennasserim; and their capital of P., on the river of the same name, about 70 miles N. of the present city of Rangoon, has now almost disappeared. In the 16th c. the Peguese founded a great kingdom; their capital was first at Tungu (q. v.), and afterwards at P. city, of which gorgeous descriptions are given by early travellers, and which is said once to have numbered 140,000 inhabitants. After numerous and sanguinary wars with the Burmese proper of Ava, the Peguese were exterminated rather than subdued in 1755. During the first Burmese war of 1823-26 P. was entirely overrun by the British force, and was the scene of many sharp encounters and much loss by sickness. It was not annexed until the conclusion of the second war of 1852, when Independent Burmah was entirely cut off from the seaboard. The horses of Burmah are generally known as P. ponies.

Pehlevi ('language of heroes'), a vernacular dialect of the primitive Persian or Iranian language, used under the dynasty of the Sassanidæ (235-640 A.D.), who revived the national religion of fire-worship. The grammatical basis of the language is the ancient Zend, considerably modified by the introduction of Semitic words. The alphabet also is Semitic, and consists of only thirteen distinct letters. The sacred books of the Parsees (q. v.) are written in P., the philological study of which has recently made much progress at Bombay. See Dastur Jamaspji's *Dictionary of P.* (vol. i. Lond. 1877).

Pei-ho', an important river in the N. of China, is formed 50 miles from its mouth by the confluence of the When-ho, Huto-ho, Jan-ho, and Wei-ho, which together water the province of Chi-li and part of Shan-si. The main stream, When-ho, which rises in Shan-si, among the mountains of the frontier, has a course of 450 miles, and forms the highway to Peking. Wei-ho is connected by the Grand Canal with the Hoang-ho.

Peine Forte et Dure (the 'strong and hard pain') is a kind of torture formerly inflicted on those who stood mute or refused to plead when put on trial. The prisoner was put into a low dark chamber, laid on his back, naked, on the floor. As great a weight of iron as he could endure was then laid upon him, and in this situation he was fed with nothing but bread and water till he died, or until his obstinacy was overcome. It appears by a record of 31 Edward III. that a prisoner lived forty days under this punishment. The motive of any one so suffering rather than answer was probably to escape the forfeiture of lands which under former law followed a conviction for felony. By 7 and 8 Geo. IV. c. 28, if any person arraigned of any crime remain mute, or will not answer directly to the charge against him, the court may order a plea of 'Not guilty' to be entered, when the trial must proceed as if the accused had actually so pleaded. P. F. et D. is said to have been inflicted in England as late as 1741. A curious and vivid account of the case of Margaret Clitheroe,

the stepdaughter of the Mayor of York, who actually suffered death from 'the strong and hard pain,' 25th March 1586, is recorded in Morris's *Troubles of our Catholic Forefathers* (1877).

Peïpus, a lake of Russia, between the governments of St. Petersburg, Pskov, Livonia, and Esthonia, connected at the S.E. with Lake Pskov by a channel 16 miles long, and from $1\frac{1}{2}$ to $4\frac{1}{2}$ miles wide. It is 52 miles long and 41 broad; its depth is 45 feet, and its area 1408 sq. miles. Fed by the Embach and the Velikaya, it empties itself into the Gulf of Finland by the Narova, 44 miles long. The banks of P. are flat, sandy, and largely covered with fir trees, and the lake abounds with fish. It has four islands, of which Narka is the largest: the only town upon its banks is Sdov.

Peish'wah (*Peshwa*, 'over-lord'), the title of the hereditary prime minister of the Rajahs of Sattara, the descendants of Sivaji the Great, the founder of the Mahratta power in W. India. The first P. was Balaji Vishwanath, a Brahmin by caste, who made himself 'Mayor of the Palace' in 1712. For nearly a century his descendants guided the policy of the Mahratta confederation in its antagonism to the Mohammedans. They fixed their capital at Poonah, the central home of the nation, about 1740; and are said to have directed at one time an army of 100,000 horsemen, with an annual revenue of seven millions sterling. The seventh and last P. was Baji Rao, who succeeded in 1796. To escape from the rivalry of the two great military chiefs of the Mahrattas, Scindiah and Holkar, he put himself under the protection of the British by the treaty of Bassein in 1803. This led to the war in which Sir Arthur Wellesley and Lord Lake completely defeated the Mahratta armies. In 1811 Mr. Elphinstone (q. v.) was appointed Resident at Poonah, and his special duty was to frustrate Mahratta intrigues. In 1816 the P. made a treacherous attack upon the Residency, but he was defeated at the battle of Kirki. He ultimately surrendered to Sir John Malcolm, who guaranteed to him a pension of £80,000 a year. His territories were annexed to the Bombay Presidency, and Bithur near Cawnpore was assigned as his residence. Here he lived till 1853, having adopted as his heir the infamous Nana Sahib (q. v.). The latter was undoubtedly regarded throughout India as the hereditary P.; and the refusal of the British Government to continue to him any portion of his adoptive father's pension, is supposed to have had something to do with the outbreak of the Mutiny in 1857. See Grant Duff's *History of the Mahrattas* (Lond. 1826); Sir John Kaye's *History of the Sepoy War*, vol. i.; *Selection from the Wellesley Despatches* (Oxf. Clar. Press. 1877).

Peisistratos (Lat. *Pisistratus*), a famous Athenian 'tyrant,' son of Hippocrates, was named after P., Nestor's youngest son. The mother of P.—her name is unknown—was cousin-german to the mother of Solon. The date of P.'s birth cannot be fixed with certainty. The year 612 B.C. seems a probable date, and certainly he could not have been born much later. His personal beauty and mental culture were great. Carefully educated, of winning manners, high-souled and generous, few among the Athenians could compare with him. His craving for power and supremacy, however, led him to condescend to acts of dissimulation utterly at variance with his generally mild and beneficent character. The relationship of P. to Solon led to a close and intimate friendship between them; and one of the first public acts of the former was by his eloquence to aid his kinsman in the war against the Megarians. In this expedition P. distinguished himself by military skill and bravery. Meanwhile the position of parties at Athens became unsettled. The old hostilities of the rival factions—the *Plain*, the *Coast*, and the *Highlands*—checked for a time by Solon's prudent legislation, broke out afresh. The party of the Plain comprised the landed proprietors; that of the Coast the wealthy middle class; that of the Highlands those whose political freedom and political equality were, from their more contracted circumstances, ill defined and hardly recognised. Lycurgus became the champion of the first party; Megacles, the Alkmaeonid, of the second; while P., seeing that this was a favourable opportunity for advancing his ambitious aims, threw in his lot with the Highlands. He appeared as the patron and liberal benefactor of the poor, threw open his gardens to the use of the citizens indiscriminately, and dispensed charity in the public streets. The best of the citizens were hoodwinked, and hailed in him, if not a deliverer from oppression, at least the friend of

moderation and clemency. Solon at once saw through his kinsman's schemes. He remonstrated with P., but in vain, warned the people of their danger, and endeavoured by speeches and poems to rouse them from their listless inactivity, but to no purpose. Even the members of the Senate were disposed to believe in P., and to declare Solon mad. The decisive moment arrived. P. appeared in the Agora with his body and his mules wounded, pretending that he had been well-nigh assassinated on account of his patriotic action. Indignation ran high in the city, the assembly was convened, and on the motion of Ariston a bodyguard of fifty citizens was granted to him notwithstanding the vigorous opposition of Solon. This guard P. increased either through the heedlessness or connivance of the people; and in 560 B.C. he made himself master of the Akropolis. Megacles and the Alkmaeonids fled. Solon retired. P., now the possessor not only of the semblance but of the substance of power, conducted the government with ability, discretion, and prudence. The fact that he attempted to make no change in the constitution or in the laws of Solon is in itself evidence of his tact and skill. But the first usurpation of P. was of short duration. Ere his power had taken root the rival chiefs had come to an understanding, and he was forced to evacuate Athens. Whether P., on his first deposition, left Attica is uncertain. Probably he did not. His property, however, was sold by auction, and he went into banishment. How he was employed during the six years that followed we know not. Meanwhile the old strife was renewed, and the coalition of the factions under Lycurgus and Megacles was broken up. Megacles now made overtures to P., and offered to reinstate him in the tyranny on condition of his accepting the hand of his daughter. To this P. consented. Hardly, however, had he entered upon his authority when Megacles, in consequence of a quarrel arising from P.'s treatment of his daughter, again combined with Lycurgus, and P. was once more driven from Athens. He fled to Euboea. On reaching Eretria, P. deliberated with his sons as to his future course. Hippias advised a fresh attempt to regain his power, and this advice was adopted. Contributions were solicited from friendly cities, and in some cases large sums were cheerfully given. With these funds he procured mercenaries from Argos. Ten years were spent in these operations. At last with a Naxian, by name Lygdamis, he crossed into Attica and landed at Marathon. Friends welcomed him. Partisans flocked to his standard. His enemies now prepared to meet him. The two armies encamped at Pallene; and P., seizing a favourable opportunity, fell upon his antagonists and scattered them in all directions. The clemency of P. on this occasion is worthy of all praise. Instead of following up his success, he intimated to the fugitives that if they would go quietly to their homes they had nothing to fear. The whole measures of P. hereafter were directed to securing his supremacy and consolidating his power. The money by which he maintained his mercenary troops was derived partly from the silver mines of Laureon, and partly from the gold mines on the Strymon. P., now fairly established in the government, steadfastly maintained the institutions of Solon. For sixteen years he remained in undisturbed possession of his power, which he exercised with mildness and moderation. He died in 527 B.C., leaving the sovereignty to his two sons Hippias and Hipparchus, known as the *Peisistratide*.

The character of P. is, upon the whole, a singularly amiable one. He did not, it is true, mount to power by a course of unimpeachable integrity, but, when he had attained the summit of his ambition, he made splendid use of his opportunities. Kindly, sympathetic, and humane, he won the esteem and goodwill of all, notwithstanding his usurpation. He encouraged agriculture among the poorer classes. To those who had no means of their own he gave cattle and seed. For the old and needy he secured provision. He was scrupulously attentive to the celebration of the religious festivals of Attica. The patron of the fine arts and the fosterer of literature, he was moreover the first editor of Homer. He adorned the city with many splendid structures, among which may be mentioned a temple to the Pythian Apollo, another to Olympian Zeus, the Lyceum, the Fountain of the Nine Springs, &c.

Pekán, or **Woodahook** (*Martes Canadensis*), a species of the Weasel family inhabiting N. America. The fur of this animal is of considerable value, and somewhat resembles that of

the Sable (q. v.). Its colour is a greyish brown, the lighter tint predominating on the upper parts. The P. lives in burrows excavated in the neighbourhood of rivers, and feeds on fish, crustaceans, &c.

Pekin', or **Pe-King** ('northern court,' in contradistinction to *Nanking*, 'southern court'), capital of the Chinese Empire, in the province of Chi-li, on the river Tung-hui, an affluent of the Pei-ho, 13 miles from the latter river, 50 S. of the Great Wall, and 100 from the sea, in lat. 39° 56' N., and long. 116° 27' E. It is situated in a fertile, well-cultivated plain, which, dotted with summer houses and gardens, rises at a short distance into woody hills. Good bituminous coal is drawn from extensive deposits to the N. and W., and excellent water is procured from numerous wells, and distributed through the city by carts and wheelbarrows. The climate, though severe, is not unhealthy, the temperature ranging from 10° to 105° F. The waters in the vicinity are covered with two feet of ice from December to March, while in summer the dust from the unpaved, undrained streets is a terrible scourge. The city consists of two parts—the Tartar city or *Nei-ching* ('within the walls') on the N., and the Chinese city or *Wai-ching* ('beyond the walls') on the S., together having a circuit of 25 miles. The native name of the two cities points to the original design, which was that the Chinese city should encircle the city of the Tartars. But the former has not been extended beyond the S. side of the latter, nor does the distinction of nationality any longer separate the inhabitants. Both cities are girt with walls of earth, cased on each side with brick, and opening every 50 feet in embrasures. The walls of the Tartar city are about 50 feet high, and vary in thickness from 40 to 52 feet. They are pierced by twelve gates, three of which lead into the Chinese city, and are dominated by massive watch-towers, loopholed for cannon. The walls of the Chinese city are only 30 feet high, and from 15 to 25 feet wide, but they are further strengthened by square towers or buttresses placed at intervals of 60 yards. Seven gates give access to the country. The gates of P., closed at sunset and opened at sunrise with great ceremony, are the chief stations of police, and the seat of customs.

The Tartar city consists of three concentric parts. The inner or prohibited city is confined by a red brick wall about 2 miles in circuit, and contains the Winter Palace where the emperor and his family reside, the Temple of Imperial Ancestors, the Hall of Imperial Portraits, the Imperial Library or Hall of the Literary Abyss, and various government offices. Encircling this, and girt by a yellow wall, the imperial city is the residence of the imperial princes and officials of the highest rank, and here are magnificent palaces, and temples and altars to Chinese divinities, the imperial gardens adorned by an artificial mountain supporting a splendid pavilion, and by an artificial lake bordered by beautiful groves. From the imperial printing-office issues daily the *Great Report*, the only Chinese newspaper, of which an English translation has appeared for 1872-76 inclusive. The official copy of this journal is of miserable proportions, but the copy sold every second day to the public is still further reduced by the withdrawal of all secret decrees and reports. The outer or Tartar city proper, more populous than the others, is the seat of six supreme tribunals, the Grand National College and the Great Medical College, and contains the famous Examination Hall, the Observatory (since 1279), the legations of Great Britain, France, the United States, and Russia, the temple of Confucius in which the emperor attends a grand annual service, a Lama temple, erected 1725-30, several Mohammedan mosques and Buddhist temples, a Roman Catholic cathedral, a Greek church, a Protestant chapel, &c. The Examination Hall is provided with numerous cells (ten thousand, it is said) for the candidates competing for public offices. The splendid Palace of Leang is the residence of the British Minister. The main streets, flooded with a grotesque and clamorous crowd, are lined by shops painted red, blue, and green, and at night are lit by torches and coloured lanterns. The character of the minor streets may be imagined from their bearing such names as 'Fetid Hide Street,' 'Dog's Tooth Street,' 'Dog's Tail Street,' 'Barbarian Street,' &c.

The Chinese city, densely crowded and utterly lacking in sanitary arrangements, is the great mercantile centre. Broad straight streets run from gate to gate and intersect each other at right angles. The centre of these is occupied by an elevated

carriage road, thronged with springless cabs, rude carts, and mules and camels with towering loads. One side of the streets is formed by brick houses of one or two stories, the other by stalls where is displayed abundance of showy merchandise. The chief buildings are the Temple of Heaven, built 1420, and the Temple of Earth, in the grounds of which the Emperor inaugurates the ploughing season at the vernal equinox. Here also are the Golden Fish-ponds, the execution ground, the theatres, and other places of amusement. Visitors have frequently remarked that the whole city wears an appearance of decay. Riots are of common occurrence, and generally arise out of the defective manner in which the city is supplied with provisions. The total pop. of P. is estimated at from 1½ to 2 millions.

Centuries before the Christian era P. was the capital of *Yen*, a kingdom overthrown by the Tsin dynasty in 223 B.C. It became the capital of the Kitan dynasty in 938 A.D., and was taken by Genhis Khan in 1215. Kublai Khan made it his residence in 1264. The court was removed to Nanking by the native emperors in 1369, but finally transferred back to P. by Yung Lo, the third member of the Ming dynasty, in 1421. A Portuguese embassy visited P. in 1517, but the representatives were imprisoned and subsequently put to death in 1523. Inter-course began with the Russians as early as 1619, and in 1667 a Dutch embassy succeeded in concluding a commercial treaty. It was visited by Lord Macartney in September 1793, but little was known of it till 1860, in which year the French and English allies forced its surrender, and secured the peace of 24th October, allowing, among other privileges, a British envoy to reside here. The allies destroyed the famous Yuen-ming-yuen (lit. 'round and splendid gardens'), situated 8 miles N.W. of P. as a punishment for the treachery of certain mandarins. Foreigners are now freely allowed to visit the city, but not to trade within its precincts. See Fortune's *Yedo and Peking* (1863); *The Treaty Ports of China and Japan* (1867); and Dr. Rennie's *P. and the Pekingese* (1875).

Pelagianism, the opinions which are associated with the name of Pelagius (q. v.), 'does not so much represent the notions of a single individual as a complete moral and religious system, which formed a decided contrast to the Augustinian doctrine regarding the relation of divine grace to the human will, and which took a firmer hold in the East than in the West,' owing to its affinity with the opinions of Origen (q. v.). Since Tertullian (q. v.) an opinion had prevailed in the West, which was unknown in the Eastern Church, that the sin of Adam had been transferred to his posterity as a predisposition to sin (see ORIGINAL SIN). This idea was combated by the Pelagians on the ground that it served as an excuse for moral indolence. Augustine's celebrated prayer, 'My God, bestow on me what Thou commandest, and command what Thou wilt,' was pronounced by Pelagius an absurdity, 'because it assumed that God can demand more than man can render, and what man must receive as a gift.' The radical principle of P. is that ability limits obligation: 'If I ought, I can; if sin be of the will, it can be avoided; if it be of necessity, it is not sin.' At the conclusion of the controversy, Augustinianism was triumphant in the West, although not recognised in the East, where P. was not officially condemned till the Council of Ephesus (431). The opinions represented by P. have been arranged under the three heads of Sin, Liberty and Grace, and Predestination. 1. In opposition to the conception of Augustine that the whole human race is a concrete totality, the logical consequence of which was the proposition that 'as all men have sinned in Adam, they are justly exposed to the vengeance of God, because of this hereditary sin and guilt of sin,' Pelagius regarded every human being as a moral agent, complete in himself, and separate from all others, so that he was in no way affected by the sin of Adam further than as a bad example. 2. Liberty and Grace.—In opposition to the view of Augustine that the grace of God is a creative principle of life producing the liberty of the will, which in the natural man is only free to do evil, Pelagius supposed that grace (*i.e.*, everything which we derive from the goodness of God) was something added to the efforts put forth by the will of man, which was free to choose good as well as evil. 3. Predestination.—From the premises that man lies under the guilt of Adam's sin, besides being thereby so much predisposed to sin that none can possibly escape from this condition who are not supernaturally assisted, it logically follows in Augustine's system

that God 'in consequence of an eternal decree, and without any reference to the future conduct of men, had elected some out of the corrupt mass to become vessels of his mercy, and left the rest as vessels of his wrath to bear the just consequences of their sins.' According to P., on the contrary, the operations of grace always follow, or must have been deserved by, the free resolution to be good; so that God's predestination is founded solely on his foreknowledge of human actions. See Hagenbach's *Lehrbuch der Dogmengeschichte* (Eng. trans. Edinb. 1847), Neander's *Gesch. der Christl. Rel. und Kirche* (Eng. trans. Lond. 1858), and Dorner's *Augustinus* (1873).

Pel'agius, the great opponent of Augustine (q. v.), was a monk of Britain, whose ecclesiastical name is perhaps a Greek equivalent of the Cymric Morgan ('sea-born'). Of his early life nothing is known, but Augustine himself tells us that by his rigid life as a monk he had gained universal respect; and in his writings he appears as 'a man filled with pain and indignation at the moral depravation of the great mass of the nominal Christians of his day.' P. also considered that the Augustinian doctrine regarding the corruption and weakness of human nature (see ORIGINAL SIN) only afforded excuses for moral indolence, and served as props for immorality. From this point of view he was led to deny that there was any such thing as a corruption of human nature, which had grown out of the Fall. Accordingly in the Western Church, where the doctrine of Augustine expressed the tendency of the time, he was regarded as a heretic. Coming to Rome about 400, P. there composed his commentaries on the Epistles of St. Paul, in which his peculiar views are expressed. The public outbreak of the controversy, however, was due to another, Coelestius, who held similar opinions, and who, as a younger man and trained advocate, was more ready to maintain his opinions in public. The two went together in 411 to Carthage, where Coelestius applied for ordination as a presbyter. Instead of getting it, however, he was accused of heresy, and condemned by a synod (412). When the attention of Augustine was called to the writings of P. as the teacher of Coelestius, he deemed it necessary to refute them. He also sent Orosius as an emissary to Palestine, whither P. had gone, and where his opinions were more congenial from their affinity with the opinions of Origen (q. v.), in order to warn the Church there against him; but although accused by Orosius and Jerome, P. was acquitted by two synods—at Jerusalem and Diospolis (Lydda), 415. Whereupon Augustine 'laid aside all forbearance, and opposed the doctrine of P. severely and bitterly in many works.' The heresy was now condemned by another synod at Carthage, 416; and although Zosimus, Bishop of Rome, at first sided with the Pelagians, when the African bishops in another synod (417) adhered to their former decision, which was confirmed by a general council at Carthage, 418, he joined in the condemnation, and excommunicated them. The controversy was decided by the Emperor Honorius against P., who was banished from Rome. His subsequent history is unknown. A peculiar importance attaches to P. The doctrinal questions that he was the first to raise are not yet settled; they have repeatedly, under different forms and with various modifications, been reiterated in the history of the Church, and the Pelagian view will, in all probability, continue to attract those who shrink from the tremendous conclusions of Augustine and Calvin, however irrefutable they may appear. Besides his *Commentaries*, P.'s chief works are *De Libero Arbitrio*, *De Natura*, *De Fide Trinitatis*. See Neander's *Gesch. der Christl. Rel. und Kirche* (Eng. trans. 1858), Wigger's *Vermuch einer Pragm. Darstellung des Augustinismus und Pelagianismus* (Eng. trans. And. U.S. 1840).

Pel'amia, a well-known genus of water-snakes or *Hydrophide*, of which the *P. bicolor* or black-backed P. is a good example. It is essentially a sea-inhabiting species, and is found swimming in the ocean at great distances from land. The tail is compressed, to fit it for serving as a swimming organ, and the nostrils are valvular. The colour is black above and yellow beneath, the tail being variegated with these colours. The average length is 2½ feet. The P. is poisonous, and belongs to the sub-order of *Colubrine* snakes.

Pel'amys, a genus of *Teleostean* fishes, belonging to the *Scomberide* or mackerel family, and represented by the Bonito (q. v.).

Pelargon'ic Acid, one of the fatty acid series, having the composition $C_9H_{16}O_2$. It is obtained by distillation with water of the leaves of *Pelargonium roseum*, a species of the order *Geraniaceæ*. It is soluble in alcohol and ether, and very sparingly so in water. It is the last of the series, which is liquid at ordinary temperature and pressure, and boils at 500° C.

Pelargo'nium is a vast genus, the glory of the natural order *Geraniaceæ*, and is almost exclusively S. African. From *Geranium*, with which it was formerly included, and which name is still often applied to the cultivated plants, it is distinguished by having irregular instead of regular flowers, a spurred sepal, no glands on the disc, and four to seven fertile stamens only, instead of ten. The species are difficult to define from the very great facility with which they form hybrids, running into innumerable varieties by seed. They differ, too, in stem—being shrubby, herbaceous, or stemless; in root—tuberous or fibrous; in leaves—entire or variously divided; in their leaf-perfume—from an unpleasant to a grateful odour; and in their flower—from striking beauty to insignificance. The species possess, in different proportions, the astringent properties of the order. From *P. roseum* what is called 'oil of geranium' is extracted, for which purpose the plant is extensively grown in France. *P. capitatum*, another Cape species, and *P. odoratissimum*, a perennial trailing herb of S. Asia, likewise yield by distillation a fragrant oil. The tuberous rootstocks of some of the species attain a considerable size, those of *P. triste* being eaten at the Cape, and some are so curiously formed as to resemble corals in appearance.

Pelag'ians, the earliest known inhabitants of Greece, were also spread over the Troas, Crete, Southern Italy, and many of the Ægean islands. Their name has been variously connected with Peleg the son of Eber (Gen. x. 25), with *plazō*, *pelagos*, *pelargos*, &c., but is most probably akin to *peran*, *perad*, in which case it would signify 'wanderers.' The theory of their Phœnician origin is forbidden by the scarcity of Semitic elements in classical Greek, and to assert the identity of the P. with the Etruscans is only to explain *ignotum per ignotius*. The ablest and most recent investigators of the subject hold the P. to have been of the same Aryan stock as the Hellenes, and to have entered Greece by way of the northern mainland. That Herodotus speaks of their dialect as 'barbarous' (i. 57) proves nothing, because he also includes in the promiscuous term 'Barbarians' the Thracians, Macedonians, and Illyrians, who are generally admitted to have been more or less distantly related to the Hellenes. Indeed in Max Müller's words, 'for the purposes of scientific classification it is almost impossible to make any use of the statements of ancient writers about these so-called barbarous idioms.' The P. seem to have been a peaceful race, occupied chiefly with agriculture, but possessing fortified towns, built in the style known to us as Cyclopean Architecture (q. v.). See the Histories of Thirlwall, Grote, Curtius, and Coxe.

Pela'yo, son of Favila, Duke of Cantabria, was the first king of Asturias, and the twenty-eighth of the Gothic kings of Spain. Much of his history is involved in obscurity, and it is only known that after the battle of Guadalete (711), gathering the scattered forces of the Christians among the mountains of Asturias, he in 718 inflicted a severe defeat on the Moslems at Cangas de Onis, which, with another victory over Munuza, governor of Leon, prepared the way for the foundation of a kingdom whose capital was the city of Leon, and which, on P.'s death in 737 passed to Alonso el Casto.

Pelecan'idae. See PELICAN.

Pelaw' Islands form the W. portion of the Caroline Archipelago, and are situated in the N. Pacific in 7°-8°30' N. lat., 134°-136° E. long. They number twenty, and have an area of 346 sq. miles, that of the principal one, Babelthuap, being 275 sq. miles. The area of the coral reefs which almost encircle them is computed by Dana to be six times greater. The islands are fertile, and the bread-fruit, cocconut, sugar-cane, and banana, grow well, while cattle and pigs are reared in considerable numbers. The inhabitants, who were estimated to number 10,000 in 1873, and are decreasing, are of the Malay race, with

an evident infusion of Papuan blood. Every village forms a republic, independent in itself, but co-operating with the others. There also exists among the members of both sexes a curious system of co-operation for mutual help and protection, called the *clöbbergoll*. The P. I. were discovered by Drake in 1579, and were brought into prominent notice by the wreck of the *Antelope* on one of them in 1783, followed by the visit of Prince Lee Boo to England. In common with the rest of the Carolines, the P. I. are claimed by Spain.

Pelican (*Pelicanus*), a genus of Natatorial or Swimming Birds, the type of the family *Pelecanidae*. In this family the bill is long, straight, pointed, and broad at its base. The nostrils are narrow. The skin of the throat, or that between the halves of the lower jaw, may be dilated to form a pouch; the wings are long, and have their first quill longer than the others. All the toes are united by the web, and the face and throat are partially covered



Pelican.

with feathers. The genus *Pelicanus* itself has a long hooked bill, and a short and rounded tail. Of this genus the common P. (*P. onocrotalus*) is a well-known example. This bird belongs to S. Europe, Africa, and parts of Asia. It occurs in flocks, which frequent sea-coasts. Its average length is 6 feet, the spread of the wings measuring about double the length of the body. The colour is white, the plumage having a delicate pink tint. The feathers of the breast are yellow, and the quills of the wings black. The bill is yellow, but red at the tip. The P. is well known for its *gular pouch*, formed by an enlargement of the skin of the throat, and depending from the lower jaw. In this cavity, the capacity of which is equal to about two gallons, the fishes caught are received. The tongue of the P. is of small size. The bird is frequently pursued by other birds, and made to disgorge its prey from the pouch. Its nest is rudely constructed of grass, and the eggs, two or three in number, are of white colour. The young are fed from the pouch of the parent. The legend that the P. fed her young with her blood arose from the fact that the bird presses the bill against the breast to extract the fishes, the red tip of the bill appearing like a blood spot on the white feathers. Another species (*P. rufus*), the red-necked P., inhabits the W. Indies.

Pelion (mod. *Zagora*), a rugged mountain ridge in Thessaly, stretching from Ossa southwards to the promontory of Sepias. On the eastern side it rises almost precipitously from the sea, causing the coast at that part to be quite devoid of harbours. It is about 5000 feet high, and is still covered with those dense forests of oak, chestnut, elm, and pine, which procured it the title of 'woody' in Homer's time (*Od.* xi. 315).

Pélissier, Jean Jacques Aimable, Duc de Malakoff, and Marshal of France, was born at Maromme (Lower Seine), 6th November 1794, became a lieutenant in the army (1815), served with distinction in the Spanish campaign (1823), and in the expedition to the Morea (1828). He took part under Bourmont in the conquest of Algiers (1830), was made a staff officer, and during 1831-39 was employed in France as adjutant. He then returned to Algiers with the rank of lieutenant-colonel, and was present in all the succeeding campaigns. In 1846 he suffocated with smoke some hundreds of Arabs who had taken refuge in the caves of Dahra and refused to surrender. The act occasioned a loud outcry in the European press. In 1850 P. was appointed a general of division, and inspector-general of infantry. Early in the Crimean War, he was placed at the head of the 1st *Corps d'Armée* (January 1855), and when Canrobert in the May following resigned the office of commander-in-chief, P. succeeded him. The storming of the Malakoff by the French troops (8th September) led to the fall of Sebastopol. In consequence of this, P. received the title of Duc and the rank of marshal. In 1858 he was sent as ambassador to London, and in 1860 as governor-general to Algiers, where he died 22d May 1864.

Pell'a, the capital of Macedonia, was situated on a hill, in the midst of marshes, near the modern village of Neokhori. It

was the birthplace of Alexander the Great, and the residence of the Macedonian monarchs from 360 to 168 B.C., when it surrendered to Æmilius Paullus, and from a splendid city sank to a mere station on the Via Egnatia. It is last mentioned by Hierocles, a writer of the 6th c. A.D.

Pell'agra is the name of a loathsome skin disease, endemic in some parts of Spain (where it is called *flema salada*), in Portugal, the Tyrol, and the N. of Italy. P. is seen in its most intense form, probably in Lombardy, where the skin is covered with tubercles and rough scales, and where it is associated with general debility, vertigo, staggering gait, melancholia, and frequently epilepsy. The melancholia characteristic of the disease has so frequently led to self-destruction by drowning, that it has been distinguished by the appellation of Hydromania. *Pellagrous insanity* is met with especially in Northern Italy, and, according to recent observers, also in certain parts of France (Rennes, Angers, &c.), and appears to depend upon a constitutional disease, the special cause of which is still unknown, but which is manifested particularly by an exanthematous exanthema, chronic diarrhoea, anæmia, and marasmus. See *Traité de la Pellagre*, par le Docteur E. Billod (Paris, 1870).

Pellow, Edward. See EXMOUTH, VISCOUNT.

Pell'ico, Silvio, an Italian poet and politician, was born at Saluzzo in Piedmont, 24th June 1788. In his sixteenth year he accompanied a relative to Lyon, where he almost forgot his native tongue, when Foscolo's *I Sepolcri* rekindled in his breast such a love of his fatherland and of freedom that he returned to Italy. After spending some time as a private tutor in the family of Count Luigi Porro Lambertenghi, whose house was a rendezvous for all the *beaux esprits* of Milan, P. published his tragedies *Laodamia* and *Franческа da Rimini* (1818). Along with some other patriotic friends he started the journal *Il Conciliatore*, became suspected of Carbonarism, was arrested (1820), imprisoned, and in January 1822 formally condemned to death. The sentence was changed by the Austrian Emperor into a fifteen years' captivity. In 1830 P. was released through the intercession of his friends. The story of his sufferings is told in *Le Mie Prigioni* (1833), a work of exquisite pathos and strange, perplexing humility, as if composed under the inspiration of those hyperboles of forgiving love that startle us in the Sermon on the Mount. *Le Mie Prigioni* has gone through innumerable editions, and been translated into most of the languages of Europe. P. died at Turin, 31st January 1854. Besides the works mentioned, P. published in 1832 the tragedies *Gismonda da Mendrisio*, *Lenoniero da Dertona*, and *Erodiade*; in 1833 *Tommaso Moro*; and in 1837 a collection of his *Opere inedite*. An edition of his posthumous works, memoirs, and letters was published at Turin (1855 *et seq.*). See Chiala's *Vita di Silvio P.* (Tur. 1852), and work of Bourdon (1868).

Pell'itory, or **Pell'itory of the Wall** (*Parietaria*), is a small genus of *Urticaceæ*, consisting of shrubby herbs, with alternate entire leaves, polygamous flowers, four stamens, papillose stigmas, and fruit included in the enlarged calyx. *P. officinalis* is frequent in Britain on old walls, and neighbouring wastes and hedge-banks. As a rustic medicine it is apparently used for various purposes in different districts of the country. Both the scientific and the popular names of the genus are derived from Latin *paries*, on account of *walls* being the usual site of growth.

Pell'itory, of Spain, is the *Anacyclus Pyrethrum* of botanists, one of a small genus of *Compositæ* with much-cut leaves, terminal solitary flower-heads, having white ray-florets, resembling in appearance the familiar chamomile. The above-named species is a native of N. Africa, Syria, and Arabia, from whence it has been introduced into cultivation to the S. of Europe and other places. It is grown for the sake of its roots, which are used in medicine under the name of 'Pyrethri Radix.' As imported, they are short tapering pieces about half an inch in diameter, externally dark brown, covered with dark shining points, internally dirty-yellow, breaking with a resinous fracture. When chewed a tingling sensation in the mouth and throat is caused, followed by a glowing heat and a copious flow of saliva. A small piece placed in the mouth and gently masticated is

of much benefit for toothache, and has also been used with more or less success for facial neuralgia, and paralysis of the tongue.

Palopidas, a famous Theban general and statesman, was descended from an ancient and noble family, but early joined himself to the democratic party. As a consequence of this, on the victory of the oligarchical faction, aided by the Spartans in 382, P. was forced to flee from Thebes, and betook himself to Athens with 400 followers. In the autumn of 379, after having completed a plan for the overthrow of the oligarchy, he returned secretly to his native town with twelve of his associates, slew there the chiefs of the ruling party, including Leontiades the Spartan leader, and was elected *Boeotarch*, along with Melon and Charon. In the war which now followed with Sparta, P. secured the alliance of Athens, and defeated the Spartans at Tegyra in 375, and at Leuctra in 371. After this he directed his policy chiefly towards extending the Theban influence in the north, affording assistance to the Thessalian towns against Alexander of Pherae, and acting as mediator in the internal dissensions of the Macedonians. Sent as an ambassador to Thessalia in 368, P. was taken prisoner by Alexander, but was rescued in the following year by the Theban army under Epaminondas. Shortly after this he went to Susa as ambassador to the King of Persia. In 364 he undertook another campaign on behalf of the Thessalian cities against Alexander, whom he defeated in the battle of Kynoskephale, though P. himself was killed. He received a magnificent burial from the Thessalians. In private life P. was distinguished by the disinterested generosity with which he applied his large fortune to relieve the wants of his friends. He lived always in the greatest intimacy with Epaminondas, whom he equalled in patriotism and amiability of character, though he was inferior to him in political and military genius. See Plutarch's *Pelopidas*, and Diodorus Siculus, xv. 62-67, 71, 75, 80, 81.

Peloponnesian War, the struggle for supremacy between the democratic Ionian and the aristocratic Dorian races, extended over twenty-seven years, commencing with the attempt of the Thebans to surprise Platea, May 7, 431 B.C., and closing with the surrender of Athens to Sparta in 404. On the side of Athens were Chios, Lesbos, Samos, and other subject islands of the *Ægean*, Platea, Corcyra, Zacynthus, the majority of the Acarnanians, the Messenians of Naupactus, and the Greek colonies in Asia Minor, Thrace, Macedonia, and on the Hellespont. The Peloponnesian Confederacy included all the states of the Peloponnesus, with the exception of Argos, besides Phocis, Locris, Megaris, Boeotia, Leucas, Ambracia, and Anactorium. The history of the war was written by Thucydides up to 411, and concluded by Xenophon. See HELLAS.

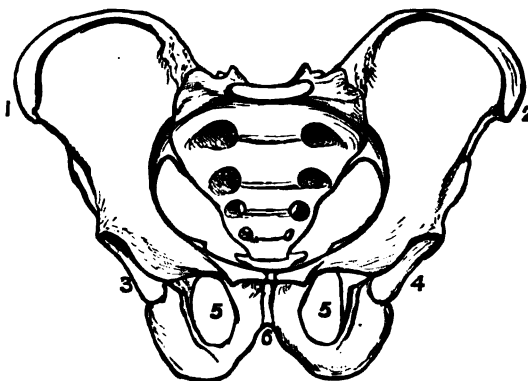
Peloponnesus (Gr. 'island of Pelops'), the ancient name of the Morea (q. v.), styled by Homer *Argos* or *Apia* ('distant land'). According to Thucydides the P. was divided into five parts, but a more usual division was into the six larger states, Achaia, Elis, Messenia, Laconia, Argolis, and Arcadia, and the four smaller, Corinthia, Sicyonia, Phliasia, and Cleonæ.

Pelops, according to one Greek myth, was slain by his father Tantalus, and served up at a banquet given to the gods. Their omniscience was undecieved, Demeter alone, lost in sorrow for Persephone, eating a part of one shoulder. Thereupon Hermes restored the lad to life, and Demeter supplied the missing member by one of ivory. To a later myth belong P.'s Phrygian origin, his wandering to the peninsula called after him the Isle of P. (*Peloponnesus*), and his marriage with Hippodamia (q. v.). She bore him two sons, Atreus and Thyestes, whom she instigated to the murder of their step-brother, Chrysippus, a crime that drew down on the house of Tantalus its final doom. P. was honoured at Olympia above all heroes, and his tomb was shown near the banks of the Alpheus.

Peltry (Fr. *pellterie*, 'furryery,' from Lat. *pellis*, 'a skin'), the skins of furred animals. The pelt is either the undressed hide, or the skin prepared without the removal of its hairy or woolly covering. A *pelisse* is a furred coat or robe. See FURS AND FURRIERY.

Pelu'sium (Gr. 'clayey'), a city of Lower Egypt, lay about 2½ miles from the sea, on the easternmost arm of the Nile delta, near the modern Damietta. It is the *Sis* of Ezekiel (xxx. 15, 16), who terms it 'the stronghold of Egypt.' The 'great anguish' foretold by the prophet found fulfilment in the surrender of the city to Cambyses (525), to Alexander the Great (333), to Antiochus Epiphanes (173), to Marcus Antonius (55), and to Augustus (31 B.C.). P. suffered greatly in the Persian invasion of 501 A. D., and after its final conquest by the califs in the 7th c., drops out of history, the Ostium Pelusiacum becoming choked with sand.

Pel'vis (Lat. *pelvis*, 'a basin'), the name applied to the bony basin or girdle giving support to the hind limbs of Vertebrata, and formed in chief by the 'haunch bones.' In man, the P. is



ADULT MALE PELVIS SEEN FROM BEFORE, IN THE ERECT ATTITUDE OF THE BODY.

1, 2, anterior extremities of the crests of the ilia in front of the widest transverse diameter of the upper or false pelvis; 3, 4, acetabula; 5, 5, obturator foramina; 6, sub-pubic angle or arch.

formed of two *ossa innominata* or haunch-bones, which are united in front to form the *pubis*, and between which the *Sacrum* (q. v.), and *coccyx*, or lower portion of the spine, is wedged behind. The *false P.* is the name given to the upper and expanded portion of the basin, as defined by the *ilio-pectineal* line. The *true P.* is the deeper part of the cavity situated below this line, and is of smaller capacity than the false, but more completely basin-shaped. The *inlet* of the P. is heart-shaped, and is somewhat encroached upon behind by the *promontory* of the sacrum. The *outlet* is the lower circumference of the P. below the pubis. The P. is regarded as possessing three chief diameters—*antero-posterior* (or *sacro-pubic*), *transverse*, and *oblique*. The average measurements of these diameters are 4 inches, 5 inches, and 5 inches respectively. The cavity of the true P. contains part of the *organs of generation*, the *bladder*, and the *rectum*, or terminal portion of the intestine. The rectum lies posteriorly, within the curve of the sacrum. The bladder is partly just behind the *symphysis pubis*. The uterus and vagina in the female are between the bladder and rectum. In the erect posture of the body the pelvis occupies an oblique position in reference to the trunk. The hollow of the sacrum, instead of looking anteriorly, looks downwards and forwards, the base of the sacrum in the female being about four inches higher than the part of the P. or *symphysis pubis*. The *axes* of the P. form a highly important study in reference to the mechanism of *parturition*. The plane of the inlet (as regards the true P.) lies in a line carried from the base of the sacrum to the upper border of the pubis. If this line be intersected at right angles at about its middle by another line, the latter line in front would correspond with the *umbilicus* or *navel*, and behind with the middle of the *coccyx*; the axis of the inlet being thus shown to be directed downwards and backwards. The axis of the outlet is directed downwards and forwards, and the axis of the cavity is curved. The female P. differs from that of the male in being as a whole lighter; the bones are of more slender make, and their muscular ridges are less plainly marked. The hollows of the ilia or haunch-bones are shallower

... are more widely ... greater breadth. The ... in the male, and the ... characters are acquired ... P shows it to be composed ... bones, together with the ... Each os innominatum ... which in the adult are firmly



ADULT FEMALE PELVIS.

... with that shown in the preceding figure, and illustrating ... the principal differences between the male and ... The numbers indicate the same parts as in the preceding

At birth the three bones are distinct, the ... completely united at about the twenty-fifth year of ... The three pieces unite to form the cup-shaped cavity ... the acetabulum, which receives the head of the thigh-bone in the formation of the hip-joint. The bones entering into the composition of each innominate bone are respectively known as the *ilium*, *ischium*, and *pubis*. The *ilium* forms the flat and expanded part of each haunch-bone, and appears as the prominence of the hip. The *ischium* is the lower part of the haunch-bone, its two extremities being represented by the 'buttocks,' while the *pubis* forms the front portion of the P., and supports the external generative organs. The *ilium* is broad and convex in front, and deeply concave behind. The ... of the ilium forms the well-recognized 'flank,' and its attachment to the muscles which constitute the walls of the acetabulum. Its lower part enters into the formation of the acetabulum. The external surface of the bone gives origin to the muscles of the back; the anterior face is hollowed for the ilio-pectineal, and the internal surface articulates with the femur. The *ischium* is a three-sided bone, with a prominent tubercle, on which the body rests in sitting, and which gives attachment to several important muscles. The *pubis* consists of a horizontal and a descending ramus. The inner extremity of the horizontal ramus, joins its fellow of the opposite side to form the 'pubis,' while the descending ramus unites with the osium below. The acetabulum, or socket for the head of the thigh-bone, is a deep, cup-shaped cavity, the rim of which is raised at the joint (the cotyloid notch) through which blood vessels and nerves pass inwards to the hip-joint. The articular foramen is a large opening between the ischium and the pubis, best closed in the male, and somewhat triangular in the female.

... have not a P., and even in the mammalia, as exemplified by the whales, the P. may be represented in a very rudimentary condition. In birds (save in the ostriches) the bones of the P. are not united to form a *pubis symphysis*, the ... of the P. having reference probably to the process of the ischium.

... of the P. Contusions of the walls of the P. are ... from the passage of carriage-wheels over the body, from falls, kicks, &c. Fracture of the P. is usually a very ... and especially because of the great violence by which it is usually produced, and the risk of injury to the pelvic ... Part of fractures may involve little or no danger, and ... is required, but the prognosis will de-

pend, in a great measure, on the presence or absence of visceral lesion. In the disease of the bones called Rickets (q. v.), the P. is often very much deformed, its outlet being narrowed, the tuberosities of the ischia pressed towards each other, and the pubic arch widened, or the pubes pressed backwards towards the sacro-vertebral angle, and the ischia thrust outwards. There are cases on record in which the P. is retarded in development, so as to retain in mature life the same relative size of infancy. Deformity of the P. may be of comparatively little importance in the male, but it is always of serious importance in the female, as complicating the function of childbirth. Female children, therefore, affected with rickets should be attended to with the utmost care, so as to avoid deformity of the P., which may render natural parturition an impossibility. Abscess of the P. may be caused by disease of the bones, or of the soft parts, or by the gravitation of matter in connection with disease of the spinal column. In such cases the abscess should not be interfered with until it is on the point of bursting, and then it should be opened and subsequently dressed on strictly antiseptic principles.

Pembroke (Cymr. *penn* and *bro*, 'the head of the district'), a town in S. Wales, on a navigable creek of the Milford Haven, 9½ miles W. of Tenby by rail, and 264 W. by N. of London. It consists mainly of a long irregular street, gradually ascending westward to a bold rocky promontory on which stands the remains of P. Castle. The stronghold came into the possession of Gilbert Strongbow, Earl of P., in the reign of Henry I., and within it Henry VII. was born in 1457. In 1648 the Royalists held it against Cromwell for six weeks. The circular keep is 75 feet high and 163 feet in circuit at the base, with walls 14 feet thick. Almost the only buildings of interest in the town are the church of St. Michael, in Norman style, and that of St. Mary, with a large square tower. P. Dock or Pater, 2½ miles W. and opposite Milford, is a seaport and the W. terminus of the P. and Tenby Railway. The Government marine works cover an area of 80 acres, and comprise graving docks, slips, and basins, engine-houses, foundries, and workshops. Fortifications enclosing the dockyard have been constructed at a cost of over £250,000. There is some foreign as well as considerable coasting trade, and steamers ply to Bristol, Waterford, &c. Small vessels laden with anthracite coal, during spring tides can reach the small quay of P. itself, on the N. side of the castle. P., with Tenby, Milford, and Wiston, returns one member to Parliament. Pop. of P. in 1871, 15,450; of P. Dock, 9534.

Pembroke College, Cambridge, was founded in 1347, by Mary de St. Paul, widow of the Earl of Pembroke, and was richly endowed by Henry VI. It is governed by a master, and has thirteen fellowships (four of them clerical) and twenty-four scholarships, viz., three of £80, nine of £60, six of £40, and six of £20, besides the Bowes Scholarship of £60, and the Blackrode Exhibition of £70. The chapel was designed by Wren, and new buildings are now (1878) in course of erection, including a library 90 feet in length. P. C. presents to twelve livings, and in 1877 had 104 members of the senate, 79 undergraduates, and 238 members on the boards.

Pembroke College, Oxford, originally Broadgates Hall, was founded by James I. in 1624, at the cost of Thomas Tesdale, of Glympton, Oxfordshire, and Richard Wighbrick, of Ilsley, Berks, and took its name from William Herbert, Earl of Pembroke, who was then Chancellor of the University. It is governed by a master, and has ten fellowships and twenty-four scholarships, six of the latter being open to competition. P. C. presents to seven livings, and in 1876 had 168 members of convocation, 84 undergraduates, and 297 members on the books.

Pembrokeshire, the most westerly county of Wales, is bounded N. and W. by St. George's Channel, S. by the Bristol Channel, and E. by Cardigan and Caermarthen. Area, 393,682 statute acres; pop. (1871) 91,998. The county, the southern promontory that continues the sweep of coast-land enclosing Cardigan Bay, has an irregular outline, indented chiefly by the beautiful expanse of St. Bride's Bay, and by the long, jagged inlet of Milford Haven, one of the finest of all natural harbours. The principal projections of the coast, which in great part is wild

and precipitous, are St. David's Head, St. Ann's Head (the horns of St. Bride's Bay), St. Govan's Head, and Penbrush Point. Off St. David's Head are the islets Ramsey, N. and S. Bishop, &c.; opposite St. Ann's Head, Skomer Island, Skokham Island, and the Smalls. In the N. the Percelley Hills traverse the county, and terminate in St. David's Head, attaining a height of 1754 feet. The surface generally is hilly and fertile, while the streams are very small, the only considerable ones being the E. and W. Cleddau, entering Milford Haven, and the Teivy, on the N.W. boundary. In 1876 there were 57,850 acres under corn crops, 13,702 under green crops, 35,610 in clover, sanfoin, and grasses in rotation, and 186,035 of permanent pasture. Barley, oats, wheat, potatoes, and turnips are the leading crops. The number of horses was (1876) 13,363; of cattle, 78,506; of sheep, 113,234; and of pigs, 24,895. P. has a mild, humid climate. The great S. Wales coalfield enters the county, but the anthracite seams vary in thickness from 6 feet to only a few inches. There is also some lead, iron, and slate wrought. The county sends one member to Parliament. Besides Haverfordwest, the county town, the centres of population are St. David's, Pembroke, Milford, and Tenby. P. has a singularly interesting local history. Such names as Haggard, Freystrop (doubtless *Freythorp*), and Milford (a true *ford*) point to early Scandinavian occupation. The English district in the S. of P., or 'Little England beyond Wales,' is the latest Teutonic settlement in Britain. From the direct witness of William of Malmesbury, and other contemporary writers, Henry I., among his measures to keep the Welsh in order, planted a colony of Flemings in Dyfed, the modern P. The colonists seem to have thoroughly ousted the Briton, for the one speech of the district is English, and most of the places have received fresh names. How the Flemings came to speak English is a standing local puzzle. But Flemish and English are both dialects of Low Dutch, and closely resembled each other in the 12th c. The English district is naturally rich in castles.

Pemm'ican, or **Pem'ican**, a kind of preserved meat originally prepared by the North American Indians, which consisted of buffalo flesh or venison deprived of its moisture by exposure to the sun's rays, and afterwards pounded and packed into bladders for future use. Similar preparations of beef have been furnished to various British Arctic expeditions. As an article of food P. has little value, and other preserved meats, which retain more of the nutritive elements of meat, have entirely displaced it. See PRESERVATION OF FOOD.

Pem'phigus, or **Pom'pholyx** is a skin disease, the eruption consisting of large bullæ, usually preceded by fever and constitutional disturbance, and locally by irritation and itching. When they burst they are succeeded by large brown crusts. The scabs fall in the course of three weeks, leaving the skin beneath of a dusky red hue, but perfectly sound. When the bullæ appear at once, the affection terminates in one or two weeks, but when they are developed at successive periods the disease may extend to three weeks or a month. The disease is one of debility, favoured by intemperance, bad diet, or cold, or it may be due to syphilis. The acute form may be treated by cooling medicines, nutritious diet, and mild local dressings. In the chronic form tonics should be employed, especially mineral acids and quinine, hydriodate of potass and arsenic. The inflamed skin should be anointed with benzoated zinc ointment, or dusted over with the oxide of zinc or starch powder.

Pen. See PENS.

Penal Servitude. The difficulties of finding colonies for the transport of criminals has made it necessary to substitute P. S. for transportation. Preceding Acts are amended by 27 and 28 Vict. c. 47, under which no sentence to P. S. for any offence committed after 1864 is to be for fewer than five years. A former conviction for felony makes the shortest term of the sentence seven years. The Crown may grant a license to convicts to be at large in the United Kingdom or Channel Islands, or in part of the same. See TICKET OF LEAVE.

Penalties (Fr. *pénalités*, from Lat. *penalis*, 'penal'). Any one failing to perform any act to which he has become bound, will be liable in damage to the person who suffers by his breach of agreement. But in estimating this damage, when there has been no fraud, indirect damage is not taken into amount. Thus

the failure to pay money at a stipulated date may occasion indirect damage to the creditor, but the law cannot estimate this, therefore the creditor's legal claim is limited to the principal sum with interest, and the expenses to which he has been put. Statutory penalties can, as a general rule, be sued for by any one, and statutes not unfrequently declare that the person suing shall be entitled to the whole or part of the P. which it imposes. It is usual when a penalty is imposed on an offence by Act of Parliament to state a maximum sum, leaving the modification to the discretion of the judge.

Pen'ance (Lat. *penitentia*) was the system of discipline to which persons who had been excommunicated for gross and scandalous offences were required to submit in the early Christian Church, before being readmitted to communion, as outward proof of their inward penitence and remorse. (See EXCOMMUNICATIO.) As those excommunicated were supposed, like the unbaptized, to be under the dominion of Satan, they had, like the Catechumens (q. v.), to undergo a period of probation under the name of penitents. Penitentiary (q. v.) priests were appointed at the time of the Decian persecution (250), and by the end of the 3d c. the Penitents were divided into four classes: the Weepers, the Hearers, the Kneelers, the Co-standers; the last three corresponding with the Catechumens.

When a penitent desired to be admitted to do public P., and his petition was granted, he received imposition of hands from the bishop, and was obliged to change his dress for one of sackcloth, to make confession of his sin, 'to prostrate himself before the presbyters of the Church, to kneel before the friends of God, and beg of all the brethren that they would become intercessors for his pardon.' According to some canons they had also to sprinkle ashes on their head, or even their whole body; to shave their head if a man, or cut their hair or go with it dishevelled and wear a veil if a woman; to fast privately, and especially to observe all public fasts; to abstain from all ablutions, from marrying, and, if married, from the marriage bed; always to pray kneeling, and to show great liberality to the poor. In later times corporal austerities, as the endurance of heat and cold, the wearing of hair-shirts, flagellations, &c., and menial offices, as burying the dead, &c., were largely introduced. The time of P. usually lasted several years; sometimes even to the hour of death. In Africa and Spain readmission was denied for ever for certain offences, unless a martyr interceded for the penitent.

Step by step the system was made more minute and elaborate. P. was extended to all sins, even the most secret; but alongside of this means were devised for relaxing its primitive severity, and for granting dispensation. The practice of auricular confession, which had originated with the Penitentiary priests, and which had fallen into entire disuse in the East, acquired ever-increasing importance in the West. Thus those who voluntarily confessed to a priest were thereby exempted from performing public P., and received absolution before undergoing the private P. which was imposed, although not at once admitted to communion. The barbarous races of Europe long resisted the system of P., and the system which was imposed upon them about the 8th c. was an accommodation to their own customs. They had always been accustomed to pecuniary mulcts, which had been adopted into their jurisprudence, so that by paying a fine a thief or a murderer could escape the punishment due to his crime. The regulations of P. among them had regard to the same customs, and persons were allowed to escape the P. to which they were liable by the payment of a certain sum of money. The system of P. had received a great impulse by the publication of the Penitential of Theodore of Canterbury (about 670), in which sins and penances were systematically classified, forming a complete confessor's *vade mecum*; but it was gradually subverted after the introduction of the system of Indulgences (q. v.), which was first adopted among the barbarians, and when found to be very profitable to the bishops, was adopted in the 12th c. on a gigantic scale by the Popes.

The early custom of associating P. with baptism, by making a distinction between sins committed before and after baptism, led the Schoolmen (q. v.) to class P. among the sacraments. According to fully developed Roman Catholic doctrine the matter of the sacrament is the contrition or remorse, the Confession, which must be auricular, and the Satisfaction. The form is the act of absolution by the priest.

At the Reformation the Reformers desired to return to the usages of the primitive Church in respect of the exercise of ecclesiastical discipline, the relaxation of which they regarded as one great cause of the universal corruption of religion which prevailed in the Church. Accordingly a very rigorous system was established at Geneva by Calvin, was adopted to some extent by the English Puritans, and more fully by the Scotch Reformers. In Scotland, any one guilty of gross and scandalous sin had to appear at the church door dressed in sackcloth while the congregation were assembling, and afterwards take their place in full view of the whole congregation, and after confession of their sin be rebuked by the minister therefor. But, just as in the Catholic Church, the full rigour of this P. began to be remitted on payment of a sum of money to be expended on charitable purposes, and it has now dwindled down to a rebuke by the kirk-session. See CHURCH DISCIPLINE.

Penang, Pulo (*i.e.*, 'betel-nut island'), or **Prince of Wales' Island**, a British possession included in the Straits Settlements (q. v.), and situated at the northern extremity of the Strait of Malacca, opposite Wellesley Province, on the mainland of the Peninsula, from which it is separated by a channel 7 miles wide. Area, 106 sq. miles; pop. (1871) 61,797, of whom 20,355 were Malays, 23,911 Chinese (5120 females), 5615 Klings, a native race, 3160 Jawi-pakans, 3848 Hindus, 1077 Bengalis, besides 343 Europeans, many Arabs, Javanese, Siamese, &c. The island is 14 miles long from N. to S., and is traversed by a well-wooded mountain ridge of granite and mica schist, which in the N., at the sanatorium of Strawberry Hill, reaches a height of 2922 feet. P. is visited daily by a grateful sea-breeze, and has a temperature in the coast-lands of from 80° to 90°, and at Strawberry Hill of 62° to 75°. Rain falls during all except the first two months of the year. On the W. and S.W. coasts are the plantations, and along the E. coast stretches a fertile and populous belt of land, laid out for the most part in gardens. The chief products are sugar, coffee, cloves, pepper, nutmegs, ginger, rice, sago, and timber. P. is also rich in fruits. The capital, George Town, lies at the N.E. end of the island, and had a pop. in 1871 of 30,729. Its harbour, defended by Port Cornwallis, is safe and commodious. P. was acquired by the East India Company in 1786, and is now under a lieutenant-governor, who is a member of the Executive Council of the Straits Settlements.

Penang Lawyers is a name given in the trade to the stems of two species of small fan-palms (*Licuala*), natives of Pulo-Penang. They are imported in the rough state, and after being made smooth and polished are manufactured into walking-sticks.

Pena'tes. See LARES.

Pen'oil (Old Fr. *pincol* (mod. Fr. *pincean*), from Lat. *penicillum*, a dim. of *penis*, 'a tail'), a term applied to two kinds of instruments—one a small hair-brush used by painters and artists in laying on colours, the other a cylinder of wood containing a slender rod of plumbago, coloured chalk, or prepared slate, for use in writing or drawing. A thin naked cylinder of slate is also called a slate-P., but a similar rod of coloured chalk is termed a Crayon (q. v.). Artists' pencils are made of the hair of the sable, badger, camel, or hog, or of swan's down, secured to a wooden handle.

Black-lead P. (familarly so called, although the name is misleading, since they contain no lead) were first employed in Italy in the 16th c. (Beckmann, *History of Inventions*). Previously a style formed of lead and tin was used for drawing lines on paper. These lines, however, were very faint as compared with the black-lead coloured marks of native plumbago, and probably that substance acquired its name of *black-lead* as much from this circumstance as from its general appearance. Keswick, in Cumberland, has long been the principal seat of the black-lead P. manufacture in England, the plumbago being found in a very pure state at Borrowdale, and from it the best English lead pencils are made. Formerly the *leads* were cut from slips sawn off the block as taken from the mine; but since the supply of large pieces of plumbago began to fail, the small fragments have been utilised for the purpose by an ingenious process devised by Mr. Brockedon. The fragments are reduced to powder and then compacted by moderate pressure. Thorough cohesion is not obtainable by simple pressure, on account of the particles of air resident in the interstices of the mass; the air must therefore be removed. This

is done by glueing paper all round a block, then perforating the paper, to allow the air to escape, and exhausting it under the receiver of an air-pump. The orifice is then closed with a wafer, and the compacted block is afterwards properly solidified by hydraulic pressure, and may then be sawn with as great facility as the native mineral. Inferior qualities of plumbago, derived from foreign sources, are, after being washed and purified, similarly formed into artificial blocks. Only the first quality of lead pencils is made from pure plumbago. The numerous inferior varieties are manufactured from a mixture of plumbago and clay, in varying proportions, by the method invented by M. Conté of Paris. The two ingredients are separately reduced to fine powder, and after the plumbago has been calcined, they are ground together, and thoroughly incorporated with water into a homogeneous paste. The leads are moulded from the pasty mass by pressing it into narrow grooves (square in transverse section) cut in a wooden board. When dry the moulded rods are shaken out, and are next hardened by exposure in a crucible to a high temperature. Another method of forming the leads is to force the pasty mixture, partly freed from moisture, through a hole in the bottom of a cylindrical press, the threads so obtained being afterwards cut into lengths and baked as already mentioned. The wooden cases in which the P. leads are enclosed are generally prepared from the P. cedar (*Juniperus virginiana*). The wood is cut into slips by machinery, and those slips which are to receive the leads are grooved. The grooves are filled with the leads, and the ungrooved slips of wood are then glued on as covers. After drying, the parallelipiped rods thus constructed are rounded in a cutting machine, then polished, varnished, and stamped with the name of the manufacturer and letters indicating the quality of the lead P. The best Keswick pencils are simply polished and not varnished. The letters stamped on pencils are H, signifying hard; HH, harder; and HHH, very hard; B, for black; BB, blacker; BBB, very black; and HB when hard and black. There are also degrees of *fineness* indicated by the letter F. Coloured pencils are made in a similar fashion, only the earthy material is not baked, because heat would destroy the colour.

Pencil cases, of which there are numerous varieties in general use, were invented by Mr. Mordan in 1822, and the small cylinders of plumbago which they contain are formed by forcing square strips through circular holes drilled in ruby, the hardness of the plumbago necessitating the employment of that precious material.

Pen'da, a famous Mercian king of the 7th c. who for a time successfully resisted the progress of Christianity in England. In 626, at the age of fifty, he ascended the throne. A heathen reaction was beginning to show itself in several of the English states—Kent, East Anglia, and Essex. In this movement P. saw a chance of Mercia freeing itself from the overlordship of the Christian kingdom of Northumbria, and allying himself with the Cymric prince Cadwallon, he attacked and slew Eadwine (q. v.) at Hatfield in 633. Nine years later he defeated and slew Oswald, the successor of Eadwine, at Maserfield. P. now stood supreme in England. Northumbria alone stubbornly resisted his overlordship, though year by year he wasted the land in ruthless invasions. Nor could he extirpate Christianity, or daunt the courage of its missionaries. Everywhere they were at work, and his power was quietly undermined in spite of his valour and craft. His own son, whom he had made king of the Middle English, received baptism from the monks of Lindisfarne. At last the extension of Northumbrian influence along the eastern coast stirred the aged monarch to a fresh, and, as it proved, a final struggle. In his eightieth year he marched against Oswi, the Northumbrian king. The two armies met at Winwidfield, by Leeds, in 665. P. was utterly routed, and fell along with thirty men of kingly family. 'The river over which the Mercians fled was swollen with a great rain; it swept away the fragments of the heathen host, and the cause of the older gods was lost for ever.' See Bede's *Hist. Eccl. Gent. Angl.*; *The English Chronicle*; and Green's *History of the English People* (1877).

Pen'dant, in later Gothic and Elizabethan architecture, an ornamental piece of stone or timber depending from a roof or vault. On stone vaulting the pendants are sometimes very large and richly carved. Of these, Henry VII.'s chapel at Westminster contains fine specimens.

Pen'dant, or **Penn'ant**, a long, narrow, tapering flag carried at the main-mast head of a ship of war to show that she is commissioned. The *Broad P.* is a square piece, carried (in the same way) on a commodore's ship. The *Rudder P.* is a rope fixed by a chain to the rudder, to prevent it from being lost when unshipped.

Penden'tive (from Lat. *pendere*, 'to hang'), in architecture, that portion of a groined or vaulted ceiling which, springing from the capital of any pillar, is enclosed by the longitudinal and transverse arches, and bounded by their apexes.

Pen'dleton, a suburb of Manchester, 2 miles distant on the main-road to Bolton, also a station on the W. section of the Lancashire and Yorkshire railway. It is a part of the borough of Salford, to which municipality it has belonged since 1852. On the Eccles Old and New Roads leading W., many villas have been erected by Manchester merchants. The pop. has increased rapidly of late years from the great development of the industries of cotton and flax-spinning, calico-printing, and dyeing. In the vicinity are extensive collieries. Pop. (1871) 25,489.

Pen'dulum is any body which oscillates under the action of gravity about one of its points which is fixed. A heavy mass or *bob* suspended from a point by a light rod or string is the ordinary form of simple P., and is the simplest form under which the peculiarities of P. motion can be studied. Suppose then a sphere of weight, *W*, suspended from a fixed point by a thin rod, whose weight may be neglected, compared to that of the bob; and let the distance from the point of suspension to the centre of the sphere be represented by *l*. This distance is the length of the P., since the mass of the bob may be regarded as concentrated at its centre of inertia, which is in this case its centre of figure. For any P. the point at which the mass may be regarded as concentrated is called the centre of oscillation. The condition that the P. should be in stable equilibrium is that the centre of oscillation should be vertically below the centre of suspension. When this condition is fulfilled, a displacement of the bob to either side will call into existence a force tending to bring it back again; and if this force be permitted to act without restraint, the P. will return to its mean position and continue to oscillate about it. If the arc of oscillation is small compared to the length of the P., the motion is very approximately simple harmonic motion, and the P. is nearly isochronous. That is, the time of oscillation through different lengths of arc is the same, provided the arcs are all small. It is given by the formula:—

$$T = 2\pi \sqrt{\frac{l}{g}}$$

when π is the constant 3.14159....., and *g* is the acceleration due to gravity in one second. Hence the time of one half-oscillation or the beat of the P. is equal numerically to

$$\pi \sqrt{\frac{l}{g}}$$

Here it is observed that mass does not enter. In other words, the material of which the bob is composed does not affect the time of oscillation. This was experimentally proved by Newton, and clearly demonstrates that the weight of a body—i.e., the attraction of the earth upon a body—is proportional to the mass of the body. And hence every body is equally accelerated under the action of gravity. A glance at the formula, which gives the time of swing of a P., suggests at once an experimental method for calculating this acceleration. Squaring both sides of the equation

$$t = \pi \sqrt{\frac{l}{g}}$$

and transforming, there results the equation

$$g = \frac{\pi^2 l}{t^2}$$

where, of course, *g* is expressed in the units of length and time chosen. When the foot and second are taken at Edinburgh, $g = 32.207$; when the centimetre and second are employed, $g = 981$. Or, in words, at the end of each successive second, the velocity of a falling body is accelerated by 32.2 feet, or 981 centimetres. Any body which, like the simple P., has one degree of freedom (oscillation, namely, in a given plane, and therefore about a definite axis perpendicular to the plane), is similarly isochronous for small oscillations. If the moment of

inertia of the body about the axis of suspension be divided by the product of the whole mass into the distance of the centre of inertia from the same axis, the quotient represents the distance from the axis of a point, known as the centre of oscillation. Its property is that if the whole mass were collected there, the simple P. so formed would oscillate in the same time as the body does. The centres of oscillation and suspension are interchangeable—a property which at once suggests an experimental method of determining the position of the centre of oscillation. The method was successfully applied by Captain Kater in his determination of the length of the second's P.

The greatest number of degrees of freedom which a P. of invariable length can have are two, since this condition of invariable length confines the bob to a definite spherical surface. Such a P. is generally termed a conical P., since the connecting sweeps out the surface of a cone, whose vertex is the point of suspension. The path traced by the bob, being the intersection of a cone by a sphere whose centre is at the vertex, is therefore a spherical conic, which for particular cases assumes extremely simple and interesting forms. If the P. is so suspended that the time of oscillation is the same in every azimuth, the cone described is one of the second order, and therefore for small oscillations the path of the bob is in general an ellipse. If the times of oscillation in two mutually perpendicular planes differ, the path is no longer so simple; but if this difference be small, the path may be regarded as an ellipse, which, however, is continually varying in eccentricity, passing through all possible forms, from a straight line to a circle.

The most important practical application of the P. is to the regulation of timepieces. In its simplest form a clock P. consists of a light metal rod with a flat circular bob attached below. Above, it communicates by means of the escapement with the clock-train, in such a way that at every beat of the P. each wheel suffers a certain definite rotation round its axis. There is therefore a particular time of beat required to make the clock keep accurate time. For this time of beat a certain length of P. is necessary. Should the P. be too long, the time of beat will be lengthened, and the clock will go slow; and if the P. is too short the clock will go fast. By a fine screw adjustment the bob can be raised or lowered according as the clock is going fast or slow. When, however, the P. is finally adjusted to the proper length, another cause of error arises from the variation of this length with temperature. An increase of temperature necessarily lengthens the P., and slackens the time, while a decrease in temperature quickens the time. To remedy this, Harrison invented his *gridiron* P., and Graham his *mercurial* P. The principle of the former is shown in the cut. The rod is composed of alternate bars of two different metals. The outside bars and the centre bar are of the same metal, and when heated expand *downwards*. The intermediate bars are made of the other metal, and when heated expand *upwards*. The coefficients of linear dilatation for these two metals are different; but the lengths of the bars are so proportioned that the whole lengthening downwards of the one set is exactly counteracted by the whole lengthening upwards of the other, so that the bob is not altered in position. In Graham's compensation P., the bob is a glass cylinder containing a quantity of mercury. When, through rise of temperature, the single metal rod lengthens, the mercury in the cylinder simultaneously expands upwards, and raises the centre of inertia of the bob; and hence, by using a proper quantity of mercury, the centre of oscillation is kept at a constant distance from the centre of suspension. See HOROLOGY.



Penel'ope, daughter of Icarus and Periboea, according to the Grecian legend embodied in the *Odyssey* of Homer was the wife of Ulysses (q. v.) and the mother of Telemachus. During the long absence of Ulysses after the Trojan war, she was surrounded by a crowd of eager suitors, but constantly put off their advances with the excuse that she must first weave a shroud for Laertes, her father-in-law, and to extend the time she used to pull down at night what she had woven during the day. This practice, however, having been detected, she was forced to name a day on which to choose between the rivals, when the timely arrival of her long-wandering husband rewarded her constancy and saved her reputation.

Pen'guin (*Aptenodytes*), a genus of *Natatorial* birds, belonging to the *Alcida* or Auk family. The hinder toe is small, and the bill slender, its base being covered by skin. The wings are very short, and covered with rudimentary or scale-like feathers. They are useless for flight, but aid the bird in swimming and diving. The front toes are webbed. The legs are short, and being placed far back on the body, enable the P. to rest in an erect posture, on the long *tarsus* or ankle. The bones are heavy as compared with those of most other birds, are destitute of air cavities, and contain marrow; conditions which give the birds a secure hold of the water. The penguins are strictly aquatic, inhabiting sea-coasts, particularly in southern latitudes, and assembling in immense numbers. They may be seen on some coasts presenting a serried array, and looking like files of soldiers drawn up in regular line. The female hatches its eggs by keeping them between its thighs, and moves about with them in this position. It usually lays a single egg, and the young are covered with a grey wool. The common P. (*A. pennantii*) is a familiar species, but the King P. (*A. pennantii*) is one of the most typical forms. The latter attains a length of 3 feet. The head and throat are of a black colour, and encircled by a yellow band. The back is grey, with a bluish tint, and the under parts are silvery white. This species is common on the Patagonian coasts, as is also the crested P. (*Eudyptes chrysoloma*).

Pen'holders are numerous in form and varied in material, but they are most commonly made of pencil cedar. Messrs. Joseph Gillott and John Morrison in 1859 patented a most ingenious machine for automatically making, polishing, and varnishing P. from rods or strips of wood supplied to it. Much ingenuity has also been expended, without any considerable advantage, in designing fountain P. intended to carry in them a supply of ink.

Penin'sula (Lat. *pene*, 'almost,' and *insula*, 'an island') a portion of land nearly encircled by water, and connected with the mainland by an isthmus.

Pen'is, the term applied to part of the male organs of generation in animals, the P. being the copulatory organ. It is found in many Invertebrates (e.g., some insects, molluscs, &c.), and may be wanting in some vertebrata (e.g., fishes, &c.). In mammalia it is attached to the *Symphysis pubis* (see PELVIS), and consists, in the human subject, of a body, root, and glans. The root is attached to the pubis by two fibrous processes, the *crura*, and by a fibrous membrane termed the *suspensory ligament*. The body of the organ is covered by a very thin integument, which at the *glans* or extremity becomes folded on itself, to form the *prepuce* or *foreskin*. The mucous membrane covering the glans is unprovided with sebaceous glands, but its surface is covered with *papillæ* which are highly sensitive. The substance of the body consists of erectile tissues, capable of undergoing distension when filled with blood. These tissues are disposed in three chief masses, of which the two *corpora cavernosa* are the chief, the *corpus spongiosum* forming the remainder of the organ. The *corpora cavernosa* lie side by side and form the upper portion of the P., whilst the *corpus spongiosum* encloses the *urethra*. Each of the former bodies consists of a strong envelope of fibrous tissue, containing erectile tissues. The *corpus spongiosum* is also erectile in its nature, and in addition contains a layer of muscular fibres. The *veins* of the P. are very numerous, and form the chief elements in the erectile tissue. They are largest in the middle of the *corpora cavernosa*, and open into the *dorsal vein* of the P. The *arteries* are derived from the *internal pudic branch* of the P. The *arteries* are derived from the *internal pudic nerve* and *hypogastric plexus*.

Peniten'tial Psalm, or **Psalm of Confession**, was a name applied in the early Church to the Fifty-first Psalm, which was regularly used as a general confession of sin at the close of daily morning service. It is now applied to seven—Ps. vi., xxxii., xxxviii., li., cii., cxxx., cxliii.; the number having probably been fixed with reference to the days of the week.

Peniten'tiar'ies are properly asylums for penitent women. The first institution of the kind in this country was the London Magdalen Hospital founded by Mr. Dingley in 1758. The condition of admission was penitence, not destitution. For fifty years the Magdalen was the only house of refuge for the fallen, and long claimed to restore permanently two-thirds of all those received within its walls. In its palmiest days 300 applicants were treated

annually, but the average of recent years has been under one half of that number. From its establishment till 1st January 1877, 10,867 women have been admitted, of which number 7119 are stated to have been reconciled to their friends or placed in service; 2402 discharged at their own request, and 1106 discharged for improper conduct. The number of cases dealt with in the Home at Streatham during the year 1876 was 141. The period of an inmate's probation is about two years, during which she is trained in laundry and needle-work, and prepared for service, and receives general and religious instruction. The proportion who remained till they were passed into service was 65 per cent. of the whole a quarter of a century ago, but has now decreased to about 42 per cent. At the end of a year a former inmate receives £1, 1s. if she is still doing well, and as a matter of fact about one-fourth come to claim this reward. The apparently less successful results of the Institution during the latter half of its existence may be greatly owing to the increased demand all over the country for domestic servants, which makes a situation now more easily obtainable by those women who sincerely wish to change their mode of life, while on the other hand many of the impenitent avail themselves of the home at times of absolute destitution. There is nevertheless abundant proof that in many instances the good work done is crowned with success. There are now a multitude of similar institutions all over the country, whose rules and regulations as to discipline and length of probation vary to a large extent. The Church Penitentiary Association had in 1877 in union with it 21 P. and 13 Houses of Refuge, in which 149 self-devoted women were ministering to an average of 753 penitents. Out of 1032 who left during the year, 489 cases were recorded as favourable, 197 as unfavourable, and 346 as doubtful. The Reformatory and Refuge Union, founded in 1857, had also a large number of P. in connection with it. The London Female Penitentiary was established in 1807, and up to 1877 had received 5333 inmates, of which 1830 had been placed out to service, 1067 reconciled and restored to their friends, and 965 had been discharged at their own request. The number of inmates average from 70 to 80. Seven Homes with accommodation for 170 inmates were in connection with the London Female Preventive and Reformatory Institution in 1878. Among the leading provincial P. are the Magdalen Hospitals at Dublin (founded 1767), Edinburgh (1797), and Glasgow.

Peniten'tiar'ies were instituted by 19 Geo. III. c. 7. They are now regulated by the Prisons Act. See REFORMATORY and INDUSTRIAL SCHOOLS.

Peniten'tiary, in the early Church, was a priest whose office was to receive private confessions, in order to facilitate and promote the exercise of public discipline. It was not long, however, till the office was abolished, on account of scandal. In modern times the name is applied to a court at Rome, as well as to the president (generally a cardinal), the business of which is the consideration of cases calling for dispensations (from penance, &c.) from the Pope.

Penn, William, son of Admiral Sir W. Penn, was born in London, 14th October 1644, and received his education at Chigwell in Essex, in Ireland, and at Christ Church, Oxford. In the last place an incident occurred which turned the whole current of his life. He heard the new gospel of Quakerism preached by Thomas Loe, became infected by its republican spirit, gave up attendance on the English Church, resented the wearing of academical robes, and even attacked fellow-students to whom they had not become obnoxious. His enthusiasm resulted in expulsion from Oxford, and earned for him the strong disapproval of his father, who at first declined to see him, but afterwards equipped him for a trip on the Continent so as to win him back to sense and worldly wisdom. The experiment was not successful, for after two years' residence in France and Italy, P. returned to England, studied at Lincoln's Inn until 1666, when, being despatched to Ireland to look after some family estates, he again met Loe and resumed his former connection with Quakerism. Again his father was disgusted with him on his return to England, and when the obstinate sectarian declined to uncover either in the presence of the Duke of York or the King, the admiral drove him a second time from his door. Though P. immediately commenced to preach and publish, the paternal heart again softened towards him. But in 1668 he was sent to the Tower for an attack upon the Trinity contained in *The Sandy Foundation Shaken*. It was followed by *No Cross, No Crown*;

Innecy with Her Open Face, and two other books, all written during the eight months of his confinement. He resumed preaching as soon as he was set at liberty, and (1670) was summoned before the magistrates; but the jury declined to convict him, and were themselves fined. In the same year died Admiral P., leaving his son £1500 a year and claims on the Government for £16,000. Imprisonment for six months (1671) resulted in his publication of the *Great Cause of Liberty of Conscience*. After a propagandist tour on the Continent in the company of Fox and Barclay, he married (1672) a daughter of Sir W. Springett. Meanwhile his attention was being directed to the New World, where the Friends were already forming themselves into colonies for the purpose of obtaining liberty of worship and equal political rights. He became a proprietor (1677) in W. New Jersey, which was partly constituted a Quaker settlement. With the intention of founding an exclusively Quaker colony he got a grant of land in 1680 from Charles II. as a quitclaim of the £16,000 due to him, between Maryland and New York. He had power to make laws with the assent of the freemen, and, curiously enough, command of the forces. In 1681 he followed the three ships which had already crossed with colonists, drew up rules for the settlers, and in 1682 published a constitution and laws. His laws, which only enacted religious conformity to the extent of belief in one God, were marked by a large spirit of tolerance. To him also was due the foundation of a lasting friendship with the Indians. Stress of business in 1684 sent him back to England, and upon the accession of James II., his father's friend, he became a visitor at Whitehall, which led to his being denounced as a Papist and a Jesuit. His connection with the court has furnished Macaulay with certain heavy charges which he has brought against him of conspiracy, falsehood, and Jacobitism. That there was some ambiguity in his behaviour both then and afterwards with regard to the Stewart family may be admitted; but it is now universally allowed that the strictures of Macaulay are not only too severe, but in at least one particular case absolutely unjust, the historian having recklessly confounded P. with his brother. Under William III. P. was thrice accused of treason, but acquitted after a searching trial in 1693. He was married a second time in 1695, and in 1700 he revisited his colony, where disputes had broken out. He returned to England in 1701; and in 1712, being embarrassed in his circumstances, offered his proprietorship for sale to the crown, but failed to agree about the terms. Being seized with a stroke of apoplexy, he became quite unfit for business. He died at Ruscombe, Berkshire, 30th July 1718. Whatever be the true explanation of his relationship to James II., P. has earned an undying character for love of liberty; and he is known to have been a conscientious and just administrator. His Complete Works were published in two vols. fol. 1726. See H. Dixon's *Life of P.* (1851); Paget's *Inquiry into the Evidence of the Charges brought by Lord Macaulay against W. P.* (1858); Macaulay's *History of England* (1849-55); and *Correspondence between P. and Logan, Secretary of Pennsylvania, and Others, from Original Papers* (vols. i. and ii.; Lippincott, 1874). A literary curiosity, entitled *Facsimile Copies of Original Letters, Deeds, &c., by William and Hannah P.*, was published by direction of Mr. Samuel Gurney (Lond. 1877).

Pennair, or **Pinakini** ('the bow of Siva'), the name of two rivers in S. India, both of which rise near Nundidrug in Mysore, and flow E. into the Bay of Bengal. (1) The north P. falls into the sea about 19 miles below Nellore town. Total length, 355 miles. Area of drainage basin, 20,500 sq. miles. It is useless for navigation, being liable to heavy floods, which in 1874 carried away an important railway bridge. At Nellore ferry an *anicut* or weir was constructed in 1857, and repaired in 1869 by Sir A. Cotton. It is now capable of irrigating 64,000 acres. The canal of the Madras Irrigation Company, completed in 1871, connects the P. with the river Krishna. (2) The south P. falls into the sea a few miles from Cuddalore. Total length, 245 miles. Area of drainage basin, 6200 sq. miles. In the upper portion of its course the water is collected in large reservoirs for irrigation.

Pennant, Thomas, D.O.L., F.R.S., a naturalist and antiquary, descended from an old Welsh family, was born at Downing, Flintshire, 14th June 1726. He was educated at Queen's and Oriel Colleges, Oxford, and early devoted himself with ardour to the study of British natural history. In 1761 he published the first part of his *British Zoology*, which gained him

a solid reputation both in Britain and on the Continent. Four years afterwards he visited France and Germany, where he became acquainted with Buffon, Haller, and Pallas. In 1769 he made a tour to Scotland, which he revisited in 1771, and where he met with a distinguished reception. After a busy life of research and literary labour, he gave to the world in 1793 an amusing work entitled *The Literary Life of the late T. P., Esq., by Himself*. He died 16th December 1798. P.'s chief works are *British Zoology* (1761-69), *Synopsis of Quadrupeds* (1771), *Genera of Birds* (1773), *Arctic Zoology* (3 vols. 1784-87), *Tours in Scotland* (3 vols. 1790), *Tour in Wales* (2 vols. 1778-81), *Account of London* (1790), *Outlines of the Globe* (2 vols. 1800).

Pennat'ula, or 'Sea-Pen,' so named from their resemblance to a quill-pen, a genus of *Calenterate* animals, class *Actinouoa*, and order *Alyonaria*. The organism consists of a main stem, the lower and dilated extremity of which is implanted in the mud or sand of the sea bed. A slender rod-like coral structure is found in the interior of the stem at its lower portion—this coral being of the *scleroblastic* variety. The main stem supports lateral branches, and the little 'polypes,' each having eight fringed tentacles, are born on the branches. P. occur round the British coasts, and may attain a length of from 2 to 4 inches. One species (*P. phosphorea*) is markedly phosphorescent at night. The name 'Cock's-comb' has been applied to species of P. which are nearly related to the *Virgularie* (q. v.) or 'sea-rods.'

Penn'ion, in Heraldry, a small flag with either one or two points. Borne on the lance, immediately below the head, the P. was considered the peculiar ensign of knightly rank, was charged with the bearer's badge, and was usually fringed with gold. The charges on the P. were so placed, that they were in position when the lance lay level for the charge. A lesser flag of the same kind was called a *fennoncelle*.

Pennsylvania, one of the States of the American Union, and of the original Confederacy of 1776-88, is bounded N. by Lake Erie and New York, E. by New York and New Jersey, from which it is separated by Delaware River, S. by Delaware, Maryland, and W. Virginia, and W. by W. Virginia and Ohio. Area, 46,000 sq. miles; pop. (1870) 3,521,951, of whom 65,294 were coloured. The State is in form almost quadrangular, its boundaries on the N., W., and S. being merely the lines of longitude and latitude. Its surface is much diversified, and is traversed from N.E. to S.W. by the Alleghany ranges, which here reach a breadth of more than 100 miles, though none of the summits attain a height of 3000 feet. To the W. of these lies a broad plateau, which occupies half the area of the State, and is only occasionally broken by ranges of low hills, while the eastern portion of the State displays an alternation of broad valleys and gently rounded hills, not less suited for the growth of cereals than the more level land in the W. The principal rivers are the Delaware, Susquehanna, Monongahela, and Alleghany, the two latter uniting at Pittsburg to form the Ohio. The chief geological formations are the Silurian, Devonian, and Carboniferous, which are overlaid in most districts by a thick bed of alluvial deposit, and interrupted by isolated masses and ridges of trap rock. The most valuable minerals worked in P. are anthracite coal (in 1870, 25,000,000 tons), iron (in 1873, 1,389,573 tons), petroleum (in 1875, 8,619,639 barrels), zinc, copper, marble, and slate. One-fourth of the area of the State is covered with forests, which are infested by bears, panthers, lynxes, wolves, and other wild animals. In 1874 there were 17,994,200 acres of the land in farms, valued at \$1,043,481,582. In the same year the produce of Indian corn was 35,821,000; of oats, 25,607,000; of wheat, 16,636,000; of buckwheat, 2,062,000; of rye, 3,250,000; of barley, 437,000; of potatoes, 9,223,000; of tobacco, 10,500,000 lbs.; and of hay, 2,421,900 tons—total value, \$117,730,915. The live stock comprised 573,700 horses, 722,600 oxen, 828,800 milch cows, 1,674,000 sheep, and 930,900 swine—total value, \$121,803,698. P. imports grain, dairy produce, cloth, and machinery; the chief articles of export being coal, iron, and petroleum. In the amount of its manufactures the State is second only to New York. In 1870 the capital invested was \$406,821,845, and the value of annual produce \$711,894,344. The chief manufactures are iron, machinery, flour, leather, cotton (in 1870 nearly 140 mills), woollens (in 1871, 457 factories), sugar, and glass. In 1877 there were 5983 miles of railway, and nine canals, with

a total length of 875 miles. The State debt in 1876 amounted to \$23,233. Harrisburg is the capital, and Philadelphia the largest city; other towns of importance are Pittsburg, Allentown, Scranton, and Reading. Delaware River was first ascended in 1616 by Cornelis Hendricksen. In 1643 a colony of Swedes settled at Tinicum Island, and founded several towns, which were taken forcible possession of by the Dutch under Stuyvesant in 1655, but came into the hands of the English on the conquest of New Amsterdam by the latter in 1664. In 1681 the territory of P. was granted by Charles II. to William Penn, in consideration of the claims of his father, Admiral Penn; and the province remained in possession of the Penns till the reading of the Declaration of Independence at Philadelphia, July 4, 1776, in which year its constitution as the State of P. was drawn up and ratified. In 1778 the original charter was annulled, and the Penns were allowed £130,000 for their unsettled lands in the State. Slavery was abolished in 1780. Great excitement was created by the discovery of petroleum in 1859, and P. still remains the chief seat of its production. In July 1877 alarming riots took place in the State, arising out of a great strike on the railways and in the collieries, which were only suppressed, after many excesses, by the troops under General Haitranft. The damage done to railway property was estimated at £2,000,000. Much ill-feeling was left behind, and a 'working-men's party' was formed outside the two great recognised divisions (Republicans and Democrats) in American politics.

Penny (Old Eng. *pening* and *penis*; Ger. *pfennig*, Icel. *penningr*, 'cattie', 'money'), a copper coin of English currency, equivalent to the twelfth part of a shilling, and the 240th part of a pound sterling. Originally it was a silver coin, and was the only one current before the Norman Conquest. Until the reign of Edward I. the P. was deeply indented with a cross, so that it could be easily broken into two for *half-pence*, and into four for *farthings*. The weight of the P. was also at this time fixed as the twentieth part of an ounce—hence the *penningweight*, one of the weights of Troy measure. The first copper P. was struck in 1797, though copper half-pennies and farthings had been in use since 1672. The P. of the present day is of much smaller dimensions than the original copper coin, and weighs when new half-an-ounce. The halfpenny is exactly an inch in diameter.

Pennyroyal. In some of the English counties this plant is in such request for flavouring purposes amongst the poorer community as to be now almost eradicated. In others it is universally grown in cottage gardens, and made into a herb tea (see MINT). American or mock P. (*Haleoma pulegioides*) is also a labiate herb with a pungent pleasant taste. It is common in the United States, and is extensively used there in domestic medicine.

Penobscot, the largest river of Maine, U.S., rises near the centre of that State, and, after a southerly course of nearly 300 miles, flows into the Atlantic at P. Bay. It is navigable for large vessels to Bangor, 60 miles from its mouth, where the tide rises 17 feet. The P. is the most important salmon-stream in the United States.

Pen'rith (Cymr. *Penrhyn*, 'the head of the ford'), an old market-town of Cumberland, picturesquely situated at the base of Beacon Hill, in a rich valley to the S. of Inglewood Forest, near the rivers Lowther, Eamont, and Petterill, 17 miles S.S.E. of Carlisle by rail. It has the ruins of a castle, a large parish church of 1720, a church in 13th c. style erected in 1850, a free grammar-school founded in the reign of Elizabeth, a literary institute, &c. The industries are brewing, ironfounding, and timber-sawing. P. is a tourist starting-point for the English Lakes, and in the vicinity are Broughton Castle, and many other interesting remains. The Beacon Hill commands delightful views of Helvellyn, Ullswater, Skiddaw, and Saddleback. Pop. (1871) 8317. P. was sacked by the Scots in the reign of Edward III., and again in that of Richard III.

Pen'ryn (Cymr. 'the headland'), a market-town of England in Cornwall, at the head of Falmouth Harbour, 2 miles N.W. of Falmouth by rail. It has a town-hall, market-house, mechanics' institute, one newspaper, granite and manure works, tanneries, flour, paper, and saw mills, and large warehouses for grain and other imports. Fishing and boatbuilding are the principal industries, and there is a considerable export trade in granite and vegetables. P., with Falmouth, returns two members to Parliament. Pop. (1871) 3679.

Pens (Lat. *penne*) are instruments employed to produce written characters by means of fluid ink. The earliest form of P. appears to have been made from a species of reed, such as is still in use in Persia, Arabia, and China. The quills of various large birds, especially the goose and the swan, were of later introduction, being unknown till about the 5th c. These constituted the P. in general use among modern civilised communities till the present generation, when steel P. were introduced, and these have now greatly superseded all other forms, although the demand for quills is yet very considerable. A steel pen was invented and manufactured by a Mr. Wise about the year 1803, but as it was both costly and inefficient, it met little success; and the first who secured a patent for making steel P. was Mr. James Perry, in whose specification, dated 24th April 1830, the modern steel pen is clearly described. The 'Perryan' P. were manufactured by the late Sir Josiah Mason of Birmingham, to whom along with the late Joseph Gillott is due the perfection to which the modern metallic pen has reached.

Birmingham has a practical monopoly of the pen manufacture, none being made anywhere else in the United Kingdom, while in foreign countries the manufacture is on a comparatively unimportant scale. The industry affords a healthy employment for females; and the Gillott factory, for beauty of machinery, tidiness, and general air of comfort, is one of the most pleasing and interesting sights in the whole range of industrial pursuits. The following is an outline of the processes necessary for the production of a steel pen:—The steel must be of the finest quality, and is received in ribbons of about 3 feet in length, and of such a breadth that the blanks for P. may be cut out, leaving the least possible amount of 'scrap' or waste. The strips are first annealed, and the scale formed on them is removed by pickling in dilute sulphuric acid, and they are passed between rollers to bring them to the necessary thickness for pen-making. The 'blanks' or pieces which form the pen are next cut out, two blanks with inoculating points being cut out of one breadth of steel ribbon. In these blanks the side slits which give elasticity to the point are first cut, the hole which terminates the slit subsequently made is next pierced, and at this stage the blanks are annealed in a muffle furnace. The maker's name or any special mark is next impressed on the blanks, and they are now ready for being rounded or raised into pen form, which constitutes the next operation. At this stage the P. in process are packed in a small iron box heated in a muffle, and hardened by plunging into oil. The P. are next tempered, after which they are polished or scoured by being mixed with polishing material, and placed in a revolving cylinder, in which they are brightened by the attrition of the revolving materials. The points have now only to receive attention, and they are first ground straight or parallel to the axis of the P., then cross ground, and as a final operation the central slit is made. The finished P. require only to be blued or browned and varnished, and the colouring is done by heating them over a charcoal fire till they assume the desired tint, the varnish consisting of lac dissolved in naphtha. The manipulative processes indicated above are performed with hand-screw presses, fitted with the requisite piercing, cutting, or bending tools, and worked by girls—self-acting machinery being but little employed. For many years Birmingham has produced annually from eight to fifteen million gross of P. Thirty years ago P. were sold wholesale at 5s. a gross, and now they are sold as low as 1½d. and 1¼d. per gross. When it is remembered that each gross requires 144 pieces of steel to go through at least 12 processes, the fact that 144 P. can be sold for 1½d. is a singular example of the results attainable by the division of labour and mechanical skill. P. are manufactured of other substances besides steel. Of these, the chief are gold P., which possess the advantage of being incorrodible by ink, besides having a fine quill-like flexibility. Gold P., tipped with a native alloy of osmium and iridium (osmiridium) are exceedingly durable. In the United States there were in 1876 some thirty factories of gold P. and pencils, producing goods to the value of nearly \$2,000,000 yearly. P. of silver, platinum, and aluminium bronze are also manufactured, and they may be similarly tipped with osmiridium.

Pensacola, a town in the W. part of Florida, U.S., on P. Bay, 10 miles from the Gulf of Mexico, and 160 miles S.S.W. of Montgomery by rail. It has an excellent harbour, protected by several forts, and considerable trade in lumber. Pop. (1870)

3347. P. was a place of some importance under the Spaniards, and near the town are the ruins of their fortresses San Miguel and San Bernardo. Held by the French from 1719 to 1723, it passed to England in 1763, was recovered by the Spaniards in 1783, and was again occupied by the English during the war of 1814. It was ceded to the United States, October 24, 1820. P. suffered severely during the civil war of 1861.

Pensionary, Grand. See GRAND PENSIONARY.

Pensioners, Military and Naval.—(1.) *Pensions to Officers.*—The highest class of pensions in the army are those called 'Rewards for Distinguished Services.' In 1877-78 the amount in the estimates under this heading was £33,530, being £21,700 pensions to officers (£100 each with few exceptions), £5000 to sergeants, £830 Victoria Cross pensions, and £8000 gratuities for long service. The corresponding 'Meritorious Services' pensions in the navy were estimated in the same year at £7400, being at the rate of £300 to flag officers, £150 to captains, and in various amounts to marine and medical officers. £240 was paid in pensions 'for conspicuous bravery.' *Pensions for wounds* are awarded by the Secretary of State for War to officers in the army, and by the Lords of the Admiralty to those in the navy, who have suffered serious injuries while on active service. From £400 to a lieutenant-general to £70 to a lieutenant is paid when wounds are equivalent to a loss of a limb, so long as the effects of the wound continue, and gratuities of from three to twelve months' pay of the ranks is granted for less serious wounds. The amounts on this account (1877-78) were £15,097 to 164 officers in the army, and £8265 to 88 officers in the navy. Ninety old and disabled officers in the navy received £5025. The Government also charges itself with *Pensions to Widows* of commissioned and warrant officers so long as they remain unmarried, provided that their husbands were sixty years of age (fifty if warrant officers) when they married, and that death occurred at least twelve months after marriage. These pensions are of three classes, according as the death of the officer has been occasioned, (1) in battle, or from wounds, death occurring within six months, (2) by some cause arising from his duty, (3) by the ordinary course of nature. In the first class they range from £60 to the widow of a lieutenant to £200 to the widow of a lieutenant-colonel or of a captain in the navy, in the second class from £50 to £150, in the third class from £40 to £120. Allowances are also sometimes made to sisters of deceased officers who are dependent upon them. In the army (1877-78) 1821 widows received pensions of £106,126. In the navy, 235 widows and relatives of slain or drowned officers received £13,374, 2604 widows of deceased naval officers £131,972, and 170 widows of marine officers £8898. When the families of the deceased are in distressed circumstances, 'compassionate allowances' are made on account of the children, varying from £5 to £40 each, and payable till the child attains the age of eighteen if a boy, or twenty-one if a girl. Charge for compassionate and royal bounty allowances in the army (1877-78) £37,035, in the navy £18,500. (2.) *Pensions to Men.*—Soldiers in the army become entitled to long-service pensions after twenty-one years' service, or a shorter period in case of wounds or disablement. So small pensions as 1½d. a day are granted to negro soldiers in the W. Indies, but the amount to soldiers in this country is 8d. a day to a private, and 2s. 6d. to a non-commissioned officer, with an addition of 1d. a day for every good-conduct badge held by the pensioner on his discharge. In certain cases pensions for wounds are granted, the maximum to a non-commissioned officer being 3s. 6d. A soldier discharged at the end of twelve years, his first period of service, is entitled to no pension; but he may enlist again for a further period of nine years. If he has been discharged as an invalid, or because he is unfit for service, he receives a temporary or permanent pension varying from 6d. a day to the ordinary amount. Gross misconduct takes away the right to a pension. In all the important towns there are staff-officers of pensions, who pay the amounts to the old soldiers in their respective districts. In 1878 there were five of these staff-officers in London, two in Plymouth, and fifty-seven in other towns, the expenses of this department being £60,000. The out-pensions in the army (1877-78) amounted to £1,345,200, £340,000 of which was charged to India. This includes the payment of 68,234 Chelsea P., and allowances to native P., and Maltese Fencible Artillery P. Gratuities to well-conducted soldiers on

and after their discharge from the army were provided from the fund arising from fines for drunkenness to the extent of £17,000. The in-P. are housed at Chelsea Hospital, London, and Kilmainham, Dublin, and receive small pensions (privates 7d. per week, corporals, &c. more), and board, lodging, and clothing. The expense of Chelsea Hospital, including pay of 538 inmates, was estimated (1877-78) at £28,400; that of Kilmainham, which accommodates about 130 P., at £6612. Pensions to seamen and marines in the royal navy are similar to those in the army, and are payable through the military staff-officers of pensions. They vary from £3 to £57 a year, and the total amount estimated in 1877-78 was £477,285 to 21,036 recipients. There have been no naval in-P. since the transformation of Greenwich Hospital to a naval college. Small pensions are granted to mercantile sailors from the funds of Trinity House. A detailed history of pensions in the British army to the year 1869 will be found in vol. ii. of the *Military Forces of the Crown*, by C. M. Clode.

Pentacrinus, a genus of *Crinoids* (q. v.) or sea-lilies, represented by the *P. Caput-Medusa* of the Caribbean Sea. Each P. consists of a starfish-like body, supported on a flexible-jointed stalk. It is rare as a living organism, though plentifully represented in a fossil state. The lists of living species, however, have been considerably extended within late years through the discovery of new species made by deep-sea dredging expeditions. The stalk in P. is pentagonal, and bears lateral processes. The genus P. occurs fossil in Mesozoic rocks, *P. fasciculosus* of the Lias being a familiar species. The calyx is short and the arms are slender and branched.

Pentadesma, a genus of *Guttifera*, to which belongs the butter or tallow tree of tropical W. Africa, called by botanists *P. butyracea*. It grows to the height of about 40 feet, and bears a large pear-shaped fruit containing a yellow oily juice, which is used by the natives as an article of food, notwithstanding its strong turpentine flavour. P. must not be confounded with Mungo Park's Shea butter-tree, for which see *BASSIA*.

Pentagon (Gr. *pentē*, 'five,' and *gōnia*, 'an angle') is a plane geometrical figure of five sides.

Pentail, a remarkable species of *Insectivorous* quadrupeds, scientifically known as the *Philocerus Louii*. It inhabits Borneo, and derives its popular name from the length of its tail, which is hairless except at its tip, where rows of stiff hairs are developed on either side, after the fashion of the barbs on the sides of a feather. The hairless portion of the tail is scaly. The P. attains the size of a small rat. Its colour is a blackish-brown above, and a yellowish-grey beneath. The tail is black, the feather-like tip white.

Pentamera (Gr. *pentē*, 'five,' and *meros*, 'a part'), one of the subdivisions of the order *Coloptera*, or that of the beetles. The P. has five joints in the *tarsi* or feet.

Pentastoma (Gr. *pentē*, 'five,' and *stoma*, 'a mouth'), a genus of lower *Arachnidans*, allied to the mites, &c., and forming the type of the order *Linguatulina* or *Pentastomida*. P. (or *Linguatulina tanoides*) is a familiar species inhabiting the liver and lungs of herbivorous mammals in a sexless state, and attaining sexual and mature development in the frontal sinuses of dogs and other *Carnivora*. The body is worm-like, the mouth being surrounded by a horny ring. The sexes are distinct, and the females are larger than the males.

Pentateuch (Gr. *hē pentateuchos*, scil. *biblos*, 'the five-volumed book') is the Alexandrian name for the first part of the Jewish Scriptures, the Thorah ('Law'), or so-called five books of Moses, which is one connected historical work beginning with the creation of the world and extending to the death of Moses.

History of Criticism.—The universal opinion in ancient times, both among Jews and Christians, was that the whole work was written by Moses. Yet, even in the 2d c., this was called in question by some of the heretical sects. Among Jewish scholars of the Middle Ages, two at least expressed doubts on the same subject. Aben Ezra (q. v.), who quotes Isaak ben Jason (11th c.) as maintaining that Gen. xxxvi. 31 was written in the time of Jehoshaphat, without agreeing with him, and without questioning the Mosaic authorship of the P. as a whole, held that such passages as Gen. xii. 6, xxii. 14, Deut. i. 1, iii. 11, xxxiv. were later additions. During the 16th c. and 17th c. various writers expressed the opinion, with various modifications, that although Moses may have written part of the P., in its present form it

was the work of a much later age—that of Samuel, David, or the Captivity: Carlstadt (*De Canon. Script.* 1520); Masius (*Com. on the Book of Joshua*, 1574); Hobbes (*Leviathan*, 1651); Peyrierius (*Syst. Theol.* 1655); Spinoza (*Tractatus Theologico-Politicus*, 1670); Clericus (*Sentimens*, 1685); and Dale (d. 1708). During the 18th c. the principal writers on the subject were on the other side, seeking to fortify the view of the Mosaic authorship; Carpzov, Eichhorn, and Michaelis in their Introductions (1721, 1782, and 1787). But at the end of the century the old doubts and objections began to be expressed again. This was done by Hasse (*Views for the Future Explanation of the Old Test.* 1785); F. C. Fulda (*The Age of the Holy Scriptures*, &c. 1791); H. Corrodi (*Attempt at an Inquiry*, &c. 1792); Otmar (Nachtigall, *Fragments*, &c. 1795); and Eckermann (*Theol. Contributions*, 1796), much in the same way as previous scholars had done. In the beginning of the present century Vater (*Com. on the P.* 1805); Augusti (*Introd.* 1806); and De Wette (*Introd.* 1806, 1807), endeavoured to prove, in a more complete way than had hitherto been done, that Moses could not be the author of the P. At the same time other writers maintained the Mosaic authorship generally, or only admitted some later additions and interpolations: Hug (*The Art of Writing among the Hebrews*, &c. 1801, and *Hist. of the Samaritan P.*); Keile (*Unprejudicial Estimation*, &c. 1811); Meyer (*Apology*, &c. 1811); Fritzsche (*Exam. of the Grounds*, &c. 1814); Jahn (*Contributions*, &c. 1818, 1819); Kanne (*Bibl. Investigations*, &c. 1819, 1820); Rosenmüller (*Schol. in P.*, 3d ed. 1821); Pustkuchen (*Hist. Crit. Investigation*, &c. 1823); Staundlin (*Authenticity*, &c. 1825); Sack (*Christian Apology*, 1829); R. Graves (1815); Hartwell Horne (*Introd.* 1818). Other writers on the conservative side, while not claiming the whole P. for Moses, ascribed to him an important share in its composition: Bertholdt (*Introd.* 1813); Volney (*Researches*, &c. 1814); Herbst (*Observat. de P.* &c. 1817); Eichhorn (*Introd.* 4th ed. 1823). Another class of writers succeeded, who denied to Moses any share at all in the composition of the P., which they held to have been compiled gradually after the time of Samuel, great part of the contents being mythical: Hartmann (*Investigations*, &c. 1831); Von Bohlen (*Genesis Elucidated*, &c. 1835); Vatke (*Bibl. Theol.* 1835). On the other side the literary unity and Mosaic authorship of the P. was maintained against all objections by Ranke (*Investigations*, &c. 1834-40), Hengstenberg (*Introd.* 1836-39), B. Bauer (*The Mosaic Origin*, &c. 1836), Movers (*Disc. of the Book of the Law*, 1834-35), Drechsler (*Inaccuracy*, &c. 1837, *Genesis*, 1838), König (*Old Test. Studies*, 1839), Welte (*The Post-Mosaic Matter in the P.*, &c. 1841), Haevernick (*Introd.* 1837-49). The most recent investigators are Stahelin (*Crit. Investigation*, &c. 1843), De Wette (*Introd.* 5th and 6th ed. 1840 and 1845), Ewald (*Hist.*, &c. 2d ed. 1853), Von Lengerke (*Canaan*, &c. 1844), Keil (*Introd.* 1853), Knobel (*The Books of Numbers*, &c. 1861), Black (*Introd.* 2d ed. 1865), Colenso (*The P. Examined*, &c. 1862-71), Kalisch (*Com.* 1800-72), Davidson (*Introd.* 1862), Graf (*The Hist. Books*, &c. 1866), Kuenen (*The P. Crit. Examined*, 1863; and *Rel. of Israel*, &c. 1874), the compilers of *The Speaker's Commentary* (1871).

Authorship.—The principal objections brought forward by critics to the received theory of the Mosaic authorship are the following:—1. Passages which seem to imply events or circumstances of a later date; e.g., Gen. xii. 6, xiii. 7 would seem to have been written when the Canaanite and the Perizzite were not in the land; xxxvi. 31, in the time of Saul, at the earliest; xiii. 18, xxiii. 2, xxxv. 27 (cf. Josh. xiv. 15, xv. 13), Ex. xvi. 35 (cf. Josh. v. 12), Lev. xviii. 24-28; Deut. i. 1, ii. 12 not before the time of Joshua, when the people were settled in Canaan; Gen. xiv. 14 not before the time mentioned in Ju. xviii. 29; and Deut. iii. 11, 14 (cf. Num. xxxii. 41, and Ju. x. 3, 4), xxxiii. 1, and especially xxxiv. could not have been written by Moses. 2. 'The Book of the Wars of Jehovah' (Num. xxi. 14), which could not have been composed before the end of the journeyings in the desert, would not likely have been quoted by Moses. 3. Some of the laws cannot with any likelihood be ascribed to Moses; e.g., (1) the ordinances regarding kings (Deut. xvii. 14-20), who were not included in the original constitution; (2) Deut. xix. 14, 20 presupposes the settlement in Canaan; (3) Ex. xxii. 29, 30, that the people have already brought first-fruits to the priests; (4) xxiii. 19, the existence of the sanctuary; (5) Lev. xxvi. 3-45, a state of things which did not exist till the later period of the kings. 4. The repetitions which occur (1) in the

giving of the laws, not merely in Deuteronomy, but, e.g., the precepts in Ex. xxxiv. 17-26, given before in xxi.-xxiii., and that in xxii. 20 repeated xxiii. 9; various precepts in Lev. xx. given before in xviii.; (2) in the historical parts—e.g., the sending of the quails (Ex. xvi. 12, 13, and Num. xi.). Similar repetitions appear in Num. xx. 1-13 (cf. Ex. xvii. 1-7), ix. 15-23 (cf. Ex. xl. 34-38), Ex. vi. 2-vii. 7 (cf. iii.-v.). 5. Discrepancies in various laws; e.g., the two ordinances that the service of the Levites was to begin at the age of thirty (Num. iv. 47) and at twenty-five (viii. 23-26), and the two that the Levites were to be supported by the tithes of the people (Num. xviii. 20-32), and that they should receive a tithe every third year while the regular tithes were to be consumed in feasting (Deut. xiv. 22-29; and the two copies of the Decalogue (Ex. xx., Deut. v.). 6. An indication of composite authorship is found in the unnatural arrangement of many of the sections; e.g., the genealogy of Moses and Aaron in Ex. vi. 14-27, which seems out of place in the context, and to show by its title, contents, and conclusion, that it was drawn up without any special reference to Moses and Aaron. The visit of Jethro to Moses (Ex. xviii.) presupposes that the people had reached Sinai (cf. v. 5, 'at the mount of God'), whereas their arrival is only related in xix. Again, all the time that elapsed between the giving of the instructions for the making of the tabernacle (Ex. xxv.-xxxi.) and its completion, according to xl. 2, 17, was nine months, which seems far too short for the work. Besides, in xxxiii. 7-11 there is an account of a 'tabernacle of the congregation,' which was pitched by Moses without the camp as a sanctuary, without any reference to any other, or to its being merely temporary. Further, the account pre-supposes the census as already made (Ex. xxxviii. 25, 26), which was only ordered to be made in the following month, Num. i. 1). In Lev. xxiv. 5-9, the ordinance regarding the shew-bread is repeated, which had been given in Ex. xxv. 30, and in xl. 4 presupposed as already well known. 7. Cases of disjointed chronology; e.g., the ordinance for the keeping of the Passover, given on the first month of the second year (Num. ix. 1), ought to have come before the account of the census (i.-iv.). 8. The great chasm in the history of thirty-eight years is considered even by moderate critics to be a very serious objection to the Mosaic authorship. According to Num. xx. 1, the people arrived at Kadesh in the first month (which must be) of the third year (cf. Deut. ii. 14), and at v. 23 there is given the account of the death of Aaron at Mount Hor, as if that event had happened immediately after; whereas, according to xxxiii. 38, it did not happen till thirty-eight years afterwards. 9. Perhaps the strongest indication of composite authorship is found in certain peculiarities of language, specially observable in Genesis, which have given rise to the distinction of the Elohist and Jehovistic narratives, a distinction originally founded on the exclusive use in different passages of Elohim or El (God) or Jehovah (Lord) as the name of the Almighty, but by no means resting on this alone. On the contrary, it is demonstrated that the series of passages forming what is considered to be the original narrative differ from all the rest of Genesis by the presence in them of a variety of verbal peculiarities as striking as is the difference, e.g., between the style of Addison and that of Johnson. 10. Although the art of writing was probably known to the Hebrews in the time of Moses (cf. Ewald, *Gesch.*, vol. i.), it seems more probable that any record of events written by a contemporary would have been a bare chronicle, such as is actually preserved in Num. xxxiii. 1-49, than a work of such extent as the P. Having regard to the above particulars, the conclusion has been arrived at even by conservative critics that, while there are considerable portions of the P. as old as the time of Moses, he did not compose the whole of it, but that it is, at any rate as we now have it, the product of a much later date. (See the articles on the separate books.) Irrespective of the critical objections enumerated above, there is no antecedent improbability that Moses wrote the last four books, which are a record of the events of his own time. As regards the Book of Genesis, or the history from the creation, the customary explanation of how he wrote it is that he was enabled to do it by inspiration, but the popular idea of inspiration may perhaps require to be modified by the recent discoveries of Chaldean literature, from which it appears that before the time of Moses, the stories contained in the first nine chapters of Genesis had a place in Chaldean mythology. See Smith's *Dict. of the Bible* (1863), Davidson's *Introduction* (1800), Ewald's *Geschichte d. Völk. Isr.*, vol. i. (Eng.

trans. 2d ed. 1869), Rawlinson and M'Caul, in *Aids to Faith* (1862), Bleek's *Einleitung in der A. T.* (Eng. trans. 1869), Smith's *Chaldean Account of Genesis* (Lond. 1876).

Pentecost (Gr. *pentēkostē*, scil. *hēmēra*, 'fiftieth day'), is the Greek translation of the later Jewish name of the Feast of Weeks (Exod. xxxiv. 22, cf. 2 Macc. xii. 32; Acts, ii. 1), which was so called because celebrated seven weeks after the Passover (Lev. xxiii. 15, 16), also called the Feast of Harvest (Exod. xxiii. 16), the Day of First-fruits (Num. xxviii. 26), &c. The time fixed for the celebration of P. was the fiftieth day from the morrow after the Sabbath of the Passover (Lev. xxiii. 11, 15-21), or from the 16th of Nisan. Originally observed purely as a harvest festival, the later Jews connected it with the giving of the law by Moses, which, as they deduced from Exod. xix., must have taken place on the 6th of Sivan. The festival is observed by the Jews to the present day on the 6th or 7th of Sivan. In the Christian Church, P. was early observed as the Festival of the Holy Spirit (cf. Acts ii.), but the name was applied to the whole period of seven weeks between Easter and P. It was the special season for administering baptism, and as all the Catechumens (q. v.) were baptized in a white dress, the last Sunday of P. got the name of Dominica in Albis, and in England that of Whitsunday. See Ginsburg in Kitto's *Cyclo. of Bib. Lit.* (3d ed. Edinb. 1876).

Pentland (a corruption of 'Pictland') **Firth**, a strait which separates the Orkney Islands from the mainland of Scotland, and connects the North Sea with the Atlantic, is 24 miles in length and from 12 to 15 miles in breadth, extending from Duncansby Head to Dunnet Head on the S., and from S. Ronaldshay to Hog Islands on the N. It has from 10 to 40 fathoms of water, and it is calculated that upwards of 4000 vessels pass through it annually. A strong current flowing from W. to E. at the rate of from 5 to 10 miles an hour renders navigation dangerous. At the eastern outlet lie the Pentland Skerries, two small islands, on one of which stands a lighthouse; and near the middle, opposite Scalpa Flow, are the islands of Stroma and Swoma. To the W. of Stroma are the breakers called 'The merry men of Moy,' which roll unceasingly even in the finest weather; and on the N. side of the same island there is a large eddy caused by the current, called 'Swalchie.' There is an anchorage in Gill's Bay, a few miles W. of Duncansby Head.

Pentland Hills, a range of hills in Scotland extending S. W. for about 12 miles through the county of Edinburgh to the borders of Lanark, in three ridges, with a mean height of 1000 feet. The highest summits are Scalt Law, or the Sisters (1898 feet), near which is Glencorse Reservoir, and Carnethy (1890 feet), on the E. slope of which is Rullion Green, where the Covenanters were defeated by General Dalziel, 28th November 1666. The rocks composing the P. H. are chiefly porphyry or other rocks of the Old Red Sandstone age, but towards the W. and S. Silurian deposits come to the surface. The slopes, 'Pentland's green acclivities,' afford excellent pasture for sheep.

Penumbra. See SHADOW.

Pen'za, a central government of European Russia, to the S. of Nijni-Novgorod, has an area of 14,826 sq. miles, and a pop. (1870) of 1,173,186. It is a wide fertile plain, varied with a few low hills, and watered by the Moksha and Sura, affluents of the Volga. About a half is cultivated, while over one-third is meadow, and there are extensive oak forests. The products are grain, flax, hemp, tobacco, beet-root, and vegetables. The chief towns, besides P., are Mokshansk, Nijni-Lomov, and Saransk. —P., the capital of the above government, lies on the Sura, 350 miles S.E. of Moscow by rail. Founded in 1666 as a defence against the Tartars, it has 19 churches, a great park and fruit-garden, a horticultural school, &c. There are industries in leather, soap, candles, and linen, and an important yearly market. Pop. (1870) 30,462.

Penzance (Cymr. 'the saint's headland'), a seaport of England in Cornwall, 9 miles E.N.E. of Land's End, and 26 S.W. of Truro by rail. Its chief edifices are the Public Buildings (1867), in the Italian Renaissance style, with a façade of 135 feet, and comprising a guildhall, council chamber, library, and museum; the market-house, public baths, custom-house, and a granite tower, erected (1873) as a memorial to Sir Humphrey Davy, who was a native of P. There are two

churches, two banks, and a weekly and a daily newspaper. Situated on Mount's Bay, and within easy reach of the finest coast scenery in England, P., from the mildness of its climate, has become a favourite winter watering-place. Its harbour is protected by a pier (1866), 800 feet long, with a lighthouse at the end. In 1876 there entered 845 vessels of 65,867 tons, and cleared 443 of 31,859. The exports (tin, copper, and fish) amounted to £41,135; the imports (iron, timber, hemp, &c.) to £50,214; and the customs to £4661. P. in 1875 had 97 vessels of 7187 tons, besides 572 boats employed in the important pilchard fishery. Mining and the raising of early vegetables employ a large number of the inhabitants. Pop. (1871) 10,425.

Pe'on. See CALOPHYLLUM.

Pe'oa, a word of most uncertain derivation, adopted by all European nations in India for a kind of civil orderly or footman in the departments of police, justice, and customs. They usually wear an official badge, and formerly bore arms.

Peoria, a city of Illinois, U.S., on the W. bank of the Illinois river, which is here crossed by two bridges, 2500 feet long, is the junction point of nine railways, and is connected with St. Louis by lines of river steamers, and with Chicago and Lake Michigan by the Michigan Canal. It has 28 churches and 5 daily newspapers. The chief manufacture is iron. An expansion of the Illinois river at this point, called *P. Lake*, is 22 miles long and 3 broad, abounds in fish, and in winter yields a large amount of ice. Pop. (1870) 22,849.

Pe'pe, the name of three Italians who played a prominent part in Neapolitan history. Gabriele P. was born in 1781 at Bojano, in the province of Campobasso; his cousins, Floristano and Guglielmo, at Squillace, in Calabria, the former in 1780, the latter on February 15, 1783. They all co-operated in the erection of the short-lived Parthenopean Republic (1799), and on its downfall took service with France, and were enrolled in the Italian Legion. In 1806 they returned to Naples, and held appointments in the armies of Joseph Bonaparte and Murat, which were confirmed by Ferdinand at the Bourbon restoration (1815). Floristano alone of the three did not involve himself in the Revolution of 1820, for his share in which Gabriele endured two years' imprisonment at Olmütz, whilst Guglielmo lived for twenty-eight years a refugee in France and England. Gabriele died in August 1849, and Floristano in 1851. Guglielmo, recalled to Naples by the insurrectionary movement of 1848, received the command of the contingent dispatched to the aid of the revolted Lombards. Disregarding the order of recall, he threw himself with 2000 men into Venice, and after its capitulation retired to Paris, thence to Nice, and finally to Turin, where he died, August 9, 1855. He published, among other works, a *Histoire des Révolutions et des Guerres d'Italie en 1847-49* (4 vols. Par. 1850). A life of his brother Florestano was written by Carrara (Gen. 1851).

Pepin. See PIPPIN.

Pepper (Lat. *piper*, serving as the botanical name of the genus; Gr. *peperi*; Sansk. *pippali*) is the type genus of *Piperaceæ* (q. v.). The most important species is *P. nigrum*, which yields the condiment of daily household use. It is a climbing shrub, with alternate heart-shaped leathery leaves, dioecious or hermaphrodite flowers, followed by spikes of berries about the size of a currant, at first green, and when mature bright red. The plant is a native of the E. Indies, where also it has long been cultivated, and has at various times been introduced into the W. Indian Islands, Trinidad, Borneo, Java, Sumatra, and other tropical countries. In cultivation it is usual to plant cuttings at the base of rough-barked trees, to the trunk of which they attach themselves during growth, and rise to a height of about 12 feet. After three years they produce fruit,



Betel Pepper.

and yield profitable crops annually (about 14lb.) for eight or ten years. The 'corns' are gathered when red, and after being dried in the sun they shrivel and change colour, becoming the 'black P.' of the shops. To form what is called the 'white P.' the fruit is freed from its fleshy outer coat by maceration and subsequent rubbing. From ancient classical writers we learn that P. was held in high esteem in very early times, and for a long period it remained one of the most costly of spices. At the present day it forms a large and important item of commerce. To some extent P. is used medicinally as a hot aromatic stimulant and tonic, and is occasionally employed externally as a rubefacient. It owes its pungency to about 2 per cent. of an essential oil, and contains about 2½ per cent. of a tasteless crystalline substance called *piperine*. The compact fruit-spikes of *P. Roxburghii* (something like those of the common British plantain used for pet birds), when sun-dried, form the 'Long P.' It is extensively cultivated in many parts of India. *P. tricinum*, another Indian species closely allied to *P. nigrum*, furnishes a very pungent fruit, forming part of the P. of trade. Betel P. (q. v.) and Cubeb P. (q. v.) are also the products of species of *Piper*, or of genera recently separated therefrom.

The name P. as an affix is further applied to numerous vegetable products irrespective of their botanical right to it. Thus, in *Solanaceæ*, we have bird P., cherry P., spur P., and bell P.—forming cayenne P.—for different species of *Capsicum*. In *Magnoliaceæ* there is the P. plant of Tasmania (*Tasmannia aromatica*); in *Anonaceæ*, the Guinea P. (*Xylofia ethiopica*). In the English flora *Sedum acre* (*Crassulacæ*) and *Polygonum Hydropteris* (*Polygonaceæ*) are respectively called the wall and water P. from their biting taste and places of growth.

Medicinal Properties of P.—The dried unripe berries of the *Piper nigrum* are used in medicine as a warm, carminative stimulant. P. acts on the mucous membrane of the rectum and urethra, and is useful in hæmorrhoids and gonorrhœa, in doses of from 5 to 20 grains. P. is contained in *Confectio opii*, and *Pulvis opii compositus*. *Confectio piperis*, prepared from black P., caraway, and clarified honey, is given in doses of from 60 to 120 grains.

Peppermint. See MINT.

Pepperpot is a W. Indian appetising preparation consisting of cassareep, capsicum, ochro, sliced cucumbers, very fine chopped shallots, Madeira wine, and other ingredients, with flesh or dried fish, and is resorted to by those affected with loss of appetite or weak digestion.

Pepper-Root is a name applied to *Dentaria diphylla*, a N. American cruciferous plant with a curious toothed creeping root-stock, which has a pungent mustard-like taste, and is used as a condiment by the natives, hence it is also sometimes called Indian mustard.

Pepsine is a preparation of the mucous lining of the fresh and healthy stomach of the pig, sheep, or calf. The cleansed mucous membrane is scraped off with a blunt instrument, and the viscid pulp thus obtained is immediately spread over the surface of glass, or glazed earthenware, and quickly dried at a temperature not exceeding 100°. The dried residue is then reduced to powder, and preserved in a stoppered bottle. P. is given in cases of indigestion from deficient or imperfect secretion of gastric juice, and in convalescence from debilitating fevers. The dose of the powder is from 2 to 5 grains.

Pepusch', Johann Christoph, a German musician, born at Berlin about 1667, settled in England in 1700, and after an engagement at Drury Lane Theatre became a teacher of music. He received the degree of Mus. Doctor from Oxford in 1713. He wrote the overture and set the music to Gay's *Beggar's Opera*, and published a treatise on *Harmony* (1731). P. died in 1752, and was buried in the Charter-House, of which he had been organist for fifteen years.

Pepys, Samuel, son of a tailor, was born at Brampton, Huntingdonshire, February 23, 1632, passed his early life in London, and received his education at St. Paul's School and the University of Cambridge. As an undergraduate he is reputed to have been a 'fast' man, an entry in his college register still preserving the record of an admonition 'for having been scandalously over-served with drink ye night before.' In his twenty-third year he married a penniless beauty of

fifteen, and in 1658 he obtained a clerkship of the Exchequer. He was soon elevated, owing to the aptitude he showed for business, to the clerkship of the Acts. Having attracted the attention of the Duke of York, Lord High Admiral, P. retained this position until 1673, and the arrangement of the entire navy was in his hands during the exciting events of the Plague, the Fire of London, and the Dutch War. During the agitation in connection with the Popish Plot, P. was briefly confined to the Tower on suspicion. Recalled to the Admiralty, he retained his place until the Revolution, when he retired into private life. He died of stone, 26th May 1703. P.'s title to fame rests wholly upon the contents of his *Diary*, a series of private jottings extending from January 1659 to May 1669. It was discovered among a collection of books and prints bequeathed by him to Magdalene College, Cambridge, and published in 1825, under the editorship of Lord Braybrooke. A sixth edition, in 4 vols., appeared in 1858. The *Diary* was originally in shorthand, which was successfully deciphered (1819-22) by the Rev. John Smith, M.A., afterwards promoted to the rectory of Baldock, Herts. As P. entered all the experiences of each day, the book remains one of the most interesting sources of allusion to persons, events, and manners given to posterity by that century. The Rev. Mynors Bright learned the cypher in 1872, and subsequently transcribed the whole MSS. He published a new edition of the *Diary and Correspondence*, with the life and notes by Lord Braybrooke, numerous portraits from the collection in the Pepysian library, and additional notes (vols. i. and ii. 1876). This edition contains about one-third more matter than was ever before published—contains, indeed, 'the whole Diary,' to use Mr. Bright's words, 'with the exception of such parts as I thought would be tedious or that are unfit for publication.' 'When he wished to keep anything particularly concealed, P. wrote his cypher generally in French, sometimes in Latin or Greek or Spanish. Afterwards he changed his plan, and put in dummy letters.' It is disappointing to hear that all passages written in this manner are quite unfit for publication, and that their perusal has in no way contributed to P.'s good fame.

Pe'ra ('beyond'), a suburb of Constantinople, on the N. side of the Golden Horn, opposite old Stambul, with which it is connected by a floating bridge. It crowns a bold promontory, and is the foreign diplomatic quarter, and the chief residence of the 'Franks.'

Perak', or Perah', a petty state in the Malay Peninsula, extending for about 70 miles along the W. coast, separated from Queddah on the N. by the Krian river, and bounded E. by a mountain range. In the S. are alluvial valleys producing rice and tobacco, and also valuable mines of tin. The interior is mountainous and overgrown with jungle. The chief means of communication is by the P. river. In 1874, owing to disturbances caused by the immigration of Chinese tin miners and by a disputed succession to the throne, it was resolved by General Sir W. Jervois, the governor of the Straits Settlements, to establish a British Resident at P., and to espouse the cause of Sultan Abdullah. Mr. Birch, a former colonial secretary at Singapore, was appointed the first Resident. On the occasion of his posting up a proclamation announcing that British officers would henceforth administer the state, he was murdered by the party of the dispossessed Sultan Ismail in November 1875. To avenge this outrage a military detachment from Singapore, reinforced by a Gurkha battalion from Calcutta, advanced up the P. river under the command of General Colborne, and a naval brigade gave valuable co-operation. After slight losses unavoidable in jungle fighting, the murderers of Mr. Birch were at last killed, and Sultan Ismail surrendered himself prisoner in March 1876. The state of P. has since been tranquil under British administration, and a loan has recently been issued in London to pay the cost of the petty war, and to open up the country. It is hoped by the merchants of Singapore that this event will lead to the extension of British protection over the entire peninsula of Malacca. See *P. and the Malays* by Major Macnair (Lond. 1878).

Perambulation of Parishes. See BEATING THE BOUNDS.

Perception is the mind's apprehension of an external world by means of the organs of sense. It is the linking of subject with object. Sensations are recognised as pertaining to self and yet not self. The self is under perfect control; sensations are

not. Individual sensations cannot be created or destroyed at will, but are passively received by the thinking subject. Our knowledge of external things may be resolved into sensations of different kinds which are grouped together in our minds, projected into space, and supposed to be united in objects existing independent of the perceiving mind. Thus what in the mind are sensations become, outwardly, qualities of a hypothetical substance. The child soon learns to associate together the sensations of heat and cold given by touch and the sensation of resistance to muscular effort, when these repeatedly and simultaneously occur. If, by and by, a certain sensation of colour be felt as an invariable concomitant of these other sensations, it is also associated with them; and coldness, hardness, and blueness—let us say—are transferred from the organs of sense and the mind to something external, of which we term them qualities. Sensation and quality are supposed to be correlatives, one in knowledge, the other in existence. In the one case, sensation appears to be a sign suggesting quality; in the other case, the quality is looked upon as that which causes the sensation.

P. proper is a higher act of intelligence than sensation—is, indeed, educated sensation; but sensation is its *sine qua non*. It is further evident that the simplest act of P. must involve, not merely recognition of an external object, but, as a prerequisite to this, an affirmation of self-existence:—consciousness declares, 'I am,' and then, 'Something not myself exists.' A vain attempt has been made in certain systems to refine upon this analysis by discriminating between the cognition, 'I know,' and the cognition, 'I know that I know,' as acts of separate faculties. The scholastic dictum well affirms the unity of this knowledge—*Non sentimus, nisi sentiamus nos sentire; non sentimus nos sentire, nisi sentiamus*. The following eight conditions, according to Hamilton, are partly common to P. and the other acts of consciousness, partly proper to P. as a special operation:—(1) A certain concentration of consciousness on an object of sense—*attention*; (2) a *plurality, alteration, difference* between the perceived object and the perceiving subject; (3) *quality*; (4) *time*—memory supposed; (5) *space*; (6) *degree*; (7) *relation*; (8) *assertory judgment*—that within the sphere of sense an object exists, and exists thus and thus conditioned.

It is difficult to discover formulated theories of P. in ancient philosophy. The writings of the Greek sages were equally psychological, cosmological, theological, ethical, political. But the thread running through the whole of ancient philosophy is dualism, the antagonism of matter to mind. Idealism proper is of comparatively recent development, Plato's 'ideas' notwithstanding. We have a couplet of Epicharmus that indicates a pretty clear knowledge of the principal fact of P.—

'Mind it seeth, mind it heareth;
All beside is deaf and dumb.'

Plutarch mentions a treatise of Strato Physicus, designed to prove 'that a sensitive apprehension is wholly impossible without [an act of] intellect.' But however accurately the ancients defined the problem, it was reserved for modern philosophy to attempt its systematic solution.

The philosophy of Descartes was the philosophy of doubt. Everything that could be doubted he resolved to reject; and so he abandoned the existence of the world, of God, of his own body, of all but self. Self remained. To doubt is to think; to think is to be a thinker; '*cogito ergo sum*.' Here was the foundation of P. From the imperfection of the thinking being, and its innate idea of P., he deduced the existence of God. But the thinking being has other ideas than that of perfection, of God; these he cannot summon or destroy at pleasure: yet they are distinct from God; therefore they must be caused in the thinking being by God. One of these ideas is that of extended substance; accordingly, unless God deceive us, extended substance must exist. To point out the fallacies of this system, or any other, is beyond the scope of this article.

Malebranche developed the doctrine of Descartes. Descartes could only bridge the gulf between matter and mind by means of what amounted to a divine revelation. Malebranche accepted his position. The soul is immaterial, the external world is material; they have nothing in common by which they may be known to each other. The soul derives its ideas neither from itself nor from things, but from God. 'We see all things in God.'

Spinoza started with the Cartesian definition of substance as that which, for its existence, stands in need of nothing else. Accordingly, Spinoza argued, there can be but one substance,

and one existence—no dualism. Everything that appears to differ from the ideal substance must be one of its 'attributes'—thought and extension, or one of its 'modes'—individual, finite, evanescent forms. This all-pervading substance is God.

But this explanation did not suffice. Why should thought and extension of necessity exclude one another, even as different attributes of the same substance? Locke, the founder of modern materialism, explained the ideal in the material. He banished all innate ideas, and derived knowledge from experience alone. Instead of drawing reality from the mind, he draws it from the external world, of which mind is the mirror. *Nihil est in intellectu quod non fuerit in sensu*.

Berkeley's position was the opposite of Locke's—he explained matter in mind. Leibniz had prepared the way for him. Sensations, he said, are altogether subjective. Distance and form are not even sensations, but are mere inferences from sensations. Things only exist in a percipient mind; their *esse* is *percipi*. 'There is not any other substance than spirit, or that which perceives.'

Hume's sceptical philosophy was the natural result of the systems of Locke and Berkeley. For Hume, knowledge was a bundle of sensations, which have no necessary connection one with another. Alarmed at such a result, Reid fell back upon common sense. According to him, the sensations of the physical organism necessarily suggest external qualities, and by our constitution we cannot but believe in their existence.

Kant dug deeper. All our knowledge begins with experience, but does it arise in experience? We have *à priori* elements in knowledge. By means of sensation we have an intuition of phenomenal objects. *Matter* is that in the phenomenon which corresponds to the sensation; *form* is that which brings the content of the phenomenon under certain relations. The matter of phenomena is given us *à posteriori*; the form is *à priori*. The two conditions of intuition are space and time.

Hume and Kant represent the two existing schools of thought. The one school explains P. upon a theory of association. 'Objects are clusters of sensations supposed to have a permanent existence independent of the individual mind, in consequence of their mutual coherence and regular concurrence.' They are, according to Mill, 'permanent possibilities of sensation.' The other school holds to *à priori* intuitions as the basis of our knowledge.

Perceval, Spencer, Right Hon., second son of the Earl of Egmont, born in London, 1st November 1762, studied with distinction at Harrow and Cambridge, and was called to the bar in 1786. He soon surmounted his natural timidity, and got into good practice. In 1796 a pamphlet upon the impeachment of Warren Hastings, in which he argued that the process was not annulled by the dissolution of Parliament, brought him under the notice of Pitt. He was shortly returned to Parliament for Northampton, which he represented after three separate dissolutions, and gave himself earnestly to a study of finance. In 1801 he became Solicitor-General in the Addington Ministry; in 1802 he was appointed Attorney-General. On the return of Pitt to power he vehemently defended the war with France. In 1807 he was made Chancellor of the Exchequer, with the emoluments also of the Duchy of Lancaster. Two years later, on the death of the Duke of Portland, he rose to be Prime Minister, and under the regency wielded immense power. On the 11th of May 1812 he was shot, when entering the House of Commons, by a Liverpool broker named Bellingham. P. was an industrious and successful but not a great statesman.

Perch (*Perca fluviatilis*), a well-known Teleostean freshwater fish, the type of the family *Percidae*. The scales are *ctenoid* or comb-like, and the *operculum* or gill-cover is armed with spines. The teeth are large and numerous, and are situated on the palate and other portions of the mouth in addition to the jaws. The ventral fins are on the breast below the pectorals. The genus *Perca* has from 13 to 15 spiny rays in the dorsal fin; the head is scaleless above. The P. is found in freshwater ponds and rivers, and attains a weight of from 2 or 3 to 5 or even 8 lbs. It is of a greenish-brown hue on the back, but the sides are marked with bands of darker colour; the first dorsal fin is brown, the second of a paler colour. The tail and pectoral fins are bright red. The P. is very voracious, and its flesh is nutritious and palatable. It is caught by different sorts of bait, has considerable vitality, and will live out of water for considerable

periods if the gills are kept moist. The sea-P. is another name for the Basse (q. v.). The giant P. is the *Lucioperca sandra*, and is found in German lakes and rivers. It may attain a length of 2 or 3 feet; its colour is a greenish olive marked with brown stripes. The scarlet P. (*Holocentrum rubrum*) is found in tropical seas, and is of a red colour, variegated with white bands.

Perch. See ROD.

Percolation (from Lat. *per*, 'through,' and *colo*, 'I strain') is a process used in pharmacy for the extraction of certain soluble ingredients of various substances by filtering a liquid through them. Many of the tinctures of the British Pharmacopœia are directed to be prepared by P., an operation which requires to be performed with great care that the tincture may be of the standard strength. The process is thus described by Mr. Squire in his *Companion to the British Pharmacopœia*: 'After the materials have been macerated for forty-eight hours in three-fourths of the menstruum ordered, P. will be most efficiently performed by decanting the liquid, pressing the ingredients in the hand, and carefully packing them, in small portions at a time, in a conical percolator, so that the mass shall be uniformly tight throughout. The decanted liquid may then be poured upon the ingredients and suffered to percolate; the remainder of the menstruum being afterwards poured upon them in order to chase the strong tinctures out. As soon as the liquid ceases to drop, the ingredients are to be removed and pressed. Any deficiency in the product may be made up by adding more of the menstruum and repeating the pressure.' The author prefers Burton's process, combined with the abstraction of air from the ingredients: 'Thus, tie up the ingredients and suspend *submerged* in the upper part of the liquid, and fit an elastic cap connected with an exhausting syringe to the neck of the vessel. When the air has been thus abstracted from the structure of the materials, and the atmosphere readmitted, its pressure drives the liquid into every part the air had preoccupied, and complete digestion begins, the impregnated liquid constantly falling, by its gravity, allows the fresh liquid to penetrate and continue the exhausting process until finished.'

Percussion (Lat. *percussio*, a 'beating' or 'striking') is the method of eliciting sounds by tapping the surface of the body, the main object being to determine the comparative density of subjacent parts. The nature of the sound may be elicited by striking over the part either *immediately*, as when the chest is gently tapped with the hand or a light hammer, or *mediately*, as when a flat body is placed upon the chest, which is then struck by the finger or the hammer. P. was first employed by Auenbrugger in the middle of last century, and afterwards by Corvisart, but Laennec, who made diseases of the chest his special study, brought it into general use, and this mode of diagnosis is chiefly employed in diseases of the lungs, heart, and abdominal organs.

Mediate P. is the mode almost universally employed, the apparatus being the pleximeter and the hammer. The *pleximeter* may consist of a flat piece of ivory or wood, a piece of indiarubber, or the index finger of the left hand laid flat on the chest. The *hammer* may consist of a piece of whalebone or light stick with a head-piece of indiarubber; of the flat edge of the stethoscope encircled by a piece of indiarubber; of a light thimble covered with indiarubber; or the points of the index and middle fingers of the right hand may be used. The pleximeter being placed flat upon the chest and held close to its walls, is struck perpendicularly, and with gentle or moderate force. The qualities of the sound to be noted are—(1) Amount in intensity of resonance, commonly called clearness; (2) duration of the sound; (3) pitch; (4) volume of sound. The physical conditions which lessen the quantity of air are—(1) Consolidation of lung-substance, as from exudation, tubercle, congestion, or œdema; (2) compression of the lung from fluid in the pleura, or by tumours. The *pulmonary P. note* is the sound elicited by striking on a part of the chest-wall below which lies a considerable depth of lung. This sound depends upon the vibration of the air contained in the tissue of the lungs, and upon the vibrations of the walls of the chest. When this *note* is exaggerated, or of a higher pitch, it is termed *tympanic*, the sound being similar to that obtained by striking the abdomen when the intestines contain air, and is generally caused by an increased quantity of air in the lung-

tissue or in the pleura, as in pulmonary emphysema, or when cavities exist in the lungs, as in pneumo-thorax. *Tubular* sounds are produced when the lung is consolidated, covering bronchial tubes. When the subjacent substance is solid or fluid, the sound is *dull* in proportion to the density and want of elasticity of the part percussed, and indicates effusion of fluid into the pleura (hydrothorax), or inflammatory solidification of the lung tissue (the hepatisation of pneumonia), or tubercular deposition (phthisis). Although the principles of P. are best illustrated in diseases of the lungs, this mode of diagnosis is indispensable in diseases of the heart, liver, abdomen, &c.

Percussion, Centre of. See CENTRE OF PERCUSSION.

Percussion Caps are small caps made of sheet copper into which a small quantity of a fulminating compound, consisting of fulminate of mercury, saltpetre, and sulphur, is introduced. P. C. are employed for exploding the charges of gunpowder in firearms, and for igniting other explosives, especially dynamite, which can only be exploded by percussion.

Percy, a Norman family, which came over at the Conquest, and obtained a grant of lands in the counties of York and Lincoln. The third baron, **William de P.**, died early in the 12th c., leaving two daughters, of whom the elder died without issue, whilst the younger married Jocelin of Hennegau, brother-in-law to Henry I. This Jocelin assumed his wife's surname, and was father of the **Richard de P.** who figures among the twenty-five barons appointed to uphold the privileges of the Great Charter. **Henry Lord P.** (created Earl of Northumberland, July 16, 1377) was an adherent of the house of Lancaster, and as such received from Henry IV. the dignity of Constable and a large accession of lands. But the king's refusal to let him ransom the prisoners of Homildon Hill aroused his discontent, and with the foremost of those prisoners, Lord Douglas, his brother Thomas, Earl of Worcester, and Owen Glendower of Wales, he mustered an insurgent army. Falling sick, he intrusted its command to his son, the 'gallant Hotspur,' who was defeated and slain at Shrewsbury, July 21, 1403. P. himself was pardoned, but two years later, engaging in a plot to seat Edward Mortimer on the throne, he had to fly to Scotland, and thence to Wales, and on a raid into England was mortally wounded (February 29, 1408). The second earl fell in the Lancastrian ranks at St. Albans (1455), the third at Towton (1461). **Henry**, the fifth earl (since 1464, when he obtained a reversal of his father's attainder), became an agent of Henry VII.'s extortions, and was killed in a Northumbrian riot (1489). **Thomas P.** forfeited head and lands by his participation in the Pilgrimage of Grace (1536), but under Mary the earldom was restored in 1557 to his son **Thomas**, who also died on the scaffold (August 22, 1572). **Henry**, the eighth earl, died in his bed, but in the Tower of London, and by his own or an assassin's hand, June 21, 1585, and his son **Henry** was long imprisoned for his share in the Gunpowder Plot. The tenth earl in the Great Rebellion sided with the Parliament, but opposed the execution of the king; with the eleventh, **Joscelin P.**, the male line became extinct (May 21, 1670). His daughter, however, had married Edward Seymour, Duke of Somerset, and their son **Algernon** received the title of Lord P. (1722), and of Earl of Northumberland (1749), which on his death (1750) passed to his son-in-law, Sir Hugh Smithson, a Yorkshire baronet. The latter assumed the name of P., was created Duke of Northumberland (October 22, 1766), and was great-grandfather to the sixth and present duke, **Algernon George P.**, who was born May 2, 1810, and succeeded his father, August 21, 1867. Northumberland House, Charing Cross, for many generations the London residence of the Percies, was sold to the Board of Public Works in 1873 for £500,000, to be removed for the construction of the splendid new approach to the Thames Embankment. The Duke spent part of the purchase-money in improving Trafalgar Square.

Percy, Thomas, D.D., born at Bridgnorth, Shropshire, April 13, 1728, entered Christ Church College, Oxford, and graduated M.A. (1753). Having taken orders, he was presented to the livings of Easton Maudit and Wilby, in Northamptonshire (1756), became domestic chaplain to the Duke of Northumberland (1766), and chaplain in ordinary to the king (1769), was promoted to the deanery of Carlisle (1778), and to the bishopric of Dromore, in Ireland (1782), where he died, September 30,

1811. Himself the author of *The Hermit of Warkworth, The Friar of Orders Grey*, and other poems, P. is best remembered as the editor of *Reliques of Ancient English Poetry* (3 vols. 1765, latest ed. by H. B. Wheatley, Lond. 1876). The ballads in this collection P. drew from private sources, and from the Pepysian, Ashmolean, and national collections. Their text is often grievously 'restored,' and few of them are really ancient, the greater number belonging to the 16th or 17th centuries. But the good wrought by the work in sweeping away current conventionalism, and in opening men's eyes to the fact that English poetry did not begin with Cowley, may be seen by comparing the scant appreciation it met with from Johnson with Wordsworth's language half a century later: 'I do not think that there is an able writer in verse of the present day who would not be proud to acknowledge his obligations to the *Reliques*. I know that it is so with my friends; for myself, I am happy to make a public avowal of my own.' P. also published *Miscellaneous Pieces relating to the Chinese* (2 vols. 1762), *A Key to the New Testament* (1765), a translation of Mallet's *Northern Antiquities* (2 vols. 1770), &c.

Per'egrine Fal'con (*Falco peregrinus*), a species of *Falconidae* or *Falcons* (q. v.), inhabiting both hemispheres, and attaining a length of from 16 to 18 inches. The colour is an ashen brown above, the head and back of the neck being dark brown. The breast is white tinged with chestnut, and the under parts are greyish-white, the whole plumage being marked with bars of dark tint. The eggs are three or four in number, and are reddish brown. The bird was formerly much in request in the sport of Falconry (q. v.). The male is termed a *Tercel*, and the female the *Falcon*, *par excellence*. The term 'Lanner' (q. v.), which properly denotes a distinct species of falcon (*Falco Lannarius*), is also applied to the young P. F. The P. F. is extremely agile and quick in flight, its power of wing being immense, and its muscular strength proportionate. It descends on its prey with a lightning-like swoop, carrying off smaller birds, game, rabbits, and hares in great numbers.

Pereira, Jonathan, M.D., F.R.S., a celebrated pharmacologist and physician, was born in the parish of Shoreditch, London, May 22, 1804. He received a classical education at Finsbury, and then devoted himself to medical studies. In 1823 he was appointed resident medical officer at Aldersgate Street General Dispensary, where three years later he became Lecturer in Chemistry, and in 1832 Professor of Materia Medica. His *Elements of Materia Medica and Therapeutics* (1839-40) contains the result of his long-continued investigations on these subjects, and is still a standard authority. Its plan and execution at once established the scientific reputation of the author. In 1840 he took his doctor's degree at Erlangen, and in 1845 became a Fellow of the College of Physicians. From the establishment of the London University, he was Examiner in Materia Medica and Pharmacy till his death, January 20, 1853. Of P.'s other works, the chief are *A Treatise on Diet* (1843) and *Lectures on Polarized Light* (1843). The last edition of his *Elements* is by Bentley and Redwood (1872).

Perekop (Russ. 'the gate of the headland,' Tartar, *Or-Kapu*), a strongly-fortified Russian town and haven in the government of Taurida, on the isthmus connecting the Crimea with the mainland, 75 miles N. of Sebastopol. It is of some military importance, but its trade in salt and cattle has received a blow from the extension of the Kharkof and Melitopol Railway into the Crimea. Pop. (1870) 4331. The *Isthmus* of P., 18 miles long, and only 5 broad at its N. end, is an arid sand waste, containing many salt lakes.

Père-La-Chaise. See LA-CHAISE.

Perennial, in Botany. Plants that die after one flowering season are with very few exceptions *Annuals* (q. v.) or *Biennials* (q. v.). If, after flowering, the whole or part of the plant lives through the winter and produces fresh flowers another season, they are P. and may be either herbaceous perennials in which the greater part of the plant dies down after flowering, undershrubs or suffruticose plants in which the annual dying portion is the flowering branches, shrubs when the perennial woody portion forms the greater part of the individual, but without what is called a trunk, and trees when the trunk is developed and the height considerable. P. herbs often commence flower-

ing the first year, and the same species may be annual or perennial according to climate, treatment, &c.

Perenn'ibranchia'ta ('perpetually gilled'), a name applied to those members of the Amphibian order *Urodela*, which retain the external gills of early life, in addition to the lungs with which they are also provided. Of the P., the Proteus (q. v.), Siren (q. v.), and Axolotl (q. v.) are good examples.

Pereslav'le-Zaliesky, a town of Central Russia, in the government of Vladimir, 79 miles N.E. of Moscow by rail. It has 35 churches, and 2 monasteries, one of which, Nikita, is much frequented as a place of pilgrimage. P. has considerable trade, and manufactures cottons, linens, cloth, and silk. Near P. is the Pleshteyevo Lake, where Peter the Great built his first ship. Pop. (1870) 7210.

Perez, Antonio, a Spanish politician, born at Monreal de Ariza, Aragon, in 1539, succeeded his father, Gonzalo P., as secretary of state to Philip II. of Spain in 1567, and long enjoyed the full confidence of the king, though his arrogance and imprudence procured him many enemies. An intrigue which he had with the Princess of Eboli, the king's mistress, being discovered by Escovedo, secretary to Don Juan of Austria, half-brother of the king, P. prevailed upon Philip, whose suspicions had already been aroused by Escovedo's premature return to Spain and the well-known ambitious designs of his master, to give orders for his assassination. It was accomplished in March 1578, and excited a great commotion in Madrid, but P. fancied himself safe from his guilt being shared by the king. However, he was arrested 28th July 1581, and, by an inquiry which terminated January 1585, sentenced to ten years' imprisonment and an enormous fine. The sentence was carried out with the utmost severity, and every means taken to extort from P. the papers which compromised the king. Most of them having been obtained, he was handed over to the authorities on the charge of the murder of Escovedo, but he contrived to escape to Aragon, and went before the court of *Justitia Mayor* of that kingdom. He published in his defence several letters of the king. P. was acquitted by the Court of Aragon; but an attempt being made to reclaim him by the Inquisition, the inhabitants of Saragossa rose in revolt, set P. free, and put to death the Marquis of Almenara, Philip's representative—a procedure which cost them their privileges (*fueros*) and the lives of the principal citizens. In November 1591 P. fled to Bearn, where he was received kindly by Catharine of Bourbon. Philip, after vainly trying to tempt him into Spain, made several attempts to assassinate him, but he fled to Henri IV., and visited England in 1593-95, where he was favourably received by the Earls of Essex and Southampton. In London he published his *Relaciones* (1594) under the pseudonym of Rafael Peregrino. The revelations which this work made still further exasperated Philip, and induced him to make further attempts at his assassination, but the vigilance of P. saved him, while two emissaries were seized and executed at London. He returned to France in 1595, and passed several years at the court of Henri IV., but after the peace concluded between France and Spain at Vervins, May 1598, his services were no longer required. His last years were spent in great distress at Paris, where he died, 3d November 1611. P.'s *Cartas Familiares* and other works are noted for their elegance of style. See Bermudez de Castro's *Antonio P., Secretario del Rey Felipe II.* (Madr. 1841), Mignet's *Ant. P. et Philippe II.* (Par. 1845), and Prescott's *History of Philip II.* (1855).

Perfumery. That the art of P. arose out of the habit of employing incense in connection with worship and religious rites is indicated by the term itself, which is compounded of *per*, 'by,' and *fumum*, 'smoke.' The modern art of P. is concerned chiefly with the application of Essential Oils (q. v.), the substances yielding these, and the compounding of substances possessed of a pleasant odour, for various purposes chiefly connected with the toilet and for incense in apartments or in the service of Roman Catholic and certain of the Anglican Churches. The materials of P. are chiefly obtained from the vegetable kingdom, but some of the most important elements of P. are derived from animal sources, and organic chemistry also supplies several substances extensively employed in inferior perfumes. Although in the vegetable kingdom almost all parts of plants in their turns—roots, stem, wood, bark, leaves, flowers, fruit,

and seed—are found to contain essential oils, and are consequently useful for P., it is principally from flowers that the perfumer draws his raw materials. The P. materials of animal origin are musk, a secretion of the Musk Deer (q. v.), civet, from the Civet Cat (q. v.), Ambergris (q. v.), a morbid secretion of the sperm whale which is occasionally found cast up on continental coasts, and Castoreum (q. v.) from the beaver, the last of which, however, is little used by perfumers. Of artificial essences, that chiefly employed in P. is the essence of mirbane or artificial oil of bitter almonds, which consists of nitrobenzol, a substance very largely made as an intermediate product in the manufacture of aniline from benzol obtained by the distillation of coal-tar. Much of the 'almond soap' sold for toilet use is scented with this perfume.

Several vegetable substances are used for perfuming by merely rasping or pounding, as in the case of highly-odorous woods, leaves, and flowers, and in some cases the materials require to undergo no preparation whatever. But the ordinary perfumes of commerce are 'bouquets' or mixed scents, prepared by compounding various essences or essential oils; and the art of the perfumer is therefore concerned with—1st, the extraction of essences or essential oils from their sources; 2d, the intimate compounding of these so as to produce 'the harmony of sweet smells'; and 3d, the application of these substances to various toilet and other preparations, such as soaps, pomades, dentifrices, &c.

In the extraction of their odoriferous principles from plants, there are four principal methods pursued—1st, Pressure; 2d, Absorption or *enfleurage*; 3d, Distillation; and, 4th, Maceration.

Expression is only available in the cases of a limited number of substances closely allied to each other. These substances are the peel or rind of oranges, citrons, lemons, and other fruits of the orange tribe. From these the essential oil is simply expressed by means of a screw-press; and the exudation, which consists of water and albuminous substances mixed with essential oil, is permitted to settle for some time. The water and albuminoids fall to the bottom, and the essential oil is syphoned off, and when filtered is ready for use. Lemon peel oil is very greatly used in the cheaper forms of P.; but the other citrine oils are more frequently employed as flavouring substances than as perfumes.

Absorption or Enfleurage is the method by which the most delicate perfumes of the vegetable kingdom are secured for use. The process depends upon the readiness with which odours are taken up and retained by fatty substances with which they may come in contact. The materials employed for absorbing the odours are purified inodorous animal fats, and fine olive and other oils. Fats impregnated with odours are known as Pomades (Fr. *Pommades*), and the absorption is effected by means of glazed sashes (*Chassis aux Vitres*), thin layers of fat being spread on each side of the glass. Over these the flowers are strewed, and a large number of such sashes are piled above each other, every pair thus making a closed box in which the layers of fat are exposed to the odour of the flowers. The flowers are periodically renewed till the fat is sufficiently impregnated with the odour. In preparing scented oils, similar sashes or frames, having iron network in place of glass, are used, and on these are spread thick cloths which have been steeped in oil. The oil is squeezed out of the cloth after it has been saturated with the odour. From either pomade or scented oil the essential oil may be separated by treatment with spirit of wine 60 over proof, and the resulting alcoholic solution is known as an essence. The substances chiefly treated by absorption are Jasmine (*Jasminum odoratissimum*), Acacia flowers (*Acacia farnesiana*), Tuberose (*Platanthes tuberosa*), Violet (*Viola odorata*), and Wallflower (*Cheiranthus cheiri*).

Distillation.—Although essential oils have a higher boiling-point than water, yet they are distilled over with steam. The distillatory apparatus usually employed contains a perforated false bottom, water being in the lower part, and the vegetable substance to be acted on resting on the perforated bottom; but sometimes water and the oil-yielding body are mixed in the still. The mixed steam and essential oil which distil over are condensed in a worm, and caught in a Florence flask in which the substances settle into two distinct layers, and the oil being almost always specifically lighter than water, floats on the top. The oil separated from the water is rectified by redistillation, and the water itself, which retains a considerable aromatic odour, is utilised in P. as distilled or perfumed water. The

greater part of the strong and less delicately flavoured aromatic oils are obtained by distillation.

Maceration or Infusion is a process by which pomades and scented oils are obtained by infusing flowers, &c., in liquefied animal fats, or in heated olive oil, whereby the odours are transferred much more quickly and perfectly to the fat or oil than is possible with the *enfleurage* process. The scented oils or fats may subsequently be treated as indicated for separation of the essences under the absorption process.

A modification of the ordinary processes for extracting essential oils proposed in 1856 by M. Millon has been developed in practice by M. Piver. It consists in treating flowers, &c., with powerful volatile solvents, such as ether, chloroform, or bisulphide of carbon; subsequently distilling off these very volatile bodies, and finally washing the essential oil with water containing a little alkali.

Several of the sweet-scented gum resins and Camphor (q. v.) play an important part in P. The gum resins of importance in incense and as yielding essences are balsams of Peru and of Tolu; Mecca balsam (*Balsamodendron Gileadense*), Storax, Benzoin, Myrrh, and Olibanum. These will be found under their own headings.

In the preparation of 'bouquets' or mixed perfumes the intimate mixture of ingredients is of essential consequence, and a special apparatus is employed to facilitate such blending by agitation. Bouquets are usually very complex in their character, and each manufacturer has recipes which he regards as peculiarly his own. Some preparations have attained great and enduring popularity, such as Cologne Water, Hungary Water, Lavender Water, Jockey Club Perfume, Essbouquet and Millefleurs. In addition to bouquets, perfumers prepare perfume sachets, or small bags of dry perfume, incense, tooth-powders, pomades, hair-oils and hair-washes, toilet soaps, and cosmetics.

The great centre of the industry in essential oils is the Department of the Alpes Maritimes, in the south of France, where flower-farming is a leading industry. At Mitcham, near London, there are also flower-farms for the cultivation of such plants as suit an English climate, and of these lavender is a notable example, English oil of lavender being much finer and more valuable than that produced in Continental countries. See *Piessé's Art of Perfumery* (1855).

Pergamum, or **Per'gamus**, an ancient city of Mysia in Asia Minor, was situated near the point where the Selinus and Cetus emptied themselves into the river Caicus. It was 13 miles distant from the sea, with which it had communication by the navigable waters of the Caicus. It is first mentioned by Zenophon, as a fortress of great natural strength (Anab. vii. 8), but remained unimportant until the latter half of the 3d c. B. C., when it was selected as a treasure city by Lysimachus, who intrusted the care of it to the eunuch Philetærus of Tium. The latter, however, made a successful revolt in 283 B. C., and remained in independent possession of P. for the next twenty years. On his death in 263 the territory descended to his nephew, Eumenes I., who extended its boundaries, and defended it with success against Antiochus. After his death in 241 B. C., he was succeeded by Attalus I. (241-197), Eumenes II. (197-159), Eumenes III. (159-138), and Attalus III. (138-133). The new state was favoured by the Romans as a useful ally against Macedonia and Syria; and at different times was augmented by the addition of Phrygia, Lydia, Pisidia, Lycaonia, and Pamphylia. Meanwhile its capital had become one of the most magnificent cities of Asia Minor. Attalus III., surnamed Philometer, bequeathed P. to the Romans. Under Roman rule the city continued to prosper, so that Pliny could still speak of 'longe clarissimum Asiæ Pergamum.' Not only did it become the centre of jurisdiction and commerce for the district, but it could also boast of a library second only to that of Alexandria, and its name has passed into the European languages as *Parchment* (q. v.). Under the Byzantine emperors P. sank into insignificance, but it still exists under the name Bergama (q. v.), and displays numerous ruins and extensive remains of its former magnificence. P. is one of the seven cities mentioned in the Book of Revelation.

Pergole'se, **Giovanni Battista**, a famous Italian musician, was born at Jesi near Ancona, 3d January 1710. He studied composition at the Conservatorio de St. Onofrio at Naples, under Gaetano Grecco, and his first important work was an oratorio,

San Guglielmo, composed about 1730. His next efforts were operas, in which he adopted a freer and more melodious style than that of the old contrapuntists, the best of them being *La Serva Padrona* (1730) and *L'Olimpiade* (1735). The last-named opera, although subsequently a triumphant success, was a failure on its first production, after which he devoted himself principally to church music. His last great works were a mass and vespers, a *Stabat Mater* and *Salve Regina*. He died at Pozzuoli, 16th March 1736. In addition to his operatic and sacred compositions he wrote much chamber music, and a large number of instrumental trios. See the *Biografia degli Italiani illustri* (Ven. 1834), and Fétis, *Biographie des Musiciens* (new ed. Par. 1878).

Pergunnahs, *The Twenty-Four*, a district of Bengal, British India, lying N.E. of the Hooghly river, and enclosing the metropolitan city of Calcutta. Area, 2788 sq. miles, including a large portion of the Sunderbunds (q. v.). Pop. (1872) 2,210,047. The name is derived from the twenty-four fiscal divisions (*parganas*) ceded to the East India Company in 1757 by the Nawab, Meer Jaffier, which formed the first territorial possession of the British in India. The imperial rights over the same tract were subsequently granted to Lord Clive for life as a *jagheer*. The country is very fertile, and supplies Calcutta with all sorts of agricultural produce and firewood. It is traversed by two railroads, and by many canals and natural watercourses. In 1876-77 the registered exports were valued at £1,644,000, chiefly rice, sugar, firewood, and vegetables; the imports at £594,000. The principal manufacture is sugar, which is annually exported to the value of £300,000. The administrative headquarters are at Alipore, a suburb of Calcutta; the military cantonments are at Barrackpore. Other towns are Diamond Harbour, Barasat, Dum-Dum, and Port Canning.

Peri, Jacopo, born in Florence about 1570, is celebrated as the earliest operatic composer. He introduced recitative, and his *Dafne* (1597) and *Euridice* (1600) were the first real operas known to have been performed. He died about 1638, but the exact date is unknown. See Fétis, *Biographie des Musiciens* (new ed. Par. 1878).

Perianth (Gr. 'around the flower') is a botanical term which may include the outer envelopes, consisting of a distinct calyx and corolla, but which is usually restricted to cases where these look so much alike (as in the tulip and hyacinth) that they cannot be readily distinguished, or where one whorl is really absent (as in the nettle).

Pericarditis, or **Inflammation of the Fibro-Serous Membrane of the Heart**, is a disease of frequent occurrence which generally appears during an attack of Rheumatic Fever (q. v.). P. also occurs as the result of cold, of renal disease, of specific fevers, of wounds by fractured ribs, and of the extension of inflammation from the lungs or pleura. In the early stage there is exudation of lymph or serum; at a later stage, false membranes are formed; and, at a still later stage, the two sides become glued together, forming adherent pericardium. Owing to the continual movement of the heart, the lymph is deposited in layers, just as the tide leaves the sand ribbed, and, in some instances, it is shaggy like the rough surface of tripe. The general symptoms of P. frequently attract little attention; but the most obvious are pain in the cardiac region, increased by cough, pressure, or lying on the left side. The action of the heart is irregular and intermittent, especially after fatigue or excitement, and there is usually headache, difficulty of breathing, disturbed and restless sleep, passing into delirium in fatal cases. The local symptoms are, at the earliest stage, on auscultating, a to-and-fro friction sound from the serous membranes not gliding smoothly upon each other, and there is usually a systolic bellows murmur which may mask the friction sound. When effusion has occurred, the dilated pericardial sac assumes a pyramidal form, and its region is marked by dulness. When the pericardium becomes adherent, the dulness is that of the normal heart. P. is a very grave malady, and when it results in endocarditis it may leave permanent valvular disease. When the effusion is copious and rapid, and when it supervenes in the course of a chronic disease, it is generally fatal. The prognosis in P. is determined rather by the complications than by the disease itself. In cases of a mild type the disease generally begins to yield within a week or ten days, and a cure may be effected

in about three weeks. Pericardial adhesions may, however, remain and occasion other structural changes of the heart. In all cases of rheumatic fever, the condition of the heart should be constantly and carefully observed, and the treatment should have direct reference to cardiac complications. In cases of such a grave nature, the treatment should be left exclusively in the hands of a skilful physician. General blood-letting, formerly so prevalent, has now been abandoned; but the local application of leeches may do good in the early stages of the disease, and should be followed by the application of hot poultices and fomentations. When effusion has occurred, blisters are serviceable. Mercury, combined with squills and digitalis, is useful as a diuretic and absorbent. Iodide of potassium is also largely used. The strength should be supported by strong soup and beef-tea. Perfect rest of body and mind is of primary importance. Cooling drinks may be taken freely throughout the course of the disease.

Pericardium ('round the heart'), the name given to the conical sac or bag which contains the heart and the beginnings of the great vessels entering or leaving that organ. It is situated behind the breast-bone and the cartilages of the ribs of the left side, from the third to the seventh inclusive. The apex of the sac is directed upwards, while its base is attached to the *central tendon of the midriff* or *Diaphragm* (q. v.). The remains of the *thymus gland* intervene between the P. and sternum in front, while behind the sac is in contact with the œsophagus or gullet, the bronchi, and the *descending aorta*. It is covered at the sides by the pleura or lining membrane of the chest. The P. belongs to the class of structures known as *fibro-serous membranes*. The *fibrous* or outer layer is of firm texture, the more delicate *serous* layer covering the heart, and then being reflected on to the inner surface of the P. The P. in this view is therefore a double sac, consisting of a portion (*visceral*) investing the heart, and of a *parietal* portion. The serous layer secretes a small quantity of *serous fluid*, which serves to render easier the movements of the heart within its sac.

Pericarp. See FRUIT.

Pericles (Gr. *Perikles*), the most distinguished of Athenian statesmen, was the son of Xanthippus, victor at Mycale, 470 B.C., and of Agariste, great-grand-daughter of Cleisthenes, tyrant of Sicyon. The date of his birth is unknown. His early life was spent in study, and his education was most thorough. Music, an essential element in Greek culture, he acquired under Pythocleides, politics under Damon, philosophy under Zeno of Elea and Anaxagoras. The instruction of the last named had on his plastic mind an enduring influence, and contributed much to the formation of his character. P. derived from his intercourse with this great thinker and teacher not only the mould of his mind, but that purity of style, grandeur of diction, loftiness of sentiment, and dignity of soul which characterised him throughout his long and brilliant career. His oratory was singularly forcible. In the sweetness of his voice and in the flow and distinctness of his utterance he resembled Peisistratos (q. v.). His easy dignity was only equalled by his unrivalled self-command. His figure was graceful, his bearing calm and resolute.

When P. entered on his public career, 469 B.C., Aristides was dead, Themistocles in exile, Cimon abroad. The leadership of the democracy was his vocation; and the sincerity of his political convictions is indisputable. Selfishness, love of place, and political success had no place in his disinterested life. He was a 'Liberal,' a 'Radical,' from principle alone. Whether in Assembly or Senate, to the duties of his office he devoted himself with great assiduity and discretion. His friends and partisans were selected with great care. Ephialtes was the ablest of them. In 461 B.C., through the agency of Ephialtes, he struck a severe blow at the Areopagite or aristocratic faction, depriving them in great part of their political sway. This was the first triumph of the democrats. A second victory was the ostracism of Cimon. In 457 B.C. was fought the unfortunate battle of Tanagra, in which P. performed prodigies of daring and valour. His general policy, however, was directed against foreign conquest or territorial increase, then so popular. In 454 B.C., after the failure of the Thessalian expedition, P. invaded Sicyon and routed its forces. Immediately after he proposed and carried Cimon's recall. With characteristic magnanimity P. now proposed a grand Hellenic confederation, the aim and object of which was to end for ever

the mutual destruction of kindred nations, to make the Hellenic race one mighty people, and Hellas one firmly cemented nation fit to defy the world. The idea was in all respects a noble one. Had it been carried out, Rome might never have been empress of the world. A noble people of a noble stock might still have controlled the Bosphorus, and the Muslim Califate might never have acquired ascendancy. But Sparta was self-willed and blind. Athens, the 'eye of Greece,' and Lacedæmon, her powerful rival in arms, were irreconcilable. The Peloponnesian War was inevitable. In 448 B.C. the Delphians were deprived by the Phocians of the oversight of the temple of Apollo. A Spartan force restored the temple to the Delphians in consideration of precedence in consulting the oracle being granted to Lacedæmon. Three years later a rebellion broke out in Northern Hellas. Athens was threatened. P. declined to fight with the insurgent states at once. Sparta accepted a bribe and retired. Cimon was now dead. Thucydides was the head of the aristocratic party. In 444 B.C. he tried to overthrow P. but without success. Thucydides was ostracised. The organised opposition of the aristocratic party was broken up. Still P. was by no means free from annoyance. Soon after the war between Samos and Miletus broke out. The Milesians were vanquished, and in their distress applied for relief to Athens. P. supported the Milesians, established a democratical constitution in Samos, and imposed on them a contribution of 80 talents. Immediately on P.'s return the Samians again revolted, were again defeated, and in 440 B.C. a peace was concluded. The position of Athens became from day to day more critical. From 490 B.C. she had been the head of the allied states, and guardian of the common treasury kept in Delos. P. removed the treasury to Athens. The charge made against him of appropriating the sums thus transferred to state purposes is true, but it is also trivial. The Athenian fleet and the army were meant to be—in accordance with the policy of P.—a national force. Undoubtedly P. spent the money of the allies freely on Athenian sculpture and architecture, but it is not mere rhetoric to affirm that all the nations of Europe, and all later ages, have in consequence become participants of the bounty of P. The Parthenon, the Odeum, and the Propylæa, with many other splendid edifices, are 'the work of his power.' Industry and commerce prospered greatly under his rule, and literature and the drama flourished by his kindly influence. He died in 429. Two years before his death the Peloponnesian War broke out (431 B.C.), fatal, indeed, to Athens, but in no way resulting from the prudent and popular government of P. For an account of the relation between P. and Aspasia, see ASPASIA. See also William Watkiss Lloyd's *Age of P.* (2 vols. Lond. 1875), and a monograph by Daniele Pollaveri (Rome, 1876).

Peridot. A name given by Haiy to a variety of Chrysolite (q. v.), and derived from the Arabic *feridat*, 'a precious stone.'

Périer, Casimir, was born at Grenoble, 21st October 1777, received his education at Lyon, served in the Italian campaign of Bonaparte, and after his return to Paris entered a large banking concern founded by his father and his brother Scipio. Under the Empire the bank prospered greatly, and at the Restoration P. attracted a great deal of attention by the publication of three pamphlets upon the loans contracted for the liberation of the territory. In 1817 he was returned to the Assembly, where, though he combated the absolutism of the Bourbons, his support was always rendered to the constitutional monarchy. In 1824 the Chambers were packed by the 'quatrecentis' of an absolutist Ministry, but P. retained his attitude of moderate Orleanist. He was elected for the departments both of the Seine and the Aube in 1827, a mark of the high estimation in which his services were held outside the Assembly. In 1830 he was re-elected, and during the Revolution of July he exerted himself to the uttermost to preserve peace among the Parisians, and to make their triumphs bloodless. Called to the presidency of the Chambers, he had to decline it on the score of ill-health, but he entered the Cabinet of 10th August. On the 13th March 1831, though filled with presentiments of evil for his country, he assumed the presidency of the council, applying himself with great earnestness to measures by which he meant to tranquillise the domestic feuds whilst peacefully adjusting foreign relationships. In the new Assembly he endeavoured to found a majority, but its first vote was antagonistic. Had it not been that the question of Belgian independence immediately rose for settlement he would

have resigned at once. Under him the public credit was re-established, and government seemed even to be secured on a firm basis, when, exhausted by his labours, P. succumbed to an attack of cholera, 16th May 1832. Guizot, who was in various respects his political disciple, gives a vivid and impressive picture of P. in his *Mémoires*.—**Auguste Casimir Victor Laurent P.**, son of the preceding, was born in Paris, 20th August 1811, entered the diplomatic service at an early age, and was secretary of embassy at various European courts. In 1846 he was elected a deputy for the First Arrondissement of Paris, and after the Revolution of 1848 supported generally the policy of Louis Napoleon, without, however, becoming a Bonapartist. He protested against the *coup d'état* (2d December 1851), was imprisoned for some days, and on his release withdrew into private life. He reappeared after the fall of the Empire, was twice appointed Minister of the Interior by M. Thiers (in October 1871 and May 1873), and on June 15, 1874, carried a motion in the National Assembly in favour of a formal recognition of the Republic. An Orleanist of the Orleanists, he saw that the safety and happiness of France did not lie in the direction of the famous Fusion, and by example and teaching he was able to transmute his friends into Republicans. To him, next after Thiers and Gambetta, the Republic owes its existence. In December 1875 P. was elected to the Senate. He died at Paris, 6th July 1876.

Perigee. See APOGEE.

Périgueux, chief town of the department of Dordogne, France, on the right bank of the Isle, a tributary of the Dordogne, 69 miles W.N.W. of Bordeaux by rail. The streets are narrow and irregular, and a part of the city is surrounded by old walls. The chief building is a splendid cathedral of the 11th c., after the style of St. Mark's at Venice. Statues of Fénelon, Montaigne, and Marshal Bugeaud adorn the chief streets. P. is a bishop's see, has a lyceum, a museum rich in antiquities, and a library of 20,000 vols. The chief articles of commerce are truffles, truffle-pies (*Pâtés de P.*), turkeys, wine and corn, liqueurs, paper and wool stuffs. Pop. (1872) 21,316. P. occupies the site of the ancient *Vesunna*, capital of the Petrocorii, from whom the modern town takes its name. In the *acilé*, the oldest part of the town, are remains of a Roman amphitheatre, fountains, an aqueduct, and a round building 88 feet high and 216 feet in circumference, supposed to have been part of a temple of Venus.

Perihelion. See APHELION.

Perihepatitis, or Inflammation of the Capsule of the Liver and Glisson's Capsule, is generally caused by disease of the liver itself, or by inflammation of neighbouring structures, such as peritonitis and pleurisy. The prominent symptoms are: tenderness on pressure, motion, or deep inspiration; but the disease is not serious unless the inflammation extends to the portal or hepatic veins, or causes obstruction of the larger bile-ducts.

Perim', a small island at the entrance of the Red Sea, 1½ miles from the Arabian and 9 from the African coast. It is about 3½ miles long, with an average width of 1½ miles. The surface is a broken tableland, and the fort and lighthouse stand on a cliff 200 feet above the sea. Water for drinking is supplied by condensation, and even that for bathing purposes requires to be brought from the mainland. There are no trees for fuel, and there is no agriculture; but large flocks of goats belonging to the Somali inhabitants browse upon grass and the leaves of shrubs. A curiosity found on the coast is the shell of *Indacna gigans*, which sometimes attains a diameter of 5 feet, and a weight of 500 lbs. The climate is healthy. P. was known to the Greek geographer Ptolemy by the name of Perantonosiam. In the 17th c. it was much infested by pirates. It was first occupied by a British force in 1799, at the time of the war with the French in Egypt, but again abandoned in the same year. In January 1857 it was permanently occupied by the British. An English officer and a detachment of sepoy from the garrison (50 men) at Aden are relieved every two months. A proposal is under consideration to erect a casemated fort with iron shields at a cost of £82,000. There is a good harbour on the S. coast, and the fort commands the Strait of Babel-Mandel on both sides. The passage generally taken by vessels going to and from the Red Sea is the narrow one on the E. side of P.

See a report by Lieutenant King in *Selections from the Records of the Bombay Government*, No. 49 (1877).—There is another P. in the Gulf of Cambay, forming part of the Bombay district of Ahmedabad. It is chiefly celebrated for its ancient Buddhist sculptures and the enormous quantities of fossil bones of mastodons, &c., which have been dug out of the conglomerate.

Perimeter. See CIRCUMFERENCE.

Pe'riod is the time during which a physical phenomenon goes through all its changes. Thus in astronomy the P. of rotation of any cosmical body is its time of rotation round its axis, and the period of revolution of a satellite comet or planet is the time it takes to complete one revolution round its primary. A simple oscillating pendulum gives the clearest idea of what is meant by a true periodicity. Its P. is the time which elapses from its passing through any one position, to its passing through the same position in the same direction again. Pendulum motion is very approximately a simple Harmonic Motion (q. v.), which is theoretically the simplest periodic motion possible in nature. According to Fourier's theorem, the most complex periodic motion can always be expressed in terms of a series of simple harmonic motions, whose periods are $0, 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \text{&c.}$, times the period of the complex motion. In all departments of physics, periodic phenomena are constantly recurring, and to analyse these into their simple harmonic components is the great aim of physical and mathematical research. A musical note owes its peculiar character to its periodicity, notes of the same fundamental P. having the same pitch. The different quality of notes of the same pitch is due to the presence of different secondary harmonic functions, whose periods are in simple numerical relation to the common fundamental harmonic. In other words, the harmonic components expressed by Fourier's theorem differ for the two notes. (See SOUND.) In physical optics, the striking phenomena of diffraction, interference, and polarisation are all explained as caused by the superposition of simple harmonic motions. The simpler astronomical periods have already been noticed. No planet or satellite, however, returns accurately to the point from which it started, or describes the same orbit twice successively. The perturbations due to the other members of the system give rise to irregularities, which, however, are themselves subject to a periodic law. For example, because the orbits of the planets are situated in different planes, the apsidal line of each (see APSE) is constantly rotating at a definite mean rate. In the case of the earth this is what is known as the precession of the Equinoxes, and its P. is 25,868. The regression of the moon is a precisely similar phenomenon. Its P. is 6940 days, or about nineteen years, and is the well-known Metonic Cycle (q. v.), during two successive ones of which lunar and solar eclipses occur in very nearly the same order. Like all astronomical cycles, it has not, however, a perfect periodicity. See CHRONOLOGY, CYCLE, EPOCH, &c.

Periodicals (in Literature) are reviews, magazines, and similar publications distinct from newspapers, appearing at regular intervals. The review is devoted to literature, science, criticism, politics, theology, &c. The contents of the magazine are still more miscellaneous, and include novels, tales, sketches, verses, &c. Among the earliest reviews in this country were the *Weekly Memorials for the Ingenious* (1681-82), which contained, in addition to original matter, translations from the older French *Journal de Savants*, the *Memoirs of Literature* (1725), and the *Literary Journal* (Dublin, 1744-49). The *Monthly Review* established by Griffiths (1749-1844), and the *Critical Review* (1756-1817) founded by A. Hamilton with Smollett's co-operation, were the leading reviews of the latter half of the 18th c. The *Edinburgh Review* was started in 1802 and the *Quarterly Review* in 1809, with the support of the Whig and Tory giants of the day respectively. The *Westminster Review* appeared in 1824 to champion the advanced liberal and utilitarian views of Bentham and Bowring. The *Dublin Review* (Roman Catholic) dates from 1836 (new series 1863), and the *North British Review* from 1844. In these and many other quarterly reviews the system has been uniform. Each number consists of several lengthy papers purporting to be reviews of published works, but being usually original and elaborate essays on the subjects treated. Of late years the French method of appending the names of contributors, and of making the contents more varied in character and even antagonistic in opinion, has been adopted in such publications as the *Fortnightly Review* (1865), *The Contemporary*

Review (1865), and the *Nineteenth Century* (1877). The great reviews have commanded the services of famous statesmen, philosophers, historians, and theologians; and their columns, rich in brilliant writing and learned research, contain valuable additions to modern literature. For some notices of weekly reviews, such as the *Saturday Review*, the *Spectator*, the *Athenæum*, *Academy*, &c., see NEWSPAPER.

The favourite form of magazine in the first half of the 17th c. in England was that represented by the famous *Tatler* (1709-10) and *Spectator* (1711-14). Among the many similar publications which succeeded were Johnson's *Rambler* and Mackenzie's *Mirror* and *Lounger*. The *Gentleman's Magazine*, which still lives, was started in 1731, and for a long time was the leading periodical. It contained sketches and essays, and for some time an account of parliamentary proceedings and of historical matter, including obituaries. The *London Magazine* (1732-84) and the *Scots Magazine* (the first magazine north of the Tweed, 1789-1817) were popular serials. *Blackwood's Magazine* (1817) (see BLACKWOOD) and *Fraser's Magazine* (1830) were of a higher order than any of their predecessors. The usual price of the leading magazines was 2s. 6d. till the appearance of *Macmillan's Magazine* (see MACMILLAN) in 1859 at 1s., after which the admirable *Cornhill*, originally edited by Thackeray, *Temple Bar*, the gossiping *London Society*, and *St. James's Magazine* (all in 1860), *Belgravia* (1866), and others entered into the field at the same price. Among the still cheaper publications of excellence are *Chambers's Journal* (1832), *All the Year Round* (long associated with Dickens, 1859), *The Leisure Hour* (1852), *The Argosy* (1856), and *Good Words* (1860). In 1877, according to May's *British and Irish Press Guide*, there were 779 P. other than newspapers circulating in the United Kingdom at prices varying from 3d. to 10s. 6d. per number (260 at 1d., 75 at 2d., 40 at 3d., 98 at 6d., 63 at 1s., 14 at 2s., 19 at 2s. 6d., 10 at 6s., and the remainder at various prices); 579 were published in the metropolis, 115 in the rest of England, 18 in Wales, 41 in Scotland, 25 in Ireland, and 1 in the British Isles. Undernoted is a classification of the numbers published at different intervals:—

	Half-yearly, irregular, and various.	Every two months.	Quarterly.	Monthly.	Fortnightly, and twice a month.	Weekly, and oftener.
Metropolis	32	3	78	401	1	64
England (Provincial)	7	—	4	82	3	19
Wales	—	—	2	16	—	6
Scotland	—	—	3	29	1	6
Ireland	—	—	1	16	—	—
British Isles	—	—	—	1	—	—
Total	41	5	88	545	5	95

Among the best of the 352 having a religious tendency are the *Sunday Magazine*, *Day of Rest*, and the *Sunday at Home*; 89 were P. for the young, chief among them being *Every Boy's Magazine*, *Aunt Judy's Magazine*, and the infantile *Peepshow* and *Chatterbox*; 95 were trade publications; 58 were identified with the temperance movement, and 14 with the interests of labour. The *Art Journal* (1849) and *Portfolio* (1870) are pre-eminent among magazines devoted to art. The number of illustrated publications increases every year, particularly those embellished by photographic, chromo-lithographic, and other new processes. There were 272 illustrated P. in 1877, 17 with coloured plates, and 9 by photography.

In France the *Journal des Savants* was started by Denis de Sallo in 1665. The year 1672 saw the birth of the *Mercure Galant*, subsequently called the *Mercure de France*, which gave reviews of poetry and the drama. The *Mémoires de Trevoux* (1701-67) was an able Jesuitical organ, its modern successor being the *Études de Théologie*, &c. The *Magasin Encyclopédique*, which ultimately altered its name to the *Revue Encyclopédique*, was founded in 1795. Guizot was for some time associated with the *Revue Française* (1828-30, 1837-38, 1855-60, and 1861-66). The *Revue de Paris* (1829-58) had a deserved reputation for fiction. By far the most celebrated of modern French reviews is the *Revue des Deux Mondes* (founded 1829), which combines the features of the English magazine and review, and has under the direction of M. Buloz secured the

services of many of the best modern writers of France, Sainte-Beuve, Thiers, De Musset, About, George Sand, Renan, and others. The *Revue de France* and *Revue Britannique* are perhaps next in importance. The number of reviews published in Paris is very great, but the vast majority are on special and circumscribed subjects. The *Gazette des Beaux Arts* (founded 1859) and *L'Art* are publications of world-wide fame. The *feuilleton* in French newspapers supplies to some extent the want of magazines similar to those published in England.

In Germany reviews have for many years been numerous. The *Acta Eruditorum* appeared in Latin at Leipsic in 1682, and lasted for half a century. The *Gelehrte Anzeiger*, founded in 1739, is still published. In the latter half of the 18th c. most of the leading towns, Frankfurt, Halle, Kiel, Gotha, &c., had their own *Gelehrte Zeitung*. Lessing contributed to the *Briefe die Neueste Literatur betreffend* (1759-65). Jena was famous for the *Allgemeine Literaturzeitung* (1785, transferred to Halle in 1804), and the *Jenaische Allgemeine Literaturzeitung* (1804-1848). Among modern and leading critical authorities are the *Deutsche Vierteljahrsschrift* (modelled on the English quarterlies), *Historische Zeitschrift* (eight times a year), *Unsere Zeit*, and the *Heidelberger Jahrbücher*. The *Deutsche Rundschau*, a monthly magazine and review founded at Berlin in 1875, has been very successful. The *Gartenlaube*, both for the excellence of its literature and the beauty of its illustrations, takes a high place among German magazines. *Der Salon* and *Daheim* may also be mentioned. The *Gegenwart* is one of the best critical weeklies. Some important reviews are published in Austria, such as the *Allgemeine Literaturzeitung* (Catholic), the *Internationale Revue*, and the *Oesterreichische Revue*.

One of the earliest critical journals of Italy was the *Giornale dei Letterati*, first issued at Rome by Nazzari about 1668. The *Novelle Letterarie*, founded in 1740, was an erudite publication. The scholarly *Rivista Contemporaneo* (Turin) is the Italian *Revue des Deux Mondes*, and has engaged the pens of some of the best modern Italian essayists. The *Rivista Europea* and the *Nuova Antologia* of Florence are also of high importance. Since the formation of the kingdom of Italy a great impulse has been given to serial publications at Rome, where over 30 P. are at present published.

A number of bulky reviews of considerable merit appear in the Russian press, such as the *Vjestnik Evropa* (founded in 1802) and the *Ruski Vjestnik* (1808). The *Nordisk Universitets Tidsskrift* (1854) is a well-managed quarterly review published by four Scandinavian universities.

In the United States the *General Magazine*, started at Philadelphia by Franklin in 1711 on the plan of the *Gentleman's Magazine*, was a venture which perished in six months, and all attempts at similar serials were comparative failures until after the Revolution. The *North American Review* (Boston, 1815) has proved the most permanent of American critical publications. Among others are the *National Quarterly Review* and the *International Review* (published six times a year). The *Knickerbocker* and *Putnam's Monthly* were two of the best of the light American magazines of the past. The *Atlantic Monthly*, founded in 1857, was for some time edited by Lowell, and occupies a prominent place. Harper's *New Monthly Magazine* has a very wide circulation, and *Scribner's Magazine* (New York), the *Galaxy* of Philadelphia, the *Overland Monthly* of San Francisco, and the *Lakeside* of Chicago, enjoy high favour. An immense number of American serials are also in the interests of the various religious sects, a condition of things incompatible with the highest literary excellence.

Periœci (Gr. 'dwelling round about') in Laconia formed an intermediate class between the freemen and the slaves. Descended from the conquered Achæans, they were personally free, but had no political rights, being subject to laws which they had no voice in making, and obeying magistrates whom they had no voice in choosing. They formed a large proportion of the population, numbering 10,000 at the battle of Plataea (479 B.C.), and they had cities of their own, some of which, as Amyclæ, seemed to have enjoyed privileges beyond the rest. The trade and industries of the country rested almost exclusively in the hands of the P., and they also cultivated the arts, which the Spartans themselves despised. The term P. was also applied by geographers to people living in the same parallel but opposite meridians.

Perios'teum (Gr. 'around the bone'), the fibrous membrane covering the surface of bones, and serving to support the blood-vessels concerned in their nutrition. The P. is firmly adherent to the surface of the bones at every point, except at their extremities, where they are invested with cartilage. This membrane is thickest and most vascular in its young condition, and grows thin in old age. It consists of two layers of membrane, closely applied. The P. is concerned largely with the growth of bone, and by the experiments of Syme (see OSSIFICATION) was found to be concerned in the repair of bones after injuries.

Periostitis, or **Inflammation of the Perios'teum**, is almost always associated with more or less inflammation of the substance of the bone itself, and is, strictly speaking, one of the forms of Ostitis (q. v.). P. occurs in two distinct forms, viz., the common or chronic, and the acute or diffuse. Chronic P. is often a consequence of syphilis, and, when limited to a small extent of surface, is called a *node*, its most common seat being the superficial bones, as the cranium, tibia, clavicle, &c. (See NODES.) The ordinary cases of *chronic* P. are really cases of inflammation of the whole bone, with deposits on its surface, induration and thickening. *Diffuse* or *suppurative* P., leading to acute periosteal abscess, may occur as a result of local injury or as a serious disease of the bone, producing a general pyæmic condition, or it may be itself a manifestation of general pyæmia. In such cases, the treatment must be energetic and decided. When the pain and tension is severe, a free incision should be made down to the bone, though the presence of fluid be not established. In less severe cases, local depletion and iodide of potassium will lead to a cure without supuration.

Peripatet'icism (Gr. *peri*, 'about,' and *patō*, 'I walk'), the philosophical system of Aristotle (q. v.), so named because he lectured in a *peripatos*, or covered walk of the Lyceum at Athens.

Perip'teral (Gr. *peri*, 'around,' and *pteron*, 'a wing'), a term used in Grecian architecture to denote a temple, the *cellæ* of which was surrounded by a single row of columns, as distinguished from the *dipteral*, in which two rows of columns were employed.

Pe'ris (Pers., from Zend. *pairika*, not akin to Eng. *fairy*), in Oriental folklore, are male and female spirits, the offspring of the fallen *finns*, but themselves beautiful, happy, and beneficent, ever at war with the wicked *Devs*. Their exclusion from Paradise forms the theme of Moore's *Paradise and the Peri* in *Lalla Rookh*.

Periss'odactyla ('uneven toed'), one of the chief divisions of the order of *Ungulate* or 'hoofed' quadrupeds. The toes are uneven in number, the tapirs exhibiting the only exception to the rule. The dorso-lumbar vertebræ number not less than twenty-two, and a third trochanter is developed on the thigh-bone. When horns are developed (as in rhinoceroses), they do not exist in pairs, and these organs are not supported by 'horn cores.' The *stomach* is of simple conformation, and the *cæcum* is large and capacious. The families of the *Equidae* (horses), *Rhinocerotidae*, and *Tapiridae* represent this group, along with the extinct family *Palaotherida*.

Peristaltic Action, the term given to the movements of the intestines, by means of which the food is propelled along the intestinal tube. The name of *vermicular motion* is also given to such movements. The source is the *muscular coat* which the intestine, in common with other parts of the alimentary canal, possesses. The contraction of the intestines may be seen to pass along the gut in an undulating or wave-like manner. The *longitudinal fibres* of the intestinal muscular coat are the first to contract, and by their action draw a portion of the intestines backwards, as it were, over the food to be propelled, this action serving in all probability to consolidate the food, and to thus render its propulsion more readily effected. The *circular fibres* next come into play, and as they contract from behind forwards they propel the food onwards to the next segment of the intestine. The movements of the intestines are not perceptible in health, but under abnormal stimulation, as after the administration of purgative medicines, the sharp contraction of the tube may be felt. The muscular fibres of the *large intestine* are stronger than those of the *small intestine*, owing to the greater

power required for the propulsion of the fecal matters with which the large intestine has to do.

Peristyle (Gr. *peri*, 'around,' and *stylos*, 'a column'), in architecture, a court, square, or cloister surrounded with columns, or having columns on three sides. The term is also applied to the colonnade itself.

Peritoneum (Gr. 'what is stretched round'), the lining membrane of the abdominal cavity, analogous to the *Pleura* (q. v.) of the chest. It is one of the *serous membranes* of the body. The P. is in reality a closed sac, one layer or side of which is applied to the abdominal walls, and the other reflected over the various organs contained within the abdominal cavity. Like the *Pericardium* (q. v.), it thus consists of a *visceral* and of a *parietal* layer. The layers enclose a central (*peritoneal*) cavity, which in the male is completely shut, but in the female communicates with the outer medium through the *Fallopian tubes* or *oviducts*. The surfaces of the P. which line its cavity are smooth and glistening, and secrete a little serous fluid, which, when increased to an abnormal extent, causes *dropsy*. The two layers of the P. are thus adapted to move easily upon each other, and to facilitate the movements of the viscera in digestion. The general arrangement of the P. may be studied if we commence with the upper wall or roof of the abdomen, where the membrane is reflected from the *midriff* or *diaphragm* on to the surface of the liver, where it aids in forming the ligaments (*suspensory, lateral, and coronary*) of that gland. From the diaphragm the P. is also reflected on to the *spleen*, and to the stomach, at the point where the gullet enters the organ, and where it forms the *gastro-suspensory ligament*. The liver is covered by the P., which passes thence to the stomach, where it forms a double fold (the *small omentum*). After leaving the stomach, the P. hangs down over the small intestine, and is then known as the *great omentum*, which on the left side joins the small omentum, and on the right invests the *colon*, or middle portion of the large intestine. The membrane also forms the *mesentery*, or layer which supports the intestine and attaches it to the walls of the body, and over which the *lacteal* or *absorbent vessels* pass on their way to the *thoracic duct*. The P. covers the upper part of the *rectum*, and in the male forms a fold between the *bladder* and the terminal part of the intestine named the *recto-vesical fold*. In the female it covers a small part of the posterior wall of the *vagina*, and is then reflected over the posterior surface of the *uterus*, whence it passes in the form of the *broad ligaments* to the hinder surface of the bladder, which in both sexes is therefore uncovered in front by P. The cavity of the P. already spoken of consists of two compartments which communicate with each other. The larger cavity extends from the midriff to the pelvis, whilst the smaller cavity lies behind the small omentum and stomach. The cavities communicate by an aperture, the *Foramen of Winslow*, placed behind the free border of the lesser omentum, and having the *inferior vena cava* behind, the Spigelian lobe of the liver above, and the duodenum below.

Peritonitis, or Inflammation of the Peritoneum. The peritoneum, or serous membrane lining the abdominal and pelvic cavities, and investing the viscera, is liable to acute and chronic inflammation, similar to that which occurs in all serous membranes, characterised by capillary congestion, redness, interstitial growth or exudation, so that the membrane loses its transparency, and is thickened, and sometimes ribbed or villous according to position. The surface of the intestines is injected, and they may be slightly glued together with soft yellow-grey lymph, shifting from one fold of the peritoneum to another. The effused lymph, characteristic of chronic cases, gravitates to the pelvic and lumbar regions, where it may escape observation for a time, or it may increase and distend the abdominal walls. P. tends to spread until the whole membrane is involved, and when arrested there may follow absorption of the fluid, organisation of the false membrane, thickening of the peritoneal surface, and adhesion of adjacent organs. The fluid, if purulent, may form an external abscess, or escape into the intestines. P. may be occasioned by external injuries, perforations of the intestines, strangulated hernia, extension of disease from neighbouring parts, and exposure to wet or cold; or it may be the result of various blood diseases, as tubercle, Bright's disease, Puerperal Fever (q. v.), &c. In the *acute* form, whatever the cause may be, there are the usual febrile symptoms, with pain in the abdo-

men, increased on pressure or by the slightest movement. The pain is generally very severe, and the patient lies in bed with the legs drawn up, the features are pinched, the expression is anxious, the abdomen is tympanitic, tense, and hot, and vomiting, which is generally present, aggravates the pain; the pulse is rapid, hard, and wiry, the tongue parched, the respiration quick, and the urine is scanty and high coloured. The *treatment of acute P.* consists in absolute rest, maintaining the position instinctively assumed, and guarding the patient against the weight of the bed-clothes by means of a support. When P. is idiopathic, leeches should be applied to the abdomen, and the bleeding should be encouraged by hot fomentations. Opiates should be given, but if there be irritability of the stomach and vomiting, they may be given as enemata, or morphia may be injected subcutaneously to allay the pain. The strength should be supported by beef-tea, eggs, and milk; and in very acute cases an ice-bag over the abdomen, with two or three layers of flannel between, will afford much relief, and subdue the inflammatory symptoms. Small pieces of ice to suck is agreeable, and mitigates vomiting. Counter-irritation, in the acute stage is not admissible, the inflammation being too general for such treatment. *Chronic P.* is generally associated with the strumous diathesis, but it sometimes follows the acute affection. In the former case numerous miliary granules lie within or immediately beneath the membrane, especially in the folds of the peritoneum which compose the omentum. The symptoms of *chronic P.* are obscure and insidious. There is generally loss of appetite, nausea, vomiting, progressive emaciation, and diarrhoea. A pricking pain, which is increased on pressure, is felt in the abdomen, which gradually gets full and tense, and fluctuation may be detected. A friction sound, produced by respiration, or movement of the abdominal walls, may be detected by the ear or the stethoscope. The *treatment of chronic P.* consists in mild, nutritious diet, milk, beef-tea, &c. Syrup of the iodide of iron and cod-liver oil should be administered, and iodine ointment may be applied externally. In severe cases, opium fomentations or counter-irritants may be applied. Very little can be done in the way of curative treatment unless chronic P. be the result of an acute attack. When complicated with disease of the mesenteric glands, phthisis, &c., the treatment must be the same as for these diseases.

Perityphilitis is the term used in medicine to denote inflammation of the areolar connective tissue round the *caecum*, a lesion of frequent occurrence during typhoid fever. It may be caused by accumulations of feces or of foreign substances in the vermiform appendix. When perforation takes place where the bowel is free from peritoneal covering, an abscess generally appears in the iliac region occupied by the caecum; but when perforation takes place directly into the peritoneal cavity, the result will be fatal peritonitis. In the early stage, leeches, followed by hot fomentations and poultices, should be applied, and opium should be given internally. Drastic purgatives should be avoided, and only liquid food should be used.

Periwig (formerly spelled *perewyke*, a corruption of Fr. *peruque*, 'a lock of hair'; Sp. *peluca*, from Lat. *pilus*, 'a hair'), contracted into **Wig**, an artificial covering of hair for the head. The use of the P. may be traced back to the Egyptians, who wore wigs to protect their shaven heads from the sun's rays. False hair was worn by both sexes of the Greeks and Romans; at one time during the Empire the head-dresses of Roman ladies were heightened with false curls and plaits, and later wigs of a blonde colour were fashionable. The P. or peruke was introduced into England from France in the middle of the 16th c. At that time a single lock of false hair constituted a P. An actor is described in *Hamlet* as a 'P.-pated fellow.' With the Restoration a long and very thick wig came into vogue, the combing of which in public was a favourite pastime with beaux. Pepys mentions in his *Diary* that ladies also wore wigs in imitation of gentlemen. Several varieties of wigs were in use before the end of the 17th c., and the following century witnessed additions to the number. In Queen Anne's time 'black-riding wigs,' 'bag-wigs,' and 'night-cap wigs' are spoken of, and during the reigns of George I. and II. 'Ramilie-tails' (so called after the battle of Ramilies), 'bob-wigs,' 'tie-wigs,' and 'pig-tails,' were introduced. The bob-wig, which resembled the natural hair in form, was worn by the middle classes, while the upper classes affected a small wig with a large queue or tail. The three-cornered hat then in fashion was more frequently carried under the arm than on the

head, lest it should disarrange the wig. Wigs fell into disuse about 1760, but the pig-tail, formed of the natural hair, continued for some time longer. Formally curled perukes are now only worn professionally by barristers and churchmen, and sometimes by coachmen of the nobility; and wigs imitating the natural hair are occasionally worn to disguise baldness.

Periwinkle (*Littorina*), a genus of *Gasteropodous* molluscs, belonging to the section *Holostomata*, in which the shell aperture is entire, and not indented for the passage of a *siphon*. The shell is of spiral form; its lip is sharp; the whorls are few in number. The *P.* (*L. littorea*) is the type of the family *Littorinida*. It is found plentifully in the rocks and tangle between tide marks, and is used for food by the lower classes. Another species is the *L. rudis*. The *P.* is sometimes named the 'whelk' or 'wilk' (*Scottic!*); but it is to be distinguished from the true whelks, which are larger, and belong to a separate family—that of the *Buccinida*.

Periwinkle is the common name of the genus *Vinca* of the natural order *Apocynacea*. It consists of about ten species, confined to the eastern hemisphere. Of these, the best known are the Greater and the Lesser *P.* (*V. major* and *V. minor*), both evergreen trailing undershrubs, with blue, purple, or white salver-shaped flowers. They are frequently planted in shrubberies and other garden adjuncts, on account of the rapidity with which they overspread and obliterate broken or unsightly ground, giving it a covering of deep shining green. Both are naturalised in various parts of Britain, and probably the latter is a native in England. *V. rosea*, from Madagascar, is cultivated as a greenhouse plant.

Perjury and Subornation. *P.* is a wilful false swearing in any judicial proceeding, in a matter material to the issue or point in question, on a lawful Oath (q. v.) administered by some one of competent authority. To constitute the crime the falsehood must not arise from inadvertence. *Subornation of P.* is the offence of procuring another to commit the crime in question. If any one swears that he *thinks* or *believes* something to be true, which he knows to be false, if the matter sworn to be material to the case, *P.* is committed. The punishment of these crimes was at one time death and forfeiture of goods, afterwards banishment or cutting out of the tongue; it is now fine, imprisonment, or penal servitude.

Perkin Warbeck, a native of Tournay, appears first in English history under the protection of Margaret of York (1490), who professed to find in him a strong resemblance to her royal brother. In 1494 he landed at Cork, and was acknowledged Richard Duke of York, the mayor and citizens declaring in his favour. From thence he went to the court of Charles VIII., who was then engaged in war with England; and subsequently, at the instigation of Margaret, Duchess of Burgundy, landed at Kent, and made an unsuccessful raid. He next went to Scotland, was received by James IV., and married a daughter of the Earl of Huntly. James supported him in two raids upon Northumberland, but the Scottish King having come to an understanding with Henry VII., *P. W.* was once more compelled to seek refuge in Ireland. In 1498 he joined the insurgents of Cornwall, taking the title Richard IV., advanced as far as Taunton, was captured, and hanged, 16th November 1499.

Perleberg, a Prussian town, province of Brandenburg, on the Stepnitz, 75 miles N. W. of Berlin by rail. It has manufactures of machinery, ovens, carriages, wadding, mustard, vinegar, &c., as well as large oil-refineries, tanning-mills, breweries, and printing-offices. Pop. (1875) 7605.

Perm, a government of E. Russia, lying on both sides of the Ural Mountains, and bounded N. by Vologda, W. by Viatka, S. by Ufa, and E. by Tobolsk. Area, 128,245 sq. miles. Pop. 2,198,666. The surface rises gradually to the Ural Mountains, the general elevation of which is from 3000 to 4000 feet. *P.* is drained on the European side by the Kama and its feeders, and on the Asiatic by the affluents of the Tobol. Nearly three-fourths is covered with wood, and only one-twelfth is under cultivation. It is the richest mineral district of European Russia, abounding in copper, gold, platinum, malachite, and salt, and having an inexhaustible wealth of iron ore, and a coal formation extending, with a width of 250 miles, from Tscherdin in the N. to Kirchigansk and Grobowa, and 45 miles S. into Ufa. The

mines give employment to over 100,000 men, and yield annually iron to the value of £6,000,000.—*P.*, the capital of the government, on the right bank of the Kama, 715 miles W. N. W. of Moscow, and on the great road from that city to Siberia. It was founded as early as 1729, and known as the Egotinsky Copper Work, but was first built in 1780 under a ukase of Catherine II. The houses are mostly built of wood, but the streets are broad. There is an active transit trade on the river, but the importance of the town is due to the mining in its neighbourhood. Near *P.* is a great copper-smelting work, and at Motovilichinsk, 2 miles up the river, and on its left bank, a cannon foundry employing upwards of 2000 men, and at which were produced, between its commencement in August 1863 and the end of 1865, 270 cast-steel cannon. Pop. (1873) 22,288.

Permian Period, sometimes known as the **Dyas**, comprises the highest Palæozoic formations which overlie the coal measures. In England, three divisions are recognised. The lower strata consists of Red Sandstone and marl, which pass into the coal measures; the middle form the magnesian limestone; and the upper are composed of the New Red Sandstone. Fossils are scarce; and nearly 50 per cent. are identical with carboniferous forms. *Productus* and *Orthis* die out, as also the low forms of coral; and the gradual disappearance of heterocercal tails among the fish remains is well marked. Traces of the Labyrinthodon are observable. In the English representative rocks, a great break in time occurs after the magnesian limestone—a gap which is filled in by formations in other parts of Europe. In Germany there are two well-marked divisions—the Kupferschiefer, contemporaneous with the underlying marls of the British system; and the Zechstein, corresponding in part to the magnesian limestone. At the base is a large mass of red sandstones, conglomerates, and breccias, with porphyries and tuffs, which is the Rothe-todtliegende of the German miners; and surmounting the Zechstein, a collection of brecciated limestones and marls which pass conformably into the Bunterschiefer of the Lower Trias. In Russia, the rocks are easily correlated to the German system. They occupy a wide track in the ancient kingdom of Perm, from which the name Permian, introduced by Murchison, is derived. Nowhere is there a great development of life, but there are evidences of important physical changes, due to volcanic action and glaciers.

Permit is a license granted to remove spirits liable to excise duties. Any person making paper in imitation of excise paper, or counterfeiting a *P.*, or uttering the same, is guilty of felony.

Permutations and Combinations. When the order or arrangement of a row of objects is changed, they are said to be permuted, and the different arrangements which can be formed are termed permutations. Thus, the three letters *a, b, c* can be arranged in six distinct ways, namely, *abc, acb, bac, bca, cab, cba*. Similarly the number of permutations of four things is 12. Assuming the number of permutations of *n* things to be the product 1. 2. 3. 4. . . . *n*, briefly written $n!$ —a rule which evidently holds for 2, 3, and 4—it is required to know how many there are of $n + 1$ things. Now, each *n*-permutation can form with the ($n + 1$)th object ($n + 1$) permutations, according to where the new object is inserted. But there are $n!$ of these *n*-permutations; hence there are $(n + 1) \times n! = (n + 1)!$ permutations of $n + 1$ things. If the rule holds for *n* things, it holds for $n + 1$; but we know it to hold for 4, therefore it must hold for 5, 6, 7, and any number. The number of possible arrangements of *n* things taken one at a time is obviously *n*. Each one can form with others ($n - 1$) pairs, in which it stands first; hence it is easily seen that the number of permutations of *n* things taken two and two is $n(n - 1)$. And generally it can be demonstrated that the number of permutations taken *r* together is $n(n - 1)(n - 2) \dots (n - r + 1)$. If the grouping together of a number of objects is considered without reference to their arrangement, the question becomes one of *combinations*. Thus though there are $n!$ permutations of *r* things taken all together, there is only *one* combination. Hence for every combination of *n* things taken *r* together there are $n!$ permutations;—or (number of combinations) \times $n!$ = number of permutations, and therefore the number of combinations of *n* things taken *r* together = $\frac{n(n - 1) \dots (n - r + 1)}{1. 2. 3. 4. \dots r}$.

The whole theory of combinations is of the greatest importance in higher mathematics, but for the various fundamental theorems reference must be made to some text-book on algebra.

Pern. See HONEY BUZZARD.

Pernambuco, a province of Brazil on the seaboard, between the provinces of Parahyba, Ceará, Piauí, Bahia, and Alagoas. It has an area of 46,257 sq. miles, with a pop. (in 1872) of 841,539, of whom 89,028 were slaves. The climate is moist and hot, and the soil fertile. The coast-line, which is 120 miles long, is low, and the sugar-cane is extensively cultivated in the neighbourhood. The interior is to a large extent mountainous and wooded, and its principal products are cotton, dye-woods, gums, drugs, &c. The S. boundary of the province is formed by the large river São Francisco, near whose banks cattle are reared in great numbers. Gold is believed to exist in the interior ranges.—P., the third city of Brazil, at the mouth of the Biberibe and Capiberibe rivers. It consists of three portions, divided by channels of water, and connected by bridges and embankments, viz. —Recife, next the sea, on a narrow, sandy peninsula, and the most mercantile part of the city; São Antonio, on a small island, and Boa Vista, on the mainland. The ancient town of Olinda, 3 miles N., now also forms a suburb of P. The harbour of P. is safe, roomy, well-lighted, and fortified. It is formed by a low sandstone reef which is submerged at high tide, but is a perfect natural breakwater; yet the town has its name (P. = 'mouth of hell') from the violent surf that breaks on the reef. The town was formerly very unhealthy, its site being low and wet, and the rainfall very great, exceeding 100 inches annually. Extensive drainage and paving operations, however, have much improved its sanitary condition. P. has an arsenal, state observatory, and several important educational institutions. Its trade is very considerable, the imports and exports during the financial year ending 30th June 1875 having amounted in value to £2,181,633 and £1,636,344 respectively. In 1875 there entered the port 525 vessels of 356,922 tons, and cleared 506 of 315,779. The chief exports are sugar, cotton, hides, and rum. Pop. (1872) 116,671.

Pernambuco Wood. See BRAZIL WOOD.

Pernov (Ger. *Pernau*), a strongly fortified seaport of Russia, in the government of Livonia, at the N.E. corner of the Gulf of Riga, and at the mouth of the river P., 103 miles N. by E. of Riga. P. is regularly built, and has three churches. It has extensive trade, the exports in 1874 (chiefly flax, linseed, and corn) amounting to £1,320,150, and the imports (principally salt, coal, and herrings) to £59,140. In 1873 there entered and cleared at the port of P. 240 vessels of 38,154 tons. Pop. (1870) 9568.

Perouse, Jean François de Galaup, Comte de la, born at Guo, near Albi, department of Tarn, August 22, 1741, became a midshipman in the French navy in 1756. He was taken prisoner in the battle of Belle Isle (1759), in 1762 returned to France, and served in the East Indies from 1773 to 1777. In 1782 the French Government sent him to destroy the English settlements in Hudson's Bay. He took the forts of Prince of Wales and York; but the expedition ended in the peace of 1783. In August 1785 P. was sent to explore the Pacific. He doubled Cape Horn, followed the W. Coast of America to California, crossed the Pacific, and traced the Asiatic coast from Manila to Petropaulovsk. The 'Strait of La P.', between the island of Saghalien and the Japanese island of Yesso, still bears his name. From Petropaulovsk he sent his journals and charts to Paris. In September 1787 he started southwards, and a letter was received from him dated Botany Bay, 7th February 1788. After this the expedition disappeared. Searches were made by D'Entrecasteaux in 1791, and by Dumont D'Urville in 1828; and it is now supposed that it was wrecked at Vanikoro, in the New Hebrides, in 1788.

Perpendicular, in mathematics, is the term applied to two lines or planes at right angles to one another, and to a line which is at right angles to a plane. The word is very often used as synonymous with *vertical*.

In fortification, it is technically the line drawn inwards from the point of bisection of an exterior side.

Perpendicular is the name given to the last modification of the Gothic (q. v.) style of architecture which flourished in Britain. It was developed from the Decorated (q. v.) towards

the close of the 14th c., and lasted till about the middle of the 16th c. The term P., first used by Rickman (1817), has reference chiefly to the numerous straight vertical lines which present themselves in the subordinate ornament. Since these, however, are almost everywhere crossed at right angles by straight horizontal lines, *rectilinear* would perhaps be a more exact designation than P. The mouldings are thinner, and the recesses of the pillars and buttresses shallower, than in the buildings of the preceding period; and it may be said generally that the P. style substitutes lightness and elegance for the massive grandeur so characteristic of the earlier Gothic. A distinctive feature of the style is the square arrangement of the mouldings over doorways, and the constant presence of square panelling, with which sometimes both the exterior and interior walls, and even the vaulting, are covered. In the window mullions the flowing curves of the preceding period are replaced by straight lines, which run upwards till they cut the enclosing arch, and which, in windows of any size, are invariably crossed by several transoms. The roofs are often of a high pitch, and have a magnificent effect, sometimes displaying a peculiarly rich species of vaulting known as Fan Tracery (q. v.). The open wooden roofs of this period are remarkable for their great size and elaborate ornament; the most notable example and the finest specimen of purely English work being that of Westminster Hall (1397-99). Stone porches are frequent, and they are generally enriched with panelling and niches for statuary. The P. style is also distinguished by the prevalence of handsome church towers. Fine examples are Gloucester and Winchester cathedrals; St. Mary's, Taunton; St. Stephen's, Bristol; Magdalen College, Oxford, &c.

Perpetual Motion, The, as understood in physics, is not the simple continuation of motion for ever. Such, indeed, according to Newton's First Law, would be possible and even necessary, if all resistance to the motion of a body could be eliminated. Physically, of course, even this theoretically possible P. M. is not realisable, as far as our experience, at all events, has shown. By 'The Perpetual Motion' is meant doing work out of nothing, or doing work without a previous expenditure of energy. The postulate, then, that the P. M. is impossible is simply a part statement of the great doctrine of modern science, the conservation of energy. When work is done work must be spent, which does not necessarily imply the other aspect of the conservation principle, that when work is spent work is also done. To construct a machine which should itself gather power as time passed on, has been the darling scheme of many paradoxers. The searchers after the philosopher's stone and the elixir of life deserve credit to which the circle squarers and perpetual motionists have no claim. These wasted their time in striving after the attainment of what all natural laws pointed out as unattainable; and notwithstanding the present development of science, there are still some monomaniacs who hope to realise their one idea of making an engine work without fuel. The various forms of apparatus devised by these show in many cases an undoubted mechanical ingenuity, which, had it been devoted to a better cause, might have added to the list of Watts and Stephenson's. The physical bearings of the subject are sufficiently considered under ENERGY.

Perpetuities, Law Regarding. It has been long ago decided by the law courts of England that succession to real estate cannot be regulated for more than twenty-one years beyond the lives of persons in existence. In Scotland the contrary rule of law prevails. The Act 39 and 40 Geo. III. c. 98, known as the Thellusson Act, prohibits accumulation of income in England for more than twenty-one years beyond the death of the testator. The Act was so called from its having been passed in consequence of the will of the late Mr. Thellusson, a London banker. This will directed the accumulation of an originally immense fortune for three generations, in favour of an unborn descendant. It gave rise to protracted litigation, which consumed the greater part of the intended accumulation.

Perpignan, a fortress of the first rank, and chief town of the department of Pyrénées-Orientales, France, on the Têt, commanding an important pass of the Pyrenees, 5 miles from the Mediterranean, and 40 S. of Narbonne by rail. It has a richly ornamented Cathedral of St. Jean, begun in 1324, a citadel of which the donjon was formerly a castle of the kings of Ara-

god, a chapel with a fine Moorish gate, and a hôtel-de-ville, rebuilt in 1692. There is some industry in cloth, leather, chocolate, &c., and an important trade in oil, silk, and Roussillon wine. Pop. (1872) 20,211. P. was founded in the 11th c., and belonged to the Kings of Aragon till taken by Louis XIII. in 1642. It was the capital of Roussillon, a former French county.

Perrault, Charles, a French author, was born at Paris, 12th January 1628, studied at the College of Beauvais, left it suddenly because he was rebuked by a professor, devoted himself diligently to private reading, and passed as an advocate in 1651. From 1654 to 1664 he remained in the office of his brother, who was receiver-general of finance, and obtained the friendship of Colbert, upon whose recommendation he was received into the Academy (1671). P. threw himself with great ardour into the study of architecture, sculpture, and painting, and by his influence the new Academy, devoted to these subjects, was organised. During this period he composed light, poetical pieces, but it was not till 1687 that his *Le Siècle de Louis le Grand*, an indifferent poetical harangue, attracted attention. In it he supported the thesis that contemporary writers were superior to the greatest of the ancients. The hot discussion to which it gave rise encouraged him to continue the subject in *Parallèle des Anciens et des Modernes*, published between 1688 and 1698, in which, by dialogue, he maintained the superiority of the modern world, not only in literature, but in science, philosophy, medicine, and cookery. The dialogues are conducted with much vivacity and ease, and, notwithstanding the theme, are wholly free from pedantry; they did not, perhaps, prove their case, but they helped to destroy the superstitious belief in the superiority of classicism. In 1694 followed *Apologie des Femmes*, in verse, a response to an attack of Boileau. Following up his glorification of the modern age, P. wrote his *Hommes Illustres du Siècle de Louis XIV.*, a collection of brief biographies of contemporaries. *Contes des Fées*, which succeeded it, were written for children in a style of the most exquisite simplicity, and by them alone he retains his place among authors who are read. P. was engaged upon a volume of *Mémoires* when he died at Paris, 16th May 1703. See *Mémoires*; St. Beuve's *Causeries du Lundi*, vol. v. P. had three brothers, of whom **Claude** (1613-88) was the most notable. He was first a physician and afterwards an architect, translated Vitruvius, and wrote *Essais de Physique et Mécanique des Animaux*.

Perron, Jacques Davy du, born at Saint Lo, Normandy, November 15, 1556, was educated at Switzerland, passed from school at ten, and at twenty was a *savant* in Latin, Greek, Hebrew, mathematics, and philosophy. Presented by Count Mantignon to Henri III., and by Henri to the poet Desportes, he was persuaded to abjure Protestantism for Roman Catholicism, and he was soon preaching eloquently before the king. Henri IV. appointed him Bishop of Evreux. For his success in converting the king to Catholicism, and for other services to the Church, he was appointed successively Archbishop of Sens, Grand Almoner and Commander of the Order of the Holy Ghost, and Cardinal. In his threefold character of poet, controversialist, and pamphleteer, he was one of the leading men of the age. He died at Paris, September 5, 1618. His works, of which the principal is a *Treatise on the Eucharist*, were printed in 1620. See the Abbé Ferret's *Le Cardinal du P., Orateur, Controversiste, Écrivain: Étude historique et critique* (Par. 1877).

Perry, a fermented drink prepared from pears in precisely the same manner as Cider (q. v.) is made from apples. P. is a wholesome, pleasant beverage, containing from 5 to 9 per cent. of alcohol.

Per'sea. See AVOCADO PEAR.

Persecutions of the Christian Church. According to the Roman idea that religion was inseparably connected with politics, or rather was subordinate to the state, which was regarded as the centre of all human interest, it was impossible that the Christian religion, which substituted for the state a universal kingdom of God, embracing and superior to all human politics, could be treated with toleration. Besides, the bringing in of new divinities was always associated, in the eyes of the government, with the adoption of foreign laws and with treasonable practices; and as the brotherly love which formed a bond of union among all Christians wherever they met was unintelligible to their Roman rulers, they were specially liable to the suspicion

of forming secret compacts. But the existing laws against new religions were not always enforced, and least of all by the worst of the Emperors, who were most indifferent to the welfare of their subjects. The fact seems very anomalous to Christians that the Church was most persecuted by the best of the Roman Emperors; but it was only consistent in men with a high sense of duty to seek to stamp out what they must have considered a fatal and impious delusion. The case of Nero is no exception, since his cruelty was not directed against Christians for what they were, but for an accidental cause. Besides persecution was often forced upon the government by popular clamour excited by individuals—priests, magicians, craftsmen, &c.—who would be losers by the gain of Christianity (cf. Acts xix. 23-41). There is ground for believing that both the number of so-called P., and the number of Christians who suffered death for their religion, have been magnified. Sulpicius Severus (died about 422), believing (from Rev. xvii. 12-14) that it was decreed the Church should pass through ten P., made the nine which are mentioned by Eusebius up to that number by adding the future reign of Antichrist. The nine generally enumerated are as follows:—Under Nero, 64, Domitian, 95, Trajan, 106, Marcus Aurelius, 166, Severus, 202, Maximin, 235, Decius, 249, Valerian, 258, Diocletian, 303. As to the number of persons, too much need not be made of the palpable exaggeration of the tradition regarding the 10,000 crucified by Trajan, but Origen (q. v.), himself a martyr, distinctly declares (*Cont. Cels.*, about 220), that 'those who have been put to death on account of Christian godliness are comparatively few, and very easily counted.' See Neander's *Gesch. der Christl. Rel. und Kirche* (Eng. trans. 1858), Mosheim's *Ecl. Hist.* (Reid's ed. Glasg. 1848).

Persep'olis, anciently the capital of the Persian monarchy, was situated at the eastern end of the plain of Mardusht, at the foot of high hills trending N. and S., near the confluence of the Araxes (*Bendemir*) with the Medus (*Pulwar*). According to ancient writers, it was surrounded by a massive triple wall, and was, next to Susa, the richest city of the Persians, containing a palace of unrivalled magnificence. All that remains of it now is included within the limits of the solid stone platform, measuring about 1500 by 800 feet, on which stood the halls and tombs of the Achaemenian kings. This platform is constructed of immense blocks fitted to one another without cement, and is in the form of three terraces, of which the central is 45 feet above the level of the plain. The most prominent object which meets the eye of the traveller as he approaches P. after crossing the Bendemir is the grand double staircase, forming the ascent on the northern side of the platform, where the height is about 35 feet. This staircase, said to be the finest in the world both as regards proportions and construction, is built of syenite blocks, some of which are so huge that three or four steps have been cut out of the same stone. The steps are 22 feet wide, each step rising only 3½ inches, with a tread of 15 inches, and the great weight and hardness of the stones used have preserved their position and outline almost unaltered. There only remains standing upon this northern terrace the two short walls, known as the Propylæa of Xerxes, which no doubt formed the principal entrance to the Great Hall. These propylæa, which stand directly in front of the top of the grand staircase, are about four yards apart, and are each finished towards the entrance with the figure of a winged bull, immediately suggesting that connection between Persian and Assyrian art which the history of P. shows to have existed. The stairs leading from this level to the central terrace are very much smaller in all dimensions than the great staircase, but are remarkable for the beauty and finish of the sculptures with which the sides and angles are adorned. The central platform is about 800 feet square, and exhibits traces of five different structures—the Great Hall of Xerxes, the Hall of the Hundred Columns, the Palace of Darius, the Palace of Xerxes, and what has been termed by Fergusson the 'Central Edifice.' Of these, the Hall of Xerxes, which bears the local designation *Chehil Minar* (Forty Columns), is the most important, and is computed to have covered an area of 2½ acres. The ruins, which are here thickly scattered about, exhibit characteristics of several different styles and afford an interesting proof of the continuity of architecture. Fifteen columns of grey marble still remain standing, measuring 60 feet in height and 15 in circumference. They are fluted in 15 divisions, and their pedestals, suggestive in their bulbous form of Assyrian and Egyptian archi-

ecture, are ornamented with the Grecian honeysuckle and lotus bud. In the remains of the north entrance, several of the capitals bear a distinct resemblance to the Ionic volute, while close by are to be seen genuine Oriental bas-reliefs. These bas-reliefs and the cuneiform inscriptions, of which translations have been published by Sir Henry Rawlinson, are remarkable for their delicate chiselling and fine preservation. See Niebuhr's *Reisebeschreibung von Arabien und anderen umliegenden Ländern* (1774); Ker Porter's *Travels in Georgia, Persia, &c.* (1821); Fergusson's *Palaces of Nineveh and Persepolis Restored* (1851); Vaux's *Nineveh and Persepolis* (1851); Rawlinson's *Five Great Ancient Monarchies* (1871); and Meyer's *Remains of Lost Empires* (1875).

Perseus, a mythic hero of ancient Greece, was the son of Zeus by Danaë, and the grandson of Acrisius, king of Argos. The Pythian oracle had foretold that if Danaë had a son, he would kill his own grandfather; and accordingly when Danaë, despite all precautions, had given birth to P. (see DANÆ), Acrisius locked them both in a chest, which he cast into the sea. This was driven by the winds to the island of Seriphos, where Danaë and her child were received as slaves into the household of King Polydectes. The latter, however, having failed after the most persistent efforts to win the love of Danaë, had recourse to various acts of cruelty, and ordered P., who had now reached manhood, to bring him the head of the Gorgon Medusa, who dwelt on the seashore near Tartessus. P. proceeded first to the Grææ, the sisters of the Gorgons, and forced them to show him the way to the ocean nymphs, who supplied him with winged sandals, a bag, and the helmet of Hades, which rendered the wearer invisible. Hermes also gave him the sword of Apollo Chrysaor, while from the goddess Athena, with whom Medusa had dared to contend for the prize of beauty, he received a polished shield by the reflection from which he might see the Gorgon without looking at her, as every one who beheld her face was instantly turned into stone. Thus prepared, he succeeded in slaying Medusa while she lay asleep with her two sisters. He then placed her head in the bag, and began his journey homewards. On his way he met with several wonderful adventures, and as he passed through Ethiopia he rescued Andromeda (q. v.), whom he married, and with whom he returned to Seriphos. There, at a banquet, he suddenly uncovered the Gorgon's head before Polydectes, who, with his followers, was turned into stone. P. then sought out Dictys, the fisherman who had saved him and his mother from the sea, and made him king of the island. After giving his winged sandals to Hermes, and the Gorgon's head to Athena, who placed it on her shield, he set out for his native Argos. But when Acrisius heard of his approach, he remembered the warning of the Pythian oracle, and fled to the court of the king of Larissa. Thither P. followed him in affectionate haste, to persuade him to return without fear. By doing this he unintentionally fulfilled the prediction, for at some games which the king of Larissa held in honour of his guest, a quoit thrown by P. was diverted by the wind so that it struck his grandfather and killed him. It is said that P., in grief for what he had done, surrendered the throne of Argos to his kinsman Megapenthes, in exchange for that of Tiryns, where he died. In Grecian art the figure of P. greatly resembles that of Hermes.

Perseus, or **Persees**, the last king of Macedonia, and eldest son of Philip V., was born towards the end of the 3d c. B.C., and succeeded to the throne B.C. 179. The growth of the Macedonian power, during his father's lifetime, had long been regarded with jealousy by the Romans, and in 171 the Senate declared war against P. Had the latter possessed the boldness and energy of his father he might have effected a series of rapid and brilliant victories, since Philip, who had foreseen this contest, left the kingdom fully prepared for it. But instead of utilising his advantages by a sudden invasion of the Roman territory, P. allowed the first two years of the campaign to pass without taking any decisive action. In the meantime L. Æmilius Paullus (q. v.) took command of the imperial forces, and soon made the influence of his military genius perceptible. At the battle of Pydna, 22d June 168 B.C., the Macedonian army was totally routed. After having been led to Rome in triumph by his successful enemy, P. was permitted to spend the remainder of his life in an honourable captivity at Alba, where he died about three years later. His

character betrays great signs of weakness, and is defaced by an extreme jealousy and avarice, which hampered his policy on all sides, and lost him many allies.

Perseverance of the Saints is an article of the Calvinistic and Augustinian theory of salvation, which is thus stated in the Westminster Confession:—'They whom God hath accepted in his Beloved, effectually called and sanctified by his Spirit, can neither totally nor finally fall away from the state of grace, but shall certainly persevere therein to the end, and be eternally saved.' The doctrine is a necessary inference from the other Calvinistic doctrines of Election (q. v.), of the Covenant of Grace, of the union of Christ with believers, in its federal, spiritual, and vital aspects, of the Atonement (q. v.), of Justification (q. v.), of the indwelling of the Holy Spirit, and of the prevalence of Christ's intercession. P. is a point on which both the Roman Catholic and the Arminian creeds differ from the Calvinistic. According to both the former, a man may be justified, and yet afterwards fall from grace, and be finally lost. See Hodge's *Outlines of Theology* (Edinb. 1870).

Per'shore, a market-town of England, in Worcestershire, on the Avon, 6 miles W. of Evesham by rail, has two churches, St. Andrew's and Holy Cross (restored 1864), two banks, one newspaper, and engineering and machine-works. Wool-stapling is the leading industry. Pop. (1871) 2826.

Persia, a country of Western Asia, is bounded N. by Turkestan, the Caspian Sea, and Russian Transcaucasia, W. by Armenia, Kurdistan, and the Tigris district of Asiatic Turkey, S. by the Persian Gulf, and E. by Beluchistan and Afghanistan, in lat. 25° 40'–39° 50', and in long. 44° 20'–61° 35'. Its extreme length, from Khoi in the N.E. to Gwadar in the S.W., is 1400 miles; and its breadth, from the river Atrak in the N. to the Makran coast in the S., 900 miles. The area is estimated at 636,900 sq. miles, and the pop. at six or seven millions, but no census having ever been taken, the accuracy of these figures cannot be guaranteed. The great divisions into provinces are as follows:—

1. Azerbaijan.	10. Khuzistan.	} Irak Ajami.
2. Ghilan.	11. Ispahan.	
3. Mazanderan.	12. Nain.	
4. Astrabad.	13. Tehran.	
5. Khorasan.	14. Khemseh.	
6. Yezd.	15. Mullayer.	
7. Kirman.	16. Ardelan.	
8. Laristan.	17. Kirmanshah.	
9. Fars.	18. Luristan.	

Physical Features.—P. occupies the western and larger half of the Iranian plateau between the valleys of the Indus and the Tigris. This plateau on the W. is united with the mountains of Asia Minor by the Armenian highlands, and on the E. connected with the Himalayas and the highlands of Tibet by the Paropamisus and the Hindu Kush. Its average height above the sea is 4000 feet, varying from 8000 in some of the outer valleys to 500 in the most depressed portions of the centre. Its greater elevation at the edges, and the fact that less than half its surface drains outwards to the Persian Gulf, the Caspian, and the Aral, indicate the basin-like nature of the plateau. The part draining inward consists of two sections, the eastern, draining into the Hamoon, or Lake of Seistan, embracing 40,000 sq. miles, and called from its chief river the Helmund basin, the western, draining into many depressions of the surface, and covering 320,000 sq. miles. P. has no great rivers. In the Caspian watershed are three considerable streams—the Kizil-Uzun, or Safid-Rud, draining 25,000 sq. miles E. and S. of the Urmia basin, the Atrak forming for its last 60 miles the boundary between P. and Turkestan, and the Gurgau. In the S.W. are the Djalal, and Karkhah, flowing to the Tigris, further S. the Diz and Karun unite in the plain of Khuzistan and discharge into the Shat-el-Arab, in the district of Arabistan—the most fertile plain in P. The chief inland streams are the Aji Chai and Jaghatu, flowing into Lake Urmia, the Hamadan Rud or Karasu, and the Shurab, flowing E. to the salt desert, the Zaindarud, fertilising the neighbourhood of Ispahan, and lost in the unexplored salt marsh of Gavkhanah, and the Kur, better known as the Bendameer, forming the salt lake of Niriz. The two chief mountain systems in P. are (1) the Elburz in the N., which runs parallel to the southern shores of the Caspian, and forms the connecting link between the Hindu Kush in the E. and the

Caucasus in the W.; (2) the Persian Gulf range, which is an offshoot or continuation, in a S.E. direction, of the Zagros mountains. Besides these there are numerous small spurs penetrating the central desert. The highest continuous range is the Kuh Dinar in Fars, with an average height of 17,000 to 18,000 feet above the sea. The volcanic peak of Demavend, in the Elburz, has been fixed by the Russian Caspian survey at 18,600 feet, and Mount Savalan in Azerbaijan at 14,000 feet. The higher summits of the Kuru range, between Ispahan and Kashan, exceed 11,000 feet, a height equalled by the peaks of the Khorasan Mountains. The plains between the ranges on the E. side of the western watershed rise from 1000 to 8000 feet high, and farther S. and E. to 4000, 5000, and 6000 feet. The largest desert in P. is that of Khorasan, extending from Kum and Kashan E. for 300 miles. The desert of Kirman stretches from Khubes to the Lake of Seistan, 150 miles, and runs S. to near the Persian Gulf. The salt-swamps of P. are the most remarkable feature of the country. The soil of the plateau is of such a nature as to form an efflorescence of salt upon the surface whenever exposed to sufficient moisture, by the overflow of rivers, or by want of sufficient slope to carry off the desert rainfall, the moisture, however, being retained underneath the surface to create in winter and spring an impassable bog. When the supply of water is constant, but insufficient to form salt lakes like Urmia and Niriz, bogs of slimy mud are formed, covered with brine in winter, and in summer with a thick crust of salt. These are termed Kuvir in the N., and Kafeh in the S. The chief is the Dashti-Kuvir ('Great Salt Desert'). It is described by Dr. Bihlé, the only European who has crossed it, as being 6 miles wide. Other Kuvirs are in the Sarjan, or Sairabad plain W. of Kirman, and in the valley of Kutru S. of Khaf.

Climate, Botany, Zoology, and Agriculture.—No country has greater diversity of climate than P. In the provinces of Laristan, Kirman, Fars, and Khuzistan, between the edge of the plateau and the Persian Gulf, the heat in summer is excessive. The climate improves as we proceed N., and Ispahan, the former capital of the country, has the most equable temperature of any town in P. The northern cities of Irak-Ajami, however, do not enjoy so favourable a climate, the cities of Kashan and Kum on the verge of deserts, and Tehran under the Elburz mountains having a summer heat as oppressive as the shores of the Persian Gulf. The rainfall on the Oceanic and Caspian watersheds is far in excess of that in the interior, that of Ghilan and Mazanderan being five times that of the districts S. of the Elburz range. In central and S.E. Persia, the annual rainfall does not exceed five inches. The prevailing winds are N.W. or S.E., the latter being the rain-bearing winds throughout the greater part of P. The nature of the soil varies as much as the climate; in the S. and E. it is light and sandy, in the W. and interior hard and gravelly, and in the district bordering on the Caspian, rich and loamy. Almost all the cultivation depends on artificial irrigation, either by canals or by the system of wells connected with underground channels, called *Kanat* or *Karia*, and peculiar to the Iranian plateau. Rice, wheat, and barley are raised, besides cotton, indigo, and tobacco, and in most districts, apples, pears, cherries, apricots, peaches, melons, quinces, grapes, and pomegranates. The chief trees are the mulberry, sycamore, walnut, cypress, conar, and poplar. Cucumbers, turnips, cabbages, carrots, potatoes (recently introduced, but thriving well), poppies from which opium is extracted, senna, rhubarb, saffron, and assafetida are also grown. Agriculture is in a very depressed state, and the rudest implements are still in use. The fauna of the Persian plateau is of the desert type, with a large admixture of Palearctic forms; that of Beluchistan and the shores of the Persian Gulf is of the same type, with a small admixture of Indian species. They include the lion, jackal, wolf, fox, hare, wild ass, wild sheep, mountain goat, wild hog, jerboas, and antelope. The flesh of the wild ass is considered a great delicacy. The domestic animals are the horse, mule, camel, ass, ox, and sheep, and the various kinds of European poultry. Bustards, black partridges, and quails are hunted. Locusts, snakes, and scorpions infest the S., and in Miana and Todervan an insect is found called the shab-gaz (*Argus Persicus*) with a very poisonous bite. Fish of all kinds are abundant in the Caspian, and there is considerable fishery of sturgeon, salmon, and carp.

Geology and Mineralogy.—The most striking feature of the geology of P. is the great prevalence of gravel, sand, and

clay formations, which are the more conspicuous from the paucity of vegetation and the absence of cultivation. The Zagros chain (from Ararat to Shiraz), consists of Cretaceous (hippuritic) and Tertiary formations, the former in the N.E. half of the range has its slope towards the central plain of P., the latter on the S.W. watershed overlooking the Tigris valley. Old granite rocks extend from Lake Urmia to the W. of Ispahan. The N.W. and S.E. ridges have the same features as the Zagros. The S. borderland of the great plateau consists of low ranges, running E. and W., composed of unfossiliferous sandstones and shales, with a few beds of nummulitic limestone of the older Tertiary epoch. In the N.W. older Mesozoic and Paleozoic formations are found than in the W. or S. The Elburz consists of Carboniferous and Devonian beds, with Jurassic or Liassic rocks. Metamorphic rocks (granite, &c.) occur in several places, and igneous formations occupy a considerable area. The highest mountain in P., Demavend, in the Elburz chain, is a volcano of geologically recent origin, which still issues heated gas. Scarcely any attempt has been made to utilise the mineral wealth of P., which, though not great, includes iron, copper, and silver in Azerbaijan, Mazanderan, and Kirman, lead in Yazd and Azerbaijan, silver near Shiraz, abundant coal near Shiraz and Hir N.W. of Tehran, marble at Maraga and Khorasan, turquoises at Mishapur, besides sulphur and saltpetre in the mountains N. of Tehran, and the latter also in Azerbaijan.

Industries, Commerce, &c.—The whole external trade of P. may be estimated at the value of £4,000,000 sterling annually, of which the imports amount to £2,500,000, and the exports to £1,500,000. The chief articles of import are cotton goods, glass, paper, iron, copper, sugar, tea; of export, silk, tobacco, skins, wood, carpets, shawls, opium, copper and lead ores, and sulphur. Tabriz is the centre of commerce, being favourably situated as an emporium for the productions of N. India, Samarcand, Bokhara, and Cabul. It receives European goods through Constantinople by sea to Trebizond, and thence by caravan. In 1875 there entered P. through this town cotton goods of British manufacture to the value of £800,000, while £110,000 worth of silk were exported to France and Spain. The direct exports of P. to Britain in 1875 were chiefly opium to the value of £24,930, and imports chiefly cotton goods to the value of £37,895. The visit of the Shah to Europe in 1873, and his concession to Baron Reuter, gave rise to great expectations of advancement in civilisation. It granted him the sole right of making railways for seventy years, and the working of all Government mines subject to paying 15 per cent. of profits to the State, the management of the forests and canals, the collection of all customs for twenty-five years, and the first choice in the making any work for the improvement of the country or the setting up of any bank, with a grant of £6,000,000 from the Government; but he has not yet been permitted to commence his undertaking, from the jealousy of the Persians and the intrigues of the Russians. P. has a system of telegraphs worked by Europeans. At the end of July 1876 there were 2490 miles of telegraph lines with 46 telegraph offices. The number of despatches in 1875 was 675,000, and the revenue from them £14,000.

Government, Finance, Army.—The government in its main features is similar to that of Turkey. It is a pure despotism, but the absolute power of the Shah is limited by the precepts of the Koran, and their interpretation by the priests. The executive is carried out by the Vizier-i-Azem or Grand Vizier, and the Ameen-ed-Doulah or Lord Treasurer, under whom are the Beglerbegs or Governors of Provinces, which are subdivided into districts under a Hakim or Governor-Lieutenant, next the Thaubet, who governs a city or town, and the Kelounter, who is found in every village, town, and city, collects the revenues, and is the medium of communication between the people and the Shah. Towns elect a Ketkhodah, or magistrate, with his servant, or 'homme-d'affaires,' the Pak-Kar, and villages a Muhuleh for the administration of justice and regulation of local matters. The revenue amounted in 1876 to £1,643,200, of which £1,388,800 was paid in money and £254,400 in kind, and of which direct imposts yielded £1,240,000, and customs £200,000. The expenditure amounted to about 1½ millions, of which the army took £678,400, expenses of the royal court £307,200, the clergy £240,000, pensions to great families, the Afghans and others, £80,000, foreign affairs £28,000, other services £60,000, education £12,000. There is no public debt, and the excess of revenue is deposited in the royal treasury.

By a decree issued July 1875, the army for the future is to be raised by conscription, and service to be for twelve years instead of for the whole life of the soldier, as before. The regular infantry consists of ten divisions of ten regiments, each regiment containing 830 men, making a total of 83,000 men, armed with old percussion muskets. The *chassepots* bought in France, or made in the arsenal at Tehran, have not yet been given to the troops. The only regular cavalry is the guard of the Shah (500 men), but in time of war each province is required to furnish a certain number of irregular horse, of which the country can raise 25,000 to 40,000 men, all well mounted. The artillery is composed of ten regiments, with three or four batteries, each of 18 to 24 cannon: total, 5000 men and 200 cannon; the latter, however, are small and of different calibre. The militia, numbering 20,000 men, are only employed as police. Christians, Jews, and Guebres are exempt from all military service.

Religion, Education, &c.—The great majority of the inhabitants are Mohammedans, only 74,000 professing other faiths, of whom 26,035 are Armenians, 25,000 Nestorians, 16,000 Jews, 7190 Guebres. The Persian Mohammedans, called Shiites or Shiabs (q. v.), differ from the Turkish, who are called Sunnites (q. v.), in some respects, as regards doctrine and ritual. The chief order of priests is the Mushtehed; next in rank is the Sheik-ul-Islam, or ruler of the faith, of whom there is one paid by the State in every large town. Under these are the Muturrelle, one in each mosque, the Muezzin, or sayer of prayers, and the Mollah, or conductor of rites. Education is more widely spread than in any Asiatic country, except China. There are many State-supported colleges, where instruction is given in Persian and Arabic literature, religion, and science.

Inhabitants.—The population of P. mainly consists of two great divisions—the *Tajiks* or settled inhabitants and the *Eylasts* (*eyl*, 'clan') or nomads. The former are descendants of the ancient Persians, Medes, and Bactrians, and prosecute agriculture, commerce, and the arts; the latter are of four races—Turkomans, Kurds, Lûurs, and Arabs. Of these the Turkomans are the most powerful; the Lûurs are of purely native origin. They are all predatory in their habits, but are generous and hospitable. They carry on an uncertain commerce with the towns, and probably amount to one-third of the entire population. There are some 25,000 native Christians, 15,000 Jews, and 6000 Guebres (q. v.), the last residing chiefly in Yezeid.

History.—In the legendary *Shah-Nameh* of the poet Firdusi the history of P. is given from the earliest times, the first king being Kaiomurs, great-grandson of Shem, surnamed Paishdad ('just judge'). He founded the Paishdadian dynasty, and was followed by Hushang, Jamshid, Feridun, Zab, and Kershasp, the last slain by Afrasiab, king of Turan, who, however, was driven beyond the Oxus by the heroic Rustam, who set upon the throne Kai Kobad, supposed to be the Deioces of the Greek writers. Kai Kobad founded the Kaianian dynasty, and was succeeded by Kai Kaus, the Cyaxares of the Greeks, and the Arphaxad of the Book of Judith, and by Kai Khusru, the Cyrus the Great of the Greek historians. Under him the Median element, predominant in P. since the reign of Cyaxares, became subject to the native Persian, and the Medes are not afterwards heard of as having a separate existence. He conquered Turan, Syria, Asia Minor, and Egypt, and was followed by his son Gushtasp, the Darius Hystaspes of the Greeks, whose attempts to conquer Greece were frustrated on the plain of Marathon (490 B.C.), as those of his son Xerxes at Salamis and Plataea. In the reign of Darius appeared Zoroaster (q. v.), the great reformer of the religion of Iran. In 465 B.C. succeeded Bahmân or Ardeshir Dirazdust ('long-handed'), the Artaxerxes Longimanus of the Greeks and the Ahasuerus of the Jewish Scriptures. He was followed by Darab I. and Darab II., the Darius Codomannus of the Greeks, with whom the Kaianian dynasty came to an end by the conquest of Alexander the Great. At the death of the latter in 324 B.C., Seleucus Nicator, the most able of his generals, seized Syria and P. He was followed by Antiochus Soter and Antiochus Theos, in whose time Arsaces, called by the Persians Arshk, slew the viceroy Agathocles, threw off the Grecian yoke, and founded the Parthian Empire, which consisted of a confederacy of free feudatories called the Muluk-ul-Sawaif ('Commonwealth of Nations'). Such were the Parthians, who stemmed the torrent of Roman conquest in the East, and often, as in the case of Crassus, inflicted on the Romans terrible defeats. They

are called by Strabo Carduchi ('Kurds'), and their yoke being a barbarous and degrading one, they are scarcely mentioned by Firdusi and the other Oriental writers. (See ARSACIDÆ.) In 228 A.D., Ardeshir, a descendant of the ancient Kaianian kings, killed Arduan, the last of the Parthian princes, and was hailed on the battle-field as Malkan Malka ('king of kings'). He founded the Sassanian dynasty. He was succeeded by Shapur (240 A.D.), who fought successfully with the Romans, and took their Emperor Valerian prisoner. Among the other notable Sassanids were Varahran I., who caused Manes, the founder of the Manichean heresy, to be executed; Nersehi, who waged a long warfare with the Romans; Shapur II., under whom the empire reached a state of great prosperity, and Varahran V., who was one of the best monarchs that ever ruled P. He fought successfully with the Roman Emperor Theodosius, and inflicted terrible defeat on the predatory hordes of Turan. Nushirvan, as famous for his justice as his conquests, died in 578, leaving an empire extending from the Red Sea to the Caspian, from the Black Sea to the Jaxartes, and from the Mediterranean to the Indus. He was succeeded by Hormazd IV., who was dethroned by his son, Khusru Parviz, who conquered Egypt, Syria, and Asia Minor, and threatened Constantinople for ten years by a camp on the Bosphorus. In the midst of his prosperity he received a letter from Mohammed, in which the latter claimed recognition as the prophet of God, to his impious rejection of which are ascribed all his subsequent disasters by the Arab historians. He was murdered by his son Shiruyah, soon after his disastrous defeat by the Roman Emperor Heraclius. In 632 Yezegeird III. ascended the throne, and was defeated in 636 at El-Kadinyah by the Saracens under Saad ibn Abu Wakkas, in a desperate battle which lasted three days and nights, and again in 641 in the decisive battle of Nevahead. The Arabs now conquered the whole country, and P. became a part of the empire of the Califs. After the murder of Ali, Moawiyah, son of Abu-Sofian, setting aside the claims of the sons of Ali, carried the seat of government to Damascus, and changed the rude austerity of the early Moslems for the gorgeous pomp of Eastern potentates, while he introduced the arts and sciences of the civilised world. He was followed by his son Yezeid, in whose reign Husain, the son of Ali, was defeated and slain on the field of Kerbela, 680. But a numerous body of believers in P. declared Ali and his successors to be the true Imams, and that this belief constitutes the most important article of the faith. Accordingly they refused to accept the *Sunnah*, or body of traditions given forth by Abu-Bekr, Othman, and Omar, and expected the restoration of the race of Ali, who, however, was cursed regularly from the pulpits of the orthodox, a custom discontinued by Omar, grandson of the third Calif. The last of the Ommiade dynasty was Merwan II., who was dethroned by the Abbasides (q. v.), who set up Es-Saffah. He was followed by Abu-Ja'far-el-Mansur, who made Bagdad his capital. The greatest of the Abbaside Califs was Hârun-al-Rashid (q. v.). Succeeding monarchs lost the warlike virtue of their ancestors, and saw Spain, Africa, Egypt, P., and Syria torn from their grasp, while they trembled at the menaces of their licentious Turkish guards. The distant lieutenants began to aspire to independence, and many of them founded dynasties, of which the chief in P. were the Saffary or Brazier dynasty, founded in 868 by Yakub-bin-Lais, son of a brazier in Sistan, who conquered Balkh, Cabul, and Fars; the Samany dynasty, which Iamail Samany, a Tartar lord, founded on the ruins of the former, ruling Khorasan and the N. of P., with capital at Bokhara; and the Dailamy dynasty, ruling Fars and the S. of P., founded by Abul-Buyah, son of a fisherman at Dailam, on the Caspian, who seized Ispahan in 933, and received from the degenerate Calif, who wished to appear to bestow a power which he could no longer withhold, the title of Amiru-l-Umara ('Chief of the Nobles'). Succeeded in 907 by his son Ahmed, and by his grandson Nasr, who acquired Ray and Kom, and died at Bokhara in 943. The Ghiznevide dynasty rose as rapidly as the Dailamy, and in 997 Mahmud (q. v.) mounted the throne. After his death the dynasty declined in power, and a torrent of Turkish invasion from the eastern shores of the Caspian overspread the country. In 1038 Togrul and Daud, the two grandsons of Seljuk, crossed the Oxus and defeated an army sent against them from Ghizni at Zandikan. From this time the Ghiznevide dynasty lost its power, but does not disappear until 1160. Togrul then advanced into Khorasan, assumed the title of king at Nishapur, conquered

all P., and entered Bagdad as a conqueror. Subsequently he acquired Mosul, and defeated the Greeks in several battles. His nephew, Alp-Arslan, in 1070 defeated the Greek Emperor Romanus Diogenes and took him prisoner. The last Seljuk king was Togrul III., who fell (1193) fighting against the invading Tokush, ruler of Khuwarizm. P. was now divided between the king of Khuwarizm, who held Khurasan, and a number of petty princes, called *Ata-begs*, of whom the chief were those of Azarbaijan and Fars. These minor governments were all absorbed by the conquests of the Mongols under Genghis-Khan (q. v.). Jalalud-Din, son of the king of Khuwarizm, offered a brave resistance, but was defeated in 1221. Hulaku-Khan, the grandson of the conqueror, was sent to govern P. and extended his conquests W. He took Bagdad, and put to death the last Abbaside Caliph, subdued Mosul and Mesopotamia, and fixed his residence at Maraghal in Azarbijan, where he died in 1264. In 1303 Mohammed-Khudah-Bundah removed the seat of government to Es-Sultaniyyah. Abu-Said, who died in 1335, was the last of the Mongol dynasty who had any real power in P., his successors until 1344 enjoying merely a nominal sovereignty among petty chiefs who engaged in warfare among themselves, thus paving the way for the conquests of Timur (q. v.). During this period Fars was governed by the Muzhaffars, the last of whom, Shah Mansur, was put to death with all his family by Timur in 1387. This conqueror subdued in 1381 Khorasan and Mazanderan, next Seistan, Kandahar, Azarbijan, and Georgia, and in 1387 entered Ispahan. During the five years which followed 1391, Timur completely subjugated all parts of P., and carried his victorious arms beyond the Caucasus. His son, Shah Rokh, who succeeded in 1408, fixed his capital at Herat. The race of Timur ceased to reign in Iran in the beginning of the 16th c. The Kurdish dynasties of Kara Koyunlu ('black sheep') and Ak Koyunlu ('white sheep') next acquired the sovereignty, but Shah Ismail Sufy, the founder of the Sufawi dynasty, restored a native monarchy in P. after it had been overrun for 850 years by the hordes of Turan, and by Arab, Turkish, and Mongol conquerors. Ismail consolidated the various factions of the country by proclaiming the doctrine of the Shiah sect to be the national religion. He carried on many successful wars, but was in 1514 defeated by Selim I., Sultan of Turkey. His successor was Tahmasp I., in whose reign arrived (in 1561) an envoy from Queen Elizabeth. The reign of Abbas the Great (1585-1628) is a splendid era in Persian history (see **ABBAS THE GREAT**). He was followed for nearly a century by a line of degenerate monarchs ending with Shah Sultan Husain, who was defeated (1722) under the walls of Ispahan, and deprived of his crown by Mahmud, chief of the Afghans. The latter died in 1725, after practising the most fearful cruelties upon the Persians. His son Ashraf was defeated in 1730 by Nadir Kuly, who, after dethroning Tahmasp II. and his son Abbas II., was proclaimed Nadir Shah (q. v.) in 1736, and ruled until 1747. On his death anarchy swept over P. The Afghans and Beluchees asserted their independence, and many chiefs seized parts of the land; but in 1755 Kerim Khan, chief of the Zand tribe, raised Ismail III. to the throne, with Reshad, chief of the Bakhtiyari tribe, as commander-in-chief, and himself as *vakil*. In 1757 the government fell into his hands alone. He chose Shiraz as his seat, and did much to benefit the country. His death in 1779 was followed by the usual anarchy, during which Agha Muhammad Khan Kajar fled to Mazanderan, put himself at the head of his powerful tribe at Astrabad, and made successive attempts against Ali Murad, Jaafar Khan, and his noble but ill-fated son Lutf Ali Khan, who, betrayed by Hajji Ibrahim Kalantar ('chief magistrate') of Shiraz, after a heroic defence was taken at Bam and put to death. The dynasty of the Kajars now (1795) began to reign. The conqueror immediately transferred the seat of government to Tehran, which was in the neighbourhood of his native provinces. He turned his arms against Georgia, which had transferred its allegiance from P. to Russia in 1783 during the distracting Zand and Kajar wars, took Tiflis before the Russians could advance to its relief, and soon conquered the whole province. He next turned his arms against Khorasan and projected the conquest of Bokhara, but he was murdered in 1797. His successor was his nephew Fateh Ali Shah, with whom the government of India, alarmed at the intrigues of Tippoo Sultan of Mysore with Zaman Shah of Afghanistan, made a commercial and political treaty. For the first seven years of his reign the Shah had been occupied in quelling rebellions in different

parts of his empire, but in 1804 he was able to turn his attention to the Russian advances on the W. frontier, where General Zizianoff had taken the provinces between Georgia and the Caspian. The Russian general was assassinated at Baku in 1805, and Russia until 1813 was too deeply engaged in the affairs of Europe to push her conquests further. Meanwhile the Shah, after vainly soliciting British aid, made overtures to France, and Napoleon had made an alliance and despatched French officers to discipline the Persian forces, but the Shah, to whom Napoleon had promised the restoration of Georgia in the event of a treaty being made between France and Russia, finding that stipulation omitted in the treaty of Tilsit of July 1805, again embraced the British alliance, and in 1811 a definitive treaty was concluded. Hostilities still went on on the Russian frontier, and in 1812 a Persian army under Abbas Mirza was cut to pieces on the banks of the Araxes. In 1813 the treaty of Gulistan was concluded, by which P. ceded to Russia all the territory she had conquered, including Georgia, Immeretia, Mingrelia, Derbend, Baku, and all Persian Daghistan, Shirvan, Sheki, Ganja, Karabagh, and parts of Moghan and Talish, while she engaged to maintain no navy on the Caspian. During the war with Russia, rebellions had broken out in various provinces of P., particularly in Khorasan, which Firoz-ud-din, prince-governor of Herat, had fomented. Accordingly in 1816 Hasan Ali Mirza, the new governor of Khorasan, led an army to Herat and terrified its governor into surrender and payment of an indemnity. Next year he led another expedition against Herat, but the government of Cabul intervened, and Fateh Khan, vizier of Shah Mahmud of Afghanistan, defeated him. In 1821 a war broke out between P. and Turkey, which was terminated in 1823. As the differences between P. and Russia arising out of the treaty of Gulistan had never been settled, in 1825 Russia took possession of Gokcheb as security. In December of that year the Czar Alexander died, and Nicholas succeeded to the throne. Meanwhile a religious movement against Russia had sprung up in P., and the government was obliged to give its consent to war, the management of which was given to Abbas Mirza, the heir-apparent. In spite of some temporary successes, the result was most disastrous to the Persians, who in 1828 agreed to the Treaty of Turkmanchai, by which the Khanates of Erivan and Nakhichevan were ceded to Russia in perpetuity, while P. paid an indemnity of nearly £4,000,000, and bound herself to maintain no armed vessels on the Caspian, which was thus converted into a Russian lake. In 1828, the infuriated mob of Tehran rose in revolt and murdered the Russian ambassador and his staff—an outrage the consequences of which were only averted by the most humiliating apologies. In 1829, cholera, followed by a famine, ravaged P. and carried off in Ghilan alone 200,000 souls. Abbas Mirza subdued the rebellious inhabitants of Khurasan, and was preparing to lead an expedition against Herat, when he died, October 21, 1833. Muhammad Mirza was immediately declared Wali Ahd ('heir-apparent'), and succeeded Fateh Ali Shah on his death, October 23, 1834. Russian influence was now predominant at Tehran, and in 1837 the Shah in person led an army against Herat. The siege commenced 22d November and continued until the withdrawal of the Persians, September 9, 1838. Its gallant defence was mainly due to the exertions of Pottinger, a young English officer, and the siege was raised when the inhabitants were at the utmost extremity, by the protest of England and the appearance in the Persian Gulf of an English force. While the Persians were prostrated with their exertions, the Russians seized Ashurada, an island 12 miles from the Astrabad coast of the Caspian Sea, ostensibly to repel the piratical incursions of the Turkomans, but really to secure the Caspian to themselves and establish a basis for further aggrandisement. Towards the end of the reign a commission from the English and Russian governments settled the boundaries between P. and the Turkish Empire. Muhammad Shah died 4th September 1848, and was succeeded by Nasru-d-Din, the present Shah, who at his accession found P. in a miserable state of exhaustion and discontent. By the help of Mirza Taky, Amiru-n-Nizam ('commander-in-chief'), he was enabled to suppress all revolts, the most dangerous of which was that of the Babis, a sect of religious fanatics with wild pantheistic and socialistic principles; but, like his two predecessors, he repaid this by the foul murder of the enlightened and faithful vizier. In 1856, after grossly insulting the British mission, the Persians led an expedition against Herat, which fell October 26.

War was declared by England November 1, and an expedition sailed from Bombay and occupied the island of Karak. Bushire was taken and a severe defeat inflicted at Kushab on the 7th January 1857, after which General Outram led his army to the mouth of the Kurun. A treaty of peace, however, was signed at Paris, March 4, by which P. renounced all claims on Herat and agreed to abstain from all interference with Afghanistan. The anxiety which P. has always shown to extend her borders led to serious difficulties with the Afghans in 1866, but the final award of Sir Frederic Goldsmid, who was sent by England as arbitrator, was given August 19, 1872, and ultimately accepted by both governments. The boundary, however, N. of Khorasan, between Merv and the Caspian, is still unsurveyed, and its settlement in view of the recent extension of the Russian frontier to Khiwa and the Oxus must be regarded as one of the most pressing Asiatic political questions. P. has made considerable progress during the last twenty years, notwithstanding the terrible famine of 1870-72 and the gross maladministration of its rulers. The expectations formed from the visit of the Shah to Europe in 1873 have as yet proved illusory, but something may be expected from the increasing intelligence and prosperity of the country and its closer contact with Western civilisation. See Blanford's *Eastern P., an Account of the Persian Boundary Commission of 1870-72* (2 vols. Lond. 1876); Clement Markham's *General Sketch of the History of P.* (Lond. 1874).

Persian Gulf, an arm of the Indian Ocean, extending N.W. for 620 miles between Persia and Arabia, with a breadth of from 27 to 207 miles, and communicating with the ocean by the Straits of Ormuz, 27 to 50 miles wide. Its entrance is formed on one side by the long promontory of Ras Musandim with two isolated rocks called the Quoins, and on the other by the Island of Ormuz (q. v.). It receives at its upper extremity the waters of the Shat-el-Arab, and contains the islands of Kishim, and on the Arabian side, Bahrein, near which are extensive banks of pearl oysters. The order of its current is the reverse of that of the Red Sea (q. v.), being upward from May to October, and downward from October to May. The chief towns on the Gulf are Bandar Abbas, Kamir, and Bushire. The trade of the Gulf was originally in the hands of the Portuguese, but afterwards fell to the Dutch and English. On the fall of the Portuguese, a powerful maritime Arab power arose on its shores, Oman or Muscat (q. v.) being the greatest native naval power in Asia. The Gulf was made known to the ancient world by Nearchus, the admiral of Alexander the Great, who sailed through it from the Indus B.C. 325, and it was afterwards the channel of communication for the most important commerce of the ancient world. It will again be of great importance when the Euphrates Valley Railway shall have been completed and the shortest route to India finally adopted, the route by the P. G. being 1104 miles shorter than that by Suez. The distances are as follows:—London to Suez 4372 miles, Suez to Karachi 1705, total, 6077; London to Bassora 4271 miles, Bassora to Karachi 702, total 4973.

Persiani, Madame Fanny, operatic singer, was the daughter of Signor Tacchinardi, a celebrated tenor, and was born at Rome, October 14, 1818. She was a leading soprano in the Italian Opera-Houses of London and Paris from 1838 to 1850. Among her greatest successes were in the operas of *Matrimonio Segreto*, *Lucia di Lammermoor*, *L'Elisir d'Amore*, and *Linda di Chamouni*. She excelled in light and sprightly characters.

Persian Language and Literature.—Modern Persian, the lineal descendant of the ancient Zend (q. v.), and consequently a member of the Aryan family of speech, is, after Arabic, the most important language of the Mohammedan world. The Arab califs destroyed all traces of Pehlevi poetry, as savouring of heathendom; and Arabic was the court language of Iran down to the conquest of the Seljuk princes (1038). Hence we are not surprised to find that Persian has incorporated in its vocabulary an infinite number of Arabic words, even forms its plurals by means of the Arabic feminine plural in *at* or *jat*, and has adopted the Semitic order of words, so repugnant to the Aryan structure generally, saying *dil-i-man*, 'heart of me,' for 'my heart.' At the same time Persian has lost nearly all the ancient Zend inflections, and strikingly resembles English in the simplicity and analytical character of its grammar. It has no article,

does not distinguish gender in substantives or adjectives, and, though extremely rich in tenses, has only one proper mood, the indicative, forming its subjunctive and optative by means of particles. One of the most melodious of languages, it is peculiarly fitted for poetry, and has been aptly styled the 'Italian of the East.' Persian handwriting (*talik*) is a modification of the Arabic (*makhi*), and of its thirty-one consonants nine are of Semitic origin. There are Persian Grammars by Sir William Jones (Oxf. 1771), Lumsden (Calcutta, 1810), Mirza Ibrahim (Eng. trans. Lond. 1841), Chodzko (Par. 1852), Spiegel (2 vols. Leips. 1856), and Vullers (2d ed. 1870); and Dictionaries by Richardson (Oxf. 1777), Handjeri (3 vols. Moscow, 1840-42), Vullers (3 vols. Bonn, 1855-67), and Palmer (Lond. 1875).

Persian literature dates from the Samanian dynasty (902-997), under whom the blind Rudaki composed his noble lyrics, translated by Malcolm in his *History of Persia*. Rudaki (about 961) commenced to versify the *Bustan Nameh* ('Garden Book'), but was murdered before he had written a thousand lines, and Firdusi (q. v.) completed the unfinished work under the title *Shah Nameh* ('Book of Kings'). This, the great national epic of Persia, is purely Aryan both in its language and subject-matter, but five Arabic words occurring on an average in every hundred verses, whilst its 'Feridun' and 'Zohak' are identical with the 'Thraetona' and 'Aji Dahaka' of the *Zend-Avesta*. Persian prose was first written by Tabari (838-922), author of a history of Persia down to the califate, but prose has never been so familiar to the genius of Persian literature as verse. The next great poet after Firdusi was Omar Kheiam (died 1123), whose *Rubaiat* or quatrains, with their strange blending of atheism and tender fancy, of manliness and cynicism, have been given to the West in the metrical translation of E. Fitzgerald (Lond. 1859). The *Kasidaks* or odes of Anwari (q. v.), the astrologer (died about 1200), are still highly treasured by the poet's countrymen for their quaint conceits; as is the *Khamseh*, a collection of Sufistic poems, of Nizami (died about 1200) for its stateliness and teeming thought. But both were soon eclipsed by the *Bustan* and *Gulistan* of Saadi (q. v.), 'combining,' says M. de Meynard, 'the delicacy of Horace, Ovid's elegant facility, the caustic *verve* of Rabelais, and La Fontaine's *bonhomie*;' and by the *Masnavi* of Saadi's contemporary, Maulavi Rumi (died 1272), a work which by its wealth of legend, doctrine, and apologue has won the title of the 'Persian Koran.' Amidst the turmoil of the Mongol invasion the Sufi Hafiz (q. v.), Persia's mystic Anacreon, poured forth his burning odes, and Jami followed Firdusi in celebrating the loves of Yusuf and Zuleikha (Joseph and Potiphar's wife). Hatifi, Jami's nephew and pupil, author of the *Laila wa Mejsnun*, was the precursor of an innumerable crowd of minor versifiers, all singing in altered keys the well-worn themes of an esoteric love and a wine that symbolised the raptures of piety. The improvisations of Kurroglou, a robber poet of the 17th c., are alone remarkable for a certain rustic vigour; whilst the verses of Hakim Kaani, poet-laureate to the reigning Shah, exhibit some tincture of Western civilisation, though adhering to all the ancient traditions of the past. Not much Persian prose has yet been printed. In the field of history, Tabari's greatest successors have been Dshuwaini (died 1275), who wrote a history of Genghis Khan; Rashideddin (died 1320), who wrote a history of the Mongols; Cazwini (died 1351), author of the *Lubb-et-tawarikh* ('Pith of History'); and Mirkhond (died 1493), whose *Rawsat us Safa* ('Meadow of Purity'), a history of Persia till 1471 A.D., was abridged by his son Khondamir, himself the author of the *Habib us Siyar* ('Biographer's Friend'). In fiction, ethics, and miscellaneous literature the standard works are Jelalud-din's *Akhlah i Felali*, a treatise on moral philosophy; Kashifi's *Anwar i Suhelle*, the Persian version of Bidpai's fables; the collection of *The Thousand Fanciful Tales*, known to have existed from the 10th c., and which formed the nucleus or basis of the Arabic *Alif Laila* or *Book of the Thousand and One Nights*; Jami's *Beharistan* ('Spring Garden'), consisting of anecdotes, aphorisms, and biographies; the *Dabistan i Masahib* of Mohsin Fani, giving a sketch of Oriental sects, &c. Persian, it may be noticed, is the medium through which much of the rich Indian literature of tale and fable has passed westwards. See S. Roussean, *Flowers of Persian Literature* (Lond. 1802); Hammer-Purgstall, *Geschichte der schönen Redekünste Perriens* (Tub. 1818); Chodzko, *Specimens of the Popular Poetry of Persia* (Lond. 1842); Sir G. Ouseley, *Notices of Persian Poets* (Lond. 1846); Zenker, *Bibliotheca Orientalis* (2 vols. Leips. 1846-59); Morley's

Catalogue of Persian MSS. (Lond. 1854); and G. B. de Meynard, *La Poésie en Perse* (Par. 1877).

Persian Powder. Various species of *Compositæ* have for a long period been recommended as insecticides, and in recent times some of the genus *Pyrethrum* have obtained considerable reputation. In 1846, Zacherl, a Tiflis merchant, introduced into Vienna under the name of Persian insect powder the pulverised flowers of *P. carneum* and *P. roseum*, two species growing wild, and also cultivated in the Caucasus and Persia. The preparation has proved efficacious in the destruction of insect pests, as also the flowers of *P. cinerariaefolium*, a Dalmatian plant.

Persigny, Jean Gilbert Victor, Duc de, son of a commercial speculator, was born at St. Germain-Lespinasse (Loire), 11th January 1808, joined the cavalry school at Saumur in 1826, and was appointed quartermaster of the 4th hussars in 1828. He became a revolutionist in July 1830, which lost him his military post, but joining the *Temps*, he wrote under his proper name of 'Fialin.' In 1834 he was converted to Bonapartism, and supported it in *L'Occident Française*. This led to an introduction to Louis Napoleon, with whom his career was subsequently bound up. It was P. who organised the Strasbourg plot and who encouraged the landing at Boulogne. The former effort he defended in a pamphlet, *Relation de l'Entreprise du Prince Napoléon Louis* (Lond. 1837); for the latter he was sentenced to twenty years' imprisonment. On the fall of Louis Philippe he hurried to Paris, gave energetic support to the Bonapartists, was appointed major-general of the Parisian National Guard and aide-de-camp of the President, became a member of the Assembly and ambassador to Berlin in 1849, assisted at the *coup d'état* of December 1851, and was raised to the Ministry of the Interior in 1852. In May of the same year he received the title of Comte, with 500,000 francs, on his marriage with a grand-daughter of Marshal Ney. He was sent as ambassador to England in 1855, was recalled to the Home Office in 1860, resigned in 1863, and received a dukedom. He died at Nice, January 12, 1872. P. was a consummate tactician, and a Liberal within the limits of the imperial theory.

Per'simon. See DATE PLUM.

Persius Flaccus, Aulus, the successor in Roman satire of Lucilius and Horace, and the antecessor of Juvenal, was born at Volaterræ, in Etruria, 4th December 787 A.U.C., and died 24th November 815 A.U.C., at the early age of twenty-seven. P. was a Roman knight of high connections. His father, Flaccus, died when he was six years old, and his mother, Fulvia Sisennia, married a second husband by name Fusius, of senatorian rank, and within a few years became a widow. P., after receiving such education as his native town was able to afford, removed at the age of twelve to Rome, where he enjoyed the instructions in grammar of the then famous Remmius Palæmon, and in rhetoric of Virginius Flavius. He afterwards became the pupil of Cornutus, the Stoic, who made a strong impression on his tender and plastic mind. P. lived on familiar terms with the poets Lucan and Cæsius Bassus, and with many others of literary celebrity; with Seneca the philosopher, also, but of the latter's talents he entertained but a lukewarm opinion. The virtuous Paetus Thrasea he revered, and by him was revered in turn. P. died of a disease of the stomach at his estate near the eighth milestone on the Appian Way. His extant works—six satires in all—were written slowly and at intervals. Altogether they number but 650 hexameter lines. His friend Cornutus corrected them, and Cæsius Bassus edited them, at the author's express desire. The popularity of the satires of P. has been immense. Not only in Rome in his own day, but in medieval times, his fame was of the highest. Scholiasts and grammarians cited him at every turn. Augustine, Lactantius, and Jerome were enamoured of him. In short, he was for long the pet heathen satirist. Latterly his reputation has waned. His youthfulness, and the unripeness of his genius, combined with his obscurity of style and language, have been against him. His nobleness and purity of soul, however, are still universally recognised. Few more virtuous men have written, certainly none with more verve and dramatic force, in the Latin tongue. The *Ediitio Princeps* was published at Rome 1469, folio, along with the works of Juvenal. Many editions followed, among which may be noted those of Casaubon (Par. 1605), Passow (Leips. 1809), Weber (Leips. 1821-31), Jahn (Leips. 1843).

English, French, and German translations are numerous. The English versions by Dryden and Gifford are well known, but the translation *par excellence* is that by Conington, with commentary (Macmillan, Clar. Pr., 2d ed. 1877).

Person (Lat. *persona*, orig. a 'mask,' then a 'character' or 'person'), is an important word in the nomenclature of theology and metaphysics. Originally denoting the mask worn by a Roman actor, not so much to conceal his own features as to set forth the supposed likeness of the character he was representing or 'personating,' it naturally acquired even in Latin the sense it now bears in English. Its theological use has arisen in connection with the doctrine of the Trinity (q. v.), and as this use seems to violate the philosophical definition of a P., viz., a distinct, self-conscious individuality, many Christians have felt, in regard to the doctrine, a perplexity which has not quite vanished under the assurance that it is an 'incomprehensible mystery.' It may be proper to notice that P. is not a New Testament word, and that nothing whatever is said in Scripture about a Godhead consisting of 'Three Persons.'

Personal, in English law. See REAL.

Personification (Gr. *prosopopæia*) is a figure of speech which consists in attributing life and mind to inanimate objects, or even to mere abstract conceptions. Its use marks a high degree of passion or enthusiasm; it is therefore a favourite form of expression with orators and poets. Milton's vision of 'a noble and puissant nation' in the *Areopagitica* is an eloquent instance of P. One still more imaginative occurs in the passage (*Paradise Lost*, Bk. ix., ll. 782-84) where Eve plucks the forbidden fruit:—

'Earth felt the wound; and Nature from her seat,
Sighing through all her works, gave signs of woe,
That all was lost.'

Personnel. By the P. of an army is meant the officers, non-commissioned officers, rank and file, and all other persons composing it. The term *materiel* is applied to the ordnance, ammunition, stores of all kinds, and everything necessary for its equipment and maintenance, &c.

Perspective is the representation upon a surface of objects exactly as they appear to the eye. It is really a branch of practical geometry, and depends upon the mathematical principles of projections. (See PROJECTION.) Only with what is called linear P., i.e., the accurate delineation of the principal lines of the picture, have we here to deal. The shading and colouring, so as to produce the desired illusion as to distance, magnitude, &c., though included in Art under the general name of P., are not considered, since they really lie beyond the limits of application of strict mathematics. It is not intended to define more than a few of the more important technical terms which are in use; for such, reference must be made to the numerous treatises and text-books upon the subject. The first principles, upon which the whole depends, and the fundamental conceptions which underlie these, shall alone be briefly indicated. If lines be drawn from every visible point of the surface of a body to the point of vision, a solid cone of rays, taking *cone* in its widest sense, will be formed, having its vertex at the point of vision. The section of this cone, by any given surface, is the P. representation of the object upon that surface. Ordinarily the surface chosen for representation is a vertical plane, which is technically named the *picture plane*. Imagine this picture plane to be transparent, and interposed between the object viewed and the eye of the observer, or point of vision. The cone of rays, drawn from the point of vision, and touching the object, intersects the picture plane in the boundary of a closed region, which is the true P. outline of the object. A little consideration shows that, keeping the point of vision and the picture plane fixed, the size of the P. representation of any object diminishes as the distance of the object is increased, and *vice versa*. Hence parallel lines, which do not lie in a plane parallel to the picture plane, appear convergent in P. Further, all mutually parallel lines which are perpendicular to the picture plane, converge in P. to the *centre of vision*, which is the point on the picture plane directly opposite the spectator's eye, since it is through this point that the perpendicular from the point of vision to the picture plane is drawn. In constructive P. this centre of vision is all important, and the horizontal line drawn through it upon the picture represents the horizon of the spectator. Any plane passing through the

spectator's eye, or any part of this plane, appears on the picture plane simply as a line. The P. outline of a sphere will in general be an ellipse, an oblique section, namely, of a right cone by a plane. When, however, the centre of the sphere lies on the line drawn from the eye through the centre of vision, the projection of the sphere upon the picture plane is a circle—the right cone is cut by a plane perpendicular to its axis. Similarly a circle drawn upon any given plane appears in general an oval resembling an ellipse; and the inscribed square becomes a quadrilateral whose sides appear to converge. The point towards which parallel lines appear in P. to converge is called the vanishing point; and when this point is known, together with the distance between the lines and the plane in which they lie, the lines can be drawn. The vanishing point of lines which are parallel to the horizontal plane lies upon the horizontal line; and all lines which have the same vanishing point make the same angle with the picture plane. The application of these principles to the drawing in P. of an object, whose distance, dimensions, and position are given, forms what may be termed the *art* of P. A knowledge of its methods is necessary to the architect and draughtsman, who should also be fully acquainted with the theory. In landscape painting the P. is not so evident; and the artistic effect depends for the most part upon the shading and colouring, which, combined with the varying magnitudes of the objects composing the subject, give the required illusion to the eye. See DRAWING and PAINTING.

Perspiration. See SWEAT.

Pertápghur (*Pratapghar*, 'fort of Pratap'), (1) The capital of the native state of the same name in the N.E. of Rajputana, India, 33 miles S. of Neemuch, and 206 N. of Baroda. The state of P. has an area of 1460 sq. miles; pop. 150,000, the majority of whom belong to aboriginal tribes; the gross revenue is £60,000, of which £20,000 is enjoyed by feudatories, and £7200 paid as tribute through the British Government to Holkar, the Mahratta Rajah of Indore. The crops are maize and millet. The title of the chief is Maharawal—(2) *Pratapgarh*, the chief town of the district of the same name in Oudh, British India, 2 miles from the right bank of the Saeer river, 32 miles from Allahabad, and 90 S.E. of Lucknow; pop. (1869) 6240. It is an old town with a ruinous rampart and fort of mud. The district of P., which lies in the S. corner of the province, has an area of 1458 sq. miles; pop. (1869) 784,156. The crops are rice, wheat, Indian-corn, barley, sugar-cane, &c.; saltpetre is also produced.

Perth, a royal burgh of Scotland, and capital of the county of the same name, on the right bank of the Tay, 45 miles N.N.W. of Edinburgh by the Fife railway, 69 by the Stirling line, and 22 W.S.W. of Dundee. The 'Fair City,' no less remarkable for its wealth of traditions than for its beauty of situation, is in great part handsomely built of freestone, and lies in the wide fertile stretch of Stathmore, with the Ochil Hills in the S., the Sidlaw Hills in the N.E., and the splendid northerly background of the Grampians. From the Moncrieff and Kinnoull Hills in the vicinity may be obtained a view which Pennant calls 'the glory of Scotland,' embracing the rich Carse of Gowrie, the noble Firth of Tay, with Dundee on its margin, and the beautiful valley of Strathearn, girt by the hills of Men-teith. The Tay, here widening to its estuary, is spanned by a stone bridge of ten arches 880 feet long, and by a handsome stone and iron railway viaduct with a public footpath. The suburb of Bridgend lies on the W. bank of the river. On either side of P., and extending along the river, are the beautiful meadows called the N. and S. Inches, about a mile and a half each in circumference. They are occasionally flooded by the rising of the Tay, and so low is the level of the city itself that a rise of about 12 feet above ordinary high-water mark is sufficient to flood the principal streets. The old Kirk of St. John, now comprising the churches of E., Middle, and W. parishes, is a massive edifice in Pointed style, with a square tower and spire 155 feet high. Here Knox preached the celebrated sermon that was followed by the demolition of the monasteries. Other notable structures are the County Buildings, erected in 1819 on the site of old Gowrie House; the Penitentiary, the largest in Scotland, with accommodation for 535 convicts, besides criminal lunatics and 52 juveniles; the spacious barracks, erected in 1793; the Marshall Institution (1823), containing a public library and

the collection (probably the finest provincial one in Scotland) of the Literary and Antiquarian Society, founded 1784; James VI.'s hospital, rebuilt in 1750; an infirmary, dispensary, and other charitable institutions; the schools; the auction marts for the sale of cattle (by far the largest and most elegant in Scotland); and the handsome central railway station. Before the Reformation P. contained a number of religious houses, of which no remains are now traceable. In 1878 there were twenty-six places of worship. P. has manufactures of cotton fabrics, winseys, gingham, and shawls, and there are flax-mills, bleachfields, tanneries, breweries, distilleries, iron foundries, &c. The exports are chiefly manufactured goods, salmon, and agricultural produce. In 1876 there entered the port 121 vessels of 9403, and cleared 126 of 9813 tons. In 1876 the imports amounted to £19,349, and the customs to £21,414. In 1877 there belonged to the port 32 vessels of 2637 tons. The salmon fisheries are of importance. Races take place in October on the N. Inch, and seven fairs are held annually. P. returns one member to Parliament, and publishes three newspapers, one once a week, a second twice a week, and a third thrice a week. In 1877-78 the annual value of real property (inclusive of railways) was £112,639, and the corporation revenue was £6700. Pop. (1871) 25,585; (1876) 26,535. A city of great antiquity, tradition even ascribing its foundation to the Romans, P. first becomes important in the 12th c., and was a residence of the Scottish kings till the ruthless murder of James I. by the wild clansmen of Sir Robert Graham (1437) showed it 'on startling evidence to be too near the Highlands for safety' (Burton). The kings had no palace here, but the court found ample reception in the Cistercian Convent. Among the places of interest in the vicinity are Scone Palace, a modern castellated building, the remains of Scone Abbey, and Dupplin Castle, with its famous classical library. P. was the seat of a General Assembly of the Church of Scotland in 1618, which met at the command of King James, and drew up, under a certain degree of compulsion, the notable 'Five Articles' enjoining kneeling at the Lord's Supper, the observance of Christmas, Good Friday, Easter, Pentecost, and Confirmation, and sanctioning the private administration of baptism and the Lord's Supper. These articles were condemned and repudiated by the famous Glasgow Assembly of 1638.

Perth, the capital of W. Australia, is picturesquely situated on the Swan River, 12 miles from its mouth, in 31° 20' S. lat., 115° 46' E. long. It consists principally of one main street nearly two miles long and lined with trees, and contains some good public buildings. The chief of these are the City Hall (built entirely by convict labour), the basement of which is used as a market, and the Protestant and Roman Catholic cathedrals. Pop. (1870) 5007, including the military and 400 convicts.

Perthes, Friedrich Christoph, a patriotic German publisher, was born at Rudolstadt, April 21, 1772, and apprenticed to a bookseller at Leipsic in 1787. After six years of business training and literary study, he passed to Hoffmann's establishment at Hamburg, where eventually (1796) he entered into the trade on his own account, and formed the friendship of many of the most famous men in Germany. In 1810 he started the *National Museum*, which achieved a wonderful popularity through the contributions of such men as Jean Paul Richter, Schlegel, and Arndt. P. took an active part in freeing Hamburg and N. Germany from the French in 1813-14, and in 1822 removed to Gotha, where he established a publishing business, which soon became famous for the issue of historical and theological works. He died 18th May 1843.—**Olemens Theodor P.**, son of the preceding, born at Hamburg, 2d March 1809, became Professor of Law at Bonn, was the friend and teacher of many Germans of the highest rank and fame, and wrote *Das Deutsche Staatsleben vor der Revolution* (1845), and the interesting *Friedrich P.'s Leben* (6th and centenary ed. 1872). He died 25th November 1867.—**Johann Georg Justus P.**, uncle of Friedrich, probably born at Rudolstadt, founded at Gotha in 1785 the publishing firm still celebrated beyond Germany by the name of 'Justus P.', and died 2d May 1816.—**Bernhard Wilhelm P.**, grandson of the latter (born 1821, died 1857), was the founder of the *Geographisches Institut* (1854), which has become world-renowned through the publication, in its *Mittheilungen* (edited by Dr. Petermann), of maps by Stieler, Berghaus, Spruner, Sydow, &c., and of contributions by travellers

in every part of the earth. The *Almanach de Gotha* (q. v.), also by the firm of Justus P., is by far the best work of the kind published in any country.

Perth'shire, the central county of Scotland, is bounded N. by Inverness and Aberdeen, S. by Stirling and Clackmannan, W. by Argyle and Dumbarton, and E. by Forfar, Fife, and Kinross. Area, 2601 sq. miles, or 1,664,690 acres; pop. (1871) 127,768. It is 70 miles long from E. to W., and 66 broad from N. to S., and lies on the border of the Highlands, comprising every variety of Scottish soil, climate, and scenery. Its natural boundary along the N. is the main range of the Grampians (q. v.), and along the W. the Southern Grampians, and the principal heights within the county are Ben Lawers (3935 feet), Ben More (3818), Ben Voirlich (3160), Schehallian (3564), Ben Scarsoch (3390), Ben Ledi (2863), and Ben Venue (2388). The Ochils (q. v.) traverse the S.E. of the county, separating the basins of the Forth and Tay, while the Sidlaw Hills, which attain a height of 1500 in Birnam Hill, separate the Carse of Gowrie from the broad plain of Strathmore. The detached hill of Dunsinane, an offset of this latter range, is famed in Scottish tradition as the site of Macbeth's castle. The chief river of P. is the Tay (q. v.), a noble stream, which, with the exception of part of its firth, is wholly within the county, and flows with a great northerly bend from W. to E., expanding in Loch Tay (16 miles), and receiving the Lyon, Tummel, Garry, Bruar, Isla, Almond, Earn, &c. The 'P.-Highlands' comprise almost the whole N.-western half of the county, and this region is intersected by a network of valleys and glens, of which the most celebrated are Strath Tay or Strathmore, Strathearn, Glens Almain (the 'Sma Glen'), Shee, Ericht, Fernal, Bruar and Tilt. The principal passes are Aberfoyle, Leny, Comrie, and Killiecrankie. Besides Loch Tay, there are numerous sheets of water, as Lochs Earn, Katrine, Achray, Venacher, Lubnaig, Voil, Rannoch, Lydoch, Tummel, and Ericht. The river Forth forms part of the southern boundary, and receives from P. the Allan and Teith. In the W. of P. is the extensive moor of Rannoch, and in the S.W. are the beautiful Braes of Balquidder. Old Red Sandstone prevails in the Lowlands, and in the Highlands mica schist, with occasional beds of quartz, sandstone, greywacke, and patches of granite. The chief minerals worked are roofing slates, coal, ironstone, blue marble, and limestone. In 1876 there were 106,006 acres under corn crops, 50,393 under green crops, 99,100 in clover, sanfoin, and grasses in rotation, and 79,343 in permanent pasture, exclusive of mountain and heath. In the same year P. had 13,764 horses, 80,024 cattle, 659,210 sheep, and 9597 pigs. The chief crops are oats, barley, wheat, turnips and potatoes. In 1877-78 the valued rental was £871,801, exclusive of £151,474 for railways and waterworks. The principal towns are Perth, Couper-Angus, Auchterarder, Crieff, Dunkeld, Blairgowrie, and Callander. P. returns one member to Parliament. Many of the finest mansions in Scotland belong to this county, but of these Scone Palace alone is famed for its historical memorials. P. lay beyond the Roman wall; and Mons Grampius or Graupius (see GRAMPAINS), between Dunblane and Crieff, was the scene of the final triumph of Agricola over the Caledonians, A.D. 84. Besides Roman roads and camps, P. has numerous interesting antiquities, including the cathedrals of Dunblane and Dunkeld, and the Abbey of Culross. P. is traversed by the 'Highland Railway,' which crosses the Grampians, and forms the direct route to Inverness and the Northern Highlands.

Perturbations, in astronomy, are the inequalities which exist in lunar and planetary motions. These inequalities are so inconsiderable that they require for their detection more delicate and longer continued observations than suffice for establishing Kepler's laws. From these laws, Newton was led to the universal law of gravitation, that every particle in the universe attracts every other particle with a force which acts in the straight line joining them, and is directly proportional to the product of their masses, and inversely proportional to the square of the distance separating them. When such a system, then, as is formed by the sun, earth, and moon is considered, it is evident that other forces exist than that which acts between the sun and earth. Consequently we cannot reasonably expect that the earth should move in a perfect ellipse round the sun, or the moon similarly round the earth. Both theory and observation, indeed, indicate the existence of irregularities or inequalities, and these

are technically called P. If only two bodies existed in the universe, and both of uniform spherical form, their motions round their common centre of mass would be easily determinable by mathematical analysis. Introduce a third body, and the difficulties are greatly increased, and the problem is incapable of general solution. For particular cases, however, the solution may be obtained to any degree of approximation by the use of infinite and rapidly converging series. Though the moon is commonly said to describe an ellipse, of which the earth occupies the focus, this is only true to a first and very rough approximation. The moon's mass is quite comparable to that of the earth, and accordingly the centre of the earth is far from coincident with the system's centre of mass. Still, however, the moon's orbit would be elliptical were it not for the P. caused by the attraction of other bodies, and especially of the sun. In discussing the lunar theory, the sun is supposed to revolve round the centre of mass of the earth and moon in an elliptic orbit during one year—though in reality it is the earth and moon which revolve round the sun. The plane of this (apparent) orbit is of course the ecliptic, to which the plane of the moon's orbit is always inclined. The whole perturbing force due to the sun is found by compounding the attraction of the sun upon the moon at any instant with the simultaneous attraction of the sun upon the earth taken in the opposite direction. In dealing analytically with this resultant, it is advisable to break it up into three rectangular components, and study the P. due to each separately. This we can do because of the smallness of the perturbing force compared to the force which really determines the moon's orbit. The most convenient directions in which to resolve the sun's perturbing force are (1) along the projection upon the ecliptic of the moon's radius vector; (2) perpendicular to this direction in the plane of the ecliptic; and (3) perpendicular to the plane of the ecliptic. The more important inequalities to which those forces give rise are noticed under Lunar Theory (q. v.). The investigation of the planetary theory, though depending upon the same principles as that of the lunar theory, is conducted very differently. The difference in the conditions of the problems necessitates a great diversity in treatment. Here we have to consider the inequalities of one given planet due to the attractions of all the rest. The great mass of the sun as compared with the mass of any planet, or indeed with the total mass of them all, greatly simplifies the problem, inasmuch as the disturbing forces must be insignificant compared to the central force which determines the orbit. In the case of the moon, the sun's great mass makes up for its great distance, so that the changes in the elements of the moon's orbit are rapid compared to the changes in the elements of a planet's orbit, which can only be detected by their cumulative effect through the lapse of time. Hence in discussing the planetary theory, the orbit is assumed to be elliptical, but the ellipse is taken as slowly changing. This is known as the method of the *variation of parameters*. Its principle is simply that the elements which determine the ellipse are subject to secular variation; and hence the orbit for a given instant is determined by simply substituting in the equations the particular values which the elements have at the instant in question. The whole bearings of the subject of perturbing forces were clearly seen by Newton, who left the lunar theory almost as complete as it now is. The elaborate researches of Lagrange, Laplace, Clairaut, Euler, and other mathematical astronomers, have been ably supplemented by the inquiries of *savants* of our own time, such as Airy, Hansen, Leverrier, Adams, Newcomb, and Thomson. See Airy's *Mathematical Tracts*, and for a more popular account, Herschel's *Outlines of Astronomy*.

Pertussis. See HOOPING-COUGH.

Peru, a republic in the N.W. of S. America, bounded on the W. by the Pacific, on the N., by Ecuador, on the E. by Brazil, and on the E. and S. by Bolivia. Its inland frontier-line has recently been rectified by arrangement with Brazil, and the limits of the country as rectified are in lat. 1°—22° S., and in long. 68° 12'—81° 32' W. Its area, according to the *Almanach de Gotha*, 1878, is 617,593 sq. miles; and its pop., according to the census of 1876, is 2,703,070. The greatest width of P. is in the extreme N., between Cape Blanco on the W. and San Antonio on the E., where the country measures over 850 miles across; its narrowest measurement is in the S., where, at Arica, it contracts to about 50 miles. The coast line, extending over 21° of lat. (1323 miles), slopes

S.S.W., and is almost unbroken by great indentations. Still there are a number of open bays upon which harbours, usually of the rudest and simplest description, have been planted. The chief of these are Paita, Truxillo, El Callao (q. v.), the port of the capital Lima, and Iniquique. The islands, inconsiderable in number and in size, are of great value for their guano deposits. Of these, Lobos de Tierra (lat. 6° 27' S.), the largest guano island in the world—7 miles long—Lobos de Afuera (lat. 6° 57' S., long. 80° 41' W.), and the Chincha Islands (q. v.), are among the chief. P. is divided into 21 departments and 3 littoral provinces.

Physical Aspect.—The scenery of P. is probably unique for imposing grandeur and variety, a distinction due to the singular contour of its surface. Within its limits are to be found a number of the loftiest mountain peaks, the most stupendous precipices and ravines, the most arid and desolate plateaux, and the most fruitful tropical valleys to be met with in the world. Its mountains clad with snow-mantles, only the fringes of which are melted in the summer heats, send down westward-flowing torrents through the tremendous gorges of the Cordillera to the Pacific, and eastward-flowing rivers through the softer valleys of the twin ranges of the Andes—rivers swift but gentle of current, which, forming the head waters of the Amazon, reach the sea on the opposite or Atlantic side of the continent. Lake Titicaca lies at a level almost as lofty as Mont Blanc, and the Oroya Railway attains the unparalleled elevation of 15,645 feet. The Andes (q. v.) here bifurcate into the E. and W. Cordilleras, the western range being the higher, and that in which alone occur volcanoes. The W. Cordillera is of granite and metamorphic rocks, the eastern or inland one of limestone in a state of disintegration, forming fantastic peaks. Between the E. Cordillera and the Pacific there intervenes a low-lying strip of desert land—a waste of sand and rock, about 40 miles in width, the domain of silence and of death. The sand of this wind-swept desert is hard, smooth, monotonously level, and strewn with heaps of bones. This maritime strip, the *Costa*, is intersected at intervals by exceedingly fertile and beautiful valleys, which mark the courses of the streams descending from the snow-clad Cordillera to the Pacific. Before the Spanish *conquistadores* arrived in the country, the waters of these streams were carefully preserved by aqueducts, and distributed by wonderful contrivances for the purposes of agriculture; but even in that age the watered valleys, though liberally peopled, were isolated by many leagues of deadly desert. This circumstance helps to explain the remarkable fact that in penetrating into the country Pizarro and his cavaliers met with no organised or effective resistance. From the coast rises abruptly the giant bulk of the Cordillera, with its immense volcanoes, its snowy peaks, and its minor hills, which would be vast mountains in any other country save perhaps in Northern India. Between its summits there are few gorges, but instead of the appalling chasms and ravines of the more eastern range, its shoulders extend afar in broad undulating plains called *punas*, which vary from 14,000 to 18,000 feet above the sea, and are frigid, sterile, dead, save for the condor that is lord above and the vicuña, the one sole denizen below. These *punas* taken together form the region which is known as the *Despoblado* ('The Unpeopled'). 'Here,' writes Squier, 'no trace of human habitation is discovered. The traveller is happy to obtain the protection of a cave or the shelter of a rock at night, and by day hurries as fast as his starving mule, suffering from the rarefaction of the atmosphere, will enable him, across the dreary waste.' The *Despoblado* is on an average 150 miles broad, and though it varies in elevation, it is throughout a desolate and repulsive region. Eastward from it and extending between the Cordilleras is a vast valley about 11,000 feet above the level of the sea. Compared with the mighty ranges on either side, this *Plateau*, as it is called, seems flat, yet even it has its mountains and valleys, rivers and lakes, and seems to be a section cut from the ordinary surface of the earth, heaved up to the elevation of Alpine summits, and supported there on each side by the massive shoulders of the Andes. In some quarters the two great mountain-ridges are separated by from 100 to 200 miles of *Despoblado* and *Plateau*; in others, nearing each other, they finally coalesce and form a 'knot,' in which the geographer fails to determine to which range the individual mountains belong. There are two famous 'knots' in P. The first at the Pass of La Raya (lat. 14° 30' S., long. 70° 50' W.), where the Rio

Vilcanota, said to be the true source of the Amazon, has its origin in a dark mountain lake and flows northward, and where also springs the Rio Pacura, which, flowing southward, falls into Lake Titicaca. The Raya Pass, therefore, is on the watershed between the northward and the southward flowing streams of the country. The other famous 'knot' is in lat. 10° 15' S., long. 76° 10' W., near the famous mines of Cerro de Pasco. The name *Sierra* is applied to the whole of the central mountain-system of the country, from its northern to its southern boundary, although between the mountain ranges there are subordinate regions, as the *Despoblado* and the *Plateau*, which have distinctive appellations. Of the latter sub-region the extensive and peculiar basin of Lake Titicaca (q. v.) in the S. forms a part. The lake, a magnificent body of fresh water, receives several considerable streams, and discharges its surplus waters by the Desaguadero River into the Bolivian Lake Aulagas, of which little is yet known save that it has no ascertained outlet to the sea. The soil of the islands and the shores of Lake Titicaca is poor, and the climate cold. Here barley seldom ripens, and the biscacha, llama, and vicuña are the only indigenous animals fit for food. Another noticeable feature of this singular country are its mountain-ringed valleys named *bolsones* (Span. *bolson*, 'a pocket'). These *bolsones* vary in altitude, and, necessarily, in climate and productions. Surrounded by mountain-ridges or by the high *punas*, these 'pockets' are naturally isolated—the routes of communication between them being by the dizziest, narrowest mountain tracks, or across river-ravines by means of narrow, frail, wind-swung bridges, formed of cables of plaited withes. The principal, or at least the most noteworthy, *bolson* is that of Cuzco, and the most remarkable with the bridge is that on the route from Cuzco across the Apurimac (*Apu-rimac*, 'the great speaker'), that speaks with the voice of thunder. The eastward border-land of the Peruvian territory is called the *Montaña*, and comprises more than two-thirds of the whole area of the country. It consists in great part of wide plains, traversed by the headwaters of the Amazon, and covered with gigantic forests which extend for about 5500 feet up the mountain-sides.

Climate, Soil, and Productions.—P., lying in the region of perpetual S.E. trade-winds, is swept by these winds after they have all but exhausted their moisture on the wooded plains of Brazil. The last particles are intercepted in the form of snow by the lofty Cordilleras, and the wind whistles over the *Costa* cold and dry. In some parts of this region no rain has fallen within human memory; but the absence of rain is partly compensated for by the *garua* or fog. The central *Plateau* is noted for the mildness and comparative humidity of its climate. In the higher uplands the climate is often inclement, and the plains of Titicaca and Pasco are especially notorious for terrific tempests and thunderstorms. P. is pre-eminent over all S. American countries for the frequency and violence of its earthquakes. Of the soil of P. little need be said, as there is not much of it. Prescott, following, perhaps too faithfully, the gossip of Garcilasso de la Vega, has described the system of agriculture of ancient P. as perfect, and its results as bounteous. For long the industry of P. has been turned from agriculture to mining and the trade in guano. But there are now considerable valleys and tracts producing maize, rice, tobacco, coffee, sugar, cotton, &c. Much of P. is admirably suited for the cultivation of cotton, and the cotton already produced is of excellent quality. P. imports grain and potatoes from Ecuador and Chili. The productions of P., recognised as mercantile, are guano, nitrate of soda, cinchona bark, silver, sugar, cotton, and rice. The population is almost confined to the towns that fringe the coast, and are scattered over the Plateau and Sierra. Perhaps the most populous part of P. is the valley of the Apurimac.

Internal Communication.—The streams flowing westward from the Cordillera are, for commercial purposes, of little value. The rivers flowing eastward from the Sierra, the chief of which is the Amazon (here called the *Marañon*), with its affluents the Ucayali, Apurimac, Vilcamana, Huallaga, &c., are of greater volume, and offer facilities for navigation into the very heart of the country. At present the chief place on the P. Amazon is Yquitos, with an arsenal and a port for Government steamers plying on the river. Up the Ucayali, and its tributary the Pachitea, steamers have advanced to the very base of the Andes, and to a point said to be only 220 miles from Callao. The roads of P., which are said to have been so perfect under

the older civilisation, have virtually ceased to exist, or are represented, at least in the uplands, by broken, dangerous mule-paths. The railways of P. are among the wonders of the New World. The country owns, for its area, a greater mileage of railway than any other of the American states. This fact, however, is, in the present condition of affairs, no matter to boast of, as at present P. has little goods and less passenger traffic. Mr. A. J. Duffield states that 'The Government railways cost enormous sums and bring in nothing; and it may safely be said that they will never figure, honestly, in the national accounts, except as items of expenditure.' The Government has contracted loans for these railways to the amount of \$150,000,000. On the subject of Government railways the latest ascertained facts are, according to Mr. Graham, British Consul at Islay (1875), that the works on the railroad which were to have connected Cuzco with Arequipa and the coast have been stopped, owing to the inability of the Government to pay the contractors, and the plant which had been accumulated has been removed, and shipped away to other places. Writing in 1876, Acting-Consul Robilliard states that the railway works to Cuzco have not been touched since 1875, but if a proposal now before Congress be accepted, it is probable that the line to Cuzco will be continued, at any rate half-way. Upon other great national undertakings, and chiefly upon waterworks, the Government of P. have expended about £20,000,000. At the close of 1876 there were in operation 1281 miles of railway belonging to the state, 496 miles belonging to private persons, and 253 miles belonging partly to the state and partly to private owners. The entire railway system in working order or in course of construction in 1876 comprised twenty-two lines of 2030 miles in length, and representing a cost of £35,994,920. The amount of receipts from these is unknown; but only the lines belonging to private companies have yet proved remunerative.

Industries and Commerce.—The chief commercial resources of P. are its great deposits of guano and nitrate of soda (see GUANO and NITRE). Mr. Duffield, perhaps the best informed inquirer on the subject, states, that the known unexhausted beds of guano amount in all to about 7,500,000 tons, selling at about £16 per ton. Further, he states that he found 'certain unmistakable indications of even larger deposits which may lie buried a hundred feet below the sand on the slopes of the southern shore;' and he draws attention to the circumstance that a month after his departure from Lima a meeting was held at the Treasurer's office—many heads of departments being present—for the purpose of receiving a communication from two Englishmen, setting forth the discovery of fresh guano deposits on the coast, in the (southern) province of Tarapaca. From all that could be gathered, these new deposits may be fairly estimated as containing 3,000,000 tons of guano.' In 1876, 156,864 tons of guano, of the value of £1,966,068, were exported, to Great Britain. The immense deposits of nitrate of soda occur in a wild, desolate pampa in the province of Tarapaca, 150 sq. miles in area, and which on the safest calculation will yield 70,000,000 tons of nitrate. In 1877 a company was formed for the purpose of working these deposits. The uses to which this substance is applied are multiplying yearly. At present it is highly valued as a fertiliser, and its commercial value is £12 to £12, 10s. per ton. The amount of nitrate exported in 1876 to Great Britain was 3,064,707 tons, valued at £1,761,450. The gold and silver mines of P. are not now productive, and mining can scarcely be regarded among the profitable occupations of the inhabitants. Potosi, once as celebrated for its silver as Golconda for its diamonds, is now poor, and, like Golconda, shorn of its ancient renown. The chief silver mines are now those of Cerro de Pasco (13,800 feet above sea level, and difficult to work for this and other reasons) and those on the shores of Lake Titicaca. The chief copper mines are those on the Chimbote-Huaraz line of railway. Both copper and tin of great purity are worked between the great mountain-chains in the south; but gold mining is now almost too inconsiderable to require notice. A bed of coal of great but undefined extent was discovered in 1877, near Oluzco, in the department of Libertad, and it is anticipated that this important discovery will immediately lead to a vast extension of the mining industry of the country. In 1876 the total exports to Great Britain amounted to £5,630,670. Among the exports were £503,224 worth of alpaca wool and £912,799 of unrefined sugar, while the imports comprised £324,350 worth of cotton goods, £130,016 of woollens, and £59,757 of coal.

The other imports are preserved provisions, silk goods, wines, liquors, and drugs. Among the reasons given for the backward state of P. are (1) the accessibility of the guano and nitrate deposits, which has withdrawn labour from other pursuits, (2) the liberation of the negro-slaves and the abolition of the poll-tax formerly paid by the Indians, and (3) the employment of Chinese coolies, of whom there are 60,000 in the country.

Religion and Morality.—The religion is Roman Catholic, and no liberty is allowed for the public exercise of any other form of worship. Peruvian morality is not high. The habits of the upper classes are luxurious, frivolous, and idle; the national temperament is passionate; and Lima, the metropolis, is one of the gayest and grossest capitals in the world. Bull-baiting is universally popular, and not only are the animal's horns often loaded with fireworks, but as an occasional novelty a condor is fastened on his back to lacerate the flesh with its terrible beak. During the year 1875, 1642 children were baptized at Callao, of which 654 were legitimate and 988 were illegitimate. The native Indians, about 350,000 in number, are wholly uncared for by the Government in every sense—religious, educational, and political. The 'priests' of the various provincial districts are habitually drunken, extortionate, and ignorant.

Government, Army and Navy, &c.—P. became independent of Spain on the 28th July 1821. The constitution, as at present (1878) existing, was adopted August 31, 1867, and is modelled on that of the United States. The legislative power is vested in a Senate of 44 members and a House of Representatives nominated by the electoral colleges of provinces and parishes, one member for every 20,000 inhabitants. The President of the Republic is assisted in the administration by a cabinet of five ministers. Receipts for the year 1875-76, £10,220,000; expenditure, £12,500,000. There is an ever-increasing foreign debt, which in January 1876 amounted to £49,010,000, besides a floating debt of unknown amount. At the beginning of 1877, such was the depreciation of Peruvian credit, that Lima bank-notes were at a discount of 50 per cent., and the sole, the nominal value of which is about 5s., has fallen in exchange in England to 2s. and 2s. 6d. The army in 1877 consisted of 13,200 troops, and the navy of 6 ironclads with 38 guns, and 6 other steamers with 56 guns. The mercantile marine, in 1876, consisted of 147 vessels of 49,860 tons, and of which 8 were steamers. No official statements of the general commerce of the country are issued.

Antiquities and Culture.—If the antiquity of a nation be no higher than that of its earliest written records, the history of P. will be found to reach back only to the beginning of the 16th c., when the Spaniards under Pizarro invaded and conquered the country, carefully rifled its treasures, and carelessly described, for the first time, its appearance, resources, &c., and made imperfect attempts to reduce its contradictory traditions to form. But though the earliest descriptions of P. are little more than three and a half centuries old, the Peruvian nation is of the highest antiquity. On landing on the shores of P., the Spaniards found not a savage or primitive race, but an empire complete in its organisation, possessing the accumulated wealth of centuries, practising a social and industrial system which the shrewdest of our philosophical economists could scarcely have improved, and boasting, besides their own remarkable palaces and temples, a series of wonderful architectural remains, the antiquity of which went beyond the traditions even of the Incas themselves. From the earth-houses of the ancient Britons to St. Paul's, the distance in time and in progressive effort is perhaps not greater than from the stone huts of the early dwellers in the Sierra to the fortress and temple of Tiahuanaco, on the S. of Lake Titicaca, whose gigantic and mysterious ruins were prehistoric even to the Incas, and were regarded by them with superstitious dread. And not more remarkable than the great antiquity of these ruins is the wonderful technical skill with which the hard stones composing them have been cut, and their geometrical ornaments and carved figures been designed and executed. Mr. Squier, who has examined the architectural works of Europe as well as of N. and S. America, makes the following remark respecting these immense carved blocks:—'I may say, once for all, carefully weighing my words, that in no part of the world have I seen stones cut with such mathematical precision and admirable skill as in P., and in no part of P. are there any to surpass those which are scattered over the plain of Tiahuanaco.' How many centuries must have elapsed before Indian tribes could have arrived at such a degree of mechanical and artistic accom-

plishment it is impossible to tell and vain to guess; and this all the more from the circumstance that the ancient buildings have been more or less destroyed while being ransacked by treasure-seekers, from the time of Pizarro to the present day. The palaces of the Chimú, near Truxillo, are by far the most important archaeological remains on the P. coast, and represent an older civilisation entirely distinct from that of the Incas. The remains of Tiahuanaco are believed to be 'as elaborate and admirable as those of Assyria, of Egypt, Greece, or Rome,' and the theory has been advanced that these buildings of nameless age must have been erected by an emigrant tribe, who brought with them a civilisation from afar. It is unfavourable for this theory, and, at the same time, a most interesting and suggestive fact in itself, that P. contains many specimens of stone circles, the exact counterparts of Stonehenge and Avebury in England, Carnac in Brittany, and the sun-circles of Scandinavia and Tartary; and that from these original and unique architectural efforts, common alike in Europe, Asia, and America, the constructive genius of the early Peruvian tribes may have developed the colossal structures of Tiahuanaco, which in their turn served the Incas as the models on which their own palaces—as that of Cuzco (q. v.)—were built. The Inca architecture is of the style known as Cyclopean—that is, the walls, &c., are built of huge, irregular blocks of stone, so carefully cut however, so admirably jointed, that even to this day the point of a knife cannot be inserted between them. The ruins on the sacred islands of Titicaca and Coati belong to the most powerful time of the Incas, and include the favourite palaces and most sacred temple. Here not only do the buildings evince the greatest care, but every effort seems to have been made to render the places delightful by the construction of terraces, gardens, and baths. The *pila* (fountain) of the Incas, supplied with water through subterranean passages from sources now unknown, never diminishes in volume, and its stream is skilfully conducted from terrace to terrace till it reaches the lake. In Titicaca and Coati there is the same beautiful, complicated series of terraces, falling off in harmonious gradations from the court or esplanade of the ruined edifice to the lake. The Peruvian aqueducts were on the grandest scale, and of the most perfect construction. They conveyed water from the mountains to the towns and to the arid sea-coast, which in the great days of the empire blossomed like the rose, and was inhabited by a numerous and thriving population. Many of these aqueducts are still in use, and in not a few of the older but still inhabited buildings the aqueduct provides a constant supply of water, the source of which is wholly unknown to those who make use of it. Agriculture was pursued with a care and success unknown in any other country except China. The scanty soil on the hillsides was laid out in terraces buttressed with facing walls of stone; and such was the anxiety of the Peruvians to utilise every yard of available ground, that they refrained from burying their dead in the usual fashion, but built them up in *chulpas* or burial towers, or hid them away in caves and niches cut in the rock, so that the dwellings of the dead might not trench on the cornfields of the living. The coast tribes worshipped Viracocha, the god of the sea, from which they drew great part of their subsistence, while the tribes that inhabited the *bolsones* and the chilly *punas* bowed down before *Inti* the sun, the giver of light and heat, the bringer of food and comfort. A pure Theism, however, is believed to have been the fundamental principle of the religion of several, if not many, of the indigenous tribes. Finally, from what we know of them, the Peruvians at the period of the Spanish invasion were pious, loyal, industrious, prosperous, and happy.

The Peruvians had no alphabet, and the annals of successive reigns were transmitted orally by the *amanutes* or 'wise men' in the schools of Quito. The only substantive memoranda of national transactions were the knotted cords, called *quippus*, in which the character of the events was indicated by the colour of the cords, the number and distance of the knots, &c. *Quippu*-reading, however, has long been a lost art; and we must therefore have recourse to the pages of the Spanish chroniclers. From this source we learn that, before the arrival of the Spaniards, the civilisation of P. had found expression in a literature of singular maturity and elegance. A genuine specimen of this literature is the *Ollanta*, a graceful drama, translated into English by Clements R. Markham, and done afresh into German by Herr Flammberg, a Quichua scholar (Vien. 1877).

History.—The chroniclers are contradictory and confusing with

regard to the number of sovereigns of the Inca dynasty prior to the Spanish invasion. Garcilasso states that the Inca dynasty arose in the 11th c., and that there were fourteen successive sovereigns of the imperial race. He refers to the Inca race proper. Montesinos states that there were more than one hundred and one Peruvian monarchs, and that the royal race sprang into existence five hundred years after the deluge. This writer is evidently going back upon the earliest traditions referring to the first princes that ruled in this region long before the Inca race was heard of. Manco Capac (q. v.) and his wife-sister Ocllo were the children of the sun (*Inti*), and were sent to earth to instruct the tribes of the Sierra in the 11th c. Their avatar took place on Titicaca Island, whence marching northwards with their adherents, they reached the fertile *bolsones* of Cuzco, and there founded the city of that name. Manco died in 1062, after a beneficent reign of forty years, during which he organised the Peruvian nation. The Peruvians, increasing and prospering, soon overflooded the *bolsones* of Cuzco into the neighbouring valleys, which they annexed. Tupac Yupanqui pushed his conquests south to the river Maule in Chili, and his son and successor, Huayna Capac (q. v.), carried the victorious Peruvian arms northward to Quito, which he incorporated. Under this warrior, and precisely at the time of the discovery of America by Columbus, the Inca empire attained its greatest extension and the height of its power. The empire extended from 4° N. to 34° S., and from the Pacific on the W. to the forests of the Amazonian valleys on the E. On his death in 1426, Huayna Capac directed that his son and heir, Huascar, should inherit the southern dependencies of the empire, while the northern kingdom of Quito should be the inheritance of another but illegitimate son named Atahualpa (q. v.). The partition of the Inca empire was an innovation in the history of the dynasty, and a civil war was the consequence, in which Atahualpa was victorious. Meantime Pizarro had landed on the coast, and by force and fraud had won astonishing successes. The brave but unscrupulous adventurer crossed the Andes, captured Atahualpa at Cajamalca, and put him to death. For some notice of the romantic adventures and the violence of the Spanish leader, see the articles ALMAGRO and PIZARRO. After the extinction of the Pizarro family the country became a viceroyalty of Spain. The empire, already stripped of its treasures, the gold and silver plate of its temples, palaces, &c., through the rapacity of the Spaniards, was now to suffer territorial diminution through the incapacity of the viceroys. Quito on the N., and a number of provinces on the S., were detached from P. in 1718 and 1788 respectively. Anarchy prevailed in the viceroyalty until, following the example of the other Spanish dependencies in S. America, P. raised the standard of independence in 1820, and was proclaimed a republic, under the presidency of General San Martín, July 28, 1821. Slavery was abolished in 1854. A misunderstanding with Spain which arose in 1863, and was the cause of the occupation of the Chincha Islands in April 1864, was brought to a peaceful conclusion in 1866. On the 22d July 1872, a revolution, led by Don Gutiérrez, Minister of War, and his two brothers, broke out. President Balta was taken prisoner and murdered in bed, and Gutiérrez appointed himself Dictator; but on the 26th he was assassinated by the populace, his brothers having been previously shot down. On the 2d August 1872, Don Manuel Pardo was elected President. The 'Citizen President,' as he was called, inaugurated a number of movements, the tendency of which was to suppress military despotism and develop the resources and the commerce of the country. General Prado was elected President, August 2, 1876. See Prescott's *Conquest of P.* (1847); *Antiquidades Peruanas*, by Tschudi and Rivero (Vien. 1851); *Guía Política Eclesiástica y Militar del Perú*, by P. M. Cabello (Lima, 1869); *Travels in P. and India*, by Clements R. Markham (Lond. 1862); *Two Years in P.*, by T. J. Hutchinson (2 vols. Lond. 1874); *Le Pérou, Productions, Finances, &c.*, by A. Chérot (Par. 1876); *P. in the Guano Age*, by A. Duffield (Lond. 1874); and *P., Incidents of Travel and Exploration in the Land of the Incas*, by E. G. Squire (Lond. 1877). Professor Raimondi, after nineteen years' residence in P., is publishing at the cost of the state a great scientific work, *El Perú*, of which the first volume appeared at Lima in 1874, to be followed by six others.

Perugia, the chief town of the province of P. or Umbria, in Central Italy, lies partly on the top and partly on the slope of a group of hills 1300 feet above the valley of the Tiber, and is 74

miles S.E. of Florence by rail. It is a fine old walled town, and contains many buildings of the 14th and 15th centuries. The broad Corso connects the two finest squares—the Piazza Vittorio Emanuele, in which stands the modern Prefettura, and the Piazza del Duomo, in which are the Fonte Maggiore (1277), one of the finest fountains in Italy, and the cathedral of San Lorenzo (the 15th c.), rich in works of art. Along the Corso are the Collegio del Cambio, containing frescoes by Perugino, in which he is said to have been assisted by Raphael, then his pupil, and the Palazzo Pubblico (1281-1333). W. and N. of the cathedral is the Piazza del Papa, with a bronze statue of Pope Julius II. of 1556, and adjoining is the Palazzo Conestabile, which contained the Madonna of Raphael, sold to the Czar in 1871 for 350,000 francs. Among the churches are San Angelo (the 6th c.), San Severo, in the chapel of which Raphael painted his first fresco about 1505, San Francesco dei Conventuali (1230), San Domenico (1304), containing the famous monument of Benedict XI., San Pietro de Casinensi, a Basilica consisting of a nave, aisles, and transept, with a fine ceiling supported on eighteen columns of granite and marble (1000), and the Oratorio di San Bernardo, with a magnificent polychrome facade (1459-61). The university (1520) has a botanic garden, natural and art history collections, a museum of Etruscan and Roman antiquities, and a valuable picture gallery, consisting of works collected since 1863 from suppressed monasteries and churches, and containing many fine examples of the Umbrian school. P. is the seat of a bishop, and has a lyceum and gymnasium. It has silk, velvet, and woollen manufactures, and carries on a trade in corn, cattle, wool, oil, and wine. Pop. (1874) 16,708, with suburbs, 49,593.

P., the ancient *Perusia*, was one of the twelve Etruscan confederate cities. It fell under the power of Rome B.C. 310. Destroyed during the war between Octavianus and Antony (41), it was afterwards rebuilt under the name of *Augusta Perusia*. It suffered severely during the wars of the Guelphs and Ghibellines, but ultimately obtained the supremacy of Umbria. Obligated to surrender to the Pope in 1370, it was, during the latter part of the 14th c., frequently a papal residence. In 1800 it passed, with the rest of the papal territory except Rome, to the kingdom of Italy. See *La Storia di P.* by Luigi Bonazzi (vol. i. 1875).

Perugia, Lake of (the ancient *Lacus Trasimenus*, Ital. *Lago Trasimeno*), lies within the province of Umbria or Perugia in Central Italy. It is 30 miles in circumference and 8 miles at its greatest breadth, has a depth of 20 feet, and an area of 42 sq. miles. It has three small islands, Maggiore, Minore, and Polvese, and was in the 15th c. emptied into the Tiber by a drain (*missaria*). Ever since the time of Napoleon I., the project of draining it has been discussed. On its banks the Roman consul Flaminius was disastrously defeated, with a loss of 15,000 men, by Hannibal (B.C. 217). The Sanguinetto, a small stream flowing into the lake, preserves the memory of the fatal battle.

Perugino, so named from having been born (in 1446) near Perugia, but whose natal name was **Pietro Vanucci**, was a distinguished painter of the Roman school, and is further memorable as having been some time the instructor of Raphael. His works, and chiefly his 'Entombment' in the Pitti Palace, are characterised by graceful delicacy of attitude and motion, correct drawing and simple, pleasing expression—qualities which he is believed to have acquired during a temporary residence at Florence, by the study of the great works of Fra Giovanni. In design he is feeble, but in colour often brilliant and harmonious. He died at Castello di Fontignano near Perugia in 1524. P. was the master of the greatest school of Italian art. Raphael was among his pupils.

Peruko. See PERUVIA.

Peruvian Bark is a name given to the different species of *Cinchona* that furnish quinine. In 1850 Mr. Markham was deputed by the Secretary of State for India to visit Peru, and in spite of great difficulties was successful in collecting large quantities of the seeds and plants of some of the most valuable species, at the same time also organising a regular supply. In 1861 he selected the principal localities for plantations on the Nilgiris and other hills of the west side of the Indian peninsula. Through Mr. Spruce, Mr. Cross, and Mr. Pritchett, other species have been introduced, the cultivation has been much extended, and complete success has attended the important experiment. In the Darjeeling district alone, in 1869, over three millions of plants

were in the Government plantations. In British Sikkim during 1875-76 the cultivation has yielded a tangible result in a crop of 211,931 pounds of dry bark, and the estimated crop for 1876-77 is 366,000 pounds. The percentage of quinine proves very satisfactory, and the 'cinchona febrifuge' prepared by the official quinologist has been shown to answer as an efficient remedy in most cases of malarious fever.

Peruvian Gooseberry. See **PHYSALIS**.

Peruwels, a town of Belgium, province of Hainault, on the Verne, an upper stream of the Scheldt, near the French frontier, and 15 miles W. of Mons by rail. It has important linen industries. Pop. (1875) 7864.

Pesaro (the ancient *Pesarium*) capital of the central Italian province of Urbino, lies on the Foglia where it flows into the Adriatic. It is pleasantly situated, with wide streets, and surrounded by old walls. Among the buildings of the town the most remarkable is the ancient palace of the Dukes of Urbino. Several of the churches contain celebrated pictures, and in the market-place there is a marble statue of Pope Urban VIII. Rossini was born here, and a monument was erected to him in 1864. The principal products are fruit, silk, and wool. The figs of P. are reckoned the finest in Italy. Pop. (1871) 11,952.

Peschiera, a fortress and small town in the N. Italian province of Mantua, lies at the S.E. end of Lake Garda, on the right bank of the Mincio, where that river leaves the lake, and is a station on the Milan-Vienna railway. It is of great importance as a military position, not only on account of its strength, but from the fact that it forms the N.W. point of the great Italian 'Quadrilateral,' the other three fortresses being Verona, Legnano, and Mantua. P. belonged formerly to the republic of Venice, by which it was ceded to the Austrians in 1796. Shortly afterwards it fell into the hands of Napoleon, who strongly fortified it. The Austrian garrison capitulated here to the Piedmontese on the 31st May 1840. In 1866 P. was annexed, along with Mantua and the Venetian provinces, to the kingdom of Italy. Pop. 2000.

Peshawur (either 'the town of Porus,' or 'full of turbulence'), the chief town of the district and division of the same name in the Punjab, British India, the N.W. frontier station of the army, 14 miles E. of the Khyber Pass, 276 miles N.W. of Lahore and 1468 from Calcutta; pop. (1876) 58,430, of whom the great majority are Mohammedans. The cantonments, 1 mile W., contain an additional 24,676. In 1872 the military force consisted of 1500 Europeans, 3600 natives, 19 guns, and 1080 horses. From the earliest times P. has always been regarded as the key of Hindustan. It has been successively occupied by the Hindus, the Greeks, the Buddhists, the Mohammedans, and the Sikhs; but the population is mainly Afghan. In 1849 it was acquired by the British, with the rest of the Punjab. During the Mutiny of 1857, it was contemplated by Lord Lawrence to abandon P. to the Ameer of Afghanistan; but it was firmly held by Herbert Edwardes and General Cotton. They disarmed the sepoys; and subsequently, when a regiment rose, 660 men out of a total of 863 were killed within a space of thirty-six hours. Thus was the Punjab frontier saved; and in addition, 3000 irregular Pathans were raised for service in Hindustan. Since that date, three European officers have been killed in the district by Mohammedan fanatics. The chief buildings in P. are the fort, a quadrilateral structure of brick, which contains an important arsenal; and the Ghore Khetra, formerly a Hindu place of pilgrimage, but now a market-place. Most of the houses have underground rooms, used in the heat of summer. The transit trade is very considerable; the imports from Afghanistan being valued at 2,180,000 in 1872. The imports are silks, fruits, nuts, dyes, shawl wool, and wood; the exports, piece goods, indigo, and tea. The manufactures are *dhoris* or cotton scarves, a variety of leather articles, and cutlery. P. has a bad reputation for unhealthiness, fever and cholera being common; but the sanitation of the town has lately been much improved.—The *district* of P., which occupies the plain between the Khyber mountains and the river Indus, and is also watered by the Cabul and Swat rivers, has an area of 2407 sq. miles; pop. (1868) 523,152. The total military force in the district is nearly 10,000 men. Earthquakes are common; the annual rainfall is only 11 inches, but the soil is fertile where irrigated. The crops are wheat, barley, Indian-corn, and cotton.

Peshi'to is the name given to the old Syriac version of the Scriptures, which was the first version of the Old Testament made from the original Hebrew for the use of Christians. That it was made from the Hebrew appears from the fact that the original version did not include the Apocryphal books, although these were added at an early date. That it was made by Christians appears from the rendering of Messianic passages, and from its universal use in the Syriac Church. It received its name (Syr. 'simple') either owing to its freedom from allegorical, midrashic additions, or in order to distinguish it from the later version made from Origen's Hexapla (q. v.), in which Origen's critical remarks were retained. The exact age of the P. is unknown. Ephraem Syrus (q. v.), speaks of it in the 4th c. as 'our version,' as if it were then generally received, and even thinks it necessary to explain some terms and phrases, as if it were already antiquated. On the other hand, the New Testament part is believed to have been done at the same time as the Old Testament, so that the version must have been made after the formation of the New Testament canon, although it wants the second and third Epistles of John, the second of Peter, Jude, and the Apocalypse. It is thus believed to be not older than the end of the second or the beginning of the third c. The Old Testament P. was first printed in the Paris Polyglott (1645), edited by a Maronite (q. v.), Sionita. The best edition is that of the British and Foreign Bible Society (Ed. Lee, 1823). The New Testament was first printed at Vienna (1555), under the patronage of the Chancellor Widmanstadt. The best edition is Leusden and Schaaf's (Lugd. Bat. 2d ed. 1717).

Pest, or **Pesth**, properly **Buda-P.**, the capital of the kingdom of Hungary, is situated in a sandy plain on the left bank of the Danube, 171½ miles E.S.E. of Vienna by rail, and opposite Ofen or Buda (q. v.), with which it is connected by a suspension bridge (1849) 1246 feet long, and by two magnificent iron bridges for railway and passenger traffic, constructed at a cost of £500,000 and £200,000 respectively. P. comprises five different quarters, the inner or old town; N. of this the **Lipótváros** (Leopoldstadt) or new town, the finest part; E. the **Terézváros** (Theresienstadt) and **Jozsefváros** (Josephstadt); and S. the **Ferenérváros** (Franzstadt). It is well built, with 21 squares, and numerous palaces; and with the many fine erections of recent years, it may compete with Vienna in point of beauty. A row of handsome structures runs along the Danube for 2 miles. The chief buildings of P. are the **Nemzeti** ('national') **Museum** (1840), with a library of 180,000 vols., and collection of Hungarian antiquities; the new **Opera-house** (1873-78), the **Nemzeti Színház**—'national theatre'—(1840), with accommodation for 2100 spectators; the beautiful **Nép Színház** (Volks-theater), erected in 1876; and the new **Hungarian Academy of Sciences** (1860), 90 feet high, and covering an area of 34,308 sq. feet, with three façades in pure Renaissance style, 203, 104, and 109 feet long respectively. The Academy contains the celebrated **Esterházy Gallery** (transferred from Vienna in 1865), which consists of 800 pictures, 50,000 engravings, and 12,000 drawings. Noteworthy are also the **Művész-Csarnok** (Künstlerhaus) (1876), in pure Renaissance style; the **Redoute Buildings**, in Romanesque-Moorish style; the **Custom-House**; the **Barrack**; the **Ország-ház** (Landhaus, 1866), the meeting-place of the Diet; the **Ludoviceum** (1837); the **Invalid Hospital**; the **Város Templom** (Stadtpfarrkirche, 1726), the **Lipótváros Templom**, a Catholic church, the **Greek church**, and the **Synagogue** (1857), in Moorish style, the best in Hungary. The finest promenades are the 'Corso,' along the Danube; the extensive wood **Város Liget** (Stadt-waldchen), one of the most beautiful spots in Europe; the **Margita-Sziget** (Margarethen Insel), an islet in the Danube, 4 miles long, where is the famous Sulphur Bath, and where are held celebrated garden concerts. The **Margita-Sziget** is also the summer residence of hundreds of people. The **Király-haloni** (Kronungshügel), a mound of earth brought from different parts of the country and erected for the coronation of **Franz Joseph** as King of Hungary, has recently been levelled because it obstructed the traffic, but is to be erected elsewhere. P. has ten Catholic and five other churches, five monasteries, and a University (transferred from Tyrnau in 1780), which in the semester of 1877-78 had 127 teachers and 1175 students; four gymnasia (two Catholic), a commercial school with 15 teachers, a veterinary school, two 'Real' schools, and a military academy (established 1872) in the Ludoviceum. Through the Academy and the

Kisfaludy Society P. is the centre of Hungarian literature and science. It is (since 1848) the seat of the Hungarian Government and Diet (to which it sends five representatives), and of the supreme court ('Curia Regia'), and is the commercial capital of Hungary. The most important industries are the preparation of brandy and flour (180 mills), ironfounding (especially carriage-wheels), printing, lithographing, and the manufacture of silks, cloth, leather, hats, oil, tobacco, and gold and silver articles. There is large trade in corn, wine, 'Slibowitza' (brandy made from plums), cattle, wool, plums, hogs' lard, wax, wood, soda, potash, and Hunyady waters. P. has a chamber of commerce, two banks, four important weekly markets, and its four great fairs, annually visited by 30,000 persons, supply with necessary goods the half of Hungary. The Society of the 'Pester Lloyd' contributes greatly to promote trade and industry, and publishes (since 1854) a well-known journal of the same name. East of P. is the **Rákosmező**, now a race-course, where the Imperial Diets met from the 10th to the 14th c.: The pop. of P. is of the most heterogeneous character. Pop. (1870) 200,476 (136,892 Roman Catholics, 39,284 Jews, 11,876 of the Evangelical, and 10,470 of the Reformed Church). 100 years ago it was only 12,000. See **J. Hunfalvy's P. und Ofen** (Darmst. 1858); **Körofi's P. ar 1870 éven** (Pest, 1871); **Bericht über die Hauptmomente in der Verwaltung der königlichen Freistadt P. im Jahre 1871** (Pest, 1872).

Pestalozzi, Johann Heinrich, the celebrated Swiss teacher and philanthropist, was born at Zürich, 12th January 1746. From his sixth year he was brought up poorly by his widowed mother, and was looked on as a child in whom feeling and fancy were more developed than practical sense. An early visit to his grandfather, a village pastor, filled him with pity for the condition of the poor; at fifteen he became a member of a society to resist official tyranny, and at sixteen, strongly moved by Rousseau's *Emile* and his Gospel of Nature, he resolved to study theology and enter the Church. Ere long he forsook theology for law, but was forced by sickness to give up study, after which he married (1769) a Zürich merchant's daughter, and bought an estate near Habsburg, which he called **Neuhof**. Here he established an agricultural school for gratuitous instruction of neglected children, which soon included fifty scholars; but P. had no faculty for organisation, and in 1780 he became bankrupt. His *Abendstunden eines Einsiedlers*, which appeared the same year in Iselin's *Ephemeriden*, the first public statement of his system of education, was followed by the popular novel *Leinhardt und Gertrud* (4 vols. Basel, 1781), written under great distress in a few weeks. This book was highly successful, but *Christoph und Elise* (1782) was less favourably received. After the removal of the French from Unterwalden (1798) he obtained from his friend **Legrand**, one of the five directors of the Swiss Republic, a commission to collect in a monastery at Stanz the orphan children of the devastated canton. Here he had soon eighty children, but the return of the French in 1799 broke up the institution. P. then removed to **Burgdorf** in the canton of Bern, where, with **Krüsi** of Appenzell, he opened a superior school, whose method he described in *Wie Gertrud ihre Kinder lehrt* (1801). After a short co-operation at **München-Buchsee** with **Fellenberg**, he removed to **Yverdon** in the canton of Vaud, where he founded a large institution, which was soon attended by upwards of 200 pupils and teachers from all parts of Europe. Wholly wanting in administrative ability, P. was in practical affairs entirely dependent on his assistants, and gradually became involved in debt, which the sale by subscription of his *Sämmtliche Werke* (15 vols. Stuttg. and Tüb. 1819-20) barely sufficed to cover. In 1825 he retired to **Neuhof**, where he wrote his *Schwanengesang* (1826), and *Meine Lebensschicksale als Vorsteher meiner Erziehungsanstalten in Burgdorf und Iffert* (1826). He died at **Brugg**, Aargau, 17th February 1827. P.'s power lay in his personality, in the inspired love with which he roused his age to earnestness about popular education. This, he taught, should be based on actual life and its relations, theory and practice going hand and hand. The harmonious development of human nature was to him the end of all education. To P.'s conception of primary teaching the common schools of Europe owe some of their most humane and rational improvements. See **Biber**, *Beitrag zur Biographie Heinr. P.'s* (St. Gall, 1827); **Blockmann**, *Heinr. P., Züge aus dem Bilde seines Lebens und Wirkens* (Leips. 1846); **Schmidt**, *Geschichte der Pädagogik* (vol. iv., Köthen, 1862); **Morf**, *Zur Biographie P.'s* (2 vols. 1868-69).

Pestilence (Lat. *pestis*, 'plague') signifies, generally, any contagious or infectious disease that is epidemic and fatal, such as the Oriental plague, the sweating sickness, cholera, smallpox, gangrenous pneumonia, &c. In the Hebrew Scriptures several words are translated *P.* or *plague*; but the most erudite biblical critics are of opinion that no special disease is referred to, and that the designation merely refers to their epidemic and fatal character. Several of these pestilences are distinctly referred to special judgments inflicted by God; but, in some cases, the symptoms of the diseases, in so far as they are described, coincide with those observable in severe epidemics of *plague* and of *cholera*. The Latin term *pestis*, which corresponds with the Greek *loimos*, is also used to indicate certain endemic diseases which were attended with a periodic and widespread fatality.

Petal. See COROLLA.

Petard (Fr. from *péter*, 'to explode'), an engine of war for breaking open gates, destroying drawbridges, barricades, and other obstructions, invented late in the 16th c. It consisted of a metal hat-shaped case filled with gunpowder and fixed to a heavy plank which was placed close to the obstruction to be removed. The explosion of the charge was effected by means of a slow match. Gun-cotton enclosed in a bag or box and exploded by means of a detonating fuze has proved an efficient substitute for the old form of *P.*

Petaurist, a name given to various species of Marsupial mammals, and, among others, to the opossum mouse (*Acrobates pygmaeus*), a creature attaining to the size of a common mouse, and which, like the other members of the family *Phalangistida* or Phalangiers (q. v.), is marked by an expansion of the skin of the sides of the body, serving as a kind of parachute, and enabling the animal to take flying leaps from tree to tree. The *P.* is brown above and white beneath. The Taguan (*Petaurista Taguanoides*), another animal belonging to this family, and also known distinctively by the name of *P.*, inhabits New Holland. This animal is blackish-brown on the upper parts and white below.

Petaurus, a genus of *Marsupial* mammalia belonging to the family *Phalangistida* or that of the Phalangiers (q. v.), and including a species known as 'flying phalangiers.' The great flying phalanger or Heppona Roo (*P. Australis*) of New Holland is a familiar species. It is about 3 feet in length. Its colour is a greyish-brown above and white below. Its tail is as long as the body. The squirrel *P.* (*P. sciureus*) of Norfolk Island is another species. Its length is about 16 inches, and its fur is of a brown colour tinted with grey. The tail is long and bushy, and the wing-membrane is well developed. The aerial *P.* (*P. Ariel*) is the size of a small rat, and exceedingly graceful in its leaping.

Petchora, or **Petchiu'ra**, a river of N. Russia, rises in the Ural Mountains, at a height of 3201 feet, flows first N. with a winding course through the governments of Perm, Vologda, and Archangel, then, after a wide sweep to the S.W., again N. to the Arctic Ocean, which it enters by a great estuary. The *P.* is about 1380 miles long, and is navigable for two-thirds of its course. Its chief tributaries from the right are the Ilytch and Ussa, and from the left the Ishma and the Zylma (with the tributary Pishma). Its basin is wild and uncultivated, and in part covered by dense larch forests.

Petech'iae, in medicine, are spots of a dusky crimson or purple colour, resembling flea bites, which appear on the skin in certain diseases. They appear to be dependent on a lowered vitality of the system which in some way affects the blood, breaking up the red corpuscles and allowing their contents to transude into the tissues. *P.* are symptoms of several very serious diseases, as purpura, scurvy, typhus, plague, &c., and occasionally appear in very severe cases of small-pox, measles, and scarlet fever. They are sometimes called *stigmata*, *vibices*, and *ecchymoses*.

Peter, one of the twelve apostles, and the son of Jona, a fisherman of Capernaum, was brought by his brother Andrew to Jesus (John i. 40-42), who gave him the name of Cephas (Aram. *cepha*, Heb. *ceph*, 'a rock'), which surname, in its Greek equivalent (Gr. *petros*, 'rock'), superseded his original name of Simon. His after life is divided into two periods by the crucifixion of Christ. In the former period he exhibited much rashness in forming opinions and forwardness in avowing them, great boldness on the impulse of the moment, which,

however, dwindled into cowardice when the danger was better realised, and a great deal of fickleness combined with an ardent attachment to his Master and undoubted zeal (cf. Mat. xiv. 28-31, xvi. 22-23, xxvi. 33-35, 69-75, Mark viii. 29, John xiii. 6-10). After the crucifixion and his own fall *P.* appears a changed man. His former impulsiveness, rashness, and forwardness are replaced by dignity, firmness, sagacity, and prudence; and his attachment to his Master and his cause is exhibited less in word than in deed. Like James and John, *P.* enjoyed a peculiar intimacy with Jesus (cf. Mark v. 37, ix. 2, xiv. 33). There can be no doubt also that he held the first place among the apostles during the lifetime of their Master, as well as afterwards. Roman writers have always magnified this pre-eminence of one who, they assert, was the first bishop of Rome, in seeking to establish the supremacy of the see of Rome over the rest of the Church; and Protestant writers, in their opposition to Papacy, have as unfairly denied to him the pre-eminence which he did possess till he disappears from sacred history after the council of Acts xv. Of his after life nothing is known for certain. Inferences from the Petrine Epistles have been repeated by uncritical writers as history. Thus he is said to have laboured in Asia Minor, to have visited Babylon and Corinth, and to have suffered martyrdom (crucifixion head downwards) at Rome. Eusebius repeats the assertion of the Clementine Homilies that he came to Rome in the year 42, and that he was superintendent of the church there for twenty (otherwise twenty-five) years; and Jerome makes him bishop for the same time. The whole story is mere tradition, and the legend of *P.*'s crucifixion is obviously coloured by a desire to illustrate 'the ruling passion strong in death;' but there is considerable difficulty in believing that *P.*, the foremost Christian of his time in position and authority, could have disappeared from the world without leaving any trace or memorial of himself.

Peter, Epistles General of, are two in number. They stand on a very different footing. The authenticity of the *First Epistle* is attested by external evidence both ancient and weighty, and it is among the books which were admitted into the canon from the first. The internal evidence that *P.* was the author has been much controverted. Some have endeavoured to show that the writer was acquainted with and made a certain use of Pauline ideas, phraseology, and doctrine, as well as those of the Epistles of James and John. Accordingly, while the Petrine authorship is maintained by many critics, the theory held by others is that the writer was an *eclectic*, 'who wished to present the practical side of Paulinism, and whose free elaboration of existing ideas and writings resulted in a peculiar letter.' As to the time when the Epistle was written critics are greatly divided; it has been fixed at almost any time between 46 A.D. and the beginning of the 2d c. The Epistle itself professes to have been written from Babylon, but this is probably to be understood mystically as Rome. The *Second Epistle* is in a different position from the first, both as regards external and internal evidence for the Petrine authorship. It was not received into the canon till the Council of Hippo (393), and the controversy regarding its authenticity has been revived in modern times. It is asserted that the writer made use of the Epistle of Jude (cf. ii. iii. with Jude), partly copying and partly imitating; that there is a manifest anxiety on the part of the writer to make himself known as the Apostle Peter (cf. i. 1, 13-18, iii. 1, 15), although once, in using the words of Jude (17) he unconsciously lays aside his assumed character (iii. 2); that there are several indications of a post-apostolic origin (e.g., the title 'Scriptures,' iii. 16, the doubts about the second coming of Christ, iii. 4, 10-12, the use of *heresy* already applied to doctrine, ii. 1); and that the difference in diction and style between the two Epistles is so great as to imply different authors. On these grounds many critics abandon the Petrine authorship, although there are not wanting able scholars who maintain it. There are no clear indications in itself when it was written. If written by *P.*, it must have been before 64 A.D.; but some critics place it as late as 170 A.D.

Peter I, Alexie'vitch, Emperor of all the Russias and founder of the greatness of Russia, commonly called **Peter the Great**, son of the Czar Alexei Michailovitch by his second marriage, with Natalia Narishkin, was born at Kolomanskoe-Selo, a village near Moscow, 30th May 1672. By right he should have succeeded his elder half-brother, Feodor III., in 1682, but he was forced to yield to the ambitious

intrigues of his half-sister Sophia, who, aided by a revolt of the Strelitzes which she had excited, divided the government, under her own guardianship, between P. and his weak-minded half-brother Ivan. Sophia ruled with her favourite Wassilij Galizyn as first minister, while P. received his education from a Genevese named Lefort, who inspired him with a love of the art of war and of Western civilisation, and quietly contributed to develop a manly, reforming spirit, though suffering him to run into gross sensual excesses. In 1689 P. married a noble Russian lady, Eudoxia Feodorovna Lapuchin. Sophia, perceiving his great faculties, and fearing she would soon become superfluous, resolved, with the aid of the Strelitzes, to rid herself of P.; but her plot failed, and she was forced to enter a cloister. P. now (1689) became sole ruler, as Ivan contented himself with the imperial title. All his energies were now bent to introduce Russia, hitherto little differing from an Asiatic state, among the Great Powers of Europe, and bring its half-barbarous people under the influence of European civilisation. With the aid of Lefort and a Scotchman named Gordon, he formed an army on the European system, invited skilled workmen from abroad, and laid the foundation of a fleet. After a war with Turkey (1696) in which he subdued Azov (formally yielded to him at the Peace of Carlovicz in 1699), and the suppression of a new conspiracy against his life by the Strelitzes and certain Russian nobles in 1697, P. undertook in April of the latter year a journey to Germany, Holland (where, as a common workman at Zaardam, he learned ship-building), and England, but was suddenly recalled from the latter country to suppress another insurrection of the Strelitzes. On his return he found they had been already quelled by Gordon; but he used the opportunity to extirpate this turbulent corps, putting them to death *en masse*. His wife, whom he perhaps unjustly believed to be privy to the conspiracy, was divorced and driven to a cloister. From 1700 to 1721 P. was an active member of the combination against Karl XII. (q. v.) of Sweden, and prosecuted with great patience his favourite plan of forming a great Russian harbour on the Baltic, as through the Turkish war he had gained access to the Black Sea. At Narva, in 1700, he felt the superiority of the Swedes in the art of war, but he prudently availed himself of Karl's absence with his army in Poland to overrun the Swedish provinces on the Baltic, and founded (1703) the new capital, St. Petersburg. His victory over Karl at Pultava (q. v.) in 1709 was his crowning success. During the Swedish war P. became acquainted with Catharine (see CATHARINE I.), whom he married privately (1707), and afterwards publicly (1712), she, in a second war with Turkey, having delivered him from great distress—surrounded at the river Pruth in an incursion into Moldavia—by bribing the Grand Vizier, so that P. escaped from the utmost danger with the loss of Azov (1711). At the peace of Nystad in 1721 P. obtained from Sweden the provinces of Ingermanland, Esthonia, Livonia, and Viborg in Finland. In the same year he took the title of 'Emperor of all the Russias,' offered him by the Senate, a body which P. had created to check the power of the Bojars. He had already (1720), in order to curb the clergy, who kept the common people in ignorance, abolished the patriarchal dignity, and established the 'Holy Administrative Synod,' of which he himself was the head. In 1722 he decreed that the appointment of his successor should henceforth rest with the emperor himself, a step occasioned by his unfriendly relations with Alexei, his son by his first marriage, to whom many that were dissatisfied with P.'s thoroughgoing reforms attached themselves. After a bloody war (1722-23) P. tore from Persia the provinces of Ghilan, Mazanderan, and Astrabad, with the towns Derbent and Baku. His reforms extended to all departments of the state; he liberally supported manufactures and mining, promoted trade by making harbours and canals, and founded several higher schools, the Academy of Sciences at St. Petersburg, &c. But general diffusion of intelligence was hindered by serfdom, for P. did nothing directly for the peasant class, and even the culture of the higher ranks of the people was of a merely external kind. The French fashions and ceremonies of the court were constantly broken through by the natural rudeness consequent on P.'s education and surroundings. He had a powerful helper in the government in Menchikoff (q. v.). A painful strangury, chiefly due to his immoderate use of brandy, with a severe chill caught by leaping into the water in the midst of winter to help a stranded ship, caused his death (8th February

1725), in his fifty-third year. The mighty task which P. set himself was to substitute for the miserably incongruous administration of the old Muscovite Czars a symmetrical bureaucratic machine, modelled on the newest principles of political science. For this work he had no technical knowledge, no requisite material, no suitable foundation; nothing but his own unconquerable genius and Titanic energy. His attempts at construction were little more than a series of failures; and in the midst of his labours he was snatched away suddenly, bequeathing the great task to his successors. A supreme autocrat by position and nature, he was regardless of the claims of noble birth and long pedigree, and threw open the service of the state to men of all ranks. Many of his chief coadjutors were not even of Russian family. 'Count Yaguzhinski, long one of the foremost officers in the state, was the son of a poor sacristan; Count Devier was a Portuguese by birth and had been a cabin-boy; Baron Shafirof was a Jew; Hannibal, who died with the rank of Commander-in-Chief, was a negro who had been bought in Constantinople; and his Serene Highness Prince Menchikoff began life, it was said, as a baker's apprentice.' The dignified orthodox Muscovites were scandalised by P.'s wanton outrage of all the traditional conceptions of propriety and etiquette, and some of them suspected that he was not the Czar at all, but Antichrist in disguise. But P. served the state with unflagging zeal—as a common artisan when he thought it necessary—and he insisted on all his subjects doing likewise, under pain of merciless punishment. And if he was arbitrary and oppressive, he freely exposed himself to danger and drudgery. By his first marriage P. was the father of the Alexei mentioned above, and by his second of a daughter Anna (married to Duke Karl Friedrich of Holstein-Gottorp, from whom is descended the present imperial family), and the Empress Elizabeth. On the centenary of his accession a colossal equestrian statue of P. by Falconet was uncovered at St. Petersburg. It is placed on a large block of granite, with the inscription, 'Petro Primo Catherina Secunda MDCCCLXXIII.' See Hale, *Biographie P.'s des Gr.* (Münst. and Leips. 1803-5); Bergmann, *P. der Gr. als Mensch und Regent* (Riga and Mittau, 6 vols. 1823-30); Ségur, *Histoire de Russie et de Pierre-le-Grand* (Par. 2d ed. 1829); Ustralov, *Istoria Zaritsovania Petra Velikavo* (St. Peters. 6 vols. 1855-63), as also the Biographies by Gordon, Voltaire, &c. *The Diary of P. the Great till the Peace of Nystad* is very important, and Mackenzie Wallace's *Russia* (1877) contains a good account of his life work.—**P. II.**, Alexievitch, Emperor of all the Russias, 1727-30, son of Peter the Great's son Alexei and Charlotte Christine Sophie of Brunswick, born 23d October 1715, ascended the throne with the aid of Menchikoff, and was ruled first by him, and after his banishment by Ivan Dolgorouki. His short reign was uneventful. He was about to marry Dolgorouki's sister, when he was cut off by small-pox (9th February 1703).—**P. III.**, Feodorovitch, Emperor of all the Russias, son of Duke Karl Friedrich of Holstein-Gottorp and Anna, daughter of Peter the Great, called properly Karl P. Ulrich, was born at Kiel, 21st February 1728. He became Duke of Holstein-Gottorp on his father's death in 1739. After his aunt Elizabeth (18th November 1742) appointed him Grand Duke and her successor, P. joined the Greek Church, and married (1st September 1745) his second cousin, Sophie Auguste Frederika of Anhalt-Zerbst, the afterwards so famous Catharine II. He ascended the throne on Elizabeth's death (5th January 1762), and soon became hated through unpopular undertakings abroad (his connection during the Seven Years' War with Friedrich II. of Prussia, for whom he had a great admiration, and his preparation for war with Denmark to regain the Gottorp part of Holstein), and his arbitrary and uncalled-for changes at home. He relaxed the system of P. the Great, and conferred various privileges on the noblesse, abolishing the principle of obligatory service in their favour in 1762. His conduct to his consort was heartless, and with his Holstein officers he gave himself up to debauchery and excess. A conspiracy was formed against him, and after a reign of half a year he was in the night of the 8-9th July deposed and imprisoned, and on the 17th was murdered at the Castle of Ropsha, near St. Petersburg. The partial abolition of obligatory service had naturally revived among the peasants the hope of emancipation from serfage, and they clung to the belief that the Czar had escaped the conspirators and was in hiding. A Cossack pretender, called Pugatchef, appeared on the Don, and began a bloody campaign with the idea of found-

ing a peasant empire (*muzhitskoe tsarsto*), but he had neither tact nor energy enough to realise such a scheme. After a series of defeats he was taken prisoner, and the revolt was quelled. See Lavaux, *Histoire de Pierre III.* (Par. 3 vols. 1799).

Peterborough, a city and episcopal see of England, in Northamptonshire, on the N. bank of the Nene, and on the border of the fens, 76½ miles N.N.W. of London by the Great Northern Railway. Its great architectural feature is the cathedral, a regular cruciform building of Norman and Early English character, with a remarkably beautiful W. front, formed by three deeply recessed arches, supported by triangular piers faced with clustered shafts, and surmounted by a lofty and richly-sculptured pediment and cross. This noble structure was mainly erected 1117-1237, but is in part of much later date, the E. aisle, which is in Perpendicular style, not being completed till 1528. At each end of the W. front is a lofty turret 156 feet high, flanked at the angles by shafts, and crowned with spires. The central tower or lantern is 150 feet high. The wooden inner roof of the nave and great transepts is decorated with paintings of kings, bishops, and grotesques. Having an extreme length of 476 feet, the cathedral is 203 broad at the great transepts; the nave and aisles are 78 feet broad, and the height of the inner roof 78 feet. At the W. end there is a range of interesting monastic buildings. The cathedral contains the tomb of Catharine of Aragon; but the remains of Mary Queen of Scots were removed hence to Westminster Abbey in 1612. Other buildings are St. Mary's Church, in First Pointed style (1861), a training college for the dioceses of P. and Lincoln (1866), and a corn exchange in Italian style. P. has large steam flour-mills and railway works, while there is an increasing trade in grain, coal, timber, lime, bricks, &c. Besides the Great Northern Railway, the North-Western, Eastern Counties, and Midland lines contribute to the traffic of P., which is also accessible to small vessels by the Nene. Two very important fairs are held here on the 10th July and 2d October respectively. P. sends two members to Parliament, and publishes two weekly newspapers. Pop. (1871) 17,434. A Benedictine abbey was founded here in the second half of the 7th c. by the Mercian king Peada, son of Penda, and his brother and successor, Wulfere. It was originally called *Medeshamstede* ('the meadow homestead'), and the circumstances relating to its erection, consecration, and endowment, are recorded at unusual length in the *Chronicle*. In 870 this abbey, along with those of Crowland and Ely, was destroyed by the Danes, only to be restored on a grander scale in 966-971. The town was sometimes called *Gildenburgh*, because a part of the minster roofs had been gilded by Abbot Leofric; but as the great church was dedicated to St. Peter, it finally took and retained the name of P. At the dissolution of religious houses (1537), P. Abbey, among the most magnificent then existing, was selected as the seat of one of the new bishops, and the buildings were preserved entire. During the Civil War the Parliamentary forces defaced the monuments in the cathedral, destroyed part of the cloisters, the chapter-house, and the episcopal palace. See *History, Topography, &c., of Northamptonshire*, by Francis Whellan & Co. (2d ed. 1874).

Peterborough, Earl of. See MORDAUNT, CHARLES.

Peterhead, a seaport of Aberdeenshire, and the most easterly town in Scotland, is built on a rocky peninsula 3 miles N. of Buchanness Lighthouse, 44 miles N.N.E. of Aberdeen by rail. Part of the town called Keith Inch is an island, separated from the rest of the town by a canal between the S. and N. harbour, over which there is a drawbridge. On this island there formerly stood a castle of the Keith family. Earl Marishall created P. a burgh of barony in 1593. The lands were forfeited in 1715, and in 1728 were purchased by the Merchant Maiden Hospital, (one of the Edinburgh Merchant Company corporations) for £3420, the annual rental being £245. The rental of this and some subsequent purchases is now (1878) over £5000 per annum; but this return is the result of large expenditure and liberal improvements by the governors of the Merchant Maiden Hospital, who are still the superiors of the town and proprietors of the estate. The valuation of the burgh for 1877 was £29,718. In front of the townhouse stands a bronze statue of the celebrated Field-Marshal Keith of the Prussian service. The statue was the gift of the present Emperor of Germany; the pedestal was subscribed for by the inhabitants. During the last few years a number of important buildings have been

erected, a music hall, courthouse, several new churches, &c. A pretty cemetery of about 3½ acres has been made by the Merchant Maiden Hospital. It was formally opened on 15th July 1869, and the governors have expended about £3000 upon it. All the buildings in P. are constructed of the well-known red granite for which P. is famous. Granite quarrying affords work for many hundreds of men; there are two polishing works, at which many public monuments for all parts of the world have been executed. The N. and S. harbours are connected by a canal, which enables vessels to leave in different winds. A new or third harbour, with a new concrete pier, called Port Henry harbour, was completed in 1878, and arrangements are being carried out for deepening the S. harbour, which will then enable vessels to enter at all states of the tide. P. has long been the chief seat of the Greenland and herring fisheries. Between 700 and 800 boats usually fish, but when the harbour improvements are completed there will be accommodation for a much larger number. There are several shipbuilding yards, at which in 1876 four vessels of 838 tons were built. The present tonnage of the port is about 7000 tons. In 1876 there cleared 798 vessels of 65,834 tons, and entered 800 of 63,717 tons. There is a large export trade in granite, grain, fish, &c. Pop. (1871) 8535; (1878) over 10,000. Along with Elgin, Kintore, Cullen, Banff, and Inverurie it sends one member to Parliament; it is also the returning burgh for East Aberdeenshire. In the vicinity are the interesting ruins of Ravenscraig and Inverurie, and the far-famed Bullers of Buchan. The river Ugie falls into the sea about 2 miles N. of P., and affords excellent rod-fishing for several miles up the river.

Peterloo Massacre, a name given to the dispersal by an armed force of a large popular gathering which met at St. Peter's Field, Manchester, for the purpose of promoting parliamentary reform. Six persons were killed and several others wounded. See Miss Martineau's *History of the Thirty Years' Peace*.

Petermann, August, a celebrated geographical writer and cartographer, was born at Bleicherode, near Erfurt, April 18, 1822, and educated first at Nordhausen, and after 1839 at the geographical school founded by Berghaus at Potsdam. After working for Berghaus, he went to Edinburgh in 1845, and was there employed on Keith Johnson's physical atlas. In 1847 he removed to London, and became known as a contributor to the *Athenæum* and *Encyclopædia Britannica* on such subjects as the Franklin search, the travels of Barth, Overweg, Vogel, &c. He was appointed first editor of the *Mittheilungen aus Justus Lertzes Geographischer Anstalt* in 1854, and has since rendered that periodical famous throughout the world for scientific method and thoroughness, as well as for freshness and range of information. Many of its maps are from his own hand, and on the subject especially of Arctic exploration he has contributed many valuable articles (see also *Macmillan* for January 1877). Of his colleagues, the best known are Ernst Behm, and Hermann Wagner (now a professor at Königsberg). Among P.'s finer maps are those of Australia (9 sheets) and the United States (6 sheets), many in Stieler's *Hand Atlas* (new ed. 1874), and one of the Eastern States of the American Union in the *Mittheilungen* (Part xi., 1877).

Peter's St., Church, at Rome, stands on the site of a five-aisled basilica, erected by Constantine and Helena (306) over the grave of St. Peter and near the scene of his martyrdom. This older structure, in which Karl the Great was crowned by Leo III. (800), had become so dilapidated that in 1450 Nicholas V. began to build a new tribune from the design of Rossellini. The work languished for fifty years after Nicholas's death, till Julius II. committed its execution to Bramante, and laid a new foundation-stone, April 18, 1506. Bramante was succeeded by Raffael, Peruzzi, Michael Angelo (1546-64), Vignola, and Giacomo della Porta, and the new church was consecrated by Urban VIII., November 18, 1626. At the close of the 17th c. £10,000,000 had been expended on St. P., and the new sacristy added by Pius VI. (1775-99) cost £180,000 more. The present expense of maintenance is about £7500 a year. Built in the form of a Latin cross, St. P. is the largest and grandest of all the churches of Christendom. It covers an area of 26,163 sq. yards, the total length of its interior being 205 yards, of the transept 150 yards; whilst the nave is 150, and the Dome (q. v.) 435 feet in height. The façade is 123 yards long and

165 feet high. Within, the church contains 30 altars and 148 columns, and is adorned by countless statues, mosaics, and other decorations. Among the most striking objects are Bernini's bronze baldachins, 95 feet high, surmounting the High Altar; the bronze statue of St. Peter, a work of the 5th c.; a 'Pieta' by Michael Angelo; and the monument to Pius VI. by Canova, to Pius VII. by Thorwaldsen, and to Pius VIII. by Tenerani. See Fergusson's *History of Ancient and Modern Architecture* (4 vols. Lond. 1875), and *St. Peter's and St. Paul's* by E. Oldfield (Lond. 1877).

Peters, Hugh, the regicide, born at Fowey, Cornwall, in 1559, entered Trinity College, Cambridge, and graduated M.A. (1622). He first went on the stage, then taking orders, held the lectureship of St. Sepulchre's, London, till an intrigue with a married woman forced him to fly to Rotterdam, whence in 1634 he sailed for America. He was pastor for five years at Salem, returned to England in 1641, became Cromwell's chaplain, and took an active part in the trial and condemnation of Charles I. Kennet even maintains that he was one of the masked executioners. At the Restoration P. was exempted from the Act of Indemnity, and hanged with nine others, October 16, 1660. He was author of *Lectiones in Psalmos* (1647), and *Last Legacy to an Only Child* (1660). See Samuel Peters' *History of the Rev. H. P.* (New York, 1807).

Petersburg, a city and port of entry in Virginia, U.S., on the S. bank of the Appomatox River, 12 miles from its mouth, and 23 S. of Richmond by rail. It has twenty-four churches, a public park called Poplar Lawn, a theatre, four newspapers, and manufactures of tobacco, cotton goods, and iron and wood wares. In 1875 it exported 3,266,804 lbs. of tobacco, 36 per cent. of the whole freight export of that article from the United States; the revenue paid on the tobacco manufactured in the city was \$812,345. The exports also included 26,240 barrels of flour, 39,648 bales of cotton, and 108,000 bushels of peanuts. Pop. (1870) 18,950. Its heroic defence by General Lee against the Army of the Potomac under Grant, the last great event in the Civil War, procured for it the title of 'the last city of the Confederacy.' The actual siege extended from 19th June 1864 to 3d April 1865. 'The bloody battle of the crater' (30th July) was only one of a series of attempts to take the city by storm. Six days after evacuating, Lee surrendered at Appomatox, and thus ended the war.

Petersburg, St. See ST. PETERSBURG.

Peter's College, St., Cambridge, commonly known as Peterhouse, is the oldest of the Cambridge colleges, having been founded by Hugh de Balsham, Bishop of Ely, in 1257. It is governed by a master, and has fourteen fellowships and twenty-one scholarships, viz., four of £80, nine of £60, one of £50, four of £40, and three of £30, all of them tenable till their holders are of standing to take their B.A. The fellowships, three of which are clerical, are tenable for life by unmarried, and for twelve years by married fellows. St. P.'s C. presents to ten livings, and in 1877 had 156 members of the senate, 37 undergraduates, and 228 members on the boards.

Peter's Pence. When Christianity was introduced into England from Rome, the English began to make pilgrimages to that city, and sent their sons thither to be educated. For the support of these pilgrims and the education of the clergy, Offa, the great Mercian king (758-796), imposed on his subjects a tax of a silver penny, payable by every family possessing land or cattle of the yearly value of thirty pence, which was called St. Peter's penny; the Pope being identified with St. Peter, who was understood, rightly or wrongly, to have been the first Bishop of Rome (see ST. PETER). At a later period this tax took the form of an annual tribute to the Pope, which in the time of King John amounted to £199, 8s.; and which was paid by other countries as well as England. The refusal on the part of the southern countries of Europe to continue the payment of P. P. was one of the first overt symptoms of that dissatisfaction with Rome which began to be expressed in the 15th c., and culminated in the Reformation. In England Edward III. first refused to pay the tribute, which was finally discontinued under Henry VIII. In modern times, especially since the Pope was deprived of his temporalities, P. P. has been to a certain extent revived under the form of voluntary contributions from the faithful.

Petersfield, a town of Hampshire, 18 miles E. by S. of Winchester, and a station on the South-Western Railway. It is clean, well paved and lighted, and has two banks, a literary institute, corn exchange (erected 1866), and an educational institution called Churcher's College, founded 1722, with an income of £600, for the education and maintenance of fourteen boys. The church, which is Norman, has a square tower with six bells, and dates from the 12th c. P. returns a member to Parliament. Pop. (1871) 6104.

Peter the Hermit, born at Amiens about 1050, served under the Comte de Boulogne in the Flemish war (1071), and afterwards married, but his wife dying, he retired to a monastery, and thence to a hermitage. In 1093 he made a pilgrimage to the Holy Land, where his zeal was kindled by the sight of the Holy Sepulchre in the hands of infidels and of their cruelty to Christian pilgrims. Furnished by the Patriarch Simeon with credentials to Pope Urban II. and the princes of Christendom, P. traversed a great part of Europe preaching the first Crusade in churches, highways, and market-places. At the Council of Clermont (1095) his wild harangue drew from the assembled multitude the cry of 'God wills it.' Early in 1096 the second popular expedition, headed by P. himself, followed in the wake of Walter the Penniless, fighting its way through Hungary and Bulgaria to Constantinople, where the Greeks gladly furnished the means of transport across the Bosphorus. On the plain of Nicæa, Christians and Mussulmans alike barred the further advance of the undisciplined rabble, and P. led back to Constantinople 3000 out of 60,000 followers. With this remnant he joined the army of Godfrey de Bouillon, and shared in the victorious march on Antioch. There, in 1097, some of the Crusaders resolved to return home, P. among the number, but Tancred withheld him, reproaching him with abandoning the enterprise he had himself originated. Accordingly P. took part in the capture of Jerusalem (1099), and was chosen by Arnould, the new patriarch, for his vicar-general. When he returned to Europe is not known, but he died in the Abbey of Neu-Montier, which he had founded at Huy in Belgium, on 7th July 1115. See CRUSADES; Schachert's *Peter von Amiens* (Berl. 1819); and H. Prat's *Pierre l'Ermitte et la Première Croisade* (Par. 1840).

Peterwardein, one of the strongest fortresses of Austria, in the Servian-Banatic frontier, on a peninsula formed by the Danube, and on its right bank, 42 miles N.W. of Belgrade. It is connected by a fortified bridge of boats with the Hungarian town of Neusatz, on the opposite side of the Danube, which is here 700 feet wide, and 50 to 60 feet deep. On a rock, of which three sides are isolated, stand the upper fortress and hornwork, and at its base the lower, including the town, which consists of one main street, and two parallel with it. The principal buildings are the arsenal, with many Turkish trophies, the commandant's residence, and the Catholic church. The fortress is capable of containing 10,000 men. Pop. of the town (1869), 5497. P. is said to have derived its name from Peter the Hermit's having marshalled here the armies for the first crusade. It was the scene of Prince Eugene's victory over the Turks, 5th August 1716.

Peth'erick, John, an African traveller, of English parentage, was born in 1820, entered the service of Mehemet Ali as a mining engineer in 1845, and became a merchant in 1849 at Khartoum, where he was made British consul. He subsequently made two journeys (1857-58 and 1861-63) in the basin of the Upper Nile and the Bahr-el-Ghasal, its great western tributary. He published *Egypt, the Soudan, and Central Africa* in 1861, and has since sent home much valuable geographical intelligence. Schweinfurth says P. was 'the first to open mercantile transactions with the tribes of those remote regions.'—**Catherine P.**, the wife and the faithful companion of the traveller on his last journey, died at St. Goran, Cornwall, in 1877.

Pétiolo. See LEAVES.

Pétion de Villeneuve, Jérôme, was born at Chartres in 1753, and first comes into notice as an advocate, who was returned for his native town to the States General of 1789. Having a turn for diffuse speeches, he bored his way into notice and even obtained a considerable hold upon public opinion, his advocacy being associated with the most extreme form of republicanism. With Mirabeau he frequently debated, outstripping him in hatred of monarchy and in vehemence for the rights of men. P. was one of the most unbridled speakers against Marie

Antoinette, and a conspicuous Jacobite. At the end of 1790 he was elected parliamentary president. Withal he earned among his friends the title *P. le Vertueux*. He was appointed (June 1791) president of the criminal tribunal of Paris, and was one of the deputies who brought back the king from Varennes, a task which he accomplished with singular brutality. On the 30th September he received the honours of a triumph at the end of the sittings of the Assembly, and on the 14th of the following November he was elected Mayor of Paris, the court assenting in order to frustrate Lafayette. His administration lasted a year, and was marked by every incitement to revolution. After the opening of the Convention P. joined the Girondists, and being impeached by Robespierre, was prosecuted and imprisoned. He escaped (1794), fled towards Bordeaux, and in the month of June was found dead, half eaten by wolves, in the neighbourhood of St. Emilion. The year before his death appeared the *Œuvres de P.*, containing his speeches and some small political works. See Regnault-Warin's *Vie de P.* (Bar-le-Duc, 1796), and the histories of Thiers, Louis Blanc, Michelet, and Lamartine.

Petition. The right of the English subject to petition the Crown or either House of Parliament appears to have been held from very early times a radical principle of the political constitution; but in the struggle during the 17th c. between the Crown and Commons, indirect endeavours to check the practice were made on both sides. Thus the first Parliament after the Restoration, remembering those tumultuous assemblages which had overawed their predecessors in 1641, passed a law against disorderly petitions. It provided that no P. should be presented for alteration of any law affecting the Church or the State without the order of three justices of the county, or that of the majority of the grand jury. A scheme for compelling the Crown, in the reign of Charles II., to assemble Parliament, by pouring in petitions from all parts of the kingdom, was thwarted by that monarch in an artfully drawn up proclamation (see *London Gazette*, 12th October 1679), in which, without controverting the principle of right, he shows his dislike to the practice, and encourages magistrates to suppress it. Since the Revolution of 1688, however, there has been no attempt to interfere with the subject's right of P. It must, however, be exercised with decorum, and respectfully. The P. requires to be endorsed and presented either by a member of the House to which it is addressed, or by an important municipal corporation. Petitions to the House of Commons are usually referred to a committee, who report regarding them. There are some cases in which a P. will be considered by the House of Commons only on the recommendation of the Crown. These arise chiefly when the P. regards public revenue. In earlier times, petitions were chiefly addressed to the House of Lords, and were more usually for the redress of private than of public wrongs.

Petition of Right, a statute so called from its being drawn in the form of an Act of Parliament, was prepared in the famous meeting of the House of Commons in 1628. It was based upon four grievances—the exaction of money under the name of loans, the commitment of those who refused compliance, billeting of soldiers upon private persons, and commissions to try military offences by martial law. The statutes which had established the liberty of the subject were recited in it, and their most recent violations enumerated, after which occurred the prayer, 'That no man hereafter be compelled to make or yield any gift, loan, benevolence, tax, or such like charge, without common consent by Act of Parliament, and that none be called to answer or take such oath, or to give attendance, or be confined or otherwise molested or disquieted concerning the same, or for refusal thereof; and that no freeman in any such manner as is before-mentioned be imprisoned or detained; and that your majesty will be pleased to remove the said soldiers and mariners, and that your people may not be so burthened in time to come; and that the aforesaid commissions for proceeding by martial law may be revoked and annulled; and that hereafter no commission of the like nature may issue forth to any person or persons whatever to be executed as aforesaid, lest by colour of them any of your majesty's subjects be destroyed or put to death contrary to the laws and franchises of the land.' It was conceded 26th June 1628. See Hallam's *Constitutional History of England*.

Peti'tio Princip'ii (Lat. 'a begging of the principle' or point in dispute), is the name given in logic to an extremely

common kind of faulty reasoning, in which the conclusion to be drawn is assumed in the premises of the syllogism.

Petőfi, Sándor (Alexander), a celebrated Magyar poet, was born of poor parents at Kiskörös, Cumania, Hungary, 31st December 1822. His youth was spent first as a common soldier, then as a strolling player. In 1843 he first attracted public attention through some poems in journals, which were collected and published in a volume in 1844, and were soon followed by the mock-heroic poem *A' Helység Kalapácsa* ('The Village Hammer'), the historical epic *János Vitéz* ('The Hero Janos,' 1845; Ger. trans. by Kertbeny, Stuttg. 1850), and several volumes of lyrics. From 1844 he was employed as co-editor of *Divatlap*, and in 1847 with Maurus Jókai undertook the editorship of *Életképek*, into which he introduced poems and stories of peasant life. His romance *A' köhtr' kötele* (Pest, 1846; Ger. trans. Halle, 1852) was less successful. He also wrote for the stage his *Tiger und Hyäne* (Pest, 1846) and a translation of Shakespeare's *Coriolanus* (1848). P.'s poems, especially his lyrics, are marked by strong colour, and are instinct with passion and fulness of life. His background is the scenery and popular life of Hungary, and shows imaginative power in every detail. He is the Burns of Hungary, and by far the richest and raciest of its poets. A patriotic Magyar, he was the leader of the Pest youth in 1848; his *Most vagy soha* ('Now or Never') was the song of the revolution. During the war P. acted as adjutant to Bem. Mészáros's displeasure at his unsoldierlike appearance induced him to retire in May 1849, but on the approach of the Russians he returned to his former post, and fell (31st July 1849) at the battle of Szegesvár. A large number of the spirited war-songs of P. are collected in *Hangok a multból* (1851). His most important poems have been translated into German by Kertbeny (4th ed. Frankf. 1866), Szarvady and Hartmann (Darmst. 1851), and Opitz (2d ed. 2 vols. Frauenfeld, 1868); and into French by M. Dozon (Par. 1877). Opitz also translated his last poem (*Der Apostel*, Par. 1873). Don Ramon L. Mainez has published (Cadiz, 1877) a Spanish translation of a number of his shorter pieces. His biography has been written by Chaffin (Par. 1861) and by Opitz (Frauenf. 1868). See Sir John Bowring's translation of *Selected Poems of P.*, with a *Biographical and Critical Introduction* (Lond. 1866).

Petra ('rock,' the Greek equivalent of the Hebrew *Sela*, properly *Sela*, 2 Kings xiv. 7, cf. Judges i. 36; 2 Chron. xxv. 12; Obad. 3), the ruins of which are found about 70 miles N. by E. of Akaba, in the midst of Mount Seir (Jos. *Ant.* iv. 4. 7), appears to have been the principal stronghold of the Edomites (q. v.) at the time when the latter were conquered by Amaziah (B.C. 837-809) King of Judah (2 Kings xiv. 7). The Israelites gave to the city the name of Joktheel, but it was still called *Sela* in the time of Isaiah (xvi. 1). In the 4th c. B.C., now under the name of P., it was the capital of the Nabatheans (q. v.), who had taken possession of the territory of the Edomites, and who were twice unsuccessfully attacked (about 312 B.C.) by Antigonos, one of the successors of Alexander the Great. At this period P. was the great emporium of the trade between the East and the West, and from the description given by Strabo, Diodorus Siculus, and Pliny, and from the appearance of its ruins at the present day, it was a city lying in a hollow in the bosom of a mountain, and surrounded by precipitous cliffs. The only approach was by a narrow ravine, the bed of a stream which flowed through the midst of the city. The area of the hollow, which was about a mile long and half a mile wide, was occupied by many public buildings, the ruins of which prove them to have been of great extent and magnificence, and private dwellings. There were also bridges over the stream, and a splendid triumphal arch. But as this area was very limited, in seeking to make the most of the site, which was of priceless value as a protection in those times of constant warfare and plundering, the inhabitants excavated the face of the rocks enclosing the area itself, and the sides of the ravines which branch out in all directions, forming habitations, temples, and tombs. It is probable that the first beginnings of the city were made by some wandering tribe taking possession of the natural caves in the limestone rock, which suggested the making of others artificially. But at any rate it has been calculated that, were all the excavations thus formed ranged in regular order, they would form a street five or six miles long. Besides, in some places they are in several 'storeys,' and sometimes 300 or

400 feet above the level of the valley. The fronts of many of them were enriched with a variety of architectural ornaments, and temples were constructed in this way, with their columns and even statuary sculptured out of the solid rock; so that the remarkable contrast was presented of precipices, which towered in natural grandeur to the height of 600 or 700 feet, having their bases wrought into splendid piles of architecture, rivalling in symmetry and beauty the finest monuments of Grecian art; the effect being still further heightened by the brilliant colours of the rock—red, purple, yellow, blue, black, and white. In the 1st c. B.C. P. was the capital of the kingdom of Arabia, to which it gave the name of Petraea. Being annexed to the Roman Empire on the overthrow of that kingdom (105 A.D.), its commercial prosperity soon began to decline, although the Emperor Hadrian (A.D. 117–138) conferred certain privileges on it, for which the inhabitants gave his name to their city. The last mention of P. is in 536, the date of a council at Jerusalem at which its bishop was present. The ruins in the Wady Musa, near Mount Hor, were first identified as P. by the traveller Burekhardt, 1812. See his *Travels in Syria, &c.* (1822), Robinson's *Bibl. Researches* (2d ed. 1856). Laborde's *Voyage de l'Arabie Pétrée*, Porter's *Handbook for Syria and Palestine* (1874).

Petrarca, Frances'co (baptized **Francesco di Petrarca**), was born at Arezzo, in Tuscany, July 20, 1304. The principal facts of his earlier life we have from himself in the *Epistle to Posterity*. His father, banished from Florence with Dante and other Ghibellines, settled first at Pisa, and then at Avignon, the seat of the Papal court. On the winding banks of the Rhone, or sometimes a little way off at Carpentras, the son learnt 'a smattering of grammar, and as much of dialectics and rhetoric as the age could afford.' Seven years he gave to the study of law at Montpellier and Bologna—seven years, 'not spent, but lost.' At the age of twenty-two he returned to Avignon, where he tells us his acquaintance was already sought by men of eminence, particularly by his staunch and powerful friends, the Colonnas. What were P.'s means of subsistence then is not known: his father, dying in 1326, left him nothing but a treasured copy of Cicero's works. It was not till 1330 that he took up his abode in the palace of Cardinal Colonna. The future poet and scholar, as one of his letters to a brother reveals, was at this time a great dandy; but he was also the most refined and learned man in Avignon. It was this dandy, in his pointed shoes, with frizzled hair, and perfumed cloak, who was transformed into a great poet in the church of the nuns of St. Clara. There, in the Holy Passion week, 1327, he cast eyes on Ugo de Sade's wife, Laura de Noves, a mere girl of twenty, and very beautiful. Beatrice may have occasionally glanced in love on her devoted Dante, but we have no mention of the faintest encouragement accorded to P. by Laura. Speculation regarding her has been baffled: we only know that she lived a virtuous wife to a somewhat exacting husband, to whom she bore a large family. Therefore in the story of Laura and Petrarch there is no tragedy; all is ideal romance, founded on the slightest pretext. The dropping of her glove, the fitting of her shadow, or the rustle of her robe would be theme enough for the finest of his sonnets. The charm of the *Cansoniere* is the charm of a delicate egotism. But P. here revealed a new love to Europe. He blended the grace of the Romans—Ovid, Catullus, Tibullus, Horace, with the Gothic chivalry developed by the troubadours, and with a mystical glamour of religion. Venus and the Virgin become one in his pages. Thus it is for their art, not for any passion they contain, that the world lavishes worship on the sonnets to Laura. In the *Vita Nuova* we feel the pulse quicken and slacken as Beatrice comes and goes, like sunshine on a cloudy day; but we read P. only for his perfect command of expression, for his skill in making much of nothing. Fertile in combination, he is yet barren in images, the whole of which, though they are repeated in endless variety, could be contained in half a dozen sonnets. Yet the amatory strain of P. began a great era in literature, and has inspired every poet since his time.

After travelling restlessly through France and the Low Countries, returning by Burgundy, the Lyonnais, and Dauphiné, P. buried himself in the delightful solitude of Vaucluse, occasionally making journeys to Avignon or Rome, but principally engaged with the *cansoni* and Latin poems. 'By the source of the Sorgia, the well-known haven of my soul, I was wont to wander solitary at evening, and in the morning the melancholy

ripple of the stream against the bank found me there still.' Meanwhile a projected history of Rome had developed into an epic on the second Punic War, entitled *Africa*. His verses on Laura had opened doors for him everywhere: in 1340 the Roman Senate and the University of Paris simultaneously offered him the laurel; and he set out for the King of Naples with his unfinished *Africa*. The king loaded him with honours, and ordered him to repair to Rome. At Rome, on Easter Day, 1341, he ascended the Capitol, received the crown at the hands of the senator Orso, recited a sonnet on the heroes of Rome, and deposited his laurels on the altar of St. Peter's. He was now for a time the man of the world. 'Love and glory,' he makes St. Augustine say to him, 'are the chains which bind you to earth.' In order to obtain means to support his considerable establishment, he accepted an archdeanery of Parma; and at Parma was finished his Latin *Africa*. Landor affirms that no man ever could read more than 500 lines of it. He was next appointed prior of Migliorino, and employed by the Church in some important political missions. The greater part of the next few years was spent at Vaucluse. In 1352 the poet again stepped into the busy world, accepted a mission to reconcile the republic of Genoa with that of Venice, was next employed by Galeazzo Visconti to dissuade Charles IV. from crossing the Alps, and some time after, in 1360, was sent by the same Visconti to Paris to congratulate King Jean on his recovery of freedom. Then he proceeded to Venice, presented his magnificent library to the republic, and was decreed a palace for its reception. Hither came Boccaccio, driven from Florence by the plague. This plague, also, carried away Laura. Boccaccio introduced to P. Leontius Pilatus, teacher of Greek. A teacher of Greek in these days was a king. P., past sixty, eagerly resumed his studies in this language. He never learnt it; but he was one of the first Italians to attempt it. This is indeed his glory. He lives before our eyes in his sonnets, but he more truly lives as the father of modern learning. He foresaw a new phase of European culture, and inaugurated it by his example: he was the apostle of humanism, the priest of letters. He lavished his time and money in the collection of manuscripts, transcribed many himself, kept five or six amanuenses to copy others, sending or journeying to distant parts of Europe whenever a literary treasure was heard of. What he accumulated, he examined; what he could not read, he set others to read. Thus, when he received a magnificent *Homer* from Constantinople, he urged Boccaccio to its translation. What marvel that his letters evince such knowledge of history and literature, when we remember that this knowledge was only to be got from obscure, crabbed, faded MSS. ! It would take long to tell the service P.'s scholarship and scholarly enthusiasm rendered to the world.

To detail P.'s various political movements would be tedious. At Ferrara, when just about to set out for Rome, he was seized with a terrible malady. Carried to Padua, he recovered in the balmy bosom of the Euganean hills. Still he continued his literary work with ever-increasing ardour. The great event of his last days was the reception of Boccaccio's *Decameron*. He got by heart the story of Griseldis, and in the last letter he wrote transmitted a Latin translation of it to Boccaccio. At Arqua, on the 18th of July 1374, he was found dead, with his head resting on an open book—fit ending for a life that had been a dream of scholarship. The stain of his youth was a connection which left him a natural son and daughter, the former of whom he survived.

P.'s Latin works are *Epistole Familiare*; *Epistola Varia*; *Epistola ad Veteres Illustres*; *Epistola Seniles*; *Epistola sine Titulo*; *Secretum* (1342); *De Vita Solitaria* (1346); *De Otio Religiosorum* (1347); *Rerum Memorandarum Libri IV.*; *De Vera Sapientia*; *Itinerarium Syriacum*; *De Remediis utriusque Fortuna* (1358); *De Officio et Virtutibus Imperatoris*; *Vitarum Virorum Illustrium Epitome*; *De Republica optime Administranda*; *De sui ipsius et aliorum Ignorantia* (1368); *Epistola ad Posteritatem* (1370); *Apologia contra calumnias Galli* (1372); *De Contemptu Mundi*; *De Obedientia ac Fide Uxoriam* (Boccaccio's tale). The standard edition of P.'s Letters is that by Signor Fracasetti (Flor. 1859; Ital. trans. 1863). The Latin poems are *Africa*, *Epistole*, and *Ecloga*. There have been more than 300 editions of P.'s works. The *Cansoniere*, or *Rime del P.* (consisting of *Trionfo d' Amore*, *Trionfo della Castità*, *Trionfo della Morte*, *Trionfo della Fama*, *Trionfo del Tempo*, *Trionfo della Divinità*) was first printed at Venice, 1470. The best modern editions are those of Marsand (Padua,

1819-20) and Leopardi (Milan, 1826). The best edition of P.'s complete works was printed at Basel (1581). The great biography of P. is that of the Abbé de Sade, a descendant of Laura, who wrote *Mémoires pour la Vie de Pétrarque* (3 vols. quarto, Amst. 1764). From this are extracted the English lives by Mrs. Dobson and Thomas Campbell. See also Ugo Foscolo's excellent *Essays on Petrarch* (1823); *Pétrarque: Etude après les nouveaux Documents*, by Mézières (Par. 1857); *Petrarcha*, by Geiger (Leips. 1874); and *Petrarch*, by Reeve, in *Modern Classics for English Readers* (1878). The bibliography of P.'s works is to be found in Rossetti's *Racconti di alcuni di tutti li Opere del P.* (Ven. 1822). Incomplete English translations from Petrarch's poems have been made by Boyd, Nott, Magregor, Milman, Merivale, Wrangham, and Lady Dacre.

Petre, a Catholic family, descended from Sir William P., 'the silent man,' who was Secretary of State under four reigns, and died in 1572. His only son, Sir John P., was raised to the peerage as Baron P. of Writtle, in Essex, July 21, 1663. William, the fourth baron, on Oates's discovery of the 'Popish plot' (1678), was sent to the Tower, where he died, January 5, 1683. His kinsman, Edward P., the famous Jesuit (born 1631), shared his captivity, but was released on the accession of James II., and called to the Privy Council (1687). Hated and threatened by the populace as James's evil genius, he escaped at the Revolution to the Continent, was rector of St. Omer (1693-97), and died at Watten, May 15, 1699. Another ecclesiastic, Francis P., consecrated bishop of *in partibus* 1750, and appointed Vicar Apostolic of the northern district of England, died December 24, 1775. The present head of the family, William Bernard P., was born December 20, 1817, and succeeded as twelfth baron, July 3, 1850. In the Catholic controversy of 1874 he upheld the Vatican Decrees against his brother Henry and Lords Acton and Camoys.

Petrel, the name of various species of *Maritimus* or swimming birds. The best known is the stormy P. (*Pterodroma castro*, or 'Mother Carey's Chicken,' a bird met with far out at sea, and frequently seen rising on the waves in the most stormy weather. It hovers above the surface of the sea, and just contrives to keep itself on the surface through the pattering action of its webbed feet and the flapping of its wings. Its colour is a dull black, and it attains a length of 6 inches. The tail is forked, the legs slender, and the second quill is the longest. Its food consists of



Petrel.

oceanic molluscs and crustaceans. The P. lays a single egg in some disused rabbit burrow. The flesh is very oily. The genus *Pterodroma* includes the Fulmar P. (*P. glacialis*), which is plentiful in the northern islands, and attains a length of 20 inches. The colour is a pure white. The eggs of the Fulmar P. are much valued by the inhabitants of St. Kilda and other islands, while an oil is obtained from both old and young birds. Other species are the cropped P. (*P. lunata*), and to the genus *Pterodroma* belong Wilson's P. (*P. Wilsoni*), the rock-petrel (*P. Zelandica*), and other species.

Petrifaction, a general name for anything organic which has been converted into stone. It is almost synonymous with the much more common word *fossil*.

Petrogale, a genus of Kangaroo (q. v.), popularly including the species named rock kangaroo. Of this genus the *P. penicillata* is the most familiar. Its length is about 4 feet, the tail measuring 23 inches. The colour is a purple grey, which is light on the under parts. The P. has no canine teeth, the muzzle is bald, and the tail is tufted at its tip. It is a native of the N.W. of Australia.

Petroica, a genus of Australian birds, of the order *Coraciiformes* and family *Sylviidae*. *P. melanota* is the native 'robbin.' The male is of a black colour on the head and back, the forehead being white, and the breast scarlet. The female is brown.

Petroleum ('rock oil'), comprises a series of more or less fluid native hydrocarbons which of late years have taken an important position in the industrial arts. The term covers liquids as thin and mobile as tar naphtha, ranging to others as thick as treacle, in colour varying from almost perfect transparency, with only the slightest straw tinge, up to opaque brownish-black, and in specific gravity from 0.800 to 0.900 or thereby. The more limpid varieties of P. contain little or no paraffin, while the thicker kinds, such as Rangoon P., are of a buttery consistence owing to the large amount of that substance in their constitution. P. is found in some localities oozing out of the earth in the form of natural springs, sometimes by boring it rises to the surface like artesian wells, and in other cases it must be pumped from its subterranean reservoir. P. occurs in very many localities throughout the world; but the sources of greatest commercial importance are certain parts of the shores and islands of the Caspian Sea, the neighbourhood of Rangoon in Burmah, and especially in extensive tracts of country in the United States and Canada. The P. of Rangoon and the Caspian regions is an important source of Paraffin (q. v.).

The important P.-yielding region of America extends from the western counties of Ontario, Canada, southwards to the valley of the Kanawha in W. Virginia. The most productive tracts occur in the N.W. parts of Pennsylvania, but in Ohio and the extreme W. of New York State there are also very valuable wells. The existence of P. in several of these localities has been known since an early period, but it is only since 1859 that American P. has been worked and introduced into commerce; but the traffic rapidly attained enormous proportions, and became a source of vast wealth to many who 'struck ile.' In 1875 the P. produced by the 10,499 wells of Pennsylvania amounted to 76,326,733 barrels, the total value of which at the wells was \$245,904,880.

Authorities are not agreed as to the origin of P., but the prevailing opinion is that it has resulted from a natural distillation proceeding within the bowels of the earth, in a manner analogous to that by which paraffin oils are distilled from carbonaceous shales. American geologists consider that the P. of their continent results from the subterranean dry distillation of accumulations of marine plants and animals. In connection with the origin of P., it is worthy of remark that in very many instances the oil springs occur in localities where there are extensive deposits of rock salt.

All crude petroleum consists of mixtures of oils varying in specific gravity and boiling-point; and as the lighter oils give off vapours which, mixed with atmospheric air, inflame with explosive violence, legislative measures have been adopted in most countries to secure the public from danger of such explosions. The exportation of crude P. from America is prohibited, and in the United Kingdom no burning oil may be sold which evolves inflammable vapours at or under a temperature of 100° Fahr. P. is consequently always submitted to fractional distillation, and the series of commercial oils prepared are brought into commerce under a great variety of names, and consequently, much confusion exists regarding the technology of the substances. The P. is, however, fractioned into three classes of products, 1st. The light oils, which, inflaming at 100°, are not available for illuminating. These are known as benzoline, P. ether, spirit or Raiglin, and are used for cleaning gloves, freeing clothing from oil stains, &c., for carburetting ordinary illuminating gas, and as an external anæsthetic in neuralgia, &c. 2d. Refined P. or burning oil, which constitutes the larger proportion of what is retained as paraffin oil. P. has superseded whale, sperm, and vegetable oils as a lighting oil on account of cheapness, brilliancy, and freedom from smoke. In addition to its enormous consumption as an illuminator, it is also used as a solvent for varnishes, &c. The 3d series—the heavy oils—are employed as lubricants under such names as globe oil, vulcan oil, phoenix oil, &c. P. has been used with some success as fuel on board of American steamers, and in the Russian navy, but it is dearer than coal; many efforts have been made to introduce it as fuel both for steam boilers and in metallurgical operations.

The imports of P., derived almost wholly from the United States and Canada, into the United Kingdom during the year 1876 were as follows:—Crude P. 1886 tons, valued at £15,952; refined P. 24,725,005 gallons, valued at £1,415,334; and evidence that the British P. industry continues to expand is afforded

by the fact that the aggregate value of the P. imported during 1877 is returned at £1,772,239. See Huguenet, *Asphaltes et Naphles* (Par. 1852); Greville Williams, *P.* (*Philosoph. Trans.* 1857); Hunt, *Hist. of P. or Rock Oil* (1861); Norman Tate, *P. and its Products* (1863); Buchner, *Mineraloel* (1864); Stoppani, *I Petrolii in Italia* (1866); Colin, *Notice sur l'Eclairage aux Huiles Min.* (Par. 1870); *Report of Select Com. of House of Lords on P. Bill* (1872); Albrecht, *Das Paraffin und die Mineraloel* (Stuttg. 1874).

Law Regarding P. in Great Britain.—The P. Act, 34 and 35 Vict. c. 105, consolidates and amends the laws relating to petroleum. Seven days after importation, and during transit, the vessel in which it is must be labelled conspicuously with a description of the petroleum, adding the words 'highly inflammable.' Licence to keep large quantities of the article must be had from local authorities. Vessels holding not more than a pint, securely stopt, may be kept without licence, provided the whole quantity kept does not exceed three gallons.

Petrol'ogy (Gr. 'science of rocks') is the section of geology which treats solely of the physical properties of rocks, their composition, structure, &c., without any regard to their fossil contents or age. A full and thorough knowledge of mineralogy is necessary to the professional petrologist.

Petromyzon. See LAMPREY.

Petronel (Old Fr. *poitrine*), a portable firearm introduced into European warfare for cavalry service late in the 14th c. It was a kind of small cannon mounted on a heavy and broad wooden stock, the butt of which was placed against the chest (Fr. *poitrine*, Lat. *pectorina*, from *pectus*) in firing. In the 16th c. the P. resembled a long pistol with a broad butt. It fell into disuse in the following century.

Petronius Arbitr, T., a *litterateur* and voluptuary of the 1st c., author of a work entitled *Satyricon*, in which all sorts of adventures are related. This singular book is written in prose narrative, with occasional pieces in verse, and resembles in its general composition the old Varronian or Menippean satire. Originally it consisted of about twenty books. The MSS., however, have come down to us in a very mutilated state. The oldest of them is a fragment, or rather series of fragments; the connection of which is ever and anon broken by blanks. The very character of the work is altogether uncommon. It is a sort of comic romance, in which a certain Encolpius and his companions in Southern Italy expose false taste in all literary and artistic matters, while they ridicule the folly, lust, luxury, and dishonesty of all around them. The characters are drawn boldly and by the hand of a master. Every line is charged with wit and humour. The Supper of Trimalchio, a rich, uneducated citizen, ever affecting the gentleman, is one of the longest and best things in the work. The minuteness of the delineation of the vices of the period is a serious drawback to a study of this quaint and curious but withal singularly able and accomplished author, the coarseness and obscenity of whose conceptions reveal a fearful state of moral depravity, while the general tone of the writer indicates an evident relish for the scenes which he describes. The *editio princeps* of the fragments of P. was printed at Venice in 1499, the second at Leipsic in 1500. The best editions are those of Burmann (Utrecht, 1709; enlarged Amst. 1743); Antonius (Leips. 1781); and of Bücheler (Berl. 1862), the first really critical edition, and the only one to which, in the present state of criticism on the subject, the student can with confidence be recommended.

Petronius C. (*Tacitus*), T. (*Pliny* and *Plutarch*), an accomplished voluptuary at the court of Nero—the Beau Brummell of the time—whose skill in the direction of the imperial pleasures secured for him the title of *Elegantia Arbitr*. This expression has led to the common opinion that the person spoken of and P. A. are one and the same. For such a supposition there seems to be no ground whatever. When Tacitus uses the phrase it is merely to describe the individual. 'Arbitr,' in the case in question, is not a name. Another statement on which great weight has been set is that of Pliny, that P. in his last moments despatched a sealed document to Nero, taunting him with his crimes and excesses. But a letter is not a book; and it would be absurd to think that this document was the *Satyricon*. There is, however, a singular likeness in the two persons. P. was no vulgar debauchee; he was a refined voluptuary. At one period of his life at least he gave evidence of fitness for higher things.

He was Proconsul of Bithynia and subsequently Consul, and we learn that he discharged his official duties with energy and ability. Relapsing, however, into a life of luxury and ease, he became prime favourite at the court of Nero. But Tigellinus, another of the Emperor's minions, falsely accused P., who, seeing his destruction certain, committed suicide, 66 A.D. He caused his veins to be opened, and had them closed from time to time, so that his death seemed to be the result of natural and gradual decay. P. is generally supposed to have belonged to the equestrian order, but the statement of Tacitus seems to lead to an opposite inference.

Petropaulovsk' ('Peter and Paul's town').—(1) A town of Russia, government of Tobolsk, on the Ischim, 220 miles S.S.W. of Tobolsk, on the great military road through the Kirghiz to Turkestan. It is well fortified, and is the centre of trade between Russia and Central Asia. Pop. (1870) 9090. (2) A town on the E. coast of the peninsula of Kamtchatka, at the head of Awatscha Bay. It is 8740 miles from St. Petersburg, and from P. to Tauroggen near Tilsit is 9200 miles, the greatest distance between two places in the Russian Empire. Formerly a place of considerable commerce, its importance sank as that of the Amur district rose, and the population has diminished to 600. P. received its name from the two ships, the Peter and Paul, of the navigator Behring, to whom a monument is erected here. The fortifications were razed in 1855, during the Crimean War, by the English and French.

Petrosavodsk', chief town of the government of Olonetz, Russia, on the W. bank of Lake Onega, 282 miles N.E. of St. Petersburg. It was founded 1703, is the seat of an archbishop, and has important iron foundries, of which the Alexandrovsky arms factory is the chief. It has already produced more than 30,000 pieces of ordnance. Pop. (1870) 10,900.

Petsh'a (*Pescium*), or **Ipék'** (i.e., 'silk'), a town of European Turkey, vilayet of Prisren, on the Bistritza, 50 miles W. of Prishtina. The former residence of the Servian patriarchs, it is a pleasant place, embowered in orchards and mulberry groves, and producing silk, tobacco, and fruits. Pop. 16,600.

Pettichaps, the name applied to several kinds of Warblers (q. v.) or *Insessorial* birds of the sub-family *Luscininae*. The greater P. is the Garden White-throat (*Sylvia hortensis*), a bird attaining a length of 6 inches, of a brown colour above and white below, the throat being pale brown. Its song is very melodious. The lesser P. (*Sylvia rufa*) is otherwise named the 'Chiff-Chaff' from its cry. It is ashen brown above, and white, tinted with light brown, beneath. Its length is 5 inches. These birds are migratory. The lesser P. arrives in Britain in March and April, and leaves in October.

Pettie, John, R.A., born in 1839 at Edinburgh, studied at the Royal Academy classes there from 1855 till 1862, and in the latter year removed to London, where he has won a brilliant reputation for vigour, variety, and resource in art. He was elected Associate of the Royal Academy in 1866, and Royal Academician in 1873. Of his numerous works, which are chiefly historical or higher *genre*, it is impossible to mention more than a few of the more prominent, as 'What d'ye lack, Madam?' (1861), 'The Trio' (1863), 'The Rival Roses' (1871), 'The State Secret,' 'Juliet and Friar Lawrence' (1874), 'The Sword and Dagger Fight' (1877), and 'Disbanded' (1878). His painting is remarkable for character, force, and technical dexterity, and in portraiture he occupies a high place.

Petty, Sir William, the earliest English economist, was born at Romsey, in Hampshire, May 16, 1623, and was educated at the grammar school of his native town, and at Caen in Normandy. After serving for a short time in the navy, he studied medicine for three years at Leyden, Utrecht, and Paris, and returning to England (1646), obtained a patent for his 'pantagraph' or copying-machine. He came to Oxford (1648), became a fellow of Brasenose (1649) and anatomical professor (1650), and was one of the earliest members of the Royal Society. Appointed physician to the army in Ireland (1652), he obtained the surveyorship of the forfeited Irish estates (1654), a post which brought him in £10,000, and afterwards became secretary to Henry Cromwell and member for West Looe (1658). At the Restoration he was knighted and created surveyor-general of Ireland, where he did much to promote the mining, timber, and fishing industries, whilst at London he was one of the chief

revivers of the Royal Society. He died at Westminster, 16th December 1687, leaving two sons, the second of whom was the ancestor of the Lansdowne family (see LANSDOWNE). Besides his valuable treatises on population, P. wrote *Taxes and Contributions* (1662), the financial *Quantulumcumque* (1682), *The Political Anatomy of Ireland* (1692), &c.; and he was the inventor of a double-bottomed ship, which was to sail against wind and tide, but came to an untimely end whilst crossing the Irish Channel.

Petty Officers, a class of sailors in the royal navy having duties and responsibilities akin to those of non-commissioned officers in the army. There are three classes of P. O., with daily pay varying from 6s. to 2s.,—the chief P. O. including the master-at-arms, the chief gunner's mate, the chief boatswain's mate, the chief captain of the fore-castle, the admiral's coxswain, the chief quartermaster, chief carpenter's mate, &c.; the first class working P. O. including the ship's corporal, gunner's and boatswain's mates, the captain of the fore-castle, the captain's coxswain, the quartermaster, coxswain of the launch, captains of the maintop, foretop, &c., the sailmaker and principal artificers; and the second class working P. O. consisting of a lower grade of responsible seamen and artificers.

Petty Sessions. The sitting of Justices of the Peace in court is called *Sessions*. They have power, under statutes, to make divisions of counties for sessional and magisterial purposes, each justice, except during Quarter Sessions (q. v.), usually exercising his jurisdiction only in the division in which he is resident. But justices have generally stated places and times of meeting for the despatch of such business as requires by law the presence of more than one justice, and yet does not require to be brought before Quarter Sessions, or Special Sessions (q. v.). These meetings are called P. S.

Petu'nia, a genus of S. American *Solanacea* closely related to the tobacco, but of no economic service. They have sticky leaves, axillary funnel-shaped flowers, generally white or some shade of purple, but the gardener's skill has now introduced varieties with striped and with double corollas—and are much used for bedding-out purposes. Some of them are sweet-smelling.

Petunt'ze, a white felspathic earth used by the Chinese in the manufacture of porcelain. By fusion it gives to the kaolin a glazed appearance.

Pet'worth, or **Sussex Marble**, a various coloured limestone, occurring as a thin layer in the Weald clay, and composed of the shells of fresh-water *Paludina*. In the cathedrals of Chichester and Canterbury there are pillars formed of it, and it is otherwise used for ornamental purposes.

Peut'inger, Konrad, a celebrated German antiquary, was born at Augsburg, 14th October 1465. After an education at Padua, Bologna, Florence, and Rome, he returned to Germany about 1486, and became town-clerk of his native city about 1493. After his death (24th December 1547) his valuable library fell to his own family, afterwards, however, to the Jesuits at Augsburg. P. wrote several works on antiquities, chief of which were *Romane Vetustatis fragmenta in Augustana Vindelicorum* (Augsb. 1505), and *Sermones Convivales de mirandis Germania Antiquitatibus* (*Ibid.* 1506). He discovered in a Benedictine monastery at Tegernsee the so-called *Tabula Peutingeriana*, a map of the military roads of the West Roman Empire, dating from the 4th c. A part of it was published by Marcus Welser as *Fragmenta Tabule Antiquæ ex Peutingerorum Bibliotheca* (Venice, 1591). From this date the map was mislaid till 1714, when, being discovered among P.'s MSS., it was sold to a bookseller, from whom it was bought by Prince Eugene, who presented it to the Vienna Library. Complete editions have been published by Franz Christoph von Scheyb (Vien. 1753), by Mannert (12 vols. Leips. 1824), who gives a complete account of its fortunes from the 4th to the 19th c., and by D'Urban in his *Recueil d'Itinéraires Anciens* (Par. 1845).

Pew (Old Fr. *puy*, Lat. *podium*, 'a support'), a term originally applied to the low open benches introduced into English churches as early at least as the 13th c. The ends of these were often richly carved, terminating in a poppy-head or other finial. After the Reformation, and under Puritan influences, they were generally replaced by the high hideous enclosures familiarly

known as 'horse-boxes,' which in this present age of church restoration are happily making way for benches of the ancient form or for chairs. In England, says Blackstone, 'pews may descend by custom immemorial (without any ecclesiastical concurrence) from the ancestor to the heir;' they may also be held by a special faculty from the ordinary, or they may be assigned by the churchwardens 'to the parishioners according to their degree.' In Scotland their assignation is vested in the heritors; in the United States different customs prevail in different States, pews being sometimes in the entire custody of the vestry or trustees, sometimes leased for a limited period, and frequently conveyed in a perpetual lease with an annual rent. Of late years a strong feeling has arisen that all seats in a church should be free and unreserved, and in many town churches of England a voluntary offertory has been established in lieu of the income formerly derived from pew-rents.

Pewter (Old Fr. *peutre*, Low Lat. *peutrum*), ordinarily an alloy of tin with antimony and lead, though the best P. has copper added in place of lead. Common P. contains only tin and lead in the proportion of 4 : 1: A fine P. is obtained by fusing together 100 parts of tin, 8 of antimony, 1 of bismuth, and 4 of copper. The effect of these additions is to harden the tin and preserve its colour, so that a good P. keeps its silvery lustre for long untarnished.

Peyer's Glands, an important group of Glands (q. v.), occurring chiefly in the small intestine, and which appear to be specially affected in typhoid fever. They are most abundant at the terminal part of the *ileum*, near the *ileo-cæcal valve*. These glands are met with in two forms, *solitary* and *agminated*, the latter being also known as *P.'s patches*. The patches vary from 1 to 3 inches in length, and attain a width of about half an inch. They are of oval form. Each gland is from half a line to a line in diameter, and consists of a network of fine fibres containing lymphoid corpuscles. The glands are penetrated by blood-vessels and surrounded with lymphatic vessels. Their functions would appear to be that of absorbing certain materials from the *chyle* or digested food. P. G. are largest in the young, and disappear in adult life.

Pézénas, a town of France, department of Hérault, on the river Peyne, at a short distance from its junction with the Hérault. It has manufactures of iron, copper, and chemicals, and a large trade in grain, wine, and liqueurs. Pop. (1872) 7314.

Pfä'fers, less correctly **Pfeffers**, a village in the Swiss canton of St. Gall, 5 miles S.S.E. of Sargans. Its hot medicinal baths have been famous since 1038. They are situated in the deep rocky valley of the Tamina, 2259 feet above the sea, and the access to them is between walls of rock from 533 to 853 feet high. The water of the main spring has a temperature of 85.4° F., that of the lower 100.6° F. In 1860 a drain 85 feet long was made through the rocks to a large grotto, into which flow 16 to 20,000 quarts of water per minute. At the village a rich Benedictine abbey (suppressed 1838) has been converted into a lunatic asylum, St. Permsberg. Pop. 1540.

Pfeiffer, Ida (*née Beyer*), born at Vienna, 15th October 1797, showed from early youth great energy and love of knowledge. After being separated from her husband, and having completed the education of her two sons, she resolved to travel abroad. She first went to Palestine in 1842, and the account of her journey, *Reise einer Wienerin in das Heilige Land* (2 vols. Vien. 1843; 4th ed. 1856), being favourably received, she next visited (1845) the three Scandinavian kingdoms and Iceland (*Reise nach dem Skandinavischen Norden*, 2 vols. Pesth, 1846), and proceeded to S. America, Australia, India, Persia, and Asia Minor; thereafter publishing *Eine Frauensfahrt um die Welt* (3 vols. Vien. 1850), a work rich in observations on woman's home life in the countries where she had been. In March 1851 she undertook a new journey. Going first to England, she left that country in May for Australasia, where she remained a year and a half on the Sunda Isles, and boldly penetrated to the interior of Sumatra and Borneo. She then proceeded to the west part of S. America, and from thence travelled through N. America, and reached home in May 1855. *Meine Zweite Weltreise* appeared in 4 vols. in 1856. In the spring of the latter year she went to Madagascar, was there cast into prison and hardly treated by the natives, and did not regain her liberty till 1858, when she returned home to die (28th October) of the ill-

usage she had received. The account of her latest travels, *Reise nach Madagascar*, contains also a biography of P. (2 vols. Vien. 1861). See *Die Reisende Ida P.* in *Unsere Zeit* (2 vols. Leips. 1858).

Pforzheim, an industrial town of Germany, in the Grand Duchy of Baden, at the confluence of the Enz, the Würm, and the Nagold, on the N. skirt of the Schwarzwald, 55 miles S.S.E. of Mannheim by rail. Long the residence of the Markgrafs of the extinct Baden-Durlach-Ernestine line, it has an ancient castle, and on an eminence a *schloss kirche*, erected between the 12th and 15th centuries, containing many interesting statues and memorials. The staple products are gold and silver wares, the production of which employs 7000 men. P. also manufactures chemicals, iron machinery, ultramarine paper, &c., and carries on a trade in timber, oil, and wine. Pop. (1875) 23,537.

Phaedrus, a Latin fabulist of the Augustan period, was probably at one time a slave of the Emperor, as the title of his work indicates—*Phadri Aug. Liberti Fabulae Aesopiacae*—and it is said he came from Thrace or Macedonia. His fables were principally translations of Aesop's, and their excellence was proportional to the closeness of the paraphrase. His only merit is a beautiful style. Another collection of thirty-two fables—*Epitome Fabularum*—first published at Naples, 1809, has been connected with his name by some. The standard edition of his writings is that of Orelli (Zurich 1831). Another edition is that of Müller (Leips. 1876).

Phaëthon (Gr. 'glittering'), originally an epithet of the sun, came next to be the name of one of the sun-god's horses, and finally of the son of Helios and Clymene, a daring youth, who, essaying to guide his father's chariot, drove so near the earth as almost to set it on fire. Thereupon Zeus slew him with a thunderbolt, and cast his body into the Eridanus or Po, whilst his weeping sisters, the Heliades, were changed into the amber-dropping poplars that fringed its banks.—*Phaeton*, an open pleasure-carriage on four wheels, takes its name from this mythic charioteer.

Phagedæna (Gr. *phagîn*, 'to eat,' or 'corrode') is the term applied to a combination of ulceration and gangrene, in which the ulcer, as it spreads, sloughs more or less deeply. There are two forms of this affection, viz., spreading P., and sloughing P. In spreading P., ulceration is the prominent symptom, the sloughing being only superficial; but in sloughing P., the slough is the prominent symptom, the surface of the ulcer being thick, black, and round in shape, a considerable depth of tissue being involved. Underneath the superficial slough, ulceration generally proceeds rapidly, involving destruction of the tissues. There is usually a yellowish-green or brownish foetid discharge; and occasionally bleeding from destruction of the vessels. The pain is of a severe, burning, stinging, and lancinating character. There is also a severe form of sloughing P., usually called 'hospital gangrene,' which is infectious or contagious, and epidemic in its nature. P. is frequently the result of tuberculosis, the syphilitic virus, intemperance, and the abuse of mercury. Hospital gangrene usually originates and spreads in hospitals where there is much overcrowding, and where the hygienic conditions are unfavourable.

Phalanger, a genus of *Marsupial* quadrupeds, also named *phalangists*, and represented by the Sooty P. (*Phalangista fuliginosa*), the P. vulpine or vulpine P., and other species. The vulpine P. is sometimes named the Australian Opossum, although it does not belong to the family of the true or American Opossum (q. v.). In the P., the second and third toes of the hinder feet are united by the integument nearly to their extremities. The great toe may be opposed to the others, and is devoid of a nail, while the rest have long curved claws. The tail is long, and its tip is prehensile. The animal is nocturnal in habits, and lives chiefly in trees and on vegetable food. The canine teeth are small. The vulpine P. attains a length of 2 feet and even more.

Phalangides, a family of *Arachnida* (q. v.), represented by the so-called 'harvest spiders.' The legs are extremely long, and the *maxillary palpi* are filamentous organs, and are terminated by claws of a simple kind. These Arachnidans receive their popular name from appearing in the fields in great numbers after harvest.

Phal'aux (Gr. probably akin to *phallos*; cf. Eng. *column*), in the tactics of the ancients, a battalion of heavy infantry (*hoplitai*), drawn up close and deep, and armed with spears 21 feet long, and short swords. Such a formation was known to Homer, and was effectively employed at Marathon (480 B.C.). It was reorganised by Philip (359 B.C.), the Macedonian P. comprising 16,384 men, sixteen deep, who were so drawn up that the spears of the fifth rank projected 3 feet beyond the first. This huge body, which could only act on level and open ground, was necessarily slow in its movements, and once broken fell an easy prey to the enemy. Hence the P. was from the first over-matched, and in course of time superseded, by the Roman Legion (q. v.).

Phal'aux, the name given to each of the joints or small bones of which the digits of vertebrates are composed. Three *phalanges* exist in each digit of man, with the exception of the great toe and thumb, in which only two are found. In some mammals (and particularly in Cetacea) the number of P. is very great.

Phal'aris, a tyrant of Agrigentum, in Sicily, who maintained himself on the throne for sixteen years (565–549 B.C.) with the aid of mercenaries and by the execution of the leading citizens. He roasted them alive in a brazen bull, making the first experiment on its inventor, Perillus. The so-called *Letters of P.* (Ven. 1498) were conclusively shown to be spurious by Bentley (q. v.), who styles them 'a fardle of commonplaces.' Their exact date cannot be determined, but they certainly belong to the Christian era.

Phal'arope (*Phalaropus*), a genus of *Grallatorial* or Wading birds (represented by the grey P. (*P. fulicarius*), by the red-necked P. (*P. hypoboreus*), and by other species. It is allied to the Snipe (q. v.). The genus P. has a long bill, and has the first and second quills longest. The toes are united at the base, and have lobes at the sides, and the hinder toe is raised and edged with a narrow membrane. The grey P. is an Arctic bird, which visits Britain in autumn and winter. It is agile in flight, and a dexterous swimmer, feeding on crustacea and molluscs. The winter plumage is blackish-brown on the head, neck, and back, a white band exists on the wing, and the neck and under parts are of a dull red. The breast and belly are pure white. The average length is 8 inches. The red-necked P. is smaller than the grey species.

Phal'lus (Gr. akin to Sansk. *pal*, 'to produce'), the Greek symbol of the generative powers of nature, corresponding to the Semitic Asherah and the Linga (q. v.) of the natives of India. It was usually made of fig-wood, and was borne in procession at the Dionysiac festivals.

Phal'lus, a genus of *Gasteromycetous* fungi in which the stems arise from a gelatinous volva, and is surmounted by a slightly wrinkled or a deeply pitted conical pileus perforated at the apex. The growth is very rapid, as is also the decay, the hymenium with the spores passing into a foetid semifluid mass. Some of the species are beautiful objects, but all have an odious smell at some period of their existence. The common stinkhorn (*P. impudicus*), a species frequent in Britain in open woods, shrubberies, &c., besides an unsightly appearance, has a disgusting carrion-like odour that may be felt for yards around its place of growth.

Phanerogamous Plants (Gr. *phaneros*, 'visible,' *gamos*, 'union'), a name applied to plants having visible flowers, in contradistinction to the flowerless plants or *Cryptogamia* (q. v.). The definition might otherwise be expressed by saying that the latter are destitute of flowers containing anthers and ovules, while P. P. have these organs. They comprise dicotyledons, monocotyledons, and gymnosperms, already referred to under separate headings. Alphonse de Candolle (1873) estimates the number of P. P. existing in the world up to 120,000 species.

Pha'raoh (Heb. *Phar'oh*), the name applied generally to the kings of Egypt in the Old Testament, is sometimes used by itself as a proper name (cf. Gen. xii. 15, &c.), a sense which is more clearly implied when, as is sometimes the case, the title 'king of Egypt' is subjoined to it (cf. 1 Kings iii. 1, &c.); and sometimes the generality of the name, like that of the Roman Cæsar, is implied by the real proper name being added (cf. P.-Necho, 2 Kings xxiii. 33; P.-Hophra, Jer. xlv. 30). The

meaning of the name was given by Josephus (*Ants.* viii. 6, 2) as simply 'king,' but in modern times it has been identified with P-RA or PH-RA, the sun-god of the hieroglyphics, as if the king had been regarded as his representative on earth, and by others with Per-aa or Pher-ao, lit. 'high house.'

1. The first P. mentioned in the Bible is the contemporary of Abraham (Gen. xii. 10-20), who is conjectured by Egyptologists to have been Salatis, Saites, or Set, the first king of the 15th (Hyk-shos) dynasty (about B.C. 2080), who held their court at Memphis and afterwards at Tanis (Avaris, Zoan). 2. The contemporary of Joseph (Gen. xl. &c.) has been identified with Usertesen I., the head of the 12th dynasty (Bunsen), but more generally with Apophis or Apepi II. of the 15th (about B.C. 1875). 3. The P. who oppressed the Israelites has been identified with Rameses II. of the 19th dynasty (about B.C. 1400), who, according to the hieroglyphics, built a chain of forts from Pelusium to Heliopolis, of which the two principal ones were called Rameses and Pachtum (Pithom, Exod. i. 11); 4. the P. of the Exodus (q. v.) with his son Memphthah or Amenophis. 5. The question as to who was the P. the father-in-law of Mered (1 Chron. iv. 18) is obscure and unimportant. 6. P., the brother-in-law of Hadad (1 Kings xi. 10-20), is supposed to have been Osochor of the 21st dynasty; 7. the father-in-law of Solomon, his successor Psusennes II. 8. P. the ally of Hezekiah against Sennacherib (Isa. xxxvii. 6), otherwise Tirhakah, king of Ethiopia (2 Kings xix. 9), was Taharka or Tirharka, the third of the 25th (Ethiopian) dynasty (about B.C. 694-668), who is known from the Assyrian cuneiform inscriptions to have waged war against the Assyrian kings Esarhaddon and Assurbannipal. 9. P.-Necho, by whom Josiah king of Judah was defeated and slain (2 Kings xxiii. 29; 2 Chron. xxxv. 20-24), was the son of Psammetichus I. of the 26th dynasty. 10. P.-Hophra, who raised the siege of Jerusalem conducted by Nebuchadnezzar in the time of Zedekiah (Jer. xxxvii. 5, xlv. 30), was the successor (about B.C. 590) of Psammetichus II., who succeeded Necho.

Pharisees were one of the so-called religious sects among the Jews in the time of Christ. The name (Gr. *pharisaios*, Heb. *pharush*, pl. *pherushim*, 'the separated') denoted those who separated themselves from Levitical impurity, which of course implied separation from those who were defiled by that. They styled themselves the 'Wise' or 'Disciples of the Wise,' and 'Associates,' meaning those who banded themselves together for the purpose of keeping the Mosaic laws regarding purity. As this implied a close study of, and great reverence for, the law, the great majority of the Scribes (q. v.), the learned in the law, belonged to the P. The religious societies of later Judaism are generally called *sects*, and a mistaken notion regarding them prevails in consequence. Sect as thus applied is a translation of the Greek word *hairesis* ('heresy'), used by Josephus in applying the titles of the schools of Greek philosophy to Jewish circumstances. These 'heresies,' however, were not, either among the Greeks or the Jews, sects at all in the modern sense, but schools of thought or parties, with no intention of separating from the general community.

The history of the P. begins with the return of the Jews from Babylon. They appear first as the 'separatists' of the time of Ezra, as opposed to those who held intercourse with the people of the land, and took wives from among them (*cf.* Ezra vi. 21, ix. 1, 2, x. 11; Neh. ix. 2, x. 29). The natural descendants of these were the Chasidim (q. v.), or Puritans of a somewhat later period. At least from the 3d c. B.C. the executive power was in the hands of the high priest and a council of elders. Before the reign of Antiochus Epiphanes (B.C. 175), from various causes, the common people, with the Scribes at their head, stood opposed to this priestly aristocracy. Under the first Asmoneans the two classes were driven by mutual antagonism into the position of parties, which under Jonathan (B.C. 161-143) became known as the P. and the Sadducees (q. v.). The former, then, were the national party, representing the democratic, religious tendency; the latter were the aristocratic party, representing the moderate, political tendency, which sought foreign alliances, and tried to introduce Gentile manners and customs. Jason (B.C. 175) and Menelaus (B.C. 172) overdid this policy, and thereby destroyed the popularity of the aristocracy; and their power was nearly ruined altogether when the nation revolted under the Maccabees (q. v.). But as the Asmoneans rose in power, becoming first high priests and then princes, a

breach was again formed between the P. and the aristocracy, which resulted in a civil war in the time of Alexander Jannæus (B.C. 105-79). In the time of Herod the Great (B.C. 37-4) the P., who numbered 6000, refused to swear allegiance to the king. But by this time the unity of the party was broken. A party of them, the turbulent spirits, engaged in conspiracies against Herod, while the majority, withdrawing more and more from politics as the condition of the country became more hopeless, sought to console themselves with a more eager study and observance of the law. But whilst the P. are thus to be regarded as the national party, it follows, from the very principle on which their existence as a party was founded, that a large number of the common people could not belong to them, but were in the position of outcasts, namely, all who, as in the time of Ezra, mingled too freely with the heathen in Palestine, which class would include the publicans, the creatures of Rome, and those of immoral life.

As to the general character of the P., the tendency described above inevitably led to the development among them of formalism, self-complacency, ostentation, superstition, and hypocrisy; but it is a great mistake to conclude, as is generally done, from the denunciations of Christ (*cf.* Mat. xxiii. 13-33; Luke vii. 36-50) that all the P. were self-righteous, superstitious, or hypocritical. The language of the Talmud (q. v.), *i. e.*, of the P. themselves, in denouncing self-righteousness and hypocrisy is quite as strong as that of the New Testament.

From what has been said it will appear that the tenets and practices of the P. are those of orthodox Judaism. The fundamental tenet of the party was that the whole nation were kings and priests, a holy nation, the object of most of their enactments being to make the people realise this—*e. g.*, at their social meals they paid great attention to washing themselves and the vessels they used, intending those meals to be like the meals of the priests. It was in this light, too, that they considered themselves to be the guardians of the law, in connection with which was another of their tenets, 'that by the side of the written law there was an oral law to complete and explain the former,' and which, like the former, was received by Moses from Sinai, and then transmitted by tradition to the men of the Great Synagogue; believing that so long as they remained faithful to God by keeping his law no power on earth could harm them. Hence they utterly repudiated the time-serving policy of the Sadducees, who maintained that human ingenuity and statecraft ought to be resorted to in political matters.' The objection to this theory from the calamities of the righteous and the prosperity of the wicked, the P. met with the doctrine of a future life, in which all these irregularities would be rectified. To facilitate obedience to the law, they put a mild interpretation on some of the Mosaic enactments, and tried to adapt them to varying circumstances. Thus, while the Sadducees understood the right of retaliation (Exod. xxi. 23) literally, the P. explained it as requiring a pecuniary compensation. See E. Deutsch on *The Talmud* (*Quart. Rev.*, October 1867, or *Lit. Remains*, Lond. 1874); C. D. Ginsburg in *Kitto's Cyclo. of Bib. Lit.* (3d ed. Edinb. 1876); Ewald's *Gesch. der Volks Isr.* (Eng. trans. 2d ed. 1869); Kuenen's *Rel. of Israel* (Eng. trans. 1874-75); Stanley's *Jewish Church* (3d series, 2d ed. Lond. 1877); and Cohen's *Les Pharisiens* (2 vols. Par. 1877).

Pharmacopœia (Gr. *pharmakon*, a 'drug' or 'medicine,' and *poieō*, 'I make') is the term applied to various books of directions for the preparation of medicines, published by the Colleges of Physicians, with the sanction of Government. Such works usually consist of a list of the articles of the *Materia Medica* (q. v.), with their properties, doses, and the tests for the determination of their purity; and also a collection of approved receipts for the treatment of disease. The first P. published under authority was that of Nürnberg, in the year 1542, the collection having been made by a student named Valerius Cordus from the works of the most eminent medical authors. Previous to that date, the works principally used by apothecaries and physicians were the book *On Simples*, by Avicenna and Serapion; the *Liber Serapionis*, by Balchasim bin Aberazerim; the *Antidotarium*, by Johannes Damascenus or Mezue; and the *Antidotarium* by Nicolaus de Salerno, commonly called *Nicolaus Magnus* to distinguish it from an abridgment known as *Nicolaus Parvus*.

The first edition of the P. of the London College of Physicians, which appeared in 1618, was chiefly founded on the works

of Meze and Nicolaus de Salerno; and successive editions appeared in 1627, 1635, 1650, 1697, 1721, 1746, 1787, 1809, 1824, 1836, and 1851. Many of the pharmaceutical preparations enumerated in the earlier editions are of the most extraordinary nature, and indicate the low state of medical science in the 17th and 18th centuries. The skull of a man who had been hanged, the urine and excrements of various animals, the blood of the cat, frogs, toads, puppy dogs, worms, snails, and woodlice find a place in the earlier editions of the P. Medicinal compounds of the most complicated nature, containing sometimes a hundred different ingredients, were ordered; thus, the *Great Antidote against Poison and Pestilence* of Mathiolus contained 124 ingredients.

The first edition of the Edinburgh P. appeared in 1699, and the Dublin in 1807. The right of publishing the pharmacopœias of London, Edinburgh, and Dublin was vested in the Colleges of Physicians of these places respectively; but by the Medical Act of 1858 it was ordained that 'the General [Medical] Council shall cause to be published, under their direction, a book containing a list of medicines and compounds, and the manner of preparing them, together with the true weights and measures by which they are to be prepared and mixed; and containing such other matter and things relating thereto as the General Council shall think fit, to be called the *British P.*, which shall for all purposes be deemed to be substituted throughout *Great Britain and Ireland* for the several above-mentioned Pharmacopœias.' This clause in the Medical Act was rendered necessary, as each P. contained many important preparations, similar in name but totally different in strength, so that dangerous accidents arose, as from a London prescription being made up in Dublin, or *vice versa*. The first British P., which appeared in 1864, although having the advantage of uniformity, had defects, and gave rise to such a general feeling of disappointment throughout the whole ranks of the medical profession that the Medical Council ordered a new edition to be prepared, the preparation of which was intrusted to a committee of eminent men, with the President of the Medical Council as chairman. These gentlemen were engaged some years upon the work, and, when completed, it was submitted to all the members of the Medical Council, and to other practical men, for the purpose of receiving suggestions. Into this edition (1867) of the P. about 100 medicines were introduced, which had been left out in the first edition, the more important additions being benzoated lard, bromide of ammonium, carbonate of bismuth, solution of citrate of bismuth and ammonia, iodide of cadmium, oxalate of cerium, flexile collodion, glycerines of borax, carbolic acid, gallic acid, tannic acid and starch, compound ointment of mercury, mercury suppositories, medicinal lozenges, tinctures of pyrethrum and sumbul, &c.

The P. Germanica and the United States P. have been recently published, and a reprint of the British P. has been recently issued by the Medical Council, to which an Addendum has been appended. Austria, Belgium, France, and Russia have also their respective pharmacopœias; but a universal P., or one of so general a nature that the most important medicines shall be all of the same strength, is still a desideratum. See the *British P.*, and Squire's *Companion to the British P.* (11th ed. Lond. 1877).

Pharmacy (Gr. *pharmakon*, 'a medicine') is that department of *Materia Medica* (q. v.) which treats of the collection, preparing, preserving, and compounding medicines, and of dispensing them according to the formulæ or prescriptions of medical practitioners. The term P. is sometimes used in a more limited sense to denote the application of the laws of chemistry to medicines so as to render them easy of administration and more perfect and certain in their action. P. is sometimes used to denote the art of compounding and mixing drugs according to the prescription of the physician.

Pharos. See LIGHTHOUSE.

Pharsalus (mod. *Fersala*), anciently a town of Thessalia, 2½ miles from the left bank of the Enipeus, and 24 miles S. of Larissa. Near it Cæsar defeated Pompey, August 9, 48 B.C., the former losing from 230 to 1200 men out of 22,000 legionaries and 1000 cavalry; whilst of Pompey's army, composed of 45,000 legionaries and 7000 cavalry, besides a host of light-armed auxiliaries, 6000 were slain and more than 24,000 taken prisoners.

Pharyngobran'chii ('pharynx-breathers'), the name of the lowest order of fishes, represented by the Lancelet (q. v.) alone.

Pharyngognath'i, a group of *Teleostean* (q. v.) fishes represented by the Wrasses (q. v.), and forming a subdivision of the sub-order *Acanthopteri*, including the teleosteans with spiny-fin rays, e.g., perches. The inferior pharyngeal bones in the P. are united so as to form a single bone, on which teeth may be borne.

Pharynx (Gr.), the hinder part of the mouth in man and vertebrata generally. It lies behind the mouth, nose, and larynx, and thus constitutes the upper portion of the alimentary canal proper. The P. consists essentially of a muscular sac, of conical shape, the base being turned upwards or towards the mouth. It may be regarded as extending from the base of the skull to the *cricoid cartilage* of the larynx as a front boundary, and to the fifth cervical vertebra behind. In length it measures 4½ inches. It is attached behind by loose tissue to the spine, while below it merges into the *œsophagus* or gullet. Into the P. no less than seven apertures open—the mouth, the two *Eustachian tubes* (leading from the internal ear), the two posterior *nares* or hinder nostrils, the larynx, and the gullet or œsophagus. In structure the P. is seen to be composed of an external or *fibrous coat*, a middle or *muscular coat*, and an internal or *mucous layer*. The last is continuous with that of the mouth, gullet, larynx, and Eustachian tubes, and is covered by columnar *Epithelium* (q. v.) of the *ciliated* variety. The *mucous glands* of the P. are very numerous. In the act of *deglutition* or swallowing the P. is intimately concerned, being raised up towards the back of the tongue to receive the food.

Diseases of the P.—The P. is liable to acute inflammation, or pharyngitis, which is constant in sore throat of all kinds, and which may be propagated from the spine, and by erysipelatous affections spreading inwards. Follicular inflammation of the P., or *clergyman's sore throat*, is indicated by huskiness of the voice, coughing, hawking, and spitting. The follicles of the *isthmus faucium* and of the P. are prominent, the mucous membrane having the appearance of being studded with granulations, and the follicles sometimes burst and discharge small masses. This is occasionally followed by ulceration. The constitutional remedies are iron, quinine, and strychnia, and the most useful topical applications are solutions of nitrate of silver, or of creosote. In cases of diphtheria, the P. is frequently the most important seat of the disease. It is occasionally the seat of tumours, and malformations of the P. and œsophagus are not uncommon. Abscesses of the P. may be formed as the result of inflammation, or in connection with disease of the spine.

Phascogale, or *Tapoa Tafa* (*Phascogale penicillata*), a species of *Marsupial* quadrupeds inhabiting Australia, and attaining a length of 17 inches. The colour is grey above and white below, the fur being exceedingly soft and woolly. The tail is very long, and has a tuft of black hairs at its extremity. The P. is a most rapacious creature, doing great damage in hen-houses. It appears to form its burrow or nest in the trunks of trees.

Phascolarctos, a genus of *Marsupial* mammals, represented by the koala or kangaroo bear (*P. cinereus*), also named the 'native sloth' by the Australian colonists. The koala attains a length of 2 feet, and is covered with a bluish-grey fur. The tail is rudimentary, and the claws are strong, and adapt the animal for an arboreal life. The great toe is opposable to the other toes, and the fingers are divided into two sets, so as to constitute a hand-like member capable of grasping the boughs of trees.

Phascolotherium, an extinct genus of mammalia, believed to include species of insectivorous marsupialia. The remains of this genus are among the earliest relics of mammalian life on the globe. They occur in the Stonesfield slates of the Lower Oolites. The extinct P. is regarded as being most nearly represented by the existing Opossum.

Phase (Gr. *phasis*, 'an appearance'), in physics, is the particular state, at a given instant, of a continuously varying and periodic phenomenon. Thus we speak of the successive phases of an eclipse, of a tide, &c.

In astronomy, P. is the name given to the appearance of a heavenly body, the visible portion of whose illuminated surface alters with change of position. The phases of the moon are familiar to all, and show that our satellite is not self-luminous, but shines solely by reflected solar light. The planets Mercury, Venus, Mars, and Jupiter show certain similar but less marked

phases. That Venus had this characteristic was shown by Galileo as soon as he directed his telescope towards her; and at the time this discovery was regarded as irresistible argument in favour of the Copernican system of the universe.

Phaseolus. See KIDNEY BEAN.

Phasianidæ. See PHEASANT.

Pha'sis (mod. *Rion*), the ancient name of a river of Colchis (Mingrelia), which, rising on the southern slope of the Caucasus, at an elevation of 2735 feet, flows eastward to the Black Sea, which it enters at Poti, after a course of 138 miles. With the Cyrus (Kur) and Oxus it formed, and to some extent still forms, a mercantile highway between Greece and Persia. The pheasant (*Avis Phasiana*) was so named because originally brought from its banks.

Phas'midæ (Gr. *phasma*, 'a spectre,' a family of *Orthopterous* insects represented by the 'walking stick' insects, and by the 'leaf insects.' In this group the bodies are of linear conformation, and the wings are either abortive, or when developed are leaf-like. The antennæ are short, and the abdomen is nearly twice as long as the other regions of the body. In *Phasma*, the typical genus, species of which are found in tropical climates, both sexes are winged. In this family the young or larvae are like the adults, with the exception that in the winged species the wings exist in a rudimentary state in the pupæ.

Pheasant (*Phasianus*), a genus of *Rasorial* or Gallinaceous birds, the type of the family *Phasianida*. In this group the bill is of moderate length and the wings are rounded. The powers of flight are not markedly developed, and the tail is long and broad. The tarsi are 'spurred,' and the hinder toe is short and raised on the tarsus. In the genus *Phasianus* itself, the tail is long and wedge-shaped, and the nostrils are in a groove at the base of the bill. The fourth and fifth quills are the longest, and the tail is long. The common P. (*P. colchicus*), is a native of Asia Minor, but has become completely acclimatised in Britain and other European countries. It attains a total length of about 2½ or 3 feet. The males have a very brilliantly marked plumage. The head and neck are blue, glossed with green and purple tints, and a patch of scarlet skin surmounts the eye. The back plumage is coloured golden red, varied with black and brown tints and markings. The quill-feathers are brown; the breast is purplish red, and the under parts are brown, tinted with black. The brown tints predominate in the female. The nest of the P. is a rude structure, consisting of grasses, &c., collected on the ground. The eggs number eleven or twelve, and are of an olive brown colour. The P. appears to like mating with other species of Gallinaceous birds. Hybrids have been reared between the P. and common fowl, the grouse, the guinea-fowl, and the turkey. The food consists of insects, seeds, and vegetable matters of various sorts. The P. runs swiftly on the ground, but has only limited powers of flight. At night it roosts on the low branches of trees. P.-shooting in England and Scotland begins on October 1st, and ends on February 3d. The birds are fed during winter, and become so tame that P.-shooting in some cases can hardly be termed a sport. The female P., as is the case with the Peacock (q. v.), frequently assumes the plumage of the male when its sexual functions cease; and the male and females remain apart except at the breeding season. The Argus P. (*Argus giganteus*) is a species of P. occurring in Sumatra, and derives its name from the volute spots on the chestnut tail. The tail-feathers are extremely long, and the average length of the bird is about 5 feet, tail included. Reeves P. (*P. Reevesii*) occurs in N. China. It is noted for the extreme development of the two central feathers of the tail, which may measure 7 feet long, and which are of a grey colour, barred with dark brown bands. The Golden P. (*Thaumalia picta*) inhabits China, as also does Lady Amherst's P. (*Thaumalia Amherstii*) and the Silver P. (*Gallophasias Nyctemerus*). The Peacock P. (*Polyplectron Napoléonis*) occurs in the Moluccas, and attains a length of 20 inches. Its general colour is brown, varied with white and blackish-brown, the abdomen being black. The name Native P. is given to the *Leipoa ocellata* of Australia, a bird allied to the Jungle Fowl (q. v.).

Pheasant-Shell (*Phasianella*), a genus of *Gasteropodous* molluscs, of which the Australian P. S. (*P. Australis*) is a good example. It was formerly in great demand, and large prices were asked and obtained for good specimens. The P. S. belongs to

the family *Turbinida*, or top shells. The colours vary greatly, brown and green tints being among the most common hues.

Phe'idias. See PHIDIAS.

Phenom'enon (Gr. 'what seems'), a term used by metaphysicians to denote something as perceived by us, not necessarily as it is in itself. The reality which causes or produces it is termed by Kant the *noumenon*, 'what is in the *nous* or mind.' In literature the meaning of P. is less exact; the word being used rather vaguely as a synonym for 'feature,' 'aspect,' 'characteristic.' There is also a vulgar and inaccurate use of the term as equivalent to something wonderful: e.g., 'The Infant Phenomenon' means a baby of enormous size exhibited in shows.

Phen'yl, an organic radical having the composition C_6H_5 . Its hydride (C_6H_6) is called Benzol (q. v.), which is of great importance in organic chemistry and in the arts as the source of the aniline dyes. *Phenic alcohol*, *Phenol*, or *Carbolic Acid* (q. v.), is well known as a powerful antiseptic, and has the formula C_6H_5OH . P. is thus of high theoretical importance as the common radical of a great many most valuable substances. See HYDROCARBONS.

Phœ'ræ, anciently a city of Thessaly, lay in the S.E. corner of the Pelasgian plain, near Mount Pelion, and 90 stadia from Pagasæ, its port. It was famed in mythology as the home of Admetus, and in history as the seat of a race of tyrants founded by Lycophron about the end of the Peloponnesian War, who sought to extend their dominion over the whole of Thessaly. Lycophron was succeeded by his son Jason, who was chosen 'Tagos' (generalissimo) of Thessaly about 374 B.C., and being assassinated in 370, was succeeded by his brothers Polydorus and Polyphron. Polyphron murdered Polydorus, and was himself murdered by his nephew Alexander, a cruel tyrant, who was killed by his wife Thebe and her brothers in 359, in whose hands P. remained till 352, when it fell a prey to Philip II., king of Macedon. Remains of P. are still seen at *Valestina*. See Strabo, lib. ix., and Leake, *Northern Greece* (vol. iv.).

Pherecy'des, a Greek sage, was a native of the isle of Syros, and flourished in the 6th c. B.C. He was the teacher of Pythagoras, and himself composed a prose theogony, under the perplexing title *Heptamychos*, in which he maintained that there were three formative principles—Zeus or Æther, Chthona or Chaos, and Kronos or Time; and four elements from which all existing things were formed—earth, air, fire, and water. The fragments of this work were edited by Sturz (Gera, 1798).—Another P., a native of Leros, who resided at Athens in the 5th c. B.C., was author of the mythological history in ten books variously styled *Historiai*, *Autochthones*, or *Archaïologiai*. Its fragments are given in C. Müller's *Historicorum Græcorum Fragmenta* (Par. 1840).

Phid'ias (Gr. 'Pheidias'), son of Charmides, was born at Athens about the time of the battle of Marathon, B.C. 490. He began work as a statuary about 464, under Hegias, and then under Ageladas of Argos, quickly showing that he shared the inspiration of the age. Fortunately for the world, there was not only a P., but a Pericles. Pericles chose him to direct the work of beautifying Athens. The buildings on the Acropolis were the result—the chief of these the Parthenon, with its chryselephantine statue of Athene (so called because the uncovered parts were formed of ivory, the drapery being of solid gold). It was dedicated 438 B.C., and was regarded as an offering from the spoils of Marathon. It stood within the precincts of the Parthenon, and was 40 feet high, exclusive of the pedestal. Some relics of the Parthenon still exist in the British Museum. (See ELGIN MARBLES.) The beauty of the temple and the statue, developed with the utmost elaboration, yet losing none of the severe dignity of earlier styles, touched the limit of art. At some distance stood the great bronze statue of Athene Promachos (70 feet high), whose crested helmet and spear-point could be seen from the sea at Sunium.

From Athens P. went to Elis and to Olympia, where he spent several years in producing the masterpiece of the world, the Olympian Zeus. It was looked upon with such reverence, that except on festivals it was hidden with a veil. It represented the god, not as striving with Titans or hurling thunderbolts upon mortals, but as wrapt in awful repose. P. said that he had striven to represent the Zeus of Homer in this statue. In

432 B.C. P. returned to the Athens which his genius had glorified, only to meet death. Faction was intensely bitter at the moment. Afraid to strike at Pericles, they assailed him through his friends. P. was accused of stealing part of the gold given for the Athene Promachos, and accused of putting a figure of Pericles and one of himself on the shield of the goddess. This second charge was not one of impiety, but treason. Pericles had been represented as fighting with an Amazon, and this was taken for an allusion to the story of Theseus and Hippolyta, and therefore for a blow at the republic. The ungrateful Athenians cast P. into the prison Miltiades had been confined in, and there he died, victim of his own greatness, in 432 B.C. See Müller's *De Phidias Vita et Operibus Commentationes* (Gött. 1827), and Lloyd's *Age of Pericles* (2 vols. Lond. 1875).

Phigalia, an ancient town of Arcadia, in the Peloponnesus, stood on a lofty hill, above the modern village of Pavlitz. It was founded prior to 659 B.C., was upwards of 2 miles in circumference, and possessed a temple of Apollo Epicurius, a peripteral hexastyle building of the Doric order, 125 feet long by 48 broad, with 38 columns. This edifice, which, next to the Theseum at Athens, is the best preserved of all the Greek temples, was first described by Chandler in 1765. Its sculptured frieze, representing the contest of the Centaurs and Lapithæ (the Phigalian Marbles), was transferred to the British Museum in 1815.

Philadelph'ia, the largest city in Pennsylvania, and second only to New York in the United States, lies on the left bank of the river Delaware, 136 miles N.E. of Washington, and 87 miles S.E. of New York by rail. In shape it is somewhat irregular, following the course of the river, towards which it has a front 23 miles in length. The total area is 130 sq. miles. The houses are mostly built of red brick, and with a uniformity of style which is rather monotonous; although within recent years this has been much improved by the introduction of other building materials, such as sandstone and white marble, large quarries of which exist in the neighbourhood. The number of dwelling-houses is unusually large in proportion to the population, and this, together with the excellent drainage, ventilation, and water supply, has made P. one of the healthiest cities in the world. In 1874 its death-rate was 19.66 per 1000. Many streams flow through the city, of which the chief are Schuylkill River, here receiving the Wissahickon and Mill Creeks, and the Hollander's Cohocksink, Gunner's, Frankford, Wissinoming, and Pennypack Creeks, emptying into the Delaware. The Schuylkill is crossed by fourteen bridges, the finest of which is the iron one in Girard Avenue, 100 feet broad and 1000 long. That in Spring Garden Street is a double bridge, carrying an upper and lower street, and is 1290 feet long and 48 wide. The streets are almost without exception built at right angles. In 1875 tramway tracks were laid down over 242 miles of streets, and this traffic employed 5490 horses, and yielded a revenue of \$4,355,231. P. is supplied with water from seven great reservoirs. Another is being constructed (1878) in the East Park, with a storage capacity of 750 million gallons. In 1876 the waterworks supplied a total of 15,097 million gallons on an assessment of \$1,093,864. There are two public parks, Fairmount and Hunting. The former of these, which is 13 miles long by 4 broad (area, 2740 acres), is one of the largest public parks that exist, and includes some natural scenery of great beauty. The finest public buildings are the custom-house, a beautiful Doric structure of white marble; the mint, also of white marble in the Corinthian style; and the post office, with a front of white marble in the French style. These will all be surpassed, however, by the new city hall, commenced in 1871, and now (1878) approaching completion. It is a colossal structure of granite and marble, measuring 470 by 486 feet, and built in the Renaissance style. The tower when finished will be 450 feet in height, the loftiest of the kind perhaps in the world, and will be surmounted by a statue of William Penn. The grand lodge temple of the Freemasons, completed in 1876, is a splendid Corinthian structure, erected at a cost of \$1,400,000. P. has three principal theatres (the Arch, Walnut, and Chestnut), an Academy of Music, with a hall seated for 2900, and six minor theatres. The oldest public library in the city is the 'Philadelphia,' founded in 1731 by Benjamin Franklin. It contains about 100,000 vols. Other literary collections are the Athenæum, Mercantile, and Apprentices' libraries, and the Ridgway Library,

the granite building of which was nearly finished in 1876, out of the fund of \$1,500,000 left by Dr. Rush in 1869. In 1870 there were 370 public and private libraries, having 2,985,770 vols. The Pennsylvania Historical Society possesses a number of valuable historical works and MSS., besides a museum of relics and curiosities. There were (1876) in P. 534 churches, of which 104 are Methodist, 102 Presbyterian, 93 Protestant Episcopal, 78 Presbyterian, 71 Baptist, 43 Roman Catholic, 22 Lutheran, 16 Quaker (8 Orthodox), and 9 Jewish. The finest churches architecturally are St. Mark's (Protestant Episcopal), the Roman Catholic cathedral of St. Peter and St. Paul, with a dome 210 feet high, and the Jewish synagogue Roclef Shalom, adorned with arabesques. The University of Pennsylvania, founded as an academy by Franklin in 1749, occupies an area of more than 6 acres, and includes a medical college with accommodation for 600 students. In 1875 it had 44 professors and instructors, and 701 students. Other medical institutions are the Women's, Jefferson's, and Hahnemann's colleges, and the College of Physicians. The principal scientific institutions are the Academy of Natural Sciences, the Polytechnic College, the Wagner Institute (free), and the Franklin Institute. The chief schools of art are the Academy of Fine Arts and the School of Design for Women. There were in 1876 492 public schools, maintained at a cost of \$1,634,653. The benevolent institutions are very numerous, and include 24 hospitals, 21 orphan asylums, 19 homes for the aged, besides several special asylums for the blind, the deaf and dumb, inebriates, &c. There are 28 market-houses, several of which are spacious handsome structures. In 1875 there were sold at the drove-yards 141,000 beef cattle, 11,720 cows, 491,500 sheep, and 243,300 hogs. There are 14 daily newspapers, of which the *Public Ledger* has the largest circulation, amounting to 95,000. In manufacturing industry P. is second only to New York, which it surpasses in the variety of the articles made and the number of persons employed. In 1870 there were 8579 establishments, having an invested capital of \$204,340,637, and employing 152,550 hands, who received \$68,647,874 in wages. In 1875 the value of the exports was \$31,936,727, of the imports \$23,457,334. The principal articles exported were breadstuffs (value 1875, \$9,222,971) provisions, tobacco, coal, petroleum (\$7,927,399), and raw cotton (\$17,819,798); the chief imports being cotton and woollen goods. Grain is shipped by means of elevators: the Girard Point elevator is 124 feet high, has storage for 800,000 bushels, and can load six vessels at one time. The total number of vessels employed in foreign trade which entered the port of P. in 1875 was 1105, with a tonnage of 952,279. There also entered 8238 coasting vessels. P. has direct communication with Europe and many American ports by regular steam lines. Navigation is kept open in winter by three powerful iceboats, owned by the city. Iron shipbuilding is carried on to a considerable extent, and there are large launching and dry docks, shipways, &c. The United States navy-yard, at League Island, is 2 miles long and about half a mile broad, has an area of 923 acres, and a maximum depth of 26 feet. There are at P. two United States arsenals; the one at Frankford produced 10,500,000 cartridges in 1875, while the Schuylkill arsenal has occasionally disbursed clothing and camp furnishings to the value of \$20,000,000 in a year. The city, which is under a mayor and councils, had in 1876 a funded and floating debt of \$69,716,524. According to the municipal census of 1876 the population is 817,448.

The first settlement within the boundaries of P. was made by the Swedes in 1638. William Penn received his charter for Pennsylvania (q. v.) March 4, 1681, and P. was founded in the same year. In 1699 there was a population of 4500. The city received its charter from Penn in October 1701. During the war with Britain, P. was occupied by the British troops under General Howe from September 26, 1777, till June 18, 1778, and the battles of Germantown and Brandywine were fought near it. Congress assembled here 1778-83 and 1790-1800. During the civil war P. adhered strongly to the cause of the Union. The city has rapidly extended in recent years, and building enterprise is greatly stimulated by the action of over 600 building societies. Purchasers acquire lots on no other obligation than to pay interest on the original value of the ground, and can compel sellers to accept payment of the principal when they choose. In 1876 the centennial anniversary of the American Declaration of Independence was celebrated here by one of the most splendid international exhibitions the world has ever seen.

It was opened by President Grant on May 10, and from that time till its close on the 10th November it was visited by 9,789,392 persons, and the receipts for admission amounted to \$3,813,742. The exhibition was situated in Fairmount Park, and the entire buildings covered an area of 75 acres. See *The Official Guide-Book*, by Thompson Westcott (Phil. and Lond. 1876), and *Étude sur l'Exposition*, by Eugène Lacroix (1877).

Philæ, the name of two small islands in the river Nile, 6½ miles above Syene. P. proper, 'the Loretto of Ancient Egypt,' is the smaller of the two. It is 417 yards long and 130 broad, and is of syenite stone; its sides are high, with steep escarpments, and crowned with high walls. In early times it was held to be one of the burying-places of Osiris, and was supposed to be 'unapproachable' by either birds or fish; but by the time of Ptolemæus Physcon (170-117 B.C.) it was so frequented by pilgrims to Osiris' tomb, and traders between Meroë and Memphis, that the priests begged that king to relieve them from the burden of excessive hospitality. The hieroglyphic characters of this petition, engraven on an obelisk brought to England by Mr. Bankes, when compared with those on the Rosetta stone, have shed much light on the phonetic alphabet of ancient Egypt. Monuments dating from the age of the Pharaohs to that of the Cæsars cover both islands. The oldest remains of any size are of a temple of Athor (the Egyptian Aphrodite), built in the reign of Nectanebus I. (378-360 B.C.). The walls of the chief temple of P., dedicated to Ammon-Osiris, are everywhere covered with symbolic figures and representations of the myths concerning that god. This temple (435 feet long by 135 broad) was rudely defaced by Christian Iconoclasts, who converted its pronaos into a church of St. Stephen. The modern name of P. is *Jesiret-el-Birbeh* ('island of temples'). The hieroglyphic name of the smaller island was *Philak* ('boundary').

Philemon, **Epistle to**, was addressed by St. Paul to P., a personal friend and apparently a convert of the apostle (*cf.* 13, 19), residing at Colosse (*cf.* 1, 2, with Col. iv. 9, 17), regarding Onesimus, a runaway slave belonging to P., whom Paul had converted (10), and who was returning to his master. The epistle was received into the canon from the first, and that it was written by St. Paul was unquestioned till the time of Baur, who considers its language to be un-Pauline, and some of its contents improbable; but his 'criticism' has not been generally accepted by scholars. Baur himself was not very sure about the validity of his own doubts. The time and place of writing are determined by the Epistles to the Colossians and Philippians. The apostle was a prisoner at the time (22), as when writing the Epistle to the Philippians (ii. 23, 24), and Onesimus seems to have travelled in company with Tychicus, the bearer of the Epistle to the Colossians (iv. 7-9). It was therefore probably written from Rome about 62.

Philemon and Bau'ois, in classic mythology, a pair of Phrygians, who hospitably received Zeus and Hermes in the disguise of ordinary men, after they had been denied shelter by every one. For this Zeus took them to an adjoining mountain, while all the surrounding country was covered with a flood, made them guardians of his temple, and granted them the only boon they requested, that they might die at the same moment. Their story has been finely treated by Ovid in his *Metamorphoses*.

Phil'ibeg (Gael. *feileadh*, 'cloth or covering,' and *beag*, 'little'), an article of male apparel, and the characteristic garment of the Scottish Highlanders. It resembles a short petticoat, being suspended from the waist and only extending to the knees. In the lowlands of Scotland and in England the P. is better known by the name *kilt*, a Saxon word signifying 'a tucked-up garment.' The P., which is made of Tartan (q. v.), is usually covered in front by the *sporran* (Gael. 'a purse or pouch'), formed of an animal's skin, and frequently tasselled and otherwise ornamented.

Phil'idor or **Dan'ican**, **François André**, a celebrated composer and chess-player, born at Dreux in Orléannais, September 7, 1726; after studying music at Paris (1736-45), made a tour through Holland, England, and Germany, everywhere gaining a marvellous reputation for his skill at chess. In 1754 he returned to Paris, and devoted himself earnestly to music, his first opera, *Blaise le Savetier* (1759), being followed by twenty others in the course of the next eighteen years. He revisited London, and there published his *Traité du Jeu d'Echecs*

(1777), at Fontainebleau brought out *Thémistocle* (1785), the finest of all his operas, and died at London, whither he had been driven by the Revolution, August 30, 1795. P.'s system of chess-playing is shown in his maxim: 'Pawns are the soul of chess.' See Allen's *Life of P.* (Phil. 1864).

Philip II., King of Macedonia, the youngest son of King Amyntas II. by his wife Eurydice, was born at Pella in 382, and brought up with great care at Thebes, whither Pelopidas had carried him as a hostage. On the death of his brother Perdiccas III., P. became regent of Macedonia and guardian to his infant nephew Amyntas, but in a few months he himself assumed the royal power and title. The step was justified by the danger of the kingdom, harassed by the Pæonians on the N. and the Illyrians on the W., and at home agitated by the rivalries of Pausanias and Argæus. Reorganising the army on the plan of the phalanx, he fell upon Argæus and defeated him, immediately afterwards concluding a peace with the Athenians, by whom Argæus had been supported. The Pæonians were speedily reduced, and the Illyrians forced to sue for peace with the loss of a portion of their territory. In one year P. had freed himself from a position of great peril; he now set himself to carry out his ambitious aims. Soon after his accession he had declared Amphipolis free, in order to please the Athenians, who had aided Argæus in the hope of gaining that city; but afterwards, making a pretext for war, he besieged and took it in 358. P. had previously formed a secret treaty with the Athenians, by which he undertook to make over to them Amphipolis in return for Pydna. He now took Pydna without a struggle, and refused to stand by his engagement with Athens. To gain the good-will of the Olynthians P. gave them the town of Potidæa, taken from the Athenians in 356. He then took a Thasian settlement named Crenides, which he renamed Philippi (q. v.). In 352, after a long siege, he took Methoné, and marched thence into Thessaly to join the Aleuadæ against Lycophron of Pheræ, who was aided by the Phocians. In a short time he overran Thessaly, and advanced to Thermopylæ, from which, guarded by a strong Athenian force, he thought it prudent to retire. He now overran Thrace, and in 349 returned to commence an attack on the cities of Chalcidice. Demosthenes (q. v.) had already seen the real object of P., and in his first Philippic oration (352) endeavoured to rouse his countrymen to a sense of their danger. The Olynthians appealed to Athens, and by the famous Olynthiac orations Demosthenes induced his countrymen to aid their cause. But by 347 all the Chalcidian cities were in P.'s hands, and in 346, after making peace with Athens, he marched into Phocis (q. v.), and put an end to the Sacred War. His ascendancy in the Amphictyonic Council was henceforth complete, and he was appointed joint-president of the Parthian games. From 342 to 340 P. conducted an expedition in Thrace for the purpose of subduing the Greek cities in that country. Phocion was dispatched by the Athenians to counteract his efforts, and in 339 compelled him to raise the siege of both Perinthus and Byzantium. In the same year the Locrians of Amphissa, for tilling a portion of the sacred land, had been attacked by the Amphictyones, and in 338 they gave the command of their army to P., who marched through Thermopylæ and seized Elatea. The Athenians, hastily forming an alliance with the Thebans, were defeated by P. in August 338, at Chæronea. Greece was now at P.'s feet. He had long cherished the design of invading the Persian Empire at the head of a united Hellas. At a congress held at Corinth this was now determined on. Early in 336 he sent troops into Asia, under Parmenion, to gain over to his side the Greek cities, but in the summer of the same year he was murdered by a noble youth named Pausanias, at a festival held at Ægæ, on the occasion of the marriage of his daughter with Alexander of Epirus. Aristotle states that the deed was due to a private quarrel, but suspicion was attached to Alexander his son and Olympias (q. v.) his wife, who had been offended at his marriage with Cleopatra, daughter of Attalus, in the previous year. P. was a liberal patron of art and science, and a clement conqueror; but his passions knew no bridle save ambition. In politics he was a master of duplicity; yet only a policy like his would have enabled Hellas to resist the later violence of Rome.—**P. V.**, King of Macedonia, was the son of Demetrius II., and was born 203 B.C. He was only eight years old at the death of his father Demetrius, but till 220 his uncle Antigonus Doson ruled as king. During the first three years of his reign P. led with great success the war against the Ætolians

at the request of the Achæans and Aratus. This war, commonly called the Social War, he concluded in 217. Becoming jealous of his old friend and counsellor Aratus, he caused his death by poison in 213. Meanwhile P. had engaged in a war with the Romans. He formed an alliance with Hannibal in 215, and from 211, when the Romans received the Ætoliæ as their allies, he gained various victories over the latter, till peace was made in 205. Another war with the Romans broke out in 200, but the complete defeat of P. by the consul Flamininus at Cynoscephalæ in 197 brought it to a sudden end. Finding that he had put to death his son Demetrius on a false accusation, he is said to have died of grief, 179 B.C.

Philip II. King of Spain, was the son of Karl V. and Isabella of Portugal, and was born at Valladolid, May 21, 1527. The heir of the largest empire in the world, he was carefully educated, and early initiated into statesmanship and war. His father's efforts at the Diets of Augsburg and Regensburg to get him elected King of Rome having proved ineffectual, P., whose first wife, Mary of Portugal, had died in giving birth to the Prince Carlos, married Mary of England in 1554, and supported the title of king of that country, as well as the sovereignty of Naples and Milan. The jealousy of the English, and their reluctance to allow him any share in the government until the birth of a son, drove him to Flanders, where he became, by the abdication of Karl V. at Brussels, October 25, 1555, sovereign of the Netherlands, and January 16, 1556, King of Spain and all its vast dependencies in the New World. He found himself almost immediately on his accession at war with the Pope and his ally Henri II. of France. His arms were successful in Italy under the Duke of Alba, and in France under Philibert, Duke of Savoy, and Count Egmont, at St. Quentin (10th August 1557), and at Gravelines (13th July 1558). In this year, however, England, his ally, lost Calais, and was obliged to cede it to France at the peace of Cateau Cambresis (2d April 1559)—a peace which P., after his rejection by Elizabeth of England, cemented by marrying Elizabeth, daughter of Henri II. of France, who had been betrothed to his son Carlos (q. v.). He now fixed his residence at Madrid, and built the Escorial (q. v.). P. next imposed upon himself the task of destroying all civil and religious liberty within his dominions, and with this view established the Inquisition, which, however, was vigorously resisted in the Netherlands, and roused a spirit of insurrection which grew into revolution, and, notwithstanding the terrible severity of Alba, and the military genius of Don John of Austria and Alessandro Farnese, achieved the independence of the northern provinces in 1579. In 1580, when the direct male line died out, P. acquired Portugal, which was annexed to Spain for sixty years. His anger against the English as promoters of the rebellion in the Netherlands led to his great attempt to conquer England by the 'Invincible' Armada (q. v.), which was so disastrously foiled. For four years (1589-93) he lent his aid to keep the Protestant Bourbon from the French throne, but he was compelled to recognise him as Henri IV. at the treaty of Vervins (2d May 1598). P. died of a loathsome disease, September 13th of the same year, at the Escorial, leaving a son by his fourth queen, Anne of Austria. Few princes have had so many biographers, and seldom has the verdict of history been so unanimous in its condemnation. With excellent abilities but little real insight or wisdom, he failed in all his greatest undertakings, and did fatal evil to Spain by crushing out the old heroic spirit which had made her pre-eminent among the nations of Europe, and destroying by a cruel and gloomy bigotry every promise of advancement in religious thought or civil freedom. See Campana, *Vita del Don Filippo d'Austria*; Herrera, *Historia del Mundo en el Reynado del Rey Phelippe II.*; Cordova, *Vida de Felipe II.*; Dumesnil, *Histoire de Philippe II.*; San-Miguel, *Historia del Rey D. Felipe II.* (4 vols. Madr. 1844-45); Gachard, *Correspondance de Philippe II.* (3 vols. Bruss. 1848-59); *Don Carlos et Philippe II.* (Bruss. 1863); Prescott, *History of the Reign of P. II.* (1855-58); and Motley, *History of the United Netherlands* (1860-65).—**P. V.**, first Bourbon king of Spain, was the grandson of Louis XIV., and was born at Versailles, December 19, 1683. By the last testament of his uncle, Carlos II., in 1700, he was declared heir to the Spanish throne. However Karl, Archduke of Austria, great-grandson of Philip III. of Spain, established a rival claim, and was supported by England, Austria, and Holland, and afterwards by Prussia, Denmark, and Hanover. The war known as the War of

the Spanish Succession (q. v.) continued with varying fortune until 1713, when the throne was secured to P. by the peace of Utrecht. In 1714 his queen, Louisa Maria of Savoy, died, and P. married the ambitious Elizabeth Farnese of Parma, who, influenced by Alberoni (q. v.), induced him to attempt the recovery of Sicily and Sardinia. He was compelled by the Quadruple Alliance (France, England, Austria, and Holland) to lay aside his schemes and dismiss Alberoni, but in 1731 he joined France and England against the Emperor, and in 1736 acquired the kingdom of the Two Sicilies for his son Carlos. In his later years P. became almost idiotic, and could only be aroused from his mental stupor by the songs of Farinelli. He died at Madrid, July 9, 1746. See Targe's *Histoire de l'Avènement de la Maison de Bourbon au Trône d'Espagne* (8 vols. Par. 1776); Coxe's *Memoirs of the Kings of Spain of the House of Bourbon* (3 vols. Lond. 1813); Viollet's *Hist. des Bourbons en Espagne* (Par. 1843); and Lord Mahon's *War of Succession in Spain* (Lond. 1832).

Philippe I. of France, son of Henri I. and Anne of Russia, was born in 1052, and named after Philip of Macedon, because of a supposed genealogical relationship between that potentate and his mother. He was consecrated king in 1059. Great events took place during his long reign, but P. is not associated with them. In 1071 he attacked Robert the Frisian, who had seized Flanders, but was shamefully defeated. He was more successful in 1076, having driven back the Normans, who were endeavouring by an alliance with Aquitaine to establish a strong power from the Seine to the Pyrenees. In 1094 he was excommunicated, and summoned to appear at the Council of Piacenza, having divorced his wife, and carried off Bertrade, wife of Fulk of Anjou. He was again excommunicated in 1100, before which he had turned the enthusiasm of his neighbours over the first Crusade to some account by buying a footing on the south bank of the Loire. The same year he associated with him in the sovereignty his son Louis, and eight years afterwards this weakest of the Capets died at Melun (29th July 1108), reconciled to Rome. See Ordericus Vitalis, the French histories of Sismondi, Michelet, and Martin, and Kitchin's *History of France* (vol. i. 1873).—**P. II.**, known as Auguste the Magnanimous, son of Louis VII. and the beautiful Alix of Champagne, was born 22d or 25th August 1165. At the age of fifteen he was crowned at Rheims, the twelve nobles who held the great fiefs immediately from the crown being present. His earliest dreams were of restoring the old Karoling power in its entirety, and says Kitchin, 'For forty-three years he pursued this end, and brought to bear on it a cold pertinacity, a freedom from uneasy scruples, a clear sagacity in conceiving crafty plans, and constancy in carrying them out.' One of his first public acts (1182) was to banish the Jews from his realm, after having plundered them of their goods; and to proclaim punishment of death to profane swearers. He had already shown his independence of character by marrying Isabelle of Hainault, niece of the Count of Flanders, against the will of his uncles. No sooner was his father dead than all the great vassals rose in rebellion, and P. had to embark (1185) on a series of wars, subduing first of all the Count of Flanders, and next the Duke of Burgundy. He then turned his attention to Normandy and the south, and (1186) waged war with Richard the Lionheart in Aquitaine—a war which ended in the friendship of the combatants, and gave P. the opportunity of intriguing with the other sons of Henry II. against their father. In 1188, Henry, betrayed by his sons, was compelled to declare himself liegeman in full, and to yield Berri. With much reluctance P. went on a crusade (1190), wintering in Sicily with Richard, landed at Acre or Ptolemais (13th April 1191), grew tired of the skirmishings, swore to his rival that he would protect his territories, and returned home. On his way back he tried to get quit of his oath by Papal intervention, but failed. He then intrigued against Richard through John, and on the tidings of the former's captivity reaching France, he attacked Normandy, and by a truce in 1196 became master of Auvergne, after a wasting war with his rival. But in 1197 his great vassals turned towards Richard, and hard times might have overtaken P. had not Innocent III. interfered in the interests of peace. On the death of Richard, Anjou, Maine, Poitou, and Touraine declared their allegiance to Arthur of Brittany instead of to John. P. took these under his protection, and in the name of Arthur dismantled every town he took in Brittany. Meanwhile (1199), having taken a dislike to his second wife, Ingeborg

of Denmark, he dissolved the marriage with her, but only to suffer the penalty of excommunication, an inconvenience which made him make peace with John. The murder of Arthur in 1202 once more roused P., and he took arms against John, attacked and captured Château Gaillard (1207), overran Normandy and seized Rouen in the same year, consolidating his conquests in the kingdom of France. To give them the appearance of legality, he summoned 'the twelve Peers of France,' six laymen and six ecclesiastics, to form a court. P. stood aloof from the religious war in Provence, though in 1215 he accepted the homage of Simon de Montfort, who had taken for himself the heritage of Toulouse. In 1214 he had crushed the coalition of barons and princes, by the decisive battle of Bouvines, a battle 'which roused the national spirit as nothing else could; it was the nation's first taste of glory.' P. sanctioned the expedition of Louis to England in 1216; but he resisted every effort of the Roman court to embark him in the Albigensian crusade. In his later days he became devout, and attended to all clerical ordinances. He died of fever at Mantes, July 14, 1223. He left an enormous fortune to his son, and a great reputation. P. was proud, patient, brave, and deceitful, eminent in the science of war, sagacious in politics, a lover of literature, and a reformer of cities. See Rigord, *De Gestis Philippi Augusti*; Guillaume le Breton, *De Vita et Gestis Philippi*; Baudot de Juilly, *Histoire de P. Auguste* (2 vols. Par. 1704); Lussan, *Anecdotes de la Cour de P. Auguste* (6 vols. Par. 1733-38); Capefigue, *Histoire de P. Auguste* (4 vols. Par. 1829); the French histories of Sismondi, Michelet, and Martin, and Kitchin's *History of France* (vol. i. 1873).—**P. III.** ('le Hardi'), son of Louis IX. and Marguerite de Provence, was born 3d April 1245, married in 1262 Isabella of Aragon, was on a crusade with his father at the time of his death, and bore back his bones from Tunis to France (1269-70). He was utterly illiterate, but surrounded the throne with lawyers. Edward I. did homage to him for the lands he held of him. He encouraged favouritism, held one great tournament, which at least proves he did not need to be jealous of his own vassals. In 1285 he led an expedition against Pedro, King of Aragon, and ruined thereby both fleet and army. This adversity induced a fever, of which he died at Perpignan, 5th October of the same year. His reign was a period of great tranquillity for France. See Guillaume de Nangis' *Gesta Philippi Audaci*; the French histories of Sismondi, Michelet, and Martin; and Kitchin's *History of France* (vol. i. 1873).—**P. IV.** ('le Bel'), son of preceding, was born at Fontainebleau in 1268, succeeded to the throne in 1285, and from contemporary descriptions of him seems to have been tall and handsome, though proud and taciturn. Lawyers continued to guide the royal policy, and in the direction of absolutism. From 1285 to 1296 nothing of importance occurred save the languid prosecution of war in Aragon and Sicily, and the payment to Edward I. of 10,000 livres for a renunciation of his claim on Normandy. From 1296 to 1304 was filled with the events of his quarrel with the Pope and the war with Flanders. Boniface VIII. offended P. first of all by mediating between him and Edward, then by ordering him to release the daughter of Guy of Flanders, and lastly (1296), by issuing a bull, entitled 'Clericis laicos,' in which ecclesiastics were forbidden to pay taxes of any kind to the civil power without the permission of the apostolical see. This was met on P.'s part by an ordinance forbidding the export from the kingdom of anything of value except with his permission. Fresh threats were thundered from Rome, and cast back by P. Nuncios were dispatched, and the dispute ended for that time by the issue of a fresh bull excluding France from the operations of 'Clericis laicos.' But after again mediating between P. and Edward, the attitude of antagonism began to reappear. The year 1300 witnessed a revival of faith in Christendom. The Pope sent an arrogant legate to France, who attempted to stir up rebellion. A bull claimed for the Pope supremacy over all temporal authorities. It was solemnly burnt by P.; the estates of France were called (1302), and declared against the Roman pretensions. The decretal of 'unam sanctam' (18th November) affirmed that the spiritual ought to judge the temporal power, and issued excommunications against all who tried to despoil those going to Rome. P. hesitated, but in 1303, by intriguing against the Pope at Rome, he had him imprisoned, and subjected to such indignities that he died. In 1304 Clement V. cancelled the obnoxious bull, and became in a large measure subservient to P. In 1304 the struggle in Flanders ended in a recognition

of its independence, the eldest son of Count Guy doing homage. The epoch on to 1314 is marked by the doom slowly prepared by P. for the Order of the Templars, whose power and wealth were a source of uneasiness to him. They were all arrested in October 1307, and their goods seized. Clement was asked to condemn them, and being in France, P. declined to let him return to Rome unless he consented. In 1310 many of the knights were burned at the stake. The king's ferocity grew with his years, until in 1314 a great confederation was formed in the country against his tyranny. He expired 29th November 1314, at Fontainebleau, having added to French territory, but leaving a name odious in the mouths of his people. See Guillaume de Nangis' *Chronicon*; Boutaric's *La France sous P. le Bel*; the French histories of Sismondi, Michelet, and Martin; and Kitchin's *History of France*, vol. i. 1873).—**P. V.** ('le Long'), second son of preceding, was born in 1293, hastened on the death of his nephew to be crowned at Rheims (1316), after which he returned to Paris, declaring that no female could succeed to the crown of France. The chief events of P.'s reign are of a sinister character. He persecuted the Franciscans, who were preaching the primitive simplicity of the early Church, and encouraged the savage superstition by which life was rendered miserable to the Jews. He died 3d January 1322. See Kitchin's *History of France* (vol. i. 1873).—**P. VI.**, of Valois, son of Charles of Valois, became regent on the death of Charles IV., was born in 1293. A great feudal lord, he was crowned king at Rheims (May 29, 1328), his rival in succession being Edward III. of England, son of Isabella of France, Philippe le Bel's daughter. P.'s reign opened with a successful campaign in Flanders, which removed the blot of Courtrai, and entitled him to enter Paris with much pomp. By 1331 Edward III. had, with the advice of his parliament, seen it to be best to do homage. But angered by the faithlessness and greed of P., he declared war (1337), which did not finally cease till the battle of Chatillon (1453). Nothing save marchings, counter-marchings, and slight unimportant skirmishes took place until June 24, 1340, saw the naval force of France entirely swept away at Sluys. It was not till the 26th August 1346, after the battle of Crécy and the fall of Calais, that a truce, which lasted for some time, was concluded between the kings. In 1347-48 the black plague struck desolation into the country, and the miseries of P.'s reign were rendered still more dark. Before he died (August 22, 1350) he added, by purchase, Vienne and Majorca to his kingdom. But he had ground down the people of France with heavy imposts, had retarded trade, broken the strength of chivalry, and sold offices, titles, and even nobility. 'All things,' says Kitchin, 'seemed to be evil in France. Oppression, war, pestilence, faithlessness in king and people, days of shame and distress.' See Froissart's *Chronique*; Lévesque, *La France sous les cinq premiers Valois*; the French histories of Sismondi, Michelet, and Martin, and Kitchin's *History of France* (vol. i. 1873).

Dukes of Burgundy.—**P.** ('le Hardi'), fourth son of Jean, King of France and Bonne of Luxembourg, was born January 15, 1342, distinguished himself at Poitiers, where, though a child, he stood by his father, and warded off the blows directed at him. On that field he gained the title 'le Hardi.' In 1363 his father bestowed on him the duchy and peerage of Burgundy, which was afterwards ratified by Charles V. Three years later he married Margaret of Flanders, and on till 1372 he operated against the English in Northern France. He fought the successful battle of Rosbeck against the Flemish in 1382, and in 1384 Flanders fell into his hands in right of his wife. 'He was,' says Kitchin, 'wise and conciliatory, restored the Flemish liberties, and was himself more a Fleming than a Lily prince.' And thus the foundation of the great Burgundian dukedom, stretching in a curve from the sea round the whole northern and much of the eastern frontier of France, was securely laid. On the king showing symptoms of madness, he seized the government (1392), and occupied himself with repelling the English invasion. He died 27th April 1404, at the Chateau of Hall, Hainault.—**P.** ('le Bon'), grandson of the preceding, son of Jean Sans Peur and Margaret of Bavaria, was born at Dijon, June 13, 1396, and on the murder of his father succeeded to the duchy of Burgundy. At Arras, in 1419, he recognised Henry V. of England as Regent of France and heir to the throne; in 1429 he went over to the side of the King of France, but on the cession of Champagne returned to his English allegiance.

Again, in 1435, through Papal influence, he entered into an alliance with Charles, though later on P. harboured the Dauphin (afterwards Louis XI.) when the latter mutinied against his father. In 1454 he put down with a strong hand a revolt of the citizens of Ghent. He died July 15, 1467, leaving Burgundy at the highest pitch of prosperity it ever reached. See Barante's *Histoire des Ducs de Bourgogne*; Michelet and Martin's French histories; and Kitchin's *History of France* (vol. i.-ii. 1873-77).

Philippeville, a town in the province of Constantine, Algeria, situated on the Gulf of Stora. It occupies the site of the ancient town of Russicada, was founded by Marshal Valée in 1837, and possesses some handsome public buildings. P. is connected by rail with the town of Constantine, 40 miles to the S.S.W., and is the outlet for a fertile district. Large sums have been expended on its harbour works, with the result of making P. the third port in Algeria. The imports in 1874 amounted in value to £1,107,000, and the exports to £1,498,000. Of the latter, the chief were grain, tobacco, flax, and cotton, as well as marble from the celebrated quarries of Filfila, in the neighbourhood. Pop. (1876) 13,736.

Philippi, a famous city of Macedonia *Adjacta*, on a steep height of Mount Pangæus, between the rivers Strymon and Nestus. Founded by Philip II., King of Macedon, on the site of an old town called Crenides ('fountains'), a Thasian colony, for the sake of the rich gold mines lying near, it is celebrated in history as the scene of the victory gained in 42 B.C. by Octavianus and Antonius over Brutus and Cassius, and also as the place where Paul first preached in Europe, A.D. 53. The ruins of P. are now called *Filibah* or *Felibejek*.

Philippians, Epistle to the, was written by St. Paul to the Christians at Philippi in Macedonia, which was the first European city visited by the apostle (Acts xvi.), and where, after he left, the work was carried on by Luke, Timothy, Clement, and Epaphroditus (iv. 3, 18), being visited a second time by himself on his third missionary journey. The Pauline authorship of the epistle, for which the testimony of antiquity is abundant and unanimous, has been questioned in modern times, although the doubters have not found many supporters. It was obviously written at the same time and place as, but after, those to Philemon (q. v.) and the Colossians (q. v.), that is, probably during his captivity at Rome (cf. i. 13, iv. 22), about 62. The chief object of the epistle was to warn his readers against certain Judaizing teachers (iii.).

Philippics (Lat. *Philippica orationes*), a common expression for orations of great vehemence and invective, derived from Cicero's naming his fourteen speeches against Antonius after the three great orations of Demosthenes against the pretensions of Philip II., King of Macedonia.

Philippine Islands, the northerly group of the Malay Archipelago, 1200 in number, lying to the N. of Borneo and the Celebes, and between the Pacific Ocean on the E. and the Chinese Sea on the W.; lat. 5° 32'-19° 38' N., and long. 117° 14'-126° 4' E. Total area estimated at 120,000 sq. miles. Pop. of the area under Spanish government (according to Dr. A. B. Meyer in the *Mittheilungen* for 1874), 7,451,352. The largest islands are Luzon (51,300 sq. miles; pop. 4,540,191); Panay (11,330 sq. miles; pop. 1,052,586); Mindanao (25,000 sq. miles; pop. 1,918,022); Samar (13,020 sq. miles; pop. 250,062); Mindoro (12,600 sq. miles; pop. 70,926); Leyte (10,080 sq. miles; pop. 285,495); Zebu (2352 sq. miles; pop. 427,356); Negros (6300 sq. miles; pop. 255,873); and Bohol (6000 sq. miles; pop. 283,515). Luzon (q. v.), on account both of size and population by far the most important of the group, is the most northerly, while Mindanao, the next in importance, is the most southerly. Mindoro Sea, on the S.W., is portioned off from the Celebes Sea in the S. by the Sulu Islands, and from the Chinese Sea in the N. by the long narrow island of Palawan or Paragoa. The whole of the islands, which are of volcanic formation, have singularly contorted outlines, and rise in bold, irregular mountain masses, attaining a height occasionally of over 7000 feet, and covered to their tops with dense forests of enormous trees. The soil everywhere is remarkably fertile, and as water abounds both in lakes and rivers, and the climate is hot and humid, the flora develops in almost gigantic proportions. The principal trees are teak, ebony, and cedar, and there is also a rich growth of iron and sapan wood and gum trees. Among the numerous

fruit trees are the cocoa-nut, bread-fruit, orange, citron, tamarind, and mango, while the forests are overgrown and fantastically draped with garlands of huge climbing plants and brilliant parasites. In the valleys and on the mountain slopes are cultivated the famous abaca or manila hemp, tobacco, cotton, sugar, coffee, indigo, rice, wheat, maize, pepper, ginger, vanilla, cinnamon, &c. Manila hemp is exported to the amount of over 30,000 tons annually. Tobacco (a Spanish government monopoly yielding 33 per cent. of clear profit) bears a yearly gross receipt of £1,062,041. There are none of the larger wild animals, but the forests swarm with monkeys, squirrels, humming-birds, birds of paradise, turtle doves, paroquets, fire-flies, and bees; and the jungles with lizards, snakes, mosquitos, huge tarantulas, &c. The rivers and lakes, which abound with fine fish of great variety, are haunted by crocodiles. The chief kinds of game are the deer, wild-boar, pheasant, and duck. The coast caves are the resort of myriads of large bats, and the repositories of the edible swallow's nest of commerce. Other articles of industrial value found in abundance along the shores are mother-of-pearl, coral, tortoise-shell, and amber. Peculiar, but excellent breeds of oxen, buffaloes, horses, goats, sheep, and swine are reared extensively. Gold occurs in the river-beds, and iron and coal are found plentifully. Other minerals extensively distributed are copper, vermilion, quicksilver, saltpetre, marble, and especially sulphur, which exists in immense quantities, both pure and mixed with iron, arsenic, and copper. The P. I. contain many active volcanoes, and are frequently visited by destructive earthquakes, such as that which devastated the province of Zamboango (Mindanao) in 1864. Near Tibi, E. of the great Yriga volcano, hot springs like those of Iceland, New Zealand, and the Yellowstone region, have deposited silicious incrustations displaying beautiful varieties of form and colour. The rainy season extends from May to December, but for the rest of the year the weather is generally fine and the heat moderate. At times, however, violent hurricanes sweep along the shores, especially during the change of the monsoons. The chief trading ports are Manila in Luzon and Iloilo in Panay, and these, together with Zebu, are the only harbours open to foreign commerce. The differential duties were abolished in April 1871, but were reimposed in July following, the Spanish importer being privileged to the extent of 2½ per cent. In 1875 there entered the open ports 314 vessels of 179,412 tons, and of these 111 were British vessels of 78,154 tons. The total exports in 1875 (chiefly sugar, hemp, coffee, cigars, tobacco, sapan wood, indigo, and gum mastic) amounted to \$19,466,839 (\$15,727,262 from Manila alone); exports (1875) to Great Britain direct were valued at \$4,157,313, to Australia at \$933,832, to Singapore at \$1,071,664, and to Hong-Kong at \$650,977. The native inhabitants of the cultivated lowlands are chiefly Tagalese and Bisayans, of whom the majority are Mohammedans (*Moros*), skilled in the production of various textile fabrics, silver and gold ornaments, cigar-cases of fibres, and beautiful coloured mats. The interior and mountain districts are inhabited by negro tribes, of whom little is known but that they are heathens, and that physically they strikingly resemble the Papuans. Besides paying a slight poll-tax (\$2 per family), the natives are held liable by the Government to render forty days' labour yearly in making roads, bridges, &c. In the province of N. Luzon the Government tobacco culture is carried on by 957,427 impressed workmen (*polistas*). There is a large mestizo class of Chinese paternity, the Chinese who visit the islands being only temporary settlers, and never bringing their wives. The half-castes are disaffected towards the Government; the last military insurrection, punished with sanguinary vengeance, took place at Manila in January 1872. The governor-general, appointed direct from Spain, resides at Manila, but the provinces are under local governors, and the *pueblos* or townships under chiefs. The army, comprising seven regiments of infantry and one of cavalry, is entirely composed of natives, with the exception of two Spanish brigades of artillery and a corps of engineers. There is a small navy, the most serviceable and characteristic vessels being the feluccas of the coast service. The Church is under an Archbishop of Manila and three bishops; the education of the people is shamefully neglected.

The islands were discovered in 1521 by Magellan, who reached Tamar on the 6th March of that year, and was killed in an encounter with the natives of Matan. In 1565 Villalobos led an expedition to the island of Zebu, and named the whole group in honour of Philip II., then Prince of Asturias. From the middle

of the 16th c. the P. I. became the emporium of a rich trade between China and Spanish America. The yearly voyage of a galleon from Manila to Acapulco, with spice and silk to exchange for silver, was proverbially the richest venture of that age. This trade was destroyed by prohibitory laws, intended to favour the mercantile and manufacturing monopolists of Spain. The seat of the Spanish government was transferred from Zebu to Manila in 1581. The comparative failure of trade in modern times is due to a niggardly fiscal system, the restrictions on foreign shipping, and the abandonment of the natives in temporal as well as spiritual affairs to the rule of parochial priests. See Semper's *Die Philippinen und ihre Bewohner* (Würzb. 1869), and *Reisen im Archipel der Philippinen* (3 vols. Leipz. 1867-72), F. Jagor's *Travels in the Philippines* (Lond. 1875), and Dr. Th. Mundt-Lauff's *Negritos der Philippinen in the Deutsche Geographische Blätter* (Brem. 1877).

Philippins (from Philip Pustioswiät, one of their earliest leaders), or **Starovery** ('Old Believers,' from *stary*, 'old,' and *vera*, 'faith'), a Russian sect, settled since 1700 in Lithuania and East Prussia. They are a branch of the Raskolniks (q. v.), and cling persistently to the ancient liturgy of the Russo-Greek church, discountenanced by the authorities for more than two centuries. They refuse to serve as soldiers, reject oaths, and for the regular priesthood they substitute celebrated elders of their own, called *Stariks*, who rebaptize all converts to their opinions. Though they have at times run into wild fanatical excesses, the P. are now peaceable and industrious people, whose chief pursuit is the tillage of the soil.

Philippopolis (Turk. *Filibé*; Bulgar. *Plowdi*), a town of Rumilia, vilayet of Adrianople, on a small island in the river Maritza (which here becomes navigable), 90 miles W.N.W. of Adrianople by rail. The island rises to a height of some 500 feet in the triple syenite hill of Bunardchik ('hill of springs'), which is conspicuous over the great fertile plain stretching away in the N. to the Balkans. The town, founded by Philip, father of Alexander the Great, was taken by the Turks in 1360. The old Greek and Byzantine town, now the Turkish quarter, occupies the heights, and is surrounded by that of the Jews (*Marach*), of the orthodox Bulgarians and Armenians, of the Catholic Bulgarians (*Pavlikans*), and of the gipsies (*Tsiganka-Mahall*). There are thirty mosques, six Greek and three Bulgarian churches, and one Roman Catholic church to hold 8000 persons. P. is one of the most important trading towns of Turkey, and the seat of a great fair on 27th August. It manufactures silks, cottons, and leather, and trades in the produce of the vicinity, including wine, rice, and silk. Pop. 45,000, of whom eleven-fifteenths are Mohammedans, one-fifth Christian, one-fifteenth Jewish and gipsy. During the late war, the Turks under Suleiman Pasha, who had fallen back upon P. after the forcing of the Schipka Pass, retired precipitately on the sudden appearance of Gourko, and the Russians entered the town unopposed, January 16, 1878.

Philippsburg, an ancient imperial fortress on the Rhine, 16 miles N. of Carlsruhe. After the Thirty Years' War, in which it played a prominent part, it was ceded to France; in the War with Louis XIV. it was recovered for Germany by Charles of Lorraine; and in 1688 it was taken by the French under Vauban, but restored at the Peace of Ryswick. Again captured by the French in 1734, when their leader the Duke of Berwick was killed, it was only held till 1735. It was finally dismantled by the French in 1800. There is a village of the same name with 2317 inhabitants.

Phillips, Ambrose, was born about 1671 in Leicestershire, studied at St. John's College, Cambridge, and in 1709 published his *Pastorals in Tonson's Miscellany*. These pieces having been extravagantly praised by Tickell, P. became an object of bitter enmity to Pope, who ridiculed him in the *Guardian* with his accustomed success. P. was a Whig, and after the accession of the House of Hanover held various lucrative posts, chiefly in Ireland. He died in London, June 8, 1749. P. received the nickname 'Namby-Pamby,' from a peculiar short metre and puerility of diction which he frequently adopted. Johnson has kindly said of his productions that, if they have added nothing to English literature, they are at least worth reading. Besides the pieces mentioned, P. wrote a *Life of John Williams, Archbishop of York* (1700); *A Winter Piece*, a poem in the *Tatler*

(1709); the tragedies *The Distressed Mother* (1711), from the *Andromaque* of Racine; *The Briton* (1721); *Humphrey, Duke of Gloucester* (1721); and most of the political articles in the *Free-Thinker* (3 vols. 1718-19). See Johnson's *Lives of the Poets*.

Philistines (variously derived from the Heb. root *palash*, 'to migrate,' from *sheplah*, the name of the plain they inhabited, by transposition, or connected with Pelasgi), were a tribe or nation who occupied the southern part of the coast plain of Palestine, which later name of the Land of Canaan, indeed, is derived from that of their territory, Philistia or Palestina. The origin of the nation is wrapped in obscurity. They are described by the Hebrew prophets as from Caphtor (Amos ix. 7), and as 'the remnant of Caphtor' (Jer. xlvii. 4), while in Deut. ii. 23 the Caphtorim are said to have driven out the Avim, and occupied their territory. Again the Philistim are mentioned (Gen. x. 14) among the descendants of Mizraim (the Egyptians), while they are distinguished from the Caphtorim. An opinion held by some of the best modern critics is that by Caphtor is to be understood the island of Crete (cf. 1 Sam. xxx. 14; Ez. xxv. 16; Zeph. ii. 5). But even if this were settled, the antecedent question is still undecided as to whether they were of Semitic or Hamitic origin, coming from Egypt, or of an Aryan stock, from the other side.

The date of the first arrival of the P. in Canaan is also quite uncertain. They had already established themselves in the S., under a monarchy, in the time of Abraham (Gen. xx. xxi., xxvi.). At the time of the Exodus they were a warlike and formidable nation (Exod. xiii. 17), ruled by five princes or chiefs of five cities, Gaza, Ashdod, Eshkalon, Gath, and Ekron (Josh. xiii. 3). Their power about this time (B.C. 1300-1200) was so great that they were able to carry on war simultaneously with the Egyptians and the Sidonians, the latter of whom they forced to remove their capital to an island (Tyre). After the Israelites were settled in Canaan, between them and the P. there was kept up an almost incessant warfare, in which the latter seem upon the whole to have had the best of it, till the time of David, from whom they received such a check as stopped their inroads for a time (cf. 1 Kings iv. 21). That they were still powerful, however, appears from the fact that Solomon thought it necessary to build forts on the frontier (1 Kings ix. 17), and the intermittent warfare which continued under the kings of Judah and Israel (cf. 1 Kings xv. 27, xvi. 15; 2 Chron. xxi. 16, 17, xxvi. 6; Joel iii. 4-6; Amos i. 6-8; Is. xiv. 29-32). In the wars between Assyria and Egypt Philistia became the battle-field for the two powers (about 700 B. C.). The Assyrian general took Ashdod, which was only retaken (about B.C. 620) by the Egyptians under Psammetichus. Gaza, which had been taken by Pharaoh-Necho (B.C. 610-594), on his return from the battle of Megiddo (2 Kings xxiii. 29; 2 Chron. xxxv. 20), was retaken by Nebuchadnezzar (about B.C. 607), again taken by Pharaoh-Hophra (B.C. 589-570), and retaken by Nebuchadnezzar about the same time as Jerusalem (B.C. 588). During the Babylonian Captivity the P. sought to revenge themselves on their old enemies (Ez. xxv. 15-17), but a change took place after the return (B.C. 535), for the fraternising of the two nations was a scandal to the puritan Jews (Neh. xiii. 23-25). From this point the history of the P. is lost in that of the neighbouring nations.

The religion of the P. was a species of nature-worship. Their deities were Dagon (q. v.), worshipped chiefly at Gaza (Judges xvi. 21-23) and Ashdod (1 Sam. v. 3-5), Astarte at Ashkelon (1 Sam. xxxi. 10), and Baalzebub, at Ekron (2 Kings i. 2-6). The Derceto of Diod. Sic. ii. 4 is the Astarte of the Bible. See Ewald's *Geschichte des Volkes Israel* (vol. i. Eng. trans. 2d ed. 1869); Hitzig's *Urgeschichte und Mythologie der Philistiner* (Leips. 1845); *Zeitschrift der Deutschen Morgenl. Gesellschaft* (1848, 1860, 1862); Mover's *Phanizier* (3 vols. 1840-56).

Phillip, John, R.A., one of the most powerful of modern painters, born at Aberdeen, 22d May 1817, was apprenticed to a house-painter, and displayed an instinctive knowledge and command of colour almost in childhood; removed to London (1837) under the auspices of Lord Panmure, and studied at the Royal Academy. He exhibited his first historical picture in 1840, but returned to Aberdeen, where he resided till, his health failing him, he went to Spain in 1851, and from this period the character of his art, which had at first been specially Scotch—as exemplified in his 'Scotch Fair,' &c.—became changed, and

he afterwards painted chiefly Spanish subjects. His chief works are 'Life among the Gipsies at Seville' (1853), 'Letter Writer of Seville,' and 'El Paseo' (1854-55), 'Spanish Contrabandistas' (1858), the 'Marriage of the Princess Royal' (1860), and 'The House of Commons, 1860' (1863). The last two are difficult subjects, embracing numerous portraits, yet both are masterly in composition, and, like all P.'s works, rich and brilliant in colour, and especially powerful in drawing and in brush-work generally. P. was admitted Royal Academician in 1859, and died in London, 27th February 1867.

Phillips, Thomas, B.A., the successor of Fuseli as professor of painting in the Royal Academy, and an able lecturer and art critic, was born at Dudley, Warwickshire, in 1770, apprenticed to a glass-painter at Birmingham, and removed to London in 1790. He first exhibited in the Royal Academy a view of Windsor Castle (1792), became an associate in 1804, a full member in 1808, and professor of painting in 1824. Early in his career he painted classical and historical subjects, but afterwards found his true vocation in portrait-painting, in which, though a contemporary of Lawrence, he achieved much distinction. P. died 20th April 1845.

Phillips, Wendell, one of the most distinguished advocates of the abolition of slavery in America, is the son of John Phillips, the first Mayor of Boston, and was born at Boston, November 29, 1811. He was educated at Harvard College, where he graduated in 1831. He then entered the Cambridge Law School, and after remaining there for two years, was admitted to the Suffolk bar in 1834. But he soon gave up the study of law to throw himself heart and soul into the anti-slavery movement, which was then, under the powerful advocacy of William Lloyd Garrison (q. v.), beginning to agitate American society. He made his *début* as an orator in 1837, at a meeting held in Boston to protest against the murder of the Rev. E. P. Lovejoy, the editor of an anti-slavery newspaper in that town, who had fallen a victim to the fury of a mob; and from that time until the abolition of slavery (February 1, 1865), he was incessantly occupied in promoting the end to which he had devoted his life and his fortune. With a great amount of solid learning, P. united an oratory distinguished for its powerful logic, its pungent wit, and its rich variety of language. He spoke without notes, in a manner grave and dignified, using gesture seldom, but always with great effect. His countrymen consider him one of their most distinguished orators, and were ever ready to give him a crowded house, on whatever subject he was to speak. After the abolition of slavery, P. devoted himself chiefly to lecturing on temperance and women's rights; but he now seldom appears in public. He has published *The Constitution of a Pro-Slavery Compact* (1844); *Can Abolitionists Vote or take Office under the United States Constitution?* (1845); *Speeches* (1852); *Defence of the Anti-Slavery Movement* (1853); *Addresses on Slavery, Temperance, &c.* (1859); *Speeches, Lectures, and Letters, 1853-63* (1863).

Phillipsburg, town of New Jersey, U.S., on the Delaware River, opposite Easton, 75 miles W.S.W. of New York by rail. It has large manufactures, chiefly of iron, and publishes a newspaper. Pop. (1870) 5932.

Phillour, a town in the district of Jullundhur, Punjab, British India, on the right bank of the Sutlej, 1110 miles N.W. of Calcutta by rail. Pop. (1868) 7535. There is an important fort here, guarding the passage of the Sutlej. At the time of the Mutiny of 1857 it contained the arsenal which fitted out the siege-train to operate against Delhi; on the first news of the outbreak, the fort was occupied by European troops, but the sepoys in the cantonments escaped to join the mutineers inside Delhi.

Philo-Judæus, to whom the later Jews have given the name of Jedediah, was a Jew of Alexandria, regarding whose personal history very little is known. The family to which he belonged were wealthy, and held in high estimation; for his brother Alexander was Alabarch or president of the Jews at Alexandria, a friend and banker to Agrippa, and donor of the gold and silver plating of nine of the doors of the temple at Jerusalem. P. himself was a man of such ability and high character, that he was chosen by his co-religionists to act as chief of a deputation of Jews who went to Rome (A.D. 39-40) to appeal to the Emperor Caligula regarding their persecution under Flaccus,

the Roman President, in connection with the emperor's insane demand that divine honours should be paid to him. As there is no record of the birth of P., it can only be conjectured from his own description of himself as 'a grey-headed old man' at the time of this embassy, of which he gives an account, that he had been about sixty years of age at the time, which would fix his birth about B.C. 20. There is abundant proof in his voluminous writings that P. was a man of great learning. Fully educated in all the doctrines, laws, and customs of his ancestors, he was an earnest student of Greek philosophy and the other branches of learning—grammar, geometry, music, poetry, &c.—which formed the intellectual atmosphere of Alexandria, at that time the metropolis of the learned world.

P. is the best representative of the philosophical tendencies of the Hellenistic Jews, who held the conviction that the Greek philosophers had derived their ideas from the Hebrew Scriptures, and especially from the Law of Moses. From this belief resulted the system of allegorical interpretation (see HERMENEUTICS), which was carried to such a pitch at Alexandria, and by none further than by P., according to whom Abraham, the father of his race, was the forerunner of all who believe in God, and Moses, the father of the law, the prophet, lawgiver, priest, and king, was the greatest of all men, who, by the abiding presence of the Spirit of God, attained to the supreme heights of wisdom. The other holy men of bygone days were only like disciples in comparison, and the greatest men among the Greeks learned from him. The Jewish nation was the first-born of the Creator, the priest and inspired prophet of other nations. But while making so much of Judaism as he does, Greek ideas filled a large place in his theology, which was founded on a combination of the Jewish, Platonic, and Neo-Platonic conceptions of God. The real nature of God cannot be defined or described. He has no qualities, and no name, except the four letters Jhvh, which mean pure Being. As to the world, it and all that exists were formed by God out of matter, but between God and his creation there existed an infinite distance. In seeking to bridge over this gulf P. found certain materials ready to his hand. In the Old Testament there was the notion of angels, as intermediate beings, of Wisdom, as a person helping at the creation (cf. Job xxviii.; Prov. i., iii., viii.), and of the Word of God, by which the light, &c., had been called into existence at the creation (Gen. i.). The conception of P. is that certain *forces* proceed from God, which he sometimes seems to describe as attributes of God, and sometimes as distinct beings, like the angels. The highest of the forces, which indeed comprises all the rest, is the divine Logos ('word'), which is both the spoken word and the thought of God; as the latter inseparable from God, but as the former the likeness of God, a second God, by whom the world was created, and is maintained and ruled. Otherwise expressed, the Logos is a manifestation of God, the ideas in which are imprinted on matter. In the world of Man, which is also created in the image of the Logos, spirit and matter war against each other. If man is to fulfil his destiny, the former must conquer and rule the latter, and in some this is accomplished by the perpetual influence of the Logos. The reform of morals consists mainly in deliverance from *matter*, from the flesh and lust. Forgiveness of sins is granted by God to all who believe, not for the world's sake, but of his own gracious nature. He serves those whom he knows to be worthy of healing, revealing himself to holy souls by his spirit, but also electing the pious before they are born.

Many parts of the doctrine of P. are still the subject of keen discussion. It is still debated by scholars, e.g., whether the Logos of P. was a person or not. The 'word of God' of the Old Testament was simply a periphrasis for Jehovah; but wisdom was distinctly personified. What P. did, then, was to identify the two, thereby making the Word a person; and what St. Paul and the author of the Fourth Gospel did was to identify the Logos with Jesus Christ. Again, the idea of P. that the world of matter and of humanity was a concrete expression of the Logos, who, as an ideal or type (the ideal world or archetype of Plato), impressed himself on matter as a signet ring, was developed, through the medium of the primitive Christian idea of a Messianic kingdom of God or of heaven, into the transcendent reality of heavenly things represented as the pattern of the present world in the Epistle to the Hebrews (cf. viii. 5; ix. 23). Another parallel between the New Testament and the writings of P., or between Christ and the Logos of P.,

is that the latter is regarded as a Mediator-Paraclete (cf. Heb. vii. 25, Delitzsch Com.). See P.'s *Works*, Gföser's *Geschichte des Urchristenthums* (1831), and P. *die Jud.-Alex. Theosophie*, Dähne's *Jud.-Alex. Religions-Philosophie* (1834), Ewald's *Geschichte des Volkes Israel* (vol. vi. 1868), J. G. Müller in Herzog's *Real-Encyclopædie*, Keim's *Geschichte Jesu von Nazara* (vol. i. Eng. trans. 1873), Kitto's *Cyclopædia of Bibl. Literature*, art. *Philosophy* (3d ed. Edinb. 1876).

Philology, Comparative, is a science dealing not with individual languages, but with the whole body of language, with rough-hewn speech rather than the polished gems of literature, with the rude jargons of a Bushman or Eskimo no less than with the Attic of Pericles or the Tuscan of Dante. It is a science partly historical and partly physical—historical because it traces the gradual evolution of human thought as recorded in language, physical because the articulate sounds through which that thought must find its utterance are subject to the restraints of physiological conditions. It is one of the youngest of the sciences, dating only from the opening years of the present century. The old Greek philosophers, dividing the whole world into Greeks and Barbarians, confined their inquiries to a single idiom—their own—and busied themselves with fruitless speculations on the origin of Language (q. v.). The first step on the pathway of linguistic knowledge was taken by the grammarians of Alexandria, who analysed the Greek language for the purpose of teaching it to the youth of Rome: to them we owe our present terminology. A far greater advance was brought about by the birth of Christianity, which broke down Gentile and Barbarian barriers, whilst its missionaries became the pioneers of philological research. Hervas (q. v.) compiled his *Catalogo* from vocabularies collected by himself and his brother Jesuits; and translations of the *Paternoster* still furnish the philologist with some of his most valuable materials. But knowledge, to be scientific, must be comparative; and its standard of comparison must be correct, or the results arrived at will be worse than useless. As in the Ptolemaean system of astronomy the belief that the sun was the centre of the universe gave rise to countless misconceptions, so the quasi-religious notion that Hebrew must be the primitive language of mankind was for centuries the *ignis fatuus* of P. Leibnitz (q. v.) was the first to dispel the illusion, and apply the principles of induction to a subject that hitherto had only been treated empirically, pointing out the necessity of collecting the greatest possible number of facts, and reasoning from them, not from foregone conclusions. Fruits of the seed thus sown were the *Glossarium Comparativum Linguarum Totius Orbis* (1787) of Catherine of Russia, Hervas' *Catalogo* (1800), and Adelung's *Mithridates* (4 vols. 1806-17). Here Hebrew, Chaldee, Syriac, Arabic, Ethiopic, and Amharic are recognised as common members of a Semitic family; the affinities are indicated of Lapp, Finnic, and Hungarian; Basque is shown to be independent of Celtic; and Humboldt is anticipated in his announcement of a Malayo-Polynesian family of speech extending from Madagascar to the Easter Isles. Glimmerings even may be discerned in Hervas' work of the grand discovery which was to revolutionise the whole study of languages, and render possible a science of C. P.—the recognition, namely, of the affinities of Sanskrit (q. v.) with nearly all the languages of Europe. Fully to appreciate the vast importance of this revelation, let us conceive for a moment Latin to have been wholly lost and Provençal only recently discovered. What a flood of light would be thrown by the latter on the younger Romance dialects; how far clearer, for instance, could some such form as *semetipsum* be detected in the Prov. *smetessme* than in the more mutilated Fr. *même* or the Port. *mesmo*. Such, but in tenfold measure, was the importance of the discovery of Sanskrit. It is easy, at this interval of time and with our *ex post facto* knowledge, to say that its value has been over-estimated, or wonder at the crass stupidity of those who failed without its aid to discern the affinity of Celtic to Latin, or of the Teutonic to the Slavonic languages. The fact remains the same, that prior to the researches of Jones and Colebrooke these affinities had passed unheeded, nor is there anything to prove that they might not have so continued down to the present day. Again, were one of us suddenly to learn that he had an unknown first cousin living in the heart of Africa, would not his attention be instantly arrested; would he not set himself to trace out the relationship, and in so doing learn perhaps more about his kindred nearer

home than he had ever known before? Similarly, when once it was shown that the English Bible and the Sanskrit Vedas had common words for father and mother, for son and daughter, for brother and sister, for house, herds, the metals, numerals, and pronouns, then men naturally began to ask whether the same held good with Latin, Greek, and German; and close on Colebrooke's Sanskrit Grammar came the Comparative Grammar of Bopp (q. v.), in which the existence of that great family of languages variously known as Aryan (q. v.), as Indo-Germanic, or Indo-European, was established beyond a doubt. With the exception of Basque, Magyar, Turkish, and Finnish, all the languages of Europe, and Sanskrit and Zend, with their modern descendants, in Asia, were seen to stand to each other in the same relation as Gaelic to Welsh, and to a parent Aryan tongue as French and Italian to Latin.

The next problem submitted to C. P. was—Given the close relationship of the Aryan languages one to another, are they in any way connected with the other languages of the world? As French is closely akin to Italian, more distantly to Greek, may not the latter bear certain remote affinities with Hebrew, Turkish, or Chinese? Unity, according to Plato, is the end of science, as of philosophy, and philologists were naturally eager to extend the great family of speech so recently established. The merest glance at the grammar and vocabulary of Basque or Finnish would suffice to show that no such close connection could be looked for between these and Sanskrit as between Sanskrit and Zend, and that it would therefore be as much more difficult to prove any connection as in pedigree-making it is harder to trace the relationship, even when known to exist, between members of the sixth than between those of the second generation. At any rate, according to the canons of the newly-founded science, classification must precede comparison, and from such classification great results have undoubtedly been obtained, though tending it may be in a different direction to what was at first anticipated. Languages as widely separated as Sanskrit and English have shown themselves to be allied like them to one another, forming a third great family, the Ugro-Altaic or Turanian (q. v.), which embraces Lapp, Finnish, Mordvinian, Turkish-Tartar, Hungarian, Mongolian, Tungusian, and probably Accadian, Basque, and the Dravidian dialects. Chinese, on the other hand, stands in a class by itself, and can be brought into no immediate relationship with any other known language.

But how is Chinese *sui generis*? how does it differ from the Turanian languages, and these again from the Aryan? and must such differences be regarded as organic or accidental, as indicating independent beginnings, or compatible with a common origin of human speech? The answer to these three questions may best be sought in an examination of the theory put forward by those philologists who hold to the original unity of language, who see in Chinese, Turkish, and Sanskrit three stages of development—an Isolating or Monosyllabic stage, represented by Chinese; an Agglutinative or Combinatory, by Turkish; and an Inflectional or Amalgamating, by Sanskrit. Chinese has no grammar at all, in the ordinary sense of the term, *i. e.*, no inflections, declension, or conjugation; it makes no formal distinction between nouns, verbs, and adjectives, the various relations of a sentence being indicated by means either of particles or position. Thus 'with a stick' is expressed by *y ting* (lit. 'employ stick'), 'in the empire' by *kuo-cung* (lit. 'empire middle'), and 'men' by *jin-tu* (lit. 'man crowd,' cf. Eng. *mankind*), whilst *ngo ta ni* means 'I beat thee,' and *ni ta ngo* 'thou beatest me.' But though theoretically each word in Chinese is monosyllabic and independent, Chinese grammarians can draw a clear distinction between 'full' and 'empty' words—those, namely, that are used with their *bona fide* signification of noun or verb, and those that are simply employed as particles, and of the latter some have wholly lost their former independent character. *Chae*, for example, in *wo-chae*, 'we' (lit. 'I company'), is no longer used separately, but only as a symbol of plurality. In the second or Agglutinative stage, words not only become empty, but simple suffixes, ground down by the wear and tear of time to single letters, or sometimes even wholly disappearing. The full word or theme, however, admits not the slightest change, its individuality always remains intact. For instance, in Turkish, from the abstract root *sew*, 'love,' is formed the present *sew-üm*, *sew-sen*, *sew-ür*, *sew-ür-iz*, *sew-ür-siz*, *sew-ür-ler*, where *sen*, 'thou,' and *siz*, 'ye,' present an uncorrupted, and *üm*, *iz*, and *ler* a corrupted form, whilst the third person ending has dropped wholly out of use.

Similarly through an almost endless variety of moods and tenses, through all the declensions of nouns or pronouns, a root always remains the same in Turkish, which could tolerate the Sansk. *as-mi*, but hardly the Lat. *sum*, whilst *lay* as the perfect of *lie*, or *kine* as the plural of *cow* would be utterly repugnant to its genius. Violations, however, of the general rule are to be met with in members of the Turanian family, e.g., the Finnish plural *käsi*, from *kädet*, 'a hand,' and the Tamil plural *karikal*, from *kal*, 'a stone.' Lastly, the distinction between Agglutinative and Inflectional languages lies chiefly in the fact that the former, retaining the consciousness of their full words, preserve these at least from decay, whilst in the latter, to quote Max Müller, 'the various elements which enter into the composition of words may become so welded together, and suffer so much from phonetic corruption, that none but the educated would be aware of an original distinction between root and termination, and none but the comparative grammarian be able to discover the seams that separate the component parts.' Not that this distinction is always complete and sharply marked. Just as in Chinese we come upon incipient traces of agglutination, and in Finnish of inflection, so in English we find forms such as *truth-ful* and *horse-man* which would not ring strange in Chinese ears, or as *man-hood* (Old Eng. *hdd*, 'state') and *wed-lock* (Goth. *lidi*, 'sport') which might form part of a Turanian vocabulary. But, on the other hand, neither Turk nor Chinaman could for an instant understand how the past tense of *throw* could be expressed by *threw*, of *capio* by *cepi*, or how a plural *mice* could be formed from a singular *mouse*. True, say the advocates of the theory we are now considering, but then change is admittedly the law of every living language. The *Beowulf* has lost its meaning for the Englishman of to-day, Cicero's *Philippics* for the Parisian, and the *Zend-Avesta* for the modern Persian. Yet English, French, and Persian can trace an unbroken descent from the languages in which those works were written; their present form is the work of two gradual but ceaseless processes—Phonetic Decay and Dialectic Regeneration. The desire to save time and trouble, to do everything with the least expenditure of energy, has caused us to drop or change the difficult guttural sounds of *high* and *laugh*; has worn away *ataticum* to *age*; and in Bohemian has reduced the parent-Aryan *duhitā* ('daughter,' 'milkier') to *dei*. It has also lessened the tax upon the speaker's memory by sweeping away a host of so-called irregularities, and substituting for them forms based on analogy—giving *slept* for the older *slep*, in Italian conjugating all verbs as though they belonged to the first conjugation, and in modern Greek making every nominative terminate in *s*, as *pateras* for *patēr* and *geros* for *gerōn*. Were phonetic decay the only principle at work, languages would in the lapse of ages be worn away almost to nothing. If all the obsolete phrases, words, and inflections were struck out from Wyclif's Bible, and no new ones substituted in their stead, the residuum would indeed be small, and its meaning hard to discover. How poorly would the Romance languages fare had they no words to represent the obsolete Lat. *ignis* and *ignis*, no mode of expressing futurity, or nothing to supply the loss of the case-endings. But, as a matter of fact, we find that new words, drawn from the treasure-house of dialects, and cast perhaps in a fresh mould, replace those that have been lost or obliterated, and that when broken-down inflections no longer suffice, men analyse their concepts anew, resolving *amabo* (*ama-fuo*) into *aimerai* (*amare habeo*) and *dulcius* into *magis* or *plus dulce*. The use of language is the communication of knowledge; accordingly, with every fresh extension of knowledge, whether in the field of art, science, or philosophy, language is called upon to express the new ideas, to supply the botanist and geologist with a nomenclature, and give new names to new inventions like printing or telegraphy—new in the sense of being reapplied or reconstructed, but whose elements are only less ancient than the metals with which we construct the latest improved machinery. Conversely, when any branch of knowledge falls into disuse, its terms grow burdensome and superfluous; men cease to remember the language of the falconer, the alchemist or the astrologer. Besides these gradual and internal changes, languages may be powerfully influenced from without, either by conquest or by the accidents of social intercourse. Thus Celtic gave place to Latin in Gaul, and to English in Britain, whilst English in turn, though holding its own against Norman-French, lost nearly all its original inflections and incorporated in its vocabulary a vast number of Romance words. Grammars, however, say some of our greatest

philologists, are never mixed, a statement which, if generally true, is false at least of the Romani or Gypsy dialects. The Welsh gypsies have preserved their ancient inflections almost intact, as *java*, 'I go' (*jama*, 'go I'), and *ghiom*, 'I went' (*ghilo-hom*, 'gone am I'); their brethren of north-west England mix English and Romani forms in nearly equal proportions, retaining *java*, but substituting *mi jawed* for *ghiom*; whilst in the dialect of the southern counties all vestiges of the old case and verb endings have wholly disappeared.

Therefore, as under the action of these various changes, French has been developed from Latin, Persian from Zend, and both Zend and Latin from a parent-Aryan speech, so, it is argued, inflectional languages may once have been agglutinative, agglutinative languages isolating, and in isolation may be seen the primeval type of human speech. The theory is plausible and attractive, but it is only a theory, and one that with wider knowledge may prove as baseless as his who, observing the universal transition from infancy to manhood, should infer that an Ethiopian had power to change his skin. The following are some of the principal objections raised against it by Pott and Sayce:—If the three stages of mental development imply mental progress, how comes it to pass that the highly-cultured Chinese stopped short at the first stage, and the Turanian races at the second; or that they have never improved on their own inferior systems, though brought into contact with Aryan Buddhism and European influences? In agglutinative languages the sign of the plural precedes the case-endings, in the Aryan it follows them—a difference explainable by no amount of phonetic decay. An analysis of Aryan inflections points to a system of pronominal roots, of which no trace is to be found in the agglutinative family. And, lastly, the theory does not take into consideration those forms of speech which do not fall strictly under one of the three heads, the polysynthetic languages of America, for example, in which the sentence is fused into a one long compound; nor account for the fact that, whilst Aryan roots are verbal and monosyllabic, Semitic and Turanian roots are both verbal and nominal, both monosyllabic and polysyllabic. Not until these objections have been met, shall we be able to proceed to a philosophic investigation of the unity of speech. But it is worth perhaps indicating that such unity would by no means, as is so frequently assumed, be necessarily identical with the original unity of the human race. For, allowing mankind to be descended from a single pair of ancestors, languages may not have been originated till long after those ancestors had passed away; and, similar causes producing similar effects, and man possessing like impulses and desires the whole world over, the first efforts at articulation may have been as manifold as are the notes of all the various species of birds. The earliest revelations of Semitic speech point at least to the northern deserts of Arabia, and those of the Aryan language to the Hindu Kush. Or, on the other hand, supposing the negro and the European to have come of distinct stocks, the latter might have been the first to develop the latent faculty of speech, and the negro might have caught the idea from him. These are some of the hypotheses, the 'might-have-beens' of philology, serving to illustrate the need of working backwards from existing facts, and of always combining abstract speculation with historical research, whilst bearing constantly in mind the shifting influences on language of pastoral or nomadic life, of increased culture, or of a standard literature. The art historian can only show the points of contact and divergence between the Italian and Flemish schools of painting by the external and internal evidence at his disposal; were he on abstract principles to argue that all art must of necessity spring from a common centre, and support his argument by chance coincidences between the design of an Egyptian mummy-case and of a painting by Raffael, he would obviously be travelling beyond his legitimate province; the results of his speculations could only excite a smile. Facts must be the arbiters between Professor Whitney and Mr. Sayce, when the former asserts dogmatically that 'Indo-European language, with all its fulness and inflective suppleness, is descended from an original monosyllabic tongue;' whilst the latter, with scarcely less appearance of authority, maintains that 'languages at first were infinitely numerous and diversified; . . . they have gradually diminished and disappeared through the course of ages by a long process of natural selection.' Whether Mr. Sayce is right in his conclusion, as we incline to hold, or whether the upholders of the homogeneity of language will ultimately triumph, time and further investigations alone can defi-

nately show. But in the meanwhile there must be no formulating of hypotheses as laws, or reasoning from foregone conclusions which after all may turn out as idle as that which made Hebrew the mother of all the dialects of Babel.

See DIALECT; GRAMMAR; INFLECTION; MYTHOLOGY, COMPARATIVE; ROOTS; and SEMITIC LANGUAGES; Max Müller's *Science of Language* (2 vols. Lond. 1862-64); A. F. Pott's *Anti-Kaulen-oder Mythische Vorstellungen vom Ursprung der Völker und Sprachen* (Halle, 1863); W. D. Whitney's *Language and the Study of Language* (New York, 1867), and *The Life and Growth of Language* (1875); T. Benfey's *Geschichte der Sprachwissenschaft* (Berl. 1869); A. H. Sayce's *Principles of C. P.* (Lond. 1874); J. Peile's *Philology* (Lond. 1877); A. Hovelacque's *Science of Language* (Eng. trans. Lond. 1877); and F. W. Farrar, *Language and Languages* (Lond. 1878).

Philomela, in Greek mythology, a daughter of King Pandion in Attica, who, being dishonoured by her brother-in-law Tereus, was metamorphosed into a nightingale, which bird was ever afterwards called by her name.

Philopomen, a patriotic Achaean general born at Megalopolis in Arcadia, about 252 B.C., was educated by a citizen of Mantinea called Cleander. His name first occurs in history in 222, when Megalopolis was taken by Cleomenes; and in the following year he distinguished himself at the battle of Sellasia. Next he served in Crete for some years. In 210 he obtained command of the Achaean cavalry, and in 208 he became head of the league. In this position he defeated Nabis about 201. He again sailed for Crete, and returned in 194, routing Nabis a second time in 192. In 188 he took Sparta, treating it with great severity, razing the walls of the city to the ground, and forcing the Achaean laws upon its citizens. In 183 he was captured by a body of Messenian troops, carried to Messene, and forced by Deinocrates to drink poison. His ashes were brought to Megalopolis by Polybius the historian, amid a procession of great magnificence. See Plutarch's Lives.

Philosophy is the universal science aiming at an explanation of all phenomena of the universe by ultimate causes. The name seems to have been coined by Pythagoras, who, unwilling to assume the title of 'wise' (*sophos*) which had been accorded to earlier sages, called himself a 'lover of wisdom' (*philos sophias*). In this modest sense Socrates also used the term P.; but it quickly became synonymous with wisdom (*sophia*). The Romans used the word *sapientia* until the time of Cicero, when *philosophia* was imported. The history of P., which, while special sciences study God, and nature, and man, aims at a common explanation of all three, may be epitomised in the definitions of it given by the most celebrated thinkers. The principal are these,—'Knowledge of things divine and human' (Pythagoras); 'Acquisition of true knowledge; a resembling of the Deity in so far as that is possible to man' (Plato); 'Art of arts, science of sciences, the science of being, as being' (Aristotle); 'a striving after virtue in the sciences, physics, ethics, and logic' (Stoics); 'Rational pursuit of happiness' (Epicurus). The modern definitions of P. are:—'The science of things, evidently deducible from first principles' (Descartes); 'Science of effects by their causes, and of causes by their effects' (Hobbes); 'Science of sufficient reasons' (Leibniz); 'Science of things possible, in so far as they are possible' (Wolff); 'Science of the connecting principles of nature' (Adam Smith); 'Science of truths, sensible and abstract' (Condillac); 'Science of the relations of all knowledge to the necessary ends of human reason' (Kant); 'Science of the original form of the Ego, or mental self' (Krug and Fichte); 'Transformation of the notions of experience' (Herbart); 'Science of the absolute, or of the absolute indifference of the ideal and real' (Schelling); 'Science of reason, in so far as the latter is the conscious idea of universal being in its necessary development' (Hegel); 'Knowledge of effects as dependent on their causes' (Hamilton); 'Attainment of truth by the way of reason; substitution of true ideas, that is, of necessary truths of reason, in place of oversight of popular opinion' (Ferrier). See under such heads as Dualism, Ethics, God, Idea, Matter, Metaphysics, Nominalism, Perception, Reason, Scepticism, Soul, Space, Time.

Philosophy, Moral. See ETHICS.

Philostatrus, the name of a distinguished Lemnian family of which the most celebrated was **Flavius P.**, born about 182

A.D. He studied and taught at Athens (whence he is called 'the Athenian'), and afterwards removed to Rome, where he was introduced to the literary circle of which Julia Domna, wife of the Emperor Severus, was the centre. P. was alive in the reign of the Emperor Philip (244-249). The following are the extant works of P.:—*Ta es ton Tyanca Apollonion*, in eight books; *Bioi Sophiston*, in two books, a history of the Sophists from Gorgias to his own time; *Hērōika* or *Hērōikos*, a dialogue concerning the heroes of the Trojan war; *Eikones*, in two books, an account of various paintings, showing great richness of fancy, and written in a pleasing style; and 73 *Epistolai*, chiefly of an amatory character. The best edition of P.'s works is by Kayser (Zur. 1844).—**P.**, the younger, usually called **The Lemnian**, grandson of the former, taught at Athens, died at Imbros, and wrote, in imitation of his grandfather, a work called *Eikones*, a portion of which still exists.

Philpotts, Henry, D.D., born at Bridgewater in Somersetshire, May 6, 1778, passed from the College School, Gloucester, to Corpus Christi College, Oxford, graduated B.A. (1793), and was elected a fellow of Magdalen. He became chaplain to the Bishop of Durham (1806), prebendary of Durham (1809), rector of Stanhope (1819), Dean of Chester (1828), and Bishop of Exeter (1830). A strong High Churchman, he was the originator of the Gorham Controversy (q. v.), whilst in Parliament he signalled himself by his bitter eloquence against the Reform Bill, the Ecclesiastical Commission, and other Liberal measures. He died at Torquay, September 18, 1869.

Phil'ter, or **Phil'tre** (Gr. *philtion*, 'a love charm or potion'), the name given by the Greeks and Romans to various drugs or preparations possessing the virtue of exciting love, the *recipe* for which has not come down to our time. Madness and death were frequently caused by the administration of powerful potions of this kind. The Thessalian philtres were notorious in Juvenal's time.

Phlebitis, or **Inflammation of the Veins** (Gr. *phlebs*, 'a vein'), consists, in some measure at least, of diffuse inflammation spreading along the cellular membrane in which the vein lies, the anatomical characters being perceived partly on the cellular tissue which supports the vein, partly on the coats of the vessel and partly in its contents. The leading symptoms of P. are hardness along the course of the vein caused by coagulation of the contents, pain, redness, and some amount of general fever. Such passive coagulation used to be called *adhesive P.* on the supposition that it was caused by effusion of lymph from the lining membrane of the vein; but in many cases there is no evidence of any inflammation, and it has been shown that the lining membrane of the veins does not secrete lymph. The condition is now called *thrombosis*, depending upon pressure or obstruction to the return of blood, from diminished power of the circulation from the varicosity of the veins, from clots of blood being lodged in the veins, and from conditions of the blood itself which are as yet but imperfectly understood. In the thrombosis which occurs in the disease called *phlegmasia dolens* the coagulation takes place in the uterine sinuses and extends down the iliac, femoral, and other veins. Sometimes the veins become blocked, to a very great extent, in consequence of some condition of general disease though without any definite local exciting cause. The varieties of P. are enumerated by Mr. Paget as follows: (1) the traumatic, including those due to distension; (2) those occurring in exhaustion, during or after either acute or chronic disease; (3) those due to extension of inflammation, or of blood-clotting from ulcers, morbid growths, or gangrenous or acutely inflamed parts; (4) those of the so-called idiopathic or rheumatic form; (5) the pyæmic; (6) the puerperal (among which it is probable that examples of all kinds, only modified by the puerperal state are grouped); and (7) the gouty.

The treatment of P. is merely expectant, the constitutional or general disorder being treated according to its own indications. Perfect rest is necessary, and the part should be put in a position to favour the return of blood; warm lotions are grateful and reduce the pain arising from tension. When there is much diffuse inflammation, incisions around the affected vein may be necessary. Pain must be allayed by opium, and alkalies should be administered in rheumatic and gouty cases. See *Clinical Lectures*, by Sir James Paget, and *Practical Pathology*, 3d ed. by Mr. Lee.

Phlebolithes (Gr. *phlebs*, 'a vein,' and *lithos*, 'a stone'), are small chalky concretions found in the cavity of the veins, and such concretions are occasionally recognised during life in the spermatic veins. P. are formed from the degeneration of clots, and consist of phosphate of lime, with some sulphate of potash and sulphate of lime, intermixed with protein substances from the blood.

Phlebotomy. See BLOOD-LETTING.

Phleg'ethon (Gr. 'flaming'), in the later Greek mythology, was a river of the lower world, whose waves were of fire instead of water, whence it was also named Pyriphlegethon (from *pyr*, 'fire'). Like the Cocytus, it flowed into the Acherusian Lake.

Phlegma'sia Dolens, a disease almost peculiar to the puerperal state, is variously called *milk-leg*, *adema dolens*, *adema lacteum*, *déplé du lait*, *metastasis lactis*, and *crural phlebitis*. It is properly a puerperal disease, and generally occurs between the end of the first and fourth weeks after delivery. P. D. attacks one extremity only at the commencement; but the other occasionally becomes affected subsequently, the left being more frequently attacked than the right. It generally occurs in those of broken-down constitutions, or who have suffered from debilitating discharges, as from profuse uterine hæmorrhage before or after delivery. P. D. is marked by a general and diffused swelling attacking the lower extremity, hard and elastic to the touch, and is attended with extreme pain, which is increased by movement or pressure. The swelling does not pit on pressure, the surface is glossy and white, the temperature high, and from a puncture or incision only a few drops of viscid serum exude which readily coagulates. P. D. is of uncertain duration, from a few weeks to many months or even years, and the acute symptoms may subside though the limb continues more or less swollen. A fatal termination is comparatively rare, but the patient may sink under the febrile paroxysm, or from debility, suppuration, or gangrene in the affected limb or other parts.—The *treatment* of P. D. consists in early evacuations from the bowels, sedatives, and medicinal agents to act on the liver, kidneys, and skin. The limb should be wrapped in a fold of new flannel, and the whole enveloped in oiled silk. Warm anodyne fomentations, or a tepid spirituous lotion, may be useful, and the early application of leeches to the hypogastrium, the groin, and the upper part of the thigh, have been recommended. In the chronic stage, frictions, with or without stimulant embrocations, and a properly adapted bandage, are of essential service.

Phle'um. See TIMOTHY GRASS.

Phlogis'ton (Gr. 'what burns, from *phlegin*, 'to burn'), an imaginary principle of fire, invented by Stahl and his school to account for the phenomena of combustion. Thus lead when calcined is oxidised, and becomes the oxide. On the P. theory, this was explained by saying that during calcination lead lost P., and so became the calx or oxide of lead. Again, by heating the calx with a substance rich in P. (carbon, for instance), P. is absorbed and the metal results. The theory was completely disproved by Lavoisier, who established the modern system of chemistry.

Phlox is a genus of showy herbaceous N. American plants, belonging to the natural order *Polemoniaceæ*, of which a number of species have long been garden favourites. The flowers usually vary in shades of blue and red, whilst some are white and others variegated. Most of the species are perennial, but *P. Drummondii* is an annual, and is one of the most popular.

Phlyctenæ or **Phlyctenulæ**, are semitransparent vesicles, filled with watery fluid, which occur during *humid* mortification, and frequently on the edges of the eyelids, especially at the inner canthus, sometimes single, often in groups, varying in size from a mustard seed to a pea.

Pho'ca. See SEAL.

Phocæ'na. See PORPOISE.

Pho'cas, a common centurion of Cappadocian birth, in 602 was raised by the faction of the Greens to the throne of Constantinople, on which he sought to secure himself by the murder of his predecessor Mauricius, his sons, and principal adherents. But Khoaru II., the Persian Shah, refused to recognise the

usurpation, and opened a campaign, that lasted more than twenty years, by the reduction of Merdin, Dara, Amida, and Edessa. At home the insurrections of Narses, the Persian general, and of the widowed Empress Constantine, were quenched in blood; the former being burnt alive in the market-place of Constantinople, and the latter beheaded at Chalcedon. But an insult put upon P.'s own son-in-law, the patrician Crispus, led to an intrigue with Heraclius, the Exarch of Africa, and suddenly the Emperor beheld the African fleet, commanded by the younger Heraclius (q. v.), steering through the Propontis. The Greens were easily bribed to desert their fallen master, who, after suffering every species of contumely and torture, was finally beheaded, October 4, 610. Hideous and deformed, a lustful, drunken savage, P. forsook the soldier's trade without assuming the duties of a prince. His reign, says Gibbon, 'afflicted Europe with ignominious peace, and Asia with desolating war.' See Gibbon's *Decline and Fall*, ch. xlvi.

Pho'cidæ. See SEAL.

Pho'cion (Gr. *Phokion*), a celebrated Athenian general and statesman, and for a number of years the chief political opponent of Demosthenes, was born of poor parents at Athens about 402 B.C. After having been educated by Plato and Xenocrates, he entered upon his military career under Chabrias, and first gained distinction in the sea-battle at Naxos (376), where he commanded part of the Athenian fleet, and by his courage and skill greatly contributed to the victory. About 354 he led an expedition to Eubœa, and although betrayed by the Eretrians, who had called him to their assistance, he maintained a successful struggle against forces immensely superior to his own, and gained a signal victory over Callias of Chalcis at Tamynac. In 341 he saved Megara, which a powerful party wished to deliver into the hands of Philip of Macedonia. In 340 he rendered a still more signal service to the Athenian state by forcing Philip to raise the siege of Byzantium and Perinthus, and by clearing the Hellespont of Macedonian cruisers. Notwithstanding these successes, however, P. was far from believing that his country was able to combat the growing power of her rival, and he continued to lend all his influence towards the maintenance of peace, and to bringing about a better understanding between Athens and Macedonia. He thus won the friendship of Alexander, and after the destruction of Thebes by the latter (B.C. 335), was able to gain easier terms for the conquered city, and to prevent the banishment of several of its patriotic defenders. He greatly offended the Athenians, however, by advising them to comply with Alexander's demand for the surrender of Demosthenes and the other leaders of the anti-Macedonian party. After the death of Alexander, when the Athenians prepared to renew the struggle for their independence, P. tried in vain to dissuade them, and after the united Greek forces had been defeated by the Macedonians at Cranon (322), leaving Athens at the mercy of Antipater, he became again mediator between the victor and the vanquished. But instead of gaining thereby the gratitude of his countrymen, he became the object of their hatred and persecution. Accused of treason, he fled with some friends to Phocis, where he sought refuge with Polysperchon. The latter, however, delivered him up as a peace-offering to the Athenians, by whom he was condemned to drink the hemlock. He perished in 317 B.C., at the age of eighty-five. His fickle countrymen soon afterwards repented of their conduct, and raised a brazen statue to his memory, at the same time condemning his accuser Agnonides to death. The private character of P. presents a noble example of unselfishness, and strict, if somewhat austere, integrity. But he did an irreparable wrong to his country by opposing the efforts of Demosthenes; and by unconsciously lending the weight of his name to the manoeuvres of those Athenian orators who were in the pay of Philip, he must be considered as having mainly contributed to destroy the independence of Athens. See Plutarch's *Lives*.

Pho'cis, a country in Northern Greece, bounded N. by the Locri Epicnemidii and Opuntii, W. by the Locri Ozolæ and Doris, S. by the Gulf of Corinth, and E. by Bœotia. Mountainous and barren, except on the Crissæan plain in the S.W., and in the valley of the river Cephissus, it owed its importance to its possessing the oracle of Delphi. Mount Parnassus rose in the interior of P.; other noted mountains were Helicon in the S.E., Cirphis in the S., and Cnemis in the N. Till the time of

Philip II. of Macedon, P. had little part in the history of Hellas. It then became merged in a war, called the Phocian or Sacred War, which engaged the chief states of Hellas, and cost P. its independence. The Phocians having tilled a part of the Crissæan plain, which the Amphictyonic Council had decreed (585 B.C.) should lie waste for ever, the Thebans, who had long been hostile, persuaded the council to impose a fine upon the Phocians, and, on their refusal to pay it, to declare the Phocian land forfeited to the Delphian god. The Phocians seized the treasures of Delphi (357), and with them carried on the war that was waged for the next ten years. The Amphictyons and Thebans, failing to overpower the Phocians and their allies, called in the aid of Philip, who put an end to the war in 346. All the towns of the Phocians were now razed to the ground, with the exception of Abæ, their inhabitants dispersed by fifties in scattered villages, and their two votes in the Amphictyonic Council handed over to Philip.

Phœbus (Gr. *Phoibos*, 'the bright' or 'shining'), is used by Homer as an epithet of Apollo, to signify the purity and radiant beauty of youth. At a later period, when Apollo became identified with the sun (Helios), the name P. was applied to him as the sun-god.

Phœnicia (variously derived from Gr. *phoinix*, 'palm tree,' from *phoinos*, 'purple,' in reference to the dye which was one of the principal articles of its commerce, to the sun-burnt complexion of the inhabitants, or to the Red (Erythrean) Sea, from which, according to Herodotus, they emigrated; from Phoenix, the brother of Cadmus and son of Agenor; &c.) was the name given by the Greeks to the country lying between the Mediterranean Sea and the mountains of Lebanon, and very indefinitely (or variously at different times) bounded by Syria on the N. and Palestine on the S. The native name was Kanaan (Canaan), but as the Phœnicians or Zidonians were the most powerful of the Canaanitish tribes at the time of the arrival of the Hebrews in Palestine (*cf.* Gen. x. 15; Josh. xi. 8), their territory gave its name to the whole country, just as that of the Philistines gave it the later name of Palestina (Philistia).

Geography.—P. proper was only about 28 miles long (varying from one to five miles broad), or little more than what was sufficient to include the two cities of Tyre (q. v.) and Zidon (q. v.), which were about 20 miles apart: Tyre in lat. 33° 17' N., and Zidon 33° 34', Zarephath lying between the two, about 8 miles S. of Zidon. But at a later period the name was applied to a district extending from the same point in the S., along the coast a distance of about 120 miles, not exceeding about 20 in breadth at any part. In this larger P. the first town to the N. of Zidon, at a distance of 16 miles, was Berytus (mod. *Beirut*, q. v.). Next to Berytus was Byblos (q. v.), the Gebal of the Bible (Ez. xxvii. 9), then Tripolis (q. v.), and lastly, near the northern extremity, Aradus, the Arvad of the Bible (Gen. x. 18, Ez. xxvii. 8), situated, like Tyre, on an island, opposite which was a small town on the mainland called Antaradus. By some authorities P. is made to extend some distance along the coast to the S., so as to include Acco (Acre, Ptolemais, q. v.) and even (which can hardly be warrantable) Joppa (q. v.), the port of communication between P. and Jerusalem. P. was extremely fertile, being composed for the most part of cross valleys formed by streams descending from the mountains on the E. Of these streams the chief were the Kasimieh (perhaps the same as the Leontes, mod. *El Litani*), five miles N. of Tyre; the Bostrenus, N. of Zidon; the Lycus (mod. *Kelb*), N. of Berytus; the Adonis (mod. *Ibrahim*), five miles S. of Byblos; and the Eleutherus (mod. *Kebir*), between Tripolis and Antaradus.

Race.—Regarding the origin of the nation little can be known with certainty, but all existing evidence goes to prove that the highly civilised nationality which was already constituted in the time of Abraham was of the same race as the Canaanites. (1) We have seen that it was their territory to which the name of Canaan, given by the Hebrews to the whole of Palestine, properly belonged; so that they were actually the Canaanites, which, as appears from their coins, was the name the Phœnicians gave to themselves, being retained by the Carthaginians even in the 5th c. A. D., as testified by Augustine (*Expos. Ep. ad Rom.*). (2) This is confirmed by Gen. x. 15, according to which Zidon was the first-born of Canaan, which probably means that from time immemorial Zidon had been the greatest Canaanite power, and by Obadiah 20, which includes the P. among the Canaanites.

Trade and Manufactures.—A graphic account is given in the Bible of the general relations that existed between P. and Palestine. P. had many valuable natural products of her own, *e.g.*, the unlimited supply of timber on the Lebanon mountains, marble, &c., while her markets were supplied with the products of almost every country of the known world; which, as well as her skilled artisans, would all be in demand in Palestine. And the latter country, again, was the granary of P., from which were exported to it wheat, barley, honey, oil, wine, and balm (Ez. xxvii. *cf.* 2 Sam. v. 11; 1 Chron. xxii. 4; 1 Kings v., vii. 13, 14; 2 Chron. ii.). In the time of Solomon, if not in that of David as well (*cf.* 1 Chron. xxii. 4), a distinct alliance of mutual accommodation was formed between the two nations, and a common trade carried on by them for a time on the Red Sea (1 Kings ix. 26-28). A remarkable departure from these friendly relations on the part of the Phœnicians is alluded to by the prophets Joel (iii. 4) and Amos (i. 9), who speak of their selling as slaves captive Israelites, who had been taken in war by their enemies and sold to the Phœnicians. But the trade with Palestine was but a small part of the commerce of P. It formed, greatly owing to its geographical position, the link between the East and the West, and by means of its countless traders, held in its hands for a time the exchange of the whole civilised world. From the shores of the Euxine were brought copper, lead, and slaves; from Armenia, horses and mules; from Damascus and Babylon, wine; from Arabia, India, and the E. of Africa, gold, precious stones, spices, aromatic gums, ivory, ebony, &c.; from Egypt, as well as Palestine, wheat; from Egypt and Babylon, linen, woollen, and embroidered goods; from the N. of Africa, skins of wild beasts, cattle, &c.; from Spain and the Scilly Islands, silver, iron, lead, and tin; from Greece, pottery and the purple dye so well known in connection with the Tyrians. All these articles, raw or manufactured, were exchanged for each other in the marts of P., or by Phœnician traders.

The skill of the Phœnicians in manufactures, as well as in mining and navigation, was considerable. The purple dye which they imported at first from Peloponnesus they afterwards learned to extract for themselves from fish found on their own coast; and, according to Strabo, Tyre was unpleasant to live in on account of its numerous dye-works. They carried to a great pitch of excellence the manufacture of Glass (q. v.), which Pliny says was accidentally discovered on the shore of P., but which was probably derived from Egypt. They were also famed for their skill, not only in architecture, but in the manufacture of beautiful vessels and ornaments in gold, silver, ivory, ebony, &c. (*cf.* 1 Kings v., vii. 13, 14; Homer, *Il.* xxiii. 743, *Od.* iv. 618).

Colonies.—A system of colonisation was carried on by the Phœnicians almost co-extensive with their trade, settlements being formed at almost every point where their commerce was established. Either as mere commercial depôts, or as more permanent colonies and cities, they had settlements in Cyprus, Cythium, Rhodes, Crete, the Cycladic and Sporadic Islands, Cilicia, Lycia, and Caria; in Chios, Samos, Tenedos, Bithynia, the coast of the Euxine, Samothrace, Lemnos, Thasos, Bœotia, and Eubœa; in Sicily, Malta, Sardinia, and the Balearic Islands; in Spain, at Cadiz, Malaga, Belon, Abdarach; probably in Cornwall and the Scilly Islands, and even on the Baltic; on the N. coast of Africa, at Hippo, Carthage, Utica, Leptis, Hadrumetum, and on the N.W. at Mauritania and Lerne. Probably they had a settlement at Ophir (q. v.), wherever that may have been.

Religion.—The religion of the Phœnicians, like that of the Philistines, to which it was closely allied, as it was in fact to that of all the other Semitic tribes, was a species of nature-worship. The powers of nature—the sun, moon, planets, and the elements—were worshipped as male—Baal (q. v.), Moloch (q. v.), Dagon (q. v.)—or female—Baaltis, Astarte (q. v.)—according as they were regarded in their destructive or their productive aspect. Besides the above deities, who were known by a number of other names expressing their different attributes, there were a number of minor ones, worshipped especially as the patrons of the seafaring class, notably Esmun (Esculapius), and a number of infernal deities. A number of natural phenomena, personal attributes, abstract ideas, seasons, trades, professions, and animals, were also deified: the last either as sacred themselves or as symbols, *e.g.*, the serpent, bull, lion, ass, dog, fishes, doves, goat, &c.

Language and Literature.—Regarding the language of the Phœnicians, the conclusion arrived at by scholars is that it was the same as the language of Canaan, which was adopted by the Hebrews (see JEWS: *Language and Literature*); in other words, that it was Semitic, and of the three branches of that language—the Aramaic, Arabic, and Hebrew—was so closely allied to the last, that the two may practically be regarded as two dialects of one language. This conclusion is favoured (1) by the name Canaan, which was not merely a Hebrew translation of the native name, but, while it is a Hebrew word signifying 'low-land' (from the Heb. root *cana*, 'to kneel, be low,' cf. Is. xxiii. 13; Zeph. ii. 5), was actually the native name, as is proved by Phœnician coins. (2) The Hebrew is called the language of Canaan in the Bible (Is. xix. 18). (3) All the fragments of the Phœnician language which have been preserved have a remarkable affinity with Hebrew: (a) The names of persons and places in Canaan when the Hebrews arrived, which have been preserved in the Bible, are Hebrew, e. g., Abimelech (Heb. 'father-king'), Melchizedek (Heb. 'king of righteousness'), Kirjath-sepher (Heb. 'city of the book'). (b) The inscriptions on Phœnician coins and stone monuments, of which a large number have been found in modern times, correspond very closely with Hebrew. (c) Both Jerome (q. v.) and Augustine (q. v.) expressly mention that in their time (4th c. A. D.) there was a great similarity between Hebrew and the Carthaginian or Punic language, which was Phœnician, but no doubt corrupted with African and Latin words and idioms. (d) This last testimony is confirmed by a passage in the *Pœnulus* (v. 1) of Plautus, given, along with a Latin translation, as the speech in the Punic language of Hanno, and which can be partially read as Hebrew, so as to give a corresponding meaning. (e) Many Phœnician and Punic names of persons and places, well known in a Greek or Latin form, but unintelligible or with fanciful meanings in these languages, can have their meaning opened at once with the key of Hebrew; e. g., Zidon (Heb. *tsidon*, 'fishery'), Tyre (Heb. *tsor*, 'cliffs'), Berytos (Heb. *beroth*, 'wells'), Carthage or Carthado (Heb. *kereth*, *hadashah*, 'new town'), Byrsa (Heb. *botrah*, 'citadel,' cf. Is. lxiii. 1), Sufes (Heb. *shophet*, 'judge'), Asdrubal (Heb. 'Baal's help'), Hannibal and Hamilcar (Heb. 'favour of Baal' and of 'Milcar'), &c. Among Phœnician writers the first place is usually assigned to a certain Sanchuniathon (q. v.), a work by whom is said to have been translated into Greek by Philo of Byblos, a Phœnician of the time of the Emperor Adrian (117-138 A. D.), of which translation fragments have been preserved by Eusebius (*Præp. Evang.*); but the very existence of Sanchuniathon is now strenuously denied, and the work that goes under his name is held to be a forgery by Philo himself. Three Phœnician historians are mentioned by Tatian (*adv. Gent.*)—Theodotus, Hyppicrates, and Mochus; the last also by Athenæus, Strabo, Josephus (*Ant. i. 3, 9*). The Carthaginians could also boast of their literature. Mago, a general, about 600 B. C., wrote a work on agriculture, which, after the destruction of Carthage, was translated into Latin (*De Re Rustica*) and Greek. Hamilcar, perhaps the son of Mago, wrote on the same subject. Himilco, the son of Hamilcar, wrote an account of his voyages to the W. coast of Europe, as did his brother Hanno for his voyages to the W. of Africa. The famous Hannibal (q. v.) is said by Livy to have written an account of his deeds. Several of the Numidian kings also wrote works in the Punic language. Of the scanty remains of Phœnician civilisation, the principal are the inscriptions (1) on the sarcophagus of King Eshmunazar discovered near Zidon in 1854, (2) on a stone disinterred in 1845 near Marseille, and (3) on the monument at Dhiban in Moab, discovered in 1868. As to the invention of the alphabet by the Phœnicians, see SEMITIC LANGUAGES.

History.—The history of P. may be divided into four periods—(1) the first or pre-historic, ending about B. C. 1500; (2) the period of the supremacy of Zidon, from about B. C. 1500 to B. C. 1209; (3) that of the supremacy of Tyre, from B. C. 1209 to about B. C. 750; and (4) a period of decline, from about B. C. 750 to B. C. 65, when the country was merged in the Roman Empire. 1. Till about B. C. 1500 the attention of the early settlers in P. seems to have been occupied with the development of their immense internal resources, and laying the foundation of that commerce which afterwards filled the world. 2. About that time Zidon began to assume the rule, which marks the beginning of a new era. When the Hebrews arrived in Palestine, Zidon was

already the first-born of Canaan (Gen. x. 15), and the 'great Zidon' (Joshua xi. 8; xix. 28), in fact giving its name to the whole nation (Joshua xiii. 6; Judges xviii. 7). 3. Tyre, which had, however, existed for a time independently of her supposed mother-city Zidon, having been a 'strong city' in the time of Joshua (xix. 29), was greatly augmented in the year 1209 B. C., when the Zidonians, defeated by the Philistines, transferred themselves, commerce, manufactures, and all, to the more secure position of Tyre, which was situated on an island. At this point Zidon almost disappears from history for a time, being completely eclipsed and perhaps rendered tributary by her younger rival, which remained the capital of the whole country, although the name of Zidonians, seems to have been applied to the Phœnicians generally. Thus Hiram, King of Tyre (B. C. 980-947), who formed an alliance with Solomon (1 Kings v.; ix. 27), and with whom the real history of P. begins, is supposed to have command of the Zidonians (1 Kings v. 6), and Ethbaal (B. C. 808-866), the father-in-law of Baal, who in the Bible is called King of the Zidonians (1 Kings xvi. 31) was, according to Menander (Jos. *Ant.* viii. 13, 2), king of Tyre. Tyre in turn was weakened by the departure, owing to political dissensions and party quarrels, of the emigrants who established the city of Carthage (B. C. 813). That city, by drawing off a great deal of the wealth and trade of the parent city, injured it, just as Tyre itself had formerly injured Zidon. About the same time similar causes produced a similar emigration from Zidon, by which the town of Aradus was founded. This town afterwards entered into a confederation with Tyre and Zidon, which gave rise to the building, by settlements from the three, of the triple town of Tripolis, for the holding of their common council. 4. On the invasion of Palestine by Shalmaneser, king of Assyria (about B. C. 730), Zidon, Ake (Acre), Palætyrus (Old Tyre), and other cities of P. voluntarily submitted to him, and, when Tyre refused to do likewise, helped him against that city. But the Tyrians defeated with twelve vessels the fleet of sixty with which the other Phœnicians had provided Shalmaneser, who thereupon attempted to compel them to surrender by cutting off their water supply. The siege, however, after having been kept up for five years, seems to have been raised, probably on the death of Shalmaneser. This account by Menander (Jos. *Ant.* ix. 14, 2) is unconfirmed by any other authority, and some think the invasion must rather have taken place under Shalmaneser's successor, Sargon; but however that may be, Tyre, although not heard of again for about a century, still remained a powerful and wealthy state, with its own kings, and even employing mercenary troops (cf. Jer. xxvii. 3; Ez. xxvi.-xxviii.; Zech. ix. 3). On the invasion of Nebuchadnezzar (about B. C. 605), Zidon, which had meantime been again rising in importance, and perhaps got a king of its own (cf. Jer. xxv. 22, xxvii. 3), submitted at once, while Tyre, holding out as before, was subjected to a siege of thirteen years, although the result is again uncertain (Jos. *c. Apion*, i. 21). During the Persian domination, Zidon seems to have attained to its highest point of prosperity, and was for a time the wealthiest and most important city of P. In the expedition of Xerxes against Greece (B. C. 484), the Phœnicians supplied the best vessels of his fleet, and the Zidonians the best of them. But having revolted against the Persians under Artaxerxes Ochus (B. C. 359-338), and being betrayed by their king Tennes when their city was besieged, the Zidonians set fire to their own houses, and 40,000 are said to have perished (B. C. 351). After the battle of Issus (B. C. 333), Zidon, which had been speedily rebuilt and re-peopled, as on two former occasions, opened her gates to the invader, while Tyre was besieged. Alexander, being greatly assisted by ships furnished by the other cities, Zidon, Aradus, and Byblos, it was this time undoubtedly taken, after a siege of seven months. Under the successors of Alexander the whole of P. came under the sway of the Seleucidæ (q. v.), and shared their fortunes, with the exception of Zidon, which again rose to such wealth and power, that Antiochus (III.), in his war with Ptolemy, was afraid to attack it (B. C. 218-216). P. was incorporated as a part of the Roman province of Syria by Pompey (B. C. 65). During the civil wars Tyre and Zidon seem to have again enjoyed a kind of independence (cf. Jos. *Ant.* xv. 4, 1), the former even having a king of its own; but of this they were finally deprived when Augustus visited the East (B. C. 20); although they continued to be towns of some importance till the end of the 13th c. See Robinson's *Bibl. Res.* (1841 and 1856); Kenrick's *P.* (Lond. 1855); Porter's

Handbook for Syria and Pal. (1858); Morer's *Die Phœnizier* and *Das Phœn. Alterthum* (Berl. 1841-56); Ewald's *Lehrbuch d. Hebr. Sprache. Erklär. d. gr. Phœn. Inschr. v. Sidon* (Gött. 1856); and in *Abhandl. d. Königl. Gesellsch. d. Wissensch.* (Gött. 1872); Davis's *Carthage and her Remains* (Lond. 1861), and Barges' *Examen e. l. r.* (Par. 1868); Grätz's *Geschichte d. Juden* (Leips. 1874); Renan's *Mission de Phœnicie* (1874), and Von Hans Prutz' *Aus Phœnizien: Geographische Skizzen und Historischen Studien* (Leips. 1876).

Phœnicopterus. See FLAMINGO.

Phœnix, a fabulous bird, in shape and size resembling an eagle, with red and golden plumage, was said to burn itself upon a pyre, from whose ashes a new P. sprang. Another version ran that the old bird, at the approach of death, built itself a nest in Arabia, and that from this nest a young one was generated, who, casing its parent's body in an egg of myrrh, flew away with it to the temple of Heliopolis in Egypt. The P. was variously held to live for 500 or 1500 years, was said to have been four times seen in Egypt, and was regarded both by the ancient Egyptians and by early Christian writers (e.g., in the Epistle of Clement) as a symbol of immortality.

Phœnix. See DATE PALM and PALMS.

Pholas, or **Pidd'ock**, a genus of *Lamellibranchiate* Mollusca, noted for a habit of stone-boring. By means of their shells they bore into rocks of all kinds, and lie ensconced in their burrows, communication being kept up with the outer world by means of the elongated *siphons* or breathing-tubes, which protrude from one extremity of the shell. The genus P. belongs to the family *Pholadide*. In this group the shell gapes at either end, and has no hinge or ligament, being often provided with accessory valves or pieces. The P. has a short body and a small foot. The mantle is partly closed, and the siphons are long and are united throughout their length. *P. dactylus*, *P. papyracea*, *P. candida*, are three familiar species, and one species *P. costata* of the S. American coasts affords food to the natives. Allied to the P. is the *Teredo* (q. v.) or Shipworm, so famous for its destructive habit of boring into wood of all kinds.

Phonetic Writing has been defined as 'visible speech.' With our present orthography a foreigner can only learn the sound of *gool* just as the first spectators of *Hamlet* or *Macbeth* knew whether the scene was laid in Denmark or in Scotland, viz., by being told. And this telling, and the remembering what is told, take no little time. A child will learn a thousand words phonetically spelled, like *sun*, *pig*, *mat*, in shorter time than twenty-five such traditional spellings as *buy*, *by*, *bye*, *tie*, and *high*. Well, then, if he belongs to the upper classes of society, where 'correct' orthography is a *sine qua non*, he may, after fifteen years of constant practice, attain a fair proficiency, or he may be one of the 90 per cent. who, Dr. Morell tells us, are plucked for spelling in the Civil Service examinations. If, on the other hand, he is one of the masses, whose education ceases with entrance on their 'teens, not only will he spell like Thackeray's 'Jeames,' but he will be unable to read our simplest writers; in the first two paragraphs of *Robinson Crusoe*, for example, being brought to a standstill by *colonel*, *foreigner*, and *lieutenant*. In 1873, 60 per cent. of the children leaving school had not reached the fourth standard, only 10 per cent. had passed in the sixth. The problem, therefore, of spelling reform, is to reduce all difficulties to a minimum, both in point of quality and quantity—to spell *buy*, for instance, *bi*, and *high*, *ti*, &c., on a similar principle. In America, where Franklin put forward a system more than a century back, phonetic spelling has found considerable favour, and an American book is easily recognised by the forms *honor*, *skeptic*, *traveler*, &c. In Germany, too, there is a growing tendency to drop such superfluous letters as the *h* in *theil*, or the second *n* in *mann*. But in England the question of spelling reform, though ably brought before the public for close on forty years, has been taken up by few educationists and fewer philologists, and even these are now divided between three separate schemes, each claiming to be better than the rest. These, to take the one that is least radical in its changes first, are the Glossic of Mr. Ellis, the Romic of Mr. Sweet, and, earliest of the three in point of date, the system invented by Mr. Isaac Pitman. Glossic, based on the present value of letters, takes as its vowel key-words: in *a*, *gnat*, *baa*, *bait*,

caul; in *e*, *net*, *bert*, *height*, *feud*; in *i*, *knit*; in *o*, *not*, *cool*, *coal*, *foil*, *foul*; and in *u*, *nut*, *fuot* (for *foot*). Its only consonantal symbols calling for special notice are exemplified in *chest* and *jest*, in *thin* and *then* (for *then*), and in *rush* and *roushe* (for *rouge*). Specimens of Glossic are *lain* for *lane*, *groo* for *grew*, *mih* for *myth*, *tais* for *phthisis*, *ail* for *isle*, *naw* for *gnaw*, and so on. Here we see an essentially conciliatory method, introducing no new characters, applying no new principle, and altering a comparatively small number of words, whilst at the same time it is calculated to reduce the time and labour spent in teaching reading and spelling by at least one third. Romic, which stands next, returns to the original Roman value of the letters, giving to *i* and *u* the sound they have respectively in *pique* and *pull*. That it is a far more complicated system than the foregoing may be gathered from the fact that to Mr. Sweet's *Handbook* a list is prefixed of 130 'of the more important symbols employed in the work.' Among these symbols 'turned' letters figure conspicuously, *air* being expressed by *aer*, and *up* by *yp*. Mr. Sweet professes to have avoided the use of new types, but there can be no question that, with existing founts, a compositor would set up Greek or Hebrew more easily than such a line as the following: 'and evriwøn dhæt hiirith dhiiz seiingz øv main, and duuith dhøm not, shæl bii laikønd ont'uu,' &c. This is as perplexing to the reader as was the 'Looking Glass' writing to Alice, and further suggests an uncomfortable impression of topsy-turviness. Eminently scientific Romic may be, and doubtless is, but it is strikingly deficient in those practical features without which no phonetic system can ever hope to come into general use. Lastly, in Mr. Pitman's method new symbols are freely introduced, *tch*, *dg*, *ng*, *oo*, &c., having each their respective character. The alphabet comprises forty letters, viz., eight mutes (*p*, *b*, *t*, *d*, *tch* of *etch*, *j*, *k*, *g*), eight continuants (*f*, *v*, *th* of *uraath*, *th* of *wreathe*, *s*, *z*, *c* of *vicious*, *s* of *vision*), three nasals (*m*, *n*, *ng*), two liquids (*l*, *r*), two coalescents (*w*, *y*), one aspirate (*h*), twelve vowels (*a* of *am*, *a* of *alms*, *e* of *ell*, *a* of *ale*, *i* of *sil*, *ee* of *eel*, *o* of *on*, *a* of *all*, *u* of *up*, *u* of *full*, *oo* of *food*), and four diphthongs (*y* of *by*, *ew* of *new*, *ow* of *now*, *oy* of *boy*). With these forty letters Mr. Pitman endeavours, and successfully, to express the English language on broad and simple principles, avoiding those infinite shades of pronunciation which may be interesting enough to an investigator of acoustics or phonetics, but to an unscientific learner could only be as bewildering as a lecture on the structural anatomy of the leg to a toddling child. It is this very simplicity which has won for Mr. Pitman's method the cordial approbation of no less an authority than Professor Max Müller, and which has enabled poor Glasgow children to read the Sermon on the Mount after six hours' teaching. Phonetic spelling is not pledged, as Archbishop Trench assumes in his *English Past and Present*, to record every dialectic variety—in Somersetshire to spell *sow* with a *z*, and in London omit the aspirate in *head*. On the contrary, its first and indispensable duty is to provide a standard of pronunciation, which may show the only way in which a word should be pronounced, and consequently written. As a single example, with our present orthography a Cockney might defend his *'ome* and *'orse* by pointing to *heir* and *honour*, but phonetic spelling, by abolishing the mute, would at once dispel the doubt. Which, or whether any of the systems now proposed, will ultimately prevail, natural selection must show. Mr. Sweet's is, we believe, too artificial and pre-Raphaelite in its minuteness; against Mr. Pitman's the vested interests of a vast body of printers stand arrayed. But that a change will come, sooner or later, in the orthography of the English language is evinced by the awakening interest of school boards and other potentates, of literary journals, and of the country at large. See ORTHOGRAPHY; A. J. Ellis, *Plea for Phonetic Spelling, or the Necessity for Orthographic Reform* (Lond. 1844), *The Essentials of Phonetics* (Lond. 1848), *English Phonetics* (Lond. 1854), and *Universal Writing and Printing with Ordinary Letters* (Edinb. 1856); I. Pitman, *Phonography, or Writing of Sound* (Bath, 1840); B. Pitman, *Manual of Phonography* (New York, 1860); M. A. Bell, *Visible Speech* (1867); E. Jones, *Popular Education: A Revision of English Spelling a National Necessity* (Lond. 1875); H. Sweet, *Handbook of Phonetics* (Oxf. Clar. Press, 1877); Max Müller, *On Spelling* (Bath, 1878); and F. G. Fleay, *English Sounds and English Spelling* (Lond. 1878).

Phonograph (Gr. *phōnē*, a 'sound' of the voice, and *graphē*, a 'writing'), is an ingenious contrivance by which a per-

manent record of uttered sounds is so obtained that they can be reproduced any number of times afterwards. It is the invention of Mr. Eddison of New York, and its most wonderful characteristic is its extreme simplicity. It consists of a thin membrane stretched in front of the side of a cylinder coated with soft tinfoil. To the membrane a sharp point is fixed, which presses against the tinfoil. If a person speaks into the membrane, it and the attached style will be set into vibrations which coincide with the air-vibrations generated by the spoken sounds, and if at the same time the cylinder be rotated uniformly round its axis, the point of the style will impress a furrow upon the tinfoil. This furrow is an exact impress of the vibrations, and may be used to reverse the process—that is, by its action upon the point, the membrane may be set into vibrations exactly similar to the vibrations by which the furrow was originally formed, and those vibrations may be transferred to the air and heard as sounds. The instrument, like the telephone, is still in its infancy, and to what extent it may be developed can only as yet be matter of wildest conjecture.

Phonology. See PHONETIC WRITING.

Phonoma'nia. See HOMICIDAL MANIA.

Phormium, or **New Zealand Flax**, as it was formerly misleadingly termed, is a plant belonging to the natural order *Liliaceæ*, and indigenous to New Zealand and Norfolk Island. Two species, *P. tenax* and *P. Colensoi*, are known, but the Maoris (q. v.) distinguish fifty-eight different varieties. The *P.* grows in bunches, each bunch producing about fifty leaves,



Phormium tenax.

which are perennial, hard, sword-shaped, from 5 to 7 feet long, and from 2 to 4 inches wide. The flower-stalk is 4 or 5 feet longer, and bears a profusion of red or brownish-yellow flowers. The seeds are flat, shining, and black, and are enclosed in a triangular capsule. The *P.* flourishes best by the side of running streams or in well-drained swamps. It does not grow at a higher elevation than 2000 feet, nor, in the South Island, far from the coast. Its inability to withstand frost prevents it from being reared in the open air in Britain, except in a few sheltered spots. The fibre is used by the Maoris in the manufacture of cordage, nets, and mats. Their mode of preparing it is by scraping the leaf with a mussel-shell, which produces an excellent article, but is very wasteful. By the use of machinery, sixteen times as much fibre can be obtained from an acre of *P.* plants. In 1870 the value of the *P.* fibre exported from New Zealand was £132,578, but is now (1878) probably only a tenth of that amount. The principal difficulty encountered is in the removal of a viscid juice which the leaves contain, but regular cultivation and cheaper labour are also required. Even under the present disadvantageous conditions, however, ropes of *P.* fibre are manufactured in the colony, while its adaptability for sacking, sheeting, towel-

ling, and even for fine tablecloths, has been proved at Arbroath, Kirkcaldy, and Leven. *P.* ropes will bear a very severe longitudinal strain, but break much more easily when knotted. They will not take tar, and must be oiled to resist the action of sea-water. *P.* cultivation on an extensive scale has recently been commenced at St. Helena, where the plant is reported to thrive.

Phos'gene Gas, a compound of chlorine and carbonic acid, formed by the direct union of equal quantities of these gases in the sunlight. The action does not take place in the dark. It is a colourless gas, with a strong, suffocating odour; is decomposed by water into hydrochloric and carbonic acids; and has a specific gravity of 3.4249. Its composition is COCl_2 .

Phos'phates. See PHOSPHORUS.

Phosphat'io Diath'esis, in medicine, designates the constitutional tendency to deposit *white gravel* in the urine. The deposit of phosphate of lime generally appears as a white cloudy mass resembling mucus or muco-pus; but which is distinguished from albumen by the precipitate which is produced by heat being re-dissolved by acids. On microscopic examination, it generally appears as an amorphous mass; but after standing it appears as spherules which may coalesce in a dumb-bell or rosette-like form, or in oblique hexagonal prisms. The triple phosphate of ammonia and magnesia appears in the form of large, conspicuous, triangular prisms, with truncated extremities, or of foliaceous or stellate prisms. Both kinds of phosphatic deposit may be mixed in the urine, which is often very fetid, and frequently acid or neutral, though generally alkaline. Alkalescence of the urine may be caused by the presence of the carbonate of soda or of potash, or of the alkaline phosphate of soda; or from the presence of the carbonate of ammonia, due to the decomposition of urea, from the action of the mucus of the bladder. The *white gravel*, under the latter condition, is composed of the triple phosphates, which are thus formed. Healthy urine contains phosphate of magnesia in solution; but when the urine becomes alkaline from the decomposition of the urea, a portion of the freed ammonia combines with the phosphate of magnesia and forms the triple salt, which is almost always mixed with a portion of the amorphous phosphate of lime. The *P. D.* is especially observed in chronic inflammation of the mucous coat of the bladder, and in disease or injury of the spinal cord. When phosphate of lime is present, the urine is alkaline, pale, slightly turbid, of a peculiar odour and of low specific gravity. It renders litmus paper *permanently* blue; while ammoniacal urine does so only *temporarily*. The *P. D.* is frequently characteristic of persons of a sallow, languid, unhealthy appearance, whose constitutions have suffered from general ill-health, mental anxiety, or sexual excesses. The treatment of such cases is chiefly dietetic, and tonics are of great value. Benzoic acid may be given with the view of restoring the acidity to the urine; and, in the ammoniacal form of the disease, the bladder should be washed out with tepid injections.

Phosphores'cence (from Gr. *phosphorus*, 'light bearer'), a property possessed by almost all bodies, in virtue of which they remain visible for a longer or shorter time after they have been completely shut off from extraneous sources of light. The shining of phosphorus in the dark is the phenomenon from which the name is derived. This phenomenon is generally explained as due to the slow combustion of the phosphorus in the air, the energy of chemical combination being transformed into light. It is therefore not a true case of *P.* *P.* excited by the action of light was fully investigated by E. Becquerel. Aided by an ingenious instrument called the phosphoroscope, its presence could be detected though it lasted for only $\frac{1}{10,000}$ th part of a second after the shutting off of the light. Action of heat renders certain bodies, such as the diamond, fluorspar, &c., phosphorescent; and many crystals, when simply broken, exhibit the same phenomenon. The rays which produce *P.* are of high refrangibility, becoming, as it were, degraded by absorption, and emitted as light rays. Fluorescence (q. v.) is a similar phenomenon; and the two have indeed many peculiarities in common.

Phosphorus (Gr. 'light bearer') ($P = 31$), a non-metallic element, discovered in 1669 by Brandt. When pure, it has a specific gravity of 1.82, and is a nearly colourless and transparent solid, but exposed to sunlight soon becomes opaque and reddish.

To preserve it pure it must be kept in water, free from air, since it gradually changes when exposed to the atmosphere even in the dark. It melts at 44° C., and boils at 290° C. It spontaneously takes fire in air when heated a little above its melting point, burning with a brilliant white flame and evolving dense clouds of solid phosphoric acid. Even a stick of it will take fire under slight friction. It exists in several allotropic modifications. Besides the pure transparent kind and the white P. produced by sunlight, there is *black P.* It is formed by melting and sudden cooling, and is reconverted by refusion and slow cooling. If P. is heated to near its melting-point and then suddenly cooled, it takes the *viscous* form. By subjecting ordinary P. for two or three days to a temperature of 230° C. under pressure in carbonic acid gas, it becomes an *amorphous* substance, red when pure, and of specific gravity 2.14. This modification differs markedly from the ordinary kind. It does not oxidise in the air at ordinary temperatures, has no odour, is not poisonous, and is insoluble in bisulphide of carbon and other phosphorus solvents. P. forms a large and most important series of compounds with other elements. It forms two oxides, known as *phosphorous* and *phosphoric* acids, and perhaps a third, the suboxide (P_2O), of which, however, little is known. Phosphorous acid (P_2O_3) is the product of the slow combustion of P., and decomposes when strongly heated into P. and phosphoric acid. Its hydrate (H_2PO_3) in solution is gradually converted into phosphoric acid by absorption of oxygen. Its salts are unimportant. Anhydrous phosphoric acid is produced when P. burns in air or oxygen. It is a white amorphous substance, extremely deliquescent. It is a powerful acid, and forms three distinct hydrates which differ in their chemical properties. They are the result of the combination of one molecule of the anhydrous with one, two, and three molecules of water, and are called respectively *meta-*, *pyro-*, and *ortho-phosphoric* acids. The first, also known as *glacial phosphoric acid*, is produced when the anhydrous acid is dissolved in water, and may be formed by oxidising P. with dilute nitric acid. Its formula is H_2O, P_2O_5 , or HPO_3 . It acts on nitrate of silver to form the metaphosphate of silver (Ag_2O, P_2O_5). If the action take place in the presence of ammonia, the pyrophosphate of silver ($2Ag_2O, P_2O_5$) results. Similarly when a boiled solution of pyrophosphoric acid ($2H_2O, P_2O_5$) be tested with nitrate of silver and ammonia, the orthophosphate ($3Ag_2O, P_2O_5$) is obtained. Each hydrate then gives rise to a distinct series of salts. In the case of pyrophosphoric and ortho or common phosphoric acid, double salts may be formed, in which not all the molecules of water are replaced by another base, or in which the different molecules are replaced by equivalents of different bases. Thus common phosphate of soda is represented by the formula $2Na_2O, H_2O, P_2O_5$; microcosmic salt, a double phosphate of soda and ammonia, by the formula $Na_2O, (NH_4)_2O, H_2O, P_2O_5$; while a pyrophosphate of soda, having the composition Na_2O, H_2O, P_2O_5 , has also been prepared. Two chlorides of P. are known, the *terchloride* (PCl_3) and the *pentachloride* (PCl_5). Both result from combustion of P. in chlorine gas, the former being obtained when P. is in excess, the latter when chlorine is in excess. The terchloride is somewhat unstable, and decomposes easily into P. and the pentachloride. With hydrogen P. forms three compounds—one solid (HP_3), one liquid (H_2P), and a gas, phosphureted hydrogen (H_3P). The liquid is volatile, and its vapour is spontaneously inflammable in the air. Phosphureted hydrogen is obtained by gently heating P. in a solution of caustic potash. It is insoluble in water, and highly inflammable in the air when prepared by this method. This inflammability, however, is due to the presence of the vapour of the liquid phosphide, since the pure gas, obtained by heating phosphorous acid, does not take fire spontaneously. The compounds of P. with nitrogen, sulphur, &c., are unimportant. P. is never found uncombined in nature; but its phosphates are common in mineral, vegetable, and animal matter. The principal earthy component of the bones is phosphate of calcium, which is obtained by the animal from the seeds of plants, where the processes of nature have stored it up. The bone ash which is left after the burning of bones is the great source of our P., and consists for the most part of phosphate of lime ($3CaO, P_2O_5$). This is reduced to a fine powder and treated with a solution of sulphuric acid, when the sulphate of lime and the acid phosphate of lime are obtained. To obtain P., the solution of acid phosphate is evaporated down to a syrupy consistency, intimately mixed with powdered char-

coal, and subjected to a white heat. The acid phosphate is decomposed, the calcium combines with P. and oxygen present to form the normal phosphate, the orthophosphoric acid breaks up in the presence of the carbon, and P., hydrogen, and carbonic oxide result. The most important of the industrial uses of pure P. is the manufacture of lucifer matches.

Pho'tius, the great promoter of the schism between the Eastern and Western Churches, came of illustrious though unknown lineage, and had filled various high offices of state, when in the winter of 858 he was suddenly called to the patriarchate of Constantinople in place of Ignatius (q. v.), deposed by the profligate Bardas, uncle to the Emperor Michael VI. Hurried in five successive days through the preliminary orders of monk, reader, subdeacon, deacon, and priest, P. himself owned the irregularity of his investiture by the apologetic tone of his letter to Pope Nicholas I. But Ignatius, also appealing to the same supreme arbiter, prevailed, and in the teeth of packed and servile councils was reinstated in his see (862). Thereupon P. answered anathema by anathema, in a fresh council (867) deposed his deposer, and renounced communion with Rome. The murder of Bardas and Michael, and the accession of Basil the Macedonian (September 24, 867) were followed by the restoration of Ignatius and the banishment of P., a sentence confirmed in the eighth Ecumenical Council (869). But the fallen patriarch soon flattered himself into the new emperor's confidence, and scarcely was Ignatius dead (877) when he was once more seated on the patriarchal throne. Joannes VIII., more pliant than his predecessor Nicholas, granted him absolution, but disputed the jurisdiction of Bulgaria, and in 879 P. convened the fourth Council of Constantinople, which sealed the schism beyond recall by its nullification of the Council of 869 and by excising the *filioque* from the Creed. A charge of conspiring against Leo VI., Basil's son and successor, caused P.'s banishment to Armenia, where he died about the year 891. The protagonist in an eventful drama, P. has been held up by his partisans as a model of holiness and purity of morals, by his opponents as a forger, a hypocrite, a very monster of iniquity. Here, as so often, the truth lies probably somewhere between the two extremes, and much of P.'s laxity of conduct was the inevitable outcome of the venal and corrupt society on which his lot was cast. His learning, at least, was peculiarly his own, and its depth and variety are preserved to us in thirteen of his published writings, the principal of which are the *Myriobiblon seu Bibliotheca*, a summary of 280 Greek MSS., most of which have otherwise perished (edit. by Bekker, 2 vols. Berl. 1824-25); *Nomocanon*, a collection of the canons of the councils recognised by the Greek Church (edit. by Voellus, Par. 1661); *Lexicon* (edit. by Porson, Lond. 1822); and 248 *Epistole* (edit. by Mountagu, Lond. 1651). Other treatises are given in vols. i. and ii. of Mai's *Scriptorum Veterum Nova Collectio* (Rome, 1825-27). See Jäger's *Histoire de P.* (Par. 1844), Neale's *History of the Holy Eastern Church* (4 vols. 1847-51), and Lämmer's *Papst Nikolaus I. und die Byzantinische Staatskirche seiner Zeit* (Berl. 1857).

Photographic Engraving, is a term embracing the numerous processes which have been devised for producing an engraved plate from which impressions of a design obtained by the agency of light may be printed with ink. Niepce in 1827 first accomplished this by coating a metal plate with bitumen, which becomes insoluble when exposed to light. After exposing the plate in the camera, he dissolved with the usual menstrua the portions of the bitumen unaltered by light, and then etched with acid the revealed portions of the metal. This method is still practised in the production of zinc relief blocks suitable for letterpress printing. In 1845, Fizeau employed an acid menstruum to bite the dark parts of a Daguerreotype plate, whereby he obtained an image in relief. A more successful process, termed *photoglyphic engraving*, was invented by Fox Talbot in 1853. It depends on the imperviousness of bichromated gelatine, acted on by light, to an etching fluid. A metal plate is coated with that substance, and on being removed from exposure to light under a negative, a solution of bichloride of platinum or perchloride of iron is poured on, which penetrates the gelatine film with a rapidity directly proportional to the degree of protection afforded to the parts while exposed, and corrodes the supporting plate to varying depths. In 1854, Paul Pretsch, utilising the property possessed by bichromated gelatine, unaltered by light, of absorbing water and swelling,

obtained by electro-deposition an intaglio or a relief-printing surface. By means of a negative he procured a gelatine relief image, and, moulding this in gutta-percha, he prepared by electrotypy an intaglio plate. A transparent positive yielded a relief plate. Pretsch called his process *photogalvanography*. The swelled gelatine process and the dissolved gelatine process (see PHOTOGRAPHY) are now utilised for the production of relief stereotype plates in place of woodcuts for book illustrations, but in most cases the plates are touched up with the tool before printing. See PHOTOLITHOGRAPHY.

Photography (Gr. *phôs*, 'light,' and *graphê*, 'a writing'). The art of producing pictures on chemically prepared surfaces by the agency of light. P. is founded on the chemical or molecular changes which the actinic or chemical rays of light effect on certain compounds, especially salts of silver, and salts of chromium in presence of organic matter. The chloride, bromide, and iodide of silver give off chlorine, bromine, and iodine respectively, being thus reduced to dark coloured sub-compounds of the metal. The iodide only changes, under the influence of light, when an absorbent for the free iodine is present, and the sensitiveness of the other two is materially increased in presence of such a body. Silver chloride or horn silver (*luna cornua* of the alchemists) was long ago known to blacken on exposure to sunlight. In 1777 Scheele the Swedish chemist ascertained that the *blue* and *violet* rays of the solar spectrum were most active in promoting this discolouration, and in 1801 Ritter demonstrated the existence of chemically active rays beyond the violet end of the spectrum. In 1802 Wedgwood and Sir Humphrey Davy published a process for obtaining profile delineations, and for copying paintings on glass, by the agency of light on nitrate of silver supported on white leather or paper. Wet chloride of silver was found to be more sensitive, but in no case could the fleeting image be rendered permanent. P. made no further advance till Nicéphore de Niépce of Châlons-sur-Saône succeeded in 1827 in producing a permanent sun-picture by a process which he called *Heliography*. He discovered that asphaltum, or bitumen of Judæa, acted on by light resisted the action of the usual solvents for that substance. Following up this important discovery he coated a silver plate with bitumen, and, after exposing it for some hours to the influence of light, controlled by the lens of a camera-obscura, he washed away the portions of bitumen unchanged by light, by means of naphtha and other fluids, and thus obtained a picture, the lights of which were represented by the bitumen, and shadows by the exposed portions of the plate. Niépce aimed at the production of a photo-engraved plate which could be printed from, and by etching the portions unprotected by bitumen he accomplished this in a rude way. This process is still utilised in the production of relief-blocks for letterpress printing (see PHOTOGRAPHIC ENGRAVING). Subsequently Niépce became acquainted with Daguerre, a French painter, who had likewise been endeavouring to obtain a permanent photographic image, and the two agreed to work in concert. After years of patient labour, Daguerre, whilst working with a silver plate coated with iodine, found that the vapour of mercury condensed on the parts of the plate affected by light and developed the image which had hitherto remained invisible. Niépce died before the important discovery could be communicated to him, and thereafter a copartnership was formed between Daguerre and Niépce's son, Isidore. A *fixing* agent had still to be sought for, and this in time being secured, a practicable photographic process became a reality (see DAGUERRETYPE). On failing to start a company to work the new invention, Daguerre offered it to the French Government, and he and Niépce the younger were rewarded with annuities. Daguerre's process was published in 1839. Concurrently with Daguerre's researches the late Mr. Fox Talbot was experimenting with silver chloride, and so early as 1834 he copied the forms of ferns, lace, &c., by the agency of light. He termed these permanent pictures *photogenic drawings*. The method by which they were obtained is the foundation of the present positive-printing process. In 1839 Talbot published his Calotype (q. v.) *paper* process, and two years later he patented his improvements on it. The calotype picture was a *negative*, that is, the lights and shades were reversed, and by waxing it to give transparency he obtained a *positive* picture, having the lights and shades as in nature, on sensitive paper placed in contact with the negative and exposed to sunlight. The calotype process was obviously a great

advance on the Daguerreotype, for whilst the latter required an exposure in the camera for each image, the former afforded an easy means of multiplying prints from the negative. On the publication of the foregoing processes many earnest workers furthered the new art by introducing new photographic agents and improving the camera. The use of hyposulphite of sodium, which is still employed as a fixing agent, was suggested by Sir John Herschell. Le Gray modified the calotype process by waxing the paper before the application of the sensitive film, and this modification proved of great value in landscape P., since the paper remained longer sensitive. In 1847 Niépce de St. Victor introduced his *albumen* process. He coated glass (the use of which as a support had been previously suggested by Herschell) with sensitised albumen, and thereby obtained a smoother surface than paper. That process gave excellent results, and continued to be practised till 1851, when Archer published his *collodion* process. Le Gray is known to have tried collodion as a support for the sensitive film, but Archer was the first to bring it into practical use. The collodion process yielded brilliant results, and it is now almost universally adopted. The following is an outline of it as practised:—A thin film of collodion containing an iodide and bromide is poured over a clean glass plate. When the film has 'set' the plate is plunged into nitrate of silver, whereby the film is impregnated with iodide and bromide of silver. The wet sensitive plate placed in a 'dark slide' is conveyed to the camera, where the light of an object is allowed to fall on it for a few seconds. The image, as yet invisible, is *developed* in the 'dark room' by pouring on ferrous-sulphate solution. The dark room is a chamber from which the actinic rays of light are excluded by the use of *yellow* or *red* glass. The image gradually appears with the application of the developing solution, and after washing in water it may be *intensified* with a solution containing pyrogallic acid, citric acid, and nitrate of silver. The plate is again washed and the image is *fixed* by removing the unaltered salts of silver with a solution of hyposulphite of sodium or cyanide of potassium. On removing with water all traces of the fixing agent, the plate is dried and varnished. The image is a negative one, and from it positive prints are procured on prepared albuminised paper containing chloride of sodium or ammonium. The paper is sensitised in nitrate of silver and afterwards exposed to sunlight in contact with the negative in a *printing-frame*. The light passes through the lights and half tones of the negative in varying intensity, and produces a proportionate blackening of the chloride of silver on the albuminised paper. On removing the print from the frame it is strengthened by means of a *toning* solution of chloride of gold and acetate of sodium. After washing in water the print is fixed with the hyposulphite of sodium solution, and thorough rinsing in water being repeated, the print is dried, mounted, and glazed under rollers. No developing agent is needed in positive printing on account of the extra sensitiveness of chloride of silver in presence of an excess of nitrate of silver to the action of the actinic rays.

The collodion negative process requires that the sensitised plate be exposed *wet*, for when dry it loses sensibility. This drawback renders the process impracticable for field-work, owing to the impedimenta requisite for its practice. By the invention of *dry plates*, however, the disadvantage has been surmounted, and the practice of landscape and astronomical P. greatly extended. In dry plates the collodion is preserved in a sensitive state for an indefinite time by coating it or mixing with it an 'organifier,' or organic substance, such as albumen, tannin, gelatine, gum, coffee, &c. After receiving the impact of light in the camera, these plates have simply to be protected from light for development at leisure. The preparation of sensitive plates for field use has lately been greatly simplified by the production of emulsions containing all the elements of a sensitive film. These compounds are prepared by emulsifying bromide of silver with collodion or gelatine, and adding glycerine; on being washed and dried, cut into shreds, and packed in the dark, they may be carried to any part of the world ready to be converted—the *collodio-bromide* by a mixture of ether and alcohol, and the *gelatino-bromide* by the action of warm water—into emulsions for immediate use. An alkaline re-agent instead of an acid one is employed in the development of dry plates.

Carbon Printing.—The want of permanency in silver prints, through careless manipulation, chiefly in washing away the

fixing agent, has created a fear that all silver prints may succumb to the action of time. Out of this fear of instability have arisen numerous processes for printing in permanent pigments. These processes are based on a peculiar property acquired by gelatine, or any similar colloid body, when sensitised with a chromium salt and acted on by light. The salt is split up, and the gelatine absorbing oxygen becomes insoluble in water. The germ of this change was discovered by Mungo Ponton in 1839. If paper be coated with gelatine containing a bichromate and a pigment, and be exposed to the varying intensities of light passing through a negative, the gelatine becomes insoluble to proportional depths. The soluble gelatine may then be washed away with hot water, with the result of developing a beautiful positive print in permanent colour. Such is the principle of carbon printing, or more correctly, pigment printing. This printing process, first rendered practicable by Mr. J. W. Swan of Newcastle, has of late years advanced to a great state of perfection, as demonstrated by the prints issued by the Autotype Company in London. They employ a 'tissue,' or paper thinly coated with gelatine charged with lampblack or other pigment and bichromate of potash or ammonia, and on removal from the printing-frame the tissue face is brought by pressure into close contact with gelatinised paper treated previously with chrome alum. The whole is then placed in warm water, in which the original paper support floats off, and the soluble gelatine is dissolved. If a 'double transfer' be necessary to bring the print into proper position, a temporary support of zinc or glass is employed during the washing operation, and the picture is thereafter transferred to paper.

Photo-Mechanical Printing Processes.—The gelatine image is further used to produce a matrix from which prints are mechanically obtained without the action of light. In the Woodbury-type process (named after the inventor) a relief picture in gelatine, hardened with chrome alum or other substance, is procured by the method adopted in carbon printing, and an impression of it is taken on a soft metal plate, as in Nature Printing (q. v.). Liquid coloured gelatine is poured over the plate, paper is laid on, and a perfectly flat and true metal plate is brought down over it. The gelatine is pressed into the depressions of the matrix, and the excess makes its exit at the edges. When the gelatine 'sets,' the paper is removed with the image adhering to it, and dipping into an alum solution renders the print insoluble. These gelatine pictures are mounted and used for illustrating books. By introducing a gritty powder into the bichromated gelatine before the formation of the image, a *grained* matrix is secured, from which impressions may be taken as in copperplate printing. The heliotype process of Mr. Ernest Edwards may be taken as a type of another class of photo-mechanical printing processes, embracing the Albertype, pantotype, &c., in which the hardened film of bichromated gelatine is itself printed from in an ordinary type or lithographic press. Bichromated gelatine on exposure to light, not only becomes insoluble, but it repels water and absorbs grease. Taking then a film and exposing it behind a negative, the property is acquired of refusing to absorb water in the exact ratio in which light has acted, while it takes a depth of fatty ink directly proportional to its repellent action on water. In the practice of the typical process, the gelatine film, supported on plate-glass, is, on removal from behind a 'reversed' negative, placed in cold water to remove the excess of bichromate and to develop the image in very slight relief. The impressions in lithographic ink pulled from the gelatine image exhibit all the gradations of tone of an ordinary photograph, and are particularly adapted for book illustration.

Photomicrography, by which enlarged permanent images of microscopic objects are depicted, through the adaptation of the microscope to the camera, and *astronomical P.*, are among the most recent triumphs of P. in promoting scientific research. For a description of these and other applications of P. to science and art (see PHOTOGRAPHIC ENGRAVING and PHOTOLITHOGRAPHY), as well as for full details of the operations and processes practised, Thomson's *Handbook and History of P.* (translated from the French of G. Tissandier, Lond. 1876), and Abney's *Treatise on P.* (Lond. 1877) should be consulted.

Photolithography is a method of producing photographic designs on stone which may be printed from in the ordinary way. P. is dependent on the reducing action of light on gelatine, and similar organic bodies, mixed with a bichromate. The parts acted on by light become insoluble in water, repel moisture,

and absorb grease. Poitevin, in 1855, patented a process for coating lithographic stone with bichromated gelatine and albumen, washing away the parts protected from light by the shades of a photographic negative, and pulling proofs directly from the developed image. P. is now accomplished by the *transfer* process. The gelatine film, subsequent to exposure beneath a negative, is coated with greasy ink, and the soluble parts of the film being washed away, the print is transferred by pressure to a lithographic stone, and impressions are obtained in the usual way. P., while eminently adapted for multiplying copies of maps, plans, &c., is not suited for reproducing pictures with fine gradations of light and shade.

Photoincography differs from P. in the substitution of a zinc plate for stone. It is extensively practised in the Ordnance Survey Office, Southampton, in reproducing plans, historical manuscripts, &c.

Photometer (Gr. *phōs*, 'light,' and *metron*, 'a measure'), an instrument for conducting photometry, or the measurement of light, by comparing one light with another and expressing their relative intensities numerically in virtue of the law of inverse squares. Several photometers have been invented. Bunsen's P. is generally adopted to ascertain the illuminating power of coal gas or other artificial light, the standard of comparison in Great Britain being a sperm candle of six to the pound weight burning 120 grains per hour. A grease spot on paper appears bright by transmitted light, and dark by reflected light; but if the paper be placed midway between two lights of equal intensity, the grease spot appears equally illuminated with the surrounding paper. This is the principle of Bunsen's P. The lights to be compared are placed on opposite sides of an oiled screen, and the brighter illuminant is removed farther from it, till equally illuminated surfaces be obtained; the distances of the lights from the screen are then measured and squared, and the two squares express the relative intensities of the lights. In Rumford's P. comparison is made of two shadows of an upright opaque rod cast upon a white screen from two sources of light. The darker shadow is produced by the more intense light, but by gradually withdrawing it the shadows at length become of equal force. The relative illuminating values are then determined as before. In the P. of Bouguer and in that invented by Ritchie, light from two sources is separately received by two inclined mirrors, placed in a box, and is reflected upwards to adjoining discs of oiled paper, equality of brightness being obtained by shifting one of the lights. Arago founded a P. on the properties of polarised light, but it, together with the instruments designed by Wheatstone, Leslie, and others, is of little value for practical purposes. The use of the radiometer for photometry has recently been suggested by Mr. Crookes.

Photophobia (Gr. *phōs*, 'light,' and *phobos*, 'fear') is an intolerance or dread of light characteristic of some forms of ophthalmia, more especially those of a strumous nature. In cases of recurrent vascular ulcer, the P. is excessive, and the child hides its head in the darkest corners or in its mother's dress, screams and struggles at every attempt to expose it to the light, and contracts the orbicular muscles spasmodically. The subjects of this disorder are nearly always strumous children, and the state of their eyes often renders them additionally unhealthy.

Photosculpture, invented in 1861 by M. Willème, an eminent French sculptor, is an art in which photography is turned to account in reproducing facsimiles of statues or living persons. The model is placed in the centre of a circular studio, and twenty-four simultaneous photographs are taken of it from different points of view. The block of clay to be modelled being now placed on a turn-plate, the outline of No. 1 photograph is scratched on it by means of the pantograph, an instrument for counter-drawing. On turning the block round $\frac{1}{24}$ th of a revolution, the contour of No. 2 photograph is similarly transferred to the clay, which is then cut according to the difference of the two profiles. Obviously, by so operating with the remaining photographs in their proper order, the clay block will, in a complete revolution, present the exact exterior outlines of the model, and the *minutiae* of the pictures being thereafter traced with the points of the pantograph, a solid figure, perfect in all the details of the photographs, is obtained. P., though an accurate and simple art, has not been extensively practised out of the country of its origin. The late M. A. Claudet of London was its most able exponent in Great Britain.

Photoincography. See PHOTOLITHOGRAPHY.

Phragmites. See REED.

Phrase, in music, a short portion of a section, containing one or more feet of one accented and one or two unaccented beats. *Phrasing* in compositions is the due indication of rhythmical divisions for performance by giving proper stress to accented notes, &c., in order to ensure correct musical expression.

Phrenitis. See MENINGITIS.

Phrenology, a system of classification and localisation of the powers of mind, first propounded by Dr. Franz Joseph Gall, and subsequently by Dr. Spurzheim, Dr. A. Combe, Dr. G. Combe, and others. Gall is said, when a schoolboy, to have remarked that certain qualities of mind were associated in his fellow-pupils with special developments of certain parts of the brain, and he was hence led to correlate the two observations by assuming that it was possible to determine the mental constitution of man by observing the size and shape of the skull and its regions. His opinion is necessarily based on the idea that the brain is an aggregation of parts or organs, and that each organ has a distinct and separate function in the evolution of mind or mental acts. This idea forms one of the fundamental propositions of P., and may be accompanied by another, namely, that *ceteris paribus*, the size of the 'organs' or parts of the brain is indicative of this activity and power. Having thus mapped out the basis of the study, the phrenologist proceeds to assert that by observation of the conformation of the external surface of the brain the character may be accurately determined, and that by studying the elevations and depressions, alleged to be capable of being felt in the skull through the scalp, the exact form of the brain mass may be ascertained. The surface of the skull and head generally is thus mapped out by phrenologists with some thirty-five 'organs,' each being supposed to correspond with a definite mental power. The recognition of these organs by the phrenologist has necessitated the construction of a special system of classification of the mental powers. The arrangement of Combe divides the intellectual powers into *Affective* and *Intellectual* faculties. The affective faculties are further divided into *Propensities* and *Sentiments*, and the intellectual into *Perceptive* and *Reflective* faculties. The following is the list of faculties according to Combe:—

AFFECTIVE.

I. PROPENSITIES.

1. Amativeness.
2. Philoprogenitiveness.
3. Concentrativeness.
4. Adhesiveness.
5. Combaticiveness.
6. Destructiveness.
7. (Alimentiveness)?
(Love of life)?
8. Secretiveness.
9. Acquisitiveness.
10. Constructiveness.

II. SENTIMENTS.

10. Self-esteem.
11. Love of approbation.
12. Cautiousness.
13. Benevolence.
14. Veneration.
15. Firmness.
16. Conscientiousness.
17. Hope.
18. Wonder.
19. Ideality.
20. Wit.
21. Imitation.

INTELLECTUAL.

I. PERCEPTIVE.

22. Individuality.
23. Form.
24. Size.
25. Weight.
26. Colour.
27. Locality.
28. Number.
29. Order.
30. Eventuality.
31. Time.
32. Tune.
33. Language.

II. REFLECTIVE.

34. Comparison.
35. Causality.

Admitting with the phrenologists themselves that this system of classification is by no means perfect, there are yet sufficient materials offered therein for criticism of the system at large. One of the chief objections to P. has always been that the brain substance shows no trace or appearance of being divided into 'organs' or parts such as the phrenologist theoretically recognises. Nor does the *development* of the brain afford any support to the phrenologist. The development of an organ is regarded in modern physiology as the surest clue to its nature and structure. The brain arises from three 'vesicles,' which make their appearance at an early stage of development, and in its early growth exhibits no convolutions such as are seen in the brain of

the adult. There is thus not the slightest trace in the brain substance of any separation into the 'organs' of the phrenologist. Neither does comparative anatomy support P. Many animals (*e.g.*, frogs) which exhibit the highest development of sexual activity have the cerebellum or lesser brain (where *amativeness* is placed by the phrenologist) represented by a mere strip of brain matter. Moreover, the knowledge we now possess of the functions of the cerebellum entirely refutes the phrenological idea of its being the seat of the sexual passion. This portion of the brain regulates the movements of the body and coordinates muscular motion. When removed from an animal, the creature has no power of moving harmoniously, but flies or walks in the most unsteady fashion. So also P. receives no support from pathology; for the cerebellum is not found diseased in those insane who are subject to strong sexual desires and to utter perversion of the sexual functions. What has just been said of the cerebellum, and of the phrenological doctrine of its uses, applies to every other 'organ' and to the system as a whole. The fact must not be lost sight of that if the convolutions of the brain are to be regarded as of equal value—and there is no justification for assuming the reverse notion—then those convolutions which are situated on the *base* of the skull must also be considered to possess definite functions. But P. has no means of reaching the base or floor of the skull, and the faculties of mind must therefore be regarded as being situated solely on the upper surface and outer parts of the brain—a supposition which in itself would effectually show the weakness and inapplicability of P. as a system of mind. Perhaps, however, the arguments which militate most powerfully against P. as a system of mind-localisation are derived from recent researches into the functions of the brain. With these researches the names of Hitzig and Ferrier are associated. By exposing and by electrically stimulating the brain, it has been ascertained that there is localisation of function in the brain it is true, but not of the mental or intellectual functions as postulated by P. It has been found that certain portions of the brain are associated with muscular movements of certain parts; and as far as research has yet proceeded, it would seem that groups of muscles derive their nerve power from, or are stimulated by, certain localised parts of the brain. Language, and the power of expressing ideas, has been located by P. in the eye, which organ is itself removed from the brain, and in its development corresponds largely to an infolded skin surface. Professor Ferrier's researches have shown that the condition of *aphasia* or *speechlessness* is produced by disease of the left hemisphere of the brain at the hinder part of its lower and frontal convolution. More curious still is it to find that aphasia is associated invariably with disease of the left hemisphere of the brain; the right side being invariably unaffected. Other regions of the brain have been shown to be the seat of sight, smell, taste, and touch. Thus the localisation of ordinary bodily functions in the brain has already been demonstrated, but the localisation of mind-functions is yet an unattempted physiological labour. One fact remains clear, however, and that is, that P. is utterly insufficient, when judged by the standard of physiology, to localise the functions of mind. It is founded on no certain experimental or scientific basis. See Prof. Laycock's *Mind and Brain*, &c. (Edinb. 1860), Sir Benjamin C. Brodie's *Psychological Inquiries* (Lond. 1854), Bailey's *Letters on the Philosophy of the Human Mind* (Lond. 1858), Sir William Hamilton's *Lectures on Metaphysics* (Edinb. 1859), Combe's *Relation between Religion and Science* (Edinb. 1857), and Prof. Bain, *On the Study of Character, including an Estimate of Phrenology* (Lond. 1861).

Phrygæna. See CADDICE.

Phrygia, called **P. Major** to distinguish it from P. Minor in Mysia, was a province in Asia Minor bounded E. by Galatia and Lycaonia, S. by Pisidia, W. by Caria, Lydia, and Mysia, and N. by Bithynia and Paphlagonia. It was traversed by irregular offsets from the mountain ranges of Olympus, Taurus, and Cadmus, and watered by the upper courses of the Hermus, the Mæander with its tributaries the Marsyas and Lycus, and the Sangarius with its tributaries the Thymbres and Alander. In the S. were the salt lakes of Anaua (*Chardak*) and Ascania (*Buldur*). P. was divided into four parts—Salutaris, the central; Pacatiana, on the Carian frontier; Epictetus in the N., and Parorios, the mountainous district, in the S.; and was crossed by several important roads, those between Ephesus and the East meeting at Synnada, from which roads led to Cilicia, to Cæsarea in Cappadocia, and

thence into Armenia. The chief towns were Dorylæum (*Eski-Shehr*), Lynnada, Ipsus, Celæne, Apamea, Colossæ, Laodicea, Hierapolis. The inhabitants came probably from the Armenian highlands, and settled in the plateau of Asia Minor. They are believed to have spread over Thrace, Macedonia, and Illyria, to have been an Aryan people, and kinsmen of the Hellenes. Though a brave race, they were forced to yield successively to the Semitic Assyrians, the Lydians, and the Persians. P. was permanently attached to the Roman province of Asia (B.C. 43). In religion the Phrygians were noted for a certain barbaric fervour. They loved orgies, were addicted to a kind of sensual mysticism, and exercised an influence more powerful than wholesome on Hellenic and Roman worship.

Phryne, a famous Greek courtesan, was born at Thespie in Bœotia in the latter half of the 4th c. B.C. Coming early to Athens, she there acquired such riches by her venal charms that she was able to offer to rebuild the ruined walls of Thebes, if only an inscription might be set thereon—'Alexander demolished Thebes, but P., the hetaira, built it up.' Amongst her lovers were Apelles, who painted her as 'Venus Anadyomene,' the sculptor Praxiteles, who took her for his model of the 'Cnidian Venus,' and the orator Hyperides, who gained her acquittal from a charge of atheism by bidding her unveil her bosom before the judges.

Phthiria'sis. See LOUSINESS.

Phthis'is (Gr. *phthio*, 'I consume'), or **Pulmonary Consumption**, is an extremely common and a very fatal disease. It may attack either sex, at any age, and is more or less common to every race of mankind and to every clime. P. may be hereditary or acquired, acute or chronic. *Acute P.* is a comparatively rare disease, and runs a rapid course. The onset is sudden, the prominent symptoms being shivering followed by high fever, profuse perspiration, rapidly increasing weakness, pain, cough, dyspnoea, and hurried breathing. *Acute P.* seems dependent on tubercular degeneration, following catarrhal pneumonia, the consolidation breaking down into soft cheesy matter, cavities of various sizes being sometimes formed all over the chest. Small and large crepitations may be everywhere detected. *Chronic P.* is a much more common form of the disease. The more prominent general symptoms are loss or appetite, impaired digestion, an aversion to fatty foods, general debility, loss of weight, night sweats, and a dry cough, most severe at night or early in the morning. The cough is soon afterwards accompanied with a clear, sticky expectoration, frequently tinged with streaks or dots of blood, and when the expectoration of blood is abundant, vomiting accompanies the cough, and hence the term 'vomiting of blood.' In hæmorrhage from the stomach, the blood comes away by a single act of vomiting, followed by black discharges from the bowels; but in hæmorrhage from the lungs, succeeding coughs generally bring up remaining portions of blood, the colour becoming darker and darker, and finally of a dirty brownish-red. There is not generally any fixed pain; but often a dull, aching feeling between the shoulders or below the clavicles. Sometimes the fingers are club-shaped, the nails curved, and a red line may be seen on the gums. The tubercular deposit, as a rule, affects the apex of one lung at first, and want of elasticity or actual dulness may be detected in the supra-spinous or supra-clavicular region. Stethoscopic examination elicits prolonged expiration; and a feebleness, jerking, or dry clicking accompanies the respiratory sound. Increased exudation is evinced by sub-crepitant, bubbling sounds, or by bronchial or tubular breathing. When the general and local symptoms are obscure, the nature of the case may be decided by the thermometer, which will indicate an increase of the evening temperature over that of the morning to a greater or less extent. In the second and third stages of chronic P. the general symptoms are increased in intensity. The fever is intensified and hectic; there are profuse night sweats and diarrhoea; frequent and irritable cough, often accompanied with vomiting; capricious appetite, and impaired digestion; the expectoration is thick, yellow, heavy, and pellet-shaped or mummular, sometimes purulent and of an offensive odour, and there is flattening above and below the clavicles of one or both sides. The tubercles formed in the first stage break down, and cavities are formed, and the walls of the cavities are usually thick and solid. The percussion sound is dull, but if there be free communication

with the open bronchi and the mouth, there is the cracked-pot sound (*bruit de pot fêlé*). On auscultation gurgling may be heard, caused by the air bubbling through liquid, or cavernous or amphoric respiration if the cavity be dry, or both may be combined if the cavity contains fluid at its lower part and be dry above. Broncophony or well-marked pectoriloquy may be observed by the vocal resonance. A murmur is frequently heard below the clavicles, especially on the left side, following the first sound of the heart, probably due to adhesions at the apex of the lung. The nature of the disease can be determined by an examination of the sputa, for tubercular matter can be detected, and at times the elastic fibres of the lung-tissue.

Treatment.—From the first appearance of suspicious symptoms, cod-liver oil should be given, at first in tea-spoonful doses, mixed with lime-water, and gradually increased. Glycerine, either alone or with the syrup of the iodide of iron, or a bitter tonic, may be given, and pancreatic emulsion has been recommended. The curative treatment is essentially dietetic and hygienic, and in the early stage of the disease a change of air and scene is recommended. When circumstances admit, a sea-voyage should be tried, or a residence for some time in a genial climate such as Torquay, Mentone, Algiers, or Madeira. The palliative treatment consists in measures to allay the cough, such as the hop inhalation, which is preferable to cough mixtures. This is prepared by mixing half a drachm of oil of hops and one drachm of heavy carbonate of magnesia in three ounces of water. A tea-spoonful of the mixture added to a pint of boiling water may be used by the Maw's inhaler. Opium, or some of its preparations, may be used as a cough mixture. In cases of hæmoptysis, gallic acid or ice may be given internally, and the injection of ergotine is recommended. Chlorodyne is useful to control diarrhoea, and the hypophosphite of lime, or the injection of atropine, to control excessive perspiration. The hypophosphite of lime is recommended in the early stages of hereditary P. See TUBERCULOSIS.

Phulwara Tree is a name given in India to the butter-tree, for which see BASSIA BUTYRACEA.

Phylactery (Gr. 'a safeguard,' 'amulet,' the name in the New Testament for the Old Testament *frontlet*, Heb. *tepheth*, 'a tie, a band,' from *tsaph*, 'to bind round') is a small square box made of parchment or black calf-skin, in which are enclosed four slips of parchment or vellum, with a passage of Scripture written on each (Exod. xiii. 1-10, 11-16; Deut. vi. 4-9, xi. 13-21), which is worn by every Jew on week-day mornings during the time of prayer, one on the hand and another on the head. Each is fastened on by a long thong, and the chief difference between the two is that inside the one for the head are four cells, one for each of the four slips of parchment, while the one for the hand has only one cell. See Kitto's *Cyclopædia of Biblical Literature* (3d ed. Edinb. 1876).

Phyllo'oda, an order of *Crustacea* (q. v.), which have usually though not always a *carapace* or shell investing the head and thorax. The feet never number less than eight pairs; while, as indicated by the name P. ('leaf-footed'), they are foliaceous or leaf-like in form, and bear the respiratory or breathing organs. The first pair of feet are used for swimming, and have no gills. In their development the P. undergo a somewhat modified metamorphosis, and the young appear as *Nauplii*. In this order several well-known crustacean forms are included. Of these, the genera *Apus*, *Limnadia*, and *Branchipus* are familiar groups, and the *Chirocephalus*, or genus of 'Fairy-shrimps,' also belong to this order. The well-known 'Brine-shrimps' (*Artemia*), found in the pans of saltworks, and in the Great Salt Lake of Utah, are also P. They live in a briny solution of sufficient strength to pickle beef.

Phyllox'era, a genus of insects peculiarly destructive to vines. The French vineyards have suffered terribly from their attacks, and all the resources of entomologists and chemists have been called in to repress their ravages. Originally brought from America, they were apparently first noticed by Fitch, an American naturalist, in 1854, in the form of galls situated on the lower surface of the vine leaves. Each gall contained a small insect, invariably a female, and capable of producing some hundreds of eggs. From each egg a little larva issued; these larvæ ascended to the upper part of the vines, and destroying the plant tissues, ultimately formed 'galls,' in which they became enclosed like

their parents. Dr. Shimer, in 1867, was fortunate enough to discern the male insect, which was winged. Meanwhile vine-pests were being met with in England. They appeared near London in 1863, but in 1867, in France, the vine-growers were forced to take measures for the repression of the new and mysterious lesion which affected their plants. The cause of this lesion long remained a mystery, until a careful examination of the diseased vines showed that they were infested with insects, which by their numbers caused the gangrene and decay of the plants. The conditions favouring the development of the P. are said to be cold and drought; but in reality our knowledge on this point is very slight and uncertain. Nor have the remedies hitherto proposed been thoroughly successful in the attempt to eradicate these pests. The most hopeful method appears to be that of fostering other insects which are harmless to the vines, but which prey on the P. Certain species of vines (e. g., *Vitis rotundifolia*) seem to escape its attack, and the cultivation of these has been recommended as likely to exterminate it.

Physalia, a genus of *Coelenterate* animals, including the 'Portuguese men-of-war.' *P. pelagica* and *P. utriculus* are two well-known species. The P. is met with floating on the surface of tropical seas. The body consists of a beautifully tinted bladder or 'float,' which serves to buoy the organism on the surface of the water, and which attains a length of 8 or 9 inches. To the under surface of the float a large number of *sroids* or *polyps* are attached, the P. being thus a compound animal. Long contractile tentacles are also developed. These animals sting very severely by means of the *cnida* or 'thread-cells' with which, like all other *Coelenterata*, they are provided. The effects of the sting may last for a long time, the symptoms resembling those of a very severe and acute inflammatory attack. Occasionally specimens of P. have been found on the coasts of Britain.

Physalis (Gr. *phusa*, 'a puffing up') is a genus of herbs and shrubs belonging to the natural order *Solanaceæ*, in which the



Physalis Alkekengi.

calyx enlarges considerably after flowering, so that the succulent fruit is enclosed in a large leafy bladder. The species are widely distributed in tropical countries, and *P. Alkekengi*, or the winter cherry, is a native of middle and S. Europe. Its fruit, which is like a small cherry within the vermilion-coloured inflated calyx, has a slightly acid taste, and is eaten in some countries. It is also said to have some medicinal value. *P. Peruviana*, the Peruvian cherry, and *P. pubescens*, both natives of temperate and tropical

America, yield a luscious fruit that is used for dessert or made into preserves. The first is occasionally cultivated in forcing-houses in Britain, and is often very inaptly called Cape Gooseberry.

Phys'eter. See CACHALOT.

Phys'ical Geography. See GEOGRAPHY.

Phys'icians, The Royal College of (of London), was founded in 1518 by Thomas Linacre (q.v.). Through the influence of Cardinal Wolsey, Linacre obtained from Henry VIII. letters patent granting to John Chambre, Ferdinandus de Victoria, and himself, physicians to the king, along with Nicholas Halsewell, John Francis, Robert Vaxley, and all other men of the same faculty in London, to be incorporated as a perpetual community or college. Linacre was the first president, and held the office till his death. The parties named were empowered to hold assemblies, and form laws for the government of the College, and of all who practised medicine in London and within seven miles thereof, with the power to interdict from practice any individual, unless previously licensed by the president and College. The original charter was obtained 'to check men who

profess physic rather from avarice than from good faith, to the damage of credulous people.' The charter ordains that 'no one shall exercise the faculty of physic in the said city, or within seven miles, without the College licence, under a penalty of £5;' that, in addition to the President, 'four censors be elected annually to have correction of physicians in London and seven miles' circuit, and of their medicines, and to punish by fine and imprisonment,' and that 'the President and College be exempt from serving on juries.' In 1523, an Act was passed confirming the charter, and enacting that the six persons named 'shall choose to them two men of the said commonality from henceforward to be called and cleaped elects, and that the same elects yearly choose one of them to be president of the said community.' It was further enacted that, in the event of a vacancy, the elects 'shall choose, name, and admit, one or two, as needs shall require, of the most cunning and expert men, of and in the said faculty in London,' and that 'no person from henceforth be suffered to exercise or practise in physic except he be a graduate of Oxford or Cambridge, until such time as he be examined at London by the said President and three of the said elects, and have from them letters or testimonials of their approving and examination.' Additional privileges and powers were conferred by an Act passed in 1540, by which the President and College were exempted, on account of their professional duties, from certain public duties which devolved on other citizens; and empowered to enter and search the houses and shops of apothecaries, and to destroy such articles as they might find 'not meet nor convenient to be ministered in any medicine for the health of man's body.' In this Act it was declared that 'surgery is a part of physic, and may be practised by any of the company or fellowship of physicians;' but, until very recent times, this recognition was denied by the College. Several Acts were subsequently passed, but nothing of any great importance occurred until the passing of the Medical Act of 1858, which provided for the granting of a new charter to the College, which was obtained in 1862. In 1860 'An Act to Amend the Medical Act' was passed, by which the provisions of the Act 1522-23, as to the elects, were repealed on the ground that their main function was licensing country physicians, and that it had virtually ceased. The Act further declares that the office and name of elects of the said College shall henceforth wholly cease, and that the presidency shall, in future, be an annual office, open to the fellows at large, who shall also be the electing body.

The meetings of the College were first held at the house of Linacre in Knight-rider Street, which he bequeathed to the College, and which they possessed till 1860. During the reign of Charles I., more accommodation being required, a house was taken at the bottom of Amen Corner, which was the seat of the College till 1666, when it was destroyed by the great fire of London. A new building was afterwards erected in Warwick Lane, which was opened in 1674 under the presidency of Sir George Ent, and where the meetings were held until 1825, when the present building in Pall Mall East was opened under the presidency of Sir Henry Hallford.

The College consists of fellows, members, licentiates, and extra-licentiates, and the government of the College is vested in the president and fellows only, the members of the College being alone eligible to the fellowship. The College, under its charter, grants licences to practise physic, including therein the practice of medicine, surgery, and midwifery, to persons who conform to the byelaws of the College. Each candidate for the licence must produce evidence (1) of having attained the age of twenty-one years; (2) of moral character; (3) of having passed, before the commencement of professional study, an examination in the subjects of general education recognised by the College; (4) of having been registered as a medical student in the manner prescribed by the General Medical Council; (5) of having been engaged in professional studies during four years; (6) of having attended, during three winter sessions and two summer sessions, the medical and surgical practice at a recognised hospital or hospitals, &c.; (7) of having pursued a prescribed course of study; (8) of having passed the professional examination. Licentiates of the College prior to 1859 are entitled to be admitted as members. Extra-licentiates, not engaged in the practice of pharmacy, may be proposed as members. There are twenty-one byelaws and regulations regarding the admission of members. Candidates must have attained the age of twenty-five; must produce a testimonial as to character, &c., from a

member or fellow; and evidence of having been engaged in professional study during a period of five years. No candidate can be admitted who is engaged in trade, or who dispenses medicines, or who practises medicine or surgery in partnership; or who refuses to make known, when required by the President or censors, the nature and composition of any remedy he uses.

According to the byelaws of the College—(1) no fellow of the College is entitled to sue for professional aid rendered by him; but this byelaw does not extend to members; (2) no fellow, member, or licentiate of the College is entitled to assume the title of doctor of medicine unless he be a graduate in medicine of a university; (3) no fellow or member of the College shall officially, or under colour of a benevolent purpose, offer medical aid to, or prescribe for, any patient whom he knows to be under the care of another legally qualified medical practitioner. See *Medical Directory*, published annually by Churchill, London.

Physic Nut, or *Curcas purgans* (sometimes placed under *Jatropha*, q. v.), is a soft-wooded shrub or small tree belonging to *Euphorbiaceæ*, a native of tropical America, and now generally cultivated in all hot countries for the sake of its seeds, which yield a purgative oil commonly employed in native medicine, and used also for burning in lamps, for cloth dressing, and as a substitute for linseed oil. The fruit is about the size of a filbert, containing three seeds, the kernels of which have a nutty pleasant taste, but are injurious, or even dangerous, if eaten in quantity. The leaves are used for fomentation; the juice of the young buds, which dries into a brilliant transparent substance of the colour and consistence of shellac, as an application to cuts and ulcerated wounds; and the bark of the root externally for rheumatism. By the Chinese the juice is made into a black varnish by boiling it with oxide of iron. The above species is generally called English P. N., to distinguish it from the French P. N. (*C. multifidus*), also a native of tropical America, and furnishing an oil of like purgative properties called Pinhoën oil.

Physics, or **Natural Philosophy**, is the science which treats of the laws that regulate all natural phenomena. It therefore lies at the basis of all true accurate knowledge of such branches of science as chemistry, geology, biology, and physiology. Much detailed knowledge of facts may, indeed, be acquired in these various departments without any sure acquaintance with the laws of P.; but in such case, a comprehensive grasp of the principles underlying the special branch of science is impossible. P. is best defined, perhaps, as the science of Energy (q. v.). It deals with matter and the properties of matter only in so far as they are intimately associated with the transformations of energy. The study of matter as matter is the province of chemistry, which in its turn recognises energy solely as affecting matter and its combinations. P. and chemistry, then, differ only in the relative importance which each attaches to these great *existences* of nature—energy and matter. Geology confines its investigations to the materials forming the earth's crust, and to the agencies which are modifying these. In physical geography it joins hands with pure P.; in mineralogy and petrology it touches on chemistry; and in palæontology it has much in common with biology. Biology concerns itself with life, and really includes physiology, which might be defined as the P. of life or the dynamics of life. Energy, then, is the subject-matter of P., and consequently the great law of P. is that grand generalisation of the 19th c.—the conservation of energy. The history of the science, viewed in the light of this principle, beautifully illustrates the gradual development of law out of chaos. Among the ancients, a deity was supposed to lurk behind every phenomenon. But this superstition soon gave way as experience grew and knowledge deepened; and we find Lucretius referring all the actions of nature to the molecular structure of matter, dowering his atoms with properties at once ingenious and wild. The world, however, was not ready for such generalisation; and no safe generalisation can be made unless founded on experience or logical induction from experience. All down through the ages we find experiment leading to the establishing of empirical laws; these directed the investigator along paths which gradually joined and converged to one great centre, while this great centre, once gained, disclosed other lines of inquiry, which led to truths more startling than man had ever before conceived. The labours of Copernicus, Brahe, Galileo, and Kepler suggested to Newton the universal law of gravitation, and resulted in the establishment of the whole of

dynamical science with a fulness and exactness which has never been excelled. Newton's experiments on light, and Huyghen's theory, developed in the hands of Young and Fresnel into the beautiful undulatory hypothesis; while the early work of Rumford and Davy, supplemented by the experiments of Joule, Colding, and Mayer, and the mathematical analysis of Rankine, Thomson, and Clausius, grew by gradual process into the united system of thermodynamics. The theory of exchanges, established by Prevost, Stewart, and others, for heat radiations, was extended by Stokes, Kirchoff, and Bunsen, to explain the dark absorption lines of the solar spectrum, first observed by Wollaston and mapped by Fraunhofer. Ampère's investigations into the mutual effects of voltaic currents, the discovery by Oersted of the fundamental fact of electromagnetism, and the brilliant researches of Faraday into electric and magnetic induction, have been gradually linked together by Weber, Helmholtz, Thomson, and Maxwell, so that now all the correlations of electricity and magnetism are recognised as instances of transformations of energy regulated in all cases by the conservation principle. Newton all but enunciated this principle in its most general form. Expressed in mathematical language, it shaped itself under the hands of Laplace and Lagrange into a complete system of celestial dynamics. It was a development co-existent with the growth of thermodynamics, but immeasurably more extensive, and now it embraces in its wide grasp the whole circle of the sciences. Thus, though the conservation of energy is common to all branches of scientific inquiry, it is peculiarly the property of P., which is the nucleus of all science.

Physiognomy (Gr. *physis*, 'nature,' and *gnômê*, 'a means of knowing'), the study of the face as an index to character and mental disposition. The writings of Lavater (q. v.) contain a full exposition of this study, which was begun by Della Porta of Naples in 1615. The face, like the body at large, sympathises to a great extent with the mental disposition of individuals and of races. As the portion of the frame more especially concerned in the 'expression of the emotions,' the face may be regarded as being intimately related to the mind and intellect, and to reflect to a greater or less degree the mental emotions. Then, also, types of facial conformation may be noted to accompany certain types of habit, race, &c. The study of P. reveals thus much, and in a general fashion may be said to possess a standing of a higher kind than Phrenology (q. v.) as a means of determining character. But its more special applications to determine the innate phases of human character, or to invariably show the working of the emotions, have not been successfully carried out. Darwin's work on the *Expression of the Emotions* may be said to present the most succinct view of the modern relations of P.; facial conformation being shown to arise from the special use of certain muscles over others.

Physiology (Gr. *physis*, the 'nature' of anything, and *logos*, an 'account' or 'description'), the department of Biology (q. v.) which investigates the *functions* of living beings. P. is thus the companion science of Morphology, which deals with the *structure* or form of organisms, and a knowledge of morphology and P. constitutes the only sure basis for the classification and arrangement of animals and plants. The study of P. may be said to include the investigation of three great functions, viz., *nutrition*, *reproduction*, and *innervation*—this last having reference to the working of the nervous system. *Nutrition* includes the processes by which the individual living being maintains its growth, whilst *reproduction* refers to the perpetuation of the species or race. *Human P.* is sometimes named the *Institutes of Medicine*, inasmuch as this branch of medical study forms the basis of rational medicine. The knowledge of the healthy processes or functions of the body, in other words, enables the physician to understand the nature of abnormal or diseased action. P. was first taught in ancient times as a branch of philosophy by Plato and other scholars. The ancient physicians (Hippocrates, Galen, Erasistratus, &c.) necessarily embodied observations on the structure and functions of the human body in the course of their studies in medicine, but only within a comparatively recent date has the science been specially studied. Harvey's discovery of the circulation in 1620 gave a great impulse to it. Haller's influence was also well marked, and John Hunter may be said to have advanced it in no slight degree.

Physophorida, an order of *Hydrozoa* represented by the *Physalia* or 'Portuguese men-of-war,' by the genera *Vesicula*

(q. v.), *Porpita*, &c. These are free-swimming organisms which swim on the surface of the sea through the agency of a *pneumatophore* or float. Each organism consists of several polyrites, and has long tentacles and thread-cells or stinging-cells.

Physostomata, a division of *Teleostean* fishes (otherwise named *Malacopecteri*) represented by the eels, herring, salmon, pikes, &c. In this group the air-bladder opens into the throat by means of a *pneumatic duct*, and the fin-rays are 'soft' or many-jointed. The scales are *cycloid*, although some of the fishes included in this group are destitute of scales, and in one or two cases *ganoid* scales may be developed. Ventral fins may be absent, as in the eels (*Apoda*), and when present, they are abdominal in position (e.g., salmon).

Phytolacca, the type genus of *Phytolaccaceæ*, consisting of about ten species of strong herbs or shrubs, distributed throughout the tropical and sub-tropical regions of both hemispheres, but most abundant in the western.



Phytolacca decandra.

After boiling, the young shoots become harmless, and are eaten as asparagus. *P. dioica*, known as *Bella sombra*, is a fast-growing tree, with a thick-based trunk, and soft, coarse-grained, fibrous wood, indigenous in La Plata and Brazil, and used as an avenue tree in Spain, Gibraltar, and Malta. In some parts of India the leaves of *P. acinosa* are eaten as a vegetable, while in the West Indies the berries of *P. octandra* serve as a substitute for soap.

Phytology (Gr. *phyton*, 'a plant,' and *logos*, 'a description') is that part of Botany that treats of plants in general.

Phytozoa (Gr. *phyton*, 'a plant;' *zoon*, 'an animal') is a name given to certain fertilising organisms in ferns, seaweeds, fungi, and other of the lower order of plants, but they are now generally called *antherozoids*, or better still *spermatozoids*, as they perform male functions identical with the pollen in phanerogamous plants, and with spermatozoa in the animal kingdom. They are formed in a cell called an *antheridium*, from which they escape as minute motile bodies, and obtaining entry into the developed female cell or *oosphere*, the reproduction of the species is secured. These movements are effected by filaments called *cilia*, but the internal force by which the motion is performed has not been ascertained. For a long time they were considered to be endowed with animal life.

Piacenza (Fr. *Plaisance*, the *Placentia* of the Romans), a city of Northern Italy in the province of the same name, lies on the right bank of the Po (here crossed by an iron bridge), 43 miles S.E. of Milan by rail. It is the seat of a bishop, and is fortified with thick walls and a citadel of great strength. The streets are very broad, and the principal of them, the *Stradone Farnese*, is one of the finest in Italy. The largest square is the *Piazza de' Cavalli*, in which stand bronze equestrian statues of the Dukes Alessandro and Ranuccio Farnese, erected 1620-24. The cathedral, a Romanesque-Lombard edifice, founded in 1122, contains some fine frescoes by Ludovico Caracci and Guercino, and has a crypt borne by 100 columns. There are other interesting churches, several hospitals, a theatre, and a public library of 40,000 vols. It was for the church of St. Sisto (1499-1511)

here that Raphael about 1518 painted his masterpiece, the *Sistine Madonna*, which is now at Dresden. There are slight silk and linen industries, and some trade in grain, wine, cheese, &c. Pop. (1874) 34,985. *Colonia Placentia* was founded by the Romans in 218 B.C., to intercept the advance of Hannibal. Twenty years afterwards it was plundered and destroyed by the Gauls, but was soon rebuilt and fortified by the Romans. During the Middle Ages P. was governed by various noble families, the Scotti, Torriani, and Visconti, while in 1488 it was plundered by Francesco Sforza, and never entirely recovered from the blow. It came finally into the possession of the Farnese (1545), under whom it was united to Parma. Church councils were held here in 1095 and 1132.

Piana dei Greci, a town of Sicily, province of Palermo, 8½ miles S. by W. of Palermo. It was founded in 1488 by an Albanian colony, but the inhabitants, noted for their predatory habits, are losing their peculiarities of language and custom. The Greek church is adorned with fine frescoes. Pop. (1874) 7714.

Pia'no (Ital. 'soft'), a direction in music, abridged *p.*; *pianissimo*, *pp.* 'as soft as possible.'

Pianoforte (Ital. 'soft-loud'), a musical stringed instrument with a keyboard, deriving its name from its capability of producing gradations of tone, its strings being struck by hammers instead of being twanged by quills or other plectra, as in the instruments of similar construction formerly in use. We may trace the origin of the P. from the dulcimer through such instruments as the *clavictherum* (the oldest keyboarded instrument; the *clavichord* or *clarichord*, which had strings of wire instead of gut; the *clavicymbalum*, or 'dulcimer with a keyboard,' the strings of which were made of steel wire; the *virginal* or *spinet*; and the *harpsichord* or *clavier*, which enjoyed a long reign of popularity, and for which many of the best compositions of Handel, Bach, Haydn, and Mozart were written. The compass of the harpsichord, which was in shape like a grand piano, was from three to five octaves. It had originally two strings in unison and one in octave for each note, and afterwards three strings in unison. Double harpsichords, with two rows of keys acting on two sets of strings, were common, many of Bach's thirty variations being written for such instruments. Harpsichords were constructed with more than twenty modifications to imitate the sounds of various instruments; but with all the complications of stops, springs, extra rows of keys, &c., it was found impossible to produce a pianoforte shading. Moreover, the quills in a well-used instrument required continual renewal. The invention of the P. has been variously claimed for Schröter, a German organist; Marius, a French harpsichord maker; Father Wood, an English monk at Rome; and Bartolomeo Cristofali, a maker of Parma, who is supposed to be most justly entitled to the honour. A number of foreign makers settled in London in the 18th c., and to them and their English brethren is due the present high perfection of the mechanism of the instrument. Among the list of eminent makers are Broadwood, Kirkman, Erard, Stodart, Clementi, Collard, Hopkinson, &c. The compass of the earliest pianofortes was five octaves. It is now usually seven octaves. The older instruments were provided with *sordini* (small pieces of wood tipped with cloth which the performer might use in lessening the vibration), hence the directions in music *con* (with) and *senza* (without) *sordini*. The dampers in modern pianofortes have a similar effect. The right-hand pedal (used in 'senza sordini' passages) raises the dampers, which otherwise fall on the strings immediately after the hammer has struck them. The left-hand pedal, producing the effect of only one string, is to be used when the words 'una corda' occur, the result being a genuine piano in tone; but its frequent use puts the instrument out of tune. There are four principal parts in a P.—the framework, the sounding-board, the mechanism, and the case. The frame is the skeleton, across which the strings are stretched by means of pins. It is made of wood or metal, and wrought-iron bars and plates are used for strengthening purposes, so that it may bear an enormous tension, amounting in a modern grand piano to nearly ten tons. Messrs. Hopkinson adopt a complete cast-iron frame in one piece, whilst the firm of Kirkman use steel. A metal frame produces the most powerful and brilliant tone, but that of wood is the sweetest. The sounding-board is made of wood. By the mechanism or action is meant the contrivances, the lever, button, check, damper, &c., affecting the hammer and the keys, and although the principle

is similar, the varieties in manufacture are almost endless, nearly every maker having some peculiar and ingenious system. At least 150 different patents have been obtained for different actions, in which the mode of striking the strings, and the control of the sounds by check and repetition apparatus are variously managed. By the invention of upright (as in the cottage P.) instead of horizontal action, a P. can be made whose mechanism is confined in one-fourth of the depth of a grand piano. The strings of the P. are of varying length and thickness. In older instruments the strings were all parallel and in the same plane, but now the longer strings are often arranged obliquely. The number of strings varies according as the instrument is a bichord or trichord. In so-called trichords the lowest octave notes have single strings of very thick steel wire covered with a double coil of fine brass wire; the strings of the next octave are similarly covered with a single coil, then one or two octaves have two plain steel wires, and the remainder of the notes in the instrument, including the middle and upper part, three plain steel wires. Among the different kinds of pianos are the grand (known in Germany as *flügel* from its wing-like shape), the cottage, the boudoir, the concert-room, the drawing-room, &c. In the manufacture of elaborate pianofortes, there are as many as 4000 distinct pieces, separately fashioned, made of many different varieties of wood, metal, and other materials.

The P. being the most charming and suitable single instrument for private use, being capable of producing the greatest variety of harmony, like a miniature orchestra, and invaluable for the accompaniment of vocal music, is considered an almost indispensable piece of household furniture, and this universal demand gives employment to thousands of workmen in the great cities of Europe. The English action is being rapidly introduced into Germany, and the London makers still rank pre-eminent for the excellence of their productions. In America, the manufacture has been carried to great perfection by Steinway, Chickering, Lindeman, Steck, &c. Beethoven, Mozart, Weber, Mendelssohn, Schumann, &c., have written some of their most beautiful pieces for the P., while such composers as Chopin, Hummel, Kalkbrenner, and Haller have almost confined themselves to this instrument. The long roll of illustrious performers on the P. contains such names as Moscheles, Thalberg, Liszt, Halle, Von Bulow, Pauer, and Rubinstein, and Mesdames Pleyel, Schumann, and Arabella Goddard. See Rimbault's *P., its Origin, Progress, and Construction* (Lond. 1860), Paul's *Geschichte des Klaviers* (Leips. 1868), Blickthur & Gretscher's *Lehrbuch des Pianofortebaus* (1871), and Brinsmead's *History of the P.* (last ed. 1877).

Piarists (Lat. *Patres Piarum Scholarum* or *Scolopini*), a religious order, devoted to the instruction of the people, and founded in 1599 by the Spaniard St. Joseph Calasanz (1556-1648). They were confirmed in 1617 by Paul V., and again in 1612 by Gregory XV., when they were raised to a congregation of 'Regular Clerks of the Pious Schools.' The habit and constitution of the P. resemble those of the Jesuits, but unlike the latter the P. have never mixed in politics. Hungary and Poland have been the chief scene of their labours, and they have also founded colleges in Bohemia, Moravia, Silesia, &c.

Piass'aba, Piass'ava, or Piac'aba, is a stout woody fibre, obtained in Bahia, from the leafstalks of a palm called *Attalea funifera*. After the withering of the leaf, the petiole remains attached to the stem by its sheathing base, and as the decay of its cellular matter takes place, the fibrous portion is liberated, ultimately hanging down in masses of considerable length. The natives make it into ropes, but the great use for which it is imported into European countries is for manufacture into brooms and brushes, particularly those used for scavenging purposes. Para P. is a finer and more valuable kind, obtained from *Leopoldinia P.*, a Brazilian palm. See *ATTALEA* and *COQUILLA NUTS*.

Piat'ra, an old town of Moldavia, Roumania, on the W. bank of the Bistritza, an affluent of the Sereth, about 40 miles N. W. of Bakan, a station on the Sereth valley railway. It has paper-mills, and one of the oldest churches in Moldavia. Pop. 20,000.

Pias'tre (Ital. *piastro*, 'a thin plate of metal,' Gr. *emplastron*, 'a plaster') is the Italian name of a silver coin, first used in Spain, where it is called *peso duro* or simply *duro*, but afterwards adopted in Spain, Turkey, and the Spanish Republics of the New World. In Spain the P., better known as the Spanish dollar, is equal to about 4s. sterling. Under Turkish misgovern-

ment, however, the coin has sunk to a mere fraction of its original value, and is at present worth from 1½d. to 2½d., and the English sovereign is considered equivalent to the piece of 100 piastres.

Piatti, Alfred, violoncellist, was born at Bergamo, in N. Italy, in 1825. He received his first lessons in music from Zanetti, after which he was a pupil of Merighi at the Conservatorio of Milan. After obtaining a high Continental reputation, he took up his residence in England in 1846, where he has never had a rival as a performer on the violoncello, particularly in chamber music. He has composed some excellent music, including *Un Passetemps Musicale*, *Mazurka Sentimentale*, &c. One of the best of his songs is *The Swallow*, sung with great success by Mr. Santley.

Piazza (Italian *piazza*, 'square, market-place'), an uncovered space enclosed by buildings.

Piazza Armerina, a town of Sicily, province of Caltanissetta, on the left bank of the Terranova, 17 miles E. by S. of Caltanissetta. It has an episcopal palace, several good churches enriched with pictures, and many fine villas. Its trade is in grain, wine, oil, chestnuts, and walnuts. Pop. (1874) 20,310. P. is said to have been founded by Greeks from Plataea.

Piazzi, Giuseppe, a celebrated Italian astronomer, was born at Ponte, in the Valtellina, 16th July 1746. He was originally destined for the Church, and joined the order of the Theatins at Milan in 1764. He had early shown an extraordinary aptitude for mathematical studies, which he continued to cultivate under such renowned teachers as Tiraboschi, Lesueur, and Jacquier, and he was soon called to a professor's chair at Genoa. Here his openly avowed preference for the philosophy of Locke and Condillac exposed him to much petty persecution, to save him from which his friend Pinto, the grand-master of the Dominicans, transferred him in 1770 to the Chair of Mathematics in the newly founded university of Malta. After remaining here some years he was sent to Ravenna, where he taught philosophy in the College of the Nobles. Thence he passed to Cremona in the capacity of a preacher-in-ordinary, and shortly afterwards to Rome, where he filled the Chair of Dogmatic Theology in the college of San Andrea della Valle. By the advice of Jacquier, who used to employ him to verify his calculations, P. accepted, in 1780, the Chair of Mathematics at Palermo. Having obtained from the Government permission to establish an observatory here, he visited France and England in order to take advantage of the most recent improvements in the construction of his instruments. On his return to Palermo he superintended the building of the observatory, which was completed in 1789. In 1792 he published the first results of his observations, which embraced the correction of various errors regarding the obliquity of the ecliptic, the aberration of light, and the parallax and movements of the heavenly bodies. The praises which this work received from all quarters induced P. to undertake a general catalogue of fixed stars, which he published in 1803, and which was crowned by the Institute of France. In 1801 he greatly added to his fame by the discovery of a new planet, which he named Ceres, between Mars and Jupiter. In 1814 he published a second and much augmented catalogue of fixed stars (containing 7646), a work which was again crowned by the Institute. P. died at Naples, 22d July 1826. Besides his greatest work, *Lezioni di Astronomia* (2 vols. Palermo, 1817) and the star catalogues referred to, he also published *Della Specola Astronomica di Palermo* (3 vols. fol. 1792-1806); *Sull'Orologio Italiano ed Europeo* (*ibid.* 1798); *Risultati delle Osservazioni della nuova Stella scoperta, il 1° Gennaio* (*ibid.* 1801); *Codice Metrico Siculo* (1812); *Ragguaglio dell'Osservatorio di Napoli* (Naples, 1821). See Scrolani's *Elogio del P. Piazzi* (Pal. 1826).

Pibroch (Gael. *piobairtichd*, 'the pipe summons'), a piece of military music played on the Highland bagpipe. The term has also been erroneously applied by Lord Byron and others to the instrument itself. It is said that every clan had its own P. The music, harsh in tone and martial and defiant in character, has often fired the patriotic fervour of the Highland troops and led them on to battle. It rallied the clansmen at Quebec and sounded the great deliverance of Lucknow. The oldest known P. 'The Battle of Harlaw' was probably composed a considerable time after the struggle between the Lord of the Isles and the Earl of Mar (1411), as there is no mention of the bagpipe in the poetical account of the battle. Such instruments are re-

corded to have formed part of the Scotch military music at the time of the battle of Balrinnes (1594).

Pi'ca. See MAGPIE.

Pica. See TYPES AND TYPEFOUNDING.

Picardy (*Picardie*), an old province of N.E. France, bounded by the Netherlands, Champagne, Isle-de-France, Normandy, and the English Channel and Straits of Dover. It included the present department of Somme, with parts of Pas-de-Calais, Oise, and Aisne. P. came early under the power of the Franks, whose kings at first fixed their capital at Amiens, the chief town. In 1157, Philip of Elsass, Count of Flanders, obtained P. as the dower of his wife Isabella. On their decease it became a part of France.

The P. dialect of French is historically famous. It was formed by a mixture of the aboriginal Celtic of Gaul with Latin, and was not greatly affected by the conquest of the Franks, but betrays the influence of a later Teutonic conquest, that of the Normans, in numerous words and grammatical forms. The names of many towns, villages, and hamlets are still Norman. The dialect of P. is one of the two great branches of the *Langue d'Oïl* (see FRENCH LANGUAGE AND LITERATURE). It is rich in metrical romances, fabliaux, chansons, proverbs, satires, and rebuses. Several of these have been published. See Grégoire d'Essigny, *Mémoire. . . . sur l'Origine de la Langue Picarde* (Par. 1811), and d'Abbé G. Corblet, *Glossaire du Patois Picard Ancien et Moderne* (Amiens, 1851).

Piccini or **Piccinni**, **Nic'olo**, a composer of extraordinary fertility, born at Bari, Naples, in 1728, studied for twelve years at the Conservatorio de St. Onofrio under Leo and Durante. On leaving this institution in 1754, he produced his first opera, *La Donna Dispettosa*, followed by shoals of similar works, among the best of which were *Allesandro nell'Indie* (1758) and the graceful *Buona Figliuola* (1760). He visited Paris in 1778, where he produced *Roland* (1778), *Alys* (1780), *Iphigénie in Tauride* (1781), and *Didon* (1783), with such success that many critics pronounced him superior to his great contemporary Glück, a verdict which posterity has scouted. He died at Passy, 7th May 1800. P. wrote over 150 operas, and numerous oratorios and cantatas. See Guingene, *Notice sur la Vie et les Ouvrages de P.* (Par. 1800); Fétis, *Biographie Universelle des Musiciens* (new ed. 1878).—**Luigi P.**, a second son of the preceding (born 1766, died 1827), had also some musical talent, and composed a number of operas, &c., now forgotten.

Picc'olo-Flute, a small flute playing music an octave higher than written, with a compass of from D to A, its intermediate notes being the best.

It is used by composers for striking effects, but requires moderate and judicious treatment from the shrillness of its tone. The organ stop called 'piccolo' is made of wood, and is two feet in length.

Piccolom'ini, the name of an old and still existing Italian family, which as early as the 15th c. possessed lands near Siena. The last P., Enea Silvio (Pope Pius II.), adopted the sons of his sister, Landomia Todeschini, who founded the lines of P. of Aragon, the dukes of Amalfi and of Montemarciano, and the Princes of Valle. To this Todeschini-P. family belonged Pope Pius III.—**Ottavio P.**, in the third generation from Caterina, sister of Pius II., was born in 1599, served first at Milan, and commanded the regiment which the Grand Duke of Tuscany sent to the succour of Ferdinand II., and to which was due the death of Gustavus Adolphus at the battle of Lützen, 1632. In 1634 he served in Bohemia in the army of Wallenstein, who confided to him his treasonable designs, which P. betrayed to the Emperor. He distinguished himself at the battle of Nordlingen, and in the campaigns of Swabia and Franconia, and in 1635 was sent into the Netherlands with 20,000 men to aid the Spaniards. He succeeded in driving out the French, but was not so successful with the Dutch. He was recalled in 1640 to defend the empire against Baner and the victorious Swedes, and in 1641 gained a marked advantage over them at Neuberg, but was defeated subsequently in Silesia by Torstenson. In 1643 he passed into the service of the King of Spain, who sent him to the Netherlands; but he failed to effect anything with an army dispirited by the terrible defeat at Rocroi (q. v.). P. was re-

called by the Emperor in 1648, and appointed field-marshal, but the peace of Westphalia speedily put an end to the war. He was sent subsequently as plenipotentiary to the Congress of Nürnberg, and raised to the rank of a Prince of the Empire. He was decorated by the King of Spain with the order of the Golden Fleece, and granted the duchy of Amalfi. He died childless at Vienna in 1656, consequently the Max P. of Schiller's *Wallenstein* had no historical existence.

Piccolomini, Marietta, an operatic singer, born at Siena in Tuscany in 1835. Coming to England with a great Italian reputation, she made her first London appearance as 'Violetta' in *La Traviata* (specially written for her by Verdi) in 1856, and achieved a great success in this country. In 1861 she married, and withdrew from professional life at the early age of twenty-six. Among her best characters were 'Lucia di Lammermoor' and 'Zerlina' in *Don Giovanni*.

Piche'gru, Charles, a famous French general, was the son of a small farmer, and was born at Arbois, 16th February 1761. He received his education at Brienne, where he showed great aptitude for mathematics, and prepared himself for the life of a monk. In 1783, however, he entered an artillery regiment, and speedily rose, after the outbreak of the Revolution, through all grades until in 1793 he became commander-in-chief of the army of the Rhine. Having formed a junction with Hoche at the head of the army of the Moselle, P. operated against the Austrians and took Germersheim, Speyer, and Worms. On the 7th February 1794 he superseded Jourdan in the army of the north, and made a brilliant campaign in Holland. Returning to Paris, 1st April 1795, he suppressed the insurrection of the Faubourgs, but shortly left for the Rhine, where he captured Mannheim. But his political opinions had undergone a change. Success made him a Royalist, and, bribed by the Bourbons, he permitted himself to be defeated at Heidelberg. In 1797 he was returned to the legislature, of which he became president, but his intrigues were again unmasked, and he suffered transportation to Cayenne. Escaping from thence to England, he threw himself with zeal into a conspiracy against the First Consul, was captured in Paris, lodged in the prison of the Temple, where he was found strangled, 5th April 1804. There is nothing noble in P.'s character, and his fate, whether it was suicide or assassination, excites no sympathy. Deep-dyed in treason to his country, it is a paltry merit that he became a royalist, and wished to get rid of Bonaparte. See Montgaillard, *Mémoires concernant la Trahison de P. dans les Années III., IV., et V.* (Par. 1804); Gassier, *Vie du General P.* (Par. 1814); Treilhe, *La Vérité dévoilée par les Temps* (Par. 1814); Savary, Duc de Rovigo, *Mémoires sur la Mort de P.* (Par. 1825); Pierret, *P., son Procès et son Suicide* (Par. 1826).

Pichin'cha, a S. American volcano, 11 miles N.W. of Quito (q. v.). It has several peaks, the highest of which is 15,924 feet above the sea. The last serious eruption occurred in 1660, but since 1867 P. has emitted smoke and ashes.

Pichler, Karoline (*née von Greiner*), a German novelist, was born at Vienna, September 7, 1769. She received the most careful education, and, encouraged by Denis, Alxinger, and Haschka, who frequented the house of her parents, early devoted herself to poetry. She was married in 1796 to Councillor Andreas Pichler, and some years afterwards commenced to publish novels. Marked by force and elegance of style, and containing much fine description, they were very well received, but they are now little read, as they are frequently prolix, while the characters are not always well developed. Her chief work is *Agathocles* (Vienna, 1808), a philosophical romance in which the beneficial effect of Christianity on civilisation is portrayed. It was written in opposition to the misrepresentations of Gibbon. Her other works were, *Idyllen* (1802); *Lenore* (1804); *Ruth, ein Biblisches Gemälde* (1805); *Erzählungen* (1812); *Die Grafen von Hohenberg* (1814); *Frauenwürde* (1819); *Die Belagerung Wiens von 1683* (1824); *Die Schweden in Prag* (1827); *Friedrich der Sträubare* (1831); *Zeitbilder* (1840); *Denkwürdigkeiten aus meinem Leben* (1844). P. died at Vienna 9th July 1843. Her complete works were published at Vienna 1822-45 in 60 vols.

Pichurim Bean or **Sassafras Nuts** are the commercial names for the cotyledons of the seeds of *Nectandra Puchury*, a tree of the Amazon district, belonging to the natural order *Lauracea*. They were formerly used as astringents and tonics,

but have more recently come into request for flavouring chocolate in substitution of vanilla, being so much cheaper. The flavour resembling that of the nutmeg, the name 'wild nutmeg' has sometimes been applied to them. They are not often imported, although there is a good demand for the article. An allied species (*N. cymbarum*) produces the Orinoco sassafras.

Pick'et (Fr. *piquet*), in military language, is a term variously applied. It denotes (1) in fortifications, a stake, shod at one end with iron, fixed in the ground for marking off distances, tying horses to, fixing tents, &c. Flags are attached when it is desired to make them visible from a distance. Small sharp-pointed pickets are also used for fixing gabions beyond a camp or fortress, and form useful defensive accessories. (2) The name P. is given to a small body of infantry or cavalry posted as sentinels in the front or flanks of an army. (3) The painful punishment of standing with one foot on a stake (picket) for a given time was so called. It was formerly common in the French army, but was abolished by Choiseul.

Pickles consist essentially of the soft parts of certain vegetables and succulent fruits prepared with and preserved in vinegar. P. are generally prepared and sold by manufacturers; but they can with ease be made of excellent quality on a domestic scale, and thereby with care any risk of deleterious admixture with salts of copper and other metallic compounds may be avoided. At one time it was a very common but most reprehensible practice to impart a vivid colour to green P. with verdigris or some other copper compounds. The presence of copper in P. is readily detected by allowing a bright steel knife to remain for a little time inserted in the suspected preparation, a film of copper depositing on the steel blade if that metal is present in solution. In preparing any P. the vegetables or fruits to be used are first well washed in pure water, and thereafter steeped in a strong salt brine. The material is next drained and dried, and placed in the jars or bottles in which they are meant to be preserved. For P. of the best quality, a sufficient quantity of hot strong malt vinegar is then poured over the substance; for lower qualities wood vinegar is used, and in that case a flavouring spice is frequently added. As soon as the jars or bottles have cooled down, they are corked up and tightly covered over to exclude as far as possible the air. It is of great consequence in the preparation of P. to avoid, as far as possible, the use of all metallic vessels and utensils, as vinegar and brine also act powerfully on metals, and the presence of poisonous metallic salt is often accounted for by this cause. Similarly in storing and keeping P. it is desirable not to use lead-glazed earthenware vessels. The fruits and vegetables which form the staple ingredients of P. in Great Britain are beetroot, the young pods of French or kidney beans, cabbage (white, purple, and red), capsicums, cauliflower, cucumbers and gherkins, eschalots, garlic and onions, mushrooms, tomatoes, and walnuts. Capers yield one of the most highly prized of all P., and olives, peaches, mangoes, limes, and melons are also treated and used as P. Mixed P. usually consist of onions, white cabbage, cauliflower, French beans, and gherkins.

Pico, an island in the central group of the Azores (q. v.), consists of a single volcanic mountain, the highest point of which (*El Pico*) is 7613 feet, and still emits smoke and lava. Area 254 sq. miles; pop. 36,000, mostly descendants of Portuguese. The island is fertile and in parts woody, and produces an excellent wine, of which some 25,000 pipes are exported annually.

Pico della Mirandola, Giovanni, an Italian philosopher and theologian, son of the Prince of Mirandola and Concordia, was born February 24, 1463, entered the University of Bologna at the age of fourteen, where he devoted himself chiefly to philosophy and theology, and was distinguished for his rapidity in acquiring knowledge. He next visited the principal schools of Italy and France, and mastered, in addition to Greek and Latin, Hebrew, Chaldee, and Arabic. Returning to Rome at the age of twenty-three, in the pontificate of Innocent VIII., he published 900 theses in logic, ethics, theology, mathematics, physics, and natural and cabalistic magic, which he offered to defend against all Europe. These famous theses, *De omni re scibili*, as P. styled them, *et de quibusdam aliis*, as Voltaire wittily added, apparently daunted the learned world, for no one had the courage to accept the challenge, but some envious

savants got Innocent VIII. to condemn thirteen of them as heretical. P. soon after settled at Florence, where he devoted himself to the twin studies of theology and Platonic philosophy. He died, November 17, 1494. P.'s contemporaries were filled with admiration of his genius. They called him the 'Phoenix.' In point of fact, however, he is perhaps the most striking instance in modern literature of superficial talent, conjoined with extensive reading. In a Civil Service competition he would probably have distanced all competitors; but had he lived and studied for a century, he would have added nothing to the store of human thought. A complete edition of his works was published at Bologna in 1496. Of these, the chief are *Conclusiones Philosophicæ, Cabalisticæ et Theologicæ; Apologia Concordiæ Comitis: Disputationes adversus Astrologiam Divinatricem-Libri xii.; Heptaplus, id est de Dei Creatoris opere sex Dierum Libri vii.; De Ente et Uno Opus, unguo plurimi loci in Moise, in Platone et Aristotele explicantur*. The last edition of his works was that published at Basel, in 1601.

Pic'otee. See CARNATION.

Picrotox'in ($C_{15}H_{14}O_5$), a bitter vegetable principle forming small, colourless, stellate needles, soluble in alcohol and barely soluble in water. To it *Cocculus Indicus* owes its active properties.

Pic'ton, Sir Thomas, a distinguished British general, was the second son of John Picton, Esq., of Poyston, Pembrokeshire, where he was born in 1758. He entered upon his military career as an ensign in the 12th Regiment of Foot in 1791, was sent to the Antilles in 1794, and after the capture of Trinidad in 1797 he was appointed governor of that island, with the rank of colonel. In 1809 he assisted at the siege of Flushing, and after it had been taken was appointed governor. He afterwards took part in the Spanish War, and stormed the citadel of Badajoz in the face of a deadly fire. Appointed in 1815 to the command of the 5th Division of the army, P. saw a large part of his troops destroyed in the engagement at Quatre-Bras, and he himself received a wound. Notwithstanding, he resumed active command at the battle of Waterloo two days after, and was killed by a cannon-ball as he charged the enemy at the head of his men, June 18, 1815. A monument to his memory was erected by command of Parliament in St. Paul's Cathedral.

Pictou', a flourishing seaport on the N. coast of Nova Scotia, is situated on a small and well-protected bay, 113 miles N.N.E. of Halifax by rail. Steamers ply from P. to Charlottetown, Quebec, and the ports of the Gulf of St. Lawrence. The principal trade is in coal, which is extensively mined in the vicinity. There are also large freestone quarries near the town. The manufactures include iron, leather, and tobacco. Pop. 3462.

Picts, a nation of northern Britain, whose origin, history, and fate were fiercely battled over by the 'learned' Pinkerton, the 'indefatigable and erudite' Chalmers, and their respective adherents, with 'the significant result,' says Burton, 'that the latest author (Robertson) coincided with the first critical inquirer into these matters, the venerable Father Innes.' More ink, indeed, has been spilt in the Pictish than in the Eastern Question, and Oldbuck and Sir Arthur were by no means the only men who lost their tempers over it. Now, when this Sphinx has grown old and unattractive, an Ædipus has at length arisen to solve her riddle in the person of Mr. Skene. His opinions, founded on the riper knowledge of the present age, have passed unchallenged hitherto, and it will therefore only be necessary to summarise them briefly, leaving aside fantastic speculations on islands in the Danube, inhabited by a fifth part of the whole Teutonic race.

At the time of the invasion of Severus (208) the independent tribes whom Tacitus in the 1st c. had described as occupying that part of Britain known by the name of Caledonia (q. v.), and whom only the threatened invasion of Agricola had formed into a temporary confederacy, were found combined into the two nations of the Caledonii and Maxatæ. These may be safely identified with the Dicalidona and Vecturiones, into whom Ammianus Marcellinus divides the P. in 364. The name *Picti* itself first occurs in a panegyric addressed by Eumenius, professor of rhetoric at Autun, to Constantius Chlorus, the future emperor, on the occasion of his victory over Allectus (296). The speaker alludes to 'the Caledonians and other P.,' and clearly

regarded the latter as a long-established race, affirming that even in Cæsar's day the British had no more formidable foe than the half-naked P. and Scots. The etymology of the name P. has been keenly contested, many scholars, amongst them Trench, Pictet, and Taylor, deriving it from the Celtic *peicta* or *peith*, 'a fighting man,' whilst Pinkerton identified it, somewhat arbitrarily, with the Peukini of Pomponius Mela. Most probably it is really, what it would at first sight appear, the Lat. *picti*, 'the painted men,' corresponding to its Irish equivalent *Cruithnigh*. So at least the Romans undoubtedly employed it (cf. Claudian, *De Tertio Consulatu Honorii*, l. 54), and so Martial had applied the epithet *picti* to the British (*Ep.* xiv. 99). More vital than this question is that of the ethnological affinities of the P., which must be decided on the external evidence of statements made by their own and foreign writers, and the internal evidence of the scanty remnants of the Pictish language. Tacitus, from their red hair and large limbs, inferred that the Caledonians were of Teutonic origin (*Agr.* xi.), but he knew nothing of their language, and it is now commonly admitted that in outward configuration there was no essential diversity between the German and Celtic races. His opinion may therefore be dismissed with Max Müller's dictum that 'it is lost labour to try to extract anything positive from the statements of the Greeks and Romans on the race and the language of their barbarian neighbours.' That the P. were Celts we have the concurrent testimony of the entire literature of Wales, of Gildas, Nennius, and Bede, and of their own national record, the so-called *Pictish Chronicle*, a work of the 10th c. But did they belong to the Cymric or the Gaelic branch of the Celtic race? The best answer to this question may be obtained by comparing the five sole surviving Pictish words with their Cymric and Gaelic congeners, viz. *P. peanfahel*, 'head of the wall,' quoted by Bede, with the C. *penauell* and G. *cenail*, where only the initial *p* agrees with the Cymric; the prefix *ur*, occurring in thirty Pictish names preserved in the Irish *Nennius*, with the C. *gur* and G. *gear*; *P. scolofh*, 'a scholar,' quoted by Reginald of Durham, a 12th c. writer, with the C. *yscolheic* and G. *sgolog*; *P. cartih*, 'a buckle,' given in Cormac's old *Irish Glossary* of the 9th c., with the C. *gwael* and G. *dealg*; and lastly, the P. *duiper*, 'rich,' from a fragment of the *Pictish Chronicle*, with the C. *goludog* and G. *saibher*, where, *d* and *s* being interchangeable, the Pictish and Gaelic forms are seen to be identical. These five words, then, agreeing partly with Cymric, more closely with Gaelic, tend to show that Pictish, in Mr. Skene's own words, 'was not Welsh, neither was it Gaelic, but a Gaelic dialect partaking largely of Welsh forms.' And his view is confirmed, as well by certain lists of Pictish kings as by four topographical names peculiar to the districts held by the P., and met with nowhere else—*pit* (old *pette*), 'a portion of land;' *auchter* (Gael. *uachter*), 'upper;' *for* (old *fothuir*), and *fin* (old *fothen*), the two last both obviously Gaelic forms from their initial consonant *f*. The absence, too, of *pens* from Galloway, and the frequent occurrence of *bar* (Gael. *barr*, 'top or point'), and *ar* or *arie* (Gael. *airidh*, 'a hill-pasture'), point to the same conclusion, against which Adamnan's statement has been sometimes urged, that St. Columba preached to the P. through an interpreter. But then, Adamnan also represents him as conversing freely with Brude, the Pictish king, and with the king's messengers, and a very slight dialectic variation will suffice to render a formal address unintelligible to the vulgar.

To gain a definite notion of the Pictish territories we must come down to the 7th c., when we find all the country N. of the Firths of Forth and Clyde, with the exception of the Scottish kingdom of Dalriada (Argyllshire), held by the Northern and Southern P., the boundary line between the two being the mountain range of the Mounth or Grampians. The seat of government seems to have alternated between these northern and southern tribes, but the latter were less purely Gaelic in race and language. They had also received the gospel from St. Ninian (q. v.) as early as 397, whilst the former were not converted by Columba (q. v.) till 565. S. of the Forth and Clyde were the P. of Lodonea (Berwick, Roxburgh, and the Lothians), whose name survives in Pentland, i. e., Petland or Pictland; and the Niduari P., whose district, coextensive with Wigton and Kirkcudbright, was known to the Welsh as Galwydel, to the Irish as Gallgaidel—the modern Galloway. And in Ireland itself, in Down and the southern half of Antrim, were the remnants of a Pictish tribe that had formerly extended over the whole of Ulster.

The chief events in the history of the P. from their first attack upon the Roman province in 360, with the subsequent raids of 387, 402, and 407, were their conversion alluded to above, their partial subjugation by the Northumbrian kings Osuald (634-42) and Osuiu, his brother (642-70), their revolt (672), and invasion by Ecgrif, who was defeated and slain at Dunnichen, May 20, 685. Restored to independence, they conformed in 710 to the Roman observance of Easter under their king, Nectan, who made Scone his capital, and in 731 was ousted from the throne by Angus mac Fergus. The latter, during a reign of thirty years, ravaged Dalriada (736), founded the monastery of St. Andrews, and united with Eadbert, King of Northumbria, in an unsuccessful attempt to subdue the Britons of Alclyde (756). Amongst his successors may be noticed Ciniod (763-75), the close ally of the Angles, Constantin (780-820), in whose reign the Scandinavian pirates first made their appearance, and Angus (820-32), on whose death Alpin the Scot claimed the Pictish crown, but was defeated and beheaded at Pitelpie, near Dundee. The overthrow of Eoganan by the Danes, together with the renewed ascendancy of the Columban clergy, assisted the downfall of the Pictish monarchy; and in 844, Kenneth mac Alpin, partly by right of conquest, partly in virtue of the Pictish law of female succession, obtained the kingdom of Scone. He, however, and his three successors, were still Pictish kings, their territory first changing the name Cruithenthath or Pictavia to Alban under Donald in 889, from which date the P. as a nation may be said to disappear. Those of Galloway, surrounded by the Britons of Strathclyde, preserved their individuality longest, and appear at the Battle of the Standard (1138) as one of the divisions of the Scottish army. That they also retained their language as at least a patois is proved by Reginald of Durham, who states that in 1164 the *sermo Pictorum* was still spoken in Kirkcudbright, whilst Buchanan tells us that even in his day, i. e., in Queen Mary's reign, 'a great part of this country still uses its ancient language.' So that Henry of Huntingdon, writing in the 12th c., was clearly wrong in speaking of the P. and their language as something well-nigh fabulous, as too are those who seem to fancy that the present Scottish nation contains no Pictish element, a theory as baseless as that which should make no Celts in France, or infer from the mastery of High German as the literary dialect that the Low German races were being eliminated from the Teutonic empire. See Innes, *Critical Inquiry on the Ancient Inhabitants of Scotland* (1729); Pinkerton, *Inquiry into the History of Scotland* (1789); Chalmers, *Caledonia* (1807); Robertson, *Scotland under her Early Kings* (1862); Hill Burton, *History of Scotland* (2d ed. 1873); A. P. Forbes, *Life of St. Ninian*, in vol. v., and W. Reeves, *Life of St. Columba*, in vol. vi. of *The Historians of Scotland* (1874); and W. F. Skene, *Chronicles of the P. and Scots, and other Early Memorials of Scottish History* (1867), *The Four Ancient Books of Wales* (1868), and *Celtic Scotland* (1876).

Picts' Houses. See EARTH-HOUSES.

Picus and P'oidæ. See WOODPECKER.

Pidd'ook. See PHOLAS.

Pie, the lowest fraction of the Indian currency, being $\frac{1}{4}$ th of an anna, or half a farthing in value, used only in accounts. The actual coin in use is the pice = 3 pies, or $1\frac{1}{2}$ farthings.

Pie, a name given to numerous well-known culinary preparations, in the whole of which certain substances are baked or cooked within a crust or covering of prepared flour paste. Pies are of two chief kinds—meat pies and fruit pies; in the former almost all varieties of animal food may be used, in the latter nearly all varieties of fruit. The pies which have attained the most world-wide reputation are the Strassburg pies, *piets-à-foie-gras*, in which the livers of geese in a condition of artificial fatty degeneration are employed. The veal and ham pies of Melton Mowbray, in England, are also well known throughout Great Britain.

Piedimonte d'Alife, a town of S. Italy, province of Caserta, on an affluent of the Volturno, at the base of Monte Cila, 20 miles N. by E. of Caserta, and 3 N.E. of Alife, the *Alife* of the Samnites, and now a mere village. P. is a thriving industrial town, with manufactures of excellent cottons, woollens, linens, paper, copper, &c. There are also large fulling and flour mills. Water-power is supplied by a torrent that issues from a cavern in the Val d'Inferno, a romantic gorge in the

vicinity. Pop. (1874) 7073.—**P. Etneo**, a town of Catania, Sicily, amidst wild volcanic scenery, near which is the famous chestnut tree known as the 'Castagno dei cento Cavalli.' Pop. (1874) 5140.

Piedmont (Fr. *Piémont*, Ital. *Piemonte*, 'at the foot of the mountain'), a former Italian principality, enclosed on three sides by the Alps and Apennines, and separated from Lombardy by the Ticino. It comprises, according to the present division, the provinces of Turin, Novara, Cuneo, and Alessandria, with an area of 11,299 sq. miles, and a pop. (1875) of 2,995,213. From the rich basin of the Po in the E., where rice, maize, and delicious fruits are abundantly produced, the country rises to the uplands, which yield excellent wine and silk, and finally to a bleaker region of forests and pastures. The Tanaro, Bormida, Clusone, the two Doras, Sesia, &c., all affluents of the Po, issue from valleys of singular beauty and fertility. The wild glens of the Cottian Alps in the W. of P. are still inhabited by the Vaudois or Waldensians (q. v.). In every valley are factories for the production of woollen and cotton stuffs, paper, silk, and cotton yarns, &c. Flour mills are numerous, some of the larger being provided with the latest improvements in machinery. Irrigation is conducted with great skill and under minute regulations. The Cavour Canal is one of the chief irrigation works. Turin, the largest town, was the frequent residence of the Dukes of Savoy, and from 1859 to 1865 capital of Italy. The earliest inhabitants of P. were Celtic and Ligurian tribes, who long withstood the influence of Rome. Indeed, the higher valleys were not completely subdued till the reign of Augustus. The dialect universally spoken even by the higher classes still retains traces of affinity to French. Thus, *pieuve* is used instead of the Italian *piovere*, *om* for *uomo*, *caur* for *cuore*, *sità* for *città*, *raon* for *ragione*, *plassa* for *piazza*. Travellers in P. find French quite as serviceable as Italian. The history of P. is closely interwoven with that of its dynasty. The House of Savoy (q. v.) as early as 1048 were sole possessors of Susa, Turin, and Aosta. In the beginning of the 12th c. the Savoy dominions, increased by the addition of Ivrea, Montferrat, Saluzzo, and Nice, were divided between the founders of the separate Savoy and P. lines. In 1367 the subdivisions were united by Amadeus V. the Great, and a law was passed settling the succession on the male line in the order of primogeniture. Amadeus VIII. received the title of duke from the Emperor Sigismund in 1416. In the Spanish War of Succession, Vittorio Amadeo II., boldly allying himself with Austria, threw off the suzerainty of France (1703), and obtained as a reward the Island of Sicily, which he was obliged to exchange for Sardinia in 1720. In 1713 he assumed the title of King, which was subsequently coupled with Sardinia. About this period P. itself was increased by large accession of territory. In 1798 the French deprived Carlo Emanuele IV. of all his Continental possessions. These, however, were restored by the Peace of Vienna, with the addition of Genoa. The name P. has been discarded, unless in a geographical sense, since 1860. See the official Report by Consul Colnaghi, Part iii., No. 13, June 1877.

Pie'dra Blanca, a town in the province of Catamarca, Argentine Republic, on the slope of an offset of the Andes, 170 miles N.N.E. of Rioja. Pop. 10,000.

Pier (from the Fr. *pierre*, a 'stone'), in architecture, is the name applied to the block of masonry between doors, windows, and other openings, as between the arches of a bridge. Norman and Gothic pillars are frequently called piers.

Pierce, Franklin, the fourteenth President of the United States of America, was born 23d November, 1804, at Hillsborough, New Hampshire, of which State his father, General Benjamin Pierce, was governor. He was educated at Bowdoin College, Maine, where he graduated in 1824, and where he formed an intimate friendship with Nathaniel Hawthorne, which lasted throughout his life. In 1827 P. was called to the bar, and practised with success in Hillsborough and Concord. He was member of Congress (1833-37), and of Senate (1837-42). After twice declining office under President Polk, he entered the army as a colonel of infantry in 1846, and on the outbreak of the Mexican War was appointed brigadier-general in the following year. P. was president of the New Hampshire Constitutional Convention (1850-51), and in 1852 he was elected President of the United States by 254 electoral votes against 42

for General Scott, the Whig candidate. His administration was a period of much political excitement, the most prominent events being the Gadsden Purchase, the repeal of the Missouri Compromise, the treaty for reciprocity of trade with the colonies of British America, and the publication of the Ostend Manifesto. It was during his term of office that the Kansas difficulties arose, which led to the war of 1861-65. P. was a zealous supporter of what is known as the State Rights doctrine, and his sympathies during the war were entirely with the Southern States. He died at Concord, October 8, 1869. See his biography by Nathaniel Hawthorne (1852).

Pierced, a heraldic epithet implying that a charge is perforated, displaying the field beneath. When the shape of the aperture is not given, it is presumed to be circular.

Pierre, Saint. See SAINT-PIERRE.

Pietà (Ital. 'piety,' 'affection for relatives'), a term applied in painting and sculpture to a representation of the Virgin Mary embracing the dead Christ, being the counterpart of the Madonna in which the mother holds the child in her arms. In St. Peter's at Rome is a P. by Michael Angelo.

Pietermaritzburg, commonly shortened to **Maritzburg**, the capital of the colony of Natal, is situated in 29° 41' S. lat., 30° 13' E. long. It derives its name from two of the Boer leaders, Pieter Retief and Gert Maritz, and was founded in 1843. P. occupies a remarkably fine site, on an elevated plain near the river Umgeni, is well laid out and substantially built. The water supply is unusually ample for South Africa, and the climate is good, though thunderstorms are very frequent. A railway to connect P. with Port D'Urban (q. v.), 54 miles distant, is being made. Pop. (in Jan. 1876) 7457, of whom 4290 were whites.

Pietists, a name applied in Germany to a class rather than a sect of religionists, who are distinguished by a preference for the practical rather than the doctrinal aspect of religion. Pietism resulted from a reaction against the hard and polemical phase which Lutheranism assumed after the struggle of the Reformation had become forgotten, and, as such, has had its counterpart in the history of every church. Its origin in Germany is ascribed to Johann Arndt's *Vom Wahren Christenthum* (1605), and the *Invitatio Fraternalitatis Christi* (1617) of Johann Val. Andreae; but the chief impulse was given by the *Pia Desideria* (1672) of Spener (q. v.). The term was first applied in 1689 to three young *doctents* at Leipzig, who had all been disciples of Spener, and chief among whom was Francke (q. v.). They began to hold meetings which they called *collegia pietatis*, and which excited the indignation of the authorities, who accused them of unsettling tendencies, of making religion consist of a pious sentimentalism, and of exaggerating the merit of good works, and compelled them to leave Leipzig. Francke repaired to Erfurt, but subsequently obtained a professorship in the new University of Halle, which now became the centre of evangelical religious life in Germany. After the death of Francke in 1727, pietism assumed a less amiable phase, its adherents becoming more spiritually exclusive and denunciatory in tone. The spread of rationalistic theology (*aufklärung*) did much to injure pietism, nor did all the attempts, from political motives, of the Prussian government to revive its simple and unquestioning spirit, give the movement anything of its previous strength.

Pie'tra Du'ra (Ital. 'hard stone') is a kind of mosaic work of hard stones characterised by brilliancy and variety of colour. The stones employed for the purpose are chiefly agate, chalcedony, carnelian, jasper, amethyst, lapis-lazuli, malachite, and occasionally variegated marbles. This costly and laborious art originated in Italy in the 16th c., and that country still maintains its excellence in the production of table-tops, &c., in P. D. The manufacture is also carried on in the imperial manufactory at St. Petersburg and in some parts of India (see INLAYING). The inlaid marble work of Derbyshire in England partakes of the nature of P. D.

Pie'trap'er'zia, a town of Sicily, province of Caltanissetta, near the left bank of the Salso, in a hilly region 6 miles S. E. of Caltanissetta. It has a trade in grain, almonds, pistachio nuts, sulphur, plaster-of-Paris, and lapis-lazuli, procured in the vicinity. Near it is an interesting old castle. Pop. (1874) 10,150.

Pie'trasan'ta, a town in the province of Lucca, Italy, on a hill 2 miles inland, and 20 N. W. of Lucca. It is girt by a castellated wall, and has many fine buildings of the 14th and 15th centuries. P. is the chief place from which the Serravezza marble is sent to market. The vicinity produces much oil and wine. Pop. (1874) 13,227.

Piezom'eter, an instrument, first constructed by Oersted, for measuring the compressibility of liquids. It consists of a glass bulb and stem open at the top. The liquid to be experimented on is introduced into the glass vessel so as not quite to fill it, and a globule of mercury is placed on the upper surface as an index. The P. is then set upright in a strong glass cylinder which is filled with water, and water pressure is applied by means of a tightly-fitting screw. The pressure is measured by the compression of a quantity of air contained in another glass tube, which is inserted with the open end downwards. Correction of course must be applied for the glass of the P.

Fig. See HOG and SUIDÆ.

Pigeon (Fr. *pigeon*, Ital. *pigione* or *pipione*; from Lat. *pipire*, 'to peep or cheep'), the general name given to a large number of birds included in the section *Columbida* of the order *Rasores*—this order including as its other representatives the true Gallinaceous birds, such as fowls, pheasants, partridges, &c. By some ornithologists the pigeons are represented as forming of themselves a distinct order, under the name *Columba*. They differ in several important respects from the ordinary *Rasores*; e.g., their hinder toe is well developed, and is placed on the ground; their wings are more powerful; and their habits, with a few exceptions, are not those of ground-birds, their feet being of slender build and adapted for perching. The ordinary *Rasores* are, further, polygamous, one male mating it may be with numerous females; the pigeons, on the other hand, are monogamous, and, as a rule, pair for life. It is a noted fact that sometimes a surviving bird of a pair will refuse to mate with another, and may remain disconsolately single for a long period. No birds are more interesting to naturalists than the pigeons, since they serve, through the facts connected with their breeding and variation, to demonstrate some of the most important ideas connected with the 'origin of species.' Darwin has collected, in his *Animals and Plants under Domestication*, an immense number of facts showing that all the common, numerous, and widely different breeds of pigeons—e.g., the pouters, tumblers, carriers, and fantails, so different not merely in appearance but in the structure of their skeleton, in the number and arrangement of their tail feathers, &c.—have descended from the Rock P. (*Columba livia*); and thus, from a common stock, forms have been produced which, had they been submitted to a naturalist ignorant of their affinities, would assuredly have been pronounced by him distinct species. In the P. the bill is generally short, straight, and compressed, the nostrils being in a fleshy membrane at the base. The P. may be divided into the sub-family *Columbina* (including the most typical forms of P.) and that of the *Gourina* or Ground P. A third division is usually added, that of the *Didunculina*, represented by the genus *Didunculus*, including the tooth-billed P. of the Navigator's Islands. The *Columbina* have a long bill, narrow nostrils, long toes, and pointed wings. Of this group the genus *Columba* (including all the common pigeons) itself is the most typical. The bill has the membrane above the nostrils somewhat prominent and dilated, and the second quill is the longest. Other genera belonging to the *Columbina* are *Carpophaga*, represented by the Fruit P.; *Ectopistes*, including the Passenger P. (q. v.); *Lopholainus*, represented by the top-knot P. of Australia; and *Turtur*, including the turtle-dove (*Turtur auritus*). The sub-family *Gourina* includes the Ground P., in which the toes are strongly made, the hinder toe being very long. The tail is of moderate length and rounded in shape. To this sub-family belong the genera *Ocyphaps* (crested pigeons); *Phaps* (bronze-wing P.); *Leucosarcia* (Wonga-Wonga P.); *Calenas* (Nicobar P.); and *Goura* (crowned P.). The sub-family *Didunculina* is represented by the tooth-billed P. (*D. strigirostris*), a near relative of the extinct Dodo (q. v.). In this sub-family the bill is arched, long, and hooked at its tip. The lower mandible has three distinct toothed processes, and the skin of the throat and around the eye is bare.

Law Regarding Pigeons in Great Britain.—Formerly in England none but the lord of the manor, or the parson, might erect a pigeon-house; and now it seems that this can only be lawfully

done by a freeholder, who may build a pigeon-house on his own ground. By 24 and 25 Vict. c. 96, any one unlawfully killing or wounding any house-dove or P., under circumstances which do not constitute larceny, is liable to a penalty, on summary conviction, of £2 above the value of the bird. In Scotland, shooting pigeons without consent of the owner is, by statute, theft; and a tenant is not entitled to shoot his landlord's pigeons on the plea of their being destructive to his farm.

Pigeon Pea is the W. Indian name for the produce of *Cajanus indicus*, a leguminous shrub, a native of the E. Indies, but now widespread in cultivation through tropical Africa and America. In India it is called the Cajan pea or toor, and there forms a pulse of general and daily use, being either roasted, used in soups, ground into meal, and with a mixture of wheat flour made into cakes, or the seed is split, forming the food called dāl. The young and green pods are also eaten as a vegetable, and the leaves and the pods after the seed is removed are valuable as fodder. There are numerous varieties. Although naturally a perennial, in cultivation it is treated as an annual. The P. P. contains about 62 per cent. of starch, and 22 per cent. of nitrogenous substances.

Pigment, or **Pigment Cells**, in physiology the term used to denote colouring matters found in animal and plant bodies, and the cells within which such colouring matters are contained. Examples are seen in those of the *choroid coat* of the eye, but more typically in the skin of the frog. These latter cells are of branched form, and may be well observed in the web of the frog's foot. Under stimuli, such as light or electricity, the P. may be seen to become massed together in the body or centre of the cell leaving the processes of the cell empty, and in this fashion producing the blanched appearance of the frog's skin under the action of light. *Chromatophora* or *colour-cells* in chameleons, cuttlefishes, &c., produce the changes of hue in these animals by alterations in form and situation.

Pigments. See PAINTS.

Pike, a weapon formed of a lance or spear head mounted on a long ash shaft, introduced into England at the close of the 15th c., and carried by a foot soldier, called a pikeman. It was originally the arm of the Swiss infantry, who usually fought in mass, presenting a serried line of steel. The P. was abandoned in favour of the bayonet in the reign of George II.

Pike (*Esox lucius*), a species of *Teleostean* fishes belonging to the *Malacopteria Abdominales*, or that section in which the ventral fins are abdominal in position. The P. is the type of a family (*Esocidae*) in which the dorsal fin is set far back in the body; and in the P. genus itself, the body is long and the snout flattened, the teeth being very numerous, and borne by almost every bone entering into the composition of the mouth. The common P. is a well-known freshwater fish, attaining an occasional weight of over 50 lbs. An average weight is from 5 to 10 lbs. Its colour is an olive-brown, tinted with green above and silvery white below. It is exceedingly voracious, and is known frequently to seize ducklings and other birds and drag them beneath the surface of the water. The P. may live to a great age. It is caught by nets, ordinary lines, and by *trimmer lines*, the bait of which is made to rest at a certain depth and runs out for some distance when the fish seizes it. P.-fishing usually extends from May to February, and November is regarded as the most favourable month. The P. spawns in spring, the young being sometimes known as 'jack' and 'luce.' The Scotch name for the P. is 'gedd.' The name P. is also given to other fishes. Thus the Sea-P. is the *Belone vulgaris* or Garfish (q. v.), the Saury P. being the *Scomberesox saurus* of zoologists. The Bony P. (q. v.) of N. America is a *Ganoïd* fish (*Lepidosteus osseus*). Several species of true P. belonging to the genus *Esox* are found in N. American lakes.

Pike Perch (*Lucioperca sandra*), otherwise named the 'Giant Perch,' occurs in many European lakes and rivers, and may attain a length of 3 or 4 feet. Its colour is an olive-green banded with brown. It belongs to the family *Percidae*, and while agreeing with the perch in most of its characters, presents in its outward aspect a strong resemblance to the Pike (q. v.). The P. P. possesses two dorsal fins. It is named the *Sander* and *Sandat* in Germany, and *Schill* in Austria. An allied species (*L. Americana*) is found in N. American fresh waters.

Pike's Peak, a summit of the Rocky Mountains in Colorado, U.S., is 14,336 feet above the sea. The ascent is difficult, but is well repaid by the magnificent view to be obtained, which embraces the sources of four great rivers—the Platte, Rio Grande, Arkansas, and Colorado. It received its name in honour of General Z. M. Pike, who first described it in 1806. The district abounds in auriferous quartz, and has since 1859 been a favourite resort for gold-diggers.

Pilaster (Ital. *pilastro*), in architecture a square pillar attached to a wall, from which it projects a third, fourth, fifth, or sixth of its breadth.

Pilchard (*Clupea pilchardus*), a Teleostean fish, attaining a size little inferior to that of the Herring (q. v.), and belonging to the family *Clupeidae*, of which the latter fish is the type. The mouth is of moderate size, and, as in the herring, the scales are large, bright, silvery, and readily detached. Pilchards are caught in immense numbers in August and September on the Cornish coast. They are fished by means of *seine nets*, enclosing a shoal of pilchards after the fashion of a pocket, and being gradually drawn shorewards. They are removed from the 'seine' by another and smaller net known as the 'tuck-net,' and are packed in hogsheads, each of which contains over 3000 pilchards. As many as 10,000 barrels have been filled in one day's successful fishing. These fish are chiefly consumed by Roman Catholic communities during Lent and other seasons of fasting. The spawning time of the P. is the month of October. It would appear probable that it does not leave the British coasts in summer, as was formerly supposed, but, like the herrings, merely retires to deeper water. In Scotland the P. is known as the 'Gipsy Herring.'

Pilcoma'yo, a river of S. America, is formed by the junction in 21° 35' S. lat. of the Suipacha and Pilaya, two streams issuing from the Bolivian Andes, and after a S.E. course of about 1200 miles, unites with the river Paraguay opposite Asuncion. The middle portion of the course of the P. is still very imperfectly explored, but many rapids, and a large marshy lagoon 185 miles in circumference, are known to exist. Its lower waters have been ascended by a steamer for 150 miles, and the least depth ascertained to be 4½ feet. Probably the P. will prove navigable by barges and canoes for 500 miles. Its banks are apparently fertile, but the hostility of the Indian inhabitants renders exploration dangerous.

Pile, in heraldry, a sub-ordinary, of a wedge-shape, issuing from the middle chief, and tapering downwards to the middle base, said to represent the piles used in building bridges, &c.

Pile'olus, a fossil genus of *Gastropodous* molluscs, the shells of which are of small size and of limpet-shape, and occur in the Lower Oolitic rocks. It belongs to the family *Neritidae*.

Piles, in engineering, are strong pieces of timber, usually elm, fir, or beech, pointed and occasionally shod with iron, that are driven into marshy or loose soils to afford a secure foundation for buildings, piers, wharves, &c. These timbers vary in length from 20 to 40 feet, according to the depth at which a firm foundation exists, and in thickness they commonly measure from 12 to 15 inches square. Many cities, for instance, Stockholm and Amsterdam, are built in great part on P. Pointed cast-iron P. are sometimes substituted for those of timber. In either case the P. are driven into the earth by repeated blows from a great iron weight called a *ram* or *monkey*, which is raised by manual or steam-power to the top of lofty guide-posts, and then suddenly disengaged and allowed to fall with tremendous force on the head of a pile. Of late years, timber and cast iron P. have been provided with screw-points; these P. penetrate the soil by imparting a rotatory motion by means of levers fixed to the upper end. In some recent works of construction, sub-aqueous foundations for piers have been formed by employing *holow* P. or cast iron cylinders in short lengths. They are sunk into the ground by removing the soil beneath them by inside operations. As one section is sunk another is bolted vertically on to it, and others are added as the work of excavation proceeds. When the solid rock is reached the jointed pile is formed into a solid column by filling in concrete or other material.

Piles, or **Hæmorrhoids**, are small tumours situated either within or at the verge of the anus, formed of enlarged vessels surrounded by infiltrated cellular tissue. *External* P. consist of

an enlarged vein or veins filled with clots, the skin and connective tissue being more or less thickened and inflamed when the veins become distended. There are also, generally, folds of loose integument around the anus in which no enlarged vessels can be detected. P. are caused by conditions which determine the blood to the part, or prevent its return, such as pregnancy, obstruction to the portal circulation, luxurious habits, sedentary employment, cold, wet, and too free purging. P. are also divided into *bleeding* and *blind* P., according as they are or are not accompanied with hæmorrhage. *Internal* P. are produced by similar causes; but they constitute a much more formidable malady, being frequently attended with copious and constant hæmorrhage during defæcation. The tumours, when large, sometimes protrude even when the bowel is not acting, and they occasionally drag the whole end of the gut out of the anus, giving rise to prolapsus. *Internal* P. are generally situated close to the anus at a little distance up the bowel; but they are often partly external as well. Some consist chiefly of varicose veins with condensed cellular tissue; in some the mucous membrane is also hypertrophied, the hypertrophy of the membrane and its capillaries constituting the greater part of the tumour; while in others large arteries and veins are intermingled with the hypertrophied mucous membrane. The form of the tumours varies, some being sessile and bright red, others pendulous and livid, while in others there are but little traces of vascularity, the consistence being harder.

The following are the more frequent symptoms of P. There is first a feeling of heat, fulness, and a dull pain about the lower part of the bowel, with a sensation as if there were a foreign body in the anus. This gives rise to straining at stool, and a small tumour, usually about the size of a grape is protruded, which may remain outside or be retracted, according as it originated outside or inside the sphincter ani. Sometimes the tumour greatly increases in size, and may cause comparatively little annoyance; but, in the majority of cases, it becomes inflamed from strangulation of the sphincter muscle; it is exquisitely sensitive to the touch, and the seat of burning stinging pain rendering defæcation difficult and excessively painful. In severe cases, the patient can neither sit nor stand, and every position is painful.

The treatment of *external* P. consists in the removal or palliation of their cause and the application of sedative and astringent agents. Habitual constipation must be relieved, and the bowels kept rather loose by some mild laxative such as the *confectio sennae c sulphure* and the *confectio piperis nigri*. When the inflammation is mild, leeching is useful; but when severe, the tumour should be cut across with a lancet and the blood squeezed out. When old P. are much indurated, they should be snipped off, and along with them all loose folds of skin. The treatment of *internal* P. varies according to their extent, appearance, and form. When recent and small, the treatment is the same as for external P. The *unguentum gallæ co.* may be applied to the P. when protruded, or astringent injections after the bowels have acted; and when protruded they should always be returned by gentle pressure. In urgent cases, especially when the bleeding is considerable, the P. should be removed. Those of the sessile and capillary variety may be safely removed by the application of strong nitric acid to the whole of the surface; but when the tumours are large and pendulous, or hardened from inflammation, other means must be adopted. The chief plans of operating for P. are with the ligature, the clamp, and the cautery. In operating with the ligature, each pile is drawn out in succession with the forceps, and its base transfixed with a double silk ligature, or encircled in a ligature, the ligature being tied as tightly as possible and cut short. When all have been tied, the mass is returned into the bowel. In operating with the clamp and cautery, each pile having been drawn out, the clamp is applied to the base, and if the P. be small, the whole tissue may be seared down nearly to the level of the clamp; but it is generally necessary to cut off part of the pile, and sear the base of it till a thick eschar is formed. The galvanic is preferred by some surgeons to the actual cautery, as forming a thicker eschar. The operation by the clamp and cautery is the best mode, the recovery being more rapid, the operation being less painful, and there being less need of confinement to bed.

Pile'wort. See RANUNCULUS.

Pil'grim, a name meaning literally 'a traveller' (Ital. *pellegrino*, Lat. *per-grinus*), came to be reserved for those who made

a journey ('pilgrimage') to some place rendered sacred by association with the founder of their religion, or with some other holy person, being prompted either by veneration for the person in question or by the belief that they would thereby receive the pardon of sin. The practice of making pilgrimages is one that has prevailed in almost all countries and in connection with all religions, but perhaps most of all with Buddhism. After that religion was established as one of the three state religions of the Chinese Empire, pilgrims began to resort to India, which was the Holy Land of Buddhism. Many Buddhist pilgrims still visit annually Adam's Peak in Ceylon, and other places in India. The Hindus resort in thousands to the Ganges, the temple of Juggernaut in Orissa, &c. The different sects of the Japanese have all their regular places of resort, and, according to the Koran, a Mohammedan might as well die a Christian or a Jew as without making the pilgrimage to Mecca. The Holy Land of Christians is, of course, Palestine, almost every spot of which is hallowed by association with some incident in the life of Christ. Perhaps the first Christian pilgrim was Helena, the mother of Constantine, who in 327 visited Jerusalem and 'discovered' the Holy Sepulchre and the Cross. Multitudes followed this illustrious example; and afterwards a pilgrimage to the Holy Land or the shrine of some saint became a common form of Penance (q. v.). In the Middle Ages these pilgrimages became the occasion of great abuses—idleness, begging, and debauchery—when Europe was swarming with men and women travelling in promiscuous companies. The ill-treatment received by the pilgrims from the Turks, after the latter conquered Palestine in the 11th c., led to the Crusades (q. v.), and when the country was finally abandoned by the Christians, pilgrimages to it were in a great measure stopped. This, however, only developed more fully pilgrimages to places in Europe—Loretto in Italy, St. Jago de Compostella in Spain, Canterbury in England, &c. The Reformation put a stop to the practice in the countries that adopted the new doctrines, and it seemed gradually dying out even in Catholic countries, in spite of the device of Jubilees (q. v.); but quite recently it has taken something like a fresh start, and thousands of Roman Catholics have been flocking to various places on the Continent where the Virgin Mary has been making her appearance.

Pilgrimage of Grace, the name assumed by the North Country insurgents of 1536, who, taking as their badge the Five Wounds of Christ, demanded the fall of Cromwell, reunion with Rome, redress to the Church, and the total reversal of the royal policy. Headed by Aske and other gentlemen, and 30,000 in number, 'all tall men and well horsed,' they marched upon York, chose Lord Dacre for their chief, with Lords Westmoreland and Latimer and nearly all the northern nobility as his subordinates, and within a few days had mastered all England N. of the Humber, with the single exception of Skipton Castle, commanded by the Earl of Cumberland. Under the imminence of the danger, Henry VIII. promised a free parliament at York; but scarcely had the insurgents returned home in triumph, when all concessions were revoked, and a renewal of the revolt (1537) was suppressed with ruthless rigour. The whole countryside was studded with gibbets, Lords Darcy and Hussey were sent to the block, the abbots of Fountains, Jervaulx, Barlings, and Kirkstead hanged, and Lady Bulmer burnt at the stake. See the Histories of Lingard, Froude, and Green.

Pillar, in architecture, a detached support, differs from a Column (q. v.) in not necessarily being of circular shape, and in not being regulated by the rules of classical proportion. During the successive periods of medieval architecture the P. assumed almost every variety of form. In the Norman style it is generally massive and plain, though sometimes fluted in a spiral or zigzag manner. In the Early English the P. becomes more complicated, and often consists of a group of smaller shafts, which correspond to the vaulting which they support; while in edifices of the Decorated Period this group of columns has an oblong or square instead of a circular arrangement. In the Perpendicular style the mouldings of the P. frequently run up into the arches, and occasionally the whole of the mouldings run up into the arches without any capital at all.

Pillar Saints (Lat. *Sancti Columnares*, Gr. *Stylitai*) were a peculiar class of monks who began to appear in the Christian Church in the 5th c. In the neighbourhood of Antioch, a monk

named Simeon (born at Sisan, in Syria, about 390 A.D.), whose excessive austerities had attracted admirers from all parts, had a pillar erected six cubits high, on which he took his stand, in order to escape the pressure of the crowd, and 'in order to be nearer heaven.' The better to accomplish this latter purpose he had the pillar heightened successively to twelve, twenty-two, thirty-six, and forty cubits. The top of it was three feet in diameter, with a balustrade round it. On this he stood constantly, eating only once a week, and engaged in prayer all night, and all day in giving counsel to the multitudes who resorted to him. In this manner he lived till his death, a period of thirty-seven years. Simeon found many imitators in the East, where the practice continued down to the 12th c., but in the West they were never allowed to carry out their purpose. See *Acta Sanctorum*, Asseman's *Acta Martyrorum Orient et Occident*. (Rome, 1848).

Pill'nitz, a village and modern royal château on the right bank of the Elbe, 7 miles S.E. of Dresden, and at the base of the Porsberg, which commands a splendid view of the surrounding country. The chapel and dining-room of the château are adorned with frescoes by Vogel. In a part of the château, since burned down, the P. Convention, an alliance between the Emperor Leopold II. and King Friedrich Wilhelm of Prussia, was framed, 27th August 1791.

Pill'ory (Fr. *pilorie*, Low Lat. *pilloricum*, from Class. Lat. *pila*, 'a pillar'), an obsolete instrument of punishment, in which the head and hands of the offender were secured through holes, in the same manner as the feet are held in the stocks. The P. was mounted on a scaffold, and the culprit was thus exposed to public opprobrium, which found vent in vocal abuse and showers of noisome missiles. The P. was used for many centuries in most European countries. In England it existed before the Conquest in the form of the *healsfange* or *halsfang* ('catch-neck'). In *Piers the Plowman* (14th c.), a reference to the P. occurs—

'And yif ye lacche Iyer, late hym nought ascapen
Er he be put on the pilorye.'—(Pass. ii. l. 202, 203)

The P. was intended 'magis ad ludibrium et infamiam quam ad poenam,' but serious injury and even loss of life has occurred where the mob was inflamed against the offender. On the other hand, when the victim was a favourite, or the prosecution unpopular, the punishment was transformed into a kind of triumph. The P. was exclusively the award of the 'forestallers, users of deceitful weights, perjury, forgery,' and such offences, till about 1637, when the press was hampered by restrictions, and all who printed books without a licence might be thus punishable. Henceforth those who suffered in the P. were chiefly authors and publishers of so-called libels and seditious pamphlets. Well-known cases are those of Leighton, Lilburn, and Warton the printers; Prynne, Bastwick, and Defoe. As late as 1814, the Earl of Dundonald (q. v.), for alleged stock-exchange swindling, was ordered to stand in the P., but the penalty was not enforced. The P. was finally abolished by the statute 1 Vict. c. 23, in 1837. The French *pillorie* or *carcan* was abolished in 1832, and the *pranger* or *schandpfahl* of Germany has also been set aside by recent legislation.

Pills are the most convenient and portable form for the administration of most medicines, and this form is especially suitable for (1) all remedies which operate in small doses, as metallic salts; (2) those which are designed to act slowly and gradually, as certain alteratives; (3) those which are too readily soluble when exhibited in other forms; (4) substances whose operation it is desirable to retard until they have reached the lower intestines, as in certain P. for habitual costiveness; (5) bodies whose specific gravities are too inconsiderable to allow their suspension in aqueous vehicles; and (6) fetid substances: while it is unsuitable for (1) medicines which require to be given in large doses; (2) deliquescent salts; (3) fluid or semi-fluid substances, such as oils, balsams, &c., which require a very large proportion of some dry powder to render them sufficiently tenacious to form into a mass; (4) substances so insoluble, that when exhibited in solid form they pass through the intestinal canal unaltered, as extract of logwood (Paris's *Pharmacologia*). P. are formed from masses sufficiently firm in consistence to preserve the globular shape, and not so hard as to be of too difficult solution in the stomach and intestines. P. are rolled in flour, starch, magnesia, liquorice powder, and, on the Continent, in lycopodium. To prevent them from becoming dry and hard, as

well as to prevent their being tasted, P. may be enveloped in silver leaf, or coated with egg-albumen and ethereal solution of tolu. When P. are intended to pass through the stomach, so as to act entirely on the lower bowels, they are made up with alcohol, and varnished with an ethereal solution of tolu. The following are the P. contained in the British Pharmacopœia:—*P. aloes*, *P. aloes et assafœtida*, *P. aloes et ferri*, *P. aloes et myrrha*, *P. assafœtida composita*, *P. gambogia composita*, *P. colocynthidis composita*, *P. colocynthidis et hyoscyami*, *P. conii composita*, *P. ferri carbonatis*, *P. ferri iodidi*, *P. hydrargyri*, *P. hydrarg. subchloridi composita*, *P. ipecacuanhæ cum scilla*, *P. plumbi cum opio*, *P. quina*, *P. rhei composita*, *P. saponis composita*, *P. scillæ composita*. The ordinary weight of a pill is 5 grains, and the dose of all P. should be from 4 to 5 or 10 grains, unless otherwise directed.

Pilot (Fr. *pilote*, Dut. *piloot*, from Low Ger. *filen*, 'to take soundings,' and Dut. *lood* or *loot*, 'lead'), a qualified sailor, specially licensed, in virtue of local knowledge, to direct the movements of ships passing through waters difficult of navigation, at a fixed rate of payment, which depends on the ship's draught of water, the distance, and the difficulty of the passage. As early as the 14th c. the laws of Wisby demanded that every shipmaster should employ a P. on nearing the coast. The laws regarding pilots and pilotage are consolidated in the Acts 16 and 17 Vict. c. 129, and 17 and 18 Vict. c. 104. It is provided that 'no master or owner of any ship is to be answerable to any person whatever for any damage done by the fault or incapacity of any qualified P. in charge of his ship within any district where the employment of such P. is compulsory.' The master of any vessel of more than 50 tons burden or 6 feet draught navigating the Thames is bound to employ the first P. that offers his services, provided he can produce his certificate and has hailed the vessel from a point near enough to admit of his call being heard by a proper lookout. The responsibility of a P. is limited to the amount of his bond. A P.-boat is distinguished by a large flag of red and white divided horizontally, and by the number of the P. to which it belongs marked on its bows and sails. A ship demanding a P. hoists a square blue flag. The chief guilds or 'brotherhoods' of English pilots are those of the 'Trinity Houses' of Deptford Stroud (whose jurisdiction extends from the Thames to the Isle of Wight), Kingston-upon-Hull, and Newcastle-on-Tyne. The general direction of P. guilds belongs to officials appointed by law as 'Pilotage authorities.' In the United States, pilotage is regulated by the Acts of Congress of 1789, 1837, and 1866, but the pecuniary liability of pilots is not quite settled. In the case of a collision, it has been decided by the Supreme Court that the owner of the ship to which the blame has been proved to belong is liable for damages even though a licensed pilot were on board at the time of the collision. Refusal to employ a licensed P. who makes a 'valid offer of service' vitiates the insurance on a vessel, and renders the master and owners responsible for the loss or damage of the cargo. In 1873, the pilots employed at Liverpool numbered 270; at New York, 176. The numbers of vessels piloted were 17,186 and 10,307 respectively.

Law Regarding Pilotage.—In the Thames and Medway, and along the coast from Orfordness to the Isle of Wight, pilotage is regulated by the Corporation of the Trinity House, and by the Lord Warden of the Cinque Ports. In other ports of the United Kingdom pilots are appointed and regulated by local Acts, or by ancient charters of incorporation, or by the Mercantile Marine Act. In those parts of a voyage where a P. is employed by regulation or usage, termed 'a pilot's fair way,' one must be employed by an *oversea* vessel. Coasting vessels are not obliged to make use of them. The master of a vessel having a regular P. on board is not responsible for damage caused by the P. unless through unskilfulness or negligence. But his proceedings must not be controlled by the master, nor will the P.'s presence absolve the master from the consequences of his own carelessness. Authorities are empowered to give certificates to masters or mates who have passed an examination to conduct their own vessels. Where there is concurrent jurisdiction, a certificate must be got from each authority. The fees for pilotage are regulated by the distance and draught of the ship. 35 and 36 Vict. c. 72, empowers Trinity House to modify the rules as to pilotage rates.

Piloty, Karl, Germany's greatest living painter, was born at Munich, October 1, 1826, and studied first under his father,

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Ferdinand P., an eminent lithographer (died January 8, 1844), and afterwards in the Academy of Munich under Schorn. Shortly after his return from a journey to Paris, Brussels, and London, he was commissioned by the king to paint 'The Founding of the Catholic League' (1854), and the fame which this picture gained him was greatly enhanced by his 'Seni before the Corpse of Wallenstein' (1855). In 1856 P. became a professor in the Munich Academy, and its director in 1874. He has painted some fine portraits, but his masterpieces are the great historical pictures 'Nero on the Ruins of Rome' (1861), exhibited at the London International Exhibition of 1862, 'Galileo in Prison' (1864), 'The Death of Cæsar' (1866), 'Thusnelda in the Triumphal Procession of Germanicus' (1873), and 'The Arrest of Anne Boleyn' (1874).

Pilot-Fish (*Naucratis* or *Scomber ductor*), a Teleostean fish belonging to the *Scomberidæ* or mackerel family, and deriving its name from the supposition that it guided the shark towards its prey. The fact seems to be that the P. follows the shark in the expectation of receiving a portion of the prey. Of old, the P.-F. was credited with directing sailors in the proper course. Its average length is 12 inches. One dorsal fin is developed, the great dorsal fin being represented by detached spines, not united by any fin membrane. The P.-F. resembles the Mackerel (q. v.) in form. Its colour is a silver-grey tinted with blue on the back, the body being encircled with five bands of a dark blue colour. The tail is 'keeled' or ridged above and below.

Pilpay. See BIDPAI.

Pilsen, a town of Austro-Hungaria in Bohemia, at the confluence of the Mies and Radbusa, 53 miles by rail W.S.W. of Prag, and 36 from the Bavarian frontier. It is well built and was formerly fortified. The chief buildings are the Church of St. Bartholomew and the Rathhaus, with a large collection of arms, but it has also a new theatre, 7 churches, and 2 monasteries. An important market is held annually. P. has great alum works and rich coal and iron mines, and produces excellent beer, linens, leather, and musical instruments. P. was stormed by Mansfield in 1618. It was the centre of the conspiracy of Wallenstein (q. v.), and in the market-place here twenty-four of his accomplices were executed in 1634.

Pimento, Allspice, or Jamaica Pepp'er, is a cheap and useful spice consisting of the dried unripe fruit of *Eugenia pimento*, a handsome bushy tree native of the tropics of the western hemisphere, and much cultivated in some of the W. India Islands—particularly Jamaica. The berries are gathered when nearly ripe, their essential oil at that period being most abundant. They are then spread upon sheets on wooden platforms in the full exposure of the sun, and are frequently turned and winnowed until the drying is perfect. In this condition each is a brown rough berry of the size of a small pea crowned with the teeth of the calyx, and contains two dark-brown seeds embedded in a yellowish flesh. Odour and taste are aromatic and peculiar. It is from this peculiarity—a sort of composite flavour of cloves, cinnamon, and nutmeg—that the name allspice originated. P. is a good deal used in cookery and confectionery, and is sometimes given as a carminative to children. An oil distilled from it, known as oil of pimento, is an aromatic stimulant, but appears to be principally employed to communicate warmth and flavour to other drugs. See EUGENIA.

Pimpernel is a name that for some unknown reason has been given to plants of the genus *Anagallis*, belonging to the natural order *Primulacæ*. It was originally applied to the burnet (*Potorium Sanguisorba*). *Anagallis* consists of about eight species of slender annual or perennial herbs found in Europe, temperate Asia, N. Africa, and S. America. They have axillary flowers, with a rotate or funnel-shaped corolla, succeeded by a many-seeded globose capsule bursting transversely, and are well represented by *A. avensis*, the scarlet P., or 'poor man's weather-glass,' so called from its flowers closing before rain. It is a weed of wide distribution—common in England, less so in Scotland. The charming little bog P. (*A. tenella*) found creeping over the wet turf of marshy ground, is more particularly plentiful in W. Britain and Ireland. Italian P. (*A. monelli*) and a Barbary species called *A. colina* are with a series of varieties cultivated as ornamental garden plants. The name 'water P.' is given to *Samolus Valerandi*, another British

plant of the primrose order. It is, however, generally called 'brookweed,' while the 'yellow P.' is *Lysimachia nemorum*, a common cove and hedgebank plant also of the same order.

Pin. See PINS.

Pina Cloth is the name of a textile fabric manufactured in the Philippine Islands from the leaf-fibres of the pine-apple (*Ananassa sativa*). The process of extracting the fibre, dressing and dyeing it, involve much trouble, and as fine qualities only are used, the articles made of it are expensive—a small shawl or handkerchief costing one or two ounces of gold. *Pinitian*, which is the finest quality, exceeding the most delicate lawn in texture, is only woven to order—a piece for the ex-Queen of Spain, for instance, costing \$500.

Pinchbeck, a yellow alloy of copper and zinc, in the proportions of five to one respectively, formerly much used in the manufacture of cheap personal adornments. P. is named after its introducer.

Pind Dadun Khan, the most populous town in the district of Jhilm, Punjab, British India, 1 mile from the right bank of the river Jhilm, and 5 from the foot of the Salt Range. It was founded in 1623, and has manufactures of copper and brass ware, silk *lungis* or scarfs, carries on boat-building, and is the centre of the salt trade of the Punjab. It is an emporium for the distribution of commodities from England and Central Asia. The imports are valued at £130,000; the exports at £60,000. Pop. (1868) 16,740.

Pin'dar (Gr. *Pindaros*, Lat. *Pindarus*), generally called the 'Theban,' and by comparison the 'Lyrist,' is, by the verdict alike of ancients and moderns, the greatest lyric poet of Greece. He was born in the spring of Olympiad 64-63 (522 B.C.). The parentage of P. is very uncertain. Some say that he was the son of Daiphantus, others of Pagondas or Scopelinus, while his mother's name is variously given as Cleidice, Cleodice, or Myrto. All authorities, however, agree that his parents belonged to Cynoscephalæ, and that he was born at the place of that name between Thebes and Thespiæ. In P.'s family the art of playing the flute was hereditary. He was a kinsman of the *Ægidæ* and had Dorian blood in his veins. The beautiful myth that the poet in boyhood, on his road to Thespiæ, had been overcome by sleep, and that he awoke with bees clustering round his lips can hardly be passed over in any record, however brief, of the life of P. (For this and similar other myths see the Greek and Roman poets *passim*, but especially of Pausanias, ix. 23, sec. 2; *Ælian*, V. H. xii. 45; *Horace*, *Od.* iii. 4, 17-20.) The father of P., the greatest master of the musical art in his time, sent young P. to Athens for the completion of his education. Lasos of Hermione, the founder of the Athenian school of dithyrambic poetry, and other masters of the poetic art, are said to have been his instructors. Whether he contested the palm of poetry with the great Boeotian poetesses Myrtis and Corinna is of less moment than the fact that he had actually been their pupil. Corinna at first is said to have reproached P. with want of mythical knowledge in his earliest performances, and eventually to have said to him, when his genius was mature, 'Sow not from the full bag but from the hand.' The 10th Pythian Ode was written by him at twenty; the style is immature, the taste a shade below that of a few of the older lyrists, but the power is unquestionable. Once entered on the professional career of poet, P.'s services were in universal demand. At every festival in the Hellenic state he was indispensable. By Hiero of Syracuse, Alexander of Macedon, Theron of Agrigentum, Arcesilaus of Cyrene, and many of the rich and powerful in his own land his pen was not only even welcomed but eagerly solicited. Like Burns—the greatest of modern lyrists—while he was ever ready to lend himself to all that was lovely, pure, true, and generous, P. never swerved from the divine function of the poet. Gifts could not mar, nor could rewards emasculate his transcendent powers. Though most of his time was spent abroad at the courts of kings, P.'s genius was essentially patriotic and national. In 473 B.C. and for four years thereafter he was the guest of Hiero. He is supposed to have died in 442 B.C. P. wrote many poems—hymns, pæans, dithyrambs, dirges, and *Encomia*. His triumphal odes—Olympian, Pythian, Nemean, and Isthmian—have a world-wide reputation. The poetical style of P. is peculiar. He abounds in wonderful conceptions and brilliant metaphors, but his *tournaure*

de phrase is so extremely abrupt that he is not only a difficult but even an obscure writer. Those, however, that have the patience to master his style find themselves well repaid by the delight which his vivid and vehement muse inspires.

Of his strength it hardly belongs here to speak; of his metres still less. Suffice it to say that P. belongs to the highest of the *Dii Majores* in Greek poetry. Any attempt to reproduce him in English has been unsuccessful. In no European language indeed does it seem likely that P. will ever be acceptably rendered. See *P.'s Leben und Dichtung* (Bonn, 1852); *Villemain's Essais sur le Génie de Pindare et sur la Poesie Lyrique* (Par. 1859.) Cf. also the editions of Böckh (Leips. 2 vols. 1811-22); Donaldson (Lond. 1841); Disson (2d ed. by Schneidewin, 1843); Cookesley (Lond. 1851); Hartung (1857); and Tycho Mommsen (1866); also Damm, *Lexicon Pindaricum* (Lond. 1814).

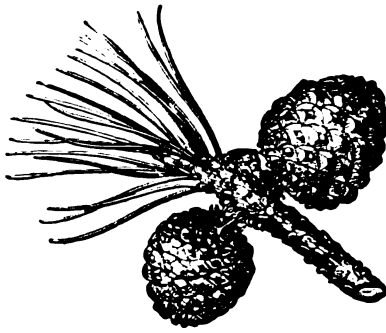
Pindaris, a collection of freebooters who established a system of terrorism in Central India at the beginning of the present century. They were mostly Mohammedans, but were bound together by no common nationality or discipline. They followed in the wake of the Mahratta armies, and were encouraged by the Mahratta leaders. In 1812 their numbers were estimated at 60,000 horsemen, armed with spear and matchlock. Their plunderings, torturings, and other excesses knew no bounds; and in 1817 Lord Hastings' resolution to restore order in Central India led to what is sometimes known as the fourth and last Mahratta War, in which the names of Elphinstone and Malcolm figure conspicuously. One of the Pindari chiefs, Ameer Khan, agreed to disband his followers in consideration of a *jageer* which has now become the State of Tonk (q. v.). Of the other three principal chiefs, one took poison, one surrendered himself, and the third was miserably destroyed by a tiger in the jungle. Their Mahratta allies, the Peishwa and Holkar, were completely defeated, and thirty hill fortresses were captured in a few weeks. The native states of Central India and Rajputana were formally taken under British protection; order was enforced among the Bheels and other wild tribes, and this part of India was placed in the direction of progress which it has since continued to pursue.

Pin'dus, a wild picturesque mountain range of ancient Greece between Thessaly and Epirus, forming the main watershed of the country. See GREECE and TURKEY.

Pine (*Pinus*) is one of the most important genera of the natural order *Conifera*, and has at times been variously united with the spruces, firs (properly so called), larches, and cedars, but is well distinguished from them by having persistent leaves in clusters of two to five in the axils of membranous scales, and the woody carpellary scales of its cones thickened at the apex. The leaves are evergreen, rigid, needle-shaped, varying from about an inch to more than a foot in length; the inflorescence is monoecious, the male catkins being in the axils of membranous bracts clustered round the branch in a dense raceme at the base of the current year's shoot; and the female flowers are solitary or in whorls on separate branches; the cones ripen in the second or sometimes in the third year; there are inverted ovules in pairs at the base of the imbricated scales, and three or more linear cotyledons. All are trees, many attaining a great height and size, and being of gregarious habit, they frequently form extensive forests. The genus consists of about 110 species, is confined to the northern hemisphere, abounding in the temperate and cold regions of Europe, Asia, and America—rarely occurring in the tropics, and not found on the mainland of Africa. The economic products are timber, tar, pitch, rosin, and turpentine; and the following is a selection of some of the most useful species:—*P. australis*—the long-leaved, southern, yellow, or Georgia pitch P.—along the S.E. coast of the United States clothes extensive dry sandy tracts known as the P. Barrens. The tree attains a height of 70 feet, furnishes a strong, durable, and much prized timber for house-builders and shipwrights, and yields the main supply of American turpentine, galipot, resin, pitch, and tar. It is distinguished by its long cylindrical cones, having the scales armed with recurved spines; the leaves are 10 to 15 inches long. *P. Canariensis*—Canary P.—forms large forests at about 5000 feet elevation in the Canary Isles, growing to a height of 70 feet, and furnishing a resinous, durable, very heavy wood, not readily attacked by insects. It is the only African species. *P. cembra* of the European Alps, Siberia, and Tartary,

attains a height of 120 feet, and yields a good turpentine. The wood is of a bluish colour, very soft and resinous, of an extremely fine grain, and is extensively used for carving and cabinet-work. *P. ponderosa*, indigenous to the eastern slope of the California mountains, at an elevation of 3000 to 4000 feet, is of comparatively small size, attaining a height of about 100 feet, with a diameter of 4 feet, and produces the largest cones of all the pines. *P. ponderosa*—the Oregon P.—on some parts of the N. Pacific coast is one of the principal timbers of export, and is therefore of great value in the lumber trade. The wood is very strong, tough, and close-grained, splendid for masts and spars, also for shrouds, and has been known to attain a height of 400 feet and a diameter of 14 feet. *P. excelsa*—the Bhotan P.—occurs at an elevation between 5000 and 12,500 feet in the Himalayas, as also in Macedonia and Montenegro. It is a fine tree, attaining 100 to 150 feet in height, with abundance of turpentine, and gives a compact even-grained heart-wood, soft and easy to work, ranking in durability next to the Deodar. In India the bark is used to roof forest huts. An edible manna is obtained from the leaves and branches. *P. Gerardiana*—the nut pine of Taspoul—a middle-sized tree forming forests in the Himalayas, is principally valuable for its edible seeds, which are obtained by heating the cones, and are stored for winter use, forming in Kunawar the staple food of the inhabitants. *P. Halimifolia*—the Aleppo P.—a native of the Mediterranean region, forming irregular and open forests, and in its variety *P. maritima*, thriving on loose coast sands. It yields a kind of Venice turpentine as well as a valuable tar; the wood is esteemed for shipbuilding and furniture, and is useful for torches. The bark is employed for tanning. *P. Lambertiana*—the giant or sugar P.—native of the N.W. American coast region between lat. 40°-43°, is a lofty tree of rapid growth, attaining 300 feet, with a straight naked trunk of from 7 feet to 20 feet diameter. It thrives best in a sandy soil, and produces a soft, white, straight-grained wood, which for internal work (flooring, &c.) is esteemed above any other P. in California. The tree yields an abundance of remarkably pure and clear resin of a sweet taste, forming a substitute for sugar. The cones are 18 inches long, with edible seeds which are used for food by the natives. *P. Laricio*—the Corsican P.—a large tree forming extensive forests in Spain, Corsica, Asia Minor, &c., chiefly in mountainous districts where the soil is calcareous. It attains a height of 120 feet or more, furnishes a valuable, coarse-grained, elastic, and durable wood, is perhaps the most resinous of all pines, and on the French coasts has been extensively planted to stop the inroads of drifting sand. *P. longifolia*—the Emodi or Chir P.—is a large handsome tree of the Himalaya mountains, producing more turpentine and resin than any other conifer of that range. The wood as a rule is not durable, but is easy to work, and in hill districts is extensively used for building. *P. Massoniana* is indigenous to China and Japan. It attains a height of 60 feet, and supplies a resinous, tough, and durable wood used for buildings and furniture. The roots when burned with the oil of *Brassica Orientalis* furnish the Chinese lampblack. *P. Menziesii* of N.W. America, is a very handsome tree, growing to a height of 70 feet, and furnishes a valuable timber. It thrives best in moist ground. *P. montana* (or *P. pumilis*)—the dwarf P.—occurs over large areas of the Alps and Carpathians, &c., luxuriating on the poorest soil. It yields freely an oil of turpentine used for medicinal purposes in Hungary, and exudes a resin. The wood serves for carving, firewood, and charcoal. *P. Pinaster*—cluster P.—occurring plentifully in the Mediterranean region, is marked by its clustered cones, and long thick rigid leaves, is of quick growth, and yields large quantities of the French turpentine. The timber is inferior. Having long spreading roots, it is peculiarly adapted for fixing loose shifting sands, more especially as it will flourish close to the sea, and has been largely planted for this purpose in France, converting enormous coast-wastes into valuable property. *P. Pinca*—the stone P.—also a quick-growing species in countries bordering the Mediterranean, forms a large tree, giving a whitish light resinous wood, much used for buildings, furniture, and ship-work. The cones take three years to ripen. The seeds are edible, and where the tree grows, are used as an article of food in the same way as almonds; they are made into sweetmeats. The taste is somewhat resinous, but not disagreeable. *P. ponderosa* of the mountains of N.W. America attains a height of more than 200 feet, and is of comparatively

quick growth. The heavy wood is in high estimation for general purposes. *P. radiata*, a Californian species, is a fine tree of rapid growth, attaining fully 100 feet high, with a straight trunk 2-4 feet in diameter. The wood is tough, and much sought for boat-building and manufacture of various utensils. It is a species that bears exposure at the very edge of the coast, and tar and pitch can be obtained from it. *P. resinosa*—red P.—indigenous to N. America, particularly Canada and Nova Scotia, furnishes a fine-grained red wood, heavy and durable, very resinous, and suitable for shipbuilding. It flourishes in dry sandy soils, attaining a height of 80 feet. *P. rigida*, or American pitch P., is a native of the northern United States, suits itself to rocky gravelly soils, sea-shores, or swampy ground, and the quality of its timber varies from heavy to light and soft, according to its place of growth. It is principally important for its large yield of resin and tar, but its wholesale destruction in the present century has much limited the supply. *P. Sabiniana*—the Californian nut P.—is most frequent on the western slopes of the Rocky Mountains. It produces a large, pale, and soft timber. The cones attain a foot in length, and the seeds are edible. *P. Strobus*—in England called Weymouth P., in America the White P.—a large and important tree, reaching to 250 feet in height and a girth of 18 feet, is a native of the northern United States and S. Canada. The wood is light coloured, soft, but with little strength. It is freely used in N. America for building, furniture, and other purposes, and is a source of supply of turpentine and gallipot. It was introduced into England in 1705, and is now grown on a considerable scale in Germany. The *P. sylvestris*, called Scotch fir, is a native of N. and mid Europe (up to 70° N. lat.), also of N. Asia. It is a very valuable tree, eminently gregarious in its habit, forming extensive natural forests, and thrives best in sandy soil, as it requires free drainage, under very favourable circumstances, a height of 150 feet. The sap-wood is large, enclosing a distinctly marked reddish heart-wood, which is durable and strong. The red deals from the Baltic and Norway are of this species, as well as a large portion of the European tar. It is frequent in peat-mosses, showing that it was formerly a native of England and Ireland. *P. Teda*—the frankincense or loblolly P.—grows in the marshes that intersect the 'pine barrens' of the southern United States, preferring a position near the coast. It yields turpentine of good quantity, though of inferior quality. The timber is not of much value. In Mexican pines we have *P. Teocote*, which gives a large resinous timber of durable quality; and a Japanese species, *P. Tsuga*, the wood of which is small, but is highly esteemed for superior furniture.



Pinus Pineæ.

The emanations from P., particularly the very resinous species, are antimalarian and antiseptic, as proved by residences near P. forests, and by the use of hospitals constructed of P.-wood. Other important trees, mostly belonging to the genera *Abies* and *Cedrus*, that have in the varying botanical nomenclature borne the name of Pinus, and are still sometimes spoken of as P., are purposely excluded from the above selection. For some of such see FIR and CEDAR. Species of *Araucaria* (q. v.) are termed Chili P. and Norfolk Island P., &c., and the *Dammara australis* has the name of Kauri P. (q. v.). These are all *Coniferae*, but the plants called Screw P. belong to *Pandanacea* (q. v.).

Pinéal Body, or Gland, or Conarium, a small conical body of reddish-grey colour, situated behind the posterior commissure of the brain. It attains a length of about 4 inches, and a breadth of 2 or 3 inches at its base. It is larger in youth than in age, and in females than in males. The P. B. is connected with the cerebrum at its base by four peduncles or stalks,

and by some few cross fibres as well. It consists chiefly of grey matter, and is well supplied with blood-vessels. A small cavity exists at its base, and within this cavity a viscid fluid, containing calcareous or limy particles, is found. The functions of the P. B. are unknown.

Pine-Apple belongs to a genus of tropical *Bromeliaceæ* (q. v.), having rigid leaves pointed and edged with sharp spines, and a fruit that is technically called a sorosis—that is, composed of numerous ovaries, floral envelopes, and bracts, all combined so as to form a succulent mass. It is named botanically *Ananassa sativa*, and is believed to be a native of Brazil, whence it has passed to other parts of tropical America, including the W. Indies, and more lately to parts of Asia and Africa. It became known to Europeans about the middle of the 16th c. We hear of it in England a hundred years later, some having been sent as a present to Cromwell; and Evelyn in his *Diary*, under date August 9, 1661, tells of its appearance at a banquet given by Charles II. at which he was present. In 1718 the cultivation of the P.-A. was first successfully established in England in the garden of Sir M. Decker, in Richmond, Surrey, in pits heated with bark, the plants being watered with tepid water. The first formal treatise on its culture was published in 1769. The author (Giles) gives a plan of a pinery heated with tan and flues. Many works have since been written on the subject, including all the minutiae of selection of soils, descriptions of houses and pits, mode of heating, times and manner of potting, watering, manures, shading, temperature, propagation, selection of varieties, expedients for enlarging the size and improving the flavour of the fruit, diseases, malformations, &c.; and the successful growth of the P.-A. is considered a test of the gardener's ability in large establishments. The fruit should be bright and golden in colour, heavy in proportion to bulk, surmounted by a small sturdy cone of leaves, the scent strong, the juice rich, of the consistence of honey, and of an exquisite flavour. These qualities combined render it the king of dessert fruits. It also makes an admirable sweet preserved in sugar or made into jam. In Devonshire pine-apples of 5 lb. weight have been grown and ripened in the open air. The fruit now hawked about the streets of London and elsewhere is imported from the Bahamas, and is a poor variety. The name P.-A. is taken from the general resemblance of the fruit to a large cone of a pine-tree.

Pine Chafer (*Hylophagus piniperda*), a species of beetles belonging to the *Hylophagidæ* or Bark Beetles (q. v.), and infesting Scotch firs. It feeds on the young shoots of these trees, and appears to eat its way to the stem. It is of small size, and of blackish-brown colour.

Pine Finch, or **Pine Grosbeak** (*Pinicola or Pyrrhula enucleator*), a species of *Insectorial* birds belonging to the section *Conirostres*. P. F. is one of the Bullfinches (q. v.), and attains a length varying from 7 to 9 inches. The head, neck, and throat are red, the back blackish-brown, and the under parts light grey. The wings and tail are of a dusky brown, variegated with white markings. The P. F. occurs in the Arctic and northern regions of both hemispheres; but in the western it migrates southwards to the United States in winter. It lays four or five eggs of a pale-green hue spotted with brown. The bird is chiefly found near pine forests, and feeds on the seeds and shoots of these trees as well as on those of the birch willow.

Pinel, Philippe, a French physician, celebrated for his treatment of lunacy, was born at Saint-André (Tarn), April 20, 1745. After studying at Toulouse and Montpellier, he removed to Paris in 1778. Here he devoted his attention to the study of lunacy, and became directing physician to the asylum at Bicêtre in 1791, and at Salpêtrière in 1795. In the latter institution, which admitted female lunatics only, he commenced a class of clinical surgery, which he continued along with his pathological lectures in the School of Medicine in Paris. His great fame rests upon his treatment of lunatics, which was a complete revolution of the old barbarous methods. Naturally his system roused vigorous opposition at the time; but in a few years it was generally accepted over the whole of Europe. P. died at Paris, October 26, 1826. His chief works are *Traité médico-philosophique de l'Aliénation Mentale* (1791), *La Nosographie Philosophique* (1798, 6th ed. 1818), a work which marks an epoch in the history of the French medical school, and *La Médecine Clinique* (1802), besides numerous papers in the *Jour-*

nal de Physique and the *Journal de Fourcroy*. He also edited for a lengthened period *La Gazette de Santé*. See Cuvier's *Eloge de P.* (*Mémoires de l'Académie des Sciences*, vol. ix.).

Pinero'lo, or **Fignerol**, a town of N. Italy, province of Turin, on the river Lemnina, at the entrance to the valley of Perosa, 1200 feet above the sea, and 23½ miles S.W. of Turin by rail. It is (since 1848) a bishop's see, and has a fine modern cathedral, 14 churches, and 2 seminaries. P. manufactures silks, woollens, cottons, and paper, and has considerable trade in wine and Alpine cheese. The fortress of P., for a time the prison of the 'Man with the Iron Mask' (q. v.), was from the 11th c. to its destruction in 1696 alternately in the hands of the house of Savoy and of France. Pop. (1874) 16,800

Piney Tree. See CALOPHYLLUM.

Piney Varnish. See DAMMAR.

Pinguic'ula. See BUTTERWORT.

Pink is the name of a well-known shade of light red; but several substances known as pinks are shades of yellow rather than red. Dutch P., for example, is a greenish-yellow colour, prepared by impregnating a white earth with decoctions of yellow berries and turmeric.

Pink (*Dianthus*) is a genus of *Caryophyllaceæ*, consisting of about seventy species of tufted herbs with narrow grass-like leaves, solitary flowers arranged in panicles or fascicles, tubular five-toothed calyx, five long-clawed petals with entire or cut limb, ten stamens, two styles, and a capsular fruit. It is represented through Europe, temperate Asia, N.W. America, and N. and S. Africa. The garden P. (of which by specialists some 300 varieties are enumerated) originates from *D. plumarius*, a plant of mid-Europe occurring also much in its wild form on old ruins in several places in England. From *D. caryophyllus* the numerous varieties of the Carnation (q. v.) are derived. Both of these are justly favourite garden flowers, and are propagated by pipings and layers. *D. barbatus*, another European species, with flowers in dense fascicles at the top of the stem, is likewise often seen in gardens under the name of 'Sweet William.' *D. superbus* ('Sweet Johns' of old), a striking and sweet-scented European species, is also cultivated. The native British plants of the genus are the 'Deptford P.' (a name given it by Gerard in 1597 from his finding it there); *D. Armeria*, which is a rather rare species; *D. deltoides*, the 'Maiden P.,' a much branched perennial, with pretty mottled rose-coloured flowers, found in dry-soil ground both in England and Scotland; *D. cæsius*, confined to the limestone cliffs of Cheddar, and called the 'Cheddar P.' in consequence; and *D. prolifer*, a rare S. of England species. None of the genus have any established medicinal qualities. For the plant called 'Sea P.' see THRIFT.

Pinkerton, John, a Scottish antiquary and historian, was born at Edinburgh, February 17, 1758. After six years' schooling at Lanark, he was apprenticed for five years to an Edinburgh writer to the signet, and published an *Ode to Craigmillar Castle* (1776). In 1780 he came to London, where he gained the friendship of Horace Walpole, and through him of Gibbon, by his *Essay on Medals* (1784) and *Letters on Literature* (1785), the latter affecting a singular orthography intended 'to reduce the harshness of the English tongue.' The *Ancient Scottish Poems never before in Print, from the MS. Collection of Sir Richard Mailland* (2 vols. 1786) have been unjustly branded as a literary forgery, though in the preface P. acknowledged his earlier *Rimes* (1781) and *Scottish Tragic Ballads* (1783) to have been mainly of his own composing. In the *Dissertation on the Origin and Progress of the Scythians or Goths* (1787), and *Inquiry into the History of Scotland preceding the Reign of Malcolm III.* (2 vols. 1790), 'snarling' P., as Burton styles him, 'railed at the plaid, and blasphemed the claymore,' everything Celtic coming in for a storm of indiscriminate abuse, and the modern Highlanders being described as 'mere savages, but one degree above brutes, indolent, slavish, strangers to industry,' whose breed requires to be utterly exterminated. Other works by P. were his *Medallie History of England to the Revolution* (1790); *Iconographia Scotie* (2 vols. 1795-97); *History of Scotland from the Accession of the House of Stuart to that of Mary* (2 vols. 1797); *Walpoliana* (2 vols. 1804); *Modern Geography* (3 vols. 1802-7); *Collection of Voyages and Travels* (16 vols. 1808-13), &c. P. settled in Paris (1802), and died

See his *Literary*

Pinnaculus (*Pinna*), a genus of Mollusca, the commonest of which is the common Mussel. It belongs to the class of bivalves, and is of a wedge-shaped and of horny texture. It is not, like the common *Pinna*, a marine mollusk, but is notable for the large size of its shells. So abundant is it that the Spaniards and Maltese weave their carpets from its produce. Pope Benedict XV. was present at the opening in 1754 made from it. Many of the shells of the *Pinna* occur in British waters. It is a Mediterranean genus, and *P. pinnaculus* is the most singular species.

Pinna (Lat. *pinna*, from Lat. *pinus*, a 'fir tree,' which was originally used in the construction), a genus of shells next in size to the launch, carried by men, and is a vessel provided with oars.

Pinna (Lat. *pinna*, from *pinna*, 'a feather;') a genus of shells next in size to the launch, carried by men, and is a vessel provided with oars.

Pinnaculus and **Pinnipedia**, terms applied to that section of the quadrupeds, including the Seal (q. v.) and Walrus, in which the limbs are modified to form swimming paddles. In these animals the body is long and fishlike. The tail is rudimentary, and the limbs are also short. The forelimbs are placed far back on the body, so that their axis nearly corresponds to that of the body itself, and the hind limbs are placed with the posterior extremity of the body form an admirable swimming apparatus. The toes are provided with strong claws. External ears may be wanting, and at most are rudimentary. Both ears and nostrils are valvular, and may be closed at will. The bones are of spongy texture and light construction. The canine teeth are long and pointed.

Pinnothoros. See PEA CRAB.

Pinnularia, a genus of peculiar plant fossils found in rocks of Devonian age. They consist of slender smooth-surfaced tubes, which give off at right angles long and delicate branches. By Dawson, *P.* is considered to represent the roots of other plant fossils, just as the *Stigmaria* of the coal, formerly regarded as a distinct plant, was found to be the root of *Sigillaria*.

Pinnule. The leaflets that compose a pinnate leaf are called pinnules. If these again are subdivided in a pinnate manner, the leaf is termed bipinnate, and the secondary pinnæ are called pinnules. See LEAVES.

Pins (Lat. *pinna* or *penna*, 'feathers;') what are pointed like such). The manufacture of *P.* is one of the characteristic industrial features of Birmingham, where, so far as regards Great Britain, they are chiefly made. Although what are termed 'solid-headed' *P.* are now only seen, the period is within the recollection of comparatively young people, when the head of a pin consisted of a separate piece of thin wire, twisted around and fastened to the body or shank. Previous to the introduction of the solid-headed pin, the making of a pin involved numerous separate operations, which were mostly performed by manual labour; but now *P.* are made by self-acting machinery. To a pin-making machine wire of suitable gauge is supplied from a coil wound around a drum, the machine itself, moved by steam power, drawing in its supply of wire at the rate it needs the raw material. As the wire enters the machine it is straightened by being pulled through a series of upright pegs, after passing which the end of the wire is caught between a pair of lateral jaws and held for an instant, during which time it receives a succession of smart blows from a sliding bar or hammer, whereby the head is formed. At the same instant a knife descends, and cuts off the proper length of wire for a single pin, and the article, so far formed, falls into a slit or groove, the opening of which is too small to allow the head to pass through. In this groove the *P.* consequently

arrange themselves with the ends to be pointed turned downwards, and the groove itself forms a long inclined plane, under which a revolving file is in motion. The file presses against the points of the *P.*, and being arranged in an inclined plane, these move onwards with a kind of revolving motion, thus presenting every side in turn to the action of the file, and therefore before the *P.* finally fall out of the groove, they have received fine properly tapered points. At this stage the *P.* are perfect so far as regards form; but they present a dirty, brassy yellow appearance, very different from the proverbial clean aspect of a new pin. Most commonly, *P.* are finished by the process of whitening or so-called silvering. For this purpose the *P.* are first cleaned by agitation in revolving barrels, in which they are mixed with fuller's earth and water. From this they are transferred to a steam-jacketed copper pan, in which they are boiled with granulated tin, to which a certain proportion of cream of tartar (potassic bitartrate) is added. When the *P.* are removed from the copper boiler they are found to be coated with a thin film of tin, to which their fine silvery appearance is due. It is only necessary now to dry the *P.*, an operation accomplished by agitating them in barrels with dry bran, and they are finally freed from that substance by subsequent winnowing. A very interesting process now remains to be performed with the finished *P.*, that is the papering. It is done by a machine to which a hopper is attached, and into it a large quantity of *P.* are thrown. By a constant raking agitation, the attendant manages to get rows of *P.* with points downwards through grooves at the lower part of the hopper. A single row is advanced from the hopper at a time, and the points of that row come in contact with the paper folded and crimped ready to receive them. By a treadle action the whole row is forced into the prepared paper at one stroke; the paper moves forward and another row of *P.* is liberated for papering in the same manner. A large proportion of the *P.* now used are simply weighed and put up in small boxes, and in these operations the females employed display remarkable dexterity. *P.* are in some cases finished by jappaning, and sometimes, especially those for etymological use, are gilt.

A patent for making solid-headed *P.* was secured in 1817 by Seth Hunt; but the first machine that was successfully worked was that patented by Lemuel W. Wright, an American, in 1824. A five years' extension of Wright's patent was granted in 1837. Since that date many improvements have been made on the apparatus, and it is now one of the most perfect pieces of automatic machinery in operation. The daily production of *P.* in the United Kingdom is calculated to be 50,000,000, of which Birmingham produces nearly three-fourths, London, Stroud, and Dublin sharing the residual fourth between them. The weight of wire, including a fractional amount of iron wire used in the manufacture of hair and mourning *P.*, consumed annually in England for this enormous production is about 1276 tons.

Pinsk, a town of W. Russia, government of Minsk, on the river Pina, which flows into the Pripet, an affluent of the Don, 210 miles from Warsaw, and 118 from the Austrian frontier. It is situated in an extensive swampy plain 440 feet above the sea, and, connected by the Oginsky Canal with the Niemen, is the centre of a considerable transit trade, chiefly in corn, tallow, wool, timber, tar, and glass, and has manufactures of Russia leather. Pop. 17,718. *P.*, founded in the 12th c., and annexed to Poland in 1569, became Russian in 1795.

Pint (Fr. *pinte*, Sp. *pinta*) is a measure of capacity equivalent to one-half of a quart and one-eighth of a gallon. It is for the most part limited to liquids. The old Scotch pint was equal to about three imperial pints.

Pinta'do. See GUINEA FOWL.

Pin'tail Duck (*Dafila acuta*), a species of *Anatida* or ducks in which the hinder toe is small, and not united by the web to the other toes. The bill is narrow, and has no tubercle at its base. The body and tail are long, the latter tapering in the male, hence the familiar name of the species. The *P. D.* occurs in the northern hemisphere, is found in Britain in winter, and also inhabits the Gulf of Mexico, the W. Indies, and the Mediterranean Sea at that season. Its colour is brown, varied with black and white lines above, and white below. The flesh is very palatable. The bird breeds in captivity, and may be readily domesticated.

Piombino, a former principality of N. Italy, stretching along the coast opposite the island of Elba, from which it is separated by a channel of the same name. Its area before its absorption by Tuscany was 132 sq. miles, and its pop. 25,000. Originally part of the territory of Pisa, it became a principality of the Appiani family in 1399, but was subsequently acquired by Spain, and later by the Buoncompagni-Ludovisi family, from whom it was wrested by Napoleon in 1805. Napoleon conferred it on Felix Bacciocchi, his brother-in-law, who was ejected in favour of the old dynasty in 1816. It was finally annexed to Tuscany, and became part of the kingdom of Italy in 1859.—P., formerly capital of the principality, is situated at the southern extremity of a woody promontory opposite Elba, and has a good harbour and old fortifications. The roadstead, Porto Vecchio, is safe and commodious. There is a large Bessemer steel work here, supplied with ore from Elba. Admirable military projectiles, of great hardness, are also manufactured. Pop. (1874) 2755.

Pioneers (Fr. *pionniers*, from Old Fr. *peon* = Ital. *pedone*, 'a foot-soldier'), labourers or artisans attached as soldiers to the infantry regiments in the British army. Their duties are the removing of obstacles on the line of march, the digging of trenches, making of bridges, sinking of mines, and generally the direction of all fieldworks. Thirteen picked men march as P. at the head of every regiment, armed with saw-back swords, and carrying among them the picks, shovels, axes, saws, crow-bars, and working implements of the regiment slung over their shoulders. Unlike the rank and file, they wear beards.

Piotrkov, or **Petrokov**, the capital of a government of the same name in Russian Poland, on the Stradra, 65 miles S.W. of Warsaw by rail. One of the oldest of Polish towns, it has a beautiful town-house, a ruined castle, many interesting churches and monastic buildings, but retains little of its former prosperity. P. was the place where the Polish Diet met and the kings were elected during the 15th and 16th centuries. It was burned by the Swedes in 1702, and the Russians gained a victory here in 1709. Pop. (1870) 13,633, of whom a great number are Jews.—The *government*, formed out of Warsaw in 1867, is the most industrial part of Poland. Along the Lodz are grouped the chief weaving and spinning works, and within P. there are 82 cotton-mills, 17 wool-spinning factories, 66 great woollen-cloth mills, 10 machine works, &c., employing about 30,000 workmen, and producing goods to the value of 3½ millions sterling. Area, 4729 sq. miles; pop. (1872) 682,495.

Pioski, **Hester Lynch**, born in January 1741 at Bodville in Caernarvonshire, was the only child of John Salusbury, Esq. of Bachygraig, Flintshire. In 1763 she married Mr. Henry Thrale, a wealthy brewer and M.P. for Southwark, and her sprightly wit soon gathered round her a brilliant circle, including Reynolds, Burke, Goldsmith, Garrick, the Burneys, and, most famous of all, Dr. Samuel Johnson. In the Thrals' townhouse and Streatham villa the lexicographer for sixteen years found, says Boswell, 'all the comforts and even luxuries of life, his melancholy was diverted, and his irregular habits lessened by association with an agreeable and well-ordered family.' Her husband dying in 1781, Mrs. Thrale settled with her four daughters at Bath, where in 1784 she married an Italian music-master, Gabriele P., to the great disgust of Johnson, and indeed of all her friends. At Florence, where she formed an acquaintance with the founders of the Della Cruscan School, she lost her second husband (1809), and returning to England, died at Clifton, May 2, 1822. Besides her *Anecdotes* (1786) and *Letters* (1788) of Dr. Johnson, she published a vast number of long-forgotten works. See A. Hayward's *Autobiography, Letters, and Literary Remains of Mrs. P.* (1861), and R. O. Masson's *Mrs. Thrale, the Friend of Dr. Johnson*, in *Macmillan's Magazine* (1876).

Pipa or **Surinam Toads**, a genus of *Amphibia* belonging to the Frog order (*Anoura*), but to a distinct family (*Pipidae*). In this group the head is broad and triangular, and the snout somewhat pointed and prominent. No teeth exist in the genus P., and the tongue is absent. The eyes are placed close to the mouth, and the legs are extremely powerful, the toes of the hind feet being completely webbed. The best known species is the Surinam toad (*Pipa Americana*). An allied species (*Dactylethra*) occurs at the Cape of Good Hope. In P. a most curious habit marks the female. In the back are excavated a number of shallow

pits or cells, and the eggs on being deposited by the female are placed by the male in these cells. The young undergo their metamorphosis within the cells in the mother's back, and emerge therefrom as the perfect animals in about eighty-two days. The P. is about 7 inches in length. Its skin is warty, and of a brownish-olive tint.

Pipe, a wine and oil measure of capacity, the value of which varies not only with the country or locality, but also with the kind of wine. Thus a P. of port contains 114 imperial gallons; a P. of sherry, 108; and a P. of Madeira, 92. The ordinary English P. or butt is equivalent to 105 imperial gallons.

Pipeclay, a variety of fine plastic clay used, on account of its freedom from colouring impurities, in the manufacture of tobacco-pipes and fine pottery. It is procured in considerable quantities in Devonshire, Dorsetshire, and Cornwall, in England.

Pipe-Fish (*Syngnathus*), a genus of Teleostean fishes belonging to the sub-order *Lophobranchii* (q. v.), and nearly allied to the *Hippocampus* or Sea-horse (q. v.). They have long slender bodies, and derive their popular name from the resemblance of the jaws to a pipe. The dorsal fin is single and is set far back in the body, and the anal fin is small or may be wanting altogether. As in the sea-horses, the males have a pouch near the anus in which the young are hatched, and afterwards protected for a considerable period. The gill aperture is small and circular. Of the P.-F. the *S. acus* or Great P.-F. is a good example. It occurs on the British coasts, and attains a length of 15 or 18 inches, but larger specimens are not uncommon. Its colour is a pale brown, diversified with dark cross bars. The snake P.-F. (*S. anguineus*) attains a length of 14 inches. Its body is more slender than in the preceding species, and it has the dorsal fin placed forward on the body. The food consists of small crustaceans and other animals.

Another group of fishes named P.-F. is the family *Fistularide*, of which the *F. tabaccaria*, or tobacco P.-F., is a good example. They also have a long snout, and are in some respects allied to the Mulletts, &c.

Piperaceæ, or the Pepper (q. v.) family, is a natural order of dicotyledonous, erect, or climbing shrubs or herbs, with articulated stems, simple leaves often of a fleshy texture, small flowers without perianth, arranged in a spiked or racemose manner, and fruit small, berry-like, and one-seeded. The number of species is about 600, found in the hottest countries of both hemispheres. Many are natives of America; those with succulent leaves growing in dry, rocky ground, whilst others are epiphytes. *Piper* is the principal genus. Some of the *Peperomia* are cultivated as objects of curiosity in stove-houses. *Artanthe* furnishes the Matico (q. v.) of the Peruvians. The properties of the order are pungent, acrid, and aromatic; some are narcotic and astringent.

Piperine (C₁₇H₁₉NO₃), a colourless, sometimes yellowish, crystallisable alkaloid, extracted from pepper by boiling with alcohol. It is insoluble in water, but readily dissolves in alcohol and ether.

Pipes, or **Tubes**, used for the conveyance of gas or water, and for numerous other purposes, are, in a social and sanitary point of view, as well as in engineering relations, of great importance, and the industries connected with their manufacture are extensive and varied. Being used for a great variety of purposes, they are fabricated of many materials, such as india-rubber, leather, earthenware, lead, brass, copper, cast iron, and malleable iron, and other metals. They are also in consequence manufactured in many different ways, and they moreover vary in size from P. of a very minute bore up to castings of 4 feet in diameter. Here attention will only be directed to the distinctive features of the manufacture of P. and T. for gas and water supply. The 'mains' or leading P. for both gas and water are made of iron, cast iron being most commonly adopted, but in the case of gas malleable iron P. are also much employed. For internal circulation of gas and water, lead P. are generally employed. These three varieties will be briefly described. *Cast iron* P. are made with great accuracy and despatch by means of the pipe-moulding machine introduced and patented in 1846 by Mr. D. Y. Stewart, of Glasgow. The essence of Mr. Stewart's invention consists in having the P. cast in a vertical or upright position, whereby a much more solid, uniform, and equal casting is secured than by making a horizontal casting, in which inevitably the

under part of the pipe would be thicker, more solid, and stronger than the upper part. At the same time the mould and curve are made much quicker and with greater nicety in Mr. Stewart's apparatus than was possible in the earlier process of pipe-casting. In casting P. the sockets are usually cast 'down' or at the lower part of the moulding machine, whereby a sound solid socket is secured. From the upper part of the pipe, a piece of about 8 or 9 inches is cut after casting, and thus a sound pipe is secured. Ordinary P. are cast in 12-foot lengths; but those of large diameter, such as the Glasgow 4-foot supply pipe, are only 9 feet long. *Malleable iron* P. are of two main classes, butt-welded and lap-welded, according to the manner in which their joints are closed. The iron for malleable P. is received in the form of plates of the required length and thickness. It is cut into strips of a breadth sufficient for the diameter of the tube to be made, and these strips are known as 'skelps.' These skelps are heated to a welding heat; one end is beaten into a semicircular form, and the whole strip is then drawn through between a pair of rolls, the opening between which is a circle corresponding to the external diameter of the tube to be made. Thus the edges of the skelp are forced together, and a joint sufficient to resist a moderate internal pressure is formed. In lap-welded P. the skelps have bevelled edges, and are first drawn into an oval form, one edge overlapping the other. The tube is reheated, a mandril is inserted, and the weld completed by hammering; after which the circular form is given to the tube by passing it between circular rolls. Such pipes are used for steam boilers, and in other positions where they are subject to great pressure. *Lead* P., such as used by plumbers and gasfitters, are made in continuous lengths by a peculiar process. The metal is melted, and in the molten condition it is forced by hydraulic pressure through an annular aperture. This aperture represents the diameter and the thickness of the pipe to be made. The metal is brought to that condition in which, while it is possible to force it through the aperture, immediately it emerges it is sufficiently solidified to retain the tubular shape it assumes by being forced through the opening. Consequently a continuous stream of finished tube is forced upwards by the apparatus, the length of the pipe made being only limited by the quantity of metal operated on and the weight of the pipe formed. P. of 7 or 8 inches gauge are thus made, but the greater proportion of lead P. are of much smaller dimensions.

Pipe-Sticks. See TOBACCO-PIPES.

Pip'i is the astringent pod of *Casalpina Pipai*, sometimes though rarely exported from the W. India Islands for tanning purposes. When (as more frequently happens) it comes intermixed with *Divi-divi* (q. v.) it detracts from the market value of the import. P. is a straight pod, whilst that of *divi-divi* is curved like the letter S.

Pip'it, the name of several *Insectorial* birds belonging to the *Dentirostral* section of the order, and allied to the Wagtails (q. v.) or *Motacillina*. Of the pipits the best known are the Meadow P. (*Anthus pratensis*) and the Tree P. (*A. arboreus*). The Rock P. (*A. aquaticus*) and Richard's P. (*A. Ricardi*) are also well-known species. The Meadow P. or Meadow Titling is a British bird, attaining a length of 6 inches. It is of a dark-brown colour tinted with olive. The wings are dark-brown, the under part brownish white. This bird is termed the 'Mosscheeper' in England, and the 'Wekeen' in Ireland. The latter name is derived from its note. It occurs in the N. of Europe, and has been found in India and Japan. The eggs number from four to six, and are of a reddish brown colour. The Tree P. arrives in Britain in April, and leaves in September—this bird, unlike the preceding species, being migratory. It is larger than the Meadow P., but closely resembles it in colour. Its hinder claws are small.

Pippi'. See GIULIO ROMANO.

Pipp'in is a name that has long been current for certain varieties of apples, and is generally supposed to have been originally applied to superior forms raised direct from pips or seeds. It is, however, recently suggested that it may have had reference to the white dots on the fruit. Ribston P., Golden P., and Newtown P., are familiar examples.

Pipp'in (Fr. *Pépin*), the name of a celebrated family which played an important part in the history of the Frankish Empire,

and to which belonged the Karoling princes. **P. of Landen** (near Liège) was mayor of the palace (major domus) in Austrasia under King Dagobert I. (628-638). After the death of Theodorik II., P. and Arnulf, Bishop of Metz, representing the lay and spiritual aristocracies respectively, were put forward by the leudes to counteract the ambitious designs of Brunhild. After her fall their friendship was cemented by the marriage of Arnulf's son Ansegisel to P.'s daughter Begga. P. died in 639, and was succeeded by his son Grimoald, who was mayor of the palace to King Sigebert of Austrasia. On Sigebert's death (656) Grimoald, after banishing Sigebert's son to an Irish monastery, attempted to set his own son upon the throne, but in a rising of the leudes both he and his son were taken and sent to Hlodowig II., King of Neustria, by whom they were put to death. Yet the P. family continued rich and powerful.—**P. of Heristal** (on the Maas, between Maastricht and Liège), son of Ansegisel and Begga, and his cousin Martin were in 678 chosen Austrasian mayors of the palace, and leaders of the Austrasian people against Ebroin, major domus of Neustria and Burgundy. After the murder of Martin by Ebroin, P.'s power was the less restricted, especially as the throne of Austrasia had stood unoccupied from 678. He was now not merely mayor of the palace, but 'Duke of the Franks' (*Dux Francorum*). Ebroin died in 681, and P. was repeatedly called to take part in the struggles of parties in Neustria. At length, in 687, he gained a decisive victory at Testry, in the Vermandois, over Berthar, mayor of the palace to Theodorik III., King of Neustria and Burgundy, whom he now set up as king over Austrasia also, so that the whole Frankish Empire was again united. Under the *fainéants* Theodorik and his successors, P. ruled the whole Frankish race in Austrasia as duke, in Neustria and Burgundy as mayor of the palace. After many wars with the Allemans, the Bavarians, and the Frisians, he died in 714, bequeathing his power to his grandson Theodebald, a child of six years, but in three years the child was dead, and Karl Martel (q. v.), a natural son of P., became duke of the Austrasian Franks.—**P. the Short**, so called from his stature, was the younger of the two legitimate sons of Karl Martel, and on the death of the latter (741) received dominion over Neustria, Burgundy, and Provence, while to Karlmann, the elder, fell Austrasia, with Suabia and Thuringia. For seven years the Frankish throne had remained unoccupied, when in 743 Karlmann and P. placed on it Hilderik III., last of the Merwing kings. In his name the brothers ruled, each in his district, under the old title of mayors of the palace, and as 'dukes and princes of the Franks' (*duces et principes Francorum*), like their father and grandfather. After six years of successful rule in peace and war, Karlmann grew weary of the world, and built a cloister for himself on Mount Soracte, 26 miles to the N. of Rome, which, later on, he left for the monastery of St. Benedict, on Monte Casino. His son and successor Drago was soon set aside, and P. became sole duke of the Franks. There was now but one step between him and the throne. With the consent of the leudes he sent to Rome Burkhard, Bishop of Würzburg, and Fulrad, Abbot of St. Denis, his chaplain, and in 752 they returned with the reply of Pope Zachary to P.'s question, Whether or not it were a good thing that in the Frankish kingdom there should be kings who had not the royal power? The Pope's reply was, 'He who has the power, ought also to have the name, of king;' and a clause appended ran thus:—'If you will smite the Lombard, we will transfer to you the seignorial rights once belonging to the emperors, and now in abeyance.' P. then deposed Hilderik, and placed him in the convent of St. Omer, where in two years he died. And now P., the choice of the leudes and the people, was crowned and anointed king by the famous Boniface (q. v.) at Soissons (752). The year following, Ataulf (Adolphus), King of the Lombards, having seized Ravenna and marched on Rome, Pope Stephen II. (or III.) fled over the Alps to ask the help of P., who received him with the utmost reverence, and was rewarded by the holy father in Rheims Cathedral with the most sacred ceremonies of the Church (754). P. and his sons Karl and Karlmann were named 'Patricians of Rome,' the royal title being henceforth *Rex Francorum et Patricius Romanorum*, and excommunication was threatened against all who at any time should withdraw allegiance from their dynasty. Crossing the Alps, P. overcame the Lombard, and deprived him of the Exarchate of Ravenna, which he presented to the 'Pope and the Republic of Rome' (755). From this 'donation

of P.' dates the temporal power of the Roman Pontiff. No sooner had the Franks retired than Ataulf again took courage and advanced on Rome. P. returned to Italy, and enforced another peace (756), in which Ataulf pledged himself to pay him tribute, and yielded the Exarchate and the Pentapolis (comprising Rimini, Pesaro, Fano, Sinigaglia, and Ancona), which were confirmed to the Pope. P. now bent all his energies to the consolidation of his empire. To this end his friendly relations with the bishops greatly contributed. In eight years he had to repress repeated risings in Gascony and Aquitaine, till in 768 Waifier, their leader, was betrayed and slain. After a seven years' siege the Arabs were driven from their capital, Narbonne, and Gaul was free of the Saracen (759). Odilo, Duke of the Bavarians, who had married Hiltrude, daughter of Karl Martel, had in 741 made himself independent, but was in 743 vanquished by P. and Karlmann. His son and successor, Thassilo, on attaining majority (757), swore allegiance to P. at Compiègne; but during the wars in Aquitaine he freed himself of the Frankish yoke. After dividing his empire between his sons Karl the Great (q. v.) and Karlmann, P. died at Paris, 24th September 768, and was buried at St. Denis.—P., second son of Karl the Great, born 776, was anointed by the Pope King of the Lombards, acted as temporary Governor of Italy, and died in 810.—P., second son of Hlodwig the Pious, was appointed by his father King of Aquitaine (815), and played an important part in the civil war between his father and his brothers, till his death (December 838), when Hlodwig gave his dominions to his other son, Karl the Bald. The people of Aquitaine, however, supported P. the Younger, a son of the former king, who, after changing fortunes, was betrayed to Karl the Bald in 864, who cast him into prison, where he died. See Gfrörer, *Geschichte der ost- und westfränkischen Karolinger* (2 vols. Freiburg, 1848); Thierry, *Recits des temps Mérovingiens* (Par. 1839); Warnkönig and Gérard, *Histoire des Carolingiens* (2 vols. Brus. 1862); Bonnell, *Die Anfänge des Karolingischen Hauses* (Berl. 1866); Kitchin's *History of France* (vol. i. 1873).

Piquet (Fr.), a game of cards requiring the court-cards, the ace, the ten, nine, eight, and seven of each suit, and played between two persons. After dealing the cards in twos till each player has twelve, the rest, a talon or stock of eight, are laid on the table. The older hand (the dealer is the younger), must then lay aside from one to five of his cards, rejecting the poorest, and regularly replacing them from the talon. His opponent similarly 'discards,' but only if he chooses. Tricks are then taken in the usual way by the superior cards of the same suit, the ace being higher than the king, the king than the queen, &c. In reckoning what is called the point, the ace counts eleven, the king, queen, and knave ten each, and the plain cards according to the number of pips. The number of points in each game is 100, and 50 saves the lurch. The score is made up by reckoning *carte-blanche*, the point, the sequence, the quatorze, the cards, and the capot. *Carte-blanche* is the name of a hand which contains no picture-cards, and counts 10 points. The point goes to the player who has the greatest number of cards in any one suit, or if both hands are thus alike, the best hand of the two high suits, counting aces eleven, face-cards ten each, and plain cards according to the number of pips. The higher hand scores the number of cards in his fullest suit. Sequence is the greatest number of consecutive cards in any one suit; should the two players have an equal number, however, the winner is he whose sequence begins with the highest card. The sequence of three cards counts 3, of four cards 4, of five 15, of six 16, of seven 17, &c. For quatorze, four equal honour-cards, the highest scores 4; if there is no set of four, the highest set of three scores 3, &c. Each player counts 1 for each lead, and the second player counts 1 if he takes a trick. The larger number of tricks gives 10 for 'cards,' the whole tricks falling to one player gives 40 additional or 'capot.' If the first player makes 29 by preliminary scores, and 1 by first lead, he counts 30 more by 'pique,' and if his first score comes up 30 before his lead, he scores 60 more by 're-pique.' There are, however, other ways of scoring.

Piquet, or **Picket**, is the name given to a small military outpost, placed to watch against surprises, and to oppose reconnoitring parties of the enemy.

Piqué-Work (Fr. *piqué*, 'pricked'), a term applied to very minute inlays of metal and sometimes of stained ivory in surfaces

of wood, bone, and ivory. It is often seen on German powder-flasks of the 17th and 18th centuries.

Piracy (from *pirate*; Lat. *pirata*, Gr. *πειρατής*, 'one who attempts' to seize vessels). This being a crime by the law of all nations, a piratical ship may be captured by the vessel of any State, and the pirates may be brought to trial within its territorial jurisdiction. By the law of England, simple P. is punishable with penal servitude for life, or for a minor term; but if there has been any dangerous wound inflicted or murder caused by the act, the penalty is death. Persons engaged in the African slave trade are by statute guilty of P., and treaties in accordance have been entered into between the United Kingdom and the United States. Germany, Russia, and Austria have declared the same law.

Piræus, a seaport of Greece, 7 miles W.S.W. of Athens by rail, has five churches, three schools, an exchange (1873), and extensive waterworks (1876). In 1873 there were twenty-five factories, employing 2500 hands, iron-foundries, steam flour-mills, glassworks, cotton and silk mills. The workmen at the Bonlanachi pottery are mostly natives of Staffordshire. Exclusive of coasters, there entered (1876) 1064 vessels, of 547,118 tons, and cleared 1049, of 541,989 tons. The exports (lead, zinc, and calamine) amounted in that year to £511,503; the imports (coal, coke, iron, spirits, and manufactured goods) to £983,210. Pop. (1871) 10,963. The P. was also the harbour of ancient Athens (q. v.), with which it was connected by the 'Long Walls,' traces of which may still be seen. The present town is wholly modern, dating only from 1835.

Piræno, a seaport of the Austrian markgrafsdom of Istria, finely situated in the Bay of Largonè, 8 miles S.W. of Trieste. It has a fine Gothic church, a rathaus, Minorite convent, and an old castle standing amid olive groves. It affords safe anchorage, has several dockyards, and is a place of considerable commerce, chiefly in corn, wine, oil, and salt. Pop. (1870) 7691.

Piraya, or **Pirai** (*Serrasalms Piraya*), a Teleostean fish formerly ranked with the salmon genus, but separated from that group, and distinguished by triangular flat-edged teeth in both jaws, these organs being disposed in a linear series. The body is more compressed than in the salmon, and the abdomen is serrated. This fish occurs in the rivers of Brazil and Guiana. It is said to be exceedingly voracious, and to occur in great shoals. The Indians are said—but the statement like others relating to the voracity of these fishes requires verification—to place their dead in the rivers inhabited by the P. with the result that the flesh is cleaned from the bones and the bones obtained for burial in the space of a single night. The P. attains a length of a foot or more. Its teeth are used by the Indians in the manufacture of arrows and other offensive weapons. The fish is captured by the aid of hook and line, and also shot by means of arrows.

Pirmasens ('Sancti Pirminii Sedes'), a town of S.W. Germany, in the Bavarian Palatinate, 37 miles W.S.W. of Speyer, with manufactures of shoes, musical instruments, leather, straw hats, and glassware. Pop. (1875) 8563.

Pirna, a town of Germany, in Saxony, situated on the left bank of the Elbe, 11 miles S.E. of Dresden by rail. It has eight churches, important river traffic, large sandstone quarries, and manufactures woollens, hosiery, earthenware, and beet-sugar. Its former citadel, *Sonnenstein*, is now a lunatic asylum. Near P. the Saxon army was forced to capitulate (15th October 1756) at the beginning of the Seven Years' War. Pop. (1875) 10,581.

Pi'sa, one of the oldest and finest cities of Italy, capital of a province of the same name, lies in a fertile valley on both banks of the river Arno, 6 miles from its mouth, and 12 N.N.W. of Leghorn by rail. It is surrounded by walls with five towers about 4½ miles in circumference, and divided into two unequal parts by the Arno, which is crossed by three fine bridges besides the railway bridge, and along both banks of which runs the Lung' Arno, the finest and most frequented street. On the N. side of this street are the chief hotels, and here every three years, on the 17th June, the famous illumination, *La Luminara*, takes place. P. has broad, level, and well-paved streets, and several fine squares, of which the most central is Piazza dei Cavalieri, the forum of the ancient republic, in which is a colossal

marble statue of the Grand Duke Cosmo, of 1596. It also contains the church of S. Stefano di Cavalieri (1565-96), adorned with Turkish trophies, ceiling paintings of the battle of Lepanto, and the largest organ in Italy; and a palace, on the site of the 'Tower of Hunger' (properly *Torre dei Gualandà alle Sette Vie*), rendered famous by Dante, in which Count Ugolino, his sons, and nephews, were starved to death for treason in 1288. In the N.E. quarter of the town is the Piazza di S. Caterina—an oval, surrounded with acacias and plane-trees, and embellished with a statue of the Grand Duke Leopold I., erected in 1832, and containing the church of S. Caterina, erected in 1253. In the N.W. quarter is the Piazza del Duomo, which has the finest buildings in P.; among these is the Cathedral, erected in 1063, and consecrated by Pope Gelasius II. in 1118. It is a basilica, in the Tuscan style, with nave and double aisles, and transept flanked with aisles, 312 feet long, 106 feet broad, and covered with an elliptical dome over the centre. It is built entirely of white marble, and is very rich in works of art. The Baptistery, or Church of St. John, opposite the Cathedral, was begun in 1153 and completed in 1278. It is circular, 101 feet in diameter, and covered with a conical dome 190 feet high, restored in 1856. The campanile or belfry, begun 1174, completed 1359, rises in eight storeys, surrounded by half-columns and six colonnades. It is 179 feet high, and from its deflection from the perpendicular of 13 feet, is called the Leaning Tower. It has a staircase of 294 steps, and contains seven bells. In the same quarter of the city is the Campo Santo, or burial-ground, laid out 1188-1200, to which fifty-three shiploads of earth were brought from Mount Calvary. It is surrounded by a cloistered structure in the Gothic-Tuscan style, the whole forming a parallelogram. Three chapels adjoin it, rich in paintings of the Tuscan school of the 14th and 15th centuries. P. has altogether more than seventy churches, among which, besides those already mentioned, may be specially noted those of S. Francesco, S. Michele in Borgo, in the Gothic style of the 13th c., S. Nicola, founded in 1000, S. Maria della Spina, in the French Gothic style, erected 1230, and rebuilt on a different site 1874, and S. Paolo a Ripa d'Arno, of the 12th c. The Accademia delle Belle Arti, founded by Napoleon, contains many fine paintings of the early Pisan and Florentine schools. La Sapienza, the University, founded about 1160, was famous during the Middle Ages, and has now 60 professors and 600 students. The building dates from 1493, and has a fine Renaissance court, with a statue of Galileo, who was born at P. in 1564, and was appointed professor of mathematics here in 1610. It has a library of 50,000 volumes, and many rare manuscripts, also a museum of natural history and a botanic garden, founded in 1544. About 3½ miles from P., at the foot of the Monti Pisani, are the Bagni di San Giuliano, known to the ancients, and still frequented in summer. The water in the springs varies in temperature from 82° F. to 104° F. The baths and the mild climate which P. enjoys attract many visitors and patients suffering from pulmonary complaints. P. manufactures soap, straw-paper, and glass. The pop., which in the 13th c. amounted to 150,000, is given by the *Almanach de Gotha* (1878) at 23,906.

P. (Lat. *Pise*), an ancient Etruscan city, became a Roman colony B.C. 180. It was named by Augustus, Colonia Julia Pisana, and during the Empire was a place of some importance; but the only traces of Roman power which remain are a few remains of baths (Bagni di Nerone) near Porta Lucca. Early in the 11th c. P. had become one of the most powerful cities of Italy. In 1025 the Pisans drove the Saracens out of Sardinia, and colonised the island. They defeated them in 1030 and 1089 at Tunis, and in 1063 destroyed their fleet at Palermo. In 1114 they conquered the Balearic Islands, and shared in the commercial prosperity that the Italian maritime cities enjoyed after the Crusades. During the 12th c. their power was at its height, and they fought many victorious battles both by land and sea, taking Majorca from the Saracen pirates, and defeating Lucca after a long-continued struggle. In this war Florence was the ally of P., and inflicted a severe defeat on Siena, which took the other side. P. adhered to the party of the Ghibellines, and suffered severely in the struggle with Genoa, being disastrously defeated by the Genoese in 1284 off the island of Meloria, the scene of its victory over the Genoese fleet forty-three years before. From this blow P. never recovered. It lost Corsica in 1300, and Sardinia in 1320, and becoming weakened by internal dissensions, fell under Castucci, Agnello, Gian-Galeazzo, and lastly Gabriello Visconti,

who sold it to Florence in 1406. The resistance of the inhabitants was ineffectual, and many of them left the city, all the trade and wealth of which had passed away with its independence. Its liberty was restored by Charles VIII. of France, after ninety years of Florentine rule. The inhabitants resisted many attempts of the Florentines to regain the city, being helped by Genoa, Siena, and Lucca, but in 1509 the Florentines bribed Louis XII. of France to withhold his aid, and after a siege which had lasted intermittently for fifteen years, captured the city. Once more, though the conqueror's terms were easy, thousands of the high-spirited Pisans voluntarily left their homes rather than submit to the hated yoke. From this time it continued subject to Florence. It finally came, with the rest of Tuscany, to the kingdom of Italy in 1860. See Nistri, *Guida di P.* (Pisa, 1845); Rohault de Fleury, *Les Monuments de Pise au Moyen Age* (Par. 1866, with Atlas); and E. Valtancoli-Montazio, *Annali di P.* (Lucca, 1842-45).

Pisa, Council of, a council held at Pisa in 1409, to end the schism which had distracted the Western Church, and to decide on the claims of the two rival Popes, or, as Gibbon finely puts it, 'to heal the wounds and restore the monarchy of the Church.' These were Benedict XIII., the creature of the French King, and Gregory XII., successor of Innocent VII. Both agreed to a general council, but both did everything in their power to prevent its meeting. However, the cardinals of each party united in summoning it, and Benedict and Gregory were cited to attend, but neither appeared in person. The council was opened, March 25, 1409, with 22 cardinals, 12 archbishops, and 80 bishops, and with the representatives of 12 archbishops and 102 bishops. The result of the inquiry was that Benedict and Gregory were both deposed, and a new Pope, who took the name of Alexander V., was elected. The Council of P., as also those of Constance and Basel, is appealed to by those who believe a general council to be superior to a Pope, but the Ultramontanes deny that any precedent has been established, asserting that the means resorted to in special emergencies cannot be allowed to regulate the course of ordinary affairs.

Pis'ciculture is the art of breeding fishes artificially. Most writers agree in assigning its origin to the Chinese, a supposition supported by the fact that at the present day it is practised in a most scientific and advanced fashion in the Celestial Empire. We know that the Romans attained great proficiency in some phases of the art of P. Various accounts of their piscicultural establishments prove that they carried out its practice in a very complete fashion. Thus Lucullus had fish-ponds the value or cost of which amounted to upwards of £30,000. The preference of the ancient Romans for certain fishes (such as mullet, carp, &c.), and the immense sums which were paid for these, may serve to explain the rise and progress of P. among the ancients. The Chinese, it is certain, knew the art of artificially impregnating the eggs of fishes by bringing the *milt* in contact with the *roe*; and in this respect they appear to have been considerably in advance of the Romans, since, as far as can be ascertained, the P. of the latter was to a large extent limited to the preservation of fishes which had been previously obtained from their native waters. The art of P. proper, it need hardly be said, deals with the manipulation and preservation of the eggs, with the best method of obtaining them from the female, and, above all, with the after treatment of the eggs, and with the conditions which most favourably affect their due development. The rearing of young fishes forms a branch of P. of no less importance than their care during their early development, or the transportation of the eggs under favourable conditions to foreign countries for hatching and acclimatisation in their rivers or seas. It appears probable that a German, Jacobi by name, was one of the first, if not actually the first, to experiment on the artificial spawning of fishes. He observed that the male fishes impregnated the eggs previously deposited by the females by simply shedding the milt over them; and having learned this much from observation, Jacobi proceeded to experiment upon the artificial impregnation of fish-eggs by manipulating the body of the male fish so as to cause the milt to be extruded on the spawn of the female. The value of Jacobi's researches was fully recognised by the German Government. A French peasant named Joseph Remy, living in the department of Vosges, made a series of similar experiments in 1849. He was fortunate enough to attract the notice of a Dr. Haxo of Epinal, who brought

scientific knowledge to supplement the practical experience of Remy, who in his work had been aided by a neighbour named Gehin. The labours of these experimenters also met with due recognition from the French Academy of Sciences. Shaw of Drumlanrig experimented before 1840 on the artificial culture of salmon ova, and published in that year a treatise on the subject of P.; while among other names familiar in this country as cultivators of this art may be mentioned those of Young, Buist, Francis, and Buckland—the last of whom, as an inspector of salmon fisheries, as well as from independent research, being a familiar authority on the subject. In Britain the salmon and trout are the only fishes the artificial breeding of which has received much attention. Pond fish, such as pike, perch, carp, &c., are simply kept in artificial waters and are allowed to breed without any supervision being exercised over their increase. But there can be little doubt that a rich pecuniary harvest awaits the investigator who, bringing practical experience, energy, and capital to the work, should institute experimentation in P. on a large and extensive scale with a view to the increase of the supply both of freshwater and marine fishes.

The impregnation of the eggs is the preliminary stage of P. This is secured by obtaining the female fishes—in the case of salmon—as they are swimming up the rivers for the purpose of spawning. The fish is then held gently but firmly in a tub of water, and the hand of the operator passed gently along the belly, so as to cause the extrusion of the eggs. A male fish is then similarly manipulated, with the effect of shedding the milt over the roe; the occurrence of impregnation being marked by the brilliant pink colour which the eggs assume. The next thing to be done is to surround the eggs with conditions approaching as nearly as possible to those of nature. Various forms of breeding-troughs and boxes are used, and the supply of water, temperature, and other details have to be carefully calculated and determined, so as to ensure the due development of the young progeny. After hatching even greater care has to be exercised in connection with the preservation, food, &c., of the young fishes. One of the best known piscicultural establishments is that at Huningue on the Rhine, formed by the Emperor Napoleon; that at Buisse in Isère is hardly less celebrated. In Scotland, the Stormontfield breeding-ponds, near Perth, are well known. This establishment was founded in 1852. The following remarks, penned in 1866 by the late Mr. Robert Buist, who was the first superintendent of the Stormontfield ponds, will serve to show the advantages derived from the artificial cultivation of salmon. Mr. Buist writes: 'The works at Stormontfield are at length placed in a position whereby fair scope will be given to our operations, and the fruit of our attempt to improve the fishings be more clearly seen. After the expenses of the new work are defrayed, the annual outlay will not be higher than it was before, and the matter of from £70 to £100 will be sufficient for carrying out all the purposes required. Finally, from the experience of upwards of fifty-five years on the Tay, and several years on other rivers, I would strongly recommend to all proprietors of salmon rivers to follow the example now set by the Tay proprietors in regard to P., the outlay being trivial, and the benefits that may ultimately accrue being very great.' Mr. Buist's table of the increase of the Tay rental since 1853 shows that in 1854 the rental was £9269. In 1865 it had increased, through the rich cultivation of the salmon, to £17,618. It is a noteworthy fact, in connection with the artificial culture of the salmon, that whilst out of 3000 eggs naturally deposited in rivers only one salmon on an average is developed, over 1000 'smolts' will be artificially hatched, produced, and sent to the sea from the same number by artificial propagation. In Mr. Buckland's 'Museum of Economic Fish Culture' at S. Kensington, the breeding boxes are formed of slate troughs, arranged like steps and stairs, one above the other, so as to admit of a continuous flow of fresh water passing through them. Each trough is 3 feet 2 inches long, 7 inches wide, and 7 inches in depth. The 'bottom' consists of gravel, cleansed and freed from insect larvæ, which are found to be pernicious enemies of the pisciculturist.

Pisci'na (Lat. 'a fish-pond') was a name applied by the Romans to any kind of reservoir, especially those connected with the aqueducts and the public baths. In the baptisteries erected near the early Christian churches, the P. was a deep basin, to which several steps descended, and in which persons

received baptism by immersion. In Catholic churches the P. is a shallow stone basin with a drain from it, and is used by the priest to wash his hands in during mass, or to cleanse the sacred vessels after mass. It is usually placed within a niche, at a convenient height above the floor. In England the P. is almost always on the S. of the altar. It is seldom found of an earlier date than the 13th c.

Pis'ek (Boh. *Pisek*), a town of Bohemia, on the Wottawa, a tributary of the Moldau, lies in a sandy plain. It is of very ancient date, and contains a curious old bridge and the remains of an ancient castle. The chief manufactures are woollen cloth, colours, and musical instruments. Pop. (1869) 9071.

Pisistratus. See *PRISISTRATOS*.

Pis'olite, or *Pea-Stone*, is a variety of Oolite, in which the concretions are as large as peas. The *pea grit* of Cheltenham is a pisolitic limestone.

Pista'cia is a genus of trees or shrubs belonging to the natural order *Anacardiaceæ*. They have alternate pinnate or trifoliate leaves without stipules, small unisexual dioecious apetalous flowers in axillary racemes or panicles, fruit a drupe with a hard, bony kernel, and seed with thick, often green cotyledons filled with fat oil. *P. vera*, a small tree, native of Western Asia, and now long cultivated in Sicily and other parts of S. Europe, yields pistachio-nuts, which are much esteemed by the Greeks and Turks both in a dried state like almonds, and made into conserves and articles of confectionery. An oil is expressed from the seed. *P. Lentiscus*, an evergreen shrub of the Mediterranean region, yields mastich or Mastic (q. v.). *P. Terbinthus*, a small tree of S. Europe, N. Africa, and Western Asia, furnishes Chios or Cyprus turpentine, used medicinally and for flavouring wines and cordials in Greece. It is obtained by making incisions in the trunk, from which the turpentine flows, and becomes hardened by exposure. Galls collected from this tree are employed for dyeing and tanning purposes—a morocco leather being prepared with them. The heart-wood of *P. integerrima*, a tree of about 40 feet in height, frequent in parts of India, is the best and most handsome wood of N.W. Himalaya for carving, furniture, and all kinds of ornamental work. It is durable, hard, close and even-grained, brown, beautifully mottled with yellow and dark veins, and takes a fine polish. The fruit and large gall-like excrescences from the leaves are used in medicine. Various other species of the genus give useful products, and it is represented both in Mexico and China in addition to the range above indicated.

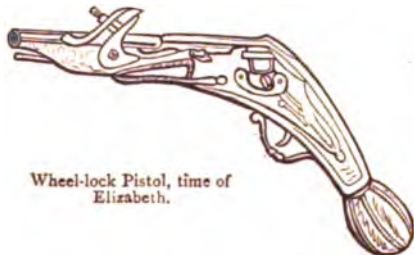
Pis'til is the female organ of a flowering plant, placed in the centre of the flower (*i. e.*, constitutes its innermost whorl), and consists of one or more *carpels*, each containing the germ of one or more seeds. The carpels are usually sessile and alternate with the inner row of stamens. In the most perfect form each one consists of three parts—(1) the *OVARY* or enlarged base, which includes one or more cavities called *cells*, containing one or more small bodies called *Ovules* (q. v.); (2) the *STYLE*, proceeding from the summit of the ovary; (3) the *STIGMA*, surmounting the style, and varying greatly in form. The style is often wanting, the stigma then being sessile on the ovary; but in the fertile P. there must be at least one ovule in the ovary, and some portion of stigmatic surface. This surface, which is variously adapted for the retention of the fecundating material from the Stamen (q. v.), is composed of a loosely cellular substance, destitute of epidermis, and usually in communication with the ovary by a channel. Some of the different forms assumed by the stigma are thus defined: *capitate*, when a small head as in the primrose; *punctiform*, when a point; *plumose*, when feathery as in grasses; *peltate*, when shield-like as in the poppy; *petaloid*, as in Iris, &c. When the P. consists of a single simple carpel, it is *monocarpellary*; if of two, three, or an indefinite number of carpels, whether separate or united, it is *bi-tri- to poly-carpellary*; when the carpels or their ovaries are more or less united into one compound ovary, it is *syncarpous*; when the carpels or ovaries are all free and distinct, it is *apocarpous*. A compound ovary may be *unilocular* or one-celled; or *plurilocular* or several-celled, when completely divided into two or more cells by partitions called *dissepiments* (septa), usually vertical and radiating from the axis of the ovary to its circumference. In general, the number of cells or of dissepiments, complete or

partial, or of rows of ovules, corresponds with that of the carpels of which the P. is composed. In apocarpous P. the styles are usually free, each bearing its own stigma. Syncarpous P. may have several styles (when the styles are free from the base); one style, with several branches; one simple style, with several stigmas; or one simple style, with a branched, lobed, toothed, notched, or entire stigma. In general, the number of styles, or branches of the style or the stigma, is the same as that of the carpels. See PLACENTA.

Pistillid'ium is a name that has been applied to what is more frequently termed the *Archegonia* of cryptogamic plants, a structure of analogous functions to the pistil or female organ of phanerogamia. In Mosses (q. v.) or Hepaticæ, for instance, it is a flask-shaped structure, enclosing near its base a large central cell, in which is formed the *oosphere*, to which an entrance is obtained by the *spermatozoid* (see PHYTOZOA) from the *antheridium*, and the result is the development of the *sporangium* or *spore-case*.

Pistoja, an interesting old town of N. Italy, province of Florence, is situated in a fertile district, on an elevation near the foot of the Apennines, and overlooking the Ombrone, a small affluent of the Arno, 21 miles N.W. of Florence by rail. It is nearly quadrangular in outline, and is girt by high, well-preserved walls, at the S.E. extremity of which is the strong Fortezza and the Campo Marzio. The cathedral of St. Jacopo, dating from the 12th c., and remodelled in the 13th c., contains a rich 'silver altar' (wrought in silver and gilded) by Simone di Ser Memmo and other masters, many fine monuments, frescoes, and terra cotta bas-reliefs. The interior was much marred by alterations in 1838-39. Other notable churches are the Romanesque St. Giovanni Fuoricivitas, erected about 1160, with an ornate façade adorned with rows of columns; the octagonal Battistero (1339), in Italian Gothic style; St. Andrea, of the 12th c., with sculptures of 1166 on the architrave of the entrances; St. Maria dell' Umilta (1509), designed by Ventura Vitoni, a pupil of Bramante, the dome by Vasari; and St. Domenico (1380), containing paintings by Fra Bartolommeo (?), Ghirlandajo, &c. These churches can boast many of the earliest attempts at sculpture in Tuscany, and the work of several of the oldest artists (e.g., Gruamons and Adesdatus). P. has also a Palazzo Pretorio, of the 14th c., now the seat of the law courts; an Ospedale del Ceppo of 1277, with a beautiful frieze, bearing coloured and glazed reliefs in terra cotta; and two libraries, the Fabbrioniana and Fortiguerrri, founded by and named after two cardinals who were born here. The Villa Puccini, a mile N., has works of art by Pampaloni and others, and stands amid fine gardens. P. has important manufactures of guns, iron and steel wares, and paper. Pop. (1874) 12,966. P. is the Roman *Pistoria*, near which Cataline was defeated and slain, B.C. 62. In the Middle Ages it was the centre of the fiercest struggles between Guelphs and Ghibellines. The Black and White parties (*Cancellieri* and *Panciaichi*), which extended their intrigues to Florence, were formed here in 1300. P. surrendered to Florence in 1351, and although its prosperity continued, became in art as well as in politics a mere pendant of the greater city.

Pis'tol, the smallest form of firearm, invented in Italy about 1520. The name is commonly said to be derived from Pistoja, a town in Tuscany, but Demmin (*Weapons of War*) mentions Perugia, and not Pistoja, as the first place of manufacture, and finds in the Italian word *pistallo*, 'a pommel,' a probable root. The oldest known examples of the P. all possess wheel-locks;



Wheel-lock Pistol, time of Elizabeth.

no matchlock P. has been met with. In the hands of the *Ritter* or German knights, the P. proved more effective than the lance,

and led to its disuse. French and English horsemen armed with the P. were termed *pistoliers*. The service P. of English lancers is 13½ inches long, and weighs 40 ounces; the barrel, 8 inches long, has a calibre of .577 inch and 5 grooves. Birmingham in England, Liège in Belgium, and Norwich in Connecticut, U.S., are the great seats of the P. manufacture. See REVOLVER.

Pistole' (derivation unknown), the name of a gold coin introduced into Spain in the 16th c. Until 1728 it was an irregular piece of money, but thereafter it received a definite form and value. The value has, however, been very variable, not only in Spain, but in the other countries which adopted it—Italy, Switzerland, and various parts of Germany. Though not now recognised in any national currency, the coin still lingers in these lands. In many parts of Germany it has a value of about 8s. 6d. sterling.

Pisum. See PEA.

Pit, in gardening, is a low structure with a roof of glass, or of other material, such as frames of reeds or boards, raised on walls made of brick or thick turf. What is called a 'cold-P.', has no artificial source of heat. It is used for protecting potted plants that are not in a growing state, or for preserving culinary vegetables from the frost. When artificial heat is required, it is obtained by a bed of bark within, and an exterior appliance of fermenting manure, or by fire-heat through flues.

Pita—flax, thread, or hemp—are fibres of species of Agave (q. v.).

Pitaká ('basket or collection'), the name of the three sacred books (Tri-pitaka) of the Buddhists of Ceylon, consisting of (1) the Vinaya P., which treats of the discipline of the monastic order; (2) the Sutra P., or discourses for the laity; (3) the Abhidharma P., or metaphysics. They are written in the Pali Language (q. v.) on palm leaves. Portions have been translated by Burnouf, Fauböll of Copenhagen, and Gogerly; but the entire series, which is estimated to be about twice as long as the Bible, has not yet been printed. It is generally admitted that the present text is identical with that settled by the Council at Patna about 250 B.C.; but it was not reduced into writing till 160 years afterwards, at the same time as the Commentaries. In 1875 this text was carefully revised by a great assembly of learned monks at Ratnapura in Ceylon. The *dharmapada*, or 'scripture verses,' has been translated into English by Professor Max Müller as an Introduction to Captain Rogers' *Buddhaghosha's Parables* (Lond. 1870). See also Burnouf's *Introduction à l'Histoire du Bouddhisme* (Par. 1845); the late Professor Childers' *Pali Dictionary*, and Rhys Davids' *Buddhism* (1877).

Pitcairn' Island, a solitary islet in the S. Pacific, situated in 25° 4' S. lat., 130° 8' W. long., and only 4½ miles in circumference. It is of volcanic origin, and the surface is very rugged, the highest point being 1008 feet above the sea level. The shores are precipitous and unsheltered by reefs, so that landing is difficult and often dangerous. The island is moderately fertile, producing the bread-fruit, cocoa-nut palm, banana, yams, sweet potatoes, and sugar-cane. Sheep, wild goats, pigs, and rats are the principal animals. The mean temperature in winter is 65°, and in summer 82°. P. I. was discovered in 1767 by a young man attached to Carteret's expedition, and was named after the discoverer. The chief interest attaching to it is in connection with the mutiny of the *Bounty* (q. v.). In 1790 nine of the mutineers, accompanied by six Tahitian men and twelve Tahitian women, with one infant, landed on P. I., but in consequence of perpetual violent quarrels, in ten years all the men, save one of the mutineers named Adams, had died, only one out of the fourteen dying a natural death. Under the guardianship of Adams, who became a changed character, the young community grew up a pattern of good morals. Its existence was first discovered in 1808 by an American merchant vessel, and thereafter British men-of-war touched at the island at intervals. In 1831 the islanders, numbering 87, were voluntarily conveyed to Tahiti, where they were liberally treated, but, disgusted with the morals of that island, most of them returned in nine months. In 1839, at their request, Captain Elliot of H.M.S. *Fly* took possession of P. I. in the name of Great Britain, and drew up a code of laws for the inhabitants. In 1856, in consequence of the scarcity of food, the islanders, who then

numbered 194, together with nearly all their live stock and effects, were removed at their own request to Norfolk Island (q. v.), whence seventeen of them returned to P. I. in 1859. The community possessing these remarkable antecedents is distinguished by its simplicity, purity, and loyalty. Education is universal, and innocent amusements are largely indulged in. Captain Moresby, R.N., who visited the islanders in 1871, while admitting that 'the passive virtues abound amongst them,' adds that 'a development of mental muscle is needed to make them systematically energetic, industrious, and persevering.' At the present time P. I. is visited principally by whalers in need of fresh water and provisions. Agriculture and fishing are the chief occupations of its now scanty inhabitants.

Pitcairne', Archibald, a Scotch physician, born at Edinburgh, 25th December 1652, studied at the university of his native city and at Paris, and acquired a wide reputation at home as a practising physician. His celebrity even secured him 'a professorship' in Leyden University, which, however, he held only for a year. He died 20th October 1713, and was buried in Greyfriars' Churchyard. P.'s chief professional work, *Elementa Medicina Physico-Mathematica* (1718), consists of his Leyden lectures. It was long a standard treatise on its subject. The author was an ardent disciple of Harvey in his great doctrine of the circulation of the blood. An elegant scholar, and a versemaker of some skill, P. occasionally employed his leisure in irritating his Presbyterian countrymen by satirical effusions which exposed him to the charges of atheism and impiety.

Pitch is the black solid shining residue from the distillation of tar after that substance has yielded up first its light oils or naphtha, and next its heavy or carbolic acid oils and anthracene compounds. P. is used for coating ironwork to prevent its oxidation, for coating the hulls of vessels, for making artificial asphalt pavements, and for various other purposes. The concrete resinous exudation from the pine *Abies excelsa* is known as Burgundy P., and is extensively employed in medicine and the arts. Natural asphaltum and hard bitumen are also called P., and the product of the asphalt lake of Trinidad and a similar deposit from Cuba are very similar in physical properties to common P.

Pitch (in music), the acuteness or gravity of a sound as determined by the number of vibrations of the air caused in producing it. In stringed instruments it is dependent on the length, weight, and tension of the strings operated on; in wind instruments, on the size of the column of air employed (see article MUSIC). The P. of musical notes has varied much at different times and in different countries, and every attempt at universal agreement has hitherto failed. The following table gives the P. in use at certain times and places for the notes middle A and C—

	A	C
Paris, Grand Opera, 1699	404	485
Do. do. 1858	448	538
French 'Diapason Normal'	435	522
Handel's Tuning Fork (1749)	416	...
London, Italian Opera (1859)	455	546
Scheidler's pitch, recommended by the Society of Arts	440	528

Pitch, Burgundy. See BURGUNDY PITCH.

Pitchblende is a greyish, brownish, or velvety-black mineral, with a dull or submetallic lustre, occurring in botryoidal masses associated with ores of lead and silver in veins. It contains 80 to 87 per cent. of protoxide of uranium, is infusible before the blowpipe, and dissolves slowly (when powdered) in nitric acid. It is used in the arts for painting upon porcelain.

Pitcher Plant. See NEPENTHES.

Pitchstone, or Ret'elite, is a compact glassy rock, varying in colour from velvety-black through various shades of dirty green and yellow to an almost white. It has a splintery fracture. It frequently occurs in the form of dykes or intrusive sheets, and is sometimes no doubt the remnant of a *coule* of some past geological age.

Pitchurim Beans. See PICHURIM.

Pith is a cylinder of cellular tissue, occupying the centre of the stem of an exogenous plant after the first year of its growth. It is active only in young stems or branches, becomes dried up and compressed as the wood hardens, and is often scarcely dis-

tinguishable in old trees. It is surrounded and encased by the medullary sheath which abounds in spiral vessels, and when young, is in direct communication with the leaf-buds, leaves, and other ramifications of the system. In the P. originate the medullary rays which form vertical plates radiating from it, traverse the wood, and terminate in the bark. They are formed of cellular tissue, keeping up a communication between the living portion of the centre of the stem and its outer surface. As the heart-wood is formed, the inner portion of the medullary rays cease to be active, but they may usually still be seen in old wood, forming what carpenters call the silver grain.

Pithe'cia. See SAKI.

Pithe'cus. See ORANG.

Pitman, Isaac, born at Trowbridge, Wilts, January 4, 1813, was educated at the grammar-school of his native town, and at the Normal College of the British and Foreign School Society in London, became master of the British School at Barton-on-Humber, Lincolnshire (1832), and established a similar school at Wotton-under-Edge, Gloucestershire (1836), publishing his *Stenographic Sound-hand* (1837). He removed to Bath (1839), and there elaborated a phonetic system, which Max Müller pronounces the best of its kind, his *Phonography, or Writing of Sound*, appearing in 1840. In 1843 he founded the Phonetic Society and the Phonetic Institute, the latter a printing-office, from which have issued the *Phonographic Reporter's Companion* (1853), a large number of standard works in phonetic spelling, and the *Phonetic Journal*, a weekly paper, which in 1876 had reached a circulation of 9250. See PHONETIC WRITING.

Piton Bark. See CARIBBE BARK.

Pitt, Thomas, the founder of the famous family of English statesmen, was born at St. Mary's Blandford in 1653. Towards the close of the century he went to the East, and was governor of Fort St. George, Madras (1698-1702). In 1714 he was made governor of Jamaica. He sat in four Parliaments, and died 28th April 1726. The P. diamond is so called from having been in his possession. His son, Robert P. of Boconnoc in Cornwall (died 1727), was father of the illustrious Earl of Chatham (q. v.).

—**William P.**, second son of the Earl of Chatham and of Lady Hester Grenville, was born 28th May 1759. He was remarkably precocious, taking as a boy keen interest in political affairs, but he was so frail in health that his education was conducted at home, under the tutorship of the Rev. Dr. Wilson, and the loving supervision of his distinguished father, who trained him in oratory and educated him for the service of the state. In 1773, when he entered Pembroke Hall, Cambridge, he exhibited a surprising knowledge of the classics. He had also a passion for mathematics, and was afterwards able to utilise the habit of mind developed in this study in discussions upon finance. Having graduated M.A., he proceeded to Lincoln's Inn, became a barrister in 1780, and went round the Western Circuit, as he was compelled to eke out his narrow income by practice. That same year he was defeated in his candidature for the University of Cambridge, but in January 1781 he was returned for the borough of Appleby, through the influence of Sir James Lowther. At this troublous time Lord North was in power, and there were two sections of the Opposition, headed respectively by Fox and Lord Shelburne. P. joined the latter, and on the 26th February made his first speech in favour of economical reform. This masterly effort, delivered with perfect self-possession, at once secured him a leading position in Parliament. But his success did not carry him off his feet. He spoke no more than twice again until the session ended. On the 27th November 1781, after Parliament met, he fairly established his reputation in the debate upon the address. Indignant at the abuses in the composition of Parliament, P. moved in 1782 for an inquiry into the state of representation, which, curiously enough, considering how long the subject afterwards slept, he only lost by 20 votes in a house of 300. When Lord Shelburne was called to the head of the Ministry, P., who had previously declined the Vice-Treasurership of Ireland, accepted the Chancellorship of the Exchequer in his twenty-fourth year. After concluding the Peace of Paris, the Shelburne Ministry came to an end, having been worsted by 'the Coalition,' which was a *rapprochement* of the Whig followers of Fox with the Tory supporters of Lord North. This ill-assorted union was strong in Parliament, but

was detested alike by the country and the king. In opposition P. again broached the subject of reform, but his motion was lost by a majority of two to one. Along with his friends Eliot and Wilberforce, he travelled to Paris in 1783, obtaining thereby his only glimpse of the Continent during his whole life. In December Fox was defeated on the India Bill, and P. accepted the post of First Lord of the Treasury, but he could not have held it had he not known that the country supported him. Addresses poured in upon him from Whigs and Tories alike, so that he felt justified in delaying dissolution of Parliament for five months, though opposed by the greatest orators of the day and beaten in sixteen divisions. At the general election P. was triumphantly supported throughout the great constituencies, and 160 of his previous opponents were unseated. He took up the premiership once more, and never was Minister in so powerful a position. He had annihilated the Whigs. The King felt bound to him by the ties of gratitude. The people were drawn to him because of his high disinterestedness and his patriotism. P.'s first great achievement, after an elevation to the premiership which lasted for seventeen years, was to make the administration of India a part of the general system of the English Government. In 1785 he devised a plan of Parliamentary reform, but the bill he brought in with the view of disfranchising thirty-six decayed boroughs was defeated by a combination of his own party with the Whigs. It has been said of P. that 'he is the first English Minister who really grasped the part which industry was to play in promoting the welfare of the world.' His efforts after financial reform and his general industrial policy were largely shaped upon the principles of Smith's *Wealth of Nations*, to which he had given long and diligent perusal. He took office at a moment when public credit was low, and his first measure—a plan of paying off the national debt by a sinking fund—though a failure, had the effect of restoring public confidence. He next attempted to 'draw what remained of the shattered empire together' by removing the harassing restrictions upon trade between England and Ireland. When that failed, he established in 1787 a treaty of commerce with France which removed every import duty. In 1788 he supported Wilberforce in his attacks upon the slave-trade. The same year, with the enthusiastic support of the great body of the nation, he resisted the Whig party in their attempt to create a regency during the King's madness, on the ground that the right to choose a temporary regent lay with Parliament. The first nine years of his premiership were peaceful and prosperous. Throughout the French Revolution P. pled for a preservation of friendship between the countries, and showed no alarm at the contagion of its principles. In the very heart of it he supported a Libel Bill of Fox's, by which the freedom of the press was finally secured. Even when the President of the French Convention had issued the war cry in the face of Europe, 'All governments are our enemies,' P. struggled to maintain peace. When, in 1793, France actually declared war, his influence was destined to decline, for though he gave fearless encouragement in the midst of disasters, his military administration did not maintain the promise of his earlier career. His generals were unsuccessful, his coalitions were failures. In 1799 he put into effect his scheme for fully conciliating Ireland by effecting its legislative union with England. His domestic policy became somewhat harsh and severe, but he never lost his sympathy with civil and religious liberty, and in February 1801 he resigned the premiership, on being foiled in his purpose of raising Catholics and Dissenters to perfect equality of civil rights. After a prolonged absence he reappeared in Parliament in May 1803, when he made a magnificent speech in favour of the war. In 1804 he was recalled to the Treasury. His wish that Fox and Grenville should join him was thwarted by the King, and singlehanded he had to face the brunt of the terrible Continental storm. The task was too much for his strength, and hastened his end. The coalition he formed with Russia and Austria was shattered by the victorious legions of France. On the 23d January 1806 he died at Putney, in the midst of the Napoleonic triumph. 'Austerlitz,' wrote Wilberforce, 'killed P.' P., says Lord Macaulay, was 'the greatest master of the whole art of Parliamentary government that ever existed.' As an orator he was remarkable for wealth of language, command of sarcasm and retort, and dignity of demeanour. He was a courageous and resolute Minister and an unequalled political leader. His triumphs in the House of Commons were great and continued, and even in dire disaster he retained the affection and

regard of the people. For twenty years he was the single hope and pilot of the country. In his foreign policy he did not display the shining talents of his father, but he inherited much of Chatham's genius—his splendid disinterestedness, his patriotism, and his pride. See Gifford's *Life of P.* (3 vols. Lond. 1814); Tomline's *Life of P.* (6 vols. Lond. 1815); Earl Stanhope's *Life of P.* (4 vols. Lond. 1861; 3d ed. 1867); May's *Constitutional History of England* (1865); Jesse's *Memoirs of Life and Reign of George III.* (1867); Lecky's *History of England in the 18th C.* (2 vols. 1878).

Pitt's, a genus of *Inessorial* birds, belonging to the *Dentirostral* group of the order, and including, among other forms, the Giant Ant-Thrush or Giant Breve (*P. Bengalensis*), the Black-headed P. (*P. melanocephala*), and the Crimson-headed P. or Bradiyure (*P. granatica*). The true ant-thrushes are found in both Old and New Worlds; the breves are confined to the former.

Pittacus, one of the seven wise men of Greece, was born about 652 B.C., at Mitylene in Lesbos. Along with the brothers of Alcæus, he slew the tyrant Melanchrus (612), commanded his fellow-countrymen in their war with the Athenians for the possession of Sigeum (606), and, on the expulsion of the aristocratic party from Lesbos, was chosen supreme ruler (589). After ten years' tenure he resigned his office, and, withdrawing into private life, died at a great age in 569. Four only out of 600 elegiac verses composed by P. are extant, but two of his maxims are still famous: 'Know the fitting time,' and 'Tis hard to be good.' See Bergk's *Pœta Lyrici Græci* (Leips. 1843).

Pittosporaceæ is a natural order of dicotyledonous trees, shrubs, or climbers, that have their headquarters in Australia, with outliers in Japan, Cape of Good Hope, the Canaries, &c., but none reaching America. The number of species is about a hundred. A few yield edible berries. The principal genera are *Pittosporum*, with flowers scented like the lily of the valley, *Billardiera* (q. v.), and *Sollya*. Some of the last named, with pretty blue flowers, are well known in greenhouses as slender, ornamental, twining plants.

Pittsburg, a city of Pennsylvania, U.S., lies at the junction of the Alleghany and Monongahela rivers, which unite here to form the Ohio, and is 354 miles W. of Philadelphia by rail. On the opposite bank of the Monongahela is Alleghany City, which is connected with P. by six bridges, and which, though still possessing a separate municipal existence, is practically part of the latter. The city now covers the peninsula of level ground between the two rivers, and extends about 7 miles up the banks of both. It is well supplied with tramways, and gas is cheaper here than in any other town in America. There are 200 churches and three public libraries; and among the principal buildings may be mentioned the university, the observatory, and six hospitals. P. has (1878) ten daily newspapers, of which two are in German, and twenty weeklies. It is one of the most important manufacturing towns in the U.S. Coal and coke are produced annually to the amount of 4,000,000 tons, half of which is floated in barges to Cincinnati, Louisville, and New Orleans, when the rivers are in flood. The chief manufacture is iron. There are twelve blast furnaces, which in 1873 yielded 163,853 tons of pig metal. Nearly double this quantity has to be imported in addition, as in the same year there were forty-three iron mills, and seventy-five foundries and machine-shops, using 474,195 tons of pig metal in their manufactures. There were also seventy glassworks, employing 5000 men, three copper mills, ten white-lead factories, and two silver-smelting furnaces, for extracting lead and silver from Rocky Mountain ores, besides a great number of smaller factories of various kinds. P. occupies the site of Fort Duquesne, built by the French in 1754. Four years later the French were expelled by the British under General Forbes, and a new fort was built, which was called Fort Pitt, in honour of William Pitt, then at the head of the British Ministry, and which has given its name to the town. Under British rule it soon became a trade centre. In 1804 it was incorporated into a borough, and in 1816 into a city. In July 1877 it was the scene of a great railway riot, in which twenty men were killed and twenty-nine wounded. Pop. (1874) 140,000; or, with the addition of Alleghany, 210,000.

Pittsfield, a town of Massachusetts, U.S., is situated upon a plain 1200 feet above the sea, about 150 miles W. of Boston

by rail. There are several lakes in the vicinity, which both add greatly to the beauty of the scenery and afford excellent water-power for the factories. The town contains ten churches and a free library, and has two weekly newspapers. The principal manufactures are cotton and woollen fabrics, silk, and tacks. Pop. (1870) 11,112.

Pitu'itary Body, a small mass of brain-substance, situated on the base of the *cerebrum* or true brain, in front of the *optic commissure*. It consists of two vascular halves or lobes separated by fibrous tissue, varies in weight from five to ten grains, and appears to be relatively larger in the foetus than in the adult, but is firmer in the latter state. Its function is unknown.

Pityri'asis (from Gr. *pityron*, 'bran') is the term applied to one of the squamous or scaly diseases of the skin. It is a chronic inflammation of the skin, characterised by the production of numerous white scales, in irregular patches of a dull red or pinkish colour, but occasionally scarcely distinguishable from the surrounding skin. It may appear on any part of the body, and frequently in succession, and it is attended with heat, tingling, and pruritus. There are three varieties of P.—viz., *P. rubra*, *P. versicolor*, and *P. nigra*—depending chiefly upon chromogenous disorders. There are also several local varieties, named according to the site of the affection, as *P. capitis*. There is also a form of P. called *chloasma*, which is due to the presence of a parasite, *microsporion furfurans*, characterised by the presence of numerous circular brownish patches, which, however, vary in shade in different persons, and in the same person at different times, and hence its name, *P. versicolor*. The common P., or dandruff of the scalp, is the most familiar example of the disease. The proximate cause of P. is congestion of the vascular rete of the derma induced by general or local causes, such as disorder of the digestive organs, the imperfect drying of the skin and then exposing it to the sun or wind, &c. P. is more curable than the other scaly diseases, and it generally yields to the frequent use of warm baths, or to the alkaline or sulphur baths, attention being paid to the general health. The object of the treatment is to slightly astringe the vessels of the skin and soften the epidermis, and for this purpose a borax lotion or diluted white precipitate ointment should be used. The form of P. due to the presence of a fungus is best treated by the application of a saturated solution of sulphurous acid gas, or by sulphur ointment, or a lotion or ointment of bichloride of mercury. Like other parasitic diseases, it is contagious.

Piu (Ital. 'more'), a direction in music. *P. allegro*, 'faster,' *P. lento*, 'slower,' &c. *P. tosto* signifies 'rather,' as in *P. tosto allegro*, 'rather quick.'

Pius, the name of nine popes.—**P. I.**, **Saint**, born at Aquileia, was 10th Bishop of Rome (142-157 A.D.), and is believed to have suffered martyrdom.—**P. II.** (Enea Silvio de' Piccolomini), one of the most eminent scholars of his age, and one of the ablest but most intriguing of the Popes, was born at Corsignano in Tuscany, 19th October 1405, of an ancient but decayed family. His early years were spent in great poverty, in spite of which he devoted himself with the utmost zeal to the study of the ancient authors, copying them out with his own hands when unable otherwise to obtain copies. In 1431 he became secretary to Cardinal Capranica, whom he accompanied to the Council of Basel. Here he found scope for his powers of diplomacy, and became recognised as the leader of the liberal party against Pope Eugenius IV. In 1439 he became secretary to the Antipope Felix V., and in 1442, by the favour of the Emperor Friedrich III., secretary to the Chancellor Kaspar Schlick. In 1445 he went to Rome to negotiate with Eugenius, embraced his party, became his secretary, and succeeded in reconciling the pope and the emperor at the Diet of Frankfurt. He was rewarded by the new pope, Nicholas V., with the bishopric of Trieste, and Callistus III. in 1446 raised him to the Cardinalate. In 1458 he was elected Pope. P. now devoted himself to the resistance of the Turks, and laboured to effect a confederacy of Christian princes for this purpose, but died August 15, 1464, before his efforts were successful. By his merit as a pontiff he redeemed the errors of his early life. His numerous historical and geographical works were published at Helmstadt (1699-1707), and are still valuable. His *Epistole* are of great importance for the history of the time. See Voigt's *Enea Silvio de Piccolomini als Pops P. II. und sein Zeitalter* (3 vols. Berl. 1859-63).—**P. III.**

(Francesco Todeschini), nephew of P. II., was born at Siena, May 9, 1439, and elevated to the papal throne after the death of Alexander VI., September 22, 1503, but died October 18th of the same year, after a reign of 26 days.—**P. IV.** (Giovanni Angelo de' Medici) was born at Milan, March 31, 1499, and elevated to the pontificate in 1560. Of a mild disposition, and anxious to reconcile the Church, he moderated the severity of the Inquisition, and with a view to stay the progress of heresy and settle the standing questions in the Church, convoked anew the Council of Trent, November 23, 1560. Its deliberations were brought to a close and confirmed by the bull of January 26, 1564, embodying the creed usually called that of P. IV. (or the 'Tridentine Creed'), from which modern Catholicism has taken its definitive form. P. died December 9, 1565.—**P. V.** (Michele Ghislieri) was born of humble origin at Bosco, near Alessandria, in Lombardy, January 17, 1504, and entered the Dominican convent of Vigevano at the age of fourteen. Of the most austere and abstinent habits, he devoted himself entirely to the advancement of his order and confirming the Catholic faith. He was early invested with the office of Inquisitor, and was sent to Como to oppose the attempts of the Protestants to introduce their faith into Italy. In July 1551 he was summoned to Rome as commissary-general of the Inquisition by Cardinal Caraffa, who, becoming Pope under the title of Paul IV., made P., in spite of his repugnance, bishop of Sutri and Nepi in 1556, cardinal in 1557, and sometime afterwards chief inquisitor of Christendom. He was confirmed in his charge in 1560 by P. IV., whom he succeeded in the chair of St. Peter, January 7, 1566. P. now carried on a series of reforms in the public morals of Rome, and revived the Inquisition with a severity which has known no parallel in the case of any other pontiff. In 1568 he ordered the bull *In Cana Domini* to be read yearly throughout the Church, and February 25, 1570, excommunicated Elizabeth of England. P., who had long meditated a war against the Turks, now united himself with Spain and Venice, and sent a large expedition against the enemy. The battle of Lepanto (q. v.), fought October 7, 1571, destroyed the naval supremacy of the Ottoman power. P. died May 1, 1572, and was canonised by Clement XI., May 24, 1712. A volume of P.'s letters was published at Antwerp in 1640. See Agatio de Somma's *Vida di Pio Quinto* (Fr. trans. 1672), and De Falloux's *Histoire de Saint P. V.* (2 vols. Par. 1844).—**P. VI.** (Giovanni Angelo Braschi) was born at Cesena, in the Romagna, December 27, 1717. He became secretary to the Pope Benedict XIV., and held various offices under Clement XIII., being created a cardinal, April 26, 1773, by Clement XIV., whom he succeeded in the papal chair February 15, 1775. His first care was to carry out economic reforms within his states, while he did much to improve the city of Rome, draining the Pontine marsh and improving the harbour of Ancona. Soon after his accession he found himself at variance with Joseph II. of Austria, and Leopold, Duke of Tuscany, whose reforms had swept away much of the papal supremacy. P. repaired to Vienna, trusting to his influence in a personal interview, but, though received with kindness, he failed to effect anything, and was obliged to submit to the curtailment of his prerogatives by the reforming Emperor. Three years afterwards occurred the French Revolution, which caused great changes to the Papacy, imposing upon it for the future new conditions of existence. Some of the earliest acts of the constituent Assembly in France were the demolition of almost all the rights of the ancient Gallican Church, and the spoliation of its property. The remonstrances of P. were unheeded, and soon the storm fell directly upon his own head. The French Government accused him of being the enemy of France, and of instigating the murder of De Basseville, a French political agent whom the Roman populace had killed in a tumult in 1793. P. was obliged to subscribe to the treaty of Tolentino, February 19, 1797. In the same year, on the pretext of revenging the murder of General Duphot, the French Directory despatched against Rome an army under General Berthier, which entered the city February 15, 1798. P. refusing to resign his temporal sovereignty, was carried to Siena, afterwards to the Certosa of Florence, to Parma, Piacenza, Turin, and at last to Valence, on the Rhone, where he died, August 28, 1799, his malady being hastened by the ill-treatment he had received. See Ferrari, *Vita Pii VI.* (1802); Merck, *La Captivité et la Mort de Pie VI.* (1814); Artaud de Montor, *Histoire de Pie VI.* (1847).—**P. VII.** (Gregorio Barnaba Luigi Chiaramonti)

was born of a noble family at Cesena, August 14, 1742. He entered a Benedictine monastery at the age of sixteen, became bishop of Tivoli in 1782, was created cardinal by P. VI in 1785, and transferred on the same day to the see of Imola, succeeding his patron on the papal throne March 14, 1800. Aided by Cardinal Consalvi, whom he named Secretary of State, P. restored order in his states, and carried out various reforms. Three months after his accession, the victory of Marengo laid Italy at the feet of Bonaparte, who signed a concordat with the Pope, July 15, 1801, which raised the Church from its ashes, and gave many advantages to the Pope, most of which were, however, annulled by the *Articles organiques* attached to the bull by Napoleon, and promulgated April 8, 1802, to which neither P. nor any of his successors have ever acceded. On May 18, 1804, Napoleon assumed the imperial power, and forced P. to come to Paris to crown him as Emperor. On May 16, 1805, he re-entered Rome, but before six months the troops of Napoleon appeared before the walls of Ancona. Negotiations passed between P. and the French Court, but on February 2, 1808, General Miollis entered Rome, and May 17, 1809, a decree annexed to the French Empire all the States of the Church, leaving only the city of Rome to the Pope. On June 10, P. issued a bull of excommunication against the plunderers of the holy see, without specially naming Napoleon. On the night of the 5th July the Pope's person was seized and carried to Grenoble, and in June 1812 to Fontainebleau. Here P. was confined and treated with some rigour, and was at last compelled to sign a new concordat, yielding up the Papal States. The fall of Napoleon restored him to freedom, and May 24, 1814, he re-entered Rome. P. at once began to repair the evils created by his long absence. Naturally he did not love either the wild democracy of the Revolution or the military despotism to which it gave birth. He condemned Freemasonry, anathematised the Carbonari, encouraged missions, and restored the Jesuits. The Vienna Congress restored to the Church much of what it had lost, and the Governments of Naples, Prussia, and Würtemberg concluded concordats with the Court of Rome. P., who had borne all his sufferings with Christian resignation, died from the effects of a fall in his chamber, August 20, 1823. See Cohen's *Precis Hist. et Polit. sur Pie VII.*, 1823; A. de Beauchamp's *Hist. des Malheurs et de la Captivité de Pie VII.*, 1814; Artaud de Montor, *Histoire de Pie VII.* (3 vols. 1836).—**P. VIII.** (Francesco Xavier Castiglione) was born at Cingoli, in the March of Ancona, November 20, 1761. In 1800 he became Bishop of Monte-Alto, Cardinal in 1816, and Pope March 31, 1829. He died November 30, 1830, after giving promise of illiberality in his views and severity in his punishments.—**P. IX.** (Giovanni Maria Mastai Ferretti, Count) was born at Sinigaglia, May 13, 1792. He was the son of Count Jerome Mastai Ferretti, the head of a Lombard family which had acquired nobility in the 17th c. from the Duke of Parma, and the Countess Caterina (*née* Solezzi), while he had an uncle who was Bishop of Pesaro. He entered the College of the Padri Scolopi at Volterra in 1803. Originally intended for the military profession, he was prevented from pursuing this career by epileptic fits, and in 1810 proceeded to Rome to study theology under Giuseppe Graziosi. He resided with his uncle, Paolino Mastai Ferretti, who was a prelate of the Papal Court and Canon of the Vatican. In 1814 he was presented to Pope P. VII., who was returning from his captivity in France. Young Ferretti at first devoted himself to the care of a hospice where young orphans were sheltered and taught, known from its founder, Giovanni Borgi, by the name of Tata Giovanni. Ordained a priest in 1819, he accompanied Monsignor Muzi in a mission to Chili, leaving Rome July 5, 1823. He remained in Chili for two years, and on his return to Rome was made a prelate (June 25, 1825). He was now appointed by Leo XII. president of the hospital of St. Michele on the Ripa Grande, archbishop of Spoleto in 1828, and transferred by Gregory XVI. to the bishopric of Imola, September 17, 1832. Here he carried out many liberal reforms, and did much to diffuse learning more widely within his diocese. Being sent on a mission to Naples at the time when cholera was raging in that city, he disposed of his plate and equipages for the relief of the dying and starving poor. In 1840 he became a cardinal, and on the death of Pope Gregory XVI. was elected Pope, June 16, 1846, by thirty-six votes out of the fifty present, avowedly the leader of the reform-

ing party, as opposed to the constitutional party, headed by Cardinal Lambruschini. Twelve hours after his election, Cardinal Gaysruck, Archbishop of Milan, reached Rome with secret instructions from Austria to veto the election of the bishop of Imola, which were, however, too late to be effectual. The new Pope took the title of P. IX., and inaugurated his reign with a number of promising liberal measures, publishing on the 18th July a general amnesty releasing all prisoners (to the number of 2000), recalling all exiles, and restoring to them their civil rights. At the same time he granted 300 crowns yearly to the relief of poor Jews, and removed from them most of their disabilities, permitting them to reside in any part of the city. In August 1846 he issued a commission for the making of railroads in his dominions, and soon afterwards granted a concession to an Englishman for a gas manufactory, and took an active interest in agriculture and the reclaiming of the deserted Campagna. These measures brought him the utmost popularity, and in the commencement of his reign he was the idol of all classes. Mazzini apostrophised him with the words '*Abbate fede Santo Padre, siate credente*,' and Carlyle declared that 'the old chimera was rejuvenised!' In June 1847 he made the liberal Antonelli a cardinal, and soon after Minister of Finance. On March 4, 1848, P. published a constitution, in which he appointed two chambers—the first of members nominated by the Pope, the second formed of representatives chosen by the electoral districts, one to 30,000 voters. Notwithstanding these reforms, a revolutionary feeling spread through Rome, fostered by the political refugees to whom his amnesty had opened the city, and on November 15, 1848, Count Rossi, the Pope's first Minister, was assassinated. From this time P. changed his rôle, satisfied that his liberal measures had failed to attach the populace. Finding that his personal safety was in danger, he fled from Rome on the 24th November 1848, to Gaeta, where he put himself under the protection of the King of Naples. At Rome a republic was proclaimed, at the head of which was Giuseppe Mazzini, who, with Armellini and Saffi, conducted the government with great prudence, until General Oudinot, at the head of a French expedition, after a siege of thirty days, took Rome (July 2, 1849), and invited the Pope to return. He entered his capital April 12, 1850, after an absence of seventeen months. His government was from this time the complete reverse of what it had been at first, and swayed by Antonelli and protected by the resident French army, he refused to make any compromise with the Liberals, and preserved until the loss of his power an obstinate and unreasoning Conservatism. He now devoted himself, as if in contrast with his former political activity, to schemes of church advancement, while he canonised saints, lavished indulgences, and at last proceeded to propound new dogmas, and to pronounce judgment on controversies which had been left unsettled by the wisdom of the ages. In 1850 he re-established the Catholic hierarchy in England, and in 1854 issued a decree propounding the doctrine of the Immaculate Conception (q. v.). In 1864 he published the syllabus of errors, and June 29, 1868, a bull for the convocation of an Ecumenical Council, whose opening was fixed for the 8th December 1869. In its fourth session, July 18, 1870, the dogma of the Papal Infallibility was promulgated. After the final withdrawal of the French troops in 1870, the inhabitants of the papal territory began to demand incorporation with the Italian kingdom, and on the 12th September General Cadorna crossed the frontiers. At first it was expected that P. would quit Rome, but after consideration he decided to remain. The result of the *plebiscitum* on the 2d October was 40,805 for, and 46 against union with Italy. The Italian Government voted the Pope a pension of £129,000 annually, and on the 31st December 1870, King Victor Emmanuel entered the Quirinal. Since 1870 P. remained in Rome, but he unceasingly kept alive the memory of his wrongs by numberless allocutions and encyclics, while by the active intrigues of his court he continued to harass the Italian Government and to scheme at every court in Europe, which was the chief cause of the dissension between the President and the French Republic in 1877. In November 1872, P. issued an encyclical letter for Germany, in which he called the Old Catholics (q. v.) 'wretched sons of perdition.' June 25, 1875, was the fiftieth anniversary of his consecration as a bishop, and his episcopal jubilee, to which many pilgrims flocked from all countries with rich offerings, was celebrated with great rejoicings. He died on the 7th February 1878, at the age of eighty-six. His reign can scarcely be looked at but as a

failure in its determined opposition to the spirit of the age, but the errors of his public life were somewhat redeemed by the virtues of his private character. His sending his benediction to the dying king of Italy was a fine example of Christian forgiveness. It was the lot of P. to hold the helm of the Church in the most troublous times for the Papacy, and it was his misfortune, not his fault, that he had not the wisdom or ability to steer her safely through the storm. In the annals of his 257 predecessors there have been few more eventful pontificates, though many greater Popes. See T. A. Trollope's *Life of P. IX.* (2 vols. Lond. 1877), and that by J. F. Maguire, M.P., and Monsignore Patterson (Lond. 1878).

Pivot Joint, the name given to those joints of the bodies of higher animals which move round a pivot or central fixed axis. They are also named 'rotary joints.' The articulation between the head and neck, or the movements of the forearm, by means of the radius passing round the ulna and lower end of the humerus, are examples. In the neck the *pivot* is formed by the *odontoid process* of the *axis* (or second vertebra of the neck), around which the head, together with the *atlas* (or first vertebra) turns.

Pizarro, Francisco, illegitimate son of Gonzalo Pizarro, a Spanish colonel of infantry, was born at Truxillo, in Estramadura, about 1471. Taught neither to read nor to write, and left to pick up a living as a swineherd, he ran away at last from his employers, and at Seville embarked with many other adventurers for the New World. He served under Alonzo de Ojeda in Hayti, and was appointed by him to command the colony. Later he was associated with Balboa at Darien, and with Pedro Arias, governor of Panama. He formed plans for a voyage of discovery with a wealthy priest and a daring soldier, named respectively Hernando de Laque and Diego de Almagro. In November 1524 he set sail from Panama with 100 men, Almagro following in another vessel, but they only went as far S. as Quemada Point. In March 1526 they again started, and after incredible hardships finally discovered the long-sailed Peru, and partly explored the country. In 1528 P. returned to Spain, and there exhibited specimens of gold and silver and cloth obtained from the Peruvians. He was invested by Karl V. with the full rights of his discovery, and was named captain-general of the province, with a salary of 725,000 maravedis. On his return to Peru with a small, well-equipped force of 110 foot soldiers and 67 cavalry, he found a civil war raging between Huascar, the legitimate ruler, and his half-brother Atahualpa (q. v.). Professing to espouse the cause of the latter, he got access to the interior of the country. After having captured the unsuspecting chief, and exacted from him an immense ransom, he burned him at the stake. Shortly after this a quarrel between P. and Almagro resulted in a civil war, which ended in the death of the latter, by whose followers P. was assassinated, 26th June 1541. He married the Inca's daughter, and his descendants, preserving the title of Marquis de la Conquista, are still to be found at Truxillo. P. was lucky rather than skilful. Rash, treacherous, cruel, he is only credited with the virtues of brute courage and perseverance.—Gonzalo P., youngest brother of the preceding by the same father but another mother, was born at Truxillo, 1506. Early in life he crossed to Peru, and soon became the first lance in the country. He was the best guerilla chief of his time, but no general. In 1540 Gonzalo was appointed governor of Quito by his brother, and led across the Andes an expedition which resulted in the discovery (though not by him) of the Amazon's source. After the murder of his brother, Gonzalo became master of Peru by defeating Blasco Nufiez in a pitched battle at Quito, 1546. But the mastery did not continue long. Pedro de la Gasca, at the head of the Spanish royalist forces, defeated and beheaded him in the following year. See Prescott's *History of the Conquest of Peru* (2 vols. 1847), and Helps' *Life of P.* (1869).

Pizzicato (Ital. 'pinched'), a direction in music for the violin, meaning that the strings are to be plucked with the finger. This style of playing often produces a pretty, piquant, guitar-like effect, and is very useful in accompaniments. The direction '*coll' arco*' or '*arco*' indicates that the use of the bow is to be resumed.

Pizzo, a seaport of S. Italy, province of Catanzaro, on a sandstone rock above the Gulf of Sta. Eufemia, 25 miles

W.S.W. of Catanzaro. It has a ruined castle, where Joachim Murat, king of Naples, was shot, 13th October 1815. There is some trade, and an important tunny fishery. Pop. (1874) 8300.

Placenta, or 'afterbirth,' the structure, developed to its fullest and most typical extent in *Mammalia*, through which communication is maintained between the mother and the unborn young. Through the P. respiration, excretion, circulation, and other processes in the young animal are maintained. Traces of this structure are visible in lower forms of animal life than mammals; e.g., in sharks and dogfishes. In these, however, the so-called P. is not developed from the true layers investing the embryo, but from a particular sac or vesicle devoted to the nutrition of the young form, and known as the *umbilical vesicle*. Its mode of origin in these lower vertebrates is therefore essentially different from that which it exhibits in mammalia. All mammals, however, do not possess a P. The two lowest orders of mammalia—the *Monotremata* (q. v.) and *Marsupialia* (q. v.)—represented by the ornithorhynchus, kangaroo, opossum, and allied forms, are destitute of it. These mammals are hence called *Implacentalia* or *Non-placental mammals*, in contradistinction to the other orders which are grouped together under the name of the *Placentalia*. To understand the structure of the P., and its modifications in the various groups of mammalia, it is necessary in the first instance to glance at its relations and development in the human subject. The inner lining or *mucous membrane* of the *uterus* or *womb* undergoes a marked development after the occurrence of impregnation. It becomes greatly thickened, and its upper layer or surface forms what is known as the *membrana decidua*. This soon exhibits a division into three layers—the *decidua vera*, which lines the uterus; the *decidua reflexa*, which invests the young animal; and the *decidua serotina*, or part which is brought in connection with certain processes or *villi* of the *chorion*, i.e., the outer covering of the fetus or embryo itself. The villi of the chorion, therefore, come to be lodged in certain depressions or *crypts*, as they are named, in the *decidua* of the uterus, so that in this way the foetal and maternal structures fuse and interlace. The limited portion of the chorion which is thus connected with the lining membrane of the uterus marks the site of the future P. The deeper portion of the mucous membrane of the uterus is hollowed out to form *sinuses*, or spaces which on the one hand open into the arteries, and on the other into the veins of the womb. The villi, or processes of the chorion, in due time grow into these sinuses, and push the thin walls of these cavities before them as they grow. The result of this is that the villi are soaked in the maternal blood which is circulating through the uterine sinuses; but it must be carefully noted that there is no direct or actual passage of the blood of the mother into the embryo. All that is contrived in this arrangement is that the blood of the mother may interchange products, by diffusion, with the blood of the fetus; these products passing readily through the thin wall of the villi and being interchanged for other products obtained from the maternal blood. That there is an actual interchange of products between the mother and the fetus, notwithstanding the absence of any direct communication between the two circulations, is evident from the observations of Drs. Harvey, Savory, and Hutchinson; poisonous matters injected into the body of foetal animals being found to pass readily and freely into the body of the mother, and even to cause death by passing into the maternal circulation through that of the fetus.

In the human subject, therefore, the P. consists of a *maternal* and *foetal* portion. It is *discoid* or cake-like in shape, from the limited area over which it is developed on the uterine walls. At birth the greater part of the P. is thrown off. It becomes detached from the walls of the uterus by the so-called *after-pains* of childbirth, together with the *decidua vera*, *decidua reflexa*, and a part of the *decidua serotina*. The remaining portion of the latter membrane becomes absorbed, or may be thrown off along with the uterine discharges which persist for some time after parturition. In the human subject the P. is said to be *discoid* in shape, and it is also termed *deciduous*, because it is cast off wholly or in greater part at birth.

All mammals, however, do not exhibit the human type or structure of P., nor are the placental structures always cast off at birth in the manner just described. As an example of an entirely different type of P., that of the pig may be selected. In

this animal the mucous lining of the uterus enlarges during the progress of utero-gestation, and the villi of the chorion combine and unite with the uterine structures as in man. But there is a notable difference in the manner in which the P. is developed in the pig; for that structure is not limited to one region of the chorion and uterus, but is developed from all parts of the chorion, save at its extremities or poles. Moreover, at birth the maternal structures are not thrown off to any appreciable extent. The villi of the chorion representing foetal structures are simply withdrawn from the uterine depressions in which they are lodged as the fingers might be drawn out of a glove. Hence the placentation in the pig is said to be *non-deciduate*, as opposed to that of man and other animals in which both foetal and maternal structures are thrown off.

All the *Primates* (man and apes or *Quadrumanæ*)—save the lemurs—possess a P., which is discoid in shape, and which is also deciduate. In the bats (*Chiroptera*), *Rodentia*, and *Insectivora* (moles, shrews, and hedgehogs), the P. conforms to the human type. The *Carnivora* also possess a deciduate P., but the form of the organ differs from that of man in being *sonary*—that is, the P. has the form of a zone or girdle enveloping the middle portion of the chorion, but undeveloped at the poles. All *Ungulate* mammals (pigs, deer, antelopes, sheep, ox, hippopotamus, rhinoceros, tapir, horse, camel, &c.) possess a *non-deciduate* P., and in this respect the *Cetacea*, or whales and dolphins, agree with them. The placentation of the order *Sirenia* (q. v.), including the Manatees (q. v.) or sea-cows and dugongs, has not been determined; but in all probability these animals will be found to agree with the whales. Among mammals which have a *non-deciduate* P. there are variations in the form and disposition of the organ. The pig, horse, camel, and cetaceans have the villi of the chorion scattered irregularly over the surface of that membrane. Hence the P. is termed *diffuse* in these animals. In the *Ruminants*, on the other hand, the villi are disposed in groups named *cotyledons*, and these may be received (as in the sheep) into cup-like depressions of the uterine walls; or (as in the cow) the villi may be concave, and may fit upon convexities of the uterine surface. The ruminant P. is therefore named *cotyledonary*, in opposition to the term 'diffuse.' The elephants (*Proboscidea*) have a *sonary* P., and so have the curious little genus *Hyrax* (q. v.). Huxley believes that the P. in both of the latter cases is truly deciduate. The elephants, in this view, become nearly related to the rodents; while hyrax remains as the type of a distinct order of mammals. The order *Edentata* presents many singularities of structure of the P., and would appear to include within its limits representatives of nearly all the types of the other groups. Thus, in *Manis*, the P. is diffuse and *non-deciduate*; in the sloth it is not *cotyledonary*, as was formerly believed, but a discoid and deciduate structure allied to that of the primates. *Orycteropus* has a *discoid* and *deciduate* P., and that of the armadillos is also said to be discoid. Professor Owen, speaking of the P. of the latter animals, says it is a single thin oblong disc, composed of foetal and maternal structures. In the lemurs, which are mammals regarded as representing the lowest members of the *Quadrumanæ* order, the P. appears to differ in the most remarkable manner from that of other Primates. Turner, speaking of the P. of this order, says, 'As the P. in the lemurs has the arrangement and structure of a diffuse P., it is presumably as non-deciduate as that of the other animals which possess the same form of P.; for in it, as in them, the foetal P. can be separated from the maternal without carrying away a portion of the uterine mucous membrane.'

Diseases of P.—The P. is liable to various diseases, the more important of which are apoplexy; fatty, cartilaginous, and calcareous degeneration; placentitis; general oedema; and atrophy. Apoplexy of the P. is caused by effusion of blood from ruptured vessels into the parenchyma of the organ, exactly as takes place in the lung. In fatty degeneration, the fatty molecules are either thrown out primarily as inflammatory exudations, or are formed secondarily from inflammatory products which degenerate into fatty particles. Placentitis, or inflammation of the P., may terminate in morbid adhesions, hepatisation, induration, and abscess; but the morbid action is generally confined to a limited portion of the P., and extends from the maternal towards the foetal surface. In general oedema, the tissues are soft, swollen, pale, and infiltrated with serum. D. of the P. are always dangerous, and often fatal to

the foetus; and in many of them there is a tendency to recur in subsequent pregnancies. As a general rule, the uterus is excited to active contraction by the morbid products, and abortion is the result; but in some cases the diseased vitality of the P. is maintained, while the embryo becomes shrivelled and attenuated, and may be retained till the full period of gestation.

Placenta is the part of the inside of the ovary to which the ovules are attached, sometimes a mere point or line on the inner surface, often more or less thickened or raised. Placentas are *axile* when the ovules are attached to the axis or centre, that is, in plurilocular ovaries when they are attached to the inner angle of each cell; in unilocular simple ovaries when the ovules are attached to the side of the ovary nearest to the style; in unilocular compound ovaries when attached to a central protuberance, column, or axis rising up from the base of the cavity. If this column does not reach the top of the cavity, the P. is said to be *free* and *central*. They are *parietal* when the ovaries are attached to the inner surface of the cavity of a one-celled compound ovary. Parietal placentas are usually slightly thickened or raised lines, sometimes broad surfaces nearly covering the inner surface of the cavity, sometimes projecting far into the cavity, and constituting partial dissepiments, but never cohering in the centre. (*Bentham.*) See PISTIL.

Placentalia and **Placental Mammals**. See PLACENTA.

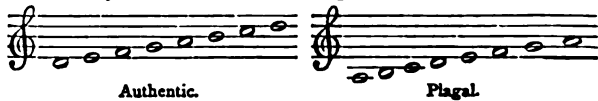
Placentia. See PIACENZA.

Placodus, an extinct genus of Vertebrate animals, the remains of which occur in rocks of *Triassic* age. It was formerly regarded as a fossil fish of the *Ganoid* kind, but is now held to be reptilian, and is included in modern systems of classification in the order *Sauropterygia*, a group to which the *Plesiosaurs* and other extinct reptiles belong. In P. the teeth occupied distinct sockets. They were of rounded form, and resembled the flat plate-like teeth found in some rays and sharks, and which are adapted for crushing the hard shells of crustaceans, &c. A double series of teeth were developed in the upper jaw of the P.; only a single row in the lower jaw.

Placogonoid Fishes, or **Placogonoidæ**, a division of *Ganoid* (q. v.) fishes, represented by the Sturgeon (q. v.), in which the skeleton is imperfectly developed; the body being incompletely covered with ganoid scales or plates often united by suture. The fossil genera *Cephalaspis*, *Pterichthys*, *Pteraspis*, &c., belonged to this section of the ganoid order.

Placoid Fishes, one of the subdivisions of the class *Pisces* or fishes proposed by Agassiz, and founded upon the characters of the scales. Placoid scales consist of small bony plates, which may bear a central spine, and are well seen in sharks, rays, and dog-fishes—these belonging to the order *Elasmobranchii* (q. v.). They do not completely invest the bodies of fishes, but are scattered in an irregular manner over the skin-surface. Placoid scales occur in a fossil state, along with fossil fin spines or *ichthyodorulites*.

Plagal, in music (Gr. *plagios*, 'oblique'), a term applied to the four Church modes formed by St. Gregory from the 'authentic modes' of St. Ambrose, by taking the fourth below the final as the new keynote of a scale extending to the fifth above. See



GREGORIAN CHANT. P. melodies have their principal notes between the fifth of the key and its octave or twelfth. P. cadences (sometimes called Church cadences, being much used in sacred composition) are those in which a sub-dominant chord precedes the final tonic chord.

Plagiotomi (Gr. 'transverse-mouthed'), a sub-order of *Elasmobranchiate* fishes, including the sharks, skates, and rays. The mouth is placed crosswise on the under surface of the head. The skull has no distinct cranial bones, and is of cartilaginous structure, and the vertebral bodies are usually ossified, but the other parts of the skeleton are cartilaginous. The scales are

Placid (q. v.), and the gills are sac-like structures opening outwardly by *branchial slits*, water being also admitted to the gills by a pair of tubes opening in *spiracles* on the top of the head. There is no air-bladder.

Plague (Lat. *plaga*, from the Gr. *πλάγῃ*, 'a stroke,' i. e., inflicted by the gods—the derivation indicating the ancient belief as to the source of the P.) is a febrile disease, characterised by buboes or swellings of the lymphatic glands, by carbuncles and petechiæ. P. prevails at certain times and places epidemically, but its true home is in the regions bordering upon the eastern extremity of the Mediterranean and its tributaries. At different periods of the 15th, 16th, and 17th centuries it occasionally visited Western Europe, and was well known in Italy, France, Germany, and England, London and Paris having suffered greatly from it in former times. The last remarkable epidemic of P. was in 1720, when Marseille lost nearly one half of its population. In later times it has been limited chiefly to Egypt, Syria, Anatolia, Greece, and European Turkey; occasionally extending northward into Russia, and westward as far as Malta. In 1844, P. became apparently extinct; but it reappeared in Western Arabia in 1853; in the province of Bengazi, Tripoli, in 1858-59; in the extreme N.W. of Persia in 1863; among the Arabs of the right bank of the lower Euphrates in 1867; in Persian Kurdistan in 1871, and among the Afjji Arabs on the lower Euphrates in 1873-74. Since the latter date, P. has prevailed epidemically in the regions adjoining the lower Euphrates till the close of 1877, the number of deaths officially recorded at Bagdad from January till June 1877 having been 1672.

The premonitory symptoms of P. are chilliness, weariness, languor or debility, precordial uneasiness, occasionally nausea and vomiting, headache, vertigo, a hot and dry skin, and a frequent pulse. These conditions are soon followed by the peculiar symptoms of P.; darting pains are felt in the groins, arm-pits, or other parts of the body, which are soon followed by enlargements of the lymphatic glands, or by inflammation of the subcutaneous tissue, constituting carbuncles. As the disease advances, the swellings increase; the tongue becomes furred, often dry, brown or blackish, and fissured, while a dark sordes collects upon the gums and lips; and there is often great thirst and an internal sensation of burning heat. The bowels, which are at first constipated, become relaxed, the stools being dark, offensive, and sometimes bloody; and the urine is generally scanty, turbid, yellowish or blackish, and tinged with blood. The general strength is greatly prostrated; the patient has a staggering gait, and attacks approaching to syncope are not uncommon. The power of the will is impaired, the intellect is confused, and delirium or coma may supervene. There are usually remissions in the morning and evening, and exacerbations during the middle of the day and night, the morning remissions and nocturnal exacerbations being commonly the greatest. Buboes may appear at the commencement of the disease, or after one or more days, or not until near the close. Carbuncles usually make their appearance later than the buboes, and may occur on any part of the body. Petechiæ, or purplish spots like flea-bites, which usually become livid as the disease advances, occur only in bad cases; and sometimes along with these spots there are vibices, or irregular purplish or livid patches like bruises.

Great difference of opinion has existed, and still exists, as to the cause of P. Some maintain that it is propagated by a peculiar contagium; others, while admitting its contagious nature, affirm that it often occurs endemically or epidemically; while others again assert that it originates exclusively either in local causes or epidemic influences. The evidence in support of the contagious nature or communicability of P. is undoubted, and it is extremely probable, though not yet demonstrated, that it depends upon the growth and multiplication of specific germs. Some have conjectured that P. is generated *de novo* from the filthy accumulations and excretions of a crowded and uncleanly population; but such exist elsewhere, and apparently under the same circumstances, without producing the effect. P. is an exceedingly fatal disease.

With respect to treatment, little can be done. There is no specific for P., and the symptoms can only be met by palliative treatment. P. is essentially a filth disease, its local habitat being in places where sanitary arrangements and personal cleanliness are ignored. That this is the case is evident from the fact that

European residents, especially English, in the infected cities of the Levant, enjoy a comparative immunity from P. See Hecker's *Epidemics of the Middle Ages* (1844, published by the Sydenham Society); *Reports on Levantine P.*, by Mr. Netten Radcliffe, in Medical Officers' Report to Local Government Board (New Series, No. vii.), and Supplement to the Sixth Annual Report of the Local Government Board for 1876 (Lond. 1878).

Plagues of Egypt were ten calamities brought upon the country by Moses (q. v.), with the purpose of compelling Pharaoh to let the Hebrews leave Egypt and set out for Canaan. Opinion regarding these P. (enumerated Exod. vii.-xii.) has been somewhat modified of late years. Travellers have discovered that they correspond in a remarkable degree with natural phenomena which occur in the country: e. g., the Nile at certain seasons has a blood-red appearance; extraordinary numbers of frogs sometimes make their appearance; the country is sometimes visited by a murrain among the cattle, or a plague of locusts; a species of stinging fly and a painful skin disease occasionally afflicts man and beast; and a wind from the desert at times raises such clouds of sand as to obscure the air for days. Accordingly, while the Rationalistic school consider the P. myths have arisen out of the natural phenomena, the ablest conservative critics explain the first nine as 'having become signs and wonders through their vast excess above the natural measure of such natural occurrences and their supernatural accumulation.' But by many the greatest difficulty is felt to be the implied idea that the displeasure of God is expressed by physical disaster, an idea which, though universally held in ancient times, is now regarded by educated people with considerable suspicion. Again, perhaps the greatest difficulty encountered by rationalising critics is how to account for what the magicians of Egypt are said to have done. According to the Christian Fathers they did it by the help of demons, or according to the latest theory it was mere jugglery. But that the writer meant that the magicians did the same things as Moses in certain of the wonders, is just as clear to a candid reader as that he understood the P. to be miracles. And hence the real difficulty here is the implied belief, which was also universally held in ancient times, that magicians could do things which far surpassed the power of ordinary mortals. See *The Speaker's Commentary* (vol. ii. Lond. 1872), *The Bible for Young People*, by Oort, Hooykaas, and Kuenen (vol. ii. Eng. trans. 1875).

Plaice (*Platessa vulgaris*, or *Pleuronectes platessa*), a species of *Pleuronectidae* or flat-fish, common on the British coasts. It attains a weight of from 1 or 2 to 8 or even 15 lbs. Its colour is a dark brown marked with red spots. The P. is caught in large quantities by nets, but may also be captured by line, a favourite bait being lobworm. It ascends rivers to spawn.

Plaid (Gael. *plaid*, 'a blanket,' contracted from *peallaid*, 'a sheep-skin'), a garment of chequered woollen cloth worn loosely or belted round the body as an outer covering. It forms a characteristic part of the costume of the Scottish Highlanders, who fasten it with a brooch at the shoulder.

Plain (Lat. *planus*), an extensive tract of level country, distinguished on account of lesser elevation from plateaux or Tablelands (q. v.). Examples in Europe are the plains of N. Germany, of Hungary, and of Russia to the E. of the Carpathians. The steppes of Eastern Europe and Asia, the deserts of Africa and Arabia, the prairies and savannahs of N. America, and the S. American llanos, pampas, and silvas, are all true plains, differing only in name and characteristics.

Plain-Song, or **Canto-Fermo**, a term originally applied to ecclesiastical chants in which the notes were of equal value and all corresponded to the white keys of the pianoforte. They were expressed on a staff of four lines. P.-S. has remained unaltered since the days of Gregory the Great. Many fine specimens of counterpoint on the plain chant, where the chant was preserved in one of the parts, and various other parts were arranged as imitations, canons, fugues, &c., were produced in Italy in the 16th c. See Stainer and Barrett's *Dictionary of Musical Terms* (1876).

Plaint (in English law) is the first process in an inferior court; or in a superior court is a complaint against the defendant, and for which the plaintiff obtains the Queen's writ. In

the county courts it describes the parties, the sum claimed, and the cause or motive of the action.

Plain'tiff (in English law) is the term denoting the person who brings a civil action against another, who is termed the *Defendant*. In Scotland the P. is called the *Pursuer*.

Plait'ing, or **Platt'ing**, is the art of interlacing flexible materials in order to produce a basket, mat, or other article. This art, which is allied to weaving, only differing from it in the fact that the fibres employed are not previously *spun*, has been universally practised from the most remote ages to the present time. Many degraded races, ignorant of the art of weaving, are very expert in P., while in civilised communities it is the foundation of the straw-plait and basket-making industries.

Plan (in Architecture) is properly the horizontal section of a building showing the disposition of the ground plot and of the upper floors. In common discourse the term P. is often used for any kind of architectural drawing.

Planaria, a genus of *Scolecida* (q. v.), belonging to the *Platyelmia* or 'flat worms,' and forming the type of the group *Planarida*. *P. larva* and *P. lactea* are two familiar species. These animals occur in mud and in damp earth, or on aquatic plants. They present the appearance of small flattened bodies, measuring from half an inch in length. The skin is provided with cilia, and a proboscis may exist. A distinct mouth and digestive system are developed, and the intestine may be straight or branched, and is never provided with an anus or outlet. The 'water-vascular system' opens externally by one or more apertures. The P. are hermaphrodite, and reproduction may take place by *fusion* and by *budding*, as well as sexually.

Planché, James Robinson, an English dramatist and archaeologist of French descent, was born in London, February 27, 1796. His first burlesque, *Amorosa, King of Little Britain*, was produced at Drury Lane in 1818. He has written more than two hundred pieces for the stage, including the libretti of a number of operas (among which is Weber's *Oberon*). He may be said to be the father of modern burlesque, though his extravaganzas, *The Fair One with the Golden Locks*, &c., instinct with grace, taste, and refinement, are entirely free from the vulgarities which disfigure many of the works of his successors. He designed the costumes for Mr. Charles Kemble's Shakesperian revivals. P. was a Fellow of the Society of Antiquaries (1830-52); was appointed Rouge Croix Pursuivant of Arms (1854), and Somerset Herald (1866). He has published *Lays and Legends of the Rhine* (1826); *Descent of the Danube* (1827); *History of British Costume* (1834); *The Pursuivant at Arms: A Treatise on Heraldry* (1852); *King Nul-Cracker: A Fairy Tale* (1853); *A Translation of the Fairy Tales of the Countess D' Aubnoy* (1855); *A Corner of Kent* (1864); *Recollections and Reflections of J. R. P.* (2 vols. 1872); *The Conqueror and his Companions* (2 vols. 1874), and a great number of songs and essays. His recent contributions to *Mirth* (1877) show that the genial veteran still retains his youthfulness of spirit.

Plane (in Geometry) may be defined as the surface swept out by a straight line moving parallel to itself along a given straight line. Every line which can be drawn in it is perpendicular to a definite direction; and a straight line drawn from a point in the P. in this direction is called the normal to the P. Parallel planes have the same normal. The Cartesian equation to a P. referred to rectangular axes is—

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$$

This intersects the P. xy ($z = 0$) in the line—

$$\frac{x}{a} + \frac{y}{b} = 1,$$

from which it is evident that a , b , and c are the intercepts on the axes made by the P. The intersection of two planes is always a straight line; and, unless their normals are co-planar, three planes intersect in a point. This last is equivalent to the algebraic statement that three equations between three unknown quantities are necessary and in general sufficient to determine these.

Plane and Planing Machine. A P. is an implement for smoothing the surface of wood or any other material, such as cast metal. It acts on level, even surfaces alone; other tools,

such as the lathe, are employed for round or curvilinear work. An ordinary P. is a well-known hand-tool, used by joiners, cabinetmakers, and other wood-workers. The body of a common P. is usually made of beech, but sometimes for finer work boxwood is employed. The under surface of the P., which is moved along the wood operated on, must itself be a true plane, and through a slit or 'gab' in it projects the chisel-edged P.-iron, which is the essential cutting-tool of the P. What is termed a double P.-iron is the ordinary form employed, it having attached to the cutting-chisel by a screw, a movable plate of metal of the same breadth as the chisel itself, and which can be moved to or from the cutting-edge, according as a fine or deep bite or shaving is desired. The cutting edge can correspondingly be made to project more or less beyond the plane surface, according to the nature of the work, and the iron is held in its place by a wooden wedge driven forcibly against it. In some planes the iron is fixed and its bite regulated by an arrangement of screws. The pitch or angle of inclination of the P.-iron varies in different planes, being more upright in those used for hard wood than in such as are employed for dressing soft wood. The variety of hand-planes for wood is very considerable, special forms of P.-surface and iron being required for groovings, mouldings, beads, &c.; fillisters, rabbets, hollows, rounds, and ploughs are well-known forms of planes.

Planing machines are now largely employed in the timber-growing countries for preparing and dressing wood in the forms in which it is extensively used, such as grooved and tongued flooring, mouldings, &c. These planing machines embrace two principal forms—(1) carriage machines, in which heavy timber is dressed by traversing cutters operating on one surface; (2) parallel machines, in which the wood is reduced to parallel dimensions on all sides by means of fixed opposite cutters, or between fixed cutters and a stationary bed or gauge. The second form of machine is employed for dressing boards, flooring, mouldings, &c. In the manufacture of implements of precision and fine machinery, true planes are of the most essential consequence, and the surface plates made by Sir Joseph Whitworth & Co. of Manchester, which are the nearest approximation to perfect planes ever yet obtained, have been of the highest value in advanced mechanical engineering. A machine to communicate a plane surface to any material must itself move in a plane surface, and the essential feature of machine planes for metal consists in a rigidly fixed cutting-chisel, against which the metal to be abraded is moved backward and forward along a bed which is a true plane.

Plan'et is the generic name for all cosmical bodies which like the earth revolve round the sun. Ordinarily, however, it is restricted to the larger and more important of these bodies, excluding the planetoids, comets, and meteorites. The name is derived from the Greek *planētēs*, 'a wanderer'—a term suggested by the apparently irregular motions by which planets are distinguishable from the fixed stars. The fixed stars always retain the same position relatively to each other. The sun and moon appear to move through them in an approximately regular manner, the former taking a year and the latter a month to perform the complete cycle. The planets, however, for long baffled every attempt to reduce their motions to a definite law; and as long as they were not understood, there was no hope for the even more eccentric comet. The motion of a P. among the stars is now direct, like that of the sun and moon, and now retrograde; while at times the P. comes to a standstill altogether. When the true system of the universe was finally recognised, these peculiarities of motion were at once seen to be necessary consequences of the conditions.

To the ancients five planets were known, viz., Mercury, Venus, Mars, Jupiter, and Saturn. Copernicus added the Earth when he fixed the centre of the universe in the sun. The elder Herschel detected a seventh, Uranus; the analysis of Leverrier and Adams gave us an eighth, Neptune; and the discovery of the first asteroid or planetoid by Piazzi on January 1, 1801, was a fitting inauguration of a century so rich in astronomical research. The empirical laws of Kepler—that planets move in ellipses round the sun which occupies a focus, that the radius vector of a P. describes equal areas in equal times, and that the squares of the periodic times of any two planets are as the cubes of their mean distances—led Newton to the demonstration of the law of gravitation. The direct dyna-

mical consequences of this law showed that Kepler's laws were true to a first approximation only, and that necessary perturbations produced deviations which could not be neglected in a complete planetary theory. Newton's work was ably supplemented by the brilliant researches of the great French astronomers Laplace and Lagrange. The latter was led by analysis to the enunciations of two remarkable theorems, which guarantee the stability of our system. These are:—'If the mass of every P. is multiplied by the square root of the major axis of its orbit, and the product by the square of the tangent of its inclination to a fixed plane, the sum of all these products will be constant under the influence of their mutual attractions;' and 'if the mass of each P. is multiplied by the square root of the axis of its orbit, and the product by the square of its eccentricity, the sum of all is invariable.' For the elements and other details, see the special articles upon the various planets. See also PERTURBATIONS.

Plan'etoids, the name generally given now to the small planets which lie between Mars and Jupiter, and which were formerly known as Asteroids (q. v.). Yearly their numbers are being added to, and at present there seems to be no limit to the discovery of new ones. There are now (March 1878) 185 P.

Plane-Tree (*Platanus*) is the sole genus of *Platanaceæ*, consisting of large trees with flaking bark, palmatifid leaves, monoecious flowers collected into unisexual globose pendulous heads, intermingled with scalelike bracteoles, each carpel producing a small one-seeded nut. It is generally considered to consist of five or six species, natives of the northern hemisphere; but some botanists incline to the idea that it comprises only one widespread and variable species. *P. orientalis*—the Eastern P.—indigenous to Greece, Armenia, and Persia, under favourable circumstances forms a majestic tree, with wide-spreading branches, and attaining a height of 70 to 90 feet. It has long been a favourite ornamental shade tree for lining roads and for street planting. Even in larger towns, such as London, it grows vigorously, resisting the smoke better perhaps than any other tree. The yellowish-white wood is compact and fine-grained, and is well adapted for furniture and other kinds of cabinet work. It was introduced into England about the middle of the 16th century. *P. occidentalis*, the P.-T. of the E. part of N. America, is more commonly cultivated in Western Europe than the above, but is less hardy. It differs in having less deeply lobed leaves, which are pubescent when full grown. This species grows to a large size, the diameter of the trunk at times attaining 12 feet, or even more: the wood is dull red, and is not readily attacked by insects; but the tree is more suited for avenues than for a timber tree. *P. racemosa*—the Californian P.—is also a good promenade tree, and is of quick growth. The deeply five-lobed leaves are copiously clothed with woolly hairs, and have originated the name *cotton tree*. Its wood is comparatively hard and durable. The mock or Scotch P. is *Acer Pseudo-Platanus* (see MAPLE). Geological researches show that the genus *Platanus* was formerly represented as far north as Greenland. The name P. is the old French form of the Greek and Latin name. Milton (*Paradise Lost*, iv. 478) writes it 'platane;' Spenser (*Faery Queene*, Bk. I., canto i.) calls it 'the platane round.'

Planor'bis, a genus of *Gasteropodous mollusca*, belonging to the section including the snails and their allies, and to the family of the pond snails (*Lymnæide*). The shell is flat and discoidal, its whorls lying in one plane. It is of thin texture, and has a sharp lip. *P. carneus* is a common species. The P. inhabits ponds and rivers, and has the habit of burying itself in mud during the dry season of the year.

Plant. To the question, What is a P.? the reply must be that it is difficult, perhaps impossible, to draw a hard-and-fast line between the animal and vegetable kingdoms; but this statement has usually reference to a certain confusion which arises on the border land among a mass of obscure, unicellular, or very simple organisms, which Ernst Hæckel, the great German innovator, has proposed to raise to the rank of an intermediate kingdom, under the name of Protista. Between the higher plants and animals the distinction seemed abundantly clear, and to depend not so much upon structure and form as upon fundamental differences in the mode of performance of the most essential vital functions; plants through their protoplasm acting in contact with

chlorophyll under the influence of light have the power of shaking asunder the elements of carbonic acid, water, and ammonia, and of recombining their four elements, carbon, oxygen, hydrogen, and nitrogen, into such ternary compounds as starch and cellulose, and such quaternary and higher compounds as albumen. This power, broadly speaking, the animal kingdom does not possess; and thus the vegetable kingdom must be understood to pre-exist the animal kingdom, and to be necessary for the preparation of its food. But in the young and active condition of the vegetable cell there is no chlorophyll present, and no such process takes place. The elements of carbonic acid and water are fixed and recombined in the green leaves of plants, and the more complex products are conveyed in solution in vessels, or by endosmosis to the growing points. At these points the cells are multiplying rapidly, but they are entirely pale, and have no power of performing any true P. functions. In a growing point every cell consists of an external cell-wall of cellulose, an inert ternary compound, enclosing a nucleated mass of protoplasm, or of protoplasm in conjunction with metaplasm, which gives all the manifestations of vital activity which we have in the lowest forms recognised as truly animal. Every living vegetable shell is thus (according to Professor Sir W. C. Thomson) an amœboid rhizopod, enclosed in an external shell of cellulose, a shell which it has been the active agent in secreting. Growth of the P.-shoot goes on, but this growth is produced by the multiplication by fission of the rhizopods, each division unfolding itself in a new cellulose chamber, which we recognise as an additional vegetable cell. During the past year or two some very important observations have brought this aspect of P.-life much more prominently before us. Several observers, including Dr. Nitschke, Sir Joseph Hooker, Professor Dickson, and more especially Mr. Darwin and his son Mr. Francis Darwin, have worked up very carefully the habits and the constitution of the amœboids inhabiting the cells of glandular hairs. In Mr. Darwin's curiously interesting book about *Insectivorous Plants* we have an account of the process by which *Drosera rotundifolia*—the common sun-dew—manures itself through its leaves, catches insects, and absorbs and assimilates the nitrogenous matter which they contain. Dr. Nitschke, Mr. Darwin, and others have traced the process fully, and have determined that under the stimulus of a supply of suitable food the cell-contents of the cells of the leaf-glands secrete a substance having very much the properties of pepsin, and an acid fluid closely resembling that produced in the stomach of the higher animals during the process of digestion. There is little doubt that some day many closer analogies will be shown to exist between the behaviour of plants and animals as regards nerve-physiology. Until a man begins to work at plants he is apt to grant to them the word 'alive' in rather a meagre sense; but the more he works, the more vivid does the sense of their vitality become.

Mr. J. B. Lawes has published the result of lengthy experiments, which show that 200 times the weight of organic matter elaborated by a P. passes through it in the form of water during its growth. With regard to the comparative amount of carbon assimilated by plants or evolved by animals, Professor Dewar has furnished tables which present the subject in a clear form. An acre of the best cultivated land fixes annually about 22 cwt. of carbon, and a healthy man evolves about 2 cwt. of carbon annually in the form of carbonic acid, so that eleven such persons supply as much as can be economised by an acre of land.

The number of species of flowering plants estimated as at present in existence over the surface of the globe is about 120,000, in the proportion of 9 to 2 for dicotyledons and monocotyledons. For the Cryptogamia no reliable data exists, every day adding to the number of recognised species even in well explored countries.

Planta'genet, the cognomen assumed by Geoffrey, fifth count of Anjou, and husband of the Empress Matilda, from the circumstance of his wearing in his helmet a sprig of the *planta genista*, or common broom. From him it passed to his son Henry II., and was borne by the kings of England down to the accession of the House of Tudor.

Plantagin'aceæ, a natural order of doubtful affinity, consisting of about fifty species of herbs met with through temperate regions. They usually have radiacal leaves and axillary scapes; the flowers are small and generally spiked; sepals, corolla, lobes and stamens all four; the anthers are large, versatile, and

deciduous; the ovary is free; the style filiform; the fruit a one to four-celled generally membranous capsule. The properties are unimportant. *Plantago* is the principal genus, and is represented by some common and well-known plants. *P. major*, or greater plantain, an abundant British species by roadsides, &c., has broadly ovate leaves, and a very long fruit spike, which is often given to cage-birds, that they may pick the seeds. It has followed the European in his emigration to America, Australia, &c., and is the 'white man's foot' of Longfellow's *Hiawatha*. *P. lanceolata* or ribwort has lanceolate, strongly-ribbed leaves, and a dark-coloured short spike. It grows abundantly as a weed in Britain, at the same time is often mixed with grass seed for dry Pastures (q. v.). *P. maritima*, or sea-plantain, with narrow fleshy leaves, and a spike varying from long to short, is a noticeable plant of coast marshes, and is equally at home on inland mountains, reaching an altitude of 1800 feet in the Scotch Highlands. *P. Coronopus*, named buck's-horn plantain, from its furcated leaves, and *P. media*, called lamb's-tongue, from the shape of the leaf, are locally common species. The seeds of *P. decumbens* are used to form a demulcent drink in some countries, and from those of *P. Psyllium* a useful mucilage is obtained. The leaves of *P. major* and *P. lanceolata* were formerly employed for dressing sores and wounds (see *Romeo and Juliet*, Act i., Scene 2, &c.).

Plan'tain and Bana'na (q. v.) are the two most important food products of *Musacca*. They are obtained from closely related members of the genus *Musa*, and have been cultivated from remote times in sub-tropical Asia, Africa, and America, and the islands of the Atlantic and Pacific Oceans. The botanical name of the P. is *M. paradisiaca*, and it differs from the B. or sweet P. (*M. sapientum*) by having longer and more irregular shaped fruits, by its stem not being spotted, and by the spathes being purple instead of green inside. They probably originate in one species. In the first the fruit is often prepared by some cooking process; in the latter it is used chiefly in its raw state. The stem-like structure of these plants is not a true stem, but a vigorous shoot that springs from the rootstock, and after fruiting dies down, to be succeeded by a new sucker sent up from below, which in a few months fruits in its turn. Under favourable circumstances a hundredweight of the clustered fruit is the annual return of each plant. P.-meal is simply prepared by reducing the dried unripe pulp to powder; it is palatable, digestible, and nourishing. In some countries a favourite mode of preparation is to bake the fruit in its skin, or fry slices of it with butter. In the West Indies the negroes use it boiled and beaten in a mortar. When ripe the pulp contains nearly 20 per cent. of sugar and pectose. A decoction of the fruit is a common beverage, and the expressed juice yields a kind of wine by fermentation. The young shoots are eaten as a vegetable, the large leaf-blades serve as thatch, fibres from the stems are made into cordage, and different portions of the plant have medicinal uses. *Musæ* can be successfully grown for their fruit in stove-houses in Britain. Sir Joseph Paxton was the first to accomplish this nearly fifty years ago, at Chatsworth. He found *M. Cavendishii* much the best adapted for cultivation, being robust, dwarf, and yielding a profuse supply of fruit of an excellent flavour. It is a native of China, and has now been introduced with much advantage into the South Sea Islands. *M. simiarum*, found in the islands of the Eastern Archipelago, from Malacca to Sunda, produces in its cultivated varieties a very delicate fruit, which sometimes attains a length of 2 feet. *M. troglodytarum*, a native of India, &c., has small reddish or orange-coloured edible fruits. *M. ensle* or Bruce's P., was discovered by that traveller in Abyssinia. It is chiefly remarkable for its immense leaves, which sometimes attain a length of 20 feet, with a breadth of 1 yard. This species produces no suckers, and requires several years to come into flower and seed; the fruit is pulpy, but the inner part of the stem and the young spikes are used boiled as an esculent. *M. textilis* furnishes what is known as Manila hemp, for which see ABACA. The plantains of the English flora have no relationship whatever to the above. See PLANTAGINACEÆ and ALISMACEÆ.

Plan'tain-Eater, the name given to various species of *Insectorial* birds belonging to the section *Conirostres*, and family *Musophagida*. The violet P. E. (*Musophaga violacea*) of Africa is a well-known species inhabiting Senegal and the Gold Coast. The beak is large, and expanded in the region of the forehead

to form a shield-like horny mass. The head is crimson above, and the body plumage a deep violet tinge with green lines. The tail is rounded. Belonging to the genus *Schizorhis* is the *S. gigantea* or blue P. E., whose plumage is dark blue above, and greenish below. There is a prominent black crest on the head. The food of the P.-E. consists chiefly of fruits. The bird is closely related to the *Touraco*, and also in a minor degree to the Hornbill.

Planta'tion and Planting of Trees. See ARBORICULTURE.

Planta'tions, Law Regarding. A tenant of land under a lease is not entitled to cut down trees. In England and Ireland, however, he has an implied right of *Estover* (q. v.). Injuring plantations is punishable by statute, and repetition of the offence may be held felony. Various acts of the Scotch Parliaments were passed for the encouragement of planting and inclosing, and for the punishment of those destroying or injuring trees. By common law, injuries done to trees or inclosures are also punishable as malicious mischief.

Plant'-Cutter (*Phytotoma*), a genus of *Insectorial* birds, allied to the *Plantain-Eaters* (q. v.) and found in S. America. The Chilean P. (*P. vara*) is a familiar species. It attains the size of a thrush, and derives its name from its habit of cutting the stalks of cereals with its sharp bill. The colour is grey tinted with bronze above; the breast and belly are a slaty-blue. The quills of the wing and tail are black.

Plantigra'da, a section of *Carnivorous* animals, including the bears, and distinguished from the *Digitigra* (q. v.) *Carnivora*, by their placing the whole sole of the foot to the ground in walking, while the latter walk on the tips of the toes. The P. are not as a whole so markedly carnivorous as the *Digitigra*. They subsist largely on fruits, roots, and honey.

Plan'tin, Christophe, famous among the earlier race of printers, was born near Tours, in 1514. He began the business of printing at Antwerp in 1555, and subsequently founded successful establishments in Leyden and Paris. The Antwerp house had often more than twenty presses, and was called by Guicciardini one of the wonders of Europe. P., though a man of high attainment, was inferior in scholarship to his contemporaries Aldus and Estienne. But he excelled them in enterprise and business capacity. His publications exceed in number those of either of his rivals, and are prized before theirs for accuracy and clearness of typography. The *Institution d'une Fille de Noble Maison, traduite de Langue Toscane en François* by Jean Beller (1555), is supposed to be his oldest publication; his most famous is the *Antwerp Polyglot* (see POLYGLOT) of Arias Montanus, towards the expenses of which Philip II. of Spain contributed six thousand ducats. Other valuable works are *Trésor des Langage bas-Alman dict. vulgairement Flamang, traduit en François et en Latin* (1573), and *Dialogues François et Flamangs* (1579). P. died at Antwerp, July 1, 1589, and his three printing establishments were subsequently conducted by three sons-in-law. The mark of P.'s works is a hand holding a pair of outstretched compasses; their motto is *Labore et Constantia*. See C. P., by F. van Hulst, in the *Révue de Liège* (1845). The quaint old mansion in the Marché du Vendredi, Antwerp, that was P.'s home and printing-office from about 1580, with its famous collection of 2000 MSS., 10,000 wood engravings, and other typographic antiquities, and library of 10,000 vols., was purchased by the city for 1,200,000 francs in 1875.

Planu'des, Maximus, a monk of Constantinople, of whom we only know that in 1327 he was sent as ambassador to Venice by the Emperor Andronicus II. He wrote homilies, orations, and a *Life of Esop*, translated into Greek the *Metamorphoses* of Ovid, Cicero's *Somnium Scipionis*, &c.; but it is as the latest editor of the Greek Anthology that he is best remembered.

Plan'ula, the name given in zoology to the general form of the embryo in *Celenterate* animals, and especially in the class *Hydrozoa* (q. v.). The P. is a minute speck of protoplasmic matter, of oval shape, and having numerous *cilia*.

Plasen'cia, a town of Spain, province of Caceres, romantically situated on a steep hill overlooking the Iserte, and at the entrance of a beautiful fertile valley, 43 miles N.N.E. of Caceres. Founded in 1190, it was at one time a place of importance. It is girt by an old wall, and has a fine Gothic cathedral, begun in 1498, a ruined castle, an episcopal palace, several interesting

Gothic churches and secular buildings, and is supplied with water by means of an aqueduct of 80 arches. There are slight industries in textiles and hats. The Iserte is here crossed by three bridges. Pop. 6844.

Plasma (Gr. *plasma*, 'an image,' or by corruption from *prason*, 'a leek'), a variety of chalcedony, having a grass or leek green colour, streaked with whitish or yellowish specks. P. is slightly translucent, and possesses a kind of waxy lustre. It was a favourite stone with ancient engravers, many of their intaglios being cut in P. Specimens of the mineral are obtained from India and China, but it is not now much regarded.

Plassey (*Palasi*, from *palas*, the red flower of the *Butea frondosa*), a village in the district of Nuddea, Bengal, British India, near the junction of the Bhagirutti and Jellinghi rivers, 96 miles N. of Calcutta. It is celebrated for the victory which Colonel (Lord) Clive, at the head of 3000 men, of whom only 800 were Europeans, gained over the army of the Nawab, Suraj-ud-Dowlah, 23d June 1757. This battle decided the fate of Bengal, and started the British on their career of conquest. The battlefield has now been entirely eaten away by changes in the river courses, and but a single tree survives of the historical mango grove beneath the shade of which Clive spent a sleepless night, and resolved, against the opinion of his council of war, to fight on the following morning.

Plastering is the covering of internal walls, ceilings, &c., in dwellings and other buildings, with plaster, for strength and elegance. The varieties of plaster used in England are mixtures of lime and sand with tanyard hair, constituting 'coarse stuff;' pure 'run' lime, with or without fine hair, called 'fine stuff;' a mixture of putty and plaster of Paris, termed 'gauge stuff,' and several kinds of 'stucco.' Well-finished work is executed with three coats; laths so covered are technically said to be 'pricked up, floated, and set,' while bricks are said to be 'rendered, floated, and set.' The setting coat on walls to be papered consists of 'fine stuff,' but for ceilings and walls to be painted, stucco, gauged thin, is used. Cornices are formed by means of moulds run along the floating coat, and again over the upper coat of gauge stuff. Enrichments or decorations are moulded in plaster of Paris. In France plaster of Paris is almost exclusively employed in P.; and of late years in England the use of selenitic mortar containing a proportion of sulphate of lime has been extending. See MORTARS.

Plaster of Paris is a soft white powder, prepared from gypsum (hydrated sulphate of lime) by reducing it to the anhydrous state by calcination at a temperature not exceeding 127° C. If this temperature be exceeded the gypsum fuses, and the powder obtained from it does not, when made into a paste with water, readily 'set' or harden, the property on which the great utility of P. of P. depends. P. of P. is extensively used in making enrichments for internal decoration, in taking casts of statues and metal-work generally, and in forming moulds for the use of the potter. It also forms the basis of many cements (see MORTARS), stuccos, and imitation coloured marbles, &c. (see SCAGLIOLA). Gypsum is abundantly distributed; but the 'plaster stone' which yields in all respects the finest P. of P. is found in the Paris basin.

Preservation of P. of P. Casts.—Recently a premium offered by the Prussian Government for the most effective method of preparing plaster casts that admit of being readily washed and cleansed was gained by Dr. Reissig of Darmstadt. He accomplishes this by converting the sulphate of lime of the cast into (1) sulphate of baryta and caustic lime, or carbonate of lime, or (2) into silicate of lime by employing suitable solutions, in which the cast is suspended. A solution of hydrated oxide of barium, containing a small quantity of slaked lime, is used in the first case, and one of silicate of potash, containing free potash, in the second. By either process the cast is uninjured in sharpness, while it is rendered perfectly insoluble in hot or cold water. It however still remains porous, and collects particles of dust, which are greedily absorbed when the cast is placed in water. To obviate this evil, the transformed cast is coated with an alcoholic solution of soap, which penetrates and fills the pores; dust may then be easily removed by means of lukewarm water and a sponge. Dr. Reissig recommends the baryta water process as being the simplest and cheapest method.

Plasters. See EMPLASTRA.

Plastron, a term applied to the under part of the body or shell of tortoises or turtles, formed of a flat bony plate. The P. was formerly regarded as corresponding to the *sternum*, or breast-bone, but is now known to represent certain skin or dermal ossifications. It consists of nine pieces.

Plata, Rio de la, the name given to the estuary of the two great S. American rivers Paraná (q. v.) and Uruguay (q. v.). It is 210 miles long, 24 miles broad where it first assumes the name, and 105 miles broad at its mouth. It is shallow, the depth varying from 16 feet opposite Buenos Ayres to 60 feet at its mouth. The navigation of the estuary is rendered dangerous by strong currents and sudden tempests, while thunderstorms are also very frequent. Nevertheless, commercially, the La Plata is of great and increasing importance. Regarding its discovery, &c., see ARGENTINE REPUBLIC.

Plataea, anciently a small town of Boeotia, 6½ miles S. of Thebes, at the foot of Mount Cithæron, and commanding the pass across that range into Attica. In 519 B.C. it formed an alliance with Athens, to which it remained faithful during the whole of its subsequent history. P. sent 1000 men to Marathon, and was also represented at Artemisium. It was the scene of the victory of Pausanias over the Persians, B.C. 479, and of a famous siege in the Peloponnesian War, B.C. 429-427. It remained in ruins until 387, when the Peace of Antalcidas allowed the younger inhabitants to return from exile and rebuild their paternal homes. But they were once more expelled by the Thebans, and did not permanently return till the victory of Philip at Chæroneia in 338 put an end to all other despotism than his own. P. is mentioned as late as the 6th c., and some considerable ruins are still visible near the village of Kokla.

Platalea. See SPOONBILL.

Platanista, a genus of *Cetacea* belonging to the Dolphin family, inhabiting the estuary of the Ganges. It has a very long slender muzzle, and about 120 teeth. The beak is somewhat expanded in the middle. It is of a greyish-black colour above and white below. The eyes are very small. There is no dorsal fin. The P. is familiarly known as the 'Soosoo,' and as the 'Gangetic Dolphin.'

Plat' Band (Ital. *fascia*), in architecture, a square moulding, whose projection is less than its breadth. The term is sometimes improperly used to denote the fillets between the flutes of a column. The lintel of a door or window is also occasionally called by this name.

Plate Marks, or Hall Marks, are certain stamped characters legally impressed on gold and silver plate and other articles made of these metals. The most important P. M. is the assay mark, which indicates the nature and value of the metal, as tested at the various assay offices or goldsmiths' halls established throughout the United Kingdom. The hall marks for gold are a crown and figures, which indicate the proportion of gold and alloy in the article. Stamped pure gold is arbitrarily represented by 24 carats or portions, and the stamped characters '18,' '15,' '12,' '9,' and '8' in the hall mark indicate these various proportions of pure gold in the composition, the remainder of the 24 parts being composed of baser metal. By an Act passed in 1854 gold as low as 8 carat, *i. e.*, 8 parts gold and 16 of other metal may be stamped; but a subsequent Act passed in 1855 excepted wedding rings, which cannot be stamped unless they reach the standard of 18 carat. Hall-marked silver plate must be standard—11 oz. 2 dwts. pure silver and 18 dwts. of copper. The marks consist of (1) the maker's mark or initials; (2) head of the reigning sovereign (the duty mark); (3) the lion passant (standard mark); (4) the mark of the local assay office; (5) the date letter. Twenty letters of the alphabet are used as date letters, which are changed every year, and the series of many cycles are easily recognised by the nature of the characters, which remain uniform for twenty years. Thus, with 1796 (London assay), begins A, 1816 a, 1836 H, 1856 a, and so on. An alphabetical series of P. M. can be traced as far back as 1438-39.

Plate Powder. For cleaning silver plate nothing is better than finely levigated or precipitated chalk. Jewellers' rouge, which consists of a fine oxide of iron, may also be advantageously used, but it is more commonly reserved for goldsmiths' work.

Mercurial P. P., which consists of mercury intimately mixed with about 12 parts of fine lime, although much used, is very hurtful, as it rapidly erodes silver surfaces to which it is applied.

Platen-Hallermund, more commonly **Platen-Hallermünde**, **August Graf von**, a German poet, born at Ansbach, 24th October 1796, studied philology at Würzburg and Erlangen, and first appeared as an author in his *Ghaslen* (Erlang. 1821). This was followed by *Lyrische Blätter* (Leips. 1821), and *Vermischte Schriften* (Erlang. 1822). The fruits of a visit to Italy are seen in his *Sonette aus Venedig* (Erlang. 1825). Later works as *Das gläserne Pantoffel*, *Das verhängnisvolle Gabel* (1826), *Der Romantische Oedipus* (1829), *Schauspiele* (Stuttg. and Tüb. 1828), *Die Liga von Cambrai* (Frankf. 1833), and *Geschichte des Königreichs Neapel von 1414-43* (Frankf. 1833). His last work was *Die Abbasiden* (Stuttg. 1835), a large poem in nine cantos. P. died of fever at Syracuse, 5th December 1835. His *Gesammelte Werke* were published at Stuttgart in 1838 (later editions 1847 and 1853). A complete edition of his *Gedichte* appeared at the same place in 1848 (new ed. 1852). P. was a true and earnest if not a great poet; somewhat didactic and formal, but pure in spirit and of high intent. See Minckwitz, *Graf P. als Mensch und Dichter* (Leips. 1838), and *Briefwechsel zwischen P. und Minckwitz* (Leips. 1836). P.'s *Tagebuch* was edited by Pfeufer (Stuttg. 1860).

Plating is the art of coating or covering one metal or alloy with another. It is usually practised for the purpose of forming a superficial deposit of the precious metals gold and silver on a basis of inferior metal, but since the introduction of electroplating (see ELECTRO-METALLURGY) many other metals and alloys, possessing advantages of beauty, durability, &c., over those which they cover, are used for P. The only distinction which can now be drawn between metal gilding and silvering on the one part and P. on the other is found in the thickness of the deposit, which is, or ought to be, a feature in the latter process, although much of the plated ware now manufactured has a coating of only the flimsiest nature. In a restricted sense, the term P. specially applies to the coating of German silver or Britannia metal with silver in the manufacture of 'plate' for table use, forks, spoons, and other similar purposes, and to a like coating of 'gilding metal' with gold for making cheap locketts and other inferior jewellery. The original process of preparing plated silver, known as Sheffield plate, is still to some extent practised, and consists in soldering to one or both sides of a thick ingot of German silver, brass, copper, or other metal, a thin plate of pure silver. The soldering is done in a muffle furnace, and the surfaces must be united in the most perfect manner, while at the same time great care must be exercised to prevent the two metals from mixing and so forming an alloy. The combined ingot of inferior metal and silver is subsequently rolled out to any required tenuity, and the original relative thickness of the two metals continues the same throughout. Thus, if in the ingot the German silver was twelve times thicker than the silver, the rolled sheet will have a perfect and uniform P. of silver one-twelfth the thickness of the metal it covers. Gold P. in jewellery work is accomplished by analogous processes.

Platinum (Pt = 198) is a hard, tough, white metal, almost always found associated in its ores with the metals, palladium, iridium, rhodium, osmium, ruthenium. These metals, indeed, are never found except with P., and form a well-marked group which is distinguished as the P. group. The great infusibility of P. and its power of resisting almost all acids render it very valuable in analysis as furnishing the chemist with crucibles in which various bodies may be heated. Though hard, it is very tough, and can be drawn into excessively fine wire, or rolled into extremely thin foil. It is a comparatively rare metal. To extract the metal, the ore is treated successively with nitric and hydrochloric acids to dissolve out the commoner metals such as silver, copper, lead, &c. The residue is then subjected to the action of aqua regia, a mixture of nitric and hydrochloric acids, which is capable of dissolving the metal. The acid liquor is decanted and mixed with sal ammoniac, when a yellow precipitate of a double chloride of P. and ammonium results. This is washed and heated, and the metal, usually with an admixture of iridium, is left as a grey porous mass (*spongy P.*). This is then pressed and forged at a high temperature into bars and plates. At no temperature does the metal unite directly with oxygen;

but in the presence of caustic earths or alkalis it oxidises slowly. At a red heat it absorbs hydrogen, forming probably with that gaseous metal a true alloy. It also readily alloys with lead, tin, bismuth, and the more fusible metals, when these are fused in contact with it. P. forms two oxides (PtO and PtO₂), which, though both bases, are of little interest. There are two chlorides. Platinic chloride (PtCl₄) is an orange-coloured deliquescent substance, formed by evaporating to dryness the solution obtained by dissolving P. in aqua regia. Heated to 240° C., it decomposes into chlorine and the olive-coloured insoluble platinous chloride (PtCl₂). At a higher temperature the whole of the chlorine is driven off. The platinic chloride forms double salts with the chlorides of potassium, sodium, and ammonium. The cyanide of P. (Pt(CN)₂) is a greenish-yellow powder, insoluble in water and acids, and forming with the various metallic cyanides beautifully crystallisable double salts.

Plato, the greatest of the Greek philosophers, was born at Aegina, B.C. 429. His father was Ariston, a member of an old and honourable family. We have few details on which we can rely regarding his life, for the anecdotes told of him by Athenæus and other gossips of antiquity do not merit a moment's attention. He was well educated, and at a very early age wrote poetry. Philosophy, however, soon absorbed him wholly, and when twenty years old he joined himself to Socrates, whose doctrines and personal character exercised a profound influence on him. After his master's death in B.C. 399, P. left Athens and travelled to Megara, Cyrene, Egypt, Magna Græcia, and Sicily. In Megara and Magna Græcia he studied the Eleatic and Pythagorean systems, and thus became thoroughly acquainted with all the results to which Hellenic Philosophy (q. v.) had then attained. When forty years of age he returned to Athens. He visited Sicily twice afterwards, but with this exception he remained at Athens for the rest of his life, teaching in the Academy, which was situated in a delightful garden near the city. Aristotle was among his pupils. He died B.C. 347, at the age of eighty-one.

P. has left a large number of writings behind him, almost all in the form of dialogues. In nearly the whole of them Socrates is the principal speaker, but the opinions put into his mouth are not, except in the earlier dialogues, at all those of the historical Socrates. The opinions intended to be conveyed are not given to any one of the characters, but rather distributed among the whole of them; even those who seemingly oppose the main current of the dialogue have their share in the development of the subject under discussion.

P.'s philosophy has, moreover, the character of an historical development, and it is only when looked at in this light that the whole appears concordant with itself. The dialogues fall readily into three groups, answering to the three periods in the life of their author. In the first group, the subjects are treated quite after the manner of the historical Socrates. We have discussions on the various virtues; thus the *Charmides* treats of Temperance or Moderation, the *Lysis* of Friendship, the *Laches* of Courage, the *Euthyphro* of Piety, and the *Protagoras* (which last may be taken as the highest example of its class) of the unity of the virtues and their identity with knowledge. In these dialogues, the faults of various definitions and the defects in the popular views of the subjects treated are pointed out; but there is no systematic body of doctrine. These writings are merely introductory: their purpose is to clear the ground.

In the second group, the positive side of the Platonic Philosophy appears. We have in the four dialogues—the *Theætetus*, the *Sophist*, the *Statesman*, and the *Parmenides*—the exposition of the ideal theory. This, which is the central point of P.'s system, may be thus stated:—Socrates, looking at the subject from an ethical standpoint, had proposed by an induction of particular instances and by definitions to attain to general notions of Justice, Temperance, Truth, &c., and P. extended his inquiry. He sought for the general notions which were contained in all existence, and these he affirmed were not mere notions of the mind, but real, indeed the only real objective existences on which all else depended. Thus there existed ideas of virtue, beauty, wisdom, and what was virtuous, beautiful, or wise in the world was only so in so far as it was a manifestation of the idea. Everything that was known to us, however mean or small, depended for its existence on ideas; and were these removed, the world would become absolute blank negation. The world, as we know

it, then, is these underlying principles in conjunction with the 'things of sense,' but what these 'things of sense' are, or the exact relation between the two parts, is not clearly expressed. The non-ideal element is perhaps something requisite for the manifestation of the ideal, or it is the negation of that element, something opposed and hostile to it. These ideas do not exist apart from and independent of each other, rather they are connected in a graduated hierarchy, at the head of which is the idea of the 'Good,' and this with P. is the same as God.

Connected with this 'ideal theory' is P.'s notion of dialectic. This is the subjective process of the mind by which we attain to true knowledge, and as true knowledge must be of the ideas (for these are the only really true existences) dialectic in an objective sense is the Science of the Ideas.

The third group of dialogues contain the application of the ideal theory to Physics, Ethics, Education, and Politics, in fact, to all the different spheres of human life. The application of the ideal theory to the creation of the world is contained in the *Timæus*, which is mythical in form. Here is described how Demiurgus (the world-forming spirit) first formed the world-soul from the eternal ideal world and the nameless chaotic mass. Into this soul, made in perfection after the image of the idea, and serving as framework, the universe was built. As the universal soul so is the individual. It partakes of the nature of the ideal world, but it is joined to a body weighed down with sensuous passions and desires. Hence the mingling of good and bad in human life. In this present life the soul has lost much of its original brightness, but it still retains a dim memory of that ideal world from which it came—hence its notions of justice, goodness, and truth. (This is the doctrine of *Reminiscence* developed in the *Phædo*.) Born of these memories, there exists in the best souls a longing after that higher state, and this is increased by the sight of beautiful and good objects. With these it desires to remain, for they vividly remind it of the ideas of beauty and goodness. (This is the famous theory of Platonic Love (q. v.) developed in the *Phædrus* and *Banquet*.) Midway between the two parts of man's nature—the sensual and the physical—is the heart (*hymos*), in itself noble, but apt to be led away and act ignobly. Hence the aim of the soul must be to rise above the sensuous to that ideal world to which it belongs. Philosophy is the path to this, and the truest philosopher is he who does it most completely; and so P.'s system becomes finally a religion and a life. The only virtue of the sensuous part is obedience—a purely negative one—but the virtue of the heart is courage; it must fight for and defend the truth, which it is the function of reason (*nous*), the highest part of the soul, whose virtue is wisdom, to discover. When all three divisions act in right measure, there arises from their union justice, the complete virtue of the whole soul. Such is the perfect man, of which the perfect state will be merely an enlarged copy. P.'s notions of both are set forth in the *Republic* and the *Laws*. The ideal state will consist of three classes, the workers, the warriors, and the rulers, to whom respectively belong the virtues of temperance, courage, and wisdom. The first class satisfy the animal wants of the community and are of little account; the second defend the State from attack; the third guide it and realise the idea of the good in their thoughts and actions. Justice is the virtue of the whole State. But how are men fitted to be responsible members of such a community? P.'s answer is his theory of Education. The youth must first be trained in music and gymnastic, *i. e.*, his mind and body must be properly developed in accordance with the ordinary Greek view. He must then study mathematics, which stand midway between the things of sense and the ideas; and finally he proceeds to dialectic, philosophy properly so called,—the Science of the Idea. The young man must be surrounded all the time only by what is severely beautiful. All poets must be banished, for they tell lies and represent the gods as committing unworthy actions. The highest good of the State is the same as that of the individual, *viz.*, the knowledge of the idea of the good and its realisation in life, and this (such is the final form of P.'s philosophy) requires for its accomplishment the absolute extinction of all merely human emotion and sentiment.

So much for P. as an abstract thinker. As a literary artist his merits are not less remarkable. He was not only the Hegel, but the Shakespeare of the ancient world. His writings are perfect in point of style. They exhibit great power and distinctness in the delineation of character, infinite wealth of

thought and splendour of imagery, rising frequently into magnificent eloquence. Throughout there is exhibited the profoundest acquaintance with human life in all its phases. The dialogues are all impersonal; only twice, and then in the most casual manner, has P. mentioned himself. An under-current of humour, which sometimes almost broadens into farce, runs through each dialogue.

The whole succeeding history of human thought bears witness to the vast influence which P. exercised. His writings embrace all preceding philosophy (and that touched to far finer and profounder issues than its founders could have imagined), and all succeeding philosophy was founded on them. Aristotle, though his relation was very much that of an antagonist, borrowed many of his conceptions from him. The Neo-Platonists (q. v.) developed certain of his doctrines, and used them in the last intellectual struggle of the heathen world with Christianity. Elements of his teaching are to be found in Stoicism, in the Mystics of the Middle Ages, and in the Hegelian Philosophy. The mere mention of the Cambridge Platonists, of whom Cudworth (q. v.) may be taken as a type, shows that his influence was felt in our country; and in the *Republic* is to be found the original of Cicero's *De Republica*, of St. Augustine's *City of God*, and of Sir T. More's *Utopia*. His influence can never cease to be felt. He belongs to the future as much as to the past, for like the philosopher of his own conception, 'he was the spectator of all time and of all existence.'

See the complete editions of P. by Baiter, Arelli, and Winckelmann (1842; smaller ed. 1852); Stallbaum (1867; with Lat. notes, 21 parts, 1836-39), and C. F. Hermann (6 vols. 1871); the Ger. trans. by Müller and Steinhart (8 vols. 1853-66); Fr. trans. V. Cousin (13 vols. Par. 1825-40); and Eng. trans. Jowett (2d ed. 5 vols. 1876); Grote, *P. and the other Companions of Socrates* (3 vols. 1865); Steinhart, *P.'s Leben* (1873); Zeller, *P. and the Older Academy* (Eng. trans. 1876). For a popular account, consult Whewell's *Platonic Dialogues for English Readers* (3 vols. Camb. 1859-60-66), and the volume by Collins in Blackwood's *Ancient Classics for English Readers* (1870-78).

Plat'off, Matvei Ivanovitch, Count, was born on the banks of the Don, August 6, 1757. He began his military career in the Turkish campaign of 1770, served under Suvorof in 1782 and 1783 in Kuban and the Crimea, and distinguished himself at the taking of Otchakof in 1788, at Bender in 1789, and at Ismael in 1790. In 1801 he was appointed Hetman of the Cossacks by the Czar Alexander I. P. served against the French 1805-7, and in the Turkish campaign of 1809. But he distinguished himself chiefly in the war of 1812 in the retreat of the French from Moscow. With his twenty regiments of Cossack cavalry he followed their retreat closely and without intermission, and caused, in the opinion of the French, no less loss than did the famine and the cold. He inflicted great loss at Wjäsna, Dorogobusch, near the village of Erzowo, at Swenichi, Borisso, Poguljanka, and Kowno, but was driven back at Malo-Jaroslawetz and Krasnoe, losing his only son, to whom he had hoped to bequeath his power, at Vereia. In 1813 he went through the campaign in Germany, and defeated Lefebore at Altenburg. In 1814 with the allies he entered France, where the fire and pillage of his irregular hordes were long remembered by the inhabitants of the country between the rivers Seine and Marne. In Paris P. found a reception which said little for the patriotism of the French, and on his visiting London with Blücher he was welcomed and presented with a sword of honour. On his return to Russia he was loaded with honours—he had been created a count in 1812. P. died at Tcherkask, 15th January 1818, and was buried in Novo Tcherkask, where the Emperor Nicholas erected a monument to him in 1853. His life has been written by Smirnoi (3 vols. Mosc. 1821).

Platonic Love. The philosophy of Plato was not an attempt to explain to the intellect the mysteries of the universe, but to reach the true method of the higher life. Owing to this practical aim love occupies a prominent place in the writings of the Greek philosopher. But it is especially in the *Phædrus* and the *Symposium* that his theory of love is fully developed. In the latter dialogue the various interlocutors pronounced discourses of love. In one of these, that delivered by the comic poet Aristophanes, the theory is propounded that the male and female formed originally one being; that in process of time this human being was cut into two, and love in man now is the search

after the lost half. That man is happiest who is successful in obtaining the exact counterpart of his own mind, and he comes next who obtains a love as congenial as possible. It is, however, in the discourse of Socrates in this dialogue that Plato's own idea of love appears. Socrates affirms that he received his instructions in love from a foreign woman, Diotima. Love itself is the child of Plenty and Poverty. It is ever striving after something, and is always in want. But what it seeks is the beautiful and the good, and it proceeds from one degree of blessedness to another. This love appears in all mankind, and pervades all the phases of human activity, though it is generally called love only when it takes the special form of affection for individuals. But even in this form it is a striving after the beautiful and the good. Love longs to propagate; it hankers after immortality. And so the person seeks the beautiful, in which, as it were, to continue his existence. But love is not content with the merely beautiful in outward appearance. It seeks the truly beautiful which is identical with goodness, and the two lovers unite to propagate in each other beautiful ideas and beautiful action. Then the true lover passes from the individual. He at first sees beauty in a single person, and loves it there. He sees beautiful ideas in a single person, and loves them there. But he moves onwards to the contemplation and love of the ideas themselves, until at length he reaches the perfectly beatific state in which the immortal surpassingly lovely idea of Beauty is revealed to him in its absolute existence, and forms for ever the joy of an eternal life.

Platoon' (Fr. *peloton*, 'a ball of thread'), formerly a small square of musketeers, sixteen going to each battalion. The word is now applied to a number of recruits assembled for instruction. 'P. exercise' consists of the operations required for the loading and firing of the rifle, as distinct from manual exercise, the carrying of the rifle in different positions.

Plattdeutsch, or **Low German**, the provincial dialect of the N. German plain extending from Holland to the Russo-Polish frontier, and from Tondern in the N. as far S. as Aachen, Kassel, Wittenberg, and Thorn (see GERMAN LANGUAGE). A descendant of the Old Saxon of the *Heliand*, P. is still to some extent a literary dialect, possessing several versions of the Scriptures, and boasting at least two well-known names—Fritz Reuter and Klaus Groth. The former of these writers was born at Stavenhagen in Mecklenburg-Schwerin, November 7, 1810, was for five years imprisoned in a fortress as a demagogue (1833-38), and died at Eisenach, July 12, 1874. In his *Läuschen und Rimels* (Treptow, 1853) and prose *Ollen Kamellen* (7 vols. Wismar, 1860-68) he has sketched the German peasant life with a truth and vigour that have gained these works a boundless popularity among the peasants themselves; and 'rhapsodists,' says a German writer, 'wandered in the poet's lifetime from village to village reciting and interpreting his merry, touching tales.' Reuter's *Sämmtliche Werke* have been published at Wismar (14 vols. 1865-75), and his *Ut de Franzosentid* has been translated into English under the title *In the Year '13*. Klaus Groth, born at Heide in Dithmarschen, April 24, 1829, and since 1859 a professor at Kiel, has written *Quickborn* (1853), *Vertelln* (4 vols. 1855-59), *Rothge der Meister Lamp* (1862), and other poems, all in the same vein as Reuter's *Läuschen*, and hardly less popular than they. In 1877 Dr. Door translated into P. the *Merry Wives of Windsor* (Ebbing), with an introduction by Groth. Nerger's *Grammatik des Mecklenburgischen Dialects* (Leips. 1869) and Lübben and Schiller's *Mittelniederdeutsches Wörterbuch* (Bremen, 1873) are the best authorities on P., and the 'Verein für niederdeutsche Sprachforschung,' founded in 1875, publishes a yearly account of its transactions. See Max Müller's 'Language and Poetry of Schleswig-Holstein' in vol. iii. of *Chips from a German Workshop* (Lond. 1870).

Platte, one of the largest tributaries of the Missouri, is formed in Nebraska, U.S., by the union of two streams called the N. and S. Forks, both rising in Colorado. The united stream, after an easterly course of 900 miles, enters the Missouri at Plattsmouth. In the upper part of its course it is of great use as a source of water-power, but towards its mouth it becomes very broad, and so shallow as to render navigation impossible. Its chief tributary is the Elkhorn. Drainage area, 7500 sq. miles.

Platt'en-See. See BALATON.

Plattsburg, a town of New York, U.S., is situated on both banks of the Saranac river, where it enters Lake Champlain, and is connected by rail with Montreal and Whitehall. It has a commodious harbour, extensive barracks, three hotels, six churches, and three newspapers. Here the British squadron on Lake Champlain was defeated by Commodore M'Donough, 11th September 1814. Pop. (1870) 5139.

Platycrinus, a genus of fossil *Crinoids* or lily-stars. *P. tricontadactylus* of the Carboniferous series is a familiar species. The stalk or column was of oval or elliptical shape, and had its articulating surfaces or facets marked by striæ or lines radiating from the centre of the joint. P. is one of the Palæocrinoids or older group, attaining its highest developments in Palæozoic rocks.

Platyel'mia, a group of *Scolecida* (q. v.), comprising those forms which have bodies of flattened shape. The tapeworms (*Taniada*), flukes (*Trematoda*), and *Turbellarea* are included in this division.

Platypus. See ORNITHORHYNCUS.

Platyrrhina (Gr. 'broad-nosed'), a genus of *Quadrumanæ* or Monkeys, confined to the New World. In this division the Marmonets (*Hapale*), Spider monkeys (*Ateles*), Howlers (*Mycetes*), the Capuchins (*Cebus*), &c., are included. The P. have no callosities or cheek pouches. The tail is long and is usually prehensile. The thumbs are wanting in *Cebus*. The nostrils are placed far apart and separated by a broad septum—hence the name 'P.' The premolar teeth number 6 in each jaw. These monkeys live on trees.

Platystoma (Gr. 'broad-mouthed'), a genus of Teleostean fishes included in the family of the *Silurida* or Sheat fishes. The name is derived from the broad form of the mouth, which has barbules or tactile filaments. There are two dorsal fins, and the skin is naked. The P. is represented by various species occurring in the rivers of S. America, and especially in those of the S.E. part of the Continent. *P. tigrinum* is a familiar species, noted for the delicacy of its flesh. The name P. is also given to a genus of *Gasteropodous mollusca*, the shells of which occur in rocks of Triassic age.

Plau'en, a town of Germany, in the Saxon Voigtland, lies in a beautiful valley on the White Elster, 28½ miles N.E. of Hof by rail. It is overlooked by the ancient Hradschin. The most prominent building is the Johanniskirche, with two spires. P. has a school of architecture, a seminary for teachers, and a *Realschule* of the first rank, with which is connected a gymnasium. It is the chief centre of the Saxon manufacture of white cottons (muslins, mulls, jaconets) and cambric. Tanning, dyeing, wigogne and cotton-spinning, and the manufacture of cere-cloth, nets, embroidery, paper, and machinery are also important industries. Pop. (1875) 28,756.

Plautus, **T. Maccius**, often erroneously called **Marcus Accius Plautus**, the most famous comic poet of Rome, was born at Sarsina in Umbria. The period of P. has been a matter of much controversy. The conclusions of Ritschl, as given in his admirable essay *De Etate Plauti*, viz., that P. was born about 254 B.C., commenced his career of comic poet about 224 B.C., and died 184 B.C., seem most worthy of acceptance. The little that is known regarding his life is derived from a passage in Varro quoted by A. Gellius (iii. 3), the substance of which may be briefly given: P. came to Rome at an early age; was first employed as a workman for the actors; saved a little money; embarked in business; lost his means; and to gain a living was obliged to work at a hand-mill grinding corn for a baker. To P.'s early residence in Rome must be ascribed his intimate acquaintance with the Latin tongue, his complete mastery of its idiom, and his familiarity with the dramatic literature of Greece. At all events, it seems certain that while engaged in the humble calling of corn-grinder he produced three plays—the *Saturio*, *Addicus*, and a third, the name of which is not known. P.'s career, commencing at 224 B.C., was continued till 184 B.C., during which time he produced comedy after comedy with unflagging energy and wonderful fertility. Of 130 plays ascribed to him only 20 remain. Of the 130, however, many were considered spurious by Roman critics; and it seems not improbable

that some of them were written by one Plantius, the likeness of whose name to the great comic poet's caused them to be attributed to the latter. Varro himself limits the genuine plays of P. to 21. Of these we possess 20, the titles of which are:—(1) *Amphitruo*; (2) *Asinaria*; (3) *Aulularia*; (4) *Captivi*; (5) *Corruti*; (6) *Casina*; (7) *Cistellaria*; (8) *Epidicus*; (9) *Bacchides*; (10) *Mostellaria*; (11) *Menachmi*; (12) *Miles gloriosus*; (13) *Mercator*; (14) *Pseudolus*; (15) *Panulus*; (16) *Persa*; (17) *Rudens*; (18) *Stichus*; (19) *Trinummus*; (20) *Truculentus*. The 21st, *Vidularia*, was extant in the time of Priscian; moreover the Milan Palimpsest contains several lines from the same play. As a writer P. occupies an important place in the literature of Rome. His fame, however, is not of the highest, although his popularity with his countrymen was immense. Lettered and unlettered alike rejoiced to do him honour, and for 500 years his plays held possession of the Roman stage. As a poet P. was intensely national. His plays are to a great extent reproductions of the witty, vigorous, and brilliant Attic comedy. But he has transfused into them a style, spirit, and character essentially Roman, and herein lies his charm. In modern times P. has found no lack of imitators and translators. The *editio princeps* of the complete works of P. was published at Venice in 1472. The best modern editions of the complete works are those by Fr. H. Bothe (Berl. 1809-11); C. W. Weise (1837-47; new ed. Tanchnitz, 1866); and that by A. Fleckeisen in the *Bibliotheca Teubneriana* (Leips. 1859). The commentaries on the special plays by Ritschl are, however, by far the most important contributions both as regards acuteness and learning yet made to the literature, history, and criticism of P.

Playfair, John, a Scottish natural philosopher, was born at Benzie in Forfarshire, March 10, 1748. When fourteen he entered the University of St. Andrews, where he displayed such talent in mathematics and the allied sciences, that within a few years after his matriculation he was intrusted with the duties of the chair of Natural Philosophy during the illness of the professor. In 1766 he was candidate for the Mathematical chair at Marischal College, Aberdeen. His non-success was probably due to his extreme youth. Having failed in his candidature in 1772 for the then vacant chair of Natural Philosophy in his own university, he was compelled in order to support his mother and her family to enter the Church. In 1782 he resigned his living and became tutor to the sons of Mr. Ferguson of Raith. Three years later he was appointed joint-professor with Dr. Andrew Ferguson of Mathematics in Edinburgh University, and on the death of Dr. Robison in 1805 succeeded to the chair of Natural Philosophy. He died at Edinburgh, July 19, 1819. His works are *Elements of Geometry* (1795), still the text-book in the Edinburgh University; *Illustrations of the Huttonian Theory of the Earth* (1820), in which he strongly supported this theory (see HUTTON); and *Outlines of Natural Philosophy* (1812 and 1816), of which a third volume was promised but never published. From 1804 he frequently contributed to the *Edinburgh Review*, criticising the trigonometrical surveys of England and France, and the works of Laplace, Zach, and Kater. In the *Transactions* of the Royal Society of Edinburgh appear numerous and varied papers by P. on more technical subjects, while to the *Encyclopædia Britannica* he contributed 'Æpinus,' 'Physical Astronomy,' and an incomplete 'Dissertation' on the progress of mathematical and physical science since the revival of letters in Europe. A collected edition of P.'s works in 4 vols., with a biographical sketch, was published in 1822. See an elaborate notice by Jeffrey in the *Annual Biography* for 1820.

Playfair, Lyon, son of Mr. George P., chief inspector-general of the hospitals of Bengal, was born at Meerut, May 21, 1819, and commenced his chemical studies at St. Andrews and the Andersonian University, Glasgow (1834). After revisiting India to recruit his health (1837), and studying organic chemistry under Liebig at Giessen (1838), he became head of some large calico printworks at Clitheroe, whence he was called to the chair of Chemistry in the Manchester Royal Institution (1843). He served on the commission to inquire into the sanitary condition of towns (1844); for his services as special commissioner of juries in the Great Exhibition of 1851 was made a Companion of the Bath, and received a joint-secretaryship with Mr. Cole in the newly-founded department of Science and Art (1853). He became inspector-general of Government museums and schools

of science (1856), President of the Chemical Society of London (1857), and Professor of Chemistry in the University of Edinburgh (1858), besides acting on the mines, Scotch fisheries, cattle plague, and other commissions. A Liberal in politics, he has represented since 1868 the Universities of Edinburgh and St. Andrews, held office as Postmaster-General in the Ministry of 1869-74, being also made a Privy Councillor, and was President of the Civil Service Inquiry Commission (1874). P. is an LL.D. of Edinburgh (1869), a member of many learned societies, and an officer of the Legion of Honour and four other foreign orders. Besides some translations of Liebig's works, he has published *Science in its Relation to Labour* (1853); *On Primary and Technical Education* (1870), and other treatises.

Playford, John, a writer and publisher of music, was born in 1613. His *Introduction to the Skill of Music* passed through ten editions from 1665 to 1684. He also published *Court Ayres* and *Psalms and Hymns in Solemn Music*. He died about 1693. His son, Henry P., published *Orpheus Britannicus*, the celebrated collection of Purcell's works.

Pleadings, in law. These are the statements in legal form of the facts which constitute the plaintiff's cause of action, or the defendant's ground of defence. The action, or suit, begins by the plaintiff delivering to the opposite party a *declaration*, or written statement, of the title of the court in which it is brought, the county, or *Venue* (q. v.) in which it is to be tried, and of the ground of action. Notice is then given to the defendant to put in his answer. In Scotch law, see CONDESCENDENCE.

Pleas, Legal, in the law of England, are of various kinds, consisting of any allegation by which the defendant endeavours to frustrate the suit—as by objecting to the jurisdiction of the court, denying the validity of the plaintiff's claim, or by pleading a tender of payment. A defendant may also plead the operation of the Statute of Limitations.—P. in Law, in Scotland, are defined as 'a short and concise note, drawn and signed by counsel, of the P.-in-law on which the action, or defence, is to be maintained.'

Plebeians (Lat. *plebei*, from *plebes* or *plebs*, 'the crowd,' containing the same root as *pleo*, *plenus*, and Gr. *πλήθος*, and perhaps *polis*), in ancient Rome, were the body of commons, one of the two great elements of the Roman nation. From the earliest period there existed, side by side with the Roman burgesses, their *clientes* or 'listeners,' so called from their dependence on the several burgess-households. According to the hypothesis of Niebuhr, before whose time the most inconsistent views were held respecting the origin of the P., the original *populus* of Rome consisted solely of the Patricians (q. v.) and their Clients, these Clients being entirely distinct from the Plebs, which was composed of the inhabitants of various Latin towns who were conquered by the Romans and transferred to Rome or its neighbourhood. Mommsen and Ihne, however, identify the Clients with the multitude (*plebes*), maintaining 'they were so termed negatively with reference to their want of civil rights.' In the prosperity of the regal period, the numbers of the P. increased with great rapidity, and as they included a large number of families which had been noble and powerful in the conquered cities, they felt all the more severely their political degradation, and gradually entered on their celebrated struggle with the Patricians, which, for the noble spirit of forbearance and deference to constituted authority displayed by the P., is altogether without parallel save in the history of England. See ROME, HISTORY OF.

Plebiscite (Lat. *plebiscitum*, 'decree of the people,' i. e., of the *Comitia Tributa*), in France, is now applied to certain resolutions submitted to the universal suffrage of the nation, as by Napoleon I. in 1799 and 1804, and by Napoleon III. in 1852 and 1870. In May of the last-named year, 7,258,379 votes were recorded in favour of the revised imperial constitution against 1,530,000; in the succeeding November the institution of a Republic was confirmed by 557,996 Ayes against 62,638 Noes.

Pleco'tus, a genus of *Cheiroptera* (q. v.) or Bats, including the *P. communis*, the common long-eared bat of Britain, and other species. In this genus, which belongs to the insectivorous family *Vespertilionida*, the ears are large, and are united at their basis. The teeth number 36. The length of the *P. communis* is 3 inches, its wing membrane when spread out to its fullest extent from 13 to 14 inches. The fur is a greyish-brown.

Plectognath'i, a well-known subdivision of Teleostean fishes, represented by the trunk fishes, tile fishes, globe fishes, &c. In this group the maxillary and premaxillary bones are firmly ossified and connected on each side of the head or jaw. The skeleton itself may be incompletely ossified, the spine being present in a cartilaginous condition. The exoskeleton exists in the form of ganoid scales or bony plates, and the ventral fins are wanting. The air-bladder is a closed sac.

Pledge is a movable subject put into the hands of a creditor by his debtor in security of a debt, or of an advance of money, which subject the creditor is bound to redeliver on receiving repayment. Should the subject perish without any fault imputable to the creditor, the loss falls on the debtor, as being the proprietor, and the creditor is entitled to the expense profitably disbursed on the subject while in his hands. In England, the pledgee may sell the P. if the debt is not paid at the date agreed on, or within reasonable time after giving notice. In Scotland, the P. cannot be sold without judicial authority.

Pleiades (Gr.), in Greek mythology, were the seven daughters of Atlas and Pleione. They were the sisters of the Hyades, whose death, or that of their father Atlas, so grieved them that they made away with their own lives, after which they were set as a cluster of stars on the neck of the Bull, which, from its resemblance to a bunch of grapes, was sometimes called *Botrys*. In another myth the P. are virgin companions of Artemis. Pursued, with their mother Pleione, by the hunter Orion, they pray to the gods for rescue, and are metamorphosed into doves (*Peleiades*), and placed among the stars. Their names were *Elektra*, *Maia*, *Taygete*, *Alkyone*, *Kelaino*, *Sterope*, and *Merope*. By the Romans the P. were called *Vergilia*. In the group of stars called the P., or 'Seven Stars,' the naked eye can discern only six. The telescope discovers many more. Kepler found 32, De Rheita 118. The brightest, Alkyone (η Tauri), is of the first magnitude. According to Mädler's hypothesis, the central sun of the universe is in this constellation.

The *Pleiad*, in literature, a collective term applied by Ptolemy Philadelphus to the seven contemporary poets—Callimachus, Apollonius of Rhodes, Aratus, Homer the younger, Lycophron, Nicander, and Theocritus. In imitation of this a 'Literary Pleiad' was formed under Karl the Great, in which Alcuin was called Flaccus Albinus; Adélar, Augustin; Angilbert, Homer; Riculf, Damoetas; and Karl himself, David. Warnefrid, and one other made up the seven. In French literature, however, the name P. is especially applied to a society of seven French *littérateurs*, who in the 16th c. set themselves to work for the reform of the French literature and language after classic models. Its members were Ronsard, Du Bellay, De Bais, Dorat, Belleau, Jodelle, and Pontus de Thyard.

Plesiosaurus, a genus of fossil Reptilia, the remains of which occur in the Upper Oolite formations. The neck was short, and the head relatively large. The jaws were well provided with teeth. The P. was nearly allied to the Plesiosaurus (q. v.).

Pleistocene (Gr. 'most recent'), or **Post-Tertiary Period**, includes all the more recent formations which contain fossils still represented among living species. The fragmentary character of many of these formations renders it difficult to fix them in chronological order. In the Norwich Crag of the Pliocene, which was no doubt the precursor of the P., there is incontrovertible evidence that the climate of the W. of Europe was becoming colder. There was thus a gradual preparation for the Glacial Age, which is regarded as the earliest P. period. The characteristic formations of the Glacial Age are—1. Occasional deposits of gravel and sand, with plant and mammalian remains underlying the Boulder Clay; 2. the Boulder Clay or Till, a mass of unstratified clay, with striated and ice-marked blocks and boulders stuck promiscuously through it; 3. the Marine Drifts, Kames, and Eskers, resembling the Till, but bearing evidence in its stratification and fossil contents of having been deposited under the sea, and thus indicating a submergence of the land during the rigours of the great ice age; 4. the Erratic Boulders, carried probably by floating ice, and resting on the kames and gravel ridges; 5. the Moraines of the valley glaciers, which gradually shrunk up from the lower valleys to their mountain fastnesses as the climate ameliorated; and 6. the Raised Beaches which occur at various heights all round our country, and

mark the geological epochs at which the land halted for a space during its emergence from the ocean. This classification is drawn up from a consideration of Britain alone; but everywhere in the now temperate regions of the northern hemisphere there is abundance of evidence that a widespread glacial climate existed. The glaciers of the Alps, Himalayas, Rocky Mountains, &c., are the remains of a much more extensive glacier system, which once filled the mountain valleys. Various explanations of this rigorous climate of bygone days have been advanced, such as alteration in the distribution of land and water, alteration in the earth's axis of rotation, passage of the solar system through a colder region of space, variation in the quantity of light and heat received from the sun, and so on. The only hypothesis, however, which has withstood a first criticism, is that advanced by Dr. James Croll. The prime cause he finds in the varying eccentricity of the earth's orbit; and this, combined with the precession of the equinoxes, may give such a succession of the seasons as to suggest a possibility of a long winter alternating with a short summer. The whole hypothesis is ingeniously elaborated in all its bearings; but the time demanded since the beginning of the Glacial Age, 240,000 years, namely, seems, upon physical grounds, to be much too long. (See EARTH.) The later formations of the P. P., known as the recent or prehistoric, introduce the human period. Four periods are recognised: (1.) the Palæolithic Age, or period of rough stone weapons; (2.) Neolithic Age, or period of polished stone weapons; (3.) Bronze Age; and (4.) Iron Age. Remains of Palæolithic man are found in cavern deposits and ancient river gravels; and by some geologists are supposed to indicate a preglacial existence. To the Neolithic Age belong the lake-dwellings of Switzerland, and the peat mosses and Kjøkkenmødding of Denmark. The succeeding bronze and iron ages transformed man gradually from a rude savage, living by the chase, into a barbarian herdsman or husbandman, until they merge into true historic times. See James Geikie's *Great Ice Age*, Lyell's *Antiquity of Man*, and Lubbock's *Prehistoric Times*.

Plen'ishing, in the law of Scotland, means the furniture of a house or the stocking of a farm.

Plenty, Bay of, a bight on the N.E. coast of the N. Island of New Zealand, so named by Cook on account of the abundance of food and water he there obtained. It is about 100 miles wide, and is studded with a number of small islands, one of which contains a hot lake, geysers, and mud springs. The shores of the B. of P. are for the most part thickly wooded, but the western portion is more open, and adapted to agriculture and sheep-farming. The principal settlement is Tauranga, near the W. extremity. It has a good harbour.

Pleonasm (Gr. *pleion* or *pleon*, 'more'), or **Redundancy** (an overflow; lit. 'wave on wave'; Lat. *re*, 'again,' and *unda*, 'a wave'), is a term in Rhetoric, denoting such additions of language as are not required to bring out the sense, and might therefore be spared; e.g., in the sentence, 'It is the *universal* opinion of *all* men,' the words italicised mean the same thing, and either is therefore sufficient.

Plesiosaurus, a well-known genus of fossil Reptilia, forming the type of the order *Sauropterygia* of Owen, otherwise known as the *Plesiosauria*. The characters of the order may be taken as those of the genus, and consist in the absence of any exoskeleton in the form of hard plates or scales, such as living reptiles usually have. The bodies of the vertebræ were simply flattened at either extremity, and their transverse processes were large. The anterior ribs had simple heads, and the *sternum* or breastbone appears to have been absent, no sternal ribs existing. There were structures known as 'false' or 'abdominal ribs,' probably imbedded among the muscles of the abdomen, and the sacrum consisted of two vertebræ. The neck was very long, forming one of the most characteristic points in the anatomy of the P., and presenting a marked contrast to the short-necked *Ichthyosauri* (q. v.). The limbs were well developed, and formed swimming-paddles. No supernumerary 'marginal vesicles' existed in P. as in *Ichthyosaurus*, and the shoulder-girdle included two clavicles, with an interclavicular element or episternum. The teeth were developed from distinct sockets. The eyes were large, a fact revealed by the size of the orbits; but the outer layer of the eye was not strengthened as in *Ichthyosaurus* by a circle of horny (*sclerotic*) plates. The fossil remains of P. occur

chiefly in the Liassic and Oolitic formations, their geological range extending to the Chalk. They died out in the latter formation. The length of these reptiles varied from 16 or 18 to 20 feet. Over twenty species are known, a familiar species being the *P. dolichodeirus*, from Liassic strata. Of the *P.*, Conybeare remarks, 'that it was aquatic is evident from the form of its paddles; that it was marine is almost equally so from the remains with which it is universally associated; that it may have occasionally visited the shore, the resemblance of its extremities to those of the turtles may lead us to conjecture; its movements, however, must have been very awkward on land, and its long neck must have impeded its progress through the water, presenting a striking contrast to the organisation which so admirably fits the Ichthyosaurus to cut through the waves. . . . It swam upon or near the surface, arching back its long neck like a swan, and occasionally darting it down at the fish which happened to float within its reach.'

Plethora (Gr. 'fulness or excess'), designates a morbid increase of the blood, beyond the wants of the system, of those constituents of the blood upon which its nutritive and stimulant properties depend, and to which it owes its peculiar character, such as the red corpuscles, fibrin, and albumen. There is no distinct proportion of the active principles of the blood which is alone compatible with health, and it is only when derangement is threatening, or obviously present, that the condition is called *P.* There may be no absolute increase of the blood; but if the wants of the system for the support of its various functions should diminish, there may be *P.*; for the loss of balance between the supply and consumption constitutes the affection. The symptoms of *P.* are florid cheeks, redness of the lips, tongue, conjunctiva, and mucous surfaces generally. The pulse is full, strong, and somewhat accelerated, and there is a feeling of heaviness and a disposition to sleep, with a sense of fulness or tension in the head, vertigo, tinnitus aurium or headache, and sometimes palpitation and oppressed breathing. Excessive eating, especially of animal food; stimulating condiments or drinks, and indolent or sedentary habits, are the most efficient agents in the production of *P.* *P.* is said to be *sthenic* when the strength and irritability of the muscular fibres are fully or excessively developed; and *asthenic* when there is a deficiency of contractility and tone in the muscular fibres; but the principle of division is not in all cases well marked.

In the *treatment* of *P.*, reference must be had to its cause and duration. In mild cases the diet should be restricted to vegetable food or milk, and saline laxatives should be administered. In severe cases, should apoplexy or pulmonary congestion be threatening, venesection should be had recourse to; but a permanent cure can be effected only by removing the cause, and the abstemiousness should be in proportion to the obstinacy of the case.

Pleura, the lining membrane of the thorax or chest. The *P.* is one of the *serous* membranes, and consists of a double layer. One layer or surface of the *P.* covers the lungs; another lines the internal surface of the thorax. The former is named the *visceral layer* or *P. pulmonalis*, the latter the *P. costalis* or *parietal layer*. A space is thus seen to exist between these two which receives the name of the *cavity of the P.* It follows from the disposition of the *P.*, that each *P.*, or part covering a lung, is a shut and closed sac. The two pleural sacs do not communicate in any way with one another, and they touch only at one point in front. The *mediastinum* is the name given to the space existing between the pleurae, this space containing all the viscera of the chest (heart, &c.) save the lungs. The disposition of either *P.* may be traced from the breast-bone or sternum, from which it passes outwards, covering the costal cartilages, ribs, and intercostal muscles; behind, it passes over the *sympathetic nervous ganglia*, and the sides of the bodies of the vertebrae, where it is separated from its neighbour sac by a small space—the *posterior mediastinum*. From the spine the *P.* is reflected on to the side of the *pericardium* or heart-sac; thence it passes to the back part of the lung at its root, while a triangular fold passes to the *diaphragm*. This fold is the *broad ligament of the lung*. The *P.* then goes over the convex part of the lung, and invests the organ generally, while below it covers the thoracic surface of the diaphragm. The right pleural sac is shorter and wider and reaches higher in the neck than its neighbour. The inner surface secretes a *serous fluid*, facilitating the movements of the lung in breathing.

The nerves are derived from the *phrenic* and *sympathetic*, and its blood-vessels from the internal mammary and other arteries.

Pleuracanthus, a genus of fossil *Elasmobranchiate* fishes, belonging to the Rays. The remains of *P.* consist chiefly of fin-spines or *ichthyodorulites* which occur in the Carboniferous rocks. The spines were provided with a double row of sharp processes or 'teeth.' *P.* remains are the oldest known fossil traces of Rays.

Pleurisy, or inflammation of the serous membrane lining the walls of the thorax and investing the lungs, is one of the most serious diseases of the chest. *P.* may be single or double, according as one or both sides are affected; and it may be either acute or chronic, simple or complicated. *P.* without pneumonia is much more common than pneumonia without *P.*; but when both are present, the correct term for the affection is pleuropneumonia. In acute *P.* the attack is usually sudden, and there may be no premonitory chill, as is usual in cases of pneumonia. An acute lancinating pain is usually felt in the mammary region, which is increased by coughing, and by taking a deep inspiration, and the pain is often so severe that inspiration is voluntarily impeded, and there is an impossibility of assuming certain positions. The pain is generally restricted to one small spot, although the inflammation may pervade a considerable extent of surface. The cough is short and dry, or is accompanied by slight expectoration. These symptoms are attended with headache, anxious countenance, rapid pulse, and hot skin; but the temperature, although fluctuating, does not rise so high, nor decline so rapidly, as in pneumonia. The physical signs of *P.*, as elicited by auscultation and percussion, are by far the more important; for pain in the region mentioned may be muscular only. In the early stage of *P.* the opposed pleural surfaces may be heard grating against each other, and producing what is termed the 'friction sound;' but this sound lasts only for a short time, and may disappear from resolution. Adhesions may form between the opposed serous membranes, or, as more frequently happens, an effusion of serum may take place in the cavity. Sometimes the serum degenerates into pus, constituting 'empyema.' When effusion has taken place dulness is elicited on percussion, and the dulness may be complete or partial according as the fluid fills the whole or only a portion of the cavity. When the effusion is partial, the region of dulness varies according to the position of the patient as the fluid gravitates towards the most dependent part. In the condition called empyema, the pus may force its way into the lung through the pulmonary pleura, and the matter is evacuated by expectoration; or it may discharge externally through an intercostal space. When the internal opening remains it is termed a bronchial fistula; and when the external opening remains it is called a parietal fistula. Air and pus may thus reach the cavity, giving rise to pneumothorax and hydro-pneumothorax. When the cavity is filled with serum the lung is pressed back against the vertebral column, and the pressure may be so great as to prevent the entrance of air into the lung, so that no breath-sounds can be detected. Increased resonance and bronchial breathing may, however, be detected at the back, the part where the lung is adhering. The vocal resonance appears faint, distant, and trembling, like the bleating of a goat, and hence the term *cephophony*. The breathing function of the lung being suspended, additional work is thrown upon the sound lung, and the respiration sounds are intensified, giving rise to puerile breathing. The patient inclines to lie on the affected side or on his back if the *P.* is single, and if there is much effusion. The duration of an attack of *P.* may vary from five or six days to as many weeks.

Treatment.—When seen in the first stage, leeches should be applied to the seat of the pain, followed by hot poultices; and a purgative should be administered. The application of straps of sticking plaster to the affected side has been found useful in preventing effusion, and counter-irritation by means of blisters is beneficial. When effusion has taken place, a combination of squill, digitalis, and mercury may be given; and this should be followed by the iodide of potassium, and the local application of small blisters or the iodide of mercury ointment. In some cases it is necessary to perform paracentesis by the pneumatic aspirator, the most convenient site for the operation being at the inferior angle of the scapula of the side affected.

Pleurisy-Root. See BUTTERFLY-WEED.

Pleurobrach'ia, a typical genus of *Calenterate* animals belonging to the order *Ctenophora* (q. v.). *P. pileus* is a well-known species, attaining the size of a lemon or orange, and having a body of the shape of these fruits, and of clear colourless nature and gelatinous consistence. The mouth is at one extremity or pole of the body, which is divided into spaces externally by eight meridional bands of *cilia*, arranged in comb-like fashion and named *ctenophores*. Two long tentacles are also present, which are capable of being retracted at will. From the stomach of *P.* three pairs of canals (*radial*, *apical*, and *paragastric*) are given off, and at the lower or apical pole of the body there is a small sense-organ named a *ctenocyst*, together with a nervous ganglion, the latter being one of the first defined appearances of a nervous system in the animal world.

Pleurodont Lizards, a group of Lizards including those which have the teeth inserted in a groove on the inner side of the jaw. The term is used in contradistinction to 'Acrodon't,' which is applied to lizards having teeth ossified to the summit or top of the jaw-bones.

Pleurodyn'ia (Gr.) is a rheumatic affection of the intercostal muscles, characterised by an acute pain in the side, aggravated by pressure, and sometimes by coughing and a full inspiration. The pain attending pleurisy is, on the contrary, relieved by pressure. *P.* generally yields to local treatment, such as counter-irritation or blistering. A liniment composed of seven parts of linimentum belladonna and one of chloroform, sprinkled thinly over spongio-piline, and applied to the affected part generally affords speedy relief.

Pleuronect'idæ, a family of *Teleostean* fishes, including the so-called flat-fishes, such as the Sole, Plaice, Flounder, Turbot, Halibut, &c., and belonging to the group *Anacanthini*, in which the fin-rays are soft. The *P.* have no swimming-bladder. Their bodies are much compressed from side to side. The *P.* lie and swim on one side—often mistaken for the belly—which is light-coloured; the opposite side being dark-coloured, approaching the sand in its tint, and thus serving to conceal the fishes. There is a long dorsal and anal fin, and the ventrals are small and jugular in position. The eyes are placed on one side of the head—on the right side in the sole, and on the left side in the turbot. After being hatched the *P.* have an eye on each side of the body, but the bones of the head become twisted, and thus bring both eyes to one side. This condition is an acquired one, a fact proved by the occurrence of the eyes in an almost normal condition in some of the species of the genus *Hippoglossus*.

Pleu'ro-Pneumo'nia. See PLEURISY and PNEUMONIA.

Plev'na, a fortified town in Bulgaria, on a tributary of the Vid, 5 miles E. of the main stream, and 25 S.S.W. of Nicopolis on the road leading, *via* Lovatz, across the Balkans to Philippopolis. It was an unimportant open town till Osman Pasha (q. v.) surrounded it with entrenched works, and it is mainly remarkable as the scene of the great decisive struggle in the late Russo-Turkish War. Osman Pasha advanced from Widdin with thirty-six battalions and forty-four guns to the relief of Nicopolis, but arriving too late for this object, was allowed, without opposition, to occupy *P.* on the 14th July 1877. Krudener sent Schilder with three regiments against *P.* on the 24th July, only, however, to be repulsed with terrible loss. The importance of the position being at length realised by the Russians, a determined effort to take it at any cost was ordered to be made under Krudener and Schakofskoy. All the available troops were hurled against *P.* on July 31, but the result was a repulse even more disastrous than the first. The two leaders acted independently; Schakofskoy went recklessly forward, while Krudener was unable to give him support. The whole plan of the campaign had to be altered, as a general advance was impossible with *P.* untaken on the flank. A period of inactivity followed, in which the Russians brought up reinforcements, and Osman strengthened his fortifications. Early in September the Grand Duke Nicholas was at the head of 60,000 men, but military critics considered that the task required double the number. After four days bombardment the great assault was made on September 11th, in presence of the Czar himself. It was repulsed with heavy loss at all points except the centre, where the Roumanians took and held the Grivtza redoubt, and the S., where Skobelev took two redoubts

from which he had to retire on the following day. This crushing defeat compelled the Russians to turn the assault into a siege, and General Todleben was charged to invest and starve *P.* into surrender. By adroit management on the part of the Turks, large reinforcements and convoys of provisions and ammunition were safely got into *P.* before the investment was complete. But Gourko and Skobelev, driving the Turks from a line of villages, eventually closed the road to Orkanye, where Chefket Pasha was contributing to the relief of *P.* and providing a retreat for Osman. Not only was *P.* now hemmed in, but the assailants were strengthened by the arrival of the Imperial Guards. Week after week passed, however, and Osman, cut off from the world, held out with heroic firmness, until to hold out longer was impossible. On December 11, he failed in a supreme effort to break through the encircling band in the direction of Widdin, and was forced to surrender with an army reduced by this time to little more than 20,000 men and with sixty guns. The Russian loss has been estimated at 50,000 lives, 25,000 in the September assault alone.

Plexim'eter. See PERCUSSION.

Pleyel, Ignaz, a musician, was born in 1757 at Rupperstahl, a village near Vienna. He was the twenty-fourth child of Martin P., schoolmaster, who observing Ignaz's musical talent, placed him under Haydn, with whom he lived five years. He visited Naples in 1777, where he produced a melodious set of quartets and his only opera, *Ifigenie in Aulide*. In 1783, he was appointed chapelmaster in Strassburg Cathedral, for which he composed a number of masses. He rapidly became one of the most popular of instrumental composers, and published many duets, trios, quartets, symphonies, &c. With the proceeds of a professional visit to London in 1791 he purchased an estate near Strassburg. In 1793 he was arrested by the Republicans for supposed aristocratic sympathies, but was liberated on setting a drama in commemoration of the 10th of August to music. He removed to Paris in 1795, and set up a musical publishing business and pianoforte manufactory, which has long been famous. He died November 14, 1831.—**Madame Marie Félicité P.**, widow of Joseph Etienne Camille P., son of the preceding, is one of the most accomplished of modern pianists. See FÉTIS, *Biogr. Univ. des Musiciens* (new ed. 1878).

Plic'a Polon'ica is the term applied to a disease of the scalp in which the hairs become matted together by an adhesive and frequently fetid secretion. The odour is exceedingly disgusting, and the matted hair becomes the resort of swarms of pediculi. When left to itself, the disease progresses for about twelve months, when the symptoms subside and the hair returns to its natural state. The diseased mass is pushed by degrees further and further from the surface until it falls off spontaneously, or is cut off by the scissors. *P. P.* is especially prevalent in Poland (hence its name), although it occasionally occurs in other countries. The hair is found, on microscopic examination, to be infested with a fungus of the genus *Trichophyton*. See KÜCHENMEISTER'S *Manual of Parasites* (vol. ii.).

Plinlimm'on, a mountain on the border of Montgomery and Cardigan counties, Wales, about 12 miles from the coast, and in the centre of a wide expanse of moorland. It has three peaks, the chief of which is 2481 feet high. Its name (Cymric *Pumlumon*, 'five rivers') points to the fact that it is the source of five streams, of which by far the most important are the Severn and Wye. From the recesses of *P.* Owen Gendower made raids on the English marches.

Plinth (Gr. *plinthos*, 'a brick'), in architecture, the square slab forming the lower part of the base of a column; also the plain projecting band at the bottom of a wall. In Classical and Gothic buildings the *P.* is sometimes divided into two or more gradations.

Plin'y (*C. Plinius Secundus*), commonly called *P.* the Elder, famous as the author of the *Historia Naturalis*, was born 23 A.D. whether at Verona or Novum Comum is uncertain. The latter, however, seems on the whole to have the best claim, and that mainly from the facts (1) that the family of the Plinii belonged to Comum; (2) that the estates of *P.* were situated there; (3) that the younger *P.* was born there, and (4) that numerous inscriptions relating to members of the family are to be found in its immediate vicinity.

History affords us but a meagre record of the events of P.'s life, but the account which the younger P. has left of his uncle's habits goes some way to fill up the blank. P. came to Rome when young, the son of a distinguished family, furnished with ample means for securing instruction from the ablest teachers of the time. At the age of twenty-three he went to Germany under L. Pomponius Secundus, of whom he afterwards wrote a memoir. While there he was appointed commander of a troop of cavalry (*praefectus ala*). He travelled over most of the German frontier, and in the brief intervals of rest snatched from the duties of a soldier's life composed his treatise *De Facultatione Equestri*. At the same time he commenced his history of the Germanic wars—afterwards completed in 20 books—a work which he dreamt he was commissioned by Drusus Nero to undertake. In 52 A.D. he returned to Rome with Pomponius and began to study jurisprudence. As a pleader he was not distinguished. The greater part of Nero's reign he spent in retirement. His work entitled *Studiosus*, an educational treatise in three books, and his *Dubius Sermo*, a grammatical work in eight books, were written about this time. Towards the close of Nero's reign he was made procurator in Spain. Here, in A.D. 71, on the death of his brother-in-law, P. was left guardian of his nephew. During his absence he entrusted the boy to the care of Virginius Rufus and adopted him on his return. Vespasian was now emperor. P. had known him in Germany, and was at once received into the imperial circle. There is no evidence, however, that he was created senator by Vespasian. At this time, probably, he completed the *Historia of Aufidius Bassus*. P.'s manner of life affords a wonderful example of perseverance and assiduity. We are indebted to his nephew for an interesting sketch of P.'s mode of living. It was his custom to spend a portion of the night in study by candle-light, in autumn, beginning at a late hour in the evening; in winter, at one or two in the morning. Before dawn he visited the emperor, and after executing what commissions he might receive, he returned home and resumed his studies. He then partook of a slender meal, and in summer would lie in the sunshine and listen while some book was being read to him, making notes and extracts all the time. Then followed in succession a cold bath, a frugal repast, a short sleep, a period of study: thus passed the day till dinner time (*cena*). During dinner some book was read to him, on which he commented from time to time. Such was his mode of life in the city. In the country his time was almost wholly devoted to study, the bath being his only relaxation. When travelling he was accompanied by a secretary with book and tablets. In winter he compelled his scribe to wear gloves that his writing might not be impeded by the cold. By this ceaseless application to study, persevered in all life long, he amassed an enormous amount of materials from which he compiled his *magnum opus*, the *Historia Naturalis*, which alone of his works has survived, and on which his fame chiefly rests. It treats of an almost endless variety of subjects, and is in fact a much more comprehensive work than its title indicates. Everything that came in P.'s way found a welcome place in his treasure-house. When the younger P. describes his uncle's work as *opus diffusum, eruditum, nec minus varium quam ipsa natura*, he is very near the mark. It consists of 37 books—the first containing a dedication of the work to Titus, and a table of contents of the remaining books—and embraces, so says P. in the preface, 20,000 matters of importance drawn from about 2000 volumes. It was impossible that such a compilation should possess much scientific value. P., with all his inordinate appetite for accumulating knowledge, was destitute of genius: he was not an original observer; he was simply a bookworm. His work is a magnificent monument of industry and research, all the more wonderful that it was reared amid the distractions of official life; it is even more: to scholars it is a work of inestimable value as supplying details on subjects that would have otherwise remained unknown. It was published 77 A.D.

The circumstances of P.'s death were singular. He had been appointed admiral, and in 79 A.D. was stationed with the fleet at Misenum. Seeing a cloud of pine-tree form rising from the top of Vesuvius, he went to a spot whence he could get a better view; got a light vessel ready; embarked; and took his tablets with him. He then proceeded to the point of danger. Hot cinders fell all round. Eager to examine the phenomena more closely, he landed at Stabiae, where he was suffocated by the vapours. All his attendants escaped. The *editio princeps* of P. was published at Venice in 1469, fol. The best

critical editions of the text are those by Sillig (Leips. 1831-36) and L. v. Jan (Leips. Tübner, 1854-1865). The French translation by Ajasson de Grandsagne, published by Panckoucke (Paris, 1829-1833) in 20 vols., is enriched by many valuable notes by Cuvier, Letronne, and other eminent men of science and letters. To enumerate the translations would be superfluous: the *Historia Naturalis* has been reproduced in almost every European tongue.—P. (*C. Plinius Cæcilius Secundus*), generally called P. the Younger, was the son of C. Cæcilius and Plania, sister of the elder P. He was born at Comum on the *Lacus Larius* (Lake of Como) 61-62 A.D. His father died young, leaving his son, a boy of nine years, to the care of his uncle, who adopted him; and who, with his mother and Virginius Rufus his tutor, bestowed great pains on his education. So apt a scholar did he prove that at the age of thirteen he wrote a Greek tragedy. He studied eloquence under Quintilian and Nicetes Sacerdos, and soon acquired the reputation of being one of the most learned men of his day. In his nineteenth year he made his first appearance in the forum, and his oratorical ability secured for him frequent employment as an advocate before the court of the Centumviri and in the Roman Senate. While still young he served as tribune militaris in Syria; was quaestor Cæsaris 89-90 A.D., tribune plebis 91-92 A.D., praetor 93-94 A.D., praefectus aerarii militaris 94-96 or 95-97 A.D., praefectus Aerarii Saturnii 98-100 or 101 A.D., Consul suffectus with Julius Cornutus Tertullus 100 A.D., Augur 103 or 104 A.D., curator of the channel and banks of the Tiber 105-107 A.D., legate and proprætor of Pontus and Bithynia 111 and 112 or 112 and 113 A.D. P. died before 114 A.D., either in his province or soon after his return. He was in his eighteenth year when his uncle perished 24th August 79 A.D.; he must therefore have died about fifty-two. P. was thrice married; twice under Domitian (ad. Traj. ii. 2), and lastly to Calpurnia (Epist. iv. 19). He had no issue by any of his wives. The chronology of P. is by no means settled. The above dates (Mommsen's) are taken from Teuffel's *Geschichte der Römischen Literatur*, sect. 335.

The extant works of P. are the *Panegyricus* and *Epistola* in ten books. The former is a pompous and fulsome eulogy on Trajan, but of some value for the information it contains about the writer and his times. The *Epistola* are a most agreeable collection of letters, and hold a high place in this kind of literature. They contain, moreover, much interesting information regarding P. and his contemporaries. P. was scholarly, genial, and liberal, and he approaches more closely than almost any other character in ancient literature to the best modern ideal of a 'well-bred, cultivated, and blameless gentleman.' The *editio princeps* of the *Epistola* published at Venice 1471 contained only eight books. The first complete edition was the Aldine (1508). The best critical edition is by Keil and Mommsen (1871). Translations are numerous. See also Church and Brodribb's 'P.' in *Ancient Classics for English Readers* (Blackwood, Edin. 1870-78).

Pliocene Period is the third and highest member of the Tertiary Period. Above 50 per cent. of its fossil shells are existing species. The formations belonging to this age are of small development in Britain, being met with only in Suffolk and Norfolk, where, spreading over the Lower Eocene, they overlap the Chalk. Three groups are distinguished—(1) *The Coralline Crag*, a series of soft, marly, whitish sands, sometimes speckled with green, containing occasionally thin bands of limestone. Of the 350 species of marine mollusca, about 30 per cent. are extinct. (2) *The Red Crag*, a group of beds of red sands and gravel, with accumulations of rolled shells. It is usually found side by side with the Coralline Crag, though here and there in hollows of the latter portions of it exist. Of its 256 marine shells 25 per cent. are extinct. (3) *The Norwich Crag*, a series of beds of sand, gravel, and loam, which contain a mingling of marine, freshwater, and land shells, with bones of several extinct mammals. There is evidence of the beginning of that severity of climate which attained its climax in the glacial period. Pliocene formations are found in Belgium, in Italy flanking the low heights of the Apennines, in Sicily covering nearly one-half of that island, and in S. Russia round the coasts of the Caspian and Aral Seas, and the N.-western shores of the Black Sea.

Flocaria, or more properly *Graciliaria*, is a genus of red-spired Algae belonging to the order *Sphaerococcoideae*, and includes the so-called Corsican moss and the Ceylon moss. The first was

formerly in repute as a vermifuge, but this repute had probably no more solid basis than the doctrine of signatures, the cylindrical stems and branches bearing a fancied resemblance to a worm—*therefore*, it was argued, an effective remedy for worms (see MEDICINAL PLANTS). If genuine, it should consist of *P. Helminthochorton*, but other species are substituted or mixed with it. *P. candida* is exported from Ceylon as an article of food. It furnishes a useful jelly for invalids and children, possessing considerable nutritive qualities. The Chinese manufacture it into a sweetmeat.

Plocœus. See WEAVER-BIRD.

Plock (Russ. *Plotzk*), a government of Russian Poland, bounded N. by Prussia, and S. by the Vistula. The surface in the N. and near the Vistula and Narew is elevated, but in general it is very level, and largely covered with lakes, marshes, and forests, the last occupying half of the whole surface. More than half the soil is arable, and 15 per cent. is excellent meadow pasture. P. had, in 1873, 204 factories, including distilleries, breweries, tobacco, soap, sugar, and candle manufactories, employing 1433 men, and yielding produce to the value of £145,067. Area, 4200 sq. miles. Pop. (1872) 485,792.—**P.**, capital of the preceding, lies on the right bank of the Vistula, 78 miles W.N.W. of Warsaw. It has a cathedral, founded in 968, 4 other churches, a theatre, and the palace of the bishop. There is considerable export trade by the Vistula, chiefly of wood and corn. Pop. (1870) 21,823.

Plajes'ti, a town of Roumania, on the Dimbow, a sub-affluent of the Danube, 33 miles N.N.E. of Bucharest by rail. It is embowered amid gardens and groves, and has some trade in grain, wool, &c. During the Russo-Turkish War (1877-78) it was for some time the headquarters of the Russian Emperor. Pop. (1870) 26,468.

Plongée, in fortification, the exterior slope of a parapet, which serves to support the weapons of musketeers, so as to direct their fire. The slope varies from 1 in 4 to 1 in 9, but in English fortification is usually 1 in 6. The P. should be flat enough to admit of sand-bags being ranged on it, to protect the defenders.

Plotinus, the Father of Neoplatonism (q. v.), was born at Lycopolis in Egypt, about 203 A.D., studied philosophy under Ammonius Saccas (230-41), and, wishing to gain an insight into the doctrines of the Persians and Indians, accompanied Gordianus on his Mesopotamian expedition (242-44). He narrowly escaped sharing the emperor's fate, but gaining Antioch passed on to Rome, where for five-and-twenty years he continued to lecture; Porphyrius, Longinus, and Amelius being amongst his hearers. The most striking feature of his uneventful life is its gnostic and ascetic element. To friends who asked him to sit for his portrait he answered that it was bad enough to have to wear a shadow, without making a shadow of a shade. He ate no animal food, abstained from baths, refused a physician in his last sickness, and so died at Puteoli in Campania, about 270 A.D. There glided, says Porphyrius, a dragon from under the bed of the dead philosopher, whom the Delphic oracle in limping hexameters declared to have been 'good and gentle, benignant exceedingly, and pleasant in all his conversation.' Amid much confusion and repetition may be discovered in P.'s writings the leading idea of an absolutely perfect being, willing to shed its goodness on all who seek for it. He saw a divine element in the philosopher, who is 'ready by nature, furnished as it were with wings, and not needing to sever himself from matter like the rest, but predisposed to things above;' in the lover, whose innate dreams of loveliness raise him towards the one incorporeal beauty; and, in a less degree, in the 'musical' man, with his passive appreciation of the beautiful. The common herd, however, wallowing in a slough of worldliness, of them the divine desire could hardly take account. This absolute goodness, therefore, indifferent to the misery and debasement about it, must differ widely from the goodness of men; virtue could not be predicated of the divine, but was merely a means towards the attainment of that final goal whose nature generations of philosophers after P. set themselves vainly to discover. P.'s guide and master throughout is Plato, whom he quotes with a reverential *ipse dixit*. His fifty-four treatises were arranged by Porphyrius, according to their subject-matter, in six *Enneads*, or sets of

nine (Gr. *ennea*) books. A Latin translation of them by Maccilius Ficinus was printed at Florence in 1492, to which the Greek text was added (Basel, 1580), the best modern editions being those of Creuzer (3 vols. Oxf. 1835), Kirchoff (2 vols. Leips. 1854), and Dübner (Par. 1855). There is a translation of the complete *Enneads* into French by Bouillet (3 vols. Par. 1857), and of selections in English by Taylor (Lond. 1834), in German by Engelhardt (Erlang. 1820). See Kirchner, *Die Philosophie des P.* (Halle, 1854); Kingsley, *Alexandria and her Schools* (Camb. 1854); Richter, *Ueber Leben und Geistesentwicklung des P.* (Halle, 1864); and Grucker, *De Plotinianis Libris qui inscribuntur 'Peri tou Kalou' et 'Peri tou noëtou Kallous'* (Par. 1866); and Lewes, *History of Philosophy* (Lond. 1867).

Plotus. See DARTER.

Ploughs and Ploughing. Ploughing is an agricultural operation by which the naturally rough and hard surface of the soil is broken up, and prepared to receive the seeds of various plants; ploughs are the implements or mechanical appliances by which this operation is performed. In ploughing, the surface is turned over in something like regular slices, and at an angle more or less uniform. The hollow parts between the ridges form beds into which the seed falls when scattered over its surface; the seed being afterwards pressed down and finally covered up by an implement drawn over the surface (see HARROW), which reduces the projecting parts to a level surface more or less uniform.

The plough passed through a great number of stages before it acquired its present highly scientific form. Its origin is unknown, although frequent mention is made of it in the earliest records of history, both sacred and profane. Rude representations of it are found on the painted walls of Egyptian tombs and in the pages of the most ancient illuminated MSS. Some classic writers have described it minutely. It may be safely conjectured that, from a very early period, man would perceive that the sowing of his seed would give better results in the way of crops when the soil was in some measure opened up than when the seed was simply strewn on its original surface, which, under the most favourable circumstances, would be anything but free and open, but under the most unfavourable would be close, hardened, and baked—a condition that would be most frequently met with under tropical suns and rainless clouds.

Passing over the rudest and most primitive forms of the plough, it may be noticed that an Egyptian monument furnishes a sketch of one that shows some approach to the parts of the modern implement, in so far as there is what might be really called a well-shaped share or sock, with two handles fitted into its back part, while a beam is also provided, to which the animal-power dragging the implement is yoked.

There is a plough used in India at the present day, and known as the 'Chatakral,' in which the wedge-shaped form of the modern mould-board is perhaps more nearly approached in its sock or share. It is pointed, with a slight curve downwards, while the beam passes through an aperture made in the upper and back part of the share. Outside of the share a small vertical handle is fixed to the beam, in order to regulate the depth to which the sharp and pointed end of the sock shall enter the soil.

In a Chinese plough we find the share still more pointed, and gradually swelling out towards the back to a considerable breadth, the other side being in a straight line. This in fact gives almost the exact form of the share of a modern plough. To the back part of the share a small and short piece of timber is fixed. This provides a point of support for two vertical uprights, the hinder of which is much longer than the front one, and acts as a lever by which the depth to which the share enters the soil is regulated.

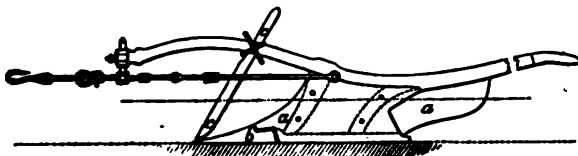
Another East Indian plough exhibits a still nearer approach both to the parts and the general arrangement of the modern implement. The share for a considerable length of its base is horizontal, the back sloping at a considerable angle upwards, while the front sweeps from the narrow point at front to the hinder part at the back in a well-designed curve. The beam, which is of considerable length, projects forward in a double or ogee curve, the outer end of which is at a greater elevation than the inner. This is fixed to the upper part of the share, while a handle at the back serves to regulate the depth to which the share penetrates the soil.

In a particular form of Mexican plough, the modern mould-board is still more closely approached in its share. The sole or base of this is horizontal, while the front is sharpened to a dovetailed form from which the share gradually rises to a part parallel to the base. To the extreme end of this upper part the one stilt or handle is dovetailed, and to the front of this is secured the end of the beam; which is further strengthened by a small vertical upright rising from the upper side of the share.

The only Roman plough of which drawings or sculptured representations have survived is one showing the form used in the time of Tarquin. It was shaped like the letter T, the ends of the T being sharp pointed, while the tail, rising upwards at a sharp angle, formed the beam. The soil was stirred by the lower sharp-pointed end, while the depth to which it entered was regulated by the ploughman pressing in or lifting up the upper end, while the implement was dragged through the soil by oxen attached to the end of the beam.

What was known as the *caschrom*, one of the earliest British ploughs, was more like a spade than a plough. The fore part was a flat, duck-billed part, somewhat like a chisel in shape, and attached to a handle which rose at a considerable angle from the front. This implement, rude though it be, is to some extent used even yet in the extreme northern parts of the kingdom, we ourselves having seen it, more or less modified, in the Shetland Islands. In one of the Harleian MSS. there is the figure of a plough in which the share is formed of a rhomboidal piece of timber attached to the lower end of a vertical part, the upper end being cleft, so as to form two handles. This cleft part passes through a flat board, which passing forward forms at its extremity the part to which the cattle were yoked. All the implements of what might be called strictly British or insular origin, had only that part of the modern plough which is known as the share. None had the double wedge known as the mould-board. It was to the Low Countries that this great improvement is owing. Long known as the 'Rotherham' (probably a corruption of Rotterdam), the plough introduced into England from the Low Countries possessed all the peculiar features of the modern plough. It was that on which succeeding ploughs were formed, and the first patent taken out was one granted to a Joseph Coljambe, of Yorkshire. Jethro Tull, to whom English agriculture is vastly indebted, if for nothing else than his system of 'drill' husbandry, invented a form of plough designed to aid this, but it was too complicated to be of general utility. Little or nothing was done after Tull's attempt, except to improve the Rotherham plough, and even in this way little was done, till a Scotch mechanic, James Small, constructed one upon scientific principles. In Small's plough we meet, indeed, with nearly all the parts of the modern plough; and succeeding makers took his implement as their model.

Ploughs may be divided into three kinds, the 'swing,' the 'wheel,' and the 'turnwrist,' with sub-classes which shall be noticed in due course. The first of these is chiefly used in Scotland and the northern parts of England; the 'wheel' in England, although its use is becoming more and more extended in the former country. The 'turnwrist' is almost purely local—a district plough, in fact—being used chiefly in Kent, although a modification of it is employed on very steep inclined land, where the furrows have all to be turned in one direction to save the long turnings at the 'hill-lands.' The illustrations in Figs. 1 and 2 will enable the reader to understand the various parts of the 'swing' or 'wheel' ploughs. We shall describe the swing first, taking what we may call the active parts of it, as the 'mould-board,' *a a* Fig. 1, the 'sock' or 'share,' *b* Fig. 1, and the 'coultter,' *c c*. In ploughing, the cutting of the slice from the original soil takes two directions, the vertical and the horizontal. The vertical cut is done by the coultter (see *c c*, Fig. 1), the horizontal by the sock or share (see *b*, Fig. 1),



while the slice so cut is turned over and placed at a certain angle by means of the mould-board. See *a a*, Fig. 1. The

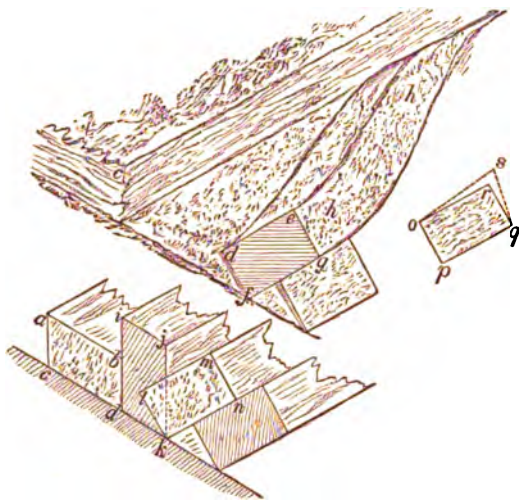
coultter (*c c*, Fig. 1) is in fact a strong knife secured to the frame of the plough, in such a way that its angle in relation to the plane of the land-surface can be adjusted as required. On the land side it is flat, while on the furrow side it is rounded, or tapered on the back in order to give the necessary strength, with lightness. The angle at which it is placed in relation to the beam of the plough is generally about 55°, but this varies according to the work to be performed. The share (*b*, Fig. 1) is placed at the fore part of the sole, on which the plough slides along the soil. In English ploughs it is made of cast iron, the under part being case-hardened to about the thickness of the sixteenth of an inch; the remainder being left soft or in its usual condition. This system, the invention of Robert Ransome, of Ipswich, enables the share to keep up always a sharp-cutting edge. The pitch or inclination of the share is made to vary, according to circumstances, so as to sink deeper into, or to rise out of, the soil; or, as it is technically stated, to take more or less land. The coultter is also capable of adjustment, so that it may receive from or approach to the land side as required. These may be called the active parts of the plough, as they in reality do the ploughing, the other members forming the part of carriers, by which the active parts are retained in their places and adjusted as circumstances may require.

It is generally considered that the mould-board plays the most important part in the operation of ploughing. But although it is a highly important member, still the coultter and the sock or share exercise an important influence in the formation of the furrow-slice. This has not merely to be severed from the general mass of soil and turned over at a certain angle, but to be so adjusted that the largest bulk of soil be exposed to the action of the atmosphere. The form of the furrow-slice has been a subject of great contention amongst plough-makers. Some maintain that it should be broken up and more or less pulverised (the angular form however being still retained), while others insist upon the slice being turned over 'in a perfectly straight line, not only unbroken but even and uncracked.'

As has been stated, it is upon the form or contour of the mould-board that the majority of writers and makers of ploughs maintain that these conditions of soil depend; but, on the other hand, this form must itself be determined to some extent by the character of the soil. Thus, in what may be termed short soils, having little cohesive properties, a mould-board with a convex contour and comparatively short length will give the broken condition of soil referred to, while in stiff and cohesive soils it will not. It is indeed from the general nature of the soil that short and convex mould-boards have been generally used in Scotland, and the converse in England. In practical ploughing, a very good test as to whether the form of mould-board suits the soil in which it is used, is the fact of the soil becoming uniformly bright all over its surface. If, on the contrary, it is brightened at one point and left dull at another, it may be safely inferred that the plough is not suitable for the soil.

We now proceed to consider the various methods in which the parts of the plough operate, taking first the mould-board. This may be considered as a long wedge, with its outer surface screw-shaped. When dragged through the soil, it partially severs it from the mass, and as it passes along turns it over at a determinate angle, the thickness and breadth of the severed soil, technically called the furrow-slice, being dependent upon circumstances, but average sizes being 10 inches by 7, or 6 by 9. The best angle for turning over the furrow-slice is found to be 45°, thus burying the weeds, &c. which form the original surface, and exposing the largest bulk or mass of soil to the action of the atmosphere. The diagram (fig. 2) illustrates the way in which the mould-board turns over the furrow-slice. In this *a b* shows the breadth of the slice as cut by the coultter entering near the point *c*, the mould-board turning over and depositing the furrow-slice in the position *d e f g*. The side *e g* corresponds to that originally lying against the land, forms, as shown in the diagram, the flat or upper side *d e*, while that cut by the share or original bottom part, as *d e*, takes now the position of the flat or upper side *d e*, while *f g*, which originally formed the upper or grassy surface, is laid in contact with the side *g d* of the furrow-slice turned over before. It will be seen how, by this process, the grass and weeds are buried. The lower part of the diagram shows the positions which the furrow-slice assumes in being turned over, *a b c d* being the form of slice before being operated upon, as the

coulter cuts the end *a c*, and the share the bottom *c d*, it is turned over by the twist of the mould-board, somewhat as



shown at *h h*, in the upper diagram in Fig. 2. The next position assumed is the vertical, as *d i j k*, the last being *k l m n*.

The 'wheel' plough varies in a very trifling degree from the swing plough, the main difference being that the one has wheels, and the swing plough, as in Fig. 1, has none.

The next plough we have to notice is that of the 'Subsoil.' Between forty and fifty years ago Lord Pomerville took out a patent for a double-furrow plough, which excited great expectations as to the economical work it was to perform. It was obviously a great gain, if by the same power double or even a half or a third more work was obtained. But from inherent defects in the plough, the expectations raised by it were not realised. The idea, however, did not die out. About ten or twelve years ago Mr. Price of Aberdeen patented a double-furrow plough which solved the difficulty. Its principal peculiarity was placing the wheels at an angle to, not parallel with, the surface of the soil, the periphery of the wheels being also angular, not parallel-faced. This plough was bought up by the firm of Messrs. John Fowler & Co. of Leeds, who introduced several improvements into it, and made it a complete success. Other forms were brought out by the Messrs. Howard of Bedford, the Messrs. Ransome, Sims, & Head of Ipswich, Messrs. Murray & Co. of Banff; and now the double-furrow plough is an established implement, capable of doing high-class work, and at a large saving of power. The forms of implements of this class vary much in point of arrangement and mechanical detail. In those made by the above firm, the one mould-board is in advance of the other, each having its coulter, but as in the case of the steam-plough there is no share, properly speaking; its place is supplied by a strong curved line, connected to the frame above at one end, and at the other to the mould-board about the middle of its length and height. The general frame is supported by two wheels, the largest of which is at the back, between and near the ends of the stilts or handles; the smaller about the centre, a little in advance of the coulter of the back or second mould-board. A land not furrow wheel is provided in front; and one capable of adjustment as regards depth is by a lever carried back between the stilts to be within reach of the ploughman.

The 'Subsoil Plough' is designed to stir and break up the lower soil which lies beneath the working range of the ordinary plough. The simplest form takes us back to primitive times, for it is simply a share attached to a vertical stem, connected with the beam to which the power is yoked. The first practical improvement was introduced by Smith of Deanston; this was greatly improved by Reid, who added wheels, and gave the power of regulating the depth to which the implement could be worked. In the most improved form of Reid's subsoiler, as made by Howard, the share or tine is

of strong wrought iron, firmly bolted overhead to the cast-iron beam. The form of the tine or subsoiler is somewhat like that of the letter L, with the angular or corner part filled in with a curved feather, but provided with an aperture which gives lightness along with the necessary strength. The frame has two stilts or handles—the left-hand one carries a small wheel, while two wheels run in front near the bride. A 'double subsoiler,' on the same principle, gives the power of working two tines with a draught not greatly exceeding that required by one. When the subsoil plough is used not only to stir the lower soil but to bring it to the upper surface, it is termed a 'trench plough,' or a 'subsoil trench plough.'

The 'Broadshare Plough,' the invention of Mr. Bentill of Maldon, is an important and useful implement. Its main object is to get rid of the surface weeds, while it stirs the soil to a greater or less depth as required; it can indeed be so arranged as to work as a subsoiler. The working parts are shares, three or more in number, of great breadth; these are preceded by an equal number of what are called 'points,' arranged parallel with each other, the centre point preceding the others. This arrangement enables the hardest soils to be penetrated, and the implement to work with a steadiness not otherwise obtained.

The 'Turn-west or wrist,' the 'Kentish,' or 'the one way furrow plough,' is, in detail of arrangement, a complicated and a heavy, clumsy-looking implement, but in the principle of its operation it is very simple. Its object is to turn the furrows all in the same direction, that is to be over at the same angle. Two mould-boards, so called, being merely pieces of board broader at one end than the other, and rounded on the upper surface, are placed so as to form a triangle, the narrow parts of the boards being placed behind the shares at this point; they are so jointed that in going in one direction, say towards the S., the mould-board, which turns the slice to the W., is thrown over in going N., becoming the side plate, the operation bringing down the other mould-board, which turns the furrow still to the westward. In this way all the furrows are turned in one direction over the whole surface of the field. The changes of the mould-boards in the Kentish plough necessitate of course a change in the direction of the point of the coulter, so that its point shall coincide with the corresponding point of the mould-board. The Kentish plough, nevertheless, does most efficient work, and is greatly esteemed in its own special district. A favourite form long in use was that of Wilkie's, and a still more recent form is that of Loocock's, manufactured by Ransome, Sims, & Head; but the most recent of all, and the most improved, is that of Davy of St. German's, Cornwall, which combines almost nearly every requisite for the operation, applied with the highest mechanical skill in the design and construction.

Ploughing.—We have already, in describing the action of the mould-board, so far explained what ploughing is in the action of this and the attendant parts; but the reader may have noticed, in looking at a newly-ploughed field, before the furrows were disturbed and the surface made smooth by the action of the harrows, that the furrows lay in a certain way. Part lie in one direction and part in another, the two sets meeting in a central point. From this to right and left there are only so many furrows. The number of those lying towards the right, and those towards the left, together make up what in England pretty generally is called a 'stetch' or a ridge. The field is divided into a certain number of those 'stetches,' between two of which a deeper part generally called a furrow is made, this in olden times constituting the only way in which the land was drained. These 'stetches' or breadths are rarely ploughed flat but convex, the point at which the two sets of furrow-slices meet, one lying to the right and the other to the left, forming the crown of the 'stetch' or ridge. Each furrow is laid over at an angle of 45 degrees, and the next furrow is turned over so as to cover only a certain portion of its surface, thus forming a series of angular seed beds. The best length of furrow is found to be an average of 250 yards, this being the distance that a pair of horses in good average working condition can take at one stretch without stopping and without being over-fatigued.

We cannot conclude the subject of P. and P. without alluding, however briefly, to steam ploughing. So far from being a thing of yesterday, it dates from a period not far short of 150 years ago. The practical period of the system may, however, be said

to have begun some five-and-twenty or thirty years ago, and it is now one of the established facts of agricultural engineering. In considering the application of the power of steam to the preparation of the soil, we must not lose sight of the fact, that steam ploughing is not the same thing as steam cultivation. We shall take up the subject of steam ploughing first. The most important, and indeed the type upon which all or nearly all the modifications of other inventors are founded, is the 'Balance Plough,' the invention of John Fowler. The introduction of this was the turning-point in the practical working of the system. Let the reader conceive of a frame, bent at its centre at equal angles, so that the two ends tilt up as it were when the central part is running free, on two large wheels. Each end of the frame is provided with three or more (generally four) plough bodies or mould-boards, all converging towards the central wheels. These bodies have no soles, but simply coulter and shares; in passing through the soil, therefore, they do not form the hard pan which is so objectionable a feature in the working of the common plough, with its solid slade or sole. This arrangement of the plough as a whole obviates the necessity to turn the implement at the end of each 'bout' or journey, for all that is necessary is simply to tilt on the central shaft the one end into the air, which has been engaged with its plough-bodies in turning over the soil say from S. to N. This operation at one and the same time lowers the other or opposite end of the frame, bringing the plough-bodies into contact with the soil, and in such a position that they are prepared to take the return journey from N. to S. As to the means employed for working the plough to and fro, Messrs. Fowler prefer what they call the direct system. In this two steam engines are used, one being placed at one, the other on the opposite side of the field. By a peculiar system of windlass, the plough is dragged to and fro between the engines, by means of a steel wire rope attached to it. It will be obvious to the reader that in order to plough the breadth of the field, the whole apparatus, as thus set down, will have to be moved transversely in proportion as the ploughing proceeds. This is effected by arrangements which, like all the others, are characterised by the highest mechanical skill and constructive excellence. As the steel rope, in consequence of its length, rubs against the soil in passing to and fro, it is supported by and runs upon light pulleys running on frames. These are placed at intervals across the field, and are changed in position as the ploughing proceeds.

Messrs. Howard of Bedford, the other most widely known makers of steam cultivating apparatus, advocate what is known as the 'roundabout' system. In this only one steam-engine is used, and it may be set down without the field, if more convenient, as well as within it. The engine works a windlass for winding, and unwinding the steel wire rope, and the plough is dragged to and fro between two anchors, arrangements being made for moving these across the field as the implement ploughs it. As the name indicates, the rope working the plough may be said to encircle the field, or go round about it according to its form. The rope in the first instance proceeds from the main windlass next the engine to the anchor, say in the furthest corner of the field. From thence it passes in a straight line to the second anchor, between which the plough works. From the second anchor the rope returns to the main windlass. Wire porters are used to keep the steel rope from the ground as in Messrs. Fowler's system. The Messrs. Howard have introduced into their system many highly ingenious arrangements. Various other makers have brought out systems varying more or less in mechanical detail, but characterised by the general features of the plans of the leading makers we have named.

In steam cultivation the soil is prepared for crops entirely by means of an implement called a grubber or cultivator. Mr. William Smith, of Woolston, near Bletchley, was the introducer, as indeed he may be said to be that of the roundabout system we have described, and by means of which he worked the grubber to and fro across the field. One great difficulty with which all makers and users of steam cultivating apparatus have to contend are the breakages to which they are so liable. Unless the drivers of the engine are particularly careful, the huge and heavy apparatus may be brought into collision with the engine; and not only this, but the breakages from ropes, and from the plough-bodies coming in contact with stones and boulders in the soil, and other parts, are constant sources of annoyance and loss.

To prevent the plough coming in contact with the engine, or proceeding too far on its journey, Messrs. Barford & Perkins, of Peterborough, have recently introduced a very effective form of self-acting apparatus, which makes it impossible for this accident to occur.

P. and P. in other Countries than Great Britain.—In Europe the only country whose ploughing implements merit notice is Flanders, which has long been celebrated for its farming, and which has given to other countries not a few of their most useful crops, and some of the most successful and striking of their methods of cultivation. It is often cited as 'the home of spade husbandry,' to which the remarkably high condition in which the soil is kept is said to be owing. While, however, the spade is used, and in some districts—for example, the Pays-de-Waes—extensively, the plough is nevertheless the principal implement employed in cultivating the soil. To those examining for the first time the condition of the splendidly cultivated Flemish fields, and the luxuriant crops which they bear, the natural impression is that the implements used to bring about such results must be of the highest class as regards design and construction. This, however, is not the case; for not only are they small in number, but the construction is simple and even rude.

Let us begin by a brief examination of the plough. Constructed wholly of wood, with the exception of those parts of iron necessary to hold the whole together, and generally, but not always, a covering of wrought iron to protect the face of the mould-board, the various parts are heavy and clumsy in the extreme. The most marked feature is the single stilt or handle with which the implement is provided. This is secured to the end of the beam, and is provided with a slight curve outwards. Within a few inches from the upper end of the stilt a small handle projects in a direction opposite to that in which the plough works. This handle resembles in form, and is somewhat about the length of, the horn of a short-horned cow. It is used to guide the plough and turn it at the end of its 'bout' or journey. It is preferred by the Flemish ploughman to a double-stilted implement, as it enables him not merely to work the plough with great ease, but also leaves his other hand at liberty to use the long iron tool by which he keeps the mould-board and coulter free from weeds. A few inches in advance of the lower and perpendicular part of the stilt or handle a vertical bar is morticed into and descends from the beam. This, together with the lower part of the stilt, supports the mould-board, which is further tightened and secured by an iron stay. The mould-board is generally constructed of timber built up in sections, and made to assume a short, abrupt, convex contour. Rude as this part of the plough appears, it lays over the furrow-slice easily with the land side cut square and clean. The sole is remarkably level and free from the alternate elevations and depressions which disfigure the working of even some of our ploughs which have a high reputation. The coulter is very different in form to that of our English ploughs, presenting somewhat the appearance of a spade cut in two, but in a vertical direction. It is adjusted by a simple wedge. The beam is horizontal—that is, parallel or nearly so with the surface of the soil—and its peculiar feature is a wooden shoe, placed near its extremity and slightly behind the bridle. This shoe, which is shaped exactly like the well-known wooden sabot of the Continental peasant, is designed to serve the purpose of the wheel—land or furrow—of our plough. It serves, however, another important purpose, of breaking the clods, getting rid of the weeds, &c. out of the way of the coulter and mould-board, and also performs, in some respects, the office of the 'skim coulter' of the best form of English ploughs, such as that of Howard's. The bridle is of iron, and of simple construction. Rough and unwieldy as the old plough is, it is nevertheless surprising how excellent is the work which it performs. It swings freely, moves along with great precision, lifts the furrow-slice well up, turning it over regularly at the usual angle of 45°, and, as we have stated, gives a sole very uniform.

The United States of America have done very much to improve the plough, by investigating the principles on which it operates, and endeavouring to discover a method or series of rules according to which the best form may be decided on. From a very early period in the history of that country, this work of practical investigation began. Jefferson, the well-known President, was the first, so far as we know, who attempted to discover a mathematical or geometrical principle by which the lines of the

mould-board could be set down, and in such a simple way that any mechanic who had but even a very general knowledge of drawing could avail himself of it. Mr. Jefferson drew up a paper explanatory of his system for the French Institute, and although he did not succeed in discovering a system generally applicable, the art of plough-making is vastly indebted to him for stating very clearly certain general principles of considerable practical value. His system of *lines* failed to secure all he aimed at, but it enabled any mechanic to construct a mould-board which, at least, was of the form deemed the right one by Mr. Jefferson. This, certainly, was a great advance in the mechanism of plough-making. For up to his time no fixed principle of design had ever been attempted, so that, however eminent any individual maker was, the secret of his success died with him. Space prevents us from pursuing further the history of American plough-making, interesting and useful as such an investigation would undoubtedly be.

As regards the art of ploughing, English agriculturists as a general principle maintain that ploughing should be done on such a system as to turn over the furrow-slice with a uniform surface, and with a mass of soil unbroken and compressed; Americans hold an opinion precisely the reverse. Various reasons have been suggested for this divergence of opinion. Perhaps the most obvious is that the soil is different, and that in consequence of the number of roots of trees left in the ground from the forest-covered condition of the soil, a short, abrupt mould-board is necessitated. But it cannot be the wholly true one, inasmuch as a large portion of the land is prairie, not forest-covered. Whatever the reason originally, recent discussions among the first American farmers show that they put the matter on a much more philosophical basis; namely, that the proper condition in which to leave the soil is that in which the atmospheric influences will be best able to act upon it. We do not mean to insist, of course, that all American ploughing is done upon this system, the influence of the English system having more or less extended to America; still it may be accepted with safety as the characteristic of the ploughing of the United States, and is, moreover, from the high position and great practical influence of those who advocate it, likely to become more and more so.

Plough-gate of Land is a term of Scotch law denoting, it is supposed, 100 Scots acres. It is the qualification of property to kill game under the *Game Laws* (q. v.).

Plover (*Charadrius*), a genus of *Grallatorial* or Wading Birds, forming the type of a family and sub-family. It is distinguished by having a short strong bill. The hinder toe is wanting, and the first quill is the longest. The tarsi are long and slender, and the outer toe is larger than the inner. Of the plovers, one of the best-known species is the Golden P. (*C. plumbeus*), also named the Yellow P. and Green P. This bird attains a length of 11 or 12 inches. It is of a greyish black above, variegated with yellow spots. The under parts are black. It visits the N. parts of Britain in summer, and migrates southwards in winter. The eggs are laid in April; they number 4, and are of a yellowish-olive colour, marked with dusky brown. The Kentish P. (*C. Cantianus*) resembles another species, the *C. hiaticula*, or Ringed P. The neck is partly encircled by a black ring. The head is a rich brown above, the upper parts being ashen brown, and the under parts white. The Dotterel (*C. morinellus*) is a third familiar species, dark brown above and black below, the body being marked by various tints and by white patches. The average length is 10 inches. The Dotterel inhabits the coasts, and lays 3 eggs, resembling those of the golden P. in colour.

The name Great P. is given to the 'Thick-knee,' a bird belonging to a different genus (*Edicnemus*) from that of the P. The Thick-knee is the *E. crepitans* of ornithologists, and is also named the Norfolk P. and Stone Curlew. Its length is about 17 inches, and the colour is a dark brown mottled with black. American species of true P. are the American Golden P. (*C. Virginianus*) and the Killdeer P. (*C. vociferus*).

Plover-Orest (*Cephalophis Delalandii*), a species of Humming-bird, found in the southern parts of Brazil. The males have a very prominent head-crest. The colour is green above; the under parts are violet.

Plum (Old Eng. *plume*; Fr. *prune*; Lat. *prunum*). The original parent of the numerous and various kinds of P. is

the *Prunus domestica* of Linnæus, a native of the Caucasus and Asia Minor, 'naturalised at least in Greece, and in most temperate regions of Europe.' It has a place in British floras, but is not indigenous, nor is it frequent in anything like even a semi-wild state. In the time of Cato (born B.C. 232) the fruit was known to the Romans, though they were, it would seem, unacquainted with the tree. Pliny, however, mentions a large number of varieties. It must have been introduced early into western Europe, and many fine sorts have originated in France. In England, Gerard, at the close of the 16th c., says that he had 'threescore sorts, all strange or rare,' in his garden. Amongst those enumerated by writers of a somewhat later date are varieties still appreciated, e.g., 'magnum bonum,' the 'Orleans' (said to have been brought from France during the English possession *temp.* Henry V., and now corrupted into 'Arline' by London costermongers), and the 'damask' or 'damson' (the *damascena* of botanists). It was introduced into cultivation from Damascus in Syria by the Romans. Another general favourite is the 'greengage,' which is a French variety ('Reine Claude'), brought to English notice by a gentleman named Gage during the last century. The various kinds offered by nurserymen at the present time number many hundreds. A fine P. forms a delicious dessert fruit, and it is also excellent in pies, tarts, preserves, sweetmeats, and in a dried state. A wine is made from the pulp, and a powerful spirit from the fermented pulp and kernel. Medicinally, plums are cooling and laxative, especially the dried fruit called 'brignoles' (see PRUNES). The wood is used in turnery, cabinet-work, and in making musical instruments, and the tree is valued in landscape-gardening from being one of the first to come into blossom. It is mostly propagated by budding. Botanically it is found impossible to draw a definite line between the wild P. and the bullace (*P. instilitia*), and between the last-named and the sloe or blackthorn (*P. spinosa*), so that the three are united by our most experienced botanists into one species, the *P. communis* of Hudson. A fourth variety, cultivated in Cashmere and the Punjab, gives a very palatable fruit. Of the bullace, the fruit is extensively used for preserves, whilst the sloe is a stiff hedge-shrub, and its shoots are valued for walking-sticks, &c.: the bark has been employed as a febrifuge. The beach P. of N. America (*P. maritima*) is of service for covering coast sands, and it yields an edible but small fruit. The name P., by colonists and traders, has been applied to various fruit-bearing trees not belonging to the genus *Prunus*, e.g., Date P. (q. v.) to species of *Diosporus*; Hog P. (q. v.) to *Spondias*; Sapodilla P. to *Achras Sapota*, and allied species; Queensland P. to *Owenia venosa*.

Plum, Date. See DATE-PLUM.

Plumage of Birds. See BIRDS and FEATHERS.

Plumatella, a freshwater genus of *Polyzoa* (q. v.), of which *P. repens* is a familiar species, found under stones, and attached to the leaves of aquatic plants. It presents the appearance of a branched organism, the *polyrites* or individual animals extending their beautiful crowns or tentacles from the ends of the branches.

Plumbagina'cese is a natural order of dicotyledons, consisting of about 200 species of herbs (often maritime), or rarely shrubs. The bulk are natives of N. temperate regions. Some are powerfully astringent, and many are acrid and blistering. Of the type genus *Plumbago*, beggars use *P. Europea* to raise blisters on their bodies to excite pity, and the root of *P. scandens* of St. Domingo (called 'Herbe du Diable') is a most energetic caustic when fresh; so also is that of the species often seen in cultivation for decorative purposes called *P. rosea*. The genus *Statice* furnishes a number of ornamental greenhouse plants, natives of the Cape of Good Hope and Canary Islands.

Plumbago. See BLACK LEAD.

Plume Bird (*Epinachus*), a genus of Insectorial birds belonging to the *Tenuirostral* group of the order, and to the family *Upupida* or Hoopoes. It forms a sub-family (*Epinachinae*), in which the bill is slender and arched, and the wings of moderate size and rounded. The hinder toe is very long, as is also the tail. The tarsi are scaled in front, and the sides of the body are covered with expanded feathers. The P. B. is an inhabitant of Australia and New Guinea, where it represents the Humming Bird. The Superb P. B. (*E. magnus*) has a small body; the plumage, however, being developed to such an extraordinary extent that the body appears to measure about 4 feet in

length. The head, neck, and under parts are green, the back and wings being of a lustrous violet tint. The Twelve-thread P. B. (*E. albus*) somewhat resembles the 'Bird of Paradise' in appearance, and derives its name from the silken plumes of the back, which give off long thread-like prolongations. The plumage is for the most part of a rich violet hue.

Plume Moth, the name given to various species of Moth (q. v.) from the wings being divided longitudinally into a number of feather-like segments. The White P. M. (*Pterophorus pentadactylus*) is a familiar species, and is to be seen flying abroad at twilight. The Twenty P. M. (*Atucita hexadactyla*) is smaller than the preceding species, and has the wings divided to a greater extent. The colour is ashen grey.

Plumm'et (from Lat. *plumbum*, 'lead'), the name given to a string, fixed at its one end and with a mass of lead suspended at the other, by means of which the direction of the earth's attraction is determined. By observing its deflection from true perpendicularity when set up in the vicinity of a mountain of known mass, the earth's mass can be estimated.

Plumptre, Rev. Edward Hayes, born August 6, 1821, obtained a scholarship at University College, Oxford, and was elected fellow of Brasenose (1844). He became chaplain at King's College, London (1847), Professor of Pastoral Theology in that institute (1853), Prebendary of St. Paul's (1863), and Professor of New Testament Exegesis (1864). In 1869 he was presented to the rectory of Pluckley, and in 1873 to the vicarage of Bickley, both in Kent. Professor P. has published *Sermons at King's College* (1859); *Lasarus and other Poems* (1864); *Christ and Christendom: the Boyle Lectures for 1866* (1867); translations of Sophocles (1866) and Æschylus (1870); *Biblical Studies* (1870); *Popular Exposition of the Epistles to the Seven Churches of Asia* (1877), &c.

Plumularia, a genus of Zoophytes or *Hydrozoa* (q. v.) belonging to the *Sertulariada* or Sea-Fir order. This genus was constituted by Lamarck, and includes zoophytes in which the stem and branches are usually branched and feathery; the cells containing the *polyptiles* being small, and placed on the inner aspects of the branches. The egg-vesicles or reproductive bodies appear to be scattered irregularly over the branches. Of this genus, *P. falcata*, *P. cristata*, *P. pinnata*, and *P. ceteacea* are familiar British species.

Plum'ule. See SEED.

Plural'ity is the case of a clergyman holding more than one benefice with cure of souls. In the primitive Church both bishops and the inferior clergy were forbidden to have two churches, as was deduced by St. Ambrose from I Tim. iii. 2, 12. As regards bishops, 'wherever there were two dioceses before, it was not lawful for one bishop to usurp them both, except where the wisdom of the church and state thought it most convenient to join them into one.' As to the inferior clergy, when there was a scarcity of ministers, a presbyter or deacon might sometimes be required to officiate in more than one church in the same diocese, but the canons of various councils are very explicit in prohibiting any one from having his name in the church roll or catalogue of two cities in different dioceses at the same time, or in any case from drawing the revenues of both. These were paid into the common stock of the city or cathedral church from which he received his monthly or yearly portion. A canon of the Council of Chalcedon (451) on this subject was renewed by the second Council of Nice (786) and other later councils. But as the clergy themselves had the making of the laws on the subject, various relaxations of this severe law of the primitive Church were introduced, at the same time that enactments were passed against the abuses of P.; e.g., in the decretals of various popes, in the third Council (1139) and fourth Council (1170) of the Lateran, and especially the Council of Trent (1546). Certain benefices were defined in the canon law to be 'incompatible'; namely, if both required residence, or their duties to be discharged at the same time, or if one of them afforded a sufficient maintenance for the incumbent. Except these, all benefices were 'compatible,' and more than one might be held by one person at the same time. In the Church of England P. used to be a great abuse, in consequence of which many parishes were deprived of a resident incumbent. According to the latest legislation two benefices cannot be held by one person unless the two churches

are within three miles of each other, or if the populations exceed 3000 in the one and 500 in the other. In the Scotch Presbyterian Churches the only case of P. allowed is that of a minister also holding a theological chair. There is at present (1878) a committee of the Established Church labouring to secure the better endowment of the chairs, with the object of abolishing P. in every case.

Plush (Fr. *peluche*, from Lat. *pilus*, 'hair') differs only from velvet by being made of heavier and coarser materials, and having its 'pile' or hairy surface uncropped. Formerly made of worsted yarn, it was used for the liveries of male servants, and as a Sunday dress material by rural labourers. P. of silk with a cotton backing is in considerable use for upholstery purposes.

Plu'tarch (*Ploutarchos*), biographer and moralist, was born at Chæroneia in Bœotia. The facts of his life known to us are mainly gleaned from his own writings. The exact date of his birth is not known; but from the fact that he was studying philosophy under Ammonius at Delphi when Nero visited that town in A. D. 66, we may assume that he was then a young man. P. mentions his great-grandfather Nicarchus and his grandfather Lamprias; but his father's name does not occur in his extant works. P. must have visited several parts of Italy. He specially mentions Ravenna, where he saw the statue or bust of Marius; and Rome, where he spent some time. While in Italy he was employed in some public business or in lecturing on philosophy. So much was he engrossed with these duties that he failed to learn the Latin language at that time, and had to postpone his studies in that direction till late in life. He was lecturing in Rome in the reign of Domitian. According to Suidas he was Trajan's preceptor, but this is very doubtful. He returned to Chæroneia, and there discharged several magisterial offices, as well as the duties of priest of Apollo. By his wife Timoxena P. had four sons, and a daughter who bore her mother's name. He was alive in 106 A. D., but when he died is not known. P. has become immortal by his *Parallel Lives*. These, forty-six in number, are arranged in pairs, each pair containing the life of one Greek and one Roman, followed in most cases by a comparison of the two. Each pair and a parallel form a book. The following are the forty-six lives:—1, Theseus and Romulus; 2, Lycurgus and Numa; 3, Solon and Valerius Publicola; 4, Themistocles and Camillus; 5, Pericles and Q. Fabius Maximus; 6, Alcibiades and Coriolanus; 7, Timoleon and Æmilius Paulus; 8, Pelopidas and Marcellus; 9, Aristides and Cato the Elder; 10, Philopomen and Flaminius; 11, Pyrrhus and Marius; 12, Lysander and Sulla; 13, Cimon and Lucullus; 14, Nicias and Crassus; 15, Eumenes and Sertorius; 16, Agesilaus and Pompeius; 17, Alexander and Cæsar; 18, Phocion and Cato the Younger; 19, Agis and Cleomenes, and Tib. and C. Gracchus; 20, Demosthenes and Cicero; 21, Demetrius Poliorcetes and Marcus Antonius; 22, Dion and Marcus Junius Brutus. The lives of Artaxerxes Mnemon, Aratus, Galba, and Otho also occur in the editions after the forty-six lives. The following *Lives* by P. are lost:—Epaminondas, Scipio, Augustus, Tiberius, Calligula, Claudius, Nero, Vitellius, Hesiod, Pindar, Crates the Cynic, Daiphantus, Aristomenes, and the poet Aratus.

As a biographer P. has certainly no equal in ancient, and few, if any, in modern times. There must, indeed, be great merits in a work that has entertained and instructed so many generations; that has been translated into so many tongues; that won the golden opinion of Montaigne and Rousseau; and that still has a charm for all degrees of men. The secret of P.'s success lies in the perfection of his portraiture. Human character is ever much the same. The *Lives* are a mirror in which any one may recognise his own lineaments.

P.'s other writings, entitled *Moralia* or *Ethical Works*, are sixty in number. They embrace a great variety of subjects, and are probably not all by him. Some of P.'s moral writings are far less studied than they deserve to be; some of the essays bearing his name, again, hardly repay perusal. The first edition of all the works of P. is that of H. Stephens (13 vols. 8vo, Geneva, 1572); the best editions those of Reiske (Leips. 1774-1782) and of J. C. Hutten (Tübingen, 1791-1805). The best modern edition of the *Lives* is that by Immanuel Bekker, published by Tauchnitz (Leips. 1855-1857). The best edition of the *Moralia* is Wytttenbach's (Oxon. 1795-1800). The English version known as Dryden's, re-edited by Clough, is considered the best; that by John and William Langhorne is best known.

Plu'to (Gr. *Ploutōn*, 'the wealth-giver'), originally Hades (q. v.), is in mythology the third son of Kronos and Rhea, and brother of Zeus and Poseidon. When the world was divided among the three brothers, he obtained the realm of darkness. He sits with his head veiled, and holds in his hand a sceptre of two prongs (that of Poseidon having three). His chariot is of ebony, his horses are four, his reins are of gold. His helmet has the power of rendering its wearer invisible; and for this reason it has often been borrowed from P. The servants of P. are the Furies and Charon. In judging the dead he is assisted by Æachus, Minos, and Rhadamanthus. The cypress, box, narcissus, and adiantum were sacred to P.; oxen and goats were sacrificed to him at night. Being childless, he mounted his chariot to visit the world, and, arriving at Sicily, he became enamoured of Proserpine, who was gathering flowers in the valley of Enna. He forced her into his chariot, made a way through the bed of a neighbouring river to the lower regions, and there installed her as queen. Homer describes the realms of Hades as being only a short distance below the surface of the earth, and the abode of spirits good and bad alike. It was later that the region was divided into Elysium and Tartarus, and that the king of the lower regions received the name P. as god of the wealth taken from the bowels of the earth.

Pluton'ic Rocks are those rocks, such as granite and certain porphyries, which though igneous are not strictly volcanic. They are ordinarily much more crystalline than volcanic rocks, and seem to have been subjected to intense heat, but under enormous pressure. It is questionable, then, whether they have ever been molten, as volcanic rocks undoubtedly have been.

Plym'outh, the great south-western port of England, in Devonshire, and on the N. side of P. Sound, 42 miles S.W. of Exeter, and 246 W.S.W. of London by the Great Western Railway. What is commonly known as P. is in reality three distinct towns, under separate local governments, and called by the inhabitants the 'Three Towns.' P. proper lies at the entrance of the Cattewater (the estuary of the Plym), into the great P. roadstead, while stretching westward the adjoining communities of Stonehouse (q. v.) and Devonport (q. v.) lie along the mouth of the Hamoaze, the estuary of the Tamar. The Cattewater in the E. is devoted to commercial purposes, and the Tamar in the W. is appropriated to the requirements of the Royal Navy. Several of the streets of P. and Stonehouse are continuous, and the suburbs of P. and Devonport intermix. From the precipitous Hoe, a hill 100 feet high, on the seaward side of the town, with houses climbing up its landward side, a magnificent prospect is obtained of P. and its surroundings. Confining the broad Sound on the S. is the breakwater, while on the extreme verge of the horizon rises the Eddystone Lighthouse (q. v.). On the E. are the fortifications of Bovisand, Staddon Heights, Mount Batten, with its martello tower, the shipping in Cattewater, and the woods of Saltram; on the N. the town itself, reaching into the wooded upland, far inland succeeded by the wild hills of Dartmoor; on the W. Devonport, with the Cornish hills for background, and the far side of the Hamoaze, beautified by the verdant slopes and tree-clad ridges of Mount Edgcombe. The Hoe is the great lounge of P., where the regimental bands play, and at this point it was arranged (March 1878) to construct a promenade pier. The town has increased with unusual rapidity, and George Street and Bedford Street, the principal thoroughfares, are lined with fine buildings. In the quarter lying around Sutton Pool there are still quaint decayed houses with projecting fronts, peaked gables, and corbels rich in curious carving. The mother church of P., St. Andrew's, is a fine specimen of the characteristic Devonshire church architecture of the Perpendicular period, to which date it mainly belongs. Built of 'moorstone' (granite and limestone), it has three long, low aisles of equal breadth, a waggon roof, a noble, massive tower (of 1460), fine E. and W. windows, and many ancient monuments. In 1874-75 it was 'restored' by the late Sir G. G. Scott. Other churches are Charles Church, Christ Church, and Trinity, the Roman Catholic cathedral (founded 1856), a fine Early English structure, with a tower 205 feet high; those of All-Saints (unfinished, 1878), and St. Jude, and several modern Dissenting chapels. The number of small religious bodies is exceptionally large, comprising Universalists, Bible Christians, Moravians, Christadelphians, P. Brethren, Calvinists, &c. The chief secular building is the Guildhall, an Early English structure built 1870-74, and forming, with the

adjoining St. Andrew's Church, a singularly picturesque and harmonious group. It consists of two separate blocks, and contains the Great Hall (145 feet by 85, with a height of 70 feet), and the Police and Law Courts, dominated by the Great Tower, 190 feet high. Other remarkable buildings are the Royal Hotel and Theatre, an Ionic edifice; the Duke of Cornwall Hotel, in modern Gothic style, at the Millbay railway station; the P. Institution (literary and scientific), extended by the addition of a museum in 1829. The Citadel, at the E. end of the Hoe, begun in 1665, consists of five regular and two intermediate bastions. Its inner gate is an elaborate structure, and bears date 1670. Drake's Island, a famous state prison in the reign of Charles II., is now a strong fort, crowned by battery and honeycombed by casemate. The Cottonian Library, founded in 1810 by W. Cotton, F.S.A., contains 20,000 vols., and a magnificent collection of prints, 5000 original sketches (by Da Vinci, Claude, Rembrandt, Rubens, &c.), bronzes, and illuminated MSS. P. has a grammar-school, founded in the reign of Henry VII.; a public free school, next to the Jews' school in Spitalfields the largest in the kingdom, educating 1500 children; a girls' high school, founded in 1874, and a high school for boys in 1877; and the Western Independent College, affiliated to London University. The ancient harbour of P. is Sutton Pool, a sheet of tidal water 13 acres in area, connected with the Great Western and South-Western Railways, and entered by a fine channel between two piers. It is lined on the E. by shipbuilding yards and factories. The Great Western Docks, in the spacious inlet of Millbay, about a mile W. of Sutton Pool, have a deep-water approach that admits very large merchant vessels. They comprise a floating basin of 13 acres, a large graving-dock, &c., and are approached by a branch of the Great Western Railway. The famous Breakwater (q. v.), a mile long, was remodelled in 1824-41 at a cost of £1,500,000. P., which now rivals Southampton as a station for the mail steamers, is the only port for the departure of Government emigrants, and the headquarters of the Royal Western Yacht Club of England. In 1876 the port was entered by 3701 vessels of 665,637 tons, and cleared by 1913 of 392,191 tons, while the imports amounted to £1,433,307, and the exports to £117,430. P. is one of the chief ports in the kingdom for the import of cattle, and also largely imports sugar, saltpetre, hemp, hides, timber, grain, and wine. The industrial products, widely exported, are principally chemicals, soaps, artificial manure, starch, black-lead, refined sugar, gin, biscuits, candles, cement, and the beautiful native marbles. There are considerable shipbuilding yards, foundries, engineering works, tar distilleries, and stained-glass works; while the district abounds in serge factories, paper and shoddy mills, granite quarries, and clay works. P. was formerly famous for its pilchard fishery, and the fisheries for hake, mackerel, turbot, John Dorys, whiting, &c., employ (1876) 531 boats and 1241 men. The manufacture of 'P. china' was only carried on from about 1765 to 1774, and the product was the first true or hard porcelain made in the kingdom. It is now highly valued, and is richly decorated with figures, shell groupings, and corals. Up to 1875, as much as £1,486,496 had been expended on the fortifications, which are stronger than those of any other English town except Portsmouth. The great Government works are on the Hamoaze. The Royal William Victualling Yard, an imposing pile of granite buildings at Stonehouse, covers 15 acres, and cost over £1,500,000. The Keyham Steam Yard, which has a large engineering establishment and two basins capable of taking in the largest vessels, is connected by a tunnel over half a mile long with Devonport Dock and the Gun Wharf, the depôt of all the Ordnance stores. The powder-works and magazines are at Kinterbury and Bull Point, close by Brunel's great work, the Royal Albert Bridge. The marine barracks are at Stonehouse, the military barracks at P. and Devonport. P. sends two members to Parliament, and Devonport, with Stonehouse, the same number. Pop. (1871) 70,091. In Old English times there was, on or near the site of P., a place called Tamarweorth. The position of the great Ridge Road, and the discovery of coins, indicate the vicinity of the Roman station *Tamara*. In *Domesday*, P. is called Sutton ('south town'); and its present name, merely an abbreviation of 'Sutton-super-P.', was not given till the reign of Henry VI. In the reign of Henry II., says Leland, the town was 'a mene thing as an inhabitation for fishars.' In 1287 the expedition to Guienne, 325 ships, assembled in its waters. The port of departure of the various expe-

ditions led by the Black Prince, it was frequently attacked by the French; notably in 1403, when the Sieur du Chastel, of Brittany, landed in Sutton Pool and burned 600 houses. In Elizabeth's time most of the great naval adventurers sailed from P., among them Hawkins, Grenville, Gilbert, Frobisher, Davies, Raleigh, and Drake. From P. issued the fleet of 80 vessels which scattered the Armada. In 1620 the *Mayflower* sailed hence with the 'Pilgrim Fathers.' During the civil war, the town, a great stronghold of the Parliament, was subjected for four years (1642-46) to a succession of sieges and blockades. In August 1779, the combined fleets of Spain and France (88 ships) were off the Sound for four days. Napoleon, before his removal to St. Helena, was brought hither in 1815. P. was visited by Garibaldi in 1864, and by Napoleon III. in 1871. The British Association paid its second visit to P. in 1877. See R. N. Worth's *History of P. from the Earliest Period to the Present Time* (Plym. 1871), Llewellyn Jewitt's *History of P., illustrated with Wood Engravings* (Lond. and Plym. 1873), and Rowe's *Ecclesiastical History of Old P.* (Privately printed, 1876).

Plymouth, a town of Massachusetts, U.S., on Massachusetts Bay, 37 miles S.E. of Boston by rail. It has a public library, 12 churches, 2 newspapers, and manufactures rivets, nails, stoves, steel hammers, cordage, and cotton cloth. There is also a fleet of vessels engaged in the Newfoundland fisheries. Here the 'Pilgrim Fathers' disembarked from the *Mayflower*, December 11, 1620, and founded the first settlement in New England. The rock is still pointed out on which they landed, and in Pilgrim Hall there is an interesting museum of relics in connection with the early settlers. Pop. (1870) 6238.

Plymouth Brethren are a Christian sect which originated about 1830. The principal founder was a clergyman of the Irish Church named Darby (from whom they sometimes get the name of Darbyites), who left that Church and established in Dublin a sect of separatists, holding an ultra-evangelical Calvinistic theology, and calling themselves 'Brethren.' Darby afterwards came to England and made Plymouth his headquarters, from which the sect generally get the name of P. B. The chief of their peculiar tenets are as follows, although there are sects among them differing by many hair-splitting distinctions of doctrine:—(1.) They hold that the Church is the one Body of Christ, in which there can be no sects and none but living members, that is true believers in the Lord Jesus, who must all be baptized by immersion when they make a profession of belief, whether baptized before or not. (2.) They hold that every believer is a *priest*, although not a minister—priesthood being that which goes from man to God; ministry, that which comes from God to man. Of the three kinds of ministers now in the Church—Evangelists, Pastors, Teachers (*cf.* Eph. iv. 11)—the work of the two last is to guide and instruct believers inside the Church; that of evangelists, to convert sinners. And they consider it absurd for the three offices to be conjoined in one man (since one man can only be expected to have the gift for one of them), much more so that he should be chosen for his office either by patron or people. (3.) Their doctrine regarding the Law professes to be that of St. Paul (Rom. vii.), that all believers are dead to the Law, not because it is abrogated, but because its obligations are swallowed up in the power of love by union with Christ. They are often charged with antinomianism on this point, and many ignorant persons among them do understand the Apostle's language to mean that it is impossible for a believer to sin. (4.) The Lord's Day they deny to be the same institution as the Sabbath, but merely a day specially set apart, not as a command, but as a privilege, for the worship of the Lord, to which the believer is to strive to bring up the standard of every day. Every Sunday they hold a love-feast of bread and wine, which, however, is in no way regarded as a sacrament. (5.) The sanctification of a believer the P. B. hold to be completely accomplished along with his justification the moment he believes, although there may be progress in experience, knowledge, spiritual ability, &c. (6.) They repudiate the confession of sin, publicly in the congregation, as too formal and unreal, being a thing that believers can only do each for himself. (7.) One more very distinctive doctrine of the P. B. is that of the personal return of the Lord Jesus. That return will be soon, and then the saved living ones will be taken away with the raised 'dead in Christ,' to reign with Christ in the New Jerusalem for 1000 years, during which period Antichrist will be revealed, and judgments poured

out on the world. At the end of the 1000 years the rest of the dead will be raised to judgment, and then will follow the eternal state. See Darby's *Christian Ministry* (Lond. 1835); Brown's *Bible Subjects for the Household of Faith*; and Guinness's *Who are the P. B.?* (Philad. 1861).

Pneumatic Despatch, a method of sending parcels and goods from one place to another by means of compressed or of rarefied air. It is identical in principle with the Atmospheric Railway (q. v.).

Pneumatics (from Gr. *pneuma*, 'wind,' 'breath,' 'spirit'), the science that treats of the properties of gases. It is therefore a part of Hydrodynamics (q. v.) which treats of fluids generally.

Pneumatic Trough, an apparatus invented by Priestley, by means of which the collection of gases is much facilitated. It is simply a vessel of water provided with a ledge or shelf 2 or 3 inches below the surface. The glass beaker, in which it is purposed that the gas is to be collected, is set mouth downwards on the ledge, projecting, however, sufficiently over the edge to permit of the bubbles of gas formed below to ascend into it and displace the water with which it was first filled.

Pneumogastric Nerve, Nervous Vagus, or Par Vagus, is one of the three divisions of the eighth pair of cranial nerves, or that given off from the brain. This nerve and its branches are distributed more widely than the other cranial nerves. It supplies the organ of voice or larynx, the lungs, pharynx, stomach, and heart. The larynx and lungs derive from it both *motor* and *sensory* filaments (see NERVE); the stomach, pharynx, gullet, and heart, obtaining only motor fibres. It arises below the *glosso-pharyngeal* nerve, and its filaments are capable of being traced through the *medulla oblongata* to a nucleus or mass of grey matter lying on the lower part of the floor of the fourth ventricle of the brain. It passes from the skull through the *jugular foramen*, at which point it bears a *ganglion* or *nerve-mass*. Its course lies down the neck inside the sheath of the *carotid* blood-vessels; its distribution on the right side varying from that on the left. The nerve of the right side ultimately passes along the hinder aspect of the gullet, and entering the abdomen is distributed to the under surface of the stomach. The fibres of the left side distribute branches to the anterior surface of the latter organ. The following are the branches of the P. N. as given in Gray's *Anatomy*:—

In the jugular fossa,	Auricular.
	{ Pharyngeal.
	{ Superior laryngeal.
In the neck, . . .	{ Recurrent laryngeal.
	{ Cervical cardiac.
	{ Thoracic cardiac.
In the thorax, . . .	{ Anterior pulmonary.
	{ Posterior pulmonary.
	{ Oesophageal.
In the abdomen, . .	Gastric.

The *functions* of the P. N. are intimately connected with the maintenance of the process of respiration, with deglutition or swallowing, with the action of the heart, and with other functions. Irritation of this nerve diminishes the frequency of the heart's pulsations; it may cause them to cease altogether by preventing contraction. The P. N. is in close relationship with the *sympathetic nerves*.

Pneumonia (from *pneumones*, 'the organs of breathing'), or inflammation of the substance of the lungs, is a disease of the respiratory organs of frequent occurrence. There are several varieties of P., and the distinctions depend upon the different portions of the lung, or the different constituents of any one portion, which may be inflamed, and upon the character of the accompanying fever. *Lobular P.* is the term used to express inflammation of a whole lobe more or less, or of a whole lung, or of distinct lobules or parts of lobules, with sound lung intervening. In *double P.* both lungs are involved; and when the inflammation is confined chiefly or exclusively to the air cells, it is called *vesicular P.*; and when the cellular tissue intervening between the different air vesicles, or between the lobules, is the tissue involved, it is termed *inter-vesicular* or *inter-lobular P.* When large portions of the pleura are, in addition, affected, it is called *Pleuro-P.* In P., however, the whole of the pulmonary parenchyma, including the air cells, the smaller bronchial tubes, the intervening cellular tissue, and the vascular ramifications, are generally affected.

In acute *common* or *lobular P.*, there are three well-marked

stages; viz. (1) that of congestion; (2) that of fully developed inflammation; and (3) that of suppuration. The clinical symptoms and pathological appearances of P. may be stated as follows:—The patient is said to catch a cold which settles on his chest; but it differs from an ordinary catarrh in that there is feverishness, preceded by shivering, derangement of the stomach and liver, occasionally jaundice and severe headache. The breathing is accelerated, and there is a hard, painful cough, the pain being referred, as a rule, to that particular part of the lung which is affected. After a short time the cough becomes softer, and a tough, tenacious sputum is expectorated, which adheres to the sides of the vessel. This sputum is of a reddish colour, and is generally termed the *rusty* sputum of P., the colour thereof being characteristic of the disease. The febrile symptoms are usually intense, and the temperature may rise to 105°. The pulse is at first frequent and hard, a herpetic eruption frequently appears on the lips and nostrils, and there may be great debility, dry brown tongue, delirium, and other typhoid symptoms.

In the first stage of P., viz., that of congestion, the lung or a portion of it is gorged with blood, and a quantity of red, frothy serum escapes on section. In the second stage the congestion passes into solidification; the part affected no longer crepitates on pressure, and when pressed between the finger and thumb it breaks down. In appearance the part affected resembles liver, and hence it has been termed *red hepatisation*. In the third stage, resolution or suppuration may take place. When resolution takes place, the lung is returning to its primary condition; but when the disease is advancing the pulmonary tissue remains dense, solid, and impervious to air, and its section, in place of being red, is of a reddish-yellow, or straw, or drab colour, or of a greyish tint, and a great quantity of a reddish or greyish fluid oozes from it. To this condition of the lung Lænnec applied the term *grey hepatisation*, or *purulent infiltration*, but it is in reality the stage of *diffuse suppuration*. The change from the first to the second stage may take place in twenty-four hours or less; but the change from the second to the third stage is of longer duration, and depends upon the intensity of the inflammation. In the third stage, or that of suppuration, moist sounds may be detected, owing to the admission of air into the lungs, and crepitations are heard both during inspiration and expiration; and as convalescence progresses, the *crepitation redux* is replaced by the healthy vesicular murmur. In P. the right lung is more frequently implicated than the left, the site of the inflammation being at the base. Of 210 cases collected by Andral, 121 were on the right lung alone, and 58 on the left alone; while in 25 it was double, and in 6 the seat was uncertain. Of 88 cases observed by the same author, P. was found to affect the lower lobe 47 times, the upper lobe 30, and the whole lung at once 11.

The *treatment* of P. has changed very much during recent years, and bleeding, formerly so frequently practised, has been now practically abandoned. Leeching, however, may be useful in certain cases, more especially if the patient be young and plethoric. Antimonial wine, in half-drachm doses, may be given every two hours, and in the course of twenty-four hours the pulse will be diminished in volume, the temperature decreased, and free perspiration induced. For two or three subsequent days the same dose may be given every four hours. If stimulants be deemed necessary, carbonate of ammonia may be given, and also quinine in full doses as an antipyretic. For the same purpose salicylate of soda may also be administered. In Germany many physicians recommend cold bathing, or cold applications to the chest, but in Great Britain local applications of hot linseed-meal poultices are recommended. Beef-tea should be given frequently, and the temperature of the room should be kept uniformly at 60° F. During the period of convalescence the patient should be carefully tended, and even after recovery the body should be carefully protected against sudden changes of temperature, as the affected lung is always more or less permanently weakened, and the tendency to tubercular consumption is increased.

Pneumothorax (Gr. *pneuma*, 'wind,' and *thōrax*, 'the breast'), or air within the cavity of the pleura, may be caused by fractured ribs, or blows; but, in the great majority of cases, air is admitted by the bursting of a small cavity into the pleura in the progress of phthisis. The symptoms of P. are sudden and severe pain, faintness and dyspnoea, followed by swelling and lividity of the face and lips. The percussion sound

on the affected side is abnormally clear or dull, the intercostal spaces are bulged out, and the respiration sounds are absent, or are greatly diminished. In general, there is, in addition, an influx of fluid, which may be detected at the base of the pleura by dulness on percussion, and by a splashing sound when the patient is shaken.

Po (Lat. *Paius* and *Eridanus*), the largest river of Italy, rises on the E. side of Monte Viso in the Cottian Alps, near the French frontier, at a height of 6260 feet above the sea. It flows N.E. until it is joined by the Dora Baltea near Chivasso, then E. to its mouth in the Adriatic, about 20 miles from which it begins to form its delta, the chief branches of which are the P. della Maestra, 3740 feet wide; the P. di Coro, 755 feet wide; and the P. della Enocca, 525 feet wide. In the first 20 miles of its course it descends 5300 feet; and at Valezza, after 120 miles, it is 600 feet above the sea. It is banked with dikes from Cremona to the marshes at its mouth, as it is subject to great and sudden inundations. The P. receives on the left the Dora Riparia, Dora Baltea, Sesia, Ticino, Olona, Lambro, Adda, Oglio, and Mincio; and on the right the Tanaro, Stura, Bormida, Trebbia, Taro, Parma, Enza, Erastolo, Secchia, Panaro, and Sauterno. At Turin it is 754 feet broad, at Pavia 1066, at Cremona 2657. Its length by its channel is 360 miles, but in a straight line from its source to its mouth 260 miles. It is navigable to Valenza 240 miles for vessels of 130 tons. The drainage area of the P. is 2700 sq. miles. The mean discharge into the Adriatic is 60,745 cubic feet per second. Its waters are lowest at the winter and summer solstices, and highest in May and October. The difference of level between ordinary low water and the highest known—that on the inundation of October 1872, at Artiglia, the *ventre* or highest point of the floods—was 28 feet. The discharge of fine silt at the mouth of the P. is computed at 55 million cubic yards per annum on an average, but the single flood of 1839-40 nearly trebled that quantity. The deposit extends the delta at the rate of 200 feet yearly.

Poa. See MEADOW GRASS.

Poaching (from Fr. *pocher* = Eng. 'poke,' and hence 'to intrude yourself into other people's property for the purpose of stealing game') was originally a popular word, but has now become a legal one, denoting the offence of killing or catching game illegally. By 1 and 2 Will. IV. c. 32, if any one be found on the land of another by day or by night without leave, in search of game, and having in his possession game 'appearing to have been recently killed,' the person having the right of killing the game, or his servant or gamekeeper, may demand the game, and if it is not immediately delivered they may *seize* it. 25 and 26 Vict. c. 114 empowers constables to search the person without a warrant, and, for the purpose of the act, extends the meaning of the word 'game' to include pheasants, partridges, woodcocks, snipes, grouse, black or moor game, and the eggs of these birds, and hares and rabbits. The act gives further extensive powers to constables and peace officers with regard to searching persons, or conveyances under circumstances which may reasonably cause suspicion of their having been engaged in poaching. See GAME LAWS; GAMEKEEPERS, LAW REGARDING; SALMON, LAW REGARDING.

Pocahontas, daughter of Powhatan, a powerful Indian chief of Virginia, was born about 1595. When quite a child she saved the life of Captain John Smith, who had been taken prisoner by her father, by interceding with the latter. But the truth of this occurrence, which is narrated in Smith's *True Relation*, is doubted. In 1609 she secretly apprised Smith of an intended attack by the Indians, and on various occasions supplied the famishing colonists with corn. In 1612 she was sold by the chief Japazaws to Captain Argall for a copper pot. Her father wished to rescue her, but in 1613 she married Thomas Rolfe, afterwards secretary and recorder-general of Virginia, and was baptized by the name of Rebecca. In 1616 she was brought to England by her husband, and presented at court. She died at Gravesend, March 1617, as she was about to leave for her native land, after giving birth to a son, from whom the Randolphs, Eldredges, Murrays, Bollinys, and other illustrious Virginian families trace their descent.

Po'chard (*Fuligula*), the type of a sub-family (*Fuligininae*) of ducks. It has a bill nearly as long as the head, and its first quill is the longest. To this group belong a large number of

ducks included in the lists of British species. The P. (*F.* or *Nyroca fuligula*) is also known as the Dun-bird, or Red-headed plover. It arrives in Britain in October, and flies northwards in spring. The colour of the male is chestnut red on the head and upper part of the neck, and deep velvet at the root of the neck. The back is grey, mingled with a darker tint. The tail is grey mixed with brown. The under parts are white tinted with grey. The P. attains a length of 20 inches. Its nest is a rude structure placed on the ground at the edges of lakes, and the eggs, numbering ten or twelve, are of a dirty-white colour. It is captured by nets, and in pits guarded by nets. Allied to the P. is the *F. cristata* or tufted duck, the scaup duck (*F. morila*), and the canvas-backed duck (*F. vallisneria*) of America. The latter species is larger than the P., and has a lighter colour on its upper parts. It migrates southwards in winter to the Chesapeake River and to the neighbourhood of New Orleans. The tufted duck derives its name from two tufts on the head.

Poco (Ital. 'little'), a direction in music; *poco forte*, 'rather loud'; *poco piano*, 'rather soft'; *poco piu allegro*, 'a little faster'; *a poco a poco*, 'gradually,' &c.

Poock, Edward, D.D., born at Oxford, November 8, 1604, passed from Thame free school to Magdalen Hall, Oxford (1619), and thence to Corpus Christi, of which he became a fellow (1628). Having already studied Oriental languages, he went to the Levant in 1630 as chaplain to the English factory at Aleppo, and there perfected himself in Arabic, made great progress in Syriac and Ethiopic, and collected for Laud a vast number of Oriental MSS. Returning to Oxford (1636), he was appointed Laudian Professor of Arabic, but shortly repairing to Constantinople on a second quest after MSS., came back to find the archbishop in the Tower. P. thereupon retired to his college living of Childrey, Berkshire, but in 1647 regained his professorship through the offices of Selden, and a year later was promoted to the chair of Hebrew, with a Christ Church canonry annexed. He was ejected from the latter (1650), but reinstated at the Restoration, aided Brian Walton in his Polyglot Bible (6 vols. 1657), and died at Oxford, September 10, 1691, leaving two sons, Edward and Thomas, who were also distinguished Orientalists. P. published *Specimen Historiæ Arabum* (1649), *Porta Mosis*; or, *Six Discourses of Maimonides* (1655), *Carmen Abu Ismaelis Tograi* (1661), commentaries on Micah, Malachi, Hosea, and Joel, &c. His *Theological Works* were edited by L. Twells, with a life prefixed (2 vols. Oxf. 1740).—**Richard Poocke, D.D.**, a member of the same family as the preceding, was born in 1704 at Southampton, entered Corpus Christi College, Oxford, and graduated LL.D. (1733). He travelled on the Continent (1734–36), and in Egypt, Syria, Mesopotamia, and Asia Minor (1737–41), publishing on his return to England *A Description of the East and of some other Countries* (2 vols. Lond. 1743–45). He became precentor of Waterford (1744), Archdeacon of Dublin (1745), and Bishop of Ossory (1756). Hence he was translated to Elphin, and lastly to Meath, where he died, September 1765.

Pod. See LEGUME.

Podagra. See GOIT.

Podargus, a genus of *Insectorial* birds belonging to the *Caprimulgida* or Goat-Suckers (q. v.). The bill is compressed, and the upper mandible overlaps the lower. The base of the bill is covered with bristles. The wings are long and pointed. The tarsi are short and covered with broad scales. The P. is found in Australia and New Guinea. The tawny-shouldered P. (*P. numeratus*), Cuvier's P. (*P. Cuvieri*), the moth-plumed P. (*P. phalaenoides*), and the plumed P. (*P. plumiferus*), are all well-known species. The plumage exhibits a preponderance of brown tints.

Podestà (Lat. *potestas*, 'power'), in Italy, the chief magistrate of a town, answering to our mayor or provost. The name was first given to the officers set over the Lombard cities by the Emperor Friedrich Barbarossa (q. v.), to fill the place of the elective consuls. After the peace of Constance (1183), the Italian republics, to curb the violence of domestic factions, almost universally established the office of P., to which their highest councils annually elected a noble citizen. He received a fixed salary, and on the expiration of his term of office was responsible for his administration to the state he had directed. In some cities, as Milan and Florence, the authority of the P. was merely judicial; in others he also held the chief military

command. The new constitution established in Florence by the Guelphic party in 1266 divided the criminal jurisdiction between the P. and the 'Captain of the People,' and during the war with Pisa at the beginning of the 16th c. the P. was superseded by a powerful bench of judges.

Podgoricza (Slav. 'near the hill'), a fortified town of Turkey, near the S. border of Montenegro, and on the E. bank of the Ribniza, 35 miles N. of Scutari. On the close of the armistice between Montenegro and the Porte in March 1877, Suleiman Pasha led his army from Nicksics to P., devastating the little principality. On the appearance of the Russians in Bulgaria Suleiman withdrew, and subsequently P. capitulated to the Montenegrins. Pop. 7500.

Pod'iceps. See GREBE.

Podiebrad and Kunstat, Georg von Boczko, king of Bohemia, born 6th April 1420, was the son of Herant of Kunstat and P., a powerful noble of the Moravian house of Bernegg and Nidda, which had emigrated to Bohemia. An enthusiastic Hussite, of Ultraquist (q. v.) views, he took part from 1434 in the struggles against the Taborites, and gained great influence in Bohemia during the reigns of the Emperor Albrecht II. and his son Ladislaus (q. v.). After having by a night attack upon Prag, in September 1448, overpowered the Catholic party, he was appointed administrator of the kingdom by the Emperor Friedrich III., and in 1452 was confirmed as such by the Bohemian Diet. After the death of Ladislaus in 1457 P. was chosen king, and on the 7th May of the following year he was crowned at Prag. He now used every means to improve the condition of the people and allay the rancour of religious parties, but his trimming between the two confessions was equally distasteful to the Catholic barons and to the headstrong Hussite bishop Rockicana. Unavailing were his negotiations (1459–61) with the German Electors to make him king of Rome and administrator of the Empire for Friedrich III. Pope Pius II.'s refusal to ratify the 'Compactaten' of Prag led to a bitter feud with P. The latter at first had the favour of the Emperor, whom he, through his son Victorin, had freed (1462) when held prisoner by his own brother Albrecht and the populace of Vienna. But Pope Paul II. having excommunicated P., the Catholic nobility declared against the king at Grünberg in 1465, and the Emperor became his enemy. In vain were the victories P. won over the 'Herrenbund' and the Bavarian 'Crusaders'; the Pope and the Emperor induced P.'s son-in-law, Mathias Corvinus of Hungary, to join his enemies. The latter having (1469) been proclaimed king at Olmütz and at Breslau, P. entered into a treaty with him, in which he promised him the succession in Bohemia. But the diet chose (February 1471) the Polish Prince Vladislav, and had already begun negotiations with the Pope for confirming the election when P. died, 22d March 1471. His sons Victorin and Heinrich I. were the Dukes of Münsterberg and Glatz, and his three daughters were married to Mathias of Hungary, Georg the Courageous of Saxony, and Friedrich I. of Liegnitz. See Jordan, *Das Königthum Georgs von P.* (Leips. 1861); G. Voigt, *Georg von Böhmen, der Hussitenkönig* in Sybel's *Historische Zeitschrift* (vol. xx., 1861); Dr. A. Bachmann, *Böhmen und seine Nachbarländer unter Georg von P.*, 1458–1461, und des Königs Bewerbung um die Deutsche Krone (Prag. 1877).

Podium, in architecture, a low wall serving as a continuous base for a row of columns.

Podocarpus, a genus of trees belonging to the natural order *Taxaceæ*, and found in Australasia, the Indian Archipelago, Japan, Chili, and South Africa, but more especially in New Zealand. *P. totara* is a New Zealand tree, from 80 to 90 feet high, the timber of which is light, tough, and durable, suited both for shipbuilding and cabinet-making. The Maoris eat the fruit, which is succulent, and borne on a fleshy stalk (whence the name P.), and use the bark for roofing their huts. The wood of *P. cupressina*, a native of Java and the neighbouring islands, is also valuable, and takes a high polish.

Podolia ('Netherland') or **Kamenez**, a government of W. Russia, bounded W. by Galicia, N. by Volhynia, E. by Kiev, S.E. by Kherson, and separated on the S. from Bessarabia by the river Dniester. Area, 16,221 sq. miles; pop. (1871) 1,946,761. P. is a hilly plateau cut by the deep valleys of the

Dniester, the Bug, and their tributaries. The mild climate is favourable to the cultivation of the vine, melon, and mulberry, and the fertile, well-watered soil yields abundant corn. The meadows afford rich pasturage, and bees are extensively reared in the woods. Corn and cattle, especially oxen, are the chief exports. The chief industry is the manufacture of beet-sugar. Trade is mostly in the hands of Jews, of whom there are 195,000 in P. The greater part of the population are Russniaks or Little Russians (formerly serfs), the nobility are of Polish extraction, and the official class Great Russians. Besides these there are numerous Rumanians, Germans, Armenians, and gipsies. P. was incorporated with the Russian Empire in 1793 and 1795, and is divided into 12 districts, the chief town being Kamenez-Podolsky.

Podophthal'mata ('stalk-eyed'), a division of higher Crustaceans, so named in contradistinction to the *Edriophthal'mata*, or those in which the eyes are sessile or unstalked. The P. include the two orders *Stomapoda* (q. v.) and *Decapoda* (q. v.). In both the eyes are supported on movable stalks or *peduncles*. The eyes of a crab or lobster exhibit the typical conformation of these organs in the P. A carapace is always present in this group.

Podophyll'um is a genus of *Berberacea*. *P. peltatum*, or 'May Apple' of the United States and Canada, is a common plant of damp shady woods, sending up from its thick creeping root-stock large, shield-like, lobed leaves, and white nodding flowers, to which succeed yellowish fruits, resembling a small lemon, containing an acid but mawkish edible pulp. The leaves possess narcotic and poisonous properties. It is from the root-stock that the resin called *podophyllin* is prepared. *P. Emodi*, the only other species, occurs between 6000 and 14,000 feet on the interior ranges of the Himalaya. It probably has the same qualities as the above.

Medicinal Properties of Podophyllin.—According to the investigations of Drs. Snow, Percy, and Anstie, P. acts upon the mucous membrane of the small intestines by being absorbed, as its application to an ulcer is followed by its specific effects. P. is supposed by some to act specially on the liver, as the administration of large doses is followed by the free discharge of bile; but this result seems to depend upon the intense duodenal irritation rather than on the direct action of the drug on the liver. P. is an active cathartic, useful in cases where brisk purging is required; and is used in place of calomel as a cholagogue. The dose of the resin is $\frac{1}{4}$ to $\frac{1}{2}$ of a grain, and it may be prescribed with aloes and soap.

Podoso'mata. See PANTOPODA.

Podu'ra, a typical genus of lower or *Ametabolic* insects represented by the various species of 'spring-tails.' They belong to the order *Thysanura*, in which the tip of the abdomen is provided with filaments, by the elasticity of which they are enabled to take leaps of considerable extent. The body is covered with delicate scales, which are used as test objects for the microscope, on account of the lines or striae with which they are marked. The species of P. occur amongst moss, in damp cellars, and in like situations. They have no wings, and they do not undergo a 'metamorphosis.'

Poe, Edgar Allan, was born at Baltimore, 19th February 1809. His father, David P., the fourth son of General David P., eloped at the age of eighteen with Elizabeth Arnold, a beautiful English actress, and went on the stage. After some years, however, General P., who had disowned his son, received him back to his home along with his wife. The young couple, however, did not survive long to enjoy their changed circumstances. They died within a few weeks of one another of consumption, leaving

three children, Henry, Edgar, and Rosalie. Edgar was adopted by a Mr. Allan, a wealthy and childless mill-owner. In his new home he received a great deal of petting without much true parental care, and this seems to have developed in him a waywardness to which he was naturally prone. In 1816 Mr. Allan took him to England, and placed him at the Manor-House School in Church Street, Stoke-Newington, where he remained about two years and a half. In 1821 he was recalled home, and placed at an academy in Richmond, Virginia. While at school here he made the acquaintance of Mrs. Helen Stannard, mother of one of his class-mates. This noble-hearted but unfortunate lady having gained the heart of the orphan boy with a few kind words, became the confidant of all his sorrows. When she died not long afterwards, P. could not at first realise his loss, and for months used to visit the grave of his friend nightly. It is almost impossible to over-estimate the influence which those lonely vigils amidst the weird sights and sounds of a churchyard exercised in moulding the peculiar character which his genius afterwards exhibited. He entered the University of Virginia in February 1826, when not quite seventeen. Here he greatly distinguished himself. In 1827 his enthusiasm was roused by the heroic struggles of the Greeks to achieve their independence, and he determined to go to Greece and join the ranks of the patriots. He was absent more than a year; but nothing is known of his travels. He returned to America in 1829, where he published his first volume under the title *Al Araaff, Tamerlane, and Other Poems*. Through the influence of Mr. Allan he now obtained admission as a cadet to the Military Academy at West Point, but was dismissed the service 'for neglect of duty.' Just before this took place (1831) he issued an enlarged collection of his poems under the title of *Poems by Edgar A. Poe*. On leaving West Point, P. resided for some time with his adopted father, and became engaged to Miss Royster. This match, however, was opposed by Mr. Allan, and a violent quarrel having taken place between him and P., the latter left the house never to return. Nothing is known of his movements until 1833, when he is found at Baltimore competing for prizes offered by the proprietor of the *Saturday Visitor* for the best prose story and the best poem. His tale, *M.S. found in a Bottle*, and his poem, *The Coliseum*, gained for him both prizes. Mr. Kennedy, one of the judges, secured P. employment on the *Southern Literary Messenger*, for which he wrote some of his best tales. In 1836 he married his cousin Virginia Clemm, who was very young and of great beauty. Next year he became assistant editor of the *New York Quarterly Review*, but shortly afterwards removed to Philadelphia, where he became connected with *Graham's Magazine*. In 1839 a collection of his best stories appeared under the title *Tales of the Arabesque and Grotesque*. In 1843 he gained a \$100 prize with his tale of *The Gold-Bug*. He removed in the following year to New York, where he contributed to various periodicals. His poetical masterpiece, *The Raven*, first appeared in *Colton's American Review* for February 1845, with the signature 'Quarles.' In a few weeks it had been reprinted in almost every magazine in the United States, and its author found himself the literary lion of the season. But the illness of his wife was now distracting his thoughts, and next summer he removed with her to a cottage at Fordham, near New York, where she died in 1847. In 1849 P. revisited Richmond, and spent two or three months there in literary work. It is said he became engaged to his early love, now a widow with the name of Mrs. Shelton. On the 4th of October he left the town by train for Fordham. Before his departure he had complained of feeling ill, and left the train at Baltimore, where he was discovered some hours later lying in the street insensible from inflammation of the brain. He was conveyed to the hospital, where he expired on Sunday, 7th October 1849. In the whole annals of unfortunate genius there is no case in which wilful perversion of fact has made such havoc of an author's reputation as in that of P. It was his unique misfortune to have in his first biographer R. W. Griswold, an enemy as malignant as he was unscrupulous. Having obtained from the deceased author's relatives the charge of editing his works, Griswold prefaced his edition with a so-called *Memoir*, in which he gratified a long-standing enmity by heaping every species of vilification, often explicit, but oftener insinuated, upon its subject. For thirty years this elaborate libel upon the poet's memory has been reprinted along with his works, and has formed the basis of almost every estimate of his character made in American,

English, and Continental works of reference. The honour of giving to the world the first fair account of P.'s life is due to Mr. J. H. Ingram, in the *Memoir* prefixed to Black's edition. No doubt, even when we subtract Griswold's fictions, there is much in the weird and joyless career of P. which is mysterious. P.'s genius was altogether of an abnormal character, delighting in the wonderful, the ghastly, and the supernatural. His unapproachable skill in analysis and his varied lore enabled him to work out his tales with a realistic force and an elaborate and subtle detail which convince the reader in spite of himself that he is perusing a sober record of fact. The most remarkable of P.'s productions are *The Gold-Bug*, *Hans Pfaal*, *A Descent into the Maelstrom*, *Ligeia*, *The Facts in the Case of M. Valdemar*, *The Fall of the House of Usher*, *William Wilson*, and *The Murders in the Rue Morgue*. His poetry, which fills but one small volume, displays with the same preference for abnormal themes an intensity of thought and feeling, a subtlety of rhythm, and a perfection of technique that no other American poet has equalled. Some of his pieces, such as *The Raven*, *The Bells*, and *Annabel Lee*, are unique in literature. The best and only complete edition of P.'s works is that referred to above (4 vols. A. and C. Black, Edin. 1874).

Poerio, Carlo, Baron, son of a lawyer, was born at Naples, April 1803. Up to 1848 he took an active part in the Neapolitan struggle for freedom. In 1848, when the constitution was proclaimed, he became first prefect of police, and next minister of public instruction. On the re-establishment of the Bourbon tyranny, P. was arrested on a charge of being a leader in the secret society of the *Unita Italiana*. The sufferings of P., and many other Liberals imprisoned with him, were exposed in letters of Mr. Gladstone to Lord Aberdeen (1850-51). P. was sentenced to 24 years' imprisonment in chains, and suffered part of this punishment at Nisida, Ischia, and Monte-Sarchia. In 1859 he and sixty other prisoners were embarked on board an American vessel for New York. The exiles obtained possession of the vessel and ran her into Cork harbour. He soon returned to Italy, and was elected a deputy to the first Italian Parliament, and became a vice-president of that Parliament in 1861. He died at Florence, April 28, 1867.

Poet-Laureate. See LAUREATE, POET.

Poetry (lit. 'creation,' from Gr. *poieō*, 'I make') has been defined by two of the world's greatest thinkers, Aristotle and Bacon, not in itself but by its accidents, the former laying stress on the fact that it is initiative and truthful, the latter on the fact that it is feigned or creative; the one holding that it produces the pleasure of a truth, the other that of a lie. Simonides makes P. merely 'word-painting.' Among the moderns, Johnson calls it 'metrical composition,' and that which pleases by 'exhibiting an idea more grateful to the mind than things themselves afford.' Whately calls it 'elegant and decorated language in verse,' and Masson 'creation and imagery in verse'—definitions that deal with the form to the exclusion of the essence, and take no account of such compositions as the Book of Job or Canticles. As colour is not essential to a picture, so neither is metre, alliteration, or rhyme to a poem; they are simply means employed by the poet as those best suited to produce an illusion on the imagination. A truer, because wider, definition of P. is Aytoun's, as 'the art which has for its object the creation of intellectual pleasures by means of imaginative and passionate language, and language generally, though not necessarily, formed into regular numbers.' Under their various heads will be found Epic P., with its kindred forms the ballad; pastoral and heroic verse; the Drama; the Lyric, to which belong the song, sonnet, ode, elegy, hymn, anthem, &c.; and the Satire; and lastly, Didactic P. See Zimmermann's *Geschichte der Poesie aller Völker* (Stuttg. 1847); Dallas' *Poetics: an Essay on P.* (1852); Shairp's *Studies in P. and Philosophy* (1868), and *Poetic Interpretation of Nature* (1877); and Doyle's *Lectures on P.* (1869).

Pogge (*Aspidophorus*), the name given to more than one species of *Teleostean* fishes belonging to the Gurnard group. A well-known example is the *A. cataphractus*, known as the P., and also as the Lyrie, or Armed Bullhead, the Sea-poacher and Noble. Its body is invested by hard, horny, or bony scales resembling those of the ganoid type, and the head, gill-covers, &c., are armed with spines. The colour is a greyish-white varied with brown, and the average length is about 6 inches.

Poggen'dorff, Johann Christian, a celebrated German physicist, was born at Hamburg, December 29, 1796. In 1812 he was apprenticed to an apothecary in Hamburg, but, after two years' service as an assistant apothecary in Itzehoe, he resolved to devote himself to a purely scientific career, and in 1820 became a student at Berlin, where his diligence and talents secured him many friends. In 1824 Professor Gilbert of Leipsic, the editor of the *Annalen der Physik*, died. This scientific journal was bought up by J. A. Barth, and under the editorship of P. began to appear the *Annalen der Physik und Chemie*, which for more than half a century were known over the whole scientific world as P.'s *Annalen*. In 1830 he became professor in Leipsic, in 1834 was created honorary Doctor of Philosophy and Extraordinary Professor by the University of Berlin, was elected a member of the Academy of Sciences in 1839, and was besides the recipient of various scientific and academic honours from his own and other nations. In February 1874, a jubilee feast, in commemoration of the fiftieth year of his editorship of the *Annalen*, was instituted. P. continued to be editor for three years later till his death, which took place January 24, 1877. He published numerous papers on physical and chemical subjects, and was besides the author of *Handwörterbuch der reinen und angewandten Chemie* (1836); *Lebenslinien zur Geschichte der Exakten Wissenschaften* (1853); and *Biographisch-Litterarisches Handwörterbuch zur Geschichte der Exakten Wissenschaften* (2 vols. 1863). It is not, however, as an original investigator that P. will hold a place in the history of science, but rather as the first editor of the *Annalen*, in which have been published the greatest discoveries of the last fifty years in experimental science. See *Annalen der Physik und Chemie* (Band clx. No. 4, 1877).

Pogonias, a genus of *Teleostean* fishes, including forms known as the 'Drumfishes,' from the grunting noises they are capable of emitting. The *P. chromis*, or 'Bearded Drumfish,' is a familiar species occurring off the coasts of N. America. It has two dorsal fins; its mouth has numerous filaments and tentacles; and the colour is a brownish-grey.

Poin'ding is the Scotch law of Diligence (q. v.), by which creditor seizes the property of his debtor in satisfaction of the debt. P. is either *real* or *personal*. Real P. proceeds on *debita fundi* (see DEBITUM FUNDI), and it affects the movables on the lands to which the debt attaches. Personal P. is used by creditors in ordinary personal obligations, and affects the debtor's movable goods and effects. There is a third mode of attachment, which has also been termed *poin'ding*, by which cattle found trespassing are detained until their owner makes good any injury they have done. The similar term of English law is *Distress* (q. v.).

Point, in heraldry, a charge of a Chevron (q. v.) shape, issuing from the dexter and sinister base of the Shield (q. v.), and tapering to the Fesse (q. v.) point. It occurs in the arms of Hanover, which formed a part of the royal arms of England from 1714 to 1837.

Point de Galle (Fr., commonly called only Galle, Ind. *galla*, 'a rock'), the second largest town and a thriving seaport in the extreme S. W. of Ceylon, situated on a bold promontory. It consists of two parts, namely the white-town, grouped round the citadel, and the native quarter, interspersed with gardens. The climate is healthier than that of Colombo or Trincomali, and the harbour, though small, is safe and accessible at all seasons. P. is of great commercial importance as a calling station for all steamships on their way to and from Calcutta, Rangoon, Penang, Singapore, China, and the Malay archipelago. The chief exports are coffee, cinnamon, Peruvian bark, and arak. The natives are skilled workers in gold and silver. Pop. (1871) 47,954. P. was founded by the Portuguese in 1518. It is now (1878) connected by telegraph with the other towns of the island.

Pointe-à-Pitre, the chief town of the division Grand Terre in the French island of Guadeloupe, on the Petit Cul-de-Sac, 20 miles N.E. of Basse Terre. It has an excellent harbour, and carries on an active export trade in sugar, rum, coffee, tobacco, &c. Pop. 15,000.

Pointed Architecture. See GOTHIC ARCHITECTURE.

Poin'ter, a variety of the Dog (q. v.), so named from its habit of 'pointing' at game; that is, when a bird is scented, the dog

suddenly stops, fixing his body and limbs, even the tail being kept rigid, and the whole attitude indicative of watchful silence. These qualities doubtless originated in the natural stealthy manner in which carnivorous animals at large approach the prey, strengthened by selection and the effects of habit. The English P. is much lighter than the Spanish breed. It has a wide and moderately large head, a broad muzzle, the lips or 'flews' not being over-pendant, and the tail tapering to a point. The colour is white, usually varied with black or liver tint.

Poisoning, Secret, is a mode of taking away life by poisons administered in such small doses, and, consequently, so slow in their operation, that the gradual sinking of the victims closely resembles the effects of disease or the gradual decay of nature. Wilful poisoning is generally secret, as the murderer wishes to conceal his crime; but the term S. P. usually refers to instances in which murder by the administration of poisons is carried out on a large scale, embracing a number of victims, and extending over a series of years. S. P. has been carried on in all ages, and there are numerous allusions to the practice by Greek and Roman writers, although much romance and mystery is intermingled with the accounts. In the myth of Hercules, the hero is said to have been killed by a poisoned robe. It was the fate of prominent public men to have numerous rivals and bitter enemies, and when such persons died suddenly their death was often ascribed to S. P. The preparation and dispensing of poisons seem to have been a special branch of study amongst those who professed a knowledge of chemistry, magic, or astrology; and many of them realised large sums of money by the sale of their preparations, or of the secret of their composition. Though chiefly practised in Italy and France, every country in Europe can furnish evidence of a familiarity with this pestilent art. Thus, for example, in the 21st year of Henry VIII.'s reign, an Act was passed declaring S. P. to be high treason, and sentencing those who were found guilty of it to be boiled to death. From the time of the Lombard invasion down to the 17th c., Italian history is full of instances of S. P., which show that poison was the favourite weapon of both the oppressor and the oppressed. The Borgias, who are generally singled out and held up to the horror and detestation of mankind on account of their numerous and systematic murders by S. P., seem to have merely practised the art on a more extensive scale than their neighbours.

Prior to 1648, S. P. became so common that the Catholic clergy found themselves bound to acquaint Pope Alexander VII. with the extent of the practice; and it was found on investigation that a secret society of young matrons met at the house of a reputed witch and fortune-teller, Hieronyma Spara by name, who supplied them with a slow poison, clear, tasteless, and limpid, and of strength sufficient to destroy life in the course of a day, week, month, or of such time as the purchaser desired. The 'wonderful elixir' compounded by La Spara had the effect of dissolving, by the sickness and death of the husbands, most of the unhappy marriages in Rome; and for a number of years it was found that young widows were extraordinarily abundant, a large number of unsuspecting victims having perished. The proceedings were, however, ultimately brought to light, and La Spara and thirteen of her companions were hanged, a large number were whipped, half naked, through the streets of Rome, and several ladies of high rank suffered fines and banishment. A similar organisation afterwards existed at Naples, headed by an old woman named Toffana, who prepared a poison similar to that of La Spara, and sold it under the name of *Acquetta*. In order to elude discovery, it was named 'Manna of St. Nicola of Bari,' the name of the renowned miraculous oil of St. Nicola. By means of this poison more than 600 persons are said to have been deprived of life; but Toffana was at length seized, tried, and strangled in 1719, and from this date S. P. gradually declined in Italy.

About the middle of the 17th c. the custom became prevalent in France, the victims being, as in Italy, the husbands; and the disclosures were first made by the clergy. Two Italians, named Exili and Glaser, who were suspected to have been the manufacturers and vendors of the poison, were imprisoned in the Bastille. Glaser died in prison, but Exili communicated his secret to a fellow-prisoner, named St. Croix, who, after his release from prison, made use of his knowledge by compounding the celebrated poison known as 'Succession Powder.' St. Croix

had many pupils, and not a few of them were men of high rank, position, and influence, so that S. P. became fashionable; the prisons teemed with suspected criminals, and the 'Chambre Ardente' was instituted for the special purpose of trying these offenders. In Paris, the trade was chiefly in the hands of two women, named Lavoisin and Lavigoreux, ostensibly midwives and fortune-tellers. Their houses were frequented by ladies of all classes, some for curiosity, but the greater number for the purchase of poison and instruction regarding the mode of administration. The two women were at last discovered, tried, and condemned, and were burned in the Place de Grève, 22d February 1680, and about 50 of their accomplices were hanged in various cities of France. Notwithstanding these executions, the practice continued to prevail for several years, owing to the high rank of many of the offenders, and more than 100 persons died at the stake or on the gallows before such crimes were suppressed in France.

Since the periods mentioned, S. P. has not prevailed to any great extent in Europe, but isolated cases have occurred. A German female, named Zwanziger, while serving as a house-keeper in various families in the territory of Bayreuth, in Bavaria, during the years 1808 and 1809, administered poison to no fewer than seventeen individuals in the course of nine months, three of whom died; and Gottfried, a woman in affluent circumstances and of good position in the town of Bremen, pursued her criminal career for fifteen years undiscovered, and when detected in 1828 had poisoned fourteen persons, and administered poison unsuccessfully to several others from the mere gratification of a malevolent temper, or the removal of supposed obstacles to her matrimonial schemes.

It is generally supposed by those unacquainted with such subjects that the actors in such dramas were acquainted with certain virulent poisons unknown to modern toxicologists, which would take effect after the lapse of a definite and often remote interval; but Sir Robert Christison remarks:—'With regard to the noted instances of S. P. which occurred towards the close of the 17th c. in Italy and France, it is plain to every modern toxicologist, from the only certain knowledge handed down to us of these events, that the actors in them owed their success rather to the ignorance of the age than to their own dexterity. And as to the refined secrets believed to have been possessed by them, it is sufficient to say, that although we are now acquainted with ten times as many and ten times as subtle poisons as were known in those days, yet none exist which are endowed with the hidden qualities once so universally dreaded.' See Sir R. Christison's *A Treatise on Poisons* (Edin. 1829; 4th ed. 1845).

Poisons. A poison is commonly defined to be a substance which, when administered in *small quantity*, is capable of acting deleteriously on the body; and, in popular language, it is applied to those substances only which destroy life in small doses; but this definition is too limited for the purposes of medical jurisprudence, for some substances have not been known to act as P. except when taken in large doses. In a medico-legal point of view, whether a man dies from the effect of a small dose of arsenic or from a large dose of nitre, the responsibility of the person who criminally administers the substance is the same, the result is the same, and the quantity required to kill cannot be made a ground for distinguishing a poisonous from a non-poisonous substance. Dr. Taylor says: 'Perhaps the most comprehensive definition which can be suggested is this: a poison is a substance which, when taken internally, is capable of destroying life without acting mechanically on the system;' but this definition does not comprehend those substances which act as P. by absorption when applied either to the skin or to an abraded surface. It is usually considered that a medicine in a large dose is a poison, and that a poison in a small dose is a medicine; but the medicinal or poisonous effects of such substances may depend not so much upon the quantity taken as upon the frequency and length of time it has been administered. According to law, the substance administered may not be a poison in the medical signification of the term, and it may not be popularly considered as such; yet, when taken, it may be destructive to life—such as powdered glass, iron-filings, sponge, pins and needles, &c.

Classification of P.—P. have been divided into three classes, according to their mode of action on the system—namely, Irritants, Narcotics, and Narcotico-Irritants. The irritants, when

taken in ordinary doses, speedily occasion violent vomiting and purging, usually accompanied with intense pain in the abdomen, the effects of the poison being chiefly manifested on the stomach and intestines, which they irritate and inflame, and hence their designation. Some irritants do not possess any corrosive action, such as arsenic, the poisonous salts of baryta, carbonate of lead, cantharides, &c., and these are often called pure irritants, as they do not exert any destructive chemical action on the tissues with which they come in contact. Many substances, however, belonging to this class of P., possess corrosive properties, such as the strong mineral acids, caustic alkalies, bromine, corrosive sublimate, &c., and the act of swallowing them is usually accompanied by an acrid and burning taste, extending from the mouth down the œsophagus to the stomach. The action of the purely irritant P. is generally more slowly manifested than that of the corrosive P., the symptoms rarely showing themselves until at least half an hour has elapsed from the time that the poison has been swallowed; while the action of corrosive P. is generally manifested immediately, as mere contact produces disorganisation of the tissue, the corrosion being due to a decided chemical action. The greater number of irritant P. belong to the mineral kingdom, though a few are derived from the animal and vegetable kingdoms, and they may be divided into the non-metallic and metallic irritants. The narcotics and the narcotico-irritants have their operation confined chiefly to the brain and spinal marrow, and their action is generally manifested by headache, giddiness, paralysis, stupor, and sometimes by convulsions. The pure narcotics neither irritate nor inflame the stomach and bowels; they are few in number, and belong to the vegetable kingdom. The narcotico-irritants are *spinal* and *cerebro-spinal* P., and have, as their name implies, a compound action. They give rise to vomiting and purging like irritants, and subsequently produce stupor, coma, paralysis, and convulsions from their action on the brain and spinal marrow. This class of P. is very numerous, embracing a large number of well-known vegetable substances.

Irritant P. are divided into four groups—the non-metallic, the metalloids, the metallic, and those of an organic nature, *i. e.*, derived from the vegetable and animal kingdoms. The non-metallic irritants comprise the *mineral acids*, as sulphuric acid or oil of vitriol, nitric acid or aquafortis, and hydrochloric acid; the *vegetable acids*, as oxalic acid, binoxalate of potash, tartaric acid, and acetic acid or common vinegar; the *alkalies*, as potash, soda, and their carbonates, ammonia and sesquicarbonate of ammonia. The metallic irritant P. comprise arsenic, arsenious acid, sulphurets of arsenic, and other compounds, corrosive sublimate or perchloride of mercury, calomel, white and red precipitates, sulphurets of mercury, cyanide of mercury, peroxides and nitrates of mercury, lead, acetate of lead, sulphate of copper and other salts of copper, arsenite of copper or Scheele's green, tartarised antimony or tartar emetic, chloride of antimony, sulphate and chloride of zinc, carbonate of zinc, preparations of tin, silver, gold, iron, bismuth, chrome, and bichromate of potash. The vegetable irritant P. are very numerous as a class; but the more important are aloe, colocynth, gamboge, jalap, scammony, savin, croton oil, castor seeds, oil of turpentine, oil of tar, darnel, ergot of rye, carob or locust bean, cantharides, and poisonous food, as fish, mussels, salmon, cheese, sausages, and diseased flesh of animals.

The principal narcotic or cerebral P. are opium and its compounds, as Godfrey's cordial, Dalby's carminative, paregoric elixir, Dover's powder, morphia and its salts, black drop, sedative solution, prussic acid, bitter almonds, noyau, cyanide of potassium, hyoscyamus niger, lactuca virosa and sativa, lettuce opium, solanum dulcamara and nigrum, camphor, alcohol, ether, chloroform, and amylene. The more important spinal and cerebro-spinal P. are nux vomica, strychnia, colchicum, white hellebore, digitalis, conium maculatum, œnanthe crocata, datura stramonium, aconite, deadly nightshade, tobacco, lobelia, cocculus indicus, laburnum, mushrooms, yew, and privet.

In all cases of poisoning the first indication is to empty the stomach, which may be done by tickling the fauces with a feather; or by the administration of copious draughts of tepid water, to which mustard may be added, or a scruple of sulphate of zinc, or some other emetic. As antidotes for the mineral acids, chalk or magnesia in water or milk should be given freely; for the alkalies and their carbonates, vinegar or lime-juice and water, and afterwards milk, should be given; for oxalic acid, chalk or magnesia in water, so as to form an insoluble oxalate of lime or

magnesia; for arsenic the hydrated peroxide of iron, and demulcent fluids such as flour and water, and milk; for corrosive sublimate, the white of egg, which forms an insoluble inert mass; for nitrate of silver, chloride of sodium or common salt, dissolved in water; for tartarised antimony, the decoction of bark or galls; for acetate of lead, sulphate of magnesia or Epsom salts, which converts it into an insoluble sulphate. In cases of poisoning from noxious gases, as carbonic acid gas, the patient should be at once removed to the free open air, after which artificial respiration should be had recourse to. Where there is heat of skin, cold water should be applied to the head and spine; but if the surface be cold, a warm bath should be employed. Both carbonic acid and carbonic oxide act as powerful narcotic P. Sulphuretted hydrogen gas appears to act as a narcotic poison when concentrated, but like a narcotic irritant when much diluted with air. Many of the gases, chiefly produced during chemical investigations, are highly poisonous, as arseniuretted hydrogen, cacodyl, &c.

In addition to the above enumerated P., there are many that affect the system by direct introduction into the circulation, through a puncture, or abrasion, or by absorption; and while some P., derived from the mineral, vegetable, and animal kingdoms, act as efficiently if introduced into the stomach, there are some P. which act only by direct introduction into the blood, and are inert when introduced into the stomach, such as P. derived from the dissection of recently dead bodies; from the bites and stings of insects, and of rabid and venomous animals. The P. of such diseases as glanders, hydrophobia, malignant pustule, and of the whole class of the zymotic diseases, may also be added to the list.

Regarding the legal definition of P., Dr. Taylor says, 'The law never regards the manner in which the substance administered acts. If it be capable of destroying life or injuring the health of an individual, it is of little consequence, so far as the responsibility of a prisoner is concerned, whether its action on the body be of a mechanical or chemical nature. If the substance criminally administered destroy life, whatever may be its nature or mode of administration, the accused is tried on a charge of murder or manslaughter, and the duty of the medical witness consists in showing that the substance taken was the certain cause of death. If, however, death be not a consequence, then the accused is tried under a particular statute for the attempt to murder by poison. Thus it is laid down that "whoever shall administer or cause to be taken by any person any poison, or other destructive thing, with intent to commit murder, shall be guilty of felony, and being convicted thereof shall suffer death." Although the administering be followed not by death but only by bodily injury dangerous to life, it is still a capital felony, provided the *intent* has been to commit murder. The *attempt* to administer to any person any poison or other destructive thing with the like intent, &c., although no bodily injury be effected, is felony, punishable by transportation for life, for fifteen years, or imprisonment for any term not exceeding three years.'

The Act 14 and 15 Vict. c. 13 requires every person who sells arsenic to enter in his books the date and quantity and purpose of its use, all which particulars may be inquired into before the sale. It is not to be sold to one who is unknown to the vendor unless in presence of a witness who is known, and whose place of abode is recorded in the book. The arsenic must also be mixed with soot or indigo, in the proportion of half an ounce of soot or indigo to a pound of arsenic. Those who offend against the Act incur a penalty of £20. According to Act 26 and 27 Vict. c. 113, extending to the United Kingdom, whoever sells or offers to sell poisoned grain, seed, or meal, incurs a penalty of £10. Whoever sows, lays, or puts on ground such poisoned grain incurs a like penalty. The use of poisoned flesh is also prohibited. See Sir R. Christison, *A Treatise on Poisons* (Edin. 1829; 4th ed. 1845).

Poitiers, capital of the ancient province of Poitou, and of the modern department of Vienne, lies on a low hill at the junction of the Boivre and the Elain, on the Bordeaux-Orleans railway. The former of these streams is here crossed by two bridges, the latter by six, two of which are for the railway. The town is widely but irregularly built, with steep, crooked streets, and is surrounded with an ancient wall, though the suburbs stretch away down into the valleys on either side. It is the seat of a bishop, and contains a university academy with three faculties

(jurisprudence, science, and literature), a public library of 30,000 vols. and MSS., a museum, a theatre, various scientific societies, and a celebrated lyceum. The University of P., founded by Charles VII. in 1431, was abolished during the Revolution. Among the large number of churches and chapels the most notable is the cathedral of St. Pierre (1152-1379), which contains the tomb of Richard Cœur de Lion. It is one of the most beautiful cathedrals in France. The church of St. Jean, which has now been converted into a museum, dates from the earliest centuries of the Christian era. The district around P. contains many remains of Celtic and Roman antiquity. The name P. is a corruption of the Latin *Pictavium*, which was derived from the Gallic tribe the *Pictavi*, who inhabited this part of the country in Cæsar's time. Here Hlodwig defeated and slew Alaric II., the West-Goth, in 507. In 1356 the battle of P. was fought between Edward the Black Prince, at the head of about 12,000 English and Gascons, and King John of France, who commanded an army 60,000 strong. The conflict took place at Maupertuis-le-Beauvois, about 5 miles N. of P., and ended in the total defeat of the French troops and capture of the king. Pop. (1872) 28,247.

Poi'tou, the name of a former province in the W. of France, embracing an area of 8650 sq. miles, which now includes the departments of Vienne, Deux-Sèvres, Vendée and part of Charente-Inférieure, Charente, Haute-Vienne, Indre-Loire, and Maine-Loire. Its capital was Poitiers (q. v.), and both names seem to have been derived from *Pictavi*, the name of the original Gallic inhabitants of the district. Up to the time of Pippin P. belonged to Aquitania, but was united by him to the Frankish state. Through Eleanor of P. it came into the possession of Louis VII. of France on his marriage with her, and afterwards into that of Henri of Anjou, her second husband, who became Henry II. of England. Under Henry III., however, it again reverted to France. After having again come into the possession of England for a short time by the peace of Breigny (1360), it was afterwards reconquered by Charles V. and united to the French crown.

Poi'trel is the name that was applied to the hinged or flounced plate which covered the breast of an armour-clad warrior in the 15th c.

Pola, the chief naval station of Austria, in the markgrafdom of Istria, 75 miles S. of Trieste by sea. It is situated on a landlocked bay of the Adriatic, which forms a magnificent natural harbour. But still more than as a modern naval station is P. interesting historically. The history of the place begins with the Roman conquest of Istria in 178 B.C., after which it became a Roman colony and a flourishing seat of commerce. Siding with the republic in the civil war, it was destroyed by Julius Cæsar. Restored by Augustus, it again attained prosperity, and became a great war harbour, with a pop. of 35,000. In 550 A.D. Belisarius, Justinian's general, assembled an army here to chastise the neighbouring pirates. Venice took P. in 1148; in the struggles of the republic with the Genoese the town was frequently destroyed, and from the last of those disasters, in 1379, it never fairly recovered. The chief of the many interesting remains of the Roman colony is the amphitheatre, which presents an imposing appearance from the sea. It is 78 feet high, 344 in diameter, and could accommodate 15,000 persons. The lower storeys consist of two series of arches (72 in number, and 18 feet in height), one above the other. The structure dates from about 150 A.D., and the exterior alone is in good preservation. Its main peculiarity is that it lies on the slope of a hill, which supplied a natural provision to the seats at one side. The Temple of Augustus and Roma, of B.C. 19, has a colonnade of six Corinthian columns 23 feet high, with a beautiful frieze. Parts of the Roman wall still stand, and two of its gates—the *Porta Aurea* or *Aurata*, and the double *Porta Gemina*. The *duomo*, though of inferior interest to the rich earlier remains, is a fine basilica. The town is the seat of a bishop, but has no industrial importance. Pop. (1869) 16,324. See the works of Allason, Kandler, and Gareis, and Freeman's *Historical and Architectural Sketches* (1876).

Polacca, or **Polacre**, a three-masted vessel used in the Mediterranean, sometimes square-rigged, sometimes with a peculiar form of sail called P. The main and fore masts, being of one piece, have neither tops, caps, nor cross-trees.

Polacca, or **Polonaise**, a musical composition, imitative of Polish dance tunes, usually in $\frac{3}{4}$ time, and andante or andantino in movement.

Poland, formerly a powerful independent kingdom of Central Europe, whose boundaries in the course of time underwent great change, including, at the beginning of the 11th c., about 87,600 sq. miles; in the 17th c., the period of its greatest prosperity, stretching from the Baltic to the Black Sea, and including 361,400 sq. miles, with a pop. of 20,000,000; and at the middle of the 18th c., before its first partition, having a pop. of about 13,000,000, and an area of 276,500 sq. miles, embracing the provinces of Great P. (with Kujavia, Masovia, and Polish-Prussia), Little P. (with Podlachia, Red Russia, Podolia, Volhynia, and the Polish Ukraine), and Lithuania (with Polish Livonia, Samogitia, &c.). The great plain between the Baltic, the Carpathians, and the Euxine is said by Jornandes and Procopius to have been inhabited in the 6th c. by Wends, Slavs, and Esthonians. While the first of these pushed westwards to the Elbe, the last were gradually crushed up to the shores of the Gulf of Finland, and the Slavonic Czechs and Moravians (about 623 A.D.) possessed themselves of Bohemia and Moravia. The country between these and the Russians was occupied by the Slavonic Lechs, of whom the chief tribe was called the Polane or Poles (from *pole*, 'a plain'), whom we find in the 8th c. forming themselves into a state on the Vistula. The history of P. properly begins with Miesko or Miecislaw I., who from about 963 held his lands in fee of the Emperor Otto I., and in 967 introduced Christianity. His son, Boleslaw I., Chobry ('brave'), who ruled from 992 to 1025, was the founder of the Polish kingdom. In the year 1000 he established the independent Archbishopric of Gnesen, with the suffragan bishoprics of Salzcholberg (Kolberg), Cracow, and Breslau. Boleslaw conquered Silesia, Lusatia, Moravia, Bohemia, and all the lands to the eastward as far as Kiev, and in 1024 received from the Pope the title of king. From about this period a yearly tribute of Peter's pence was paid to the Pope by all Poles save the nobles and clergy. After the death of Boleslaw's son and successor, Miecislaw II. (1025-34), who lost the royal title and Lusatia, wild anarchy prevailed, and struggles between the nobles (*Czalchta*) and the serfs, till his son Casimir I. (1041-58), who had retired to Germany, with the help of the Emperor Heinrich III. won back the power. Casimir's son, Boleslaw II. (1058-79), restored (1076) the kingly title, but was driven from the throne by his nobles for the murder (1079) of Bishop Stanislaus in the church at Cracow, the act which gave to P. her patron saint and martyr. The brother of Boleslaw, Wladislaw I. (1079-1102), who called himself simply 'Duke,' was succeeded by his warlike son, Boleslaw III. Krzywosty ('Wry-mouth'), who rendered tributary all the E. part of Pomerania as far as the Oder, and gained possession (1121) of the whole Pomeranian coast, for which he swore fealty (1133) to the Emperor Hlothair. Boleslaw III. dying in 1138 divided the country between his four sons, and gave his eldest son Wladislaw II. (1139-46)—who received Cracow and Silesia, and became the ancestor of the Dukes of Silesia—a sort of lordship over his brothers. A fifth brother, Casimir II. (1177-94), passed over at the division, reunited all P. except Silesia under his rule, but lost Pomerania. After his death the kingdom underwent new divisions, and a fatal step was taken by his younger son Konrad, to whom had fallen Masovia, calling in the aid of the Teutonic Knights (q. v.) against the heathen Prussians. After long and bloody wars they possessed themselves of all the lands from the Oder to the Gulf of Finland, and by shutting off P. from the sea, took away her northern defence and trade. The feeble rulers that succeeded Casimir were powerless to prevent internal anarchy and the destructive incursions of the Mongols. At length Wladislaw I. Lokietek ('the Short') (1305-33), had the fortune to reunite the kingdom by joining together Great and Little P. His son, Casimir III. the Great (1333-70), was the last of the Piast dynasty. He conquered Galicia, Volhynia, and Podolia, extended and confirmed the powers of the Diet, or assembly of the nobles, encouraged education, agriculture, and trade, and by his liberality to the lower orders earned the title of the 'Peasants' King.' From the accession (1370) of Casimir III.'s sister's son, Lewis the Great of Hungary, till his death in 1382, P. was united with that kingdom; and by the marriage of Lewis's daughter

Hedwig with Jagello (q. v.), in 1386, Lithuania was joined to P. Under the kings of this house—Wladislaw II. (1386–1434); his two sons, Wladislaw III. (1434–44), who was also king of Hungary, and Casimir IV. (1444–92); the three sons of the latter, Johann I. Albrecht (1492–1501); Alexander (1501–6); Sigismund I. (1506–48); and Sigismund's son, Sigismund II. August (1548–72)—under whose government Protestantism made considerable progress—the kingdom was extended to its old boundaries; but at the same time there was a great increase in the power and imperiousness of the nobles, through which the kings gradually lost the power to curb the republican spirit that prevailed in the nominal monarchy of P. It was the misfortune of P. to lose this wise line of princes at a time when all Europe was in a state of transition, and the ferment of innovation led to the questioning of every opinion and right. P. now became a virtual republic under the form of an elective monarchy, and so remained for 200 years till its dissolution under the eleventh elected king. The powers of the king were greatly restricted by the Diet, which consisted of the 'senators' (the highest nobles and clergy) and the other nobles, and was divided into five classes: (1) the Archbishop of Gnesen and the bishops; (2) the thirty-four 'Waiwodes,' or governors of provinces; (3) the 'Castellans,' originally commanders of fortresses; (4) the nobles; and (5) the deputies of the chief towns. In 1573 were concluded the *Pacta conventa*, by which it was provided that only after the death of a king should his successor be chosen, and then by a diet called by the primate of the kingdom, and attended by all the nobles in arms, while the *Pax dissidentium* promised complete toleration and equal rights to Christians of all creeds. In vain did Henri III. of Anjou (elected 1573) strive to reverse these changes, and after a reign of four months he secretly left P. to ascend the throne of France. After the brave Stephan Bathori (q. v.) (1575–86), there ruled in P. three kings of the Swedish house of Vasa. The election of Sigismund III. (1587–1632) was brought about by the Zamoiski party in 1587, because he had been a sister's son of the last of the Jagello line, and much was expected from a union of the two most powerful crowns of northern Europe. On the death of his father Johann II. in 1592, he inherited the crown of Sweden, but the connection between Catholic P. and Protestant Sweden was soon torn asunder, the result being an intermittent war between the two countries till the peace of Oliva in 1660. The weak Sigismund at his death (1632) left P. in anarchy, threatened both by Sweden and Russia, to his able son Wladislaw IV. (1632–48), who forced (1634) the Russians at the peace of Palänowka to resign all their conquests in P., and by the treaty of Stuhmsdorf with Sweden (1635) restored the Polish supremacy over the duchy of Prussia. He was succeeded by his half-brother John II. Casimir (1648–72), under whom was introduced (1652) the *Liberum Veto* (Polish, *Nie pozwalam*, 'I cannot consent'), a fatal license, which placed all legislative power at the mercy of each individual nuncio. Worst by the Tartars, the Cossacks, the Turks, the Russians, and the Swedes, John Casimir fled from his throne, leaving Karl Gustaf of Sweden master of P. from Courland to the Carpathians. But regaining courage, and rallying his nobles, he expelled the invaders, and recovered the greater part of P. by the peace of Oliva (1660); which, however, gave to Sweden Livonia and Esthonia, and took from P. the overlordship of Prussia. After an unsuccessful war with Russia, John Casimir was forced at the peace of Andrussov (1667) to yield Smolensk, Kiev, and all the Ukraine E. of the Dnieper. On the 16th September 1668 he abdicated, and on the 16th December 1672 died at Nevers as Abbot of St. Germain des Prés. After violent disputes with the higher nobles, who wished to elect a foreign prince, the lesser nobles set the poor and incapable Michael Thomas Koribut Wisniowiecki upon the throne (1672–74); during whose reign John Sobieski led that campaign against Turkey which is known as 'the miraculous,' and while the king was dying at Lemberg from the effects of a debauch, left 40,000 Mussulmans dead on the field of Choczim. This victory won the crown for John III. Sobieski (q. v.), who for a time covered P. with glory, but was powerless to prevent the decline of the kingdom, due to the instability of its institutions. He was succeeded by two kings of the House of Saxony, August II., 1697–1733—who as Elector of Saxony was Ferdinand August II.—and August III. The former having joined the combination against Karl XII. of Sweden, P. was overrun by Karl, who placed on the throne Stanislaus Leszcziusky (1704–9). But after

the battle of Pultava August regained his powerless crown, which it had before cost him great sums to win. After his death the contentions inevitable to a Polish election deepened into a general war between the Great Powers of Europe, some in favour of the banished Stanislaus Leszcziusky, the choice of the majority of the nation, others supporting August III.—as Elector of Saxony Friedrich August II.—the son of the late king, who was recognised in 1735 at the peace of Vienna. The 'Dissidents,' who in 1563 had obtained equal rights with the Catholics, had already in 1717 lost great part of these; the Jesuits fed the flame of persecution, and from their iniquitous capital tribunal at Thorn (1724) sowed the seeds of deadly hatred. By the Diets of 1733 and 1736 the Dissidents were excluded from all public offices, and henceforth they were subjected to severe oppression. In taking their part Russia found a welcome opportunity for interference in the domestic affairs of her de-ranked and anarchical neighbour. After the death of August III. (1763), Catharine set on the throne her discarded lover Count Stanislaus August Poniatowski (1764–95). 15,000 Russians forthwith entered P. to support Stanislaus and protect the Jews and Dissidents, and the real power lay in the hands of Repnin, the Russian ambassador at Warsaw. The national party in the Diet of 1766 seeking to abolish the *liberum veto*, and sharpen the laws against the Dissidents, Russia seized the opportunity to send 40,000 men into P. When under their protection Prince Radziwil concluded the General Confederation of Radom, June 1767, and in October the Diet set about preparing a new constitution to be guaranteed by Russia. Repnin demanded the equality of the Dissidents and banished the recalcitrant bishops to Siberia. The new constitution had not yet been accepted (24th February 1768) by Russia and Prussia, when the Confederation of Bar was formed (20th February) for the protection of the Catholic Church and national freedom with Marshal Krasinski at its head. Though it succeeded in inducing the Turks to declare war against Russia (30th October 1768), that power had troops enough to occupy South and East P. at once. In the summer of 1770 Austria seized the Hungarian comitat of Zips, which in 1412 the Emperor Sigismund had pledged to P., and Friedrich of Prussia sent across his frontier a force of 12,000 men. In vain did the confederates of Bar, with the moral support of France, seek to gain possession of Warsaw, raise Lithuania in arms, and seize the weak king (3d November 1771), that they might force his abdication in favour of Pulawski. Everything miscarried. Already had the Prussian and Austrian ambassadors plotted in St. Petersburg and Vienna the *first partition of P.* Maria Theresa at first rejected the proposal with indignation, but was soon persuaded to put forward extensive claims. After the conclusion of a secret treaty on the 5th August 1772, Russia, Prussia, and Austria presented their claim to the Diet of Wilna. Russia took (23d August 1773) Polish Livonia, the Waiwodeships of Vitebsk and Mstislav, half of Polozk and part of Minsk,—in all 43,800 sq. miles; Prussia got Polish Prussia (except the towns of Danzig and Thorn), and a part of Great P. (the Netze District), 14,240 sq. miles; and to Austria fell Zips, half of the Waiwodeship of Cracow, and part of Sandomir, Red Russia, &c.,—about 28,000 sq. miles. The Poles now for the first time saw their mistake. Straining every nerve to secure the independence of what was left to them, and encouraged by the new king of Prussia's promise of protection, they adopted (3d May 1791) a new constitution, which won the praises of Fox and Burke and the approval of Prussia. This provided that after the death of Stanislaus P. should be a kingdom hereditary in the House of Saxony, and with institutions based on the more liberal principles of modern times, the *Liberum veto* being abolished, and the third estate admitted to national representation and public offices. But Catharine rejected it in her declaration of the 18th May, and the Turkish war ending soon after with the Peace of Jassy, she had her hands free to oppress P., while the Prussian king found it more convenient to join in a new robbery than to risk a struggle in support of his promise. Under Catharine's protection, a confederation was formed at Targowitz against the new constitution. After a brave resistance the Polish troops were forced to yield to Russia's superior strength, and in 1793 was made a *second partition*, by which Russia obtained a great part of Lithuania, with the Ukraine, Podolia, the E. half of Volhynia, &c. (110,700 sq. miles); and Prussia the waiwodeships of Posen, Gnesen, and Kalish, &c., with the towns of

Danzig and Thorn (28,200 sq. miles). P. was now reduced to 84,646 sq. miles, with a pop. of 3,500,000; the king had merely the name, and Russian soldiers and officials filled the land with deeds of riot and brutality. At length an attempt was even made to disarm the remnant of the Polish army, but the ill-treated folk rose (March 1794) to the resistance of despair, Kosciusko placed himself at the head of his countrymen, the Russians were driven from Warsaw, and in the sacred struggle for fatherland and freedom the valour and devotion of the Poles seemed about to atone for the faults of bygone generations. The battle of Raclawicz (4th April), and the relief of Warsaw, besieged by the Prussians (5-6 September 1794), are the brightest days in the life of the Polish nation. But they came too late. Without fortresses or military skill, without allies or even arms, P. was no match for her great oppressors. Kosciusko was defeated and taken prisoner at Maciejowicz, and Suvaroff advanced on Warsaw, which, on the fall of its suburb Praga was forced to yield. Austria now demanded a share of the spoil, the three Powers proceeded to the *third and last partition of P.* (24th October 1795)—in which Russia took 44,460, Prussia 21,830, and Austria 18,250 sq. miles—and P. was torn from the number of European nations. While the destruction of P. has been fitly called 'the greatest crime of modern times,' the fate of that unhappy country will for ever stand in history as a warning to all states in which either the highest or the lowest classes wield a preponderating power, the surest token of a nation's fall. The king without a country was dismissed with a pension, and died at St. Petersburg in 1798. The promises of the three robber Powers to respect the nationality of the Poles, and to suffer certain national bodies to direct legislation, taxation, and trade, though repeated, confirmed, and extended by the Treaty of Vienna in 1815, were never kept. The declining hopes of the Poles were raised by the victories of Napoleon, who formed in 1807, in connection with the kingdom of Saxony, a duchy of Warsaw out of lands (40,415 sq. miles, with a pop. of 2,200,000) yielded by Prussia at the Treaty of Tilsit. To this West Galicia (61,320 sq. miles, with a pop. of 3,800,000) was added in 1809. But his reverses in Russia in 1813 turned the scale, and at the Vienna Congress (1815) a 'Constitutional kingdom of P.,' whose crown was united to that of Russia, and a little 'Republic of Craow,' were erected. On the 27th November 1815 P. received a free constitution with two chambers, and the promise of a separate army and finances, with a native viceroy and responsible ministers. The first diet met in 1818, but already in 1820 the Emperor Alexander I. expressed displeasure at the rejection of certain Government bills, and on the death of the first viceroy a successor was not appointed, but the Grand Duke Constantine thenceforth ruled alone with brute violence as 'military governor.' In 1825 ceased the freedom of the press, and an arbitrary addition to the constitution suppressed the Diet. Secret societies were organised, and on the 29th of November 1830 the Poles rose in revolt. Several Russian generals were assassinated, and the Russian troops (7000) fled from P. On the 4th December a provisional government was established under Prince Czartoryski, Ostrowski, and Lelewel. Soon after General Chlopicki was chosen Dictator, but he busied himself more with negotiations with the emperor than with military preparations. Nicholas refusing to treat with 'rebels,' Chlopicki resigned. A new government under Czartoryski formally deposed (25th January 1831) the House of Romanoff, and proclaimed the reunion of Lithuania and W. Russia with P. On the 6th February General Diebitch with 130,000 Russians entered P., and on the 14th began the struggle. In the first actions the success lay with the new Polish leader Skrzynecki, but after the drawn battles of Wawer (20th February) and Grochow (25th February) the Poles were compelled to retreat to Warsaw. On the 1st April they won a great victory at Wawer, but on the 26th May they suffered a severe defeat at Ostrolenka, from which they never recovered. Warsaw capitulated on the 8th September, and by the 16th the Polish rising was at an end. Upwards of 40,000 Poles emigrated to England, France, and Switzerland. The independence of P. was annihilated by the 'Organic Statute' of the 20th February 1832, and the Polish army was incorporated with the Russian. The universities of Warsaw and Wilna were closed. Warsaw and Modlin became Russian fortresses. Numerous estates were confiscated and given to Russian officers, and their former owners consigned to the *oubliettes* of Siberian fortresses. The country was divided into 'governments' instead of 'waiwode-

ships,' the old coinage, weights, and measures were succeeded by those of Russia, and in 1851 the customs frontier between Russia and P. was blotted out. An intended revolt in 1848 under Mierolawski was nipped in the bud, and in the same year a rising of the Ruthenian peasants against their nobles in East Galicia gave a pretext for destroying the republic of Craow, which was merged in Galicia. A better day seemed to dawn with the accession of Alexander II.; the government of Prince Michael Gortchakoff was milder than that of Paskevitch, and many emigrants returned home. During a visit to Warsaw (April 1856) the emperor counselled the Poles to cherish 'no dreams' of independence. But the flame of patriotism was not yet extinct. In the winter of 1860-61 the popular feeling began to find expression in sorrowful church-services, and almost the whole nation went into mourning. On the 8th June 1862 the Grand Duke Constantine was appointed 'viceroi,' with the Marquis Wielopolski as 'civil governor,' and Russia hastened to appease the people by a milder rule. In vain; from June to August repeated attempts were made to assassinate the Russian leaders, and the Government forthwith instituted an arbitrary conscription to draft off the 'revolutionary element.' A secret 'national government' was formed, whose 'hanging gendarmes' were implicitly obeyed, and a rising took place which was not wholly put down till January 1864, by General Berg, acting in concert with Muravieff in Lithuania, and Kauffmann in Volhynia. Then followed a general banishment of the nobles and confiscation of their estates. The peasants, freed from their obligations to the nobles, in 1863 in Lithuania and Volhynia, and on the 2d March 1864 in P. proper, received their farms from the Russian Emperor, and paid taxes to the exchequer of the empire. To break the power of the clergy, the monasteries, 114 in number, were abolished, and their estates confiscated (November 8, 1864), the direction of the Catholic Church in P. was transferred to St. Petersburg, and the bishops were forbidden to hold direct communication with the Pope. Russia now used every means to diffuse the Russian language in P., making it the only language recognised for instruction in the common schools, and completely Russianising the University of Warsaw. Gradually the smallest branches of the Polish administration were placed (1867-69) under the central authority of Russia, and with the removal of the supreme courts in 1876 vanished the last faint gleam of national individuality. According to Brachelli, the Polish nation now numbers 9,700,000 souls; of whom 4,772,000 are under Russia, 2,463,000 under Austria, and 2,432,000 under Prussia. See Bronikowski, *Die Geschichte P.s bis 1825* (4 vols. Dresden, 1827); Röpell & Caro, *Geschichte P.s bis 1455* (4 vols. Gotha, 1840-75); Rulhière, *Histoire de l'Anarchie de Pologne* (4 vols. 1807); Lelewel, *Geschichte P.s* (2d ed. 1847); Spazier, *Geschichte des Aufstands 1830-31* (3 vols. 1832); Duchinski, *La Moscovie et la Pologne* (Constantinople, 1855); Von Smitt, *Suwarow und P.s Untergang* (Leips. 1858); Ssolowjow, *Geschichte des Falles von P.* (1865); Bulle, *Geschichte der neuesten Zeit* (1875); Röpell, *P. um die Mitte des 18 Jahrhunderts* (Gotha, 1876); and E. von der Brüggel, *Polens Auflösung Kulturgeschichtliche Skizzen aus den letzten Jahrzehnten der Polnischen Selbstständigkeit* (Leips. 1878).

The Russian province of P., till January 19, 1874, a distinct part of the Russian Empire with a separate administration, has from that date been called the General Government of Warsaw, and placed on the same footing with the rest of Russia. Its area of 47,101 sq. miles (one-fourth forest, lakes, and swamps) has (1872) a pop. of 6,276,575 (65 per cent. Polish, 13 per cent. Jews, 11 per cent. Russians, and the rest Lithuanians or Germans), and is divided into ten governments—Warsaw, Kalisz, Piotrkow, Radom, Kielce, Lublin, Siedlce, Plock, Lomza, Suwalki. It is a fruitful plain, watered by the Vistula, with its tributaries the Pilica, Bug, and Wieprz. Agriculture is the chief occupation. In 1872 the corn reaped in P. amounted to 14,741,430 qrs.; the potato crop to 118,108,709 bushels. The industries include the weaving of woollens, linens, and cottons, brewing, distilling, and the manufacture of leather, oil, sugar, and wax. In 1872 the exports of P. (chiefly timber, wheat, rye, wool, swine, woollen fabrics, hides and leather, flax, metals, horses, bristles, oil-seeds, cattle, bones, and caviar) were valued at £9,700,490, and imports (mainly raw cotton, machinery, metals, salt, woollens, hardware, petroleum, liquors, cottons, fish, linens, colours, fruit, and silks) at £15,821,253. The customs amounted to £1,329,971. At the last census 77 per cent.

of the pop. of P. were Roman Catholics, $5\frac{1}{2}$ per cent. Protestants, and $4\frac{1}{2}$ per cent. of the United Greek Church; but since the rising of 1863 Russia has forced thousands to forsake the Roman Catholic for the 'Orthodox' Greek Church.

Polar Expeditions. The prevailing ideas in Western Europe of the splendour and exhaustless wealth of India were revived and confirmed by the glowing tale of Marco Polo in the 13th c., and in the discovery of routes to El Dorado a task was provided for a race of practical, enterprising men, quickened by the spirit of the Renaissance. By the beginning of the 16th c. the Portuguese had discovered the sea passage to India round the Cape of Good Hope, and the Spaniards that round S. America, but both these routes were guarded by a strict monopoly. Thus excluded from the East, England became eager to find a route for herself, and Sebastian Cabot in 1496 inaugurated the long search for a North-West Passage. The gradual discovery of such a route, and of a similar route to the East along the N. coast of Europe and Asia, is traced in the article NORTH-EAST AND NORTH-WEST PASSAGES. The present article is confined to the consideration of expeditions made for the purpose mainly of exploration in the Arctic regions. The land surface of the Arctic region is much greater than that of the Antarctic, and the former has, chiefly on that account, a higher temperature. In both regions the sea teems with life, but in the Arctic region alone, land animals, such as the bear, wolf, reindeer, musk-ox, and Arctic fox, are scattered over the frozen surface. Birds are numerous in both regions, and, strangely enough, are found in even greater number and variety in the severer region of the S. A hardy vegetation, including, in summer, beautiful flowers, extends beyond the Arctic circle, but in the opposite region no tree grows further S. than about lat. 56° . That the land around both poles was formerly covered by tropical or semitropical vegetation is proved by the discovery of fossil remains. To account for this phenomenon there are many theories, that of Dr. Croll being the last and perhaps most probable. According to Dr. Croll, the change in the eccentricity of the earth's orbit, combining with the precession of the equinoxes, produces in long lapses of time a slow secular change of climate, of warmer and colder cycles, alternating in the N. and S. hemispheres. However this may be, within the term of our actual knowledge these regions have been given over to icy desolation and long sunless winters, broken by three months of joyous summer, when the sun never sets.

Arctic Expeditions.—The early expeditions (first 1603) of Stephen Bennet were mainly for the purpose of moose-hunting. But in 1607 Henry Hudson was sent forth by the Muscovy Company to find his way, if possible, across the Pole. He got as far as lat. $81^{\circ} 30'$ to the E. of Spitzbergen, when he was stopped by the ice, and put back to Nova Zembla. The three voyages of Jonas Poole (1610-12) added little to existing knowledge; but about the same time Thomas Marmaduke penetrated N. of Spitzbergen to lat. 82° . In 1614, Baffin, passing up Davis Strait, discovered the extension of that channel, to which he gave the name of Smith Sound. Next year Lothery corrected some of Hudson's observations. With the single and abortive exception of Captain Wood in 1676, the English made no effort to reach the N. Pole for more than a century and a half. In the reign of George III. the Admiralty fitted out two vessels for purely scientific discovery, and under Captain John Phipps (1773) they coasted Spitzbergen to Cloven Cliff, then for about a month traced the edge of the field of ice, eventually found an opening which allowed them to reach lat. $80^{\circ} 48'$, but were frozen in, and only extricated after the severest exertions. This failure, and the still greater one of Captain Cook in his attempt to advance N. through Behring Strait (1779), had the effect of so discouraging explorers, that the offer by Parliament of £5000 to the crew which should penetrate to within 1° of the Pole met with no response. In 1806, Scoresby advanced to lat. $81^{\circ} 30'$ due N. of Spitzbergen, and in later voyages explored great part of Jan Mayen's Land and the E. coast of Greenland. The close of the war with France in 1815 was followed by a renewal of the attempt to find a N.W. Passage. In 1818 the *Dorothea* and *Trent*, under Franklin and Buchan, in an attempt to find a passage from Spitzbergen to the Pole, reached lat. $80^{\circ} 37'$ amid great perils, and were forced to return on account of the injuries they received from the ice; while the *Isabella* and *Alexander*, under Ross and Parry, penetrated up Baffin Sea to the entrance of Smith Sound, and made many important discoveries. In

1827-33, Captain Parry (q. v.) and Lieutenant James Ross, commissioned by the Admiralty to attempt a passage to the Pole, made one of the most daring and adventurous voyages on record. They sailed in the *Hecla* on 25th March, anchored the ship in Hecla Cove, Spitzbergen, 20th June, and proceeded next day to push boldly N. in two specially constructed boat-sledges, the *Enterprise* and *Endeavour*. These vehicles when used as sledges were dragged by the men. The labour of traversing alternately fields of rough ice and dangerous pools, ice hummocks, and deep snow-slush, in thick fog or heavy rain, was terribly exhausting. Finding that they drifted S. as rapidly as they were advancing, Parry began the return journey 27th July, and reached the *Hecla* without mishap, 21st August. He had got as far as $82^{\circ} 45'$, the highest latitude reached till 1875. We must here at least refer to the fatal expedition of Sir John Franklin (q. v.) on account of its great influence on Polar research. Within the last thirty years more than forty 'Franklin search expeditions' have gone forth from England and America, the last being that of Captain Allan Young in the *Pandora* in 1875. The first purely scientific expedition from America was that of the *Advance* under Dr. Kane, which left New York 30th May 1853, entered Smith Sound, and was abandoned after passing two winters in Rensselaer Bay. Kane saw from a height of 480 feet at Cape Constitution what he wrongly supposed to be an 'open Polar sea.' Dr. Hayes, who had accompanied Dr. Kane, again set out in 1860, made his winter harbour near Cape Alexander, and after forty-six days of dog-sledging, reached lat. $81^{\circ} 35'$, where his progress was stopped 'by rotten ice and cracks.' He claimed to have demonstrated the existence of an open sea and the feasibility of exploring the entire region. On 3d July 1871 Captain C. F. Hall started in the *Polaris*, and, after a singularly prosperous voyage, entered Kane's 'open sea,' and attained lat. $82^{\circ} 16'$ without 'obstacle of any kind.' The vessels wintered in the high lat. of $81^{\circ} 38'$. Captain Hall died 8th November from the effects of imprudent exposure. The *Polaris* party made many interesting discoveries regarding the abundance of animals (including the musk-ox), &c. The lowest temperature registered was 48° F. below zero. In June 1872 the vessel drifted with the pack ice into Baffin Bay, where suddenly she tore away before the wind, leaving nineteen castaways on the floe. The ship ran ashore on the E. side of Smith Sound, and the crew set sail S. in two boats constructed from her timbers. Happily both parties were rescued from their perilous position by whalers. In 1868 Captain Koldewey, in the *Germania*, a small vessel fitted out by Dr. Petermann, pushed N. along the E. coast of Greenland, was stopped by pack ice, and later reached the high lat. of $81^{\circ} 5'$ to the N. of Spitzbergen. He then sailed down Hinlopen Strait, and finally reached Bergen safely in September 1868. The 'Second German Expedition,' as the voyage of the *Germania* and *Hansa* is called, took place in 1869-70. The ships made for the E. coast of Greenland, but 35 miles S. of Sabine Island, the place of rendezvous, the *Hansa* was wrecked on the ice, and its crew made a marvellous escape. They drifted S. on the 'ice-raft' or floe to lat. $61^{\circ} 4'$ in 200 days, and eventually reached Friedrichsthal, a Moravian colony on the W. coast of Greenland, in two boats. The *Germania* wintered in lat. $74^{\circ} 18'$, a few miles from land, and among the discoveries in the northerly journeys were 'an enormous layer of coal alternating with sandstone' in about 75° , and the Devil's Cape, a reddish wall 3280 feet high, in 76° , from whence, Payer believes, the Greenland coast trends N.W. to Smith Sound. During the spring journey the party reached their furthest point, $77^{\circ} 1'$, on April 15. The *Germania* returned to Europe safely in September 1870. The Austrian Expedition of 1872-74, under Weyprecht and Payer, was one of the most important of all times. Grasped in the ice in lat. $76^{\circ} 32'$, the *Tegetthoff* drifted slowly N. from Nova Zembla, and (30th August 1873) sighted land in $79^{\circ} 43'$ F. The winter of 1873-74 was devoted to the exploration of the new country, which was named Franz-Joseph Land (q. v.). In May 1874 the crew abandoned the *Tegetthoff*, and dragged the boats across the ice to Barentz Island, then along the coast of Nova Zembla, and were rescued in an exhausted state by the Russian schooner *Nikolai*. The last and greatest expedition is that of the *Alert* and *Discovery*, under Captain George S. Nares, which left Portsmouth 29th May 1875. Advancing up Smith Sound, the *Discovery* was left in Lady Franklin Sound, while the *Alert* was only closed in (16th September 1875) after attaining lat. $82^{\circ} 27'$

on the shores of the Polar Sea, a point far north of that gained by any ship before. In the spring various sledge parties carried on the work of exploration, the chief one being that under Markham and Peary, which advanced to the high lat. of $83^{\circ} 26' 26''$, or to within 400 miles of the Pole. The results of the expedition, generally, were that the Polar Ocean is apparently a 'sea of ancient ice,' and is certainly not an 'open sea,' and that Europeans may safely winter in a climate where the most intense cold known prevails. The sledges explored the fringe of the frozen ocean over 50° of longitude, and added vastly to our knowledge of Arctic physiography. Nares concludes that it is impossible either to carry ships further N. in Smith Sound, or from any attainable position in the Sound to advance nearer the Pole by sledges. The vessels were safely extricated, and arrived at Disco 25th September 1876. A new Dutch Arctic Expedition left Amsterdam for Spitzbergen in May 1878, and the American Howgate Expedition started in July 1878. See Sir John Richardson's *Polar Regions* (Edinb. 1861), Smith's *Arctic Expeditions from British and Foreign Shores* (Edinb. T. C. Jack, 1877), and Dr. Petermann's articles in the *Mittheilungen* for recent years. For expeditions in the Antarctic regions, see SOUTH POLAR RESEARCH.

Polarisation is a term applied to a variety of distinct physical phenomena, in all of which, however, a certain *directedness* is implied. Thus the polarity of a magnet is a kind of P., and perhaps the most familiar of all and the easiest to recognise. Here we have two ends, called poles, possessing opposite properties, and the same peculiarity is possessed by solenoids or helices of conducting wire traversed by currents, and through them may be extended to rotation of bodies generally. In the same way a rectilinear current, regarded as the seat of magnetic action and the cause of the existence of a magnetic field, is also polarised. The word P., however, is rarely used but in two connections, which shall be considered in succession.

1. *Polarisation in Electrolysis.*—When a current is passed through an electrolyte, decomposition is known to take place. For instance, if the poles of a Daniell cell are connected to two pieces of platinum, which act as the electrodes to a quantity of acidulated water, the oxygen is given off at the electrode which is connected with the copper or positive pole, and the hydrogen at the electrode which is connected with the zinc or negative pole. Now platinum and indeed all metals have a remarkable power of condensing gases on their surface, and consequently not all the hydrogen and oxygen formed is given off. Some remains attached to the surface of the electrodes, so that now these electrodes can no longer be regarded as similar. The one is coated with hydrogen and the other with oxygen; and the electrolyte with its electrodes becomes in fact the source of a galvanic current, which acts in a direction contrary to the original current. This is proved by simply throwing the electrolyte into a galvanometer circuit, when a deflection is observed which gradually diminishes, thus indicating a dissipation of the P. When the original current is kept flowing constantly through the electrolyte, its intensity is of course diminished because of the contrary current due to P. As the current is continued the P. tends to reach a finite value, and the nearer the P. is to its maximum, the quicker is the dissipation when left to itself. It is this P. which renders experimental investigation into the electric resistance of liquids so difficult, and which is the great cause of the variation of resistance in simple cells. Exactly similar phenomena are observed if a current is sent through a dielectric like india-rubber or glass. The glass, however, must be at a temperature of 100° C. or higher, since for low temperatures it is a non-conductor; but these substances, though solid, appear to be true electrolytes, or at all events may be regarded as acting as such. See Clerk Maxwell's *Electricity and Magnetism*, vol. i.

2. *Polarisation of Light.*—If a ray of ordinary light be transmitted through a thin slice of the semi-transparent mineral tourmaline cut parallel to the axis, it becomes what is called polarised. Polarised light, however, cannot be distinguished by the eye from ordinary light; and the only apparent change in the transmitted beam will be a slight colouring in consequence of the natural tint of the crystal employed. That the light has not the same properties after transmission which it had before, is proved by transmitting it through another similar slice of tourmaline. It is then seen that when the slices have a certain relative position to each other, there is no light whatever transmitted. By rotating either, so as to alter their relative

positions, the combination will become transparent, and the transparency will increase, as the rotation is continued, until it reaches a maximum, when the transmitted light will be of the same intensity as if it had been transmitted through one piece of tourmaline equal in thickness to the two taken together. If the rotation is still continued, the light will begin to fade until it reaches its minimum again, until it becomes completely extinguished. By still continuing the turning the same cycle will take place—transparency and opacity alternating with every intermediate stage. Each maximum and minimum recurs after rotation through 180° , or two right angles; while rotation through one right angle is accompanied by a change from maximum to minimum, or from minimum to maximum. It is clear, then, that light passed once through the tourmaline, has completely changed its character. It is no longer symmetrical about an axis, since it passes similarly through a second piece of tourmaline only when the latter has a certain position. Rotate this tourmaline through one right angle, and the light is unable to pass. There is maximum transmission when the tourmalines are set so as to have their axes parallel; there is minimum transmission when these axes are perpendicular to each other. Tourmaline then polarises light; but to recognise this P. it is necessary to have two pieces of apparatus, the one to polarise and the other to analyse. In the case described, the first piece of tourmaline is the polariser; the second piece, the analyser. The above experiment shows that a polarised ray of light is unsymmetrical round an axis; it has, so to speak, *sides*, and in this differs from ordinary light. According to the now universally accepted undulatory theory, light is regarded as a form of radiant energy, transmitted in undulations through the all-pervading ether. These undulations are supposed to be caused by vibrations taking place in planes perpendicular to the ray. In ordinary unpolarised light the vibrations take place in all possible directions perpendicular to the axis of the ray. In polarised light, such as we get by transmission through tourmaline, the vibrations are executed all in one plane. Here we have what is known as *Plane P.*, to be distinguished from other kinds to be considered later. And now, upon this hypothesis, a very simple reason is afforded for the complete cutting off of the light when the tourmalines are set so as to have their axes at right angles. In whatever position the second tourmaline is, it will act upon the already polarised ray exactly as the first tourmaline did upon the ordinary light. It will make the vibrations take place in a plane definitely fixed with respect to itself, it will simply transmit the portions of the vibrations which are resolved into this plane, and will therefore transmit none when this plane is perpendicular to the original plane of vibration. Such is the general explanation of plane P. Experiment shows that reflected light is always partially polarised. It may be simply demonstrated by looking at reflected light through a piece of tourmaline and rotating the crystal, when a varying intensity will be observed. The amount of P. depends upon the angle of incidence, but attains a maximum for a definite angle which differs for different media. Brewster proved by experiment that this *polarising angle* is such that its tangent is equal to the refractive index of the medium; or, in other words, the reflected ray and refracted ray are at right angles to each other when the incident ray makes the polarising angle with the perpendicular to the surface. The same law can be deduced from theory. Not only, however, is the reflected ray polarised, but, as might have been expected, so is the refracted ray. It is of course only partially polarised, but by refracting it, with accompanying reflection, through a series of thin parallel plates, it will, so to speak, undergo continual sifting and emerge highly polarised. The plane in which a plane-polarised ray, incident at the polarising angle, is most copiously reflected, is called the plane of P. of that ray. When a doubly-refracting crystal such as Iceland spar (see REFRACTION) is traversed by a ray of light, the ray, except when parallel to the optic axis, is divided into two, known as the ordinary and extraordinary rays. The former is refracted according to the ordinary law, the latter not so. Both, however, are polarised. In order to study the P. successfully, one must be thrown completely out of the field. This may be effected in various ways, but the most common method is by the use of a Nicol's prism, which is merely the two halves, obtained by splitting a rhomb of Iceland spar along a diagonal plane, cemented together again by Canada balsam. The ordinary ray is then totally reflected at the surface of the Canada balsam, while the extraordinary ray is allowed to pass.

When a plane polarised ray of light is reflected at a surface it becomes elliptically polarised—that is, the vibrations take place no longer in straight lines, but in ellipses whose axes are equal and parallel. The explanation of this is as follows. The incident polarised ray may be decomposed in two directions, namely, in the plane of incidence, and perpendicular to that plane. The effect of reflection, however, is to alter the phases of these portions in opposite ways, so that the one set of vibrations is accelerated and the other retarded. After reflection, then, we have a combination of two harmonic motions of equal period but of *different* phase, and the result is, in accordance with known kinematical law, elliptical motion. Should the phases differ by a quarter of a period, the ellipse will become a circle, and we shall have circularly-polarised light, provided that the amplitudes are equal. This latter condition is effected when the plane of P. of the incident ray makes, with the plane of incidence, an angle of 45° . *Fresnel's rhomb* is a parallelepiped of glass, so cut that a ray of plane polarised light entering perpendicularly by one of the sides, suffers two internal reflections, and emerges perpendicularly from the opposite face as a circularly polarised ray. Transmission through a second rhomb reduces the ray again to the plane polarised condition; but the plane of P. has been rotated through one right angle. This rotation of the plane of P. is a phenomenon which always accompanies the direct transmission of a plane polarised ray through certain media; but in such cases the amount of rotation is a function of the thickness of the medium. Such a medium is rock-crystal, and Biot established by experiment that the rotation is always proportional to the thickness, and increases, *ceteris paribus*, with the refrangibility of the ray. It is this which accounts for the beautiful colours which the polarised ray presents when viewed through an analyser. Solutions of sugar, oil of turpentine, and certain other liquids have the same rotating effect, though not to such a marked extent. All such substances are grouped in two classes, according to the direction in which the rotation takes place. Ordinary quartz and oil of turpentine give right-handed rotation, *i. e.*, in the direction of the hands of a watch; solution of uncrystallisable sugar, and the kind of quartz known as left-handed, gives the rotation in the other direction. These phenomena have been accounted for by taking a plane-polarised ray to be equivalent to two circularly polarised rays in which the vibrations are in opposite directions, and then supposing that these oppositely circularly polarised rays are transmitted with unequal velocities through the medium. One of them will then be retarded by an amount proportional to the thickness traversed, and it can be shown mathematically that this retardation fully accounts for the rotation of the resultant plane P. Similarly is explained the rotation of the plane of P. by the action of magnetism. The undoubted rotatory character of magnetic action is supposed to accelerate the one circularly-polarised ray and retard the other.

If between a polariser and analyser set so as to permit no light to pass, a plate of a doubly refracting crystal, such as mica or selenite, is introduced, a portion of the light will at once pass, except for two positions of the interposed plate. These positions are when the principal section of the crystal coincides with the plane of P., or is perpendicular to it, and there is maximum illumination for positions midway between these. Should the interposed plate be very thin, a most gorgeous combination of colours results. Rotation of the crystal alters simply the *intensity* of the light, the tints remaining the same. If, however, the crystal is fixed and the analyser turned, the light will pass through every grade of tint into the complementary colour. Here we have *interference* of polarised light. Experiment and theory alike agree in showing that two rays of light polarised in the same plane interfere and produce fringes, as two rays of common light do, and that the interference diminishes as the planes are more and more inclined to each other, until when they are perpendicular there is no interference. The splendid optical effects which interference of different kinds of polarised light affords cannot here be entered upon. For a popular description of them the reader is referred to Spottiswoode's *P. of Light* ('Nature' series, 1874). The theory is very fully explained in Lloyd's *Wave Theory of Light* (3d ed. 1873).

Pol'der (Dutch, probably allied to the English 'pool'; Ger. *pfuhl*, 'a pool' or 'marsh'), or **Kooge**, a name given in Holland to reclaimed lands which lie below the level of the sea or adja-

cent river. They are the beds or lakes or marshes out of which the water has been pumped—in the case of the smaller P. by means of wheels driven by windmills, in the case of those of large area by powerful steam pumping-engines. They would soon return to their original condition were the pumps withdrawn, or were the dykes by which they are surrounded to give way. The polders of Holland are extremely numerous (S. Holland alone contains over a thousand), and some of them lie as low as 40 feet below high-water mark. In the Schermermeer P., N. Holland, there are four drainage levels. The largest, in which the work of drainage is completed, are those of the Haarlem Lake (q. v.) and Beemster (near Edam in N. Holland), measuring 15 miles in circumference. But the largest ever planned is now in construction out of the Zuyder Zee. The preliminary work in this vast undertaking is the erection of a dyke or wall of partition from Enkhuisen to Kempen, *via* the islands of Urk and Skockland, a distance of 25 miles. The dyke has a breadth of 164 feet at its base, and is to rise 26 feet out of the water.

Pole and Polar. To fix a point in space requires three numbers. These three numbers may be taken with reference to three fixed planes, which are usually rectangular. The distances of the point from these planes are the co-ordinates of the point, and when given, completely determine the position of the point. In the method of polar co-ordinates, the point is fixed by a distance and two angles. When the distance of the point from the origin or P. is given, the point loses one of its degrees of freedom, and may be anywhere upon the surface of a sphere. If, however, we know the altitude of the point above a plane fixed in space and passing through the P., and its azimuth with reference to a straight line fixed on that plane, the position of the point is completely fixed. For many problems, especially in astronomy, polar co-ordinates are much more convenient than rectangular co-ordinates. In quaternion analysis, the three polar co-ordinates are combined in one symbol, the *vector* drawn from the origin to the point. In modern geometry, the term P. has a totally distinct meaning. From every point two tangents, real or imaginary, can be drawn to a curve of the second order. In all cases the line joining the points on the curve where the tangents touch is a real line, and is called the polar of the point. Conversely the point is called the P. of the line. If the curve of reference be a circle whose centre is O, the polar of any point P is the perpendicular which intersects OP, or OP produced in the point Q such that the product OP.OQ is a constant, the square namely of the radius of the circle. The polar of a point which lies upon the polar of another point passes through the latter; or, if A be a point in the polar of B, B is a point in the polar of A. The curve formed by the ultimate intersections of the polars of the points upon a given curve is the reciprocal polar of the latter curve. One particular case of this is the reciprocal polar of a given circle, which is always a conic section whose directrix is the polar of the centre of the circle. It is of importance as being the case of the Hodograph (q. v.) for motion under the action of the force of the inverse square. The method of reciprocal polars, by which one theorem regarding lines and points leads directly to a related theorem regarding points and lines, is a development from the theorems given above. See Salmon's *Conic Sections* for detailed discussion concerning them.

Pole, Reginald, son of Sir Richard P. and Margaret, Countess of Salisbury, was born 3d March 1500, at Stourton, Staffordshire. He received his education first of all in a convent at Sheen, from which he passed to Magdalen College, Oxford, to the tuition of Latimer and Linacre. Having graduated B.A. in his fifteenth year, he was speedily advanced in the Church by Henry VIII., to whom he was related. P. next took up his residence at Padua, and for five years associated on the footing of a prince with Erasmus, Bembo, Sadoletto, and other scholars of European reputation. In 1525 he came back to England, where his refinement and scholarship made a great impression. Henry VIII., now bent on obtaining a divorce from Catharine of Aragon, was anxious that his kinsman should assist him. P. seems, if we may judge from a recently discovered letter, to have at first gone heartily into the matter, but he was at heart a staunch Churchman, if not a man of strong intellect or character, and he soon drew back, retiring to the Continent. In 1531 he was offered the Archbishopric of York as the price of his consent, but declined to give it. Having

published an attack on the king in a Latin treatise, *De Unitate Ecclesiastica*, it was answered by the seizure of his relatives—the aged Countess of Salisbury, the Marquis of Exeter, and Lord Montague—all of whom were brought to the block. On the 22d December 1536, Paul III. created him a cardinal at Rome, and in the following year he acted as legate before Karl V. and François I. In 1545 he performed the duties of legate-president at the Council of Trent, and in 1549 was all but appointed to the Papal chair. He returned to England, November 24, 1554, as Roman plenipotentiary, with the commission of restoring the realm to the Catholic faith, and under Queen Mary became Archbishop of Canterbury and Chancellor of the Universities of Oxford and Cambridge. He died of a quartan fever, 18th November 1558. P. was a finished classical scholar, and has left models of good latinity in his *Reformatio Angliæ*, *De Concilio*, and *De Justificatione*. 'Everything,' says a writer in the *Saturday Review* (16th February 1878), 'that comes to light about P., is favourable to his moral character and uprightness of intention, but everything also seems to indicate a feebleness of intellectual power in which the last Cardinal of Canterbury is contrasted most distinctly with the last Cardinal of York.' See Phillipps' *Life of Reginald P.* (Oxf. 1764), and Calendar of State Papers and MSS. existing in the Archives and Collections of Venice, &c., vol. vi. Part 1, 1555-56, edited by Rawdon Brown, published under the sanction of the Master of the Rolls (Lond. 1877).

Pole-Axe, a kind of battle-axe having a long pole shaft, carried by medieval foot soldiers. The axe-head varied much in form among the different nationalities; sometimes it combined a spear point and hammer. The Bayeux tapestry shows the English soldiers armed with plain pole-axes. The Lochaber axe—the national weapon of the Scottish Highlanders—and the Lowland Scottish Jedburgh axe, in use from the 16th to the 18th c., were noted varieties of the P.-A. The short hatchet used in the navy in resisting boarders, cutting ropes, &c., also bears the name P.-A.

Polecat (*Putorius fatidus*), a species of Carnivorous animals belonging to the *Mustelidae* or weasel family. It has thirty-four teeth, and ears of moderate size. The body is about 18 inches long. Like other members of its family, the P. has *anal glands*, placed near the root of the tail, the secretion of which has a most offensive odour, on account of which it is known as the 'Foumart' or 'Foul marten.' The name 'Fitchet' is also given to it. The under fur is close, and of a pale yellow colour; the upper fur is composed of long brown hairs. The P. is very destructive to poultry-yards, but its food appears to be of a very miscellaneous kind, and includes frogs, fishes, and the smaller quadrupeds. The nest occurs at the end of a burrow, and from four to five young are produced at a birth. The outer and longer hairs of the fur afford the materials from which the finest artists' brushes are made.

Polemonia'ceæ is a natural order of dicotyledonous annual or perennial herbs, or rare shrubs with entire or divided leaves, usually white or blue flowers in terminal cymes, and fruit a three-celled capsule. It numbers about 100 species, chiefly met with in temperate and arctic regions, and especially plentiful in W. America. The properties are unimportant, but many have been long cultivated in gardens for their showy flowers; e.g., different species of *Phlox*, *Gilia*, *Polemonium*, *Limnanthes*, *Leptosiphon*, &c., while several of the genus *Cantua*, from Peru, and the climbing tendrilled *Cobea scandens* are ornamental greenhouse plants. The seeds of various *Collomææ* when moistened under the microscope form beautiful objects. Jacob's Ladder (q. v.) represents the order in Britain.

Polen'ta, an article of food of Italian origin prepared from the meal of Indian-corn boiled to a stiff paste or porridge. It is allowed to cool, and, before using, is cut into slices nearly an inch thick, which are thickly sprinkled with Parmesan cheese, then saturated with olive oil or melted butter, and baked for half an hour in an oven, and served hot. The fine meal of Indian-corn is called *polentina*, and in the United States the porridge of Indian-corn, under the name of *mush*, is a common article of diet.

Poles, Geographical, of the earth, are the extremities of its axis of rotation, and are situated 90° from every point of the equator. They are not coincident with the magnetic poles.

which are the points where the magnetic meridians meet. See TERRESTRIAL MAGNETISM.

Pole Star, or **Polaris**, is a star of the second magnitude, so named because it is the nearest conspicuous star to the celestial north pole, or the point in the sphere of the heavens which corresponds to the earth's north pole.

Pole'wig (*Gobius minutus*), a species of Teleostean fishes belonging to the Gobies, and distinguished by its small size and transparent grey colour, varied with black dots and dark patches.

Police' (Lat. *politia*, Gr. *politeia*, 'civil government'; from *polis*, 'a city') are officers in town and country whose business it is to preserve the peace and to prevent and detect crime. In London, P. justices are stipendiary magistrates, created, except those in Bow Street Office, by statute in 1792. Their number is limited to twenty-seven. They are appointed by the Home Secretary, and are under his control. They must be barristers. Their duties are judicial, and consist in the examination and commitment or discharge of persons brought before them by the constables, under the control of the P. commissioner. One magistrate is required to attend at each of the P. courts every day except Sunday, Christmas Day, Good Friday, and any public fast or thanksgiving day, from ten in the morning till five in the afternoon, and at such other times as may be directed by the Home Secretary. The following is a summary of the chief regulations of the P. Acts within the metropolitan districts. All houses of public resort are, for the prevention of disorderly conduct, placed under the same regulations as drinking-houses. Unlicensed theatres are prohibited. Reputed gaming-houses may be forcibly entered, and all present taken into custody. Obstructions and nuisances in thoroughfares are prohibited. Street musicians must leave a particular locality when required to do so by a householder. The P. may act on the river, and at any time go on board of a vessel to observe the conduct of persons on board. They may apprehend, without a warrant, any one whom they suspect of having committed, or of being about to commit, a felony, misdemeanour, or breach of the peace, or any one loitering about, who cannot give a satisfactory account of himself. They may stop and detain till due inquiry be made any vehicle removing furniture between 8 P.M. and 6 A.M. The Act 2 and 3 Vict. c. 93 empowers the Justices of any county, in quarter sessions, to make application to the Secretary of State for the establishment of a county and district constabulary. The provisions of this Act are enlarged and rendered more effectual by 19 and 20 Vict. c. 69 and 22 and 23 Vict. c. 32. Where constabularies have been established in divisions of counties, they may be consolidated and a chief constable appointed for the county. County constables are to have the same powers and duties in boroughs as borough constables have in counties. In Scotland, a system of P. has been established in Edinburgh, Glasgow, and other considerable towns. The expense of those establishments is provided for by an assessment on the householders, and the superintendence of the whole is intrusted to commissioners chosen by the ratepayers.

In the army there is a body of military P. consisting of steady and intelligent soldiers who act under the orders of the provost-marshal, and whose chief business is to arrest all who infringe discipline. In Ireland and in some European countries the civil P. possess a military organisation.

Policy of Insurance is a written obligation specifying the nature of the risk insured against, and the premium of insurance. In Marine Insurance (see under INSURANCE) those who undertake the obligation put down their names and the sum for which they respectively become bound, and it is from thus *underwriting* the obligation that they are called *underwriters*. The word P. is an Italian corruption (*polizza*) of the Gr. and Lat. *polyptycha* ('many-fold'), a name given in the Middle Ages to memoranda written on several tablets.

Polignac, a French family which traces its origin to the 5th c., but whose name only emerges in history towards the end of the 9th.—**Melchior de P.**, son of the sixteenth marquis, was born at Puy-en-Velay, 11th October 1661, studied at Clermont and Harcourt, where he became steeped in the Cartesian system. Having entered the Church, he soon became known as a polished and cultivated man of the world, was present (1689) at the Roman Conclave when Alexander VIII.

was elected, and again (1692) on the election of Innocent XII. In 1695 he went to Poland, where he diplomatized in favour of Prince de Conti, but without ultimate success. He then retired to the Abbey of Bonport, and during four years devoted himself to the composition of an ambitious poem entitled *Anti-Lucretius*, which ultimately took shape in nine books, with a thousand to thirteen hundred verses in each, and even then was not completed. He recovered the lost favour of Louis XIV. in 1702, went to Utrecht in 1712 as French plenipotentiary, assisted at three Papal Conclaves, and from 1721 to 1730 watched over French interests at Rome. He died at Paris, April 3, 1742. See Faucher's *Histoire du Cardinal de P.* (2 vols. Par. 1772.) Among the friends of Marie Antoinette (q. v.), and Louis XVI., who by their extravagance and folly largely helped in alienating the populace of Paris from royalty, were **Yolande Martine Gabrielle de Polastron, Duchesse de P.** (born 1749, died 1793), and her husband, **Jules Duo de P.** (died 1817). His eldest son, **Armand Jules Marie Heraclius**, who received the grant of an estate from the Emperor of Russia in Lithuania as an emigrant, became under Louis XVIII. a field-marshal, and sat in the House of Peers. His brother, **Auguste Jules Armand Marie, Prince de P.**, born at Versailles, 14th May 1780, was an intimate friend of the Comte d'Artois, afterwards Charles X., and received from the Pope on account of his ardent clerical policy the title of 'Prince.' He became ambassador at St. James's (1823), was Premier in the last Bourbon Ministry, and issued the famous and fatal decrees which resulted in the fall of Charles X., and was imprisoned in the fortress of Ham until the November amnesty of 1836. He died at Paris, 2d March 1847.

Polish Language and Literature. Polish, which, with Czech and Wendish, forms the Western branch of the Slavonic family of speech, was once the language of all the country extending between the Elbe and Dnieper, but is now restricted to Russian Poland, Posen, Galicia, parts of Silesia, Eastern Prussia, and Pomerania, and to the villages scattered over the Siberian steppes, to which a paternal government has banished its Polish kinsfolk. Even within these narrow limits Russian and Prussian statesmen are doing their utmost to stamp it out, and it is mainly to the efforts of the refugees who throng the capitals of Europe that Polish owes its survival as a literary dialect. Its vocabulary has been enriched by the incorporation of Latin, German, and Russian elements, and its grammar bears many points of resemblance to the Latin. Thus, like Latin, it has no article, and possesses two conjugations and seven cases, the locative being quite distinct from the instrumental. It has, however, three numbers and three genders. Polish employs the Latin alphabet with certain modifications, *v* being represented by the Teutonic *w*, whilst double consonants are of frequent occurrence—*cs*, *ds*, *rs*, and *szs*. There are Polish grammars by Poplinsky (9th ed. 1869) and Malecki (Lemb. 1863); German-Polish dictionaries by Mrongovius (Danz. 1835, Eng. ed. Berl. 1851) and Booch-Arkossy (Leips. 1865-68); and an English-Polish dictionary by Chodzki (Berl. 1874). See Miklosich, *Vergleichende Grammatik der Slavischen Sprachen* (4 vols. Vien. 1852-74); and Schafarick, *Geschichte der Slavischen Sprache und Literatur nach allen Mundarten* (Prague, 1869).

The Polish literature, though perhaps the most important of any Slavonic people, is deficient in the quality of originality. Ostrowski divides it into four epochs—that of the monks, from the 10th c. A.D.; that of the knights, from 1500; and that of the people, from 1800 down to the present day. The monks, who in the 10th c. brought Christianity to Poland, wrote hymns in the language of the country, and the most ancient monument of Polish—still intelligible to an unlettered peasant—is the *Bogorodzica* ('God's Virgin Mother'), ascribed to Bishop Adalbert (died 997). But with Christianity came Latin, which for centuries choked the growth of a national literature, and was the language of the chroniclers from the 12th to the 16th c., from Martin Gallus (died 1150) down to Jan Dlugosz (died 1480). The abandonment of Latin by the Diets and the establishment of a representative form of government gave a great impulse to the national idiom, and paved the way for Poland's golden age of literature, the chivalrous reigns of the two Sigismunds (1507-72), who were to their country what Louis XIV. was to France. To this period belong one Catholic and two Protestant translations of the Scriptures into Polish, the hymnal of Seklucyan and Trzycki, the

Memoirs of Réj, the 'Polish Montaigne' (1515-68), the poems of Kochanowski, Grochawki, and Janitius, the histories of Cromer and Bielski, and the metaphysical writings of Skarga, Herbut, &c. This renaissance was followed, under Jesuit influence, by a slumber which lasted down to the present century, when Poland rang with the sudden cry of *ojczyzna*—Fatherland. The 18th c. attempt of the Piarists, the Jesuits' opponents, to create a literature based on the models of French Classicism, had borne but scanty fruit in Krasicki's *Myszeis* ('War of Mice') and *Monomachia* ('War of Monks'), in the satires of Wegierski and Trembecki, and the love-songs of Kniaznin; and the people's heart was first truly stirred by Woronicz (died 1829) in his *Sibylla*, the epic of Poland's history, and by Niemcewicz, the national poet, dramatist, novelist, and historian (died 1841). Greater than these, however, was Adam Mickiewicz (1798-1850), the leader of the victorious Romantic school, and author of the epic *Konrad Wallenrod* and *Pan Tadeus*, who counted among his followers the lyricists Brodzinski, Odyniec, and Kraszewski, with the so-called 'Ukrainian poets' Zaleski, Malczewski, and Goszczyński. Of Polish writers living or lately dead, the chief in the field of poetry are Asnyk, Belza, and Krasinski, author of the *Nieboska Komedia* ('Undivine Tragedy'), and in that of fiction, Rzewuski and the renegade Czajkowski; whilst as historians may be mentioned Lelewel, Lepkowski, and Szujski; as metaphysicians, Goluchowski, Supinski, and Libelt, founder of the 'philosophy of intuition'; and as philologists, Linde, Lealaw, and Rykaszewski. See Orchowski, *Polskie Polonaises* (2 vols. Gött. 1816-17); Chodzko, *La Pologne Historique et Littéraire* (3 vols. Par. 1834-47), and Mrs. Robinson ('Talvj'), *View of the Languages and Literature of the Slavic Nations* (New York, 1850).

Polishing Materials possess different degrees of hardness, hence their utility in the industrial arts in polishing metal, stone, glass, wood, &c. They are chiefly derived from the mineral kingdom, but a few animal and vegetable substances are also employed as P. M. for soft surfaces. For cutting and polishing gems and hard stones, diamond dust is employed, and next to that substance in hardness ranks alumina, which occurs in great purity as Corundum (q. v.), and Emery (q. v.), and is also the chief constituent of Rotten-stone (q. v.). Siliceous materials, as grits, Grindstones (q. v.), Hones (q. v.), Pumice (q. v.), Tripoli Powder (q. v.), and Bathbrick (q. v.), have varying applications in polishing; while for very smooth surfaces, metallic oxides, as Rouge (q. v.), and Putty Powder (q. v.), charcoal, chalk, cuttlefish bone, and other substances, finely pulverised, are extensively used, either in a dry state, or mixed with fat or wax to form a paste. Polishing wheels are usually made of wood covered with leather, and their surfaces are charged with a paste of a fineness adapted to the work in hand.

Polishing Slate, a kind of yellow or greyish-yellow slate employed in polishing metals, glass-lenses, &c. It is composed of diatomaceous matter, and is abundantly found in Bohemia and the Auvergne.

Political Economy, or Economics (Gr. *oikos*, 'a house,' and *nomos*, 'a law'), originally dealing with household thrift, gradually widening till it embraced the management of society (*polis*, 'a city' or 'state'), in recent times has become the science of the laws according to which wealth is acquired and used. The earliest work on economics we know of is *Eryxias*, or *About Wealth*, anonymous, about 427 B.C. Plato's writings (and especially Book ii. of the *Republic*) contain much discussion of economical questions; in Xenophon's *Economics* is a remarkable passage on division of labour. But Aristotle founded P. E. His *Ethics* deals with law for individual man; his *Politics*, with the relation of man to man in society; his *Economics*, with property and the rights connected with it. In Book ii. chap. i. of the last-mentioned work, the term 'P. E.' first occurs. From the time of Aristotle down to the 16th c. we have no reason to suppose that any systematic treatment of economics was attempted. The Italians were early in the field of modern inquiry. During the first few years of the present century appeared a collection of the entire works of the Italian political economists, in fifty octavo volumes, edited by Custodi. Of the band of reformers represented in this edition, the first was Antonio Bandini of Siena, who addressed a memoir to the Grand Duke of Tuscany in 1737, recommending free-trade in corn, the granting of leases to

tenants, and the repeal of vexatious imposts, with the substitution in their place of a tax levied uniformly on all property, even that of the nobility and the church. Bandini's work was not published till 1775. Before that time Fernando Galiani of Naples had produced his treatise, *Della Moneta*, a great advance on the times, full of error as it is considered now. Then came another free-trade discourse, *Sopra i Bilanci delle Nazioni*, by Carli, 1771—a companion work to Pillo Verri's *Sulle Leggi Vincolante*. These writings breathe the same spirit of hostility to restriction in all its forms, but abound in crudities and absurdities of theory.

France, for interest in this subject, was little behind Italy. The Alps between the two nations fitly typify the mountains of flinty prejudice which had to be tunnelled through. The earliest French work on economics is the *Traité d'Économie Politique*, by Montchrestien (Rouen, 1615). In 1662 Louis XIV. placed at the head of the finance department a man well instructed in the principles of economics—Colbert. In the early years of his ministry Colbert gave a great impetus to free trade; but later he favoured the mercantile system, a system which taught that a country should sell and not buy. To this system the name of *Colbertisme* was given by adult baptism: Blanqui has shown that it really originated with Karl V. and the Spaniards. Vincent Seigneur de Gournay, a learned merchant, became Intendant de Commerce—a sort of President of the Board of Trade—in 1751 and for some time pushed a reforming policy finally overthrown as revolutionary—which, indeed, in the best sense it was. He maintained that government should protect the general community from the monopolising tendencies of classes, that it should protect a man in any investment of his capital not immoral, and that it should promote competition, trusting to the natural operation of men's interests for the increase of national wealth. Some years after Gournay had thrown up the reins of trade, Quesnay began to theorise. Not until an old and infirm man did he turn his attention to economics, contributing the articles 'Fermier' and 'Grains' to the *Encyclopédie*. In the second of these contributions he made his distinction between *produit total* and *produit net*—between the productiveness of agriculture and the unproductiveness (as he supposed) of other employments. In this article also, it is only fair to state, he advocated unrestricted commerce. The system of Quesnay—of the Economistes or Physiocrates—was a natural recoil from the mercantile system. The mercantile system had well-nigh ruined the country by proclaiming money the only riches; the Economistes returned to Sully's dictum, 'Labourage et pâturage sont les mamelles de l'Etat,' and supplemented this with their celebrated formula 'Acheter, c'est vendre; Vendre, c'est acheter.' They only erred in confining the term 'productions' to agricultural labour.

Perhaps the first treatise on Economics in England worthy of note is Thomas Muir's *England's Treasure by Foreign Trade* (Lond. 1664). Sir Joshua Child's *Brief Observations Concerning Trade* appeared in 1668. It was thought worthy of translation into French by Gournay, and threw out valuable hints on population, money, and monopolies. Sir Dudley North's *Discourse upon Trade* (1691) was aimed at national jealousies, and was really a prelude to the doctrines of free trade. The man who gave Adam Smith the clue to a philosophical treatment of economics was Hutcheson, Professor of Moral Philosophy in Glasgow. His explanation of Value, and Demand and Supply, has been little improved upon by Smith. Hume and Lord Kames also prepared Smith's way.

The appearance of the *Wealth of Nations* (1776) created a revolution in the science of Economics. In a few years it began to alter laws and treaties; it was translated into all the European languages; ministers of state quoted it. No other work ever effected so immediate and permanent a change in the legislation of civilised countries. Perceiving the error of the mercantile system, which regarded money alone as wealth, and the error of the Physiocrates, who found wealth only in the soil, Smith made labour the basis of his doctrine. The *Wealth of Nations* treats of 'the causes of improvement in the productive powers of labour, and the order ascending to which its produce is naturally distributed among the different ranks of the people; of the nature, accumulation, and employment of stock; of systems of P. E.; of the revenue of the sovereign or commonwealth.'

Two later economists of note in England, Malthus and Ricardo, developed doctrines Smith had prepared the way for, yet did not anticipate. In 1798 the former published anonymously *An*

Essay on the Principle of Population as it affects the Future Improvement of Society, but in subsequent editions his name was affixed. This treatise was called forth by an essay by Godwin in the *Inquirer*, and Godwin replied to it bitterly in the book entitled *Of Population*. The Malthusian doctrine is that population increases in geometric progression, while subsistence increases only in arithmetical progression. There are but three checks on this tendency to over-population—vice, misery (infant mortality and all disease), and moral restraint in marriage.

Ricardo's *Principles of P. E. and Taxation* appeared in 1817. His peculiar doctrines are those concerning rent and value. He declares that rent is caused by the transfer of cultivation from one sort of soil to another sort inferior to it. As soon as the first soil is insufficient to produce enough corn to satisfy demand, a second soil is brought under tillage; and only then is a rent drawn from the first. As to value, Ricardo maintains that the value of an article depends, not on the demand for it, but on the amount of labour required to produce it. J. S. Mill has to some extent adopted this view in denying that a demand for commodities is a demand for labour. Now that the doctrines of Free Trade developed by the economists and Adam Smith have assumed the form of natural laws, original teaching on Economics is not so much looked for. The best of recent French economists are J. B. Say, Sismondi, Blanqui, Chevalier, Bastiat, Rossi, Garnier, and Dunoyer. Of Italians may be mentioned Gioja, Beccaria, Poulet, Invrea, Mennechini. The principal Germans are Paelitz, Barth, Riedel, Bülow, List, Rau, and Hildebrandt. English writers are De Quincey, James Mill, Torrens, M'Culloch, Whately, M'Leod, Longfield, Scrope, Bailey, Burton, Cairnes, Stirling, Price, Fawcett, Jevons, &c. See *Dictionnaire de l'Économie Politique* (2 vols. Par. 3d ed. 1864), Blanqui's *Histoire de l'Économie Politique* (4th ed. Par. 1860), both with good bibliographies, and an admirable little primer of P. E. by W. Stanley Jevons (Macmillan, 1878).

Political Offences. These may be divided into *major* and *minor* offences against the state. Respecting the former, see TREASON; MISPRISON OF TREASON; ATTAINDER; and under BILL, *B. of Attainder*. Regarding the latter, see COIN; COINING, LAW REGARDING; under CONTEMPT, CONTEMPT OF PARLIAMENT; MEETINGS SEDITIOUS; SEDITION and POLITICAL SOCIETIES. Applicable to both classes, see EXTRA-DITION.

Political Societies. The Act 39 Geo. III. c. 79 was directed against certain associations called societies of *United Englishmen, United Scotchmen, United Irishmen, &c.*, which were formed for purposes at that time considered treasonable. It prohibits members of societies from taking any oath not required by law, and makes various provisions to prevent secrecy of membership and procedure. The provisions of this Act are extended by 57 Geo. III. c. 19. The aim of these Acts being solely to prevent the formation of treasonable or seditious societies, their severe restrictive provisions are not likely to be enforced against any society, whether political or otherwise, unless it come under suspicion of being treasonable or seditious. 9 and 10 Vict. c. 33 provides that no one shall prosecute under the above-quoted Acts except the law officers of the crown.

Politics may be looked upon either as the science or as the art of government. It has to do with the business of governing, seeking the greatest happiness of those governed; it has also to do with the formation of governing bodies, with a view to their common weal.

In the first of these departments it embraces legislation, which means the making of positive law. But a general law issued by a governing body would be useless, were it not carried into practice on every occasion falling within its scope. Accordingly there must be established a distinction between the *legislative* and the *executive* powers of a government. An executive command is a special command issued in accordance with a law already passed. Such executive commands or acts are either administrative or judicial. A judicial declaration decides whether or not a certain person has been brought within the scope of a certain penal provision, or whether a certain person is possessed of a certain disputed right. In judicial proceedings, the Government functionary acts only at the motion of others. But in administrative proceedings the functionary may act spontaneously, and such proceedings are for the purpose of carrying a

rule of law into effect when there is neither a question of legal culpability nor a question of right.

A government is called a *monarchy* when it is vested in a single person. There are many degrees of this form, from despotism to limited monarchy, such as that of Britain. When the governing body consists of a few who acquire the ascendancy, whether hereditary or not, it is called an *aristocracy* or *oligarchy*. When the body comprises the majority of the nation, the government is called a *democracy*. These forms are often mixed.

Poliziano, Angelo, Italy's greatest poet between Petrarch and Ariosto, was born 24th July 1454, at Monte Puliciano, in Tuscany, where his father, Messer Benedetto Ambrogini, was a needy doctor of laws. He came as a boy to Florence, and was educated in the palace of Lorenzo de' Medici, studying Latin under Landino, Greek under Andronicus of Thessalonica, the Platonic philosophy under Ficino, and the Aristotelian under Argyropylus. He published Latin compositions in his fourteenth and Greek in his eighteenth year, a twelvemonth later edited Catullus, and about the same time composed his *Orfeo*, a combination of tragedy, pastoral, and opera, with its famous *Mænad chorus*. In the half-epic, half-idyllic *Giostra* (1477), P. sang how Giuliano de' Medici loved Simonetta, and carried off the prize in the tourney, a trivial theme enough, but one that our poet touched with matchless art and adorned with the rare scholarship displayed in his rendering of Homer into Latin hexameters, and Latin prose translation of Herodian. He also wrote scores of minor verses (*ballate*, *rispitti*, and *strambotti*); edited Justinian's *Pandects*, Ovid, Quintilian, and the younger Pliny; translated Plutarch's *Love Tales*, Epictetus, Alexander Aphrodisius, and selections from Moschus and Callimachus; and charmed the Renaissance scholars with his *Miscellanea* (1489), a series of studies on the classic authors. Lorenzo made him tutor to his sons, and he was professor of both Greek and Latin in the University of Florence, numbering amongst his hearers Reuchlin, Grocy, Linacre, and the Portuguese Tessiras. Honours rained thick upon him—the flatteries of a pope, the citizenship of Florence, a canonry in the cathedral, the choice of any or every professorial chair. But Savonarola's prophetic thunders came to drown the merry strains of his *Canti Carnascialeschi*, his patron Lorenzo was dead, and P. himself, 'weeping early and late,' passed away at the age of forty, 24th September 1494, on the eve of the French entry into Florence. In him the New Learning attained its zenith, and his is also the higher praise of having revived his native Tuscan, which since Petrarch's day had fallen into neglect, of having at one stroke perfected the Italian epic stanza, and left to his successors a model of faultless style. That style, indeed, in all P.'s poetry is paramount to the subject-matter, and that he cared more about how than what he wrote is undeniable; but the fault belongs less to the poet than to the times in which he lived, when paganism and classicism had established artificial canons of sentiment and utterance, and Italian liberty lay crushed beneath a load of sloth, tyranny, and foreign wrong. The best edition of P.'s works is by Carducci (Flor. 1864). Mr. J. A. Symonds has translated portions of the *Orfeo*, *Giostra*, &c., in an article, *P.'s Italian Poetry*, in the *Fortnightly Review* for August 1873. See Mähly, *Angelus Politianus* (Leips. 1864).

Polk, James Knox, eleventh President of the United States of America, was born in Mecklenburg county, N. Carolina, 2d November 1795. The son of a respectable farmer, he received a good education, and after graduating at the University of Nashville in 1818, was admitted to the bar in 1820, and in 1824 elected member of Congress by the Democratic party. After holding several minor appointments, he was chosen Speaker of Congress in 1835 and 1837, and Governor of Tennessee in 1839. In December 1844 he was elected President of the United States with 170 votes as against 105 for Henry Clay. The chief events of his administration were the settlement of the Oregon boundary question, the reorganisation of the financial system, the Mexican war, and the acquisition of California and New Mexico. He died at Nashville, June 19, 1849. Though not possessed of great talent, P. was a man of firm character and irreproachable integrity.

Polka (Bohem. *půlka*, 'half'), a popular dance in three-quarters time, with the third quaver accented. It consists of three steps to

the first three beats of each bar, a rest being taken on the fourth beat. It originated in Bohemia about 1830, and on its introduction into England in 1843 had for a considerable time a reign of amazing popularity.

Pollack (*Merlangius pollachius*), a species of Teleostean fishes belonging to the *Gadida* or cod family. It is common on the coasts of Britain, and is called the whiting and coal-fish. In Scotland its local name is the 'lythe.' The P. is caught in numbers by the rod and line, almost any white object, even a piece of rag, serving as a bait. It has three dorsal fins, the tail is forked, and the upper jaw is much shorter than the under.

Pollan (*Coregonus Pollan*), a fish belonging to the *Salmonidae*, found in certain fresh-water lakes of Ireland (e.g. Loch Neagh). It is allied to the Vendace (*C. Willoughbii*) of English lakes. Its average length is from 10 to 12 inches. The flesh is highly esteemed. The P. is caught in large numbers by nets. It appears to spawn in November and December.

Pollard (from *poll*, 'to cut off the head'; Low Ger. *bolle*, 'a tree-top'), a term which in the 17th c. denoted a tree lopped of its side branches, but is now applied to a tree whose crown or 'poll' has been cut off when at the height of 10 or 12 feet from the ground, that it may send out new branches near the section. Trees pollarded for fuel or fence-wood, are in England chiefly confined to hedgerows, or the banks of rivers running through marshy grounds; but on the Continent they are frequently met with in the open country, where their unsightly bareness does much to mar the landscape.

Pollen. See STAMEN.

Pollenza (*Palentia*), a town of Majorca, near the N. coast of the island, 30 miles N.W. of Palma, has a Jesuits' college, and produces coarse cotton and woollen cloths, boots and shoes, rope, &c. Pop. 7000. There are two small Italian towns of the same name, one 5½ miles from Macerata, near which Stilico gained his great victory over the Goths in 403 A.D., the other in the province of Cunea, celebrated for its antiquities.

Pollilore, a town in the district of Chingleput, Madras Presidency, British India, near Conjeveram, and 43 miles S.W. from Madras. It is the scene of two battles. In 1780 Colonel Baillie was here completely defeated and taken prisoner by Hyder Ali. This was the greatest defeat the British had hitherto sustained in India. The lives of the prisoners were only saved by the intervention of Hyder's French officers. Paintings commemorative of the victory are still to be seen at Seringapatam. But in the following year, on the anniversary of the former battle according to the lunar calendar, Sir Eyre Coote won his first victory over Hyder Ali on the same spot.

Pollio, Caius Asinius, born at Rome in 76 B.C., first signalled himself by his accusation of the Pompeian tribune C. Cato (54), and having espoused the cause of Cæsar, and shared with him the passage of the Rubicon (49), was despatched to Sicily to aid in the expulsion of M. Cato, and thence to Africa, where he drew off the remnants of the Roman army after Curio's defeat by Juba. He next saw service at Pharsalia (48), as tribune of the plebs opposed Dolabella's measure for the cancelling of debts (47), attended Cæsar on his Spanish campaign (45), and at the time of the dictator's assassination (44) was carrying on the war against S. Pompeius with scant success, as administrator of the Further Province, which on the formation of the Second Triumvirate he exchanged for Transpadane Gaul. He played the part of peacemaker between Antony and Octavian in 40, was consul the same year, and in 39 earned a triumph by his victory over the Parthini in Illyria. Thenceforth he led a retired life, declining in 32 to avow himself a partisan of either Octavian or Antony, and dying at his Tusculan villa in 4 A.D. Himself no mean historian, orator, and playwright, if we accept the verdict of his contemporaries, P. is most famous as a liberal patron of letters in the persons of Virgil and Horace, as the founder of Rome's first public library, and as the originator of that mutual admiration system which afterwards formed a theme for the satire of Martial and Juvenal. Of his critical acumen, we know that he detected the 'Patavinity' of Livy, impugned the accuracy of Cæsar's *Commentaries*, and challenged Sallust for his pseudo-archaisms, a charge from which the critic's own perished

works were not entirely free (Quint. i. 8; ix. 4). See Thorbecke's *Commentatio de C. Assinii Pollionis Vita et Studiis* (Lugd. Bat. 1820).

Pöllnitz, Karl Ludwig, Freiherr von, celebrated as a writer of memoirs, was the second son of Major-General Gerhard Bernhard von P., minister of state to the Elector of Brandenburg, and was born at Issomin, a village in the archbishopric of Köln, 25th February 1692. After squandering his patrimony, he travelled through various countries of Europe, bearing arms successively in Austria, Italy, and Spain, and nowhere fixing his abode, till at last King Friedrich II. of Germany took a liking for him, and made him his reader. In this position his disorderly habits often led him into disgrace, from which the force of his wit enabled him again to rise to the favour of Friedrich, who at length appointed him director of the theatre. After twice joining the Catholic Church, and as often returning to Protestantism, he became for the third time a Catholic, and died 23d June 1775. P.'s *Lettres et Mémoires, avec nouveaux Mémoires de sa Vie et la Relation de ses Premiers Voyages* (nominally Amsterd. 1735), and *État abrégé de Saxe sous la règne d'Auguste III., Roi de Pologne* (Frankf. 1734), widely read in his own day, are untrustworthy, witty, and scurrilous. After his death, Brunn published P.'s *Mémoires pour servir à l'Histoire des quatre derniers souverains de la Maison de Brandebourg, Royale de Prusse* (2 vols. Berl. 1792). P. is also the reputed author of *Histoire secrète de la Duchesse d'Hanovre, épouse de George I., Roi de la Grande Bretagne* (Lond. 1832), and editor of Gundling's posthumous *La Saxe Galante* (1737).

Poll'ock, Sir George, a son of David P., saddler to George III., was born in Westminster, 4th June 1786, and educated at a school in Vauxhall. He entered the Military Academy of Woolwich (1801), sailed for Calcutta (1803), and received his commission as lieutenant of artillery in the service of the East India Company (1804). He was present at the storming of Deeg and the unsuccessful assault on Bhurtapore (1805), in the Nepaulese campaign commanded the artillery under General Wood (1817), and for his services as lieutenant-colonel in the war with Burmah received the Companionship of the Bath (1825). In the Afghan War of 1842, with a single battalion of infantry, one regiment of dragoons, and fourteen guns, he forced the Khyber Pass, defeated Akhbar Khan, and by his occupation of Cabul effected the relief of Jellalabad, being rewarded for these splendid services by the thanks of Parliament, the Grand Cross of the Bath, and a life pension of £1000 from the East India Company. He was appointed envoy at the court of Oude (1843) and military member of the Supreme Council (1844), returned to England (1846), and took up his residence at Clapham, obtaining his promotion as lieutenant-general (1851) and general (1859), whilst holding the senior directorship of the Company (1854-56). He was created field-marshal (1870), Constable of the Tower (1871), and a baronet (1872), and dying at Walmer, 6th October 1872, was buried in Westminster Abbey. See C. R. Low's *Life and Correspondence of Sir George P.* (Lond. 1873).—**Sir Frederick P.**, elder brother of the preceding, was born in London, 23d September 1783, and passing from St. Paul's School to Trinity College, Cambridge (1802), was Senior Wrangler and Smith's Prizeman (1806), and obtained a college fellowship (1807). Called to the bar at the Middle Temple in the same year, he travelled the Northern Circuit, dividing its honours with Brougham, Scarlett, and Campbell, was made a King's Counsel (1827), and returned as Conservative member for Huntingdon (1831). Having served as Attorney-General in Peel's Ministries of 1834 and 1841, he was created Lord Chief Baron of the Exchequer (1844), on the resignation of which office in 1866 he received a baronetcy. He died 23d August 1870, leaving a son, **Sir Charles Edward P., Q.C.**, who was born 21st October 1823, is the author of various legal treatises, and in 1873 was created Baron of the Exchequer.

Pollockshaws, a thriving municipal burgh in Renfrewshire, Scotland, in a valley at the confluence of the White Cart and the Auldhouse Burn, 2½ miles S. by W. of Glasgow, and 6 E. by S. of Paisley. It is a station on the Glasgow and Barrhead Railway, has some good churches and an excellent public library, which is to be extended, with the addition of a reading-room, through a legacy of £2000 received in 1877, aided by local sub-

scription. Under the Education Act of 1872, £5187 had been spent upon school-buildings at the close of 1877. P. is the seat of important industries in cotton-spinning, weaving, bleaching, and dyeing. It has also paper-works, potteries, and large engineering works. In the year 1855-56, the rental of P. was £9955; in 1877-78 it amounted to £24,483. Pop. (1871) 8921. Two miles distant is the village of Thornliebank, where are situated the most extensive calico-printing works in Scotland.

Poll'ok, Robert, a Scottish poet and minister, was born in 1799 at Muirhouse, in the parish of Eaglesham, Renfrewshire. After going through his Arts course in the University of Glasgow, he entered the Divinity Hall of the Secession Church, where he studied for five years under Dr. Dick, and was licensed to preach in 1827. In the same year he published, by the advice of Professor Wilson, the work by which he is known, *The Course of Time*, a poem in 10 books, intended to describe the spiritual life and destiny of man. The excess of work, however, consequent upon his carrying on the composition of his poem at the same time with his theological studies, brought on symptoms of consumption, and he removed to the S.W. of England along with his sister. He died at Shirley Common, near Southampton, 17th September 1827, just as he was beginning to find himself famous. His work has run through twenty-four editions, a success which is chiefly owing to its popularity among the religious classes of Scotland, of whose favourite Calvinistic doctrines the *Course of Time* may be considered a poetical embodiment. Formerly it was made the subject of much extravagant praise, the young author, whose premature death heightened the interest in his work, being often profanely compared to Milton. But although there are many passages which show a poetical gift of high promise, and one or two which even glow with a sublime ardour, the interest is ill-sustained, and the general effect of the whole production is extremely heavy and monotonous. The greater part is not superior to an ordinary Scotch sermon. Before publishing his poem, P. had written three prose tales, entitled *Helen of the Glen*, *Ralph Gemmill*, and *The Persecuted Family*, which have been frequently published in one volume under the title *Tales of the Covenanters*. See the Memoir of his life (1843).

Polo, a modern game devised by the British officers in India to take the place of football, for which the climate was unfavourable. It resembles hockey and golf, but the player is mounted on horseback, and wields a 'mallet,' which must be 4 feet 4 inches long. It is played by 'sides,' as in football; and the object is to drive the ball from one goal to another. Even when the player is a skilful rider, there is considerable danger in P., as much, however, from collisions and blows with the mallet as from falls. By the club rules, as played at Jerome Park, the height of the ponies used is limited to 14 hands. The animals are 'hog-maned,' and have their tails cut short. P. has rapidly become one of the most popular of all British games, and has also taken kindly to American soil since it was introduced by Mr. James Gordon Bennet in 1876. In the latter country Mexican mustangs are now trained for P.-playing.

Polo, Marco, of a patrician family of Venice, Dalmatian by extraction, was born in 1250. His father and uncle, Nicolo and Maffeo P., after sailing on a trading expedition to Constantinople, crossing the Black Sea to the Crimea, travelling overland to Bokhara, and passing some time in Cathay, returned laden with wealth after an absence of nineteen years. In 1271 they again set out, accompanied by Marco, then twenty-one years old. Bearing letters from Gregory X., they made their way into the interior of Asia, through Greater Armenia, Persia, Irak, Khorassan, by the city of Balkh into the country of Badakhshan, at the source of the Oxus, where the illness of Marco detained them twelve months. Resuming their journey to the N.E., they crossed the high table-land of Pamir (a route followed again by no European till the journey of Lieutenant Wood to the sources of the Oxus in 1838), and proceeded to Cashgar, Yarkand, and Khotan, reaching the city of Lop or Kobi. Traversing for thirty days the desert of Gobi, they arrived at Shatchen in Tangut, whence they journeyed to the city of Karakorum. When they came within forty days' journey of Cambaluc (i.e., *Khan-baligh*, 'imperial city,' probably Pekin), capital of Cathay, an escort met them and conducted them to the imperial city. The Khan employed Marco about his person, and when

he had become acquainted with the language and customs of the Mongols, employed him in embassies to some of his chiefs. Marco everywhere made careful notes of all that came under his observation. As the Khan's representative he visited successively Western China, Eastern Thibet, and thence to the borders of Burmah (Mien). Though our information is only incidental, it would appear that he was later charged with a mission to India, and for three years acted as governor of the city of Yang-cheu-fu. After having spent seventeen years in the Khan's service, the Polos with great difficulty obtained permission to visit their native country. They were joined by an embassy from Kublai to the King of Persia, and the whole party sailed from Fu-kien in 1292, in a fleet of fourteen ships. They touched at Ziambar, Borneo, Lobak, Sumatra, the Nicobar and Andaman Islands, Ceylon, and the Carnatic, and sailed up the Persian Gulf. Thence they travelled by land through Kurdistan and Mingrelia to Trebizond; and again taking ship on the Black Sea, they arrived at Venice in 1295. Dressed like Tartars, and speaking their native tongue with difficulty, they could scarcely gain recognition from their friends. Maffeo became one of the chief magistrates in Venice. Marco commanded a galley in the fleet sent (1298) against the Genoese, was wounded in an engagement, and was carried prisoner to Genoa. During his captivity he dictated an account of his travels to Rusticiano, a humble litterateur of Pisa. In 1299 Marco returned to Venice, where he married and had three daughters. He died in 1324. Nicolo, the father, was dead before August 1300; Maffeo, the uncle, was alive and well in 1309. The description M. P. gave of his travels was long discredited; even on his deathbed he was adjured to retract his supposed falsehoods. But he remained firm; and now his work remains to the geographical world a wonder of accurate information. He was the first to trace a route across the breadth of the Asiatic continent, naming and describing kingdom after kingdom from Cilicia to the Yellow Sea. He revealed China with its mighty rivers, swarming cities, and rich industries; described for the first time the strange nations on its borders—Thibet, Laos, Siam, Cochinchina, and Japan; and made known to Europe the wondrous Indian archipelago, India itself, not as a mythical region but as a real country, visited and partly explored, the secluded Christian kingdom of Abyssinia, and in remoter quarters the high plateau of Pamir, Siberia, and the Arctic Ocean.

It is a curious fact, only ascertained within the last half century, that the original MS. of the 'Book of M. P.' was in French, and very bad French. But most of the MSS. (of which eighty are known) are in Latin, after the version of Friar Pipino, executed in P.'s lifetime. The first printed edition appeared at Antwerp about 1485, and at Venice in 1496. The French and Latin texts were published in the *Mémoires* of the Paris Geographical Society in 1824. Marsden's English translation (1818), revised and annotated, forms a volume of Bohn's Antiquarian Library (1854). Pauthier's edition (Par. 1865) brought a vast amount of curious Chinese learning to bear on the subject; but the principal contribution to the literature of the subject is Colonel Yule's *Book of Ser M. P.*, a new translation (2 vols. Lond. 1875).

Polotak', a town of Russia, in the government of Vitebsk, stands at the confluence of the Polota with the Düna, 95 miles E. S. E. of Düna by rail. It is the seat of a Greek-United archbishop; has a kremlin, several Greek and Catholic churches, and a cadet academy (formerly a famous Jesuit college); and carries on a lively river trade. Pop. (1871) 11,928. After passing from the Tartars to the Russians (1564), P. was captured by Stephen Bathori (1576), next became capital of a Polish *vaivodship*, and finally reverted to Russia (1772).

Polta'va. See PULTAVA.

Polyandry (Gr. *polys*, 'many,' *aner, andros*, 'a man') is the custom prevailing in many wild tribes by which a woman is married to several men at once. The Todas of India, the people of Thibet, and other tribes of Asia, follow this practice. It exists also in Ceylon, in the Aleutian Islands, among the Kor-yaks, among the Zaporovian Cossacks, among the tribes of the Orinoco, and in Lanzarote, [one of the Canary Islands]. It appears that in ancient times the field of P. was wider than it is now. Cæsar mentions it as a practice of the Britons, and Tacitus, in spite of his well-known passage regarding the monogamy of the Germans, still affirms that in his time traces of the

P. existed among the Goths. The custom, like that of polygamy, originated in unequal balance of the sexes. See Humboldt's *Personal Narrative* (trans. 1819), Grey's *Polynesian Mythology* (1855), Latham's *Descriptive Ethnology* (1859), Tennent's *Ceylon* (1859), Lubbock's *Origin of Civilisation* (1870), and Tylor's *Primitive Culture* (1871).

Polyan'thus (Gr. 'many-flowered'). In the Primrose (q. v.) the pedicel of each flower appears to spring from the root, but the inflorescence is in reality a sessile umbel, and the flower stalks are not true *scapes* (see INFLORESCENCE). Sometimes it is found with a more or less peduncled umbel, and it is from such a form as this the P. has originated, so that it is merely a cultivated variety of *Primula vulgaris*, and its diversified appearance results from the skill of the horticulturist in selecting and propagating from the best 'sports.' The P. is not the same as the English oxlip, which is sometimes made a synonym of it, that being a series of hybrid forms between the primrose and the cowslip. The true oxlip is a well marked species, very rare in Britain.

Polyan'thus Narciss'us. See NARCISSUS.

Polyatom'ic Al'cohols include what are ordinarily called secondary and tertiary alcohols. A primary alcohol when oxidised loses hydrogen and yields its aldehyd ($C_2H_5O + O = C_2H_4O + OH_2$); a secondary alcohol similarly treated yields a ketone ($C_2H_5O + O = C_2H_4O + OH_2$); while a tertiary alcohol breaks up when oxidised into a mixture of acids. According to the accepted theory, these alcohols are thus distinguished. Methyl alcohol may be regarded as marsh gas having its one hydrogen atom replaced by hydroxyl (OH). By replacing another hydrogen atom by a hydrocarbon (CH_3, C_2H_5 , &c.), the higher homologues are obtained; and as long as this substitution is so affected as to leave two of the original marsh gas hydrogen atoms, the alcohol is a primary one. If only one of the marsh gas hydrogen atoms is left unaffected, a secondary alcohol is obtained; and when all have been replaced by various hydrocarbon radicles, a tertiary alcohol results. It is evident then that a secondary alcohol must contain not fewer than three carbon atoms, and a tertiary alcohol not fewer than four.

Polybas'ic Acids are acids possessing more than one hydrogen atom capable of being replaced by a metal equivalent.

Polyb'ius, a Greek statesman and historian, was born about 204 B. C. at Megalopolis in Arcadia. His father, Lycortas, the friend of Philopomen, became at his death in B. C. 182 general of the Achæan League. Educated by these men in war and politics, P. was a champion of national independence, siding neither with the Macedonian nor the Roman party in the Achæan League. On the breaking out of the war between the Romans and Perseus of Macedon, P. and his fellow-moderates, in opposition to Callicrates, the leader of the Roman party, sought to remain neutral, but in 169 the commissioners of the Senate, Popillius and Octavius, declared neutrality hostile, naming specially as unfavourable to Rome, Lycortas, Archon, and P. This crushed the national party, and in the same year Archon was made general, and P. commander of the horse, with orders, if needful, to help the Romans. Shortly after, by decree of the League, P. was sent to offer the whole Achæan force to the consul Q. Marcius Philippus in Macedonia. After the defeat of Perseus at Pydna (168) the Roman Commissioners C. Claudius and Cn. Dolabella ordered 1000 of the noblest Achæans, including P., to be carried off to Italy (167), on the charge of not having aided the Romans. P. lived at Rome with Æmilius Paullus and his sons Fabius and Scipio till 151. Through Scipio he got that access to the state documents so necessary for his great work, attending him, too, in his military expeditions. In 151 the surviving Achæan exiles were permitted to return to Greece. There P. remained till 149, when he appears with the consul M. Manilius at Lilybæum. In 146 he witnessed the destruction of Carthage by Scipio, and returning to Greece shortly after the fall of Corinth, aided in obtaining moderate terms from the Romans, and in drawing up new laws for his vanquished countrymen, who raised statues to him at Megalopolis, Mantinea, Pallantium, Tegea, &c. From this time till his death by a fall from his horse in 122, P. was engaged on his history. He visited Egypt in 143, and was

probably with Scipio at the fall of Numantia in 134; in earlier life, too, he had journeyed in Africa, Spain, and Gaul. P. wrote five works. His *Life of Philopæmen*, in three books, his treatise *On Tactics*, praised by Arrian and Ælian, that *On Living under the Equator*, mentioned by Strabo, and his *History of the Numantian War*, referred to by Cicero in a letter, have entirely perished. His great work, the *Universal History*, contained forty books. The first part (from 220 B.C., where Aratus stops, to 168), aiming to show how the Romans had in these fifty-three years subdued most of the world, contained the history of the second Punic War, the Social War in Greece, the war between Antiochus and Ptolemy Philopator in Asia, and the subjugation of Macedonia by Rome in 168. Books I. and II., however, narrate briefly the history of Rome from its capture by the Gauls (390 B.C.) to the beginning of the second Punic War (218 B.C.). The second part brought down the history to 146 B.C., when with the fall of Corinth Greece was completely subdued; Book XL. forming a chronological summary of the whole. The style of P. is by no means pure, is without ornament, and lacks care both in the choice of words and the construction of sentences. He was, moreover, utterly unimaginative, but his judgment was 'cool, calm, and calculating,' and his preparatory studies and practical knowledge of war and politics very great. Hence his work is thoroughly didactic, a 'Pragmateia,' as he calls it, rather than a history. Of the forty books we have five entire, and a number of fragments and extracts, some of considerable length—e.g., one from Book VI., giving an account of the Roman army, discovered at Corfu shortly after the revival of learning. The best annotated edition of P.'s works is that of Schweighäuser (8 vols. Leips. 1789-95, and Oxford, 5 vols. 1823); the best texts are Bekker's (Berl. 1844), and Hultsch's (4 vols. (1867-72). See Livy, XXVIII.-XLV., Plutarch, *Lives of Philopæmen and Paullus Æmilius*, and K. W. Nitzsch, *Polybius* (Keil, 1842).

Polyearp, one of the Apostolic Fathers (q. v.), was a bishop who suffered martyrdom at Smyrna soon after the middle of the 2d c. All our information regarding him is derived from two authorities—the writings of Irenæus (q. v.), and a letter from the Church at Smyrna to the Philomelians, giving an account of his martyrdom and the many miracles which accompanied it. According to a letter of Irenæus preserved in Eusebius, P. was instructed by the apostles, had intercourse with many who had seen Christ, and was appointed bishop for Asia in Smyrna, where, at an exceedingly old age, he departed this life. According to the same authority he sojourned at Rome in the time of Bishop Anicetus or of the Emperor M. A. Antoninus, and converted many heretics to the Church of God. Jerome (q. v.), paraphrasing and amplifying the account of Irenæus, tells us that P. was a disciple of the Apostle John, by whom he was ordained Bishop of Smyrna, and was chief of all Asia, inasmuch as he saw and had for masters some of the apostles and those who had seen the Lord. Again Jerome and Eusebius, interpreting the visit of P. to Rome in the light of the Pascal controversy, which, however, did not arise till after the time of P., gathered from the above passage of Irenæus that while Anicetus ruled the Church of the Romans, P., yet surviving, came to Rome and entered into a conversation with Anicetus on account of some discussion in reference to the day on which the Passover was to be held. According to the letter called the Martyrium of P., which claims to have been written by eye-witnesses of the martyrdom and in the following year, but which from its contents—miraculous and non-miraculous—was probably the work of a much later period, P. was burned at Smyrna 'after he had served Christ eighty-six years.' Eusebius states that he suffered death under M. A. Antoninus, who began to reign 161, so that, however soon after that date his martyrdom be fixed, there is a difficulty, either about the great age of P. or his intercourse with the apostles. The date has been fixed by various writers at 147, 161, 166, 169, 175, 178; but all by mere conjecture. The only extant writing of P., although others are mentioned by later writings, is an Epistle to the Philippians, regarding the authenticity of which there is much controversy. The best editions are by Hefele (1839, 4th ed. 1855), Jacobson (1838, 4th ed. 1866), and Dressel (1857, 3d ed. 1876). See Donaldson's *Christ. Lit. and Doctr.* (vol. i. Lond. 1864); Clementson's *Epistles of Ignatius and P.* (1827); and an Essay by Canon Lightfoot in the *Contemporary Review* (May 1875).

Polychrome Printing denotes the art of printing two or more colours at a single operation of the press. Of the several processes from time to time devised, that patented in 1820 by Sir William Congreve, and since then modified and improved, has been most successful. Congreve employed compound metal plates so constructed as to separate and descend to different levels, at which the coloured inks were severally applied, and afterwards to rise and unite to form a single printing surface. Recently a polychrome process on an entirely different plan from the above, by which any number of colours forming pictorial designs may be printed simultaneously, has been patented in this country by C. O. Radde of Hamburg. See STENOCHROMY.

Polycotyledonous Plants. In the same way that plants with no cotyledons are called *acotyledonous*, those with one *monocotyledonous*, and those with two *dicotyledonous*, the name P. P. has been given to the comparatively small number having from two to many cotyledons. This occurs in *Conifera*, especially in the genera embracing the fir, spruce, and larch, in which up to fifteen have been observed. Some botanists, however, consider that such plants have normally two cotyledons, which have been merely deeply divided into a number of linear segments.

Polycrates, son of Æacus, in the 6th c. B.C. made himself tyrant of Samos, and having raised a fleet of one hundred vessels, subdued Lesbos, Miletus, and other neighbouring states. So great and unbroken was his prosperity, that Amasis (q. v.), his friend and ally, counselled him to sacrifice his dearest treasure, thereby to avert the jealousy of heaven; and P. cast into the sea a costly signet-ring, only to recover it a day later from the belly of a fish, as Schiller sings in his *Ring des Polykrates*. Thereupon Amasis, so runs the story, broke off his alliance with one whose fortune seemed too good to last; though Grote considers it more probable that it was P. himself who abandoned his Egyptian for a Persian ally, as in 525 we find him aiding Cambyses (q. v.) in his invasion of Egypt with forty vessels manned by discontented Samians, who were to be set in the forefront of the fight. They escaped, however, their intended fate, and returning with a mixed Spartan and Corinthian force, besieged P. for forty days within his citadel. His hour was not yet come, and for three years longer he ruled with increased magnificence, till in 522 his deadly enemy Oroetes, satrap of Sardis, lured him to the mainland, and there had him seized and crucified.

Polycystina, a group of *Protozoa*, belonging to the class *Rhizopoda* (q. v.), and allied to the *Foraminifera* (q. v.). These animals are all microscopic, and possess shells of flinty material, and of exceeding delicacy of form and beauty of outline. They are usually included in the group *Radiolaria*. Many species occur in a fossil state, the so-called 'Infusorial earth' of Barbadoes being almost entirely composed of the minute shells of P. This deposit is of Tertiary age.

Polydipsia (Gr. 'great thirst') is a term which has been applied to the disease *Diabetes Insipidus* (q. v.).

Polygalaceæ is a natural order of herbs or shrubs with alternate or sub-opposite leaves; small or showy irregular flowers, either solitary or racemose, having their two inner sepals petaloid; petals, three or five; ovary free, two-celled; style simple. There are about 400 species distributed through tropical and temperate regions. The properties may be summarised as bitter, emetic, purgative, and diuretic. *Polygala* is the type genus, and out of its 200 species is represented in Britain by three, to which the name 'milkwort' is given. *P. vulgaris* is a pretty plant, with white, pink, blue, lilac, or purple flowers, and in some of its varieties is common on heaths, poor pasture-ground, &c.; *P. calcarea* is confined to the chalk-hills of S. England; and *P. austriaca* is very rare and local. Many of the species possess medicinal properties, but the only one that has passed into notoriety is *P. Senega*, the root of which, under the name of Senega Root, has its place in *materia medica* as 'an excellent stimulating expectorant, well adapted for chronic bronchitis in old people, and for the advanced stages of pneumonia.' It is a N. American species, and was first introduced into medical practice as a remedy for snake-bites. Of Cape species, several are in cultivation, such as *P. oppositifolia*, *P. latifolia*, *P. cordifolia*, their purple petaloid sepals and fringed keel-like petal rendering them elegant and attractive ornamental

plants. *Comesperma volubilis*, a graceful little twining plant of Australasia, bearing a great abundance of beautiful blue flowers, belongs to the same category. *P. Chamabuxus*, a shrubby European species, is frequent in gardens. The S. American species of *Securidaca* ramble to a great height over forest trees, and when in flower make a handsome show. To this genus belongs the 'Buaze' (*S. longipedunculata*) of Livingstone's 'Travels,' the fibre of which resembles flax, and from its high quality will probably, on the opening up of Africa, be an article of commerce. *Mundtia spinosa* of S. Africa yields an insignificant edible fruit. The anomalous genus *Kramaria* is now included in *P.*, and will be referred to under RATTANY ROOT.

Polygamous (Gr. *polys*, 'many,' and *gamē*, 'marriage') is applied in botany to those species of Phanerogamia (q. v.) that bear on the same plant some flowers entirely male, others entirely female, and others hermaphrodite. Examples of such are the elm, maple, and horse-chestnut.

Polygamy (Gr. *polys*, 'many,' and *gamē*, 'marriage') is a name for the custom according to which a man may lawfully have more than one wife at a time. In Asia *P.* has existed from time immemorial, and Mohammedanism has fostered the practice. Montesquieu surmised that the custom arose in consequence of the great proportion of females in the population of the East; it more probably owed its origin in part to the premature old age of women in certain countries. In the Scriptures *P.* is mentioned as existing before the flood; in patriarchal times it was common; the Mosaic law tolerated it. There is no indication that it was practised by the Jews in the time of Christ. The Koran allows a man to have four legitimate wives; but only the rich can indulge so far. Arabs generally content themselves with one wife. *P.* can never prevail except where slavery exists in some form or other, its expense otherwise being too great.

A statute of Edward I. places *P.* among the capital crimes. By statute of George III. it is made punishable with imprisonment or transportation for seven years. By the laws of ancient and modern Sweden its penalty is death. In modern times *P.* has had defenders. Bernardus Ochinus, in the 16th c., published *Dialogues* in favour of *P.*, which were replied to by Beza. John Lyser, a Lutheran divine, took a firmer stand in *Polygamia Triumphatrix* (Lond. 1692). The Rev. M. Madan also advocated *P.* in *Thelyphthora*, a work in which he maintained that St. Paul's injunction that a bishop should be the husband of one wife implied that other men might have more wives if they chose. The development of *P.* by the revelations of Joseph Smith, the Mormon prophet, in 1843, needs only to be mentioned.

Polygar (*palegara*, 'tent-man'), the name applied to a class of petty chieftains, who were found by the British at the close of the last century established in the S. of India, especially in the Carnatic. They occupied hill forts, and lived by plunder. They offered a strenuous opposition to the pacification of the country; but the majority were dispossessed, and the remainder, deprived of their independence, have settled down into ordinary *aminidars* or landholders.

Polygas'trica (Gr. 'many-stomached'), a term applied by Ehrenberg to denote the group of Infusorian animalcules and other organisms with which they were at first associated. The name *P.* was bestowed on these organisms under a misapprehension of their structure, no stomach or digestive apparatus being developed in the Infusoria.

Polyglot (Gr. *polys*, 'many,' and *glotta*, 'language') is a term properly applicable to any book containing the same subject-matter in various languages, but is now almost solely applied to editions of the Bible in which the original text and several of the ancient or modern versions of it are arranged alongside of one another, so that any one portion of the text and the corresponding portions of the versions are exhibited at one view. The idea of a *P.* Bible was first carried out as early as the 3d c. by Origen in his Hexapla (q. v.). About the beginning of the 16th c. the famous printer Aldus Manutius formed the plan of a *P.*, and printed a specimen page containing the first fifteen verses of Genesis in parallel columns of Hebrew, Greek, and Latin. His undertaking did not meet, however, with support, for no more of the work was printed. The only copy of this page known to exist is in the National Library of Paris (MSS. No. MMMLXIV.). *P.* Bibles are generally divided into

greater and lesser. The former class includes four works—1. The 'Complutensian *P.*' (Compluti, 1514-17, 6 vols. fol.), so called from having been published at the Spanish town Alcala, the Latin name of which is Complutum. It was produced through the exertions and at the expense of Cardinal Francisco Ximenes de Cisneros, Archbishop of Toledo, whose name appears on the title-page, and whom it cost over 50,000 ducats. The first four volumes contain the Old Testament, the Hebrew, Greek, and Latin being printed in three parallel columns, and the Chaldee paraphrase with a Latin translation at the foot of the page, while the margin exhibits the Hebrew and Chaldee radicals. The fifth volume includes the New Testament in Greek, with a parallel column containing the Vulgate Latin version, besides various prolegomena and appendices. The sixth volume contains a Hebrew and Chaldee lexicon to the Old Testament, an index of Latin words occurring in the work, an alphabetical list of all proper names in the Bible with their interpretation, and an introduction to the Hebrew grammar. Many MSS. were collated for this *P.*, but modern investigation has shown these to have been late and valueless. 2. The 'Antwerp *P.*' (Antverpiæ, 1569-72, 8 vols. fol.). This work, sometimes called the 'Royal *P.*' from its having been produced at the expense of Philip II. of Spain, was edited by Benedict Arias Montanus, a Spanish scholar, sent to Antwerp by the King for this purpose, and printed by Christophe Plantin, who was its original projector. The first four volumes contain the Old Testament in the Hebrew text (which is that of the Complutensian revised with one of Bomberg's Bibles), the Chaldee paraphrase, the LXX., and the Vulgate. The fifth volume comprises the New Testament in Greek, Latin, and Syriac; while the remaining three volumes are filled with lexicons and grammars of the various languages employed, together with indexes, a treatise on sacred antiquities, and (in the eighth vol.) a Latin translation of the entire Bible by Santes Pagninus, revised by Montanus. This *P.* is of great rarity, 500 copies only having been printed, and the greater part of these lost in a storm at sea with the vessel which was conveying them to Spain. 3. The 'Paris *P.*' (Lutetiæ Parisiorum, 1645, 9 parts in 10 vols. large fol.). This work was executed at the expense of the parliamentary advocate Guy Michel le Jay, who was reduced from great wealth to utter poverty by the undertaking. The first five volumes contain the Old and New Testament reprinted from the Antwerp *P.* The remaining four are devoted to the Syriac and Arabic versions of the Old Testament, with Latin translations of them; the sixth also including the Samaritan Pentateuch, now printed for the first time. As regards appearance and typography, this is unquestionably the most magnificent *P.* ever printed; but the incorrectness of the text, the absence of critical and other apparatus, as well as inconvenience of form and arrangement, make it of much less value than—4. The 'London *P.*' (Londini, 1657, 6 vols. fol.), which, edited by Brian Walton, and hence sometimes called 'Walton's *P.*,' surpasses all the others alike in point of correctness and fulness. Nine languages are employed, though no book is printed in more than eight. The first volume, besides prolegomena embracing sixteen separate dissertations, contains the Pentateuch, every sheet exhibiting at one view the Hebrew text, the LXX., the Vulgate, the Chaldee Targum of Onkelos, the Hebræo-Samaritan text, and the Samaritan, Syriac, and Arabic versions. To each of these, except the Vulgate, is annexed a literal Latin translation. The second and third volumes include the rest of the Old Testament in the same languages, except the Samaritan, and with the addition of an Ethiopic version of the Psalms. The fourth contains the Apocrypha in Greek, Latin, Syriac, and Arabic, with a twofold Hebrew text of the Book of Tobit. After these come two additional Chaldee Targums to the Pentateuch, and a Persian version of it, each having a Latin translation affixed. The fifth volume embraces the New Testament in Greek, Syriac, Latin, Arabic, and Ethiopic, with the addition of a Persian version in the case of the Gospels. The sixth volume forms an appendix to the work, containing a copious collection of various readings, besides various useful and learned dissertations. As a supplement to this work, Edmund Castle prepared his famous Heptaglott Lexicon (Londini, 1669, 2 vols. fol.). The lesser polyglotts include (1) 'Vatablus's Bible' (1586, 3 vols. fol.), in Hebrew, Greek, and Latin, with preface, &c.; (2) 'Wolder's *P.*' (Hamburgi, 1596, 2 vols. fol.), in Greek, Latin, and German; (3) 'Hütter's *P.*' (Noribergæ, 1599, fol.). The plan of this work

is peculiar. The Old Testament portion, which is incomplete, extending only to Ruth, is printed in nine different languages, distributed through four different volumes in such a way that all the volumes include the Hebrew, Chaldee, Greek, Latin, and German, while each has in addition one of these modern versions, French, Italian, Saxon, or Slavic. The New Testament (2 vols. fol.) is in twelve languages, embracing, in addition to the above, except the Chaldee, Saxon, and Slavic, the Syriac, Spanish, English, Danish, Bohemian, and Polish versions; (4) 'Reineccius's P.' (Lipsiæ, 1750, 3 vols. fol.), containing the Old Testament in Hebrew, Greek, Latin, and German, the Apocrypha in the three latter, and the New Testament in Greek, Latin, Syriac, and German. It is very correctly printed, and includes useful appendices; (5) 'Bagster's P.,' containing the Old Testament in Hebrew, Greek, Latin, English, German, French, Italian, and Spanish, and the New in these and also in Syriac; (6) Stier and Theile's *Polyglotten Bibel zum praktischen Hand-Gebrauch*, containing the Old Testament in Hebrew, Greek, Latin, and German, and the New in the three latter, the fourth column being filled with a valuable collection of various readings from other German translations. There are also polyglots of various portions of the Bible, the Psalms and the New Testament being those most frequently met with in this form. See Le Long, *Bibliotheca Sacra* (vol. i.); Dibdin's *Introduction*; Horne's *Manual of Sacred Bibliography*; Pettigrew's *Bibliotheca Sussexiana* (vol. i. part 2); Butler's *Horæ Biblicæ*; and Adam Clark's *Succession of Sacred Literature*.

Polygnotus, the first great painter of Greece, was a native of the island of Thasos, but removed in 463 B.C. to Athens, which thereafter became the capital of the arts. To the genius of P., who may be regarded as the founder of historic painting, the highest tribute is paid by Aristotle, Lucian, Pliny, and others. He was the painter of the earliest authenticated portrait—that of Elpinice, the sister of Cimon; but his most important works, which adorned the public hall at Delphi, were the 'Destruction of Troy' and the 'Visit of Ulysses to Hades.' P. was surmamed *Ethographos* ('painter of character') by Aristotle; he created painting as an independent art, and, in the opinion of Warnum, 'for originality and discernment he has perhaps never been equalled by any artist, ancient or modern.'

Polygon (Gr. *polys*, 'many,' and *gônia*, 'a corner'), in mathematics, is any figure plane or gauche bounded by straight lines meeting at definite angles. There are as many angles as sides; and when both the angles and the sides are all equal, and the figure confined to one plane, the P. is regular.

Polygonaceæ, or **Polygoneæ**, a natural order of dicotyledonous herbs, shrubs, or rarely trees, with alternate simple leaves, having usually sheathing stipules; the flowers are small, hermaphrodite, or unisexual; the perianth herbaceous or coloured; the ovary free, ovoid, trigonous, or compressed; the fruit, a one-seeded nut, generally enveloped in the perianth. It numbers about 500 species, of which the bulk are found in temperate regions. The characteristics are astringency, arising from the presence of tannin, and acidity, depending chiefly on oxalic acid; some are purgative and some acid. Of the type genus *Polygonum*, the sub-genus *Fagopyrum* has already been referred to under BUCKWHEAT, and *P. bistorta* under BISTORT. Other species are *P. convolvulus*, a strangling troublesome pest among crops; *P. persicaria* and its allies, ranking as prolific agrarian weeds; *P. aviculare*, or 'knot-grass,' an abundant and variable weed on waste and cultivated ground; *P. hydropiper*, called 'water pepper,' from its acrid properties, common in watery places; and *P. amphibium*, which as an aquatic is a handsome plant. These are all British species, and there are several others of interest to the botanist only. In the Himalaya, *P. cymosum* is used as spinach, and *P. Sieboldii* supplies a good cattle fodder in Japan. *Rumex* contains about fifty species, a number of which come under the popular designation of docks (see DOCK). Some of these, as *R. obtusifolius* and *R. crispus*, are great nuisances to agriculturists. For other species see article SORREL, closely related to which group is *Oxyria reniformis* of the Arctic region and the Alps of the north temperate zone, forming an excellent pot-herb and antiscorbutic. It grows up to 4000 feet in the Scotch Highlands. The most important genus, both in an economical and medicinal view, is *Rheum*, for which see RHUBARB. The N. American genus *Eriogonum* is distinguished by the

absence of leaf stipules. Besides the species mentioned under *Calligonum*, in arid tracts of N.W. India, *C. polygonoides* locally constitutes half the larger vegetation, and in the S. Punjab the abortive flowers, which fall in great numbers, are swept up and made into bread. When in full bloom its small pink blossoms fill the air with a pleasant odour like over-ripe strawberries. Of *Atraphaxis*, an Asian and Cape of Good Hope genus, a few species are in cultivation, but present minor attractions. Of the few trees that belong to the order, *Coccoloba uvifera* is the most noteworthy, for which see SEA-GRAPE.

Polyhymnia, or **Polymnia** (Gr. 'rich in song'), in Greek mythology, one of the Nine Muses (q. v.), the inventress of the lyre and the mother of Orpheus. In works of art she is represented in a thoughtful attitude, with the forefinger of her right hand placed upon her mouth.

Polym'erism, in chemistry, is that kind of isomerism in which the substances, though they have the same percentage composition, have different molecular weights. Thus oxygen and ozone, whose molecular symbols are O₂ and O₃ respectively, may be looked upon as polymeric. The most interesting group of polymeric bodies are the hydrocarbons of the olefine series, ethylene (C₂H₄), propylene (C₃H₆), butylene (C₄H₈), amylene (C₅H₁₀), &c., and these being at the same time homologous, show a regular gradation in their boiling-points and specific gravities.

Polynésia (Gr. *polys*, 'much or many,' and *nēsos*, 'an island'), a geographical term of varied significance applied to the island regions of the central Pacific Ocean. Literally interpreted, the name would include all the groups from Sumatra to the Galapagos, together with Australia; and to this vast region the term Oceania has been applied by French geographers. It is more usual at the present time, however, to exclude from P. the Indian Archipelago—which has been called Malaysia—together with Australia, New Guinea, and the other islands S. of the Equator as far as the meridian of 180°. To this latter region have been given the names of Australasia and (New Zealand being excepted) Melanesia (q. v.). The remaining islands, after making these deductions, are broadly known as P., and it is of them that this article will treat. P. thus circumscribed is still a most extensive region, reaching from 20° N. lat. to 30° S. lat., and from the Pelew Islands in 130° E. long. to Easter Island in 109° W. long. The principal island groups comprised within it are:—N. of the Equator—the Ladrone, Caroline, Marshall, and Sandwich Islands; upon the Equator—the Gilbert and Galapagos Islands; and S. of the Equator—the Ellice, Phoenix, Samoan, Friendly, Society, and Marquesas Islands, with the Paumotus, or Low Archipelago. The general name of Micronesia (*i.e.*, 'region of small islands') has been given to the islands N. of the Equator, with the exception of the Sandwich Islands.

The islands composing P. may be broadly divided into two kinds, viz., those of volcanic origin and those of coral formation. The former are for the most part rugged and mountainous, with sharp lofty peaks, the highest of which is the volcano of Mauna Kea, in Hawaii, 13,953 feet above the sea-level. Besides the Sandwich Islands, the chief volcanic groups are the Ladrone, Marquesas, Society Islands, and Samoa. The shores of these islands are usually abrupt, and on account of the depth of the water, coral reefs are comparatively scarce. Active volcanoes are now found only in the Ladrone, Sandwich, and Kermadec Islands. The islands of coral formation are small and low, and much more numerous than the high or volcanic islands. For an account of their origin and different forms, see CORALS AND CORAL ISLANDS.

The climate of P. is tropical, but is tempered by the insular character of the land and by the influence of the trade-winds. In some parts hurricanes occur during two months of the year, but as a rule the climate is balmy and pleasant, and excessive heat is characteristic chiefly of the more bare and exposed of the coral islands. The soil, especially of the volcanic islands, is very fertile, producing the cocoa-nut, bread-fruit, banana, yam, and sweet potato in abundance. The cultivation of cotton, sugar, coffee, tobacco, rice, &c., has been commenced in some of the more civilised groups, and has entirely succeeded where the requisite labour is obtainable. Pigs, dogs, and rats, were the only quadrupeds indigenous to P., but cattle, horses, goats, and sheep have been successfully acclimatised, especially in the

larger islands. Birds and insects are numerous, but snakes are confined to certain groups. Fish are very abundant, and constitute the staple food of the inhabitants. The Bêche-de-Mer (q. v.) is plentiful on the reefs around many of the islands.

The inhabitants of the widely-scattered islands of P. are generally believed to belong to a single race, and they speak the same language with variations of dialect only. The origin of this race has been the subject of much interesting speculation and inquiry, and the question cannot yet be regarded as settled. The principal theories regarding the Polynesian race are four in number, viz. :—(1) That it is of American origin; (2) that it is of Malay origin; (3) that it is the result of an emigration of Turanian Mongols from Central Asia prior to the emigration of the Malays; (4) that it forms of itself a race distinct from any either in Asia or America, and independent of those continents. Of these various theories, the first is now generally abandoned, and the third has not advanced beyond the stage of hypothesis. The second has received the most extensive adoption, but the latest researches seem to point to the fourth being, after all, the true theory. The complexion of the Polynesians is brown, with a yellowish tinge, and their hair is black, long, and straight. They are tall and finely proportioned, with handsome features, the nose being not unfrequently aquiline, though, as a rule, the nostrils are rather wide. Throughout P. the chiefs are remarkable as presenting points of physical superiority to the bulk of the people, and this has led to a theory that the former belong to a different race of more recent appearance in P. The Polynesians are more athletic than the Malays, from whom they also differ, as Mr. A. R. Wallace has pointed out, in being 'energetic, demonstrative, joyous, and laughter-loving.' They are like the Malays, however, in their fondness for voyaging—a trait which has played a most important part in their history. The Polynesian language is simple and euphonious, abounding in vowels. Much has been made of the occurrence in it of certain Malay words, but this element is now generally recognised to be, as Mr. Wallace says, 'a recent phenomenon, originating in the roaming habits of the chief Malay tribes.'

Another question has arisen as to whether the Polynesian and Papuan races are radically distinct, or are simply variations of the same race. In disposition and habits the Polynesians and Papuans possess many points of resemblance, but in colour, hair, and language the differences between them are as great. The Papuans, moreover, do not possess the system of *tapu*, or taboo, and the habit of kava-drinking, both of which prevail throughout P. Their traditions are also entirely different, as well as their mode of warfare, the bow being in use among the Papuans, while the only weapons of the Polynesians were clubs, spears, and daggers. At the present day the Papuans and Polynesians do not appear to coalesce when resident on the same islands. The inhabitants of Micronesia differ in some respects from those of the rest of P., and approximate more closely to the Malays. In regard to the myths of P., Fornander says, 'The Polynesian and Hebrew and Chaldean legends' are not copies one from the other, but 'independent and original versions of a once common legend held alike by Cushite, Semite, Turanian, and Arian up to a certain time in their national life.'

When first visited by Europeans, the Polynesians were addicted to idolatry and various savage practices, such as cannibalism, infanticide, &c., but the labours of missionaries and the spread of civilisation have to a large extent put an end to these evils. Immorality is the great vice of the people, and to it and their fondness for ardent spirits is due the fact that in most of the groups the population is decreasing. Elephantiasis is the most common disease; but measles, influenza, and smallpox have at times committed great ravages. The Polynesian being lazy, and the prodigality of nature freeing him from the necessity of working for his living, the resources of the islands are still undeveloped, but by the employment of Chinese labourers they might be made to yield all kinds of tropical produce in abundance. See *An Account of the Polynesian Race: its Origin and Migrations, and the Ancient History of the Hawaiian People*, by Abraham Fornander (vol. i. Lond. 1878). Through the influence of Professor Max Müller, an annual grant was procured from the Earl of Carnarvon towards the printing of Whitmee's *Comparative Polynesian Dictionary* in January 1878.

Polyphemus, the name of a beetle (*Chelorchina polyphemus*) belonging to the family *Dynastida*, and which attains a consider-

able size. The term is also given to a genus of crustaceans allied to the familiar 'water-fleas.' *P. pediculus* is a well-known species, occurring in ditches and ponds. These animals have only one eye—hence their name—and swim on their backs by means of the legs and antennæ.

Polyphemus (Gr. 'the much-speaking one'), the one-eyed Cyclops, a son of Poseidon and the nymph Thoosa, who in his Sicilian cave devoured six of the comrades of Ulysses. But that hero, first making the monster drunk, blinded him with a burning pole, and then escaped by concealing himself and his companions beneath the bellies of the giant's sheep, just as Sinbad does in the *Thousand and One Nights*. Ovid makes P. murder Acis, his rival in the love of Galatea.

Polyphony (Gr. *polys*, 'many'; *phōne*, 'voice'), in Music, a contrapuntal composition in which each part of a musical piece forms a melody in itself. In *Homophony*, on the other hand, the harmony is produced by a series of chords. See COUNTER-POINT. The following is a specimen of polyphonic composition:—



Polypi, a term formerly used in zoology to denote all lower animals which had a circle of arms or tentacles surrounding the mouth, as well as other forms which did not exhibit such. The name 'polype' in former years was in fact used to describe any animal belonging to the Zoophyte group, or to the class represented by the sea-anemones, corals, and their neighbours; even the *Polyzoa*, a class widely removed from the preceding, were included under this term. In modern zoology its use is restricted to denote the members of the class *Actinozoa*. The term P. has no significance whatever in natural history classification; the division of animals corresponding most closely with the old group of the P. being the sub-kingdom *Coelenterata* (q. v.), which includes the Zoophytes, Sea-anemones, &c. The *Polyzoa* (q. v.), on the contrary, are much higher animals—although presenting a striking resemblance to many of the *Coelenterata*—and are included in the sub-kingdom *Mollusca* (q. v.).

Regarding the Zoophytes or *Hydrozoa*, as most nearly resembling one division of the old group of the 'P.' little need be said. They are as a rule compound organisms which agree in possessing one stomach-sac separated or specialised from the body cavity, whilst their reproductive organs are external processes of the body wall. Such organisms are well represented by the *Sertularida*, or 'Sea-firs,' which grow rooted and fixed to stones and shells, and which may be cast ashore in large quantities after storms. They present the appearance of plants, and reproduce their colonies by a suitable process of *budding* or *gemmation*, as well as by sexual processes. The separate individuals in the compound zoophyte are named *polyrites*, each resembling in all essential details the little fresh-water polype or *Hydra* (q. v.) common in ponds and ditches. In the class *Actinozoa*, as already remarked, the animals receive the names of *Polypes*. They may be simple (e.g., sea-anemones) or compound (e.g., most corals, *Alcyonium* (q. v.), &c.). In this class a stomach-sac is developed, and the reproductive organs are internal. In both *Hydrozoa* and *Actinozoa*, the body substance consists of two layers—an outer or *ectoderm*, and an inner or *endoderm*; while the stinging or extricating organs termed *Cnidae*, or 'thread-cells,' occur in all of these forms. The class *Hydrozoa* includes the following orders of zoophytes:—

1. *Hydrida*: ex. *Hydra*.
2. *Corynida*: ex. *Tubularia*, *Eudendrium*, &c.
3. *Sertularida*: ex. *Sertularia Plumularia*, &c.
4. *Campanularida*: ex. *Clytia*, &c.;

and, in addition, contains orders represented by such genus as the Portuguese men-of-war or *Physalia* (q. v.), the Jellyfishes or *Medusida* (q. v.), &c. In the class *Actinozoa* there are four orders:—(1.) *Zoantharia* (sea-anemones, reef-building corals, &c.); (2.) *Alcyonaria* (*Alcyonaria*, red coral, isis, &c.); (3.) *Rugosa* (extinct corals); and (4.) *Ctenophora* (q. v.) (*Pleurobrachia* (q. v.), *Cestum*, &c.).

Polyvide, a name used in Zoology to indicate the separate individuals composing a *Polyzoön*, or member of the class *Polyzoa* (q. v.).

Polypodium is an extensive genus of ferns (*Filices*), distributed all over the world, but predominant in tropical countries. They have free veins, globose sori on the back of the frond, and no indusium; otherwise the species are much diversified in habit and appearance. The fronds are simple, lobed, pinnatifid, or compound; they present great contrasts in size, and vary in texture from membranous to leathery. In Britain P. is represented by the Polypody (*P. vulgare*), common on walks, banks, trees, &c.; the Oak-fern (*P. Dryopteris*) and the Beech-fern (*P. Phegopteris*), both plants of shady places in hilly districts; and *P. alpestre*, limited to the Scotch Highlands. In addition there are two or three doubtful species. The genus numbers altogether about 400 species.



Polypodium vulgare.

Polyporus is an enormous genus of pore-bearing *Fungi*, of which two species are mentioned under Amadou (q. v.), and another forms Dry Rot (q. v.) in oak timber.

Polyprion, a genus of Teleostean fishes represented by the Stone Basse (*P. cernium*), or Couch's P., and by other species. It is nearly allied to the perch, and is included in the family *Percidae* itself. Its colour is a dark brown, tinted with purple. The first fin rays are spiny. The Stone Basse usually swims near floating timber and wreckage, and appears to feed on smaller fishes.

Polypterus, a genus of Ganoid fishes inhabiting the Nile, Senegal, and other African rivers. The dorsal fin is separated into a number of small portions, each of which has a single spine in front. The pectoral fins consist of a central stem, to which the fin rays are attached. The tail-fin is *heterocercal*, or unequally lobed. The younger P. are said to have external gills in their young state; if this is true, they are related to the mud-fishes or *Lepidosirens* (q. v.), and also to the *Elasmobranchii* (q. v.).

Polyypus is an antiquated term employed to signify any pedunculated tumour attached to a surface, to which it was supposed to adhere like a parasite. The most common seat of P. is the mucous membrane, and the following are the principal varieties—(1) *fibro-cellular* tumours, developed in the sub-mucous tissue, and covered with mucous membrane; (2) tumours composed of *fibro-plastic* cells, not developed into fibro-cellular tissue; (3) *warty* and *epithelial* growths with narrow necks; (4) all sorts of tumours which project and have a narrow neck; (5) *hydatid* P., consisting of a number of thin vesicles filled with a watery fluid. The varieties of P. are also named, according to their seat, *nasal* P., *aural* P., and P. of the *rectum* and *uterus*.

Polystile (Gr. *polys*, 'many,' and *stylos*, 'a column'), in architecture, an edifice or court surrounded by several rows of columns.

Polytechnique. See ÉCOLE POLYTECHNIQUE.

Polyth'eism is the belief and worship of many gods. The prevalent view regarding P. is that it is a degradation of a previous Monotheism (q. v.), which is further identified with that of the Jews. This view was first attacked by Hume (*Essays*, 1742), who maintained that the mind gradually rises from a lower to a higher conception of Deity, and who has been followed by the more 'advanced' school of writers on religion since, although many able scholars still base their investigations on the older and what may be perhaps called the traditionary view; e.g., Creuzer (*Symbolik und Myth. d. a. Völker*), Schelling (*Religions-Philosophie*), Gladstone (*Studies on Homer and Juventus Mundi*). According to the newer theory, P. is a

development of Fetichism (q. v.). Otherwise, religion is a development of Mythology (q. v.), the one beginning where the other stops; and if so, P. must necessarily precede Monotheism, because the elements of mythology are numerous, and therefore every religion must begin with a multitude of divine figures. Besides the above authorities, see T. Parker's *Discourse of Religion* (Works, Lond. 1866), Goldziher's *Mythology among the Hebrews* (Eng. trans. Lond. 1877).

Polyzo'a, a class of *Molluscoida*, or lower Mollusca, defined as consisting invariably of compound animals, which have a complete digestive system, and a nervous system consisting of a single nerve-mass only, a heart being absent. The upper part of the digestive system can be protruded from and retracted within the body-sac or cell, and the mouth is surrounded by a circle of ciliated tentacles. Of the P. no better examples can be cited than the *Flustra* or 'sea-mats' which are cast upon our shores, and which, growing rooted and attached to stones and shells, resemble pieces of pale brown seaweed. The P. inhabit fresh waters and the sea, and the name 'corallines' is not unfrequently applied to them, both in a recent and in a fossil state. Each *Polyzoön* consists of a colony of animals (or *polyptides*), which has grown from a single polypide by a process of continuous budding. The single and primitive polypide in its turn was produced from an egg, developed by the generative organs possessed by each member of the colony. Each polypide is enclosed in a double-walled sac or cell, the outer wall being named the *ectocyst*, and the inner wall the *endocyst*. No connection exists between the various members of the colony, save such as may be maintained by the common integument that unites them. The so-called *colonial nervous system*, which was supposed to bind the members of the colony together, has been almost certainly proved to be non-existent. A mouth surrounded by tentacles, a stomach and intestine, which is bent on itself and terminates close to the mouth, comprise the digestive system, and present us with a superiority of structure to the Hydrozoa or zoophytes, with which the P. were long confused. The interior of the cell is filled with the nutritive fluid, which is circulated, in the absence of a heart, by the agency of the *cilia* lining the endocyst. The nervous system consists of a single nervous mass or *ganglion* placed on one side of the gullet. No sense-organs appear to be developed. On the exterior of the cells of P. certain curious little bodies named *Avicularia*, or 'bird's-head processes,' are found. These exhibit continual movements, but their exact nature and relations to the P. on which they exist are unknown. The muscular system of the P. is well developed, and consists of *retractors*, by means of which the animals are enabled to withdraw themselves into their cells, and of *parietal* or *circular* muscles. The P., as already said, reproduce themselves by budding or gemmation, this process providing for the growth of each colony. But new colonies spring from eggs or ova, which are developed by the complete reproductive apparatus belonging to each cell, the P. being thus *hermaphrodite*. Certain peculiar bodies, supposed to be internal buds, and named *winter-eggs* or *statoblasts*, also give origin to new colonies. The P. are divided into two groups—the *Phylactolamata* or *Hippocrepian* P., in which the tentacles are arranged in a horse-shoe shape or crescentic fashion, and in which a valvular process or epistome guards the mouth. Most of the fresh-water P. belong to this group. The second division is that of the *Gymnolamata*, in which no epistome exists, and in which the tentacles are arranged in a circular fashion. To this latter group belong most of the marine P. Some of the best-known genera of P. are *Flustra*, *Eschara*, *Cellularia*, *Salicornaria*, *Bicellaria*, *Membranipora*, *Lepralia*, *Fredericella*, *Bowerbankia*, *Alcyonidium*, *Pedicellina*, *Cristatella*, &c.

Poma'cesæ, or **Po'mesæ**, is a sub-order or tribe of *Rosaceæ* (q. v.), in which the tube of the calyx is more or less globose, lined with a fleshy and juicy disc, and the fruit a one to five-celled *Pome* (q. v.) It comprises numerous trees and shrubs common in temperate regions of the northern hemisphere, including a number that yield valuable edible fruits. For the most important members, see AMELANCHIER, APPLE, CRATÆGUS, COTONEASTER, HAWTHORN, LOQUAT, MEDLAR, PEAR, PYRACANTHA, QUINCE, SERVICE.

Pomade' and **Poma'tum** (Fr. *pommade*, from *pomme*, 'an apple'), terms originally applied to an ointment made of lard

and apples. It now denotes any aromatised fats, used principally for dressing the hair, and to a smaller extent for other toilet purposes. Plain pomades are made from purified animal fats, chiefly lard, aromatised in several ways, regarding which see *PERFUMERY*; but among the endless variety of preparations sold under fancy names by hairdressers, various oils, as almond, olive, palm, and specially castor oil, are used, the thickening and stiffening substances being white bees-wax and spermaceti. Beef marrow is also a favourite substance for preparing pomades, and in such as are put forward as hair preservatives and stimulators of the growth of the hair, tincture of cantharides is an almost invariable ingredient.

Pombal, Dom Sebastião José de Cárvalhoe Mello, Marquis of, was born in 1699 at Soura, near Coimbra. His youth was restless. He studied law at Coimbra, then entered the army for a short time, and having turned student again at Soura, eloped with a rich widow, Teresa da Moronha Almada. His uncle, Paulo Carvalho, obtained for him a post in England as secretary of legation in 1739; but in 1745 he was recalled, soon afterwards being sent to Vienna to settle a dispute between the Pope and Maria Theresa regarding the archbishopric of Aquileia. At Vienna, his first wife being dead, he married the Countess Daun. The queen-dowager of John V., conceiving an affection for his wife, recommended him to the notice of her son Joseph I. In 1750 he was appointed Foreign Secretary to this weak monarch, and he soon had him completely under control. He began reform by limiting the power of the Church, checked the Inquisition, resumed the corn lands, put an end to the flagrant abuses of power in the colonies, expelled the jesuit missionaries from Paraguay, and founded two trading companies, one for the E. Indies, another for Brazil. His administration did much to mitigate the distress occasioned by the great earthquake of November 1, 1755, which buried many thousands of persons. He was subsequently created Prime Minister, with the title of Count of Oeyras. An attempt to assassinate the king on the night of September 3, 1758, only increased P.'s power, by placing the lives of the principal conspirators in his hands. The Duke of Aveiro and the Marquis of Tavora were broken on the wheel, many of their accomplices being put to death with scarcely less cruelty. The Jesuits were suspected of sharing in the plot, and were decreed banishment. When they refused to go, P. caused them to be embarked in ships and transported to the States of the Church. Clement XIII. thereupon sent a nuncio to remonstrate, but the nuncio was sent home unheard. Clement XIV. shortly afterwards abolished the order of the Jesuits. In two wars with Spain P. had an opportunity of organising the army on a new basis, and put the frontiers in a better state of defence. He took great pains to raise the standard of education in Portugal. The university systems were overhauled; the study of physical sciences was introduced; navigation, shipbuilding, the principles of commerce and agriculture were taught by distinguished Englishmen and Frenchmen, and the censorship was relaxed. P.'s daring gained him renown and riches, but also many enemies. On the death of his master Joseph, in 1777, he was dismissed by the new king, Pedro III., and Portugal soon sank into the state of distraction from which he had raised it. He died at Pombal, 8th May 1782. See the *Vita di Seb. de Carvalho* (1781), an apology for P. entitled *Administration du Marquis de P.* (Amsterd. 1787), and Smith's *Memoirs of the Marquis of P.* (Lond. 1843).

Pome (Fr. *pomme*, Lat. *pomum*, 'an apple'). In the apple and its allies, parts of the flower besides the ovary unite to form the fruit—the edible portion being mainly developed from the calyx tube—and to this description of fruit the technical name P. has been assigned by botanists. In the specialisation of horticulture the word has been made use of to found the title of a journal called the *Pomologist*, also of the Pomological Society, established for the benefit of those who devote themselves more particularly to the cultivation of apples and pears.

Pomegranate is the name of a small tree called by botanists *Punica Granatum*—the only species of its genus, and, from its anomalous character, one of uncertain position in scientific classification. At present it is placed by our most experienced systematists in the natural order *Lythraceæ*. In habit, it somewhat resembles the hawthorn, and has often spinescent branches; oblong entire glabrous deciduous leaves; sessile terminal flowers, solitary or in three-flowered cymes, with usually scarlet petals

(sometimes yellow or white); and a pulpy fruit of about three inches in diameter, covered with a leathery rind. The structure of the fruit by its division into two tiers is remarkable, but of too technical a character to describe here. The P. is a native

of N.W. India, Afghanistan, westwards to Syria, from whence at a very early period it was carried to Greece (where it is now run wild), to the N. African coast, and at a later date was transferred to other parts of the Mediterranean region. It is now grown in many subtropical countries of the Old and New Worlds, and by artificial means in less congenial latitudes. That it

was a fruit highly prized we have the evidence of numerous ancient writers, in addition to the references to it in the Old Testament (*e.g.*, Deut. viii. 8), in Homer's *Odyssey*, and the fact of its frequent sculpture on Egyptian monuments. The pulp has a sweet or subacid delicate flavour, is kept cool by the dense rind, and in warm countries proves particularly grateful and refreshing. The rind is extensively used for dyeing or tanning purposes, morocco leather being prepared from it or the bark. The flowers yield a light-red dye, the root is an excellent vermifuge (considered a specific against tapeworm in India), and the light-coloured wood is close-grained, hard, and heavy.

Medicinal Properties of P.—The dried bark of the root of the *Punica Granatum* is employed in medicine as an astringent and anthelmintic. It is considered to be more efficient than turpentine in the expulsion of tapeworm. A decoction of the fresh root (2 oz. to Oj) is preferred to that of the dried bark, and a pint of it should be taken in three doses, an hour apart, before breakfast. The dose of the pharmaceutical decoction is from 1 to 2 oz. As an anthelmintic, male fern is more relied on.

Pom'el, in Architecture, a knob, knot, or boss used as a final ornament on the top of the roof of a turret, the summit of a pavilion, &c.

Pomm'ern (Lat. *Pomerania*, Slav. *po mor*, 'near the sea'), a province of Prussia, bounded N. by the Baltic, E. and S.E. by West Prussia, S. by Brandenburg, and W. by Mecklenburg. It extends along the Baltic for nearly 200 miles, with a breadth of 30 to 80 miles, and is divided into the three governmental districts of Stettin, Stralsund, and Köslin. P. is intersected by the Oder (q. v.), which, flowing through a marshy country, divides into many arms, of which Reglitz, the largest, forms the Dammer Lake, and falls, with the main stream, into the Frisches Haff. Other rivers are the Rega, Persauk, Grabon, Wipper, Stolpe, Lupow, Leba, and Rheda. The surface of P. is in general very level, and the coasts are defended by dykes. The soil is much less fertile than that of other provinces of Prussia, having only 6.6 per cent. of level loam and clay soil, while Prussia has, on an average, 28.2 per cent. In Köslin 45.4 per cent. of the soil is sand, and 35 per cent. mixed clay; in Stettin, 29 sand and 13 moor; in Stralsund, 20 sand and 63 mixed soils. The best part is, in spite of the sand dunes and marshes, the belt along the coast, of which the portion from Stolpe to Kolberg yields abundant wheat. The chief employment of the people is agriculture, and the principal productions are buckwheat, potatoes, flax, hemp, cabbages, beetroot, and tobacco. The rearing of horses, cattle, and sheep is the most important branch of industry, but there are considerable fisheries of salmon and sturgeon, eels, lampreys, and crayfish. P. is poor in the useful minerals, but yields immense quantities of peat, besides bog-iron, lime, chalk, salt, and amber. P. had (1872) 364 miles of railway. It has a University at Greifswald, and 17 gymnasia, besides other schools. Area, 11,627 sq. miles. Pop. (1875) 1,462,290. P. formed part of the ancient kingdom of the Wends or Vandals. It was ruled by its own dukes from 1062, and converted to Christianity in the 12th c. by Bishop Otto of Bamberg. It attained its greatest extension under Duke Suantepolk (1220-66), and the line came to an end with Boleslaus XIV. in 1637. Meanwhile part of the country had been occupied by the Swedes during the Thirty Years' War, and by the Peace of Westphalia



Pomegranate.

Sweden retained the island of Rügen and the rest of P., with the exception of Hinterpommern. The peace of Stockholm, in 1720, united all P. with Prussia, except the part N. of the Peene and the island of Rügen, which only fell to Prussia in 1815. See Barthold, *Geschichte von Rügen und P.* (5 vols. Hamb. 1839-45); Fock, *Rügensch-Pommersche Geschichten aus 7 Jahrh.* (6 vols. Leips. 1861-72).

Pomology. See POME.

Pomona (akin to Lat. *pomum*, 'apple'), the Latian goddess of fruit-trees, at Rome had her special priest, the *Flamen Pomonalis*. Her husband, Vertumnus (Lat. *verto*, 'I turn'), the god of the changing seasons, had wooed her vainly under a thousand varying forms, but at last won her love, first as an aged crone, then as a blooming youth (Ovid, *Met.* xiv. 623; Propert. iv. ii. 2, 21).

Pomona, or **Mainland**, the largest of the Orkney Islands (q. v.), lying in the centre of the group, is 25 miles long by 15 broad, its coast-line being extremely irregular. Area, 150 sq. miles; pop. (1871) 16,541. From the W., where the cliffs rise steeply from the sea, the island has a general slope towards the E., the highest point being the Ward Hill of Orphir (876 feet). The surface, in great measure heath and moorland, is studded by numerous freshwater lochs, which, like their streams, abound in trout. Oats, barley, and turnips are the chief crops, and the herring fishery employs a large number of the inhabitants. Kirkwall (q. v.) and Stromness (pop. 1632) are the principal towns, and among the antiquities are the 'Picts' Houses' of Quanterness, the Maes-howe tumulus with its Danish runes, and the Standing Stones of Stennis, of which only sixteen out of sixty are still erect.

Pompadour, Jeanne Antoinette Poisson, Marquise de, mistress of Louis XV., was born in Paris, 29th December 1721. Her mother was the wife of Antoine Poisson, a clerk and army contractor; but P. was taken under the protection of one Normand de Tournehem, who, after educating her highly, gave her in marriage to his nephew D'Étoiles (9th March 1741). Her marriage gave her position and independence, but not contentment, for her mother had filled her mind with thoughts of becoming the king's mistress. She threw herself in his way at hunts in the most attractive costumes, and ogled him at masked balls, until (April 1774) she was established at court in the position she so much envied. Her success was deeply resented on account of her low birth, which, says Kitchen, 'seemed to be a far more heinous fault than her adultery.' At the period of her triumph she was in the height of physical grace, to which she added vivacity of mind and real kindness of heart. For the next twenty years France may be said to have been ruled by her. She kept her hold on Louis XV. by constantly devising new pleasures for his dull and jaded appetite. In order to keep him amused she had recourse to the services of the litterateurs and artists of the time, among them Voltaire, Crébillon, and Diderot. By and by she became the friend of financiers and ministers of state, and through her was exercised the patronage of all important posts. The sums of money which passed through her hands were immense, and the lands which were granted to herself and brother were of great extent. 'Yet,' says Lacratelle, 'she made a splendid, even a beneficent use of her wealth; she portioned poor girls, assisted old men, repaired ruined villages, followed the impulse of the new philosophy.' P. died 15th April 1764, having passed into the stage of *amie nécessaire* to the king, who remained perfectly unmoved when he lost her. She was buried in the Church of the Capucine, Place Vendôme, Paris. See Goncourt's *Les Maîtresses de Louis XV.*, Sismondi's *Histoire des Français* (vols. xxviii., xxix.). Everything really authentic regarding P. is to be found in M. Campardon's *Mde. de P. et la Cour de Louis XV.* (Par. 1867). In 1878 M. Malassis edited *Correspondance de Mde. de P.* It does not contain anything new, but the work is an *édition de luxe*.

Pompeii, a famous ruined city of Italy, situated near the S. base of Mount Vesuvius, about a mile from the Bay of Naples, and 15 miles S.E. of Naples by rail. In the excavation of P. we are presented with a picture, mutilated but not defaced, of actual life in a typical Roman city 1800 years ago. All the garniture at least of social and public life is here, for the city was stricken down, and 'the earth with faithful watch has hoarded all!' The tragic story of P. has been the theme of Schiller,

Bulwer Lytton, and other celebrated writers. P. is first mentioned in history in B.C. 310, but many of its monuments prove it to be much older. Founded by the Oscans, it was soon leavened with the civilisation of the Greeks, and its position near the mouth of the navigable Sarnus brought it prosperity. (Both the sea and the river were forced back from the town by the subsequent convulsions of nature.) After the Samnite wars P. was made subject to Rome, and the rebels in the Social War were defeated in the vicinity. Thoroughly Romanised in course of time, the town became a favourite retreat of the wealthier Romans (*e.g.*, Cicero), and had at one time a pop. of about 30,000. In A.D. 49 an earthquake destroyed a great part of P., but it was shortly rebuilt in the improved style of imperial Rome. On the 24th August 79, P. was overtaken by the final catastrophe. First came a dense shower of ashes, covering the town to a depth of 3 feet, then a shower of red-hot rapilli or pumice-stones, 8 feet deep, followed at intervals by fresh showers of ashes. After the first shower many of the inhabitants escaped, but the whole number of those who perished is estimated at 2000. P. was ultimately found buried to a depth of about 20 feet, but this was partly the result of later eruptions. Extensive excavations were undoubtedly made in ancient times, and the ruins were freely ransacked for marbles and precious stones. But during the Middle Ages the very site passed out of the memory of man, and it was only the discovery of some statues and bronze utensils by a peasant in 1748 that drew the attention of Charles III. to the lost city. Excavations begun at this time were carried on feebly under the Bourbons, and with more vigour during the reign of Murat, but no regular plan was adopted till after the political changes of 1860, when the works were placed under the able superintendence of M. Fiorelli. Since then the chief movable objects found have been sent to the Naples Museum, while at P. itself a museum and library have been recently instituted, and a dwelling-house erected for students supported by Government. A railway has been constructed for the removal of *débris*, and at the present rate of progress Fiorelli calculates that P. will be completely excavated in seventy more years, at a cost of 5,000,000 francs. As much as 40,000 francs are received yearly as admission fees. The town walls, pierced by eight gates, are 2843 yards in circumference. The streets, bordered by pavements, are straight and narrow, the broadest being about 24 feet across. They are finely paved with large polygonal blocks of lava. In the streets are frequent notices, in red letters, referring generally to municipal elections. The chief peculiarity of the dwelling-houses is the internal court (*atrium*), surrounded by a covered passage, with the *impluvium*, or reservoir for rain-water, in the centre. P. is singularly rich in gay decorations. Marble is rare, and the columns even in the public buildings are made of tuff-stone or brick, but they are covered with stucco, and painted in almost glaring colours (red and yellow). The mural decorations are noted for extreme delicacy and variety. The Forum, with an open space of 515 by 107 feet, is paved with large slabs, and enclosed on three sides by an arcade, and on the fourth by the Temple of Jupiter, which was being restored at the time of the eruption. The Great Theatre, a very old building, was restored about the beginning of the Christian era, and could hold 5000 persons. To the S.E. is the amphitheatre, 148 yards by 114, which held 20,000 spectators. Between 1861-72 the skeletons of 87 human beings, 7 horses, and 3 dogs were discovered. On 4th April 1878 were found, in presence of Prince Leopold, a gold armlet, a ring with engraved agate, two bronze vases, a cook's 'shape,' a blue glass vase, a terra-cotta lamp, &c. See Mazois' *Ruines de P.* (Par. 1812-38), Breton's *Pompeia* (Par. 1855), Gell's *Pompeiana* (1824-30, new ed. 1876), Beule's *Drame au Vesuve* (Par. 1872), Helbig's *Campanische Wandmalerei* (1874), Prof. Overbeck's *P.* (3d ed. Leips. 1875); Fiorelli's *Scavi di Pompei* 1861-72 (1875).

Pompeius Magnus, Cneius, born 30th September 106 B.C., as the son of Pompeius Strabo, a noted soldier of fortune, was trained to arms in the Social and first Civil Wars. His father's death in 87 left him a seeming prey to his father's foes, but by marriage with a prætor's daughter he weathered the peril, and in 83 defeated three Marian generals and turned the scale in Sulla's favour, winning from him the title of *Imperator* and the hand of his step-daughter, for whom P. coldly divorced his first consort. In 81 he pursued the vanquished Marians to Africa, whence, after slaying Carbo and other heads of the faction,

together with four-fifths of a Numidian host, he returned in the same year to Rome to receive a triumph—a simple *equus*, not yet twenty-five—and be greeted with the enduring epithet of *Magnus*, 'the Great.' Having quelled the counter-revolution of the Consul Lepidus (77), he next advanced at the head of 30,000 men against Sertorius, who still upheld in Spain the Marian cause, and proved a worthier foe than any P. had yet encountered. Only after six chequered campaigns, and after Sertorius had fallen by the hand of his own legate and rival, Perpenna, could P. bring the war to a successful close (71), and hasten home in time to crush the rising of the gladiator Spartacus. Once more he entered Rome in triumph, and chosen colleague in the consulship to Crassus (70), proceeded to break with the aristocratic party by his measures for the restoration of the tribunate and extension of the judicial functions beyond the senate. The popularity thus earned gained him supreme command of a fleet and large force of infantry for the suppression of piracy in the Mediterranean, and this task accomplished in ninety days (67), he next obtained the conduct of the war with Mithridates. Him he defeated in Lesser Armenia (66), and within five years had established the Roman supremacy in Pontus, Phœnicia, Syria, and Palestine, taking Jerusalem after a three months' siege (63), and returning to Rome in 61 to celebrate his third and greatest triumph, when Romans learnt how P. had captured 800 ships, 1000 fortresses, and 900 towns, had founded 39 cities, enriched the treasury with 20,000 talents, and nearly doubled the republic's revenue. But meanwhile there had arisen one, his equal in arms and far his superior in statesmanship, Cæsar (q. v.), with whom and Crassus, to secure the ratification of his acts in Asia, P. found himself obliged to form the coalition known as the First Triumvirate (60). In vain did he henceforth seek to stem by jealous edicts that rival's career of conquest, and bind the people to himself by largesses of corn and the dedication of a splendid temple; in vain did he once more court the aristocracy, and in the year succeeding Crassus' death obtain the sole consulship (52). Cæsar's passage of the Rubicon (49) forced P. to fly to Greece, where, after a passing victory at Dyrrachium, he saw the host hastily mustered by the fame of his Eastern conquests melt at Pharsalia before the Cæsarian veterans. From that fatal field he rode to the coast of Thessaly and took ship for Egypt, where, as he stepped ashore, he was stabbed, at the bidding of the eunuch-regent Pothinus, by one of his old centurions, 29th September 48 B.C. P.'s military skill was counterbalanced by his failure as a statesman, the justice of his provincial government by his coldness and arrogance at home, his freedom from the vices of the age by the readiness with which he divorced his wives. A deep dissembler, he lacked the real generosity which makes and retains friends, and, in the words of Merivale, 'was feared by all, admired by some, trusted by few, and loved by none.' See Merivale's *Fall of the Roman Republic* (Lond. 1853), and Mommsen's *Römische Geschichte* (5th ed. 3 vols. Berl. 1868-70).

Pom'pelmouse, **Pompo'leon**, or **Pumelo**, are names given to extra large fruits produced by some of the sub-varieties of *Cedrus decumana* or Shaddock (q. v.).

Pompey's Pillar, a column standing on a mound 600 yards to the S. of Alexandria, is 98 feet 8 inches high, its shaft (73 feet) being composed of a single block of red granite. It was formerly surmounted by a figure of Diocletian, in whose honour, according to the inscription on its base, it was erected by Publius, eparch of Egypt, in 296 A.D. Its popular name is possibly a corruption of the Gr. *pompaios*, 'conducting,' applied to the pillar from the fact of its serving as a landmark.

Ponce, a town on the S. coast of the Spanish island of Puerto Rico, standing about 3 miles inland from its harbour, has a Catholic church in semi-Moorish style, an Anglican church (1874), a well-built townhall, a theatre with accommodation for 2000 people, and an hospital erected (1875) at a cost of £8000. The streets are lit with gas, and waterworks are now (1878) in course of construction. The steamers of the Royal Mail Company touch weekly at the port, and there is telegraphic communication with Jamaica and Santa Cruz. The exports (sugar, molasses, coffee, and tobacco) amounted in 1884 to £480,929; the imports (hardware, lumber, provisions, &c.) to £429,044. Estimated pop. (1877) 12,000.

Ponce de Leon, Luis, one of the most famous Spanish poets in the time of Karl V., was born at Granada of an illus-

trious family in 1527. He entered the Order of St. Augustine at Salamanca in 1544, and was appointed professor of theology there in 1561. In 1572 he was imprisoned for five years in a dark cell by the Inquisition for having translated the Song of Solomon contrary to the decree of the Council of Trent. He resumed his chair in 1577, was raised to the rank of vicar-general of the province of Salamanca, and died at Madrigal, 23d August 1591. A happy mixture of elegance, sensibility, and enthusiasm gives P. a foremost place among the lyric poets of Spain. He unites the glowing imagination of a Hebrew prophet to the artistic chastity of an ancient Greek. Long and close study of the classical models, and particularly of Horace, had refined his taste and polished his diction to a degree which has scarcely been attained to by any later Spanish poet. P. substituted a short rhymed measure for the long stanzas of the canzoni. His chief works published in his lifetime were *De los Nombres de Cristo* (1583-85); *La Perfecta Casida* (1583)—both of which are grand prose poems. His lyrics were first published by Quevedo at Madrid in 1631, under the title *Obras Proprias, y Traduciones Latinas, Griegas y Italianas; con la Paraphrasi de Algunos Salmos y Capítulos de Job*. A complete edition of his works appeared at Madrid (6 vols. 1804-16). See Nicholas Antonio, *Bibliotheca Hispana Nova* (2 vols. Rome, 1672); Ticknor's *History of Spanish Literature* (3d ed. 1861).

Pon'cho (Span.), a sort of cloak worn originally in Chili, consisting of a blanket with a slit in the centre, through which the head is thrust. Waterproof ponchos of painted cotton-cloth or rubber-cloth are used in the United States army, chiefly by mounted troops.

Pon'dicherry (*Puthucherry*), the chief French settlement in India, and the seat of government.—The town is situated on the Coromandel or E. coast of S. India, 86 miles S. of Madras. Estimated pop. 30,000. It is well built, and is divided by a canal into the White and Black quarters; there are boulevards lined with trees. The chief buildings are the Church of Foreign Missions, the Government House, and the lighthouse. The trade is not large, as the harbour is only an open roadstead, in which ships anchor one mile from the shore. In 1872-73 the coasting trade was thus valued:—Imports, £31,000; exports, £112,000. It has been proposed to connect P. with the S. Indian railway system. P. was the headquarters of the French at the time of their wars with the British in the Carnatic during the middle of the 18th c. It was then considered the handsomest city in India, with the strongest fort; but both were taken and razed to the ground by the British in 1761.—The district of P., which is entirely enclosed within the British district of N. Arcot, has an area of about 107 sq. miles, and a pop. of about 80,000. Along with the other French settlements in India, P. sends a member to the Chamber of Deputies.

Pondweed is a name given to the aquatic genus *Potamogeton* (Gr. 'near a river'), of which there are about 50 species. Of these, a considerable number are found in Britain, forming a large part of the subaqueous vegetation of the ponds, canals, streams, fresh and brackish ditches, and other waters of moderate depth. Some possess leaves that float on the surface over large areas, and so attract attention, while others only raise thin flower-spikes into the air for fertilisation, and are attractive merely to the naturalist. The properties are unimportant, though in the economy of nature the plants form food and home for much low animal life. An allied genus called *Zannichellia* bears the name of 'Horned P.' See *NAIADACEÆ*.

Pon'go, the name by which the Gorilla appears to have been first described by Purchas in his *Pilgrims* (1626). The third chapter of this work includes 'The strange adventures of Andrew Battell of Leigh in Essex, sent by the Portuguese prisoner to Angola, who lived there and in the adjoining regions neere eighteene yeeres.' Among other curiosities described by Battell is the 'ape monster Pongo.' There appears to be little doubt that the P. of Battell is the gorilla, the 'Engeco' being the chimpanzee. The term P. also appears to have been used to denote the Orang of the Eastern Archipelago, a monkey, it is hardly needful to remark, entirely distinct from the gorilla.

Poniatowski, a princely house of Poland, descended from the Italian family of Torelli, whose ancestors were Counts of Guastalla and Montechiarugolo. The first distinguished member of the family was Count Stanislaus P., born at Dereczyn

in Lithuania in 1677, who during the war of the Polish Succession was an active supporter of Stanislaus Leszczyński and Karl XII. of Sweden. After the death of Karl he went over to August II., but on his death again took the side of Leszczyński, and at the capitulation of Danzig was taken prisoner by the Russians. After his liberation P., at the request of Leszczyński, became reconciled to August III., whose confidence he henceforth enjoyed till his death at Ryki, in the Lublin Palatinate, August 3, 1762. P. left several sons by his second wife, the Princess Czartoryska, of whom, after Stanislaus August, king of Poland, the most noteworthy were **Prince Kazimierz P.** (1721-1800), Grand-Chamberlain to the latter; **Andrzej P.**, born 16th July 1735, who (1756) was made a prince of the German Empire, and at his death (March 3, 1773) was an Austrian general of artillery; and **Michał P.**, the youngest, who became Archbishop of Gnesen and Primate of the Empire, and whose sudden death during the rising of 1794 was popularly ascribed to suicide through fear on account of his unpopularity.—**Prince Jozef Antoni P.**, born at Warsaw, 7th May 1762, was the son of Andrzej P. and the Countess Kinska. He early entered the Austrian service, but in 1789 returned to his native country, where his untiring efforts as a major-general to improve the organisation of the Polish army were rewarded with the chief command during the campaign of 1792. When the king, his uncle, agreed to the Confederation of Targowicz, P. resigned his post and went to Italy, returning in 1794 to become a volunteer in the army of Kosciuszko, who had formerly served under him. As commander of a division he did great service during the two sieges of Warsaw, and soon after the surrender of that town he retired to Vienna, from whence he returned in 1798 to live on his estates near Warsaw till 1806. On the erection of the Duchy of Warsaw in 1807, P. was appointed Minister of War. In 1809 he commanded the Polish army against the Austrians under the Archduke Ferdinand, and, though defeated (19th April) at Raszyn, by skilful manœuvres forced the enemy to evacuate Poland, and penetrate Galicia as far as Cracow. P. was also at the head of the Polish contingent in the campaign against Russia of 1812-13, and on the 16th October of the latter year was appointed by Napoleon Marshal of France on the field of Leipsic. On the 19th he was ordered to cover the rear of the retreating French army. The victors had already occupied the suburbs of Leipsic, and planted light troops on the opposite bank of the Elster, when P., with now only 300 men and 30 horses, was forced to attempt its passage. The French troops had previously destroyed the only bridge, and P., severely wounded, spurred his horse into the river, and sank in its swollen waters. His body, found on the 24th and buried on the 26th, was afterwards removed to Warsaw, and in 1816 was re-interred at Cracow, in the sepulchre of the Polish kings. At Warsaw there is an equestrian statue of P. by Thorvaldsen. A monument erected (1814) at Leipsic by his comrades was in 1876 renovated by the Estates of Galicia.—**Prince Jozef P.**, natural son of Prince Stanislaus P. (born 23d November 1757, died 13th February 1831), who was the last legitimate scion of his house, was born at Rome, 21st February 1816, and educated at Florence. In his younger years he gained some celebrity as a tenor singer. Naturalised (1848) in Tuscany by the Grand-Duke Leopold II., he was Tuscan Plenipotentiary at Brussels (1849), and at London (1850-53). From 1854 he lived in France. Under the Second Empire he was made a member of the Senate, and was intrusted with several extraordinary diplomatic missions. In 1870 he removed to London, where he died, 3d July 1873. P. composed several operas, of which the most successful were *Giovanni di Procida* (1840), *Pierre de Médici*, *Don Desiderio*, and *À travers le Mur* (1861).

Ponsælion is the name of a new and beautiful scarlet pigment prepared by boiling cyanide of potassium with binocide of mercury, adding a solution of caustic potash, and when cold bisulphide of carbon. The resulting precipitate passes rapidly through a variety of tints, and after a day's exposure to the air assumes a brilliant vermilion hue, which is permanent. P. was first obtained from Newcastle coals, and it derives its name from *Pons Ælii*, the Roman Newcastle-on-Tyne.

Pont-à-Mousson, an old picturesque town in the department of Meurthe, and the French frontier station on the line from Nancy to Metz, from the former of which places it is distant N. N. W. 20 miles. It stands on the Moselle, is over-

looked by a ruined castle on a lofty eminence, was for two centuries the seat of a university founded in 1571, and has a Gothic church of St. Martin dating from the 14th c. It carries on an active trade in coal, timber, grain, &c. Pop. (1872) 8211.

Pontchartrain, a lake of Louisiana, U.S., about 5 miles N. of New Orleans, which communicates with it by the P. Railway (one of the first constructed in the U.S.), and by two canals navigable by schooners. These canals do not enter the Mississippi, but terminate in basins in the rear of the city. The lake is 40 miles long from E. to W. and 25 broad, with an extreme depth of 20 feet. Almost surrounded by cypress swamps and *prairie tremblantes*, it is drained by the Rigolets and Chef Menteur first into Lake Borgne and then into Mississippi Sound. Forts Pike and Macomb defend these channels, through which is carried on an important commerce. Before the construction of the Mobile Railway, the traffic between New Orleans and Mobile, Pensacola, and the watering-places on Mississippi Sound was by steamer from the lake terminus of the P. Railway. Several places along the shores of the lake are much frequented by the people of New Orleans in the hot season. An immense boulevard between the lake and the city was being constructed in 1877. The lake is named after Comte de P., Minister of Marine under Louis XIV.

Pontecorvo, a town of S. Italy, province of Caserta, on a hill overlooking the Garigliano, 28 miles S. of Sora. It has old, massive walls, is the seat of a bishop, manufactures macaroni and plaster wares. The cathedral, adorned with fine frescoes, has valuable archives. The bridge here was destroyed to check the march of Hannibal, and the whole district is rich in Roman remains. In 1860 the bridge was again destroyed by the Bourbon troops, but was rebuilt soon after. Pop. (1874) 10,760. Napoleon conferred on Bernadotte the title of Prince of P. in 1806.

Ponté Delgada, the most important seaport of the Azores, on the S. coast of St. Michael's Island, has now an excellent harbour, and is defended by St. Braz Bastle, and by two forts. It exports great quantities of the oranges for which the island is famous, and some wheat and maize. The orange crop of 1876-77 was much below the average, but in 1876 there entered 133 British vessels of 35,960 tons, and cleared 138 of 37,170 tons. The value of British imports was £49,127, and of exports to Great Britain £130,216. The port is yearly visited by a number of American whalers, for the purpose of taking in stores and landing oil for transhipment. A breakwater 860 metres long is (1878) in course of construction, on the model of that of Holyhead, and by 1875 a length of 580 metres was completed, at a total cost of £317,722. The part of the harbour thus formed has an area of 25,000 square metres; that not yet completed will have an area of 90,000 square metres, and a greatest depth of 60 feet. The new quay, at which vessels drawing 18 feet of water will be able to discharge, is to be 50 metres long. Pop. 20,000.

Pontefract (pron. *Ponfret*), a town of England, in the W. Riding of Yorkshire, on a hill near the confluence of the Aire and Don, 10 miles S. E. of Leeds by rail. It was called Kirkby before the Conquest, but received its present name from the breaking of a bridge (*Pons fractus*) over the Aire, which long delayed the advance of William upon York, and the final blow of his terrible vengeance on Northumbria. Ilbert de Lacy, who received from William a grant of the place, subsequently built here a famous castle. In the 14th c., P. passed by marriage to Thomas, Earl of Lancaster, who, for having caused the death of Gaveston, was with many barons taken prisoner and beheaded in P. castle. In this castle, also, Richard II. was imprisoned and 'hacked to death;' Archbishop Scrope was beheaded in 1405; and Anthony Woodville, Earl Rivers, Lord Grey, and others were put to death by Richard III., to smooth his way to the throne. It was taken by Robert Aske at the head of the 'Pilgrims of Grace,' and in the civil wars, the last stronghold that held out for Charles I., it was finally dismantled by Major-General Lambert in 1649. The keep is the only part now remaining. As a municipal borough, P. is one of the oldest in the kingdom, dating from 1484; while as a parliamentary borough it is considerably older. It has a fine church of All Saints in Early English style, restored in 1867, and a Norman Church of St. Giles, the parish church since 1790.

P. is a great seat of the manufacture of malt and liquorice, and has flour-mills, iron and brass foundries, hat factories, breweries, brick and tile works, &c., while in the vicinity are numerous coal mines. New waterworks were opened in 1874. The well-known 'P. cakes,' lozenges of refined liquorice, have been made here for centuries, and are stamped with a rude figure of the famous castle. Eight cattle fairs are held yearly, and two race-meetings (on a good course a mile to the W.) during spring and summer. In the neighbourhood are kept the Badsworth Hounds. P. sends two members to Parliament, and publishes two newspapers. Pop. (1871) of municipal borough, 5350; of parliamentary, 11,653.

Pontvedra, capital of a province of the same name in Galicia, Spain, on a peninsula formed by the confluence of the Lerez, Alta, and Tomaso, 35 miles S. by E. of Santiago. The united rivers here enter the inlet called the Rio de P., a magnificent natural harbour, and the Tomaso is spanned by a grand Roman bridge (*Pons vetus*), which gives name to the town. The great local industry is the sardine fishery. Pop. 6623.

Pontianak, a town of Borneo, and the capital of the Dutch Western Residency, on the W. coast of the island, and on the S. side of the estuary formed by the confluence of the Landak and Kapuas. The stream, here 300 yards broad, widens into a broad natural haven, known by the name of the town, and lined along both shores by dense forests, swarming with parrots and monkeys. The only buildings of any pretension are the residence of the native Sultan of P., the Dutch Residency House, defended by Fort du Buis, the hospital, and a mosque. The trade, which is increasing, is chiefly in the export of diamonds, gold-dust, sugar, rice, cotton, and coffee. The large country governed by the Dutch Resident is particularly rich in minerals. In Montrado district are the principal gold mines, the total yield of the Residency in this mineral being some 425,000 ounces yearly. The yield of diamonds has of recent years fallen off, but the fields of P. will always be remembered for having produced the famous gem of the Sultan of Matan, weighing 367 carats. Pop. of the town, 12,000, including many Chinese; of the Residency, in 1870, 337,772, of whom 312,565 were natives, 25,000 Chinese, and only 207 Europeans.

Pontifex, among the Romans, a member of the College of Pontifices, founded by Numa, and presided over by a P. Maximus, who held his office for life. The name is by some regarded as a form of *pompifex*, 'conductor of processions,' whilst others derive it from *pons*, a 'bridge,' and *facere*, 'to make' or 'sacrifice,' either because, according to Varro, the *pons sublicius* was built by the pontifices, or because on it they offered sacrifice. The college was originally composed of four members, besides the P. Maximus, all of them Patricians; but four Plebeians were added by the *Lex Opulnia* (300 B.C.), and the number was subsequently raised by Sulla to fifteen, and by Cæsar to sixteen. Fifteen was the ordinary number under the emperors, who themselves held the office of P. Maximus down to the reign of Gratianus (375 B.C.). The pontifices did not devote themselves to the cultus of any one divinity, like the flamens, Salii, &c., or like the augurs to divination; they were the supreme ecclesiastical authorities, vested with the oversight of the whole body of religion, with the upholding of priestly rights (*ius pontificium*), and with the ordering of the calendar. Their formulas were contained in the *Libri Pontificales*, discovered on the Janiculum (181 B.C.). Self-election (*co-optatio*), the original mode of filling up vacancies in the College of Pontifices, was abolished by the *Lex Domitia* (104 B.C.), by which the right of appointing new members devolved on the *Comitia Tributa*. It was revived by Sulla (81 B.C.), again suppressed (63 B.C.), and finally restored by M. Antonius. In the Catholic Church the Pope's fourth title is 'Supreme Pontiff of the Universal Church.'

Pontifical is a book containing the offices properly used only by bishops (doubtless named after the *Pontifical books* of ancient Rome, which contained an account of the duties of the pontifices or priests, bishops having received the name of pontiff), and consists of three parts:—Relating (1) to persons, e.g., the administration of the sacraments, the benediction of various classes of persons, &c.; (2) to things, e.g., the consecration of churches, church-furniture, &c.; and (3) to different occasions, e.g., the publication of the movable feasts, &c. An authoritative collection of the various offices in use was first issued as a P. by

Pope Clement VIII. (1596); of which new and revised editions were published in 1644 and 1748. The Anglican P. consists of the offices for confirmation and ordination in the Liturgy.

Pontine Marshes (Ital. *Paludi Pontine*, Lat. *Pomptina Paludes*), a low, marshy district near the W. coast of Central Italy, extending S.E. from Nettuno to Terracina, a distance of 31 miles, and varying in breadth from 6 to 11 miles. It is separated from the sea-coast on the W. by low downs, and it is supposed that the origin of the P. M. is due to the silting up of the mouths of the small streams Nymptæus, Ufens, Amenus, and others, which at one time flowed through it from the Volscian hills. Pliny states that originally there were twenty-three cities in this plain; in 432 B.C. the 'Pomptinus Ager' is said to have yielded abundant corn; and in 312 B.C. the censor Appius Claudius led across it the celebrated Appian Way. But a century and a half later the P. M. had greatly increased, and an attempt was made to drain it by the consul Cethegus in B.C. 160. Subsequent efforts of Julius Cæsar and of Augustus were without success, and the P. M. were not reduced till the time of Pope Boniface VIII., who drained by a canal the land about Sezzo and Sermonetta. Pope Pius VI. in ten years (1778-88) succeeded in draining the greater part of the P. M., and reopened the Appian Way. Though the deadly Malaria (q. v.) which formerly infested the P. M. is now abated, the plain is still very unhealthy during the heat of summer. See Prony, *Marais Pontins* (1813), and Giordani, *Gita alle Paludi Pontine* (1872).

Pontoon (Fr. *ponson*, from Lat. *pons*, 'a bridge'), a portable floating vessel forming a support in the construction of bridges for military purposes. Boats were used to support timber platforms in the wars of the ancients, as by Darius in the bridging of the Bosphorus. Xerxes employed 674 vessels when he crossed the Hellespont. pontoons of wood, covered with tin or leather, were extensively used in Germany and other countries in the 17th and 18th centuries. In the wars with the great Napoleon the British armies used pontoons of wood tinned inside and covered with metal, about 20 feet long, 5 feet broad, and 2 feet deep, a size which has not since been altered to any great extent, although great improvements in construction have been introduced. The pontoons were drawn up in line, and fastened to a couple of ropes drawn tightly across the river, being connected with timber baulks or joists upon which the flooring planks were placed. The late General Blanchard invented cylindrical pontoons of tin, which have the advantage of great lightness and buoyancy, most essential features in machinery which has to be transported from place to place. Rectangular frames are roped to the surface of the cylinders, on which rafts are formed. Captain Fowke, R.E., has invented a boat-P. of canvas on a wooden frame, which has increased lightness and surprising stability. The pontoons at present in use in the British service are of two kinds, both made of tin. One is cylindrical, with hemispherical ends, 22 feet 6 inches long, 4 feet wide, and 2 feet 4 inches deep. The other is of cigar shape, 14 feet 9 inches long, and 1 foot 7 inches broad. Rafts formed on two pontoons of the first kind are sufficient for the passage of troops and light ordnance; those formed on three pontoons at close distances for siege artillery. A raft of two pontoons can be formed in a quarter of an hour by half a dozen men, and dismantled in half the time. Pontoons are conveyed with their accompaniments in four-wheeled carriages. When they are not at hand, bridges are sometimes formed by groups of rough trunks of trees, lashed together, anchored in the river, and made fast by ropes stretched across the channel, baulks being applied as in a P. bridge. Casks are sometimes also used in the construction of military bridges. The Russians effected the crossing of the Danube at Galatz in June 1877 by a bridge of rafts lashed together longitudinally, other logs being laid crosswise upon them, to which was lashed another layer of longitudinal logs. On this was formed a roadway of planks wide enough for six men to march abreast. In the great crossing of the 27th June at Simniza, boat-loads of troops, protected by field-guns, first crossed the river, and after securing Sistova, an iron P. bridge was thrown across, upon which the main body passed over.

Pontus, a country in the N.E. of Asia Minor, bounded E. by Colchis and Armenia, S. by Cappadocia, W. by Galatia and

Paphlagonia, and N. by the Pontus Euxinus, from which it received its name. It was watered by the Halys (*Kizil Irmak*, 'red river'), Iris (*Kasalmak*), Thermodon (*Thernich*); Acampsis or Apsarus (*Tchoruk*), and Phasis (*Rion*), and was surrounded by lofty mountain ranges which sent down spurs towards the sea. The immediate coast-lands, however, were level and of great fertility, yielding grain, fruits, and timber in abundance. Among its cities were Pharnacia (*Kerasunt*), Trapezus (*Trebizond*), Amisus, and Polemonium. P. was first raised to a kingdom by Ariobarzanes I. (363 B.C.), from the last of whose successors, Mithridates VI. (q. v.), it was wrested by the Romans (63 B.C.). It was formed into a province (63 A.D.), and under Constantine was divided into Helanopontus in the S.W. and Polemoniaca in the E.;

Pontypool, a town of Wales, in Monmouthshire, at the base of the bold elevation of Mynydd-Maen, on the right bank of the Afon Llwdd, 8½ miles N. of Newport by rail. In the reign of Charles II. the manufacture of japanned wares was introduced by Thomas Allgood, while his son invented the polishing process for the production of 'P. ware,' but both industries have been transferred to Birmingham. The inhabitants (4834 in 1871) are mainly employed in the adjoining coal and iron mines. P. publishes a weekly newspaper.

Po'ny (perhaps from 'puny'), a general name given to the various breeds of small horses. The best known varieties are the Welsh, Shetland, and Iceland ponies, other breeds being the Exmoor, Dartmoor, and New Forest ponies. These vary greatly in constitution and hardiness. The Shetland ponies are small and exceedingly hardy; the Welsh ponies are larger, and are also well adapted for travelling in mountainous districts. Ponies are generally far from docile, and require considerable care and patience in training.

Poo'dle (Ger. *pudel*), a breed of dogs of small size, and exhibiting great intelligence, docility, and affection. The fur is usually white, soft, and woolly. The P. appears to be derived from some of the water-dogs, although its exact derivation is unknown. A special variety of P., named the Barbet, has very long and silky hair.

Poodoo-Cottah (*Puthu-kottei*), the capital of a native state in S. India of the same name, in political connection with the Government of Madras, 220 miles S.S.W. of Madras. It has wide, clean streets, and is celebrated for the palace, temple, and tank, all in the same enclosure.—The state of P., which lies between the British districts of Madura and Trichinopoly, has an area of 1380 sq. miles; pop. (1874) 316,695; revenue, £50,000, of which two-thirds are alienated in feudal and religious grants. The country is well cultivated, and dotted with innumerable tanks, some of considerable size. The ruler, called Tondiman, is the only independent ruler on the Carnatic coast of Madras, a position he owes to the loyalty of his ancestors to the British. The administration is practically in the hands of the political agent at Trichinopoly.

Poole (Cymr. *Pwll*, 'a marsh' or 'lagoon'), a seaport of England, in Dorsetshire, 7½ miles S. of Wimborne by rail, is situated on the N. side of P. Harbour. It has five churches, a guildhall, vegetable and fish markets, a public wharf, literary and mechanics' institutes, two banks, two weekly newspapers, &c. Cordage and sailcloth are largely manufactured, and there are good herring and plaice fisheries; but the yacht and ship building industry has greatly declined, only six British vessels of 292 tons having been built in the years 1872-76. P. Harbour, an irregular inlet, 6 miles long, formed by the projection of the 'Isle' of Purbeck, is one of the best havens on the southern coast. Since 1876 the narrow entrance (¼ mile) has been improved, and the channel leading into the harbour deepened. In 1876 there entered 762 vessels of 75,218 tons, and cleared 857 of 73,237 tons. The imports in that year amounted to £147,676; the exports (chiefly grain and Portland clay) to £19,825; and the customs to £3443. P. had (1875) 65 vessels of 5925 tons, besides 89 fishing-boats. It returns one member to Parliament. Pop. (1871) 10,097. From a Roman road leading to Winchester, P. is supposed to have been a Roman port, but in Leland's time it was only a poor fishing village. It sided with the Parliament in the Civil War, and its fortifications were demolished at the Restoration.

Poole, Matthew, an English divine, born at York in 1624, studied at Emmanuel College, Cambridge, and in 1648 became minister of St. Michael-le-Querne, London. Ejected for nonconformity in 1662, he devoted himself to biblical studies, his great work, the *Synopsis Criticorum* (5 vols. Lond. 1669-76), being a condensation of the *Critici Sacri* (1660). His *Nullity of the Romish Faith* (1666) and *Dialogues between a Popish Priest and an English Protestant* (1667) led Oates to include his name in the list of persons marked for assassination by the 'Popish Plotters' (1678), and P. fled for security to Amsterdam, where he died in October 1679, 'leaving behind him,' says Wood, 'the character of *clarissimus criticus et casuista*.' His unfinished *Annotations upon the Holy Bible* was published with additions by his friends (2 vols. Lond. 1683-85).

Poole, Paul Falconer, R.A., a self-taught painter, was born at Bristol in 1810. He exhibited his first Academy picture, 'The Well, a Scene in Naples,' in 1830; his second, 'The Farewell,' in 1837, since which time he has been a regular exhibitor, being elected A.R.A. in 1846 and R.A. in 1861. His works, if somewhat defective in drawing and monotonous in colour, are strikingly original and harmonious. Among his later productions are 'Philomena's Song by the Beautiful Lake' (1867), 'The Spectre Huntsman of Onesti's Line' (1870), 'Imogen before the Cave of Belarius' (1871), and 'A Lion in the Path' (1873), the last a noble Poussinesque landscape.

Poo'nah (*Pind*), the chief town of the district of the same name, in the Presidency of Bombay, British India, and the former capital of the Mahrattas, is situated on a plateau at the foot of the W. Ghauts, at the confluence of the Moota and Moulah streams, 1823 feet above the sea, 119 miles S.E. by rail from Bombay, and 58 N. of Sattara. Pop. (1872) 90,436; of the cantonments and Kirki, 28,430; total, 118,866. P. is the military headquarters of the Bombay army, and frequently the residence of the Governor during the hot months. It was never a fortified city. The chief building is the Peishwa's palace, a handsome quadrangle surrounded by cloisters of carved wooden pillars; it is now used as an hospital and lunatic asylum. The jail in the neighbourhood at Yirauda is a model structure. The cantonments, on an elevated site a mile W. from the town, are well laid out and healthy. They afford accommodation for 4000 European soldiers. In 1850, an elaborate system of waterworks was concluded, towards the cost of which £17,000 was spent by Sir Jamsetjee Jejeebhoy. There are prosperous institutions for higher education, including the Deccan College, with 100 pupils and European professors. There is a large trade in the raw products of the country; but the business of the jewellers and weavers has declined. The chief manufactures are cotton and silk goods, gold and silver lace, and leather. A specialty of P. is the *sari* or woman's robe, finely woven of cotton or silk, and ornamented with a gold border after the *shikar* pattern. P. is first heard of in 1604, as granted to the grandfather of the founder of the Mahratta power, Sivaji the Great. Subsequently it became the capital of the Peishwa (q. v.), originally the minister of the Sattara Rajah, but ultimately the chief member of the Mahratta confederacy. In 1818 the Peishwa, who was bound by close treaties to the British, treacherously commenced hostilities by the battle of P. or Kirki; he was defeated and dethroned.—The district of P.—the original home of the Mahratta nation—lies within the Deccan, E. of the range of the W. Ghauts. It has an area of 5099 sq. miles, and a pop. (1872) of 907,235. The country is much broken up by hill ridges. The crops are millets, rice, *ragée*, potatoes, cotton, and sugar-cane. There are manufactures of coarse cotton cloth and paper, and the *tussur* or wild silkworm is successfully cultivated.

Poon-Wood is the produce of two species of *Calophyllum* (q. v.), natives of the East Indies. *C. longifolium*, a large tall tree, common on the Aracan coast, &c., yields the true 'Poon-spars' of commerce, and *C. inophyllum*, which is of a much stronger and less elevated growth, furnishes a soft timber that is useful in shipbuilding where no great strength is required.

Poop (Fr. *poûpe*, Lat. *puppis*), in large ships, a partial deck stretching aft from the mizzen-mast over part of the upper deck. The P. is passing out of use, being of no advantage great enough to make up for its increase of leeway in sailing, and of danger from the enemy in action. In Greek and Roman ships the

upper part of the P. carried a fan-shaped ornament (Gr. *aphlaston*, Lat. *aplustre*).

Pooral'iah (*Purulia*), the chief town of the district of Maunbhoom, Bengal, British India, 40 miles W. from Bancoora. Pop. (1872) 5695. The place is of no importance except as a British station. In the neighbourhood are some ruined stone temples of the Jains.

Poor'boah (*Purbid*), a generic term of Sanskrit derivation applied to the inhabitants of India E. of the junction of the Ganges with the Jumna at Allahabad. During the Sepoy war of 1857-58 it came into general use in the British army for the Bengal mutineers, who were almost entirely recruited from the Provinces of Oude and Behar, to distinguish them from the native army of the two other Presidencies and from the Sikhs, who remained staunch.

Poor and Poor Laws. The word Pauperism (Lat. *pauper*, 'poor'), though almost unknown to the law, is used generally to indicate the settled condition of large masses of the people who are not only poor, but who are more or less dependent on the aims of the state. Among the nations of antiquity the charity resulting from religious dictate or natural feeling was in time displaced or supplemented by legislative decree. The kindly spirit of Old Testament injunction (*e.g.*, 'thou shalt not hinder thine heart nor shut thine hand from thy poor brother,' Deut. xv. 7) lost its force in later times of widespread mendicancy. The hair-splitting refinements and definitions of Rabbinical writers on the law are collected in Maimonides' *Mishnoth Ainiim*, translated into Latin by Prideaux, under the title *De Jure Pauperis*. Athens, which at one time could boast of having no beggars, made provision for those maimed in battle, and later for the soldiers' orphans. The Greek republics had also many clubs or societies (*Erasoi*) for mutual friendly relief. Among the Romans the extremes of wealth and penury were guarded against by the Agrarian and Licinian laws. (See AGRARIAN LAW and LICINIA GRNS.) Caius Gracchus introduced the distribution of grain at reduced prices, and although Augustus (in whose time 2,000,000 were thus fed) tried to check the practice, it continued till the fall of the empire. Various Roman writers tell of its evil effects both on land and people. During the Middle Ages, the labourers in feudal countries were *villains* and serfs. In England, prior to any existing record, the great mass of the rural population had risen to comparative independence as peasant proprietors. Even the serf, though bound to the soil and in the strictest sense his lord's property, had acquired definite rights, and on the performance of service duly limited by custom his holding was quite secure. Under the Edwards money payments took the place of personal service, and thus was created a new class of free labourers. The scarcity of labour after the Black Death, and the lawlessness of the 'landless men,' led to the enactment of the Statutes of Labourers (1349), intended to re-attach the serfs to the soil and to control their wages. The statutes, even after the suppression of the Peasant Revolt, were utterly ineffectual, and only intensified the hatred between rich and poor, and created a mass of pauperism to be dealt with in later times. In a century and a half after the Peasant Revolt villainage had become obsolete, and the market was still in the labourers' hands. The great proprietors rapidly turned from tillage to sheep-farming, which required fewer hands, and the course of eviction to which this led greatly increased the free-labour class, and augmented the social danger of vagabondage. A policy of pitiless repression towards vagrants, begun in the Statute of Winchester in 1285, was continued till the enactment of 12th Richard II. (1388), which is the first statute for the relief of destitution. Without referring to the atrocious legislation of earlier reigns, we find the 14th of Elizabeth (only a few years before the passing of her famous 43d), after reciting that all parts of this realm 'be presently with rogues, vagabonds, and sturdy beggars exceedingly pestered, by means whereof daily happeneth . . . horrible murders, thefts, and other great outrage,' enacting that all vagrants, for a first offence, shall be grievously whipped and burned with an iron on the right ear; for a second, regarded as felons; and for a third, suffer death as felons without benefit of clergy. Strype says that every English county had from 300 to 400 vagrants living by theft and rapine. 'It was on this host of "broken men" that every rebellion could count for support;

their mere existence was an encouragement to civil war' (Green). In Henry VIII.'s reign, according to Harrison, 'threescore and twelve thousand great thieves, petty thieves, and rogues' were hanged, and in the earlier years of Elizabeth there were some 400 annual executions. Similar laws in various European countries were alike merciless. In the time of Elizabeth the issue of a royal commission enabled the Government to legislate more wisely and effectually, though still the main object of the laws was to protect society rather than to relieve the poor. As before, labour was enforced on the idle and settlement on the vagrant; but a distinction was made for the first time between these and the really impotent and destitute, while each town and parish was held responsible for the relief of its indigent and disabled poor, as it had long been responsible for the employment of able-bodied mendicants. Houses of correction were ordered for the punishment and amendment of vagabonds by means of compulsory labour, and the churchwardens were empowered to levy a general poor rate in each period. The well-known Act, 43d of Elizabeth, which matured and finally established this system, has been the base of pauper-administration till about a generation ago. Its great distinguishing principles are (1) a distinction between pauper and vagabond, and (2) local responsibility for local distress. The great social danger against which these Acts were directed now gradually disappeared, partly however owing to the development of new industries, which quietly relieved the glutted labour-market, and partly to the growth of wealth in the country. The great Act of Elizabeth had not taken effect up to the reign of Charles I. in some parishes, which simply ignored their poor, and assessed no rates. The 3d William and Mary (1691) remedied certain abuses of the unlimited power of churchwardens and overseers, and enabled the justices to grant relief in cases of emergency. Under the three Georges the overseers were made accountable to the parishioners by means of returns and inspection, and all out-door relief was abolished—an act which greatly increased the number of workhouses. But the 36th George III. (1796) repealed this last Act, and so extended the application of relief that by 1801 the rates had risen to £4,000,000, and by 1820 to £7,330,254. The commission of 1832 revealed the terrible evil of the allowances in aid of wages—wages fell, idleness increased, till in some parishes every labourer was a pauper. Farmers employed men from the parish at reduced wages, while idle paupers were better lodged and fed than industrious workers, and even than a large class of ratepayers. Marrying at the age of seventeen, paupers claimed relief on the day after their marriage. The recommendations of the commissioners, embodied in the 4th and 5th Will. IV. (1834), were (1) that out-door relief should cease; (2) that a central authority should control the administration; (3) that unions be established for the better management of workhouses and classification of inmates; and (4) that there be kept a complete system of accounts. In eight months 2066 parishes were merged in 172 unions. The operation of the Amendment Act was at once seen in the reduction of the rates from £6,317,255 in 1834 to £4,044,741 in 1837. It was found impossible to withdraw out-door relief, which is still paramount in England, but the exceptions to the general rule against allowance in aid of wages is rare, as in the case of the cotton famine of 1861. The last great change in poor-law administration was the exchange of the Poor-Law Board of 1847 for the Local Government Board in 1871.

Present State of Poor Laws in England.—The Local Government Board consists of a president, appointed by the Crown, and certain *ex officio* members named in the Act. This board discharges the functions of the former Poor-Law Board and of the Home Secretary, and under the Acts relating to Registration of Births, Deaths, and Marriages, Public Health and Improvements, attends to sanitary matters and local taxation. It also discharges the duties of the Privy Council under the Acts relating to prevention of disease and to vaccination. The board has power to appoint officers with salaries, at rates to be determined by the Treasury. Any rule made by the board is valid if made under the official seal, and signed by the president or one of the *ex officio* members, and countersigned by a secretary or assistant-secretary. With regard to *Guardians of the Poor*, see that article. The term *workhouse* includes any house in which the poor of any parish or union is lodged. Commissioners may order workhouses to be built, with the consent of the majority of owners and ratepayers. Sums raised for the pur-

pose are to be charged on the rates; but are not to exceed one year's average amount. Loans are to be repaid in ten equal yearly instalments. Commissioners may order workhouses to be altered or enlarged without consent of the parish; but the cost must not exceed one-tenth of the year's rates, or £50. Introducing spirituous or fermented liquors into a workhouse, without the order in writing of the master, subjects the offender to a penalty of £10, or two months' imprisonment. The Act imposes penalties on paupers leaving a workhouse, carrying off clothes or other goods, on their refusing to work, or otherwise infringing the regulations of the workhouse. With regard to the emigration of paupers, see EMIGRATION, LAW REGARDING. Where Guardians (q. v.), select vestries, or similar bodies have been established, no out-door relief is to be given except as directed by them, subject to the control of the commissioners. But in sudden and extreme cases overseers may give temporary relief (not in money) to persons not settled in the parish. If an overseer refuse or neglect to give such relief, a Justice may order it, and an overseer disobeying the order is liable to a penalty of £5. A justice may also give an order for medical assistance in case of dangerous illness. In any union two justices may order out-door relief to any adult person unable to work from infirmity. The officials of a workhouse are bound to admit any one having an order from a competent authority. In extreme cases applicants must be admitted without an order, and if the house is full, must be accommodated elsewhere. A husband is liable to maintain the children of his wife, whether by previous marriage or illegitimate, till they are sixteen, or till the death of the mother. No pauper can be removed from any parish or workhouse till twenty-one days after notice of his being chargeable has been sent to the parish to which the order of removal is directed, unless the order be accepted. No removal can be made pending an appeal. A parish losing an appeal pays costs. No pauper can be removed from a parish after three years' residence. Legitimate children are settled in the parish of their parents. Illegitimate children have the settlement of their mother. A woman acquires the settlement of her husband; hence an Englishwoman marrying a native of Scotland or Ireland loses her claim to parochial relief in England. Apprenticeship gives a settlement in the parish where the last forty days were served. The putative father of a bastard child born after 10th August 1872 is liable to the mother in a sum not exceeding five shillings. Generally all property within the parish is rateable, but places of public worship are exempt. Money in anyone's house is not rateable, but personal property yielding an annual profit is so. The churchwardens and overseers have the power of fixing the rate. There are several Acts of Parliament specially applicable to the houseless poor of London. The rateable value of the metropolis is now (1878) considered to be about twenty-six millions sterling.

In Scotland, the relief of the poor is now administered under the Poor-Law Amendment Act of 1845. A Board of Supervision is established in Edinburgh, and assessments are imposed by the Parochial Boards. Usually owners and occupiers pay one half of the rate. It never falls wholly on the occupier as it does in England. In Ireland the P. L. is substantially the same as in England. See PARISH, CHURCH WARDENS, OVERSEERS, SETTLEMENT, &c.

In Foreign Countries.—There are only two countries in Europe, viz., England and Denmark, in which the poor are relieved exclusively by a special tax; and only three, Prussia, Denmark, and Sweden, in which there is a legislative declaration of the right of every destitute person to state support. Except in England and Denmark, the rates are supplemented by voluntary subscriptions and endowments. Differing in a marked way from England, most European countries give relief in kind as a rule. The Danish system, based on the Danske Lov of 1683, differs from that of most European countries in having been always entirely secular, but closely resembles the English system prior to 1834, and like it shows an abuse of out-door relief. In Sweden since 1871 the system has been based on the English law of 1834, and is more stringent than perhaps that of any other European country. It prohibits relief to the able-bodied, and makes masters liable for the relief of servants and labourers. The system in Norway, like that which prevailed formerly in Hamburg, and which still prevails in Elberfeld, is distinguished by minute subdivision of administrative authority for supervision and inquiry. As in Sweden, 'out-quartering' (the *lægd*) is common, and here pauperism appears to be exceptionally low.

Although vagrancy was prohibited in Germany by a law as far back as 1497, none of the states forming the empire had any definite poor-laws till the beginning of the 18th c. The 'Law of Relief Domicile,' 1870, grants to every German the right to settle where he pleases, and allows a settlement for two years' residence. The whole country is divided into local unions, consisting of one or more communes. The central government has no direct control over them, but the Minister of the Interior has a sum (£96,000 in 1871) which he may distribute among overburdened unions. The systems in Leipzig and Elberfeld are noted mainly for strict personal investigation of cases. France has the most perfect charity organisation in the world, there being no compulsory relief except in cases of lunatics and deserted children. From the communal customs (*octroi*) the municipal councils vote subsidies; but the *octroi*, which is applied to many other objects, never comes to be regarded as a poor-rate. Outdoor relief is given through the Bureaux de Bienfaisance, indoor through the *hospitaux* and *hospices*, of which together there were 1557 in 1869. All these establishments, no matter whence they derive their funds, are under State supervision and are purely secular. The *Sœurs de Charité*, who are salaried and are highly intelligent, visit in special districts and make minute reports to the *Bureaux*. In Belgium, a 'classic land of pauperism,' there is properly speaking no poor-rate, the burden being 'thrown upon private, charity stimulated, husbanded, and regulated by the state.' In Italy communes are bound to maintain pauper lunatics and foundlings. Hospitals, almshouses, and asylums are very numerous (especially in Rome), and are supported by foundations and subscriptions, and managed by religious and other bodies. A law of 1862 ratified the power of the original managing bodies, subject to the general control of the state. In Russia, since 1864, under the new system of local government, the *zemstvos*, or representative assemblies, are entrusted with all funds and establishments for the relief of the poor, and can levy various taxes. St. Petersburg has an Imperial Society which relieves and classifies beggars, and a Grand Philanthropic Society, with branch committees in seven towns and a funded capital (1870) of £330,000, and real estate of £440,000. The latter society supports almshouses and schools, and grants medicines to the poor. See Reports of the Poor-Law Commissioners and Poor-Law Board (1835-72); Archbold's *Poor-Law* (12th ed. 1873); Emminghaus' *Das Armenwesen und die Armen Gesetzgebung in Europäischen Staaten* (Berl. 1870, Engl. trans. 1873); *Reports on Poor-Laws in Foreign Countries, communicated by Her Majesty's Secretary of State for Foreign Affairs* (1875); and J. Guthrie Smith's *Poor-Law of Scotland* (new ed. 1878).

Pooree' (*Puri*, 'the city'), the chief town of the district of the same name, Bengal, British India, on the coast of the Bay of Bengal, 250 miles S.W. of Calcutta, and 595 N.E. of Madras. Pop. (1872) 22,695. Here is the far-famed temple of Juggernaut (q. v.), by which name P. itself was formerly known. The whole town is holy ground; and it is said to be crowded at the time of the *rath jatra*, or car festival, by 90,000 pilgrims. —The district of P. is the most southerly in Orissa, bordering on the Ganjam district of Madras. Area, 2473 sq. miles; pop. (1872) 769,674. It contains the Chilka Lake, an expanse of water bordering the sea, 334 sq. miles in extent. The staple crop of the district is rice, which is exported in ordinary years. In the famine of 1866, the loss of life was greater here than anywhere else. Salt is largely manufactured on the sea-coast by evaporation, and yields an annual revenue of £28,000.

Poor's Roll is, in Scotland, the roll of litigants who on account of poverty are allowed to sue or defend *in forma pauperis*. This privilege is conferred by the Court, on being satisfied of the poverty of the applicant, and that he has *probabilis causa litigandi*. The party has counsel and agent gratuitously provided for him, and is relieved from paying the fees of Court. The warrant entitling to the benefit of the P. R. remains in force for two years.

Popayan, a town in the United States of Colombia, finely situated at the base of the Western Cordillera, and on the river Cauca, 5750 feet above the sea-level. It was founded by the Spaniards in 1537, and in 1837 was nearly destroyed by the combined effects of an earthquake, volcanic eruption, and flood. Though of less importance now than in former days, P. is hand-

somely built and laid out, and possesses a cathedral college, and mint. Pop. 20,000.

Pope. See RUFFE.

Pope (Lat. *papa*, 'father,' *i.e.*, of the church or the clergy) was, during the 3d and two following centuries a title common to all the bishops of the Western Church, and still common to those of the Greek Church. The Church was at first governed on republican principles, but as the clergy gradually assumed a position distinct from that of the laity, and especially after the Church was established by Constantine (324), its constitution came more and more to be formed on the model of the empire; so that the hierarchy of priests, bishops, metropolitans, and patriarchs corresponded with gradations in the civil power. And finally the Bishop of Rome, whose pre-eminence in the Church was the result of many concurrent circumstances, was gradually exalted into a position corresponding to that of the emperor. The Bishop of Rome held the same position relatively to the bishops of the whole empire as did the Metropolitans (q. v.) to those of a province. Disputes were referred to the See which was first in rank, and by a canon of the Council of Sardica (347) an appellate jurisdiction was allowed to the Bishop of Rome. Further, Rome was one of the most illustrious seats of the apostles; her bishops claiming to be the successors of St. Peter; and standing as they did in the forefront, had always to bear the first brunt of the various persecutions. Moreover, it suited the policy of the emperors to favour the establishment of a supreme patriarchal authority in their capital, as an instrument by which to control the Church. Thus Theodosius (409-450) in his Code and Valentinian III. (425-455) both enacted that the bishops were to be guided with regard to the customs of the Church by 'the P. of the Holy City.'

This development was also favoured by the Karoling monarchs, with whom the bishops of Rome entered into a close alliance. In return for the title of king bestowed on him by the P., Pippin (q. v.) undertook to defend the Holy Church against the Lombards. He accordingly compelled them to evacuate the territory called the Exarchate, which they had wrested from the Roman Empire, and causing the keys of the conquered towns to be laid on the altar of St. Peter, laid the foundation of the temporal power of the P. The alliance was no less close which existed between the P. and the succeeding German Emperors, who became as completely the liege lords of the popedom as the Karolings had been. When a vacancy occurred, ambassadors from Rome waited on the Emperor to receive his announcement of a successor. But at the same time it was naturally the personal interest of the Emperor that the P. should hold an important place in the eyes of the world. To have him acknowledged sole primate of the universal Church only enhanced the authority which the Emperor held over him.

Such was the state of affairs when Gregory VII. (1073-85) ascended the papal throne, and set about reducing to a perfectly organised system the idea of the supremacy of the Church over the State, and of the P. over the Church. His first step was to wrest the investiture of the P. from the hands of the Emperor. As the instrument for carrying out his purpose he made use of the Isidorian Decretals (q. v.), which had been published about the middle of the 9th c., and other forgeries of contemporary canonists, according to which every P. lawfully appointed was holy and infallible, no council could be held without his injunction, none but Œcumenical Councils were legal at all, and no speech could be held with an excommunicated man. This last article Gregory, in his *Dictatus*, translated into 'An excommunicated king is no longer fit to reign, and must be deposed.' The papal pretensions were further expanded and fortified by the *Decretum* of Gratian (about 1150), a manual of canon law in which the Isidorian forgeries and those of the Gregorian canonists were combined with additions of his own, and by which he forwarded greatly the grand scheme of making the Christian world the domain of the Pope-king. A significant sign of the effect of this work and of the progress made by the idea was that Innocent III. (1198-1216), who taught that the papal power is to the royal or imperial as the sun to the moon, changed the title of the P., which had hitherto been Vicar of Peter, to Vicar of Christ. Another idea developed at this time was that every Christian by the act of his baptism became a subject of the P.

Meantime the authority of the P. over the clergy within the

Church had been proportionally advanced. A great instrument in rendering the metropolitans dependent on the P. was the Pallium (q. v.), without which they could not discharge any ecclesiastical function. The popes began (about 600) by sending a pallium to certain bishops acting specially as vicars of the Roman See, and to all metropolitans. In 742 it was enacted by a council at Frankfurt that all metropolitans should request their pallium at the hand of the P., in token of their willing submission to the Roman See. This was construed by the popes into a promise of obedience before receiving the pallium, and was changed by Gregory VII. into an oath of allegiance. Having established their supremacy over the metropolitans, it followed of course that the popes had entire control over the ordinary bishops. The metropolitans were generally accredited as legates or vicars of the P., but more complete control was maintained by means of legates *a latere*, and when the Isidorian title 'universal bishop' gained its true significance at the beginning of the 13th c., the bishops were reduced to the position of mere helpers, delegates, and vicars of the P., to whom he assigned such a share of his rights as he thought fit; and they soon began to describe themselves as bishops 'by the favour of the Papal See.' The election of bishops had to be confirmed by their metropolitan, but men whose elections were disputed, as was often the case, began frequently to apply to Rome for confirmation. After that the popes began to confirm all episcopal elections, and then in certain cases to nominate the bishops themselves. Adrian IV. began with letters of commendation (1154). These letters, however, under Alexander III. (died 1181) assumed a tone of command, and under Innocent III. (1198-1216) were enforced, in spite of all opposition, by officers appointed for the purpose. It was decreed by Innocent III. (1215) that a see should not be vacant more than three months, and that those not filled up within the specified time lapsed to the P. *jure devolutionis*. Clement IV. claimed the right (1266) of appointing to all benefices vacated by the death of the incumbents while at Rome, *in curia vacantis*; the number of which was very great, owing to the great encouragement given in every way to go to Rome with appeals. From this time also the idea was advanced that the P. alone could sever the bond between a bishop and the Church on his resigning his office, and the principle established, which was afterwards made a rule by John XXII. (1316-33), that sees vacated by resignations lapsed to the P. On these various pleas Papal nominees were thrust in everywhere.

The rights of bishops, metropolitans, as well as of princes, having thus been usurped by the P., it remained for him yet to usurp those of the councils of the Church, by having it acknowledged that the infallibility of the Church in regard to faith and morals is vested not in the bishops collectively as the successors of the apostles, but in the P. alone, a doctrine which began to take definite shape in the 13th c. The first step in this direction had been taken by Gregory VII., when, in his *Dictatus* (about 1073), he declared that the P. was infallible. At the second Lateran Council (1123) Callixtus II. published the decrees in his own name, and the position of bishops in the councils of the 13th c. generally was simply to give their formal consent to the decrees of the P. The Mendicant Orders (q. v.), with their monarchical constitution, did most effective service in establishing the supremacy of the P., on which indeed their own privileges entirely depended; and it was a member of one of them—Thomas Aquinas (1224-74)—who sketched out the doctrine of Papal infallibility. That doctrine, however, was repudiated by the University of Paris, 1388, and a stand was made against it in the Councils of Pisa, Constance, and Basel (15th c.); but at the fifth Lateran Council (1512-17) Leo X. declared in the Bull *Pastor Æternus*, that 'the P. has full and unlimited control over councils.' Even after the Papal abuses and exactions had helped to bring about the Reformation, the supremacy of the P. over the Church and the kingdoms within its pale, and especially his infallibility, which was maintained in its fullness and formulated into a doctrine by Cajetan (about 1535), authoritatively promulgated by the Bull of Paul IV. (1558), and more distinctly defined in the Bull *In Cana Domini* (1627), became the watchword of the Jesuits, who desired to see the whole Church organised on the principle of their own order. This theory, which found few adherents out of Italy till the Jesuits took it up, has received in modern times the name of Ultramontanism, in reference to the opposition to it which has prevailed chiefly in France (hence called Gallican-

ism, see GALLICAN CHURCH), Switzerland, and Germany, and which has given rise to the Old Catholic movement (see OLD CATHOLICS), and to a disruption of the Roman Catholic Church (1873). The reign of the late P. (Pius IX. 1846-78) formed an epoch in the history of the Papacy, for the infallibility of the P. was by an Œcumenical Council formally decreed to be a doctrine of the Church (1870), by a singular coincidence in the very year in which he was finally deprived of his temporal dominions.

The election of the P. from 'St. Linus' (St. Peter's successor) down to Nicholas II. in 1059, was in the hands of the whole Roman community—civil authorities, people and clergy. Throughout the 10th and earlier part of the 11th c. the Papacy had become a virtual possession of the dominant faction among the Roman nobility, and the scandalous contest preceding his own election was the immediate reason of the decree issued by Nicholas II., which, as Milman words it, 'wrested the power of nominating the P. from the lower clergy, the turbulent barons, and the populace,' and transferred it to the College of Cardinals. See Gieseler's *Lehrbuch der Kirchengeschichte* (Eng. trans. 1855); *The P. and the Council*, by Janus (Eng. trans. 2d ed. 1869); Döllinger's *Einige Worte über die Unfehlbarkeitsadresse* (Mün. 1870); *Erklärung an den Erzbischof* (Mün. 1871); Langen's *Das Vaticanische Dogma, &c.* (Bonn, 1871); Cardinal Manning's *Temporal Power of the P.* (Lond. 1876); and Wm. Arthur's *The P., the King, and the People* (1877).

Pope, Alexander, was born in London, May 21, 1688. His father, a Roman Catholic, having acquired a small fortune as a linendraper, retired in the year of his son's birth to Binfield, in Windsor Forest. P. was educated at haphazard. Having taught himself to write by copying out of printed books, he learned the rudiments of Latin and Greek from a priest named Banister; then he attended school at Twyford, where he was flogged for lampooning his master, and at London, where school-books were deserted for Dryden, Spenser, Waller, Ogilby's translation of Homer, and Sandy's translation of Ovid. When about twelve years old he enjoyed a momentary glimpse of Dryden, whom he ever revered as the greatest of his masters. Soon after he returned to Binfield, and there performed for himself the double duties of scholar and teacher until he reached the age of twenty. The *Ode to Solitude*, written when he was twelve, evinces the success of this peculiar training, or want of training. From his thirteenth to his fifteenth year he was engaged on an epic called *Alexander*, and wrote four books before burning it. A comedy and a tragedy were likewise destroyed; but his early satirical *Lines to the Author of a Poem entitled 'Successio'* (Elkanah Settle) were printed several years later in *Miscellaneous Poems and Translations* (1712). His first published work was his *Pastorals*, printed in the sixth volume of Tonson's *Poetical Miscellany* (1709). In 1711 the *Essay on Criticism* appeared anonymously, and received the heartiest abuse from John Dennis. In the following year P. contributed the *Messiah: a Sacred Eclogue*, to the *Spectator*. About the beginning of 1713 he resolved to turn painter, and actually studied for a year and a half under the care of Jervas, pupil of Kneller. But he soon returned to literature, after throwing away 'three Dr. Swifts, two Lady Bridgewater, a Duchess of Montague, half a dozen earls, and one knight of the garter!' In 1713 appeared *Windsor Forest*, written when he was sixteen, and an *Ode for Music on St. Cecilia's Day*. In 1714 he printed the extended version of the *Rape of the Lock*, a sketch of which had formed part of the *Miscellaneous Poems and Translations*. This carefully finished poem originated in a quarrel between two families on account of the attempt of a gallant to filch a tress from a reigning belle, Miss Arabella Fermor. A friendship with Addison induced P. to write a prologue for the first performance of *Cato*, and to defend that play from the attack of John Dennis in a *Narrative of Dr. Robert Norris concerning the strange and deplorable Frenzy of J. D.* Addison was by no means gratified by this defence; yet Pope continued writing for the *Guardian*, to which he had already contributed several papers.

Up to this time P. had lived on an allowance from his father: all his poetry together had not brought him £100. Upon the advice of Addison and Swift he now issued proposals for a poetical translation of the *Iliad*, to be published in six quarto volumes at a guinea each. 'The author shall not begin to print,' said Swift, 'until I have a thousand guineas for him.' Once pledged

to the public, 654 copies being quickly subscribed for, P. took fright, for his scholarship was small. 'Though I conquered the thoughts of it in the day,' he writes, 'they would frighten me in the night.' 'My usual method was to take advantage of the first heat, and then to correct each book, first by the original text, then by other translations, and lastly to give it a reading for versification only.' And so, more by the help of Latin and French than by that of Greek, the *Iliad* was translated in six years, 1715-20. Besides the subscriptions, P. received from Lintot, the publisher, £200 for each volume; and Dr. Johnson estimates his total profits at £5320. P. now set up as a man of fashion, but soon tiring of what to him was mere acting, he retired with his parents to Chiswick, where he published a collection of his poems (1717), in which appeared the *Elegy to the Memory of an Unfortunate Lady* and the passionate *Epistle of Eloisa to Abelard*. In 1718 he removed to a villa at Twickenham, whither he persuaded Lady Mary Wortley Montagu to come for a short time; but an acquaintance begun with ardour ended in mortification. Some say that P. proposed to Lady Mary in circumstances so ridiculous that she burst into uncontrollable laughter, and that P. ever after, as evinced in the coarsest of his satires, nursed towards her the most malignant hatred. In 1725 he brought out an edition of Shakespeare in six volumes. For this he got little money and less applause. Lintot, encouraged by his former speculation, engaged him to translate the *Odyssey*, and the work appeared in six vols. (1725-26). Although he only executed the half of this, the other half being the work of two hacks, Broome and Fenton, he earned by it £2885. 'It is a pretty poem, Mr. P.,' said Bentley, 'but you must not call it Homer.' In 1727 P., in conjunction with Swift, published three volumes of *Miscellanies*, in which was the *Treatise of Martinus Scriblerus on the Bathos*. The authors attacked in this treatise repaid the abuse in kind, and brought down upon their heads the greatest satire ever penned. The *Dunciad* (1728), for invention, variety of illustration, and scathing wit, is only approached by Dryden's *M. Flecknoe*; but it is now read with as much pity as admiration.

In 1731 appeared the epistle to Burlington *On Taste*; next year, his epistle to Bathurst *On the Use of Riches*. These are now the fourth and third of the *Moral Essays*, the first being the epistle to Cobham *On the Knowledge and Characters of Men* (1733), and the second, the epistle to Martha Blount *On the Characters of Women* (1735). The four epistles contained in the *Essay on Man* were addressed anonymously to Bolingbroke, 1732-34. In 1735 P. wrote a poetical *Epistle to Dr. Arbuthnot*. Curll the bookseller printed a collection of P.'s letters to Mr. Henry Cromwell in 1726; three years afterwards P.'s correspondence with Wycherley was published, and in 1735 appeared *Mr. F.'s Literary Correspondence for Thirty Years*. P. declared that this last was unauthorised, and brought out a genuine edition in 1737; but it is now discovered that in this case, as in some other cases, he was unscrupulous and vain enough to resort to forgery in order to gain a reception for his works. His last important poem was the *New Dunciad* (1742). With the help of Arbuthnot he began to collect his writings, but ere he had accomplished much he died at Twickenham, May 30, 1744. P. was the artist among poets. We read his writings with pleasing exhilaration, but with little glow of heart. No poet has ever excelled him in the combination of reason and fancy, concentrated meaning and melodious verse, playfulness and causticity of wit. The two highest orders of poetry, the epic and dramatic, he wisely left untouched. His attempts at lyrical poetry were few and unsuccessful. But he is the first of didactic poets. To him, moreover, we are mainly indebted for the development of English heroic verse. The classic editions of P. are Warburton's (9 vols. 1751), Bowles's (10 vols. 1807), Roscoe's (10 vols. 1824), Ward's (1873), and the Rev. Whitwell Elwin's, 5 vols. of which have appeared (1871-77). There are many biographies of P., from those of Ayre, Dilworth, Ruffhead, Johnson, to those of Bowles, Roscoe, and Carruthers (Bohn, 1857). See also De Quincey's essay on P., and Thackeray's *English Humourists*. A *Concordance of the Original Poetical Works of P.*, by Dr. E. A. Abbott, appeared in 1875. A German life of P., by Deetz, was published at Leipzig in 1876.

Poperinghe, a walled town of Belgium, province of W. Flanders, within 4 miles of the French frontier, and 10 W. of

Ypres by rail. It has manufactures of linens, woollens, lace, tobacco, and pottery, and a trade in hops, which are extensively raised in the vicinity. Pop. (1873) 10,868.

Popinjay, a term applied to the *Picus viridis* or green woodpecker. See WOODPECKER.

Po'piah Plot. See OATES, TITUS.

Poplar (*Populus*) is a genus of *Salicaceæ* (see WILLOW), consisting of about twenty species of deciduous trees distributed through N. temperate regions. The flowers are dioecious, in lateral drooping catkins, with spirally arranged crenate or cut scales, each bearing one flower in its axil; the stamens are four to 30, the filaments free; the stigmas two to four cleft; the capsule has spreading valves. The leaves are generally broad, and those on shoots and suckers often differently shaped and clothed to those borne on the tree itself. Among the noteworthy species the following are the most important. *P. alba*—the albe or white P.—a native of Europe, N. Africa, and Middle Asia, often attains a height of 100 feet; furnishes a soft and light even-grained white wood, much used for packing-cases, for toys, for shoe-soles, and by turners for bowls, trays, &c. Its variety *P. canescens* which gives a better timber for millwrights and carpenters, is probably indigenous in England, flowering in early spring before the leaves appear, and throwing up abundant root-suckers. *P. balsamifera*, the Tacamahac or Balsam P., is a native of Northern Asia, and N. America, forming a large tree with fine foliage, and diffusing a pleasant odour from the abundant balsamic juice of its buds, leaves, and branches; a tincture prepared from the buds is used medicinally in America. It is hardy in England, and often planted. *P. euphratica* ranges from the Himalaya to Syria, and occurs along ravines in Algeria. It forms a tree up to 50 feet high, the wood of which being harder and more compact than that of most poplars, is employed largely in some countries for beams, rafters, panelling, and turnery. Most of the laquered Sindh boxes are made from it. The favourite habitat of the tree is along the banks of rivers, and on the Tigris and Euphrates its timber is used for planking and boat-building. This is the 'willow' tree of Psalm cxxxvii. *P. monilifera* or *Canadensis*, the cotton-wood tree of N. America, is of quick and luxuriant growth, attaining 100 feet, and yields a valuable timber. *P. nigra* or Black P. is native in Europe, and throughout Northern and W. Asia, preferring river banks or dampish ground. Is not indigenous in England, but is largely planted. The growth is rapid, and the light and soft wood is much used by joiners, coopers, turners, match-makers, and carvers, also for wooden shoes and superior charcoal. The bark serves for tanning, and in India the tree is often pollarded as cattle fodder. A variety with erect slender branches, known as the Lombardy P. (*P. pyramidalis* or *P. fastigiata*), is originally from Asia. It has long been cultivated in Italy, whence it was introduced into France in 1749, and into England in 1753, where it has been extensively planted as an ornamental tree. The female tree is barely known, so that it is propagated by layers, not by seed. *P. tremula* is described under Aspen (q. v.). The wood of this as well as that of the white and black P., have of late been much sought after for conversion into pulp for paper manufacture. *P. ciliata* is the aspen of India, its large leaves making a continuous fluttering noise with the least breath of wind, and *P. tremuloides* is called the N. American Aspen.

Poplin, a name borne by several varieties of plain or figured stuffs, having a silk warp, and a worsted, flax, or cotton weft, largely manufactured at Manchester, Dublin, and Lyon and other French towns. P., in name and substance, is derived from a French silk stuff, called *papeline*, because Avignon and other seats of its manufacture were situated in *papal* territory. On the introduction of the manufacture of papeline into England, the name became corrupted into P., and long-combed wool was substituted for the floss silk previously employed for weft. Irish poplins, known as *tabinets*, are much esteemed; their manufacture originated with French Protestant refugees, who settled in Ireland at the close of the 17th c.

Popocatepetl (Aztec, *popoca*, 'smoking,' and *tepetl*, 'a mountain'), a famous volcano of Mexico, 10 miles S.W. of Mexico city. It is conical shaped, 18,720 feet high, formed chiefly of

porphyritic obsidian, and clad with vegetation (dense forests in the lower levels) to a height of 13,000 feet, where the region of perpetual snow begins. It was active at the time of the Spanish conquest, but, though it still smokes, no eruption is recorded since 1540. Cortes failed in an attempt to reach the summit, but Francisco Mantano, one of his followers, succeeded, and was even lowered 450 feet into the crater by ropes. The brothers Glennie, who fixed the height of P. barometrically, ascended the mountain in 1827, and the feat has been performed repeatedly since.

Poppy (Old Eng. *popig*) is the genus *Papaver*, the type genus of the natural order *Papaveraceæ* (q. v.), and consists of about fifteen species of annual milky-juiced herbs, with lobed or cut leaves, solitary flowers on long peduncles, one-celled ovary, short capsule opening by very small valves under the lobes of the persistent sessile stigma, and small pitted seeds. They are distributed through Europe, N. Africa, and N. Asia, with one S. African and one Australian species. Four are more or less frequent in Britain, but, it is suspected, do not hold a higher grade of nativity than colonists. *P. Rhæas*, distinguished by its sub-globose glabrous capsule, in some parts renders the corn-fields a blaze of scarlet; *P. dubium*, with an obovate glabrous capsule, is also a frequent species; *P. Argemone*, with a clavate hispid capsule, is a smaller plant, with paler and less conspicuous flowers; and *P. hybridum*, bearing a globose prickly capsule, is the rarest, not reaching north to Scotland. But the most important species of the genus is *P. somniferum*, a glaucous



Papaver somniferum (Poppy).

plant with lobed or toothed amplexicaul leaves, large white or blue-purple flowers, an ovoid or globose capsule, and black or white seeds. Besides supplying Opium (q. v.), it possesses sufficient economic value to ensure its cultivation. The seeds yield by expression about 50 per cent. of a bland valuable oil of a pale golden colour, fluid to within 10° of the freezing-point of water. It dries easily, is inodorous, of agreeable flavour, and by simple exposure to the sun in a shallow vessel is rendered perfectly colourless. It serves as an article of food, as a fine oil for painters, and to adulterate the better qualities of medicinal, culinary, and unguentual oils. The seed has no narcotic properties, but has a sweet taste, and is used parched in various countries as food, also by sweetmeat makers; it is the maw-seed given to cage birds. *P. orientale* and *P. bracteatum*, strong-growing perennials, natives of Asia Minor, are showy garden plants with red flowers, and are, with the peony, the largest flowered herbs grown in the open air in England.

In two allied genera *Maconopsis* (Gr. 'a P.' and 'resemblance') *cambrica* is called Welsh P., and *Glaucium luteum* bears the name of yellow-horned P., from its long and narrow curved capsule.

Medicinal Properties of P.—The nearly ripe capsules of the white P., *Papaver somniferum*, dried and deprived of their seeds, are used in medicine for purposes similar to opium. The pharmaceutical preparations are the *decoctum*, which is generally applied warm as a soothing agent. There is also an *extract*, the dose of which is from 2 to 5 grains. The *syrrup* is administered to adults in doses of 1 drm., and to children, 10 to 20 minims, increasing cautiously in consequence of their susceptibility to the influence of opium. The preparations of P. are of uncertain strength. The fresh petals of the *Papaver rhæas*, the red P., are chiefly used on account of their colouring properties.

Poppy-Head, a finial ornament often used to terminate the upright ends of benches, &c. The earliest examples occur in the Decorated Style (q. v.), and are generally plain *fleurs-de-lis*. Later the P. took a variety of forms, and was often most elaborately carved.

Porbeagle, or **Beaumaris Shark** (*Isurus cornubicus*), a species of Shark (q. v.) somewhat resembling a porpoise in appearance, and attaining a length of 5 or 6 feet. The colour

is greyish-black above and white below. The P. feeds on fishes and molluscs. It has two dorsal fins, of which the first is set far forwards on the back. The muzzle is pointed, and the gill-openings are large.

Porcelain, a kind of ceramic ware, distinguished from common pottery by superior hardness of paste or body, a purer white colour, and some amount of translucency, owing to its being semi-fused by the high heat at which it is baked. The term is derived from the Italian *porcellana*, a cowrie-shell, owing to the likeness of its glazed surface to that shell. *Porcellana* again, comes from *porcella*, a little pig, from the fanciful resemblance of the cowrie to the pig. See POTTERY AND PORCELAIN.

Porcelain Crab, the general term applied to the members of the family *Porcellanidae*, in which the shell is smooth and porcelain-like. The *Porcellana platycheles*, or broad-clawed porcelain crab, is a familiar British species.

Porch, a small structure erected to shelter the entrance of a church or other edifice. The use of the P. dates from an early period. Many fine examples are found in Norman architecture. In the Decorated and Perpendicular styles, wooden porches of one storey are common; those of stone have often a chamber built over them, which was used as a chapel or a muniment room. At all periods the P. has been a favourite object of decoration. Those of the Norman style have their ornament chiefly on the inside and about the doorway, while those of later date are frequently decorated both without and within. Small chapels attached to churches are sometimes called a P.

Porcupine (*Hystrix*), a genus of Rodent mammals, having four molar teeth on each side of each jaw, imperfect collar-bones, and long spines or quills, as part of their body-covering. The P. has four toes and a rudimentary thumb in the fore feet, and five toes in the hinder feet. The muzzle is pointed. As in other Rodents, the incisor teeth are long, grow from permanent pulps, and are adapted for gnawing substances. In the true P. belonging to the genus *Hystrix*, the tail is not prehensile. The *H. cristata* is the common P. of S. Europe, N. Africa, and Asia. It has long spines capable of being erected or depressed at will, but which cannot be projected from the skin at will as was formerly supposed. An under coating of short bristly hair is developed, and the spines, often used for pen-holders, are marked with alternating bands of dark brown and white. The average length of the animal is about 2½ feet. The tail is short and is provided with short spines. The P. lives in burrows, and appears to hibernate in winter. The food consists of roots, &c., and the flesh is highly esteemed. The genus *Atherura* of Asia and the E. Archipelago has a peculiar tail-appendage of flat horny plates, representing modified spines. Of this genus the *A. fasciculata* is a good example. The P. of the New World belongs to the genus *Erethizon*. The Canadian P. (*E. dorsatum*) has short spines, and attains a length of 3½ or 4 feet. The Coendoo of S. America has a prehensile tail. Of this latter group the *Cercolabes prehensilis*, commonly known as the Brazilian P., is a familiar example. The tail is scaly towards its tip, and the average length of the body is 3½ feet.

Porcupine Crab (*Lithodes hystrix*), a species of crab occurring on the coasts of Japan, and so named from the numerous spines that everywhere spring from its shell and limbs. The hinder pair of legs are small. The northern spine crab (*Lithodes maia*) of the British coasts also belongs to the genus of P. C.

Pordenone, a town of N. Italy, province of Udine, on the right bank of the Noncello, near the base of the Alps, 50 miles N.N.E. of Venice by rail. It is supposed to be the *Portus Naonis* of the Romans, and was the birthplace of Giovanni Licinio da P. (q. v.), whose 'St. Christopher' is in the cathedral, a building begun in 1347. P. has also a fine Palazzo Comunale, the ruins of a noble castle, and of the old fortifications. There is ample water-power, and the manufactures are silk, cotton, ironwares, and pottery. Pop. (1874) 8269.

Pordenone, properly, **Giovanni Antonio Licinio**, one of the greatest of the Venetian fresco and oil painters, was born at Pordenone, in Friuli, in 1484, and was the contemporary and

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the not unsuccessful rival of Titian and Giorgione. Many specimens of his best works are to be seen in the churches and mansions of Upper Italy; his noblest oil painting is the altarpiece in the church of Santa Maria dell' Orto, Venice; while in England he is represented by portraits and other subjects in the National Gallery, South Kensington, and in private collections. P. died in 1540 at Ferrara.

Porifera, a name formerly applied to the class of Sponges now known as that of the *Spongia* (q. v.), and included in the sub-kingdom *Protozoa*.

Porism (Gr. *porisma*, 'something deduced from a previous demonstration'), the name given by Euclid to two distinct kinds of mathematical propositions. The first corresponds to the class now known as *corollaries*, i. e., propositions involved in others, and obtained along with them, though having no direct bearing upon the principal object in view in establishing these others. The other class he collected on account of their great use in geometrical investigation; but beyond this, and a criticism of Pappus, we have no exact knowledge concerning them. Pappus pronounced them an ingenious and useful collection, and attempted a definition of them. But of this nothing remains save an adverse criticism on the definition given by some geometers, namely, that *Porisma est quod deficit hypothesei a theoremate locali*. The succeeding account given is so fragmentary as to be almost unintelligible. The first successful attempt to reproduce them was made by Dr. Simpson, who published the result of his inquiries in 1746, and defined a P. as 'a proposition in which it is proposed to demonstrate that one or more things are given, between which and every one of innumerable other things not given, but assumed according to a certain law, a certain relation described in the proposition is to be shown to take place.' The meaning of this definition, which is somewhat obscure, may be best obtained from an example. Let it be required to divide a line so that the rectangle contained by the segments is equal to a given space; then it is evident that this is only possible when the space is not greater than the square of half the line. Or again, lines which by their intersection gave the proposition sought, might under certain conditions not intersect at all, or perhaps coincide, when of course the proposition would become indeterminate. These are simple instances; but in all similar cases the P. is the proposition which (first) asserts that the given proposition may become indeterminate, and (second) discovers the conditions by which this indeterminateness is brought about. It thus is neither wholly a problem nor a theorem, but is something intermediate, partaking of the nature of both.

Pork (Fr. *porc*, 'a hog,' from Lat. *porcus*) is the fresh uncured flesh of the domestic pig, *sus scrofa*. It differs very materially from other butcher meat in flavour, and in the large proportion of fat it contains as compared with the other constituents of flesh. As the animal is easily and cheaply kept, not subject to many diseases, and takes on flesh with great rapidity, P. can be produced with profit at a comparatively moderate cost. P. is not extensively employed in its fresh condition, but it is chiefly cured and preserved in various ways as Ham (q. v.) and Bacon (q. v.), being from its highly fatty nature specially well suited for use in these forms. Nevertheless, roast pig is esteemed a great luxury, and roast P. has also its admirers, while fried bacon, or ham and eggs, and boiled ham, are universal favourites. The fatty nature of P. renders it indigestible by some, but where it can be assimilated it is a valuable food, and especially serviceable where there is a tendency to phthisis. The following represents the composition of 1 lb. of P., judged from the composition of the entire carcass, as analysed by Lawes and Gilbert:—Water 6 oz. 69 grs., albuminoids 315 grs., gelatinous matter 385 grs., fat 8 oz., and mineral matter 105 grs.

P.-packing forms an immense industry in Chicago and Cincinnati, in the United States of America. Chicago possessed in 1876 sixteen 'P.-packeries,' which were occupied, during the winter season chiefly, in slaughtering 2,500,000 hogs for home and European consumption, while during the year ending February 1878 the enormous number of 4,009,311 animals passed through these establishments. The Cincinnati *Price Current's* twenty-ninth annual report of P.-packing in the West gives the hogs packed in the winter of 1877 as 6,505,000; 723,368 barrels; lard, 761,192 tierces; cured meats, 980,000,000 lbs; 9,048,566

bags were packed in the year ending 1st March 1878. In 1876 the P. imported by Great Britain from the United States amounted to 54,195,000 lbs.

Porosity (from Gr. *poros*, a soft, friable, permeable stone, e.g., 'tufa'), in physics, is a property believed to be common to all kinds of matter, though particular substances, such as un-enameled porcelain, possess it to such a marked extent that they are distinguished as *porous*. Unless matter be perfectly homogeneous, or composed of atoms squeezed close to each other, suppositions for which there is not the slightest evidence, it must of necessity be porous.

Porphyry (Gr. 'purple') is a term vaguely applied to igneous rocks of the Trappean type (see TRAP). *Porphyrite* has a more restricted signification, including all the basic felspathic traps, just as *Felstone* is the name of the acidic group. See FELSPAR.

Porphyry, the arch-opponent of Christianity, was born about 233 A.D. at Batanea (Bashan), in Syria, his original name being Malchus (Melech, 'a king'), whence Aurelius styled him *Basileus*, and Longinus *Porphyrius*, 'purple,' the royal colour. As a youth he made the acquaintance of Origen at Cæsarea, and was perhaps his pupil, and at Athens he studied under Longinus and Apollonius. On his first visit to Rome (253) he had no opportunity of hearing Plotinus lecture, but during a subsequent residence (263-269) he became the attached disciple of the 'Father of Neoplatonism.' In 270, to divert the attacks of a settled melancholy, he travelled to Lilybæum in Sicily, passed on to Carthage, and, returning to Rome, succeeded to the chair of his late master. As his interpreter he was held in high esteem alike by senate and people, and died about 305 A.D. Predisposed by his Oriental birth and training for a fusion of East and West, for deepening the mysticism of the Neoplatonic philosophy, P. recognised the power of Christianity, but sought to counteract it by a spiritualisation of the ancient myths. From scattered notices of his fifteen books *Adversus Christianos*, composed in Sicily and destroyed by Theodosius, we gather that he had made a critical study of the Jewish and Christian Scriptures, the twelfth and thirteenth books being devoted to a minute examination of the prophecies of Daniel, in the course of which he anticipated several of the conclusions of Collins and the modern German rationalists. He saw the necessity of basing religion on divine authority, and accordingly supported the Pagan creed by oracles, and himself claimed to have beheld in his sixty-eighth year an ecstatic vision of the deity. But it is as the developer of the theory of predication that P. is perhaps most widely known, the text of scholastic speculation on this point being, according to Cousin, a passage from P. quoted by Boethius. Of fifty-six works by P., all in Greek, only nineteen have come down to us whole or in fragments, and these have not yet been published in a collected form. His *Vita Pythagora*, *Epistola ad Marcellam*, and *De Abstinentia ab Esu Animalium* have been edited by Nauck (Leips. 1860), his *Vita Plotini*, by Creuzer (Oxf. 1835), his *De Philosophia ex Oraculis haurienda*, by Wolff (Berl. 1856), &c. See Holstenius, *De Vita Porphyrii* (Rome, 1630); Neander, *Kirchengeschichte* (vol. i. p. 290, Hamb. 1825); and A. S. Farrar, *Critical History of Free Thought* (Lond. 1862).

Porpoise (*Phocæna*), a genus of *Cetaceans* or Whales, included in the Dolphin family (*Delphinidae*). The name P. is derived from the French *porc-poisson* ('sea-hog'); the Italian *porc-peuce*, and the German *meer-schwein* having the same meaning. In the genus *Phocæna*, both jaws are provided with teeth, and the dorsal fin is triangular, and placed towards the middle of the back. The common P. (*P. communis*) is one of the most familiar of the Cetacea, and is very common around the British coasts. It is a dreaded enemy of most of our food fishes, and pursues the salmon and herring with avidity. The average length of the P. is seven feet. Its colour is a bluish black on the upper parts, and silvery white below. The head of the P. is blunt, and is not developed to form a muzzle, as in the dolphin. The young are large even at birth. The nostrils are united to form the single 'blow-hole,' which is of crescentic shape, and placed above the eyes. The P. is gregarious. The skin is exceedingly thick, and much valued for making a strong, durable leather. The blubber attains a depth of about an inch, and affords an oil. The flesh is not unpalatable, but its dark-coloured appearance must have tended to

place it in disrepute. The Cape P. (*P. Capensis*) inhabits the S. African Seas; and the Grampus (*P. orca*) is nearly allied to the P.

Porpora, Nic'olo, a musician, born in Naples in 1689, died in 1767. He was a pupil of Scarlatti, and the composer of about fifty operas and a number of religious compositions, which, though now but little known, were received with great favour at the time. His style in recitative has always been highly esteemed. See Fétis, *Biographie Universelle des Musiciens* (new ed. 1878).

Porridge (a corruption of *potage*), is a very nutritious article of food, made from oatmeal by sprinkling it in boiling water, slightly salted, and constantly stirring till the whole thickens. It is usually eaten to breakfast with milk, butter, or treacle, and is a favourite diet of the Scottish peasantry.

Por'sena, or **Por'senn'a**, Lars, king of Clusium in Etruria, is known to readers of Livy as the monarch to whom Tarquinius Superbus applied for help when expelled from Rome. Responding to the call of Tarquinius, he marched on Rome with a large army, and pushed the Romans across the Pons Sublicius without striking a blow. But although the Roman guards thus deserted their post, the Etruscans were foiled by the bravery of a single man, Horatius Cocles. By his single arm he stopped the narrow entrance to the bridge until it was broken down behind him, and then swam across the Tiber to the city. The attack became a siege. One day, as P. sat in his tent, his secretary was struck down by his side; and the assassin proved to be a Roman. This was Caius Mucius Scaevola, who boldly declared that his intention had been to kill the king, and affirmed that 300 noble Romans were under oath to accomplish P.'s death. Perceiving the determination of the citizens, P. is said by Livy to have accepted hostages, and returned to Clusium. From the hints, rather than from the plain statements of other historians, it would appear that Rome was actually subdued by the Etruscans. The Romans certainly lost the lands they had taken from the Veientes, and Niebuhr concludes that these lands were seized by the conqueror's strong hand.

Por'son, Richard, born at East Ruston, in Norfolk, on Christmas Day 1759, was educated by his father, a weaver and parish clerk, and at the village schools of Bacton and Happisburgh, till in 1771 Mr. Hewitt, the curate of the parish, offered to teach him gratuitously along with his own boys. Under him the lad made such rapid progress that in 1774 Mr. Norris, a neighbouring squire, was induced to raise a fund for sending him to Eton, where he remained four years without acquiring much beyond a facility in Latin verse-making. Proceeding to Trinity College, Cambridge (1778), P. gained a foundation scholarship (1780), graduated as third senior optime and senior medallist (1782), and was elected a fellow of his college (1787), under the obligation to resign at the end of ten years unless he should enter holy orders. A course of theological reading soon convinced him that he could not conscientiously subscribe the Thirty-Nine Articles; he resigned his fellowship in June 1792, and five months later was unanimously chosen Greek professor, with the munificent stipend of £40 a year. Meanwhile his reading had brought him across Travis' *Letters to Gibbon*, on the disputed text of 1 John v. 7, and these evoked his celebrated *Letters to Archdeacon Travis* (1790), a work which, though admirable for its critical acumen and masterly English style, was looked on as an attack upon Christianity, and lost its author a valuable legacy. P.'s means were miserably straitened at this period, and he would walk from Cambridge to London to avoid the expense of coach-hire, whilst in London a guinea lasted him for an entire month. Worse than poverty, however, was an insatiable craving for drink—brandy by preference, but if that could not be got, ink, embrocation, spirits of wine, or even water. In 1792 P.'s friends raised him an annuity of £100, and in 1806 he was appointed principal librarian to the newly-founded London Institution, with a salary of £200. This post he filled, or rather neglected, for barely two years, being seized with apoplexy in the Strand, September 19, 1808, and dying on the 28th following, at the early age of forty-nine. His meditated editions of *Æschylus* and *Aristophanes* had come to nothing; of Euripides he only edited four plays, the *Hecuba* (1797), *Orestes* (1798), *Phanissa* (1799), and *Medea* (1802); and his remaining works were limited to a few scattered articles in *Matsy's Review*,

the *Monthly Review*, the *Gentleman's Magazine*, and to the posthumous *Adversaria* (1812), and notes and emendations on Pausanias (1820), Photius (1822), and Suidas (1834). Some dozen capital *bon-mots*, a few quaint anecdotes, and a picture of wasted opportunities, in which unswerving honesty is the single redeeming feature, are all that we now remember of him whom his contemporaries described as 'one of the profoundest Greek scholars, and the greatest verbal critic that any age or country has produced.' See J. S. Watson's *Life of Richard P.* (Lond. 1861).

Port, in naval language, denotes either (1) a harbour for receiving or discharging cargoes; (2) an opening in a ship's side for a gun, also called a P-hole (q. v.); or (3) the 'Larboard' (q. v.) side of a ship, the left hand to one looking towards the bow.

Portadown' (Irish Gael. *Port-a-Dúin*, 'port of the fort'), a market-town of Ireland, in the county of Armagh, 21 miles W.S.W. of Belfast by rail, on the Bann, which is here navigable for vessels of 60 tons. It has one Anglican, two Roman Catholic, and three Presbyterian churches, and one weekly newspaper. There are manufactures of cotton and linen goods, and a trade in grain, flax, pork, butter, &c. In 1873 the town revenue was £830 and the debt £720. Pop. (1871) 6375.

Port'al, in architecture, the arch over a gate or doorway. The term is sometimes loosely used for Porch (q. v.).

Portal Veins, the system of veins existing in Vertebrate animals for the purpose of conveying blood to the Liver (q. v.), for the manufacture or secretion of bile. This system of veins consists of four trunks, receiving the venous blood from the digestive system. These four trunks are the *inferior* and *superior mesenteric*, *splenic*, and *gastric* veins. The single vein (*vena portæ*) formed by their union enters the liver. It is destitute of valves. The splenic and gastric veins unite with the other two veins, the inferior and superior mesenteric; and these two in turn unite to form the *portal vein*. The union of the two mesenteric veins takes place in front of the vena cava, and behind the upper border of the larger extremity of the *Pancreas* (q. v.) or sweetbread.

Portamen'to, in singing, is the gliding from one note to another; *P. della mano* (in pianoforte playing), the management of the hands.

Portarlington, a market-town of Ireland, chiefly in Queen's and partly in King's County, and on both banks of the Barrow, near a branch of the Grand Canal, 41½ miles S.S.W. of Dublin by rail. The river is crossed by two bridges, and the chief buildings are the fine English church, the so-called French church, and a Roman Catholic Church with a spire 140 feet high. There are several good schools, at one of which the Duke of Wellington and his brother Lord Wellesley were pupils. P. has eight fairs yearly, and manufactures leather, tobacco, soap, and candles. It returns one member to Parliament. Pop. (1871) 2424. P., the old Irish *Coolteodra*, took the name of Lord Arlington, to whom it was granted by Charles II. Sold to Sir Patrick Traul, it was, on his attainder, granted by William III. to General de Rouvigny, who introduced a number of French and Flemish refugees. The town and estate were subsequently purchased by the Dawson family, who were created Earls of P.

Port Arms (Lat. *portare*, 'to carry'), a movement in musketry drill in which the rifle, held in the right hand, and supported by the left arm, is laid in a horizontal position across the chest.

Port-au-Prince (Sp. *Vera Paz*), the capital of Hayti, on the W. coast, at the head of the Bay of Gonaives. Despite its prepossessing look from seawards, it is ill-built, squalid, and unhealthy. The streets are cumbered with refuse, and the harbour is obstructed by mud-islands overgrown with mangrove shrubs. The chief buildings are the president's house, the senate-house, the hospital, college, lyceum, and the Petit Seminaire, with 318 pupils in 1876. A terrible fire destroyed the best part of the town in February 1875. P. is the seat of a Roman Catholic archbishop, and exports coffee, cocoa, cotton, mahogany, Campeche and other woods. In 1876 the exports amounted to \$3,267,326, the imports to \$5,243,161. In the same year there entered the port 305 vessels of 284,112 tons, and cleared 296 of 273,317. Pop. (1877) 20,000.

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Port Blair, the chief town of the Andaman Islands, and the headquarters of the Indian convict settlement. The penal settlement contains 7000 prisoners, arranged in six classes, and employed in clearing jungle, cultivation, &c. The annual cost is about £100,000. It was on the pier of the harbour at this place that Lord Mayo, the Governor-General of India, was stabbed by a Mohammedan convict from the N.W. frontier on 23d February 1872.

Port Canning, a now almost deserted town in the district of the Twenty-four Pergunnahs, Bengal, British India, on the Mutlah mouth of the Ganges, 28 miles S.E. of Calcutta. It was founded in 1853 by a private company, aided by Government, at a time when it was thought that the main stream of the Hoogly was in danger of silting up. The shares of the company immediately became the subject of much illegitimate speculation. After an expenditure of more than £100,000, the enterprise was finally abandoned in 1870. A railway still runs from Calcutta to P. C., but it is worked at an annual loss to the Government, its proprietors.

Portcullis (Fr. *porte*, 'a gate,' and *coulisse*, 'something that slides down,' from *couler*, 'to flow' or 'glide'), a narrow-shaped frame of wood or iron, formerly much used in the defence of fortified places. It hung over the gateway, and in case of an assault was made to slide down a vertical groove in the jambs of the gate. In heraldry the P. has rings at its upper angles, from which chains are hung.

Port Durban, or **Port Natal**, the oldest and largest town and only seaport in the colony of Natal, on the shores of an inlet 3½ miles long and 2½ miles wide. The entrance to the harbour is impeded by a bar, which the best engineering skill has hitherto failed to remove. The town is well built and laid out, and among its most agreeable features is its beautiful botanical garden. Pop. (1877) 10,488.

Port Elizabeth, an important town in S. Africa, situated at the W. extremity of Algoa Bay (q. v.). It was founded in 1820, and named after the wife of Sir R. Donken, who was Lieutenant-Governor of Cape Colony at the time. P. E. is the most English town in S. Africa, and the buildings in its principal line of street, which is two miles long, will bear comparison with those of much larger towns in Britain. The water supply, however, is deficient, and the lack of trees gives the town a bare appearance when viewed from the sea. The educational institutions of P. E. are numerous and efficient, the chief among them being the Grey Institute, which consists of a high school and three elementary schools. It was inaugurated by Governor Sir George Grey in 1854, and is supported by a land endowment. P. E. is commercially the most important town in S. Africa, its trade being double that of Cape Town. The principal articles of export are wool—of which 35,428,634 lbs. were exported in 1874—skins, hides, horns, and ostrich feathers. The commercial importance of P. E. has been attained in spite of great natural disadvantages, goods requiring for a long time to be landed and shipped by means of surf-boats. Jetties now exist, but as the bay is exposed to heavy S.E. gales, a breakwater is necessary. A wooden one was constructed some years ago, and proved of great service till it was rendered useless by the sand silting up within it. Plans by Sir John Coode for overcoming the difficulty, though at great cost, are likely to be adopted. A line of railway connects P. E. with Uitenhage, 18 miles N. Pop. (1875) 12,974.

Porte, **Sublime**, the name given to the Turkish Government. The origin of the term lies in the Oriental custom of holding courts, conclaves, &c., at the gates of cities, palaces, &c., the S. P., which is the French for 'lofty gate,' being applied first to the high doorway of the Sultan's palace, and afterwards to his government generally. The universal employment of French as the diplomatic language throughout Europe explains the currency of the term in its French form.

Porter, a variety of malt liquor or Beer (q. v.), characterised by a fine dark brown colour, a mellow, bitter, and peculiar burnt-like taste. The beverage originated in London in the early part of the 18th c., and took its name from having been at first a favourite liquor with the street porters and labouring population. It however rapidly gained in popular estimation, and is now a much-used beverage. The best P. still continues

to be made in London, after which Dublin P. is highly esteemed. Good London P. contains about 6·4 per cent. of alcohol, and nearly a similar amount of saccharine and extractive matter; 'stout,' which is a richer beverage, has about 7·3 per cent. of alcoholic strength.

Porter, David Dixon, an American naval commander, born in Pennsylvania, June 8, 1814, is the youngest son of Commodore P. (1780-1843), who as commander of the *Essex* distinguished himself in the war with England (1812-14). After two years' service in the Mexican navy, he entered that of the U.S. (1829), passed his examination (1835), and was employed in the coast survey till 1841, when he obtained his lieutenantcy. Placed on special duty at the Washington Observatory (1845), he resigned this post in the succeeding year for active service in the Mexican war, and in 1861, on the outbreak of the Civil War, was despatched with the rank of commander to the relief of Fort Pickens. Having next commanded the mortar-flotilla at the reduction of the forts below New Orleans, and at the unsuccessful siege of Vicksburg, P. was appointed, in October 1862, acting rear-admiral of the Upper Mississippi squadron, and co-operated in the second and successful attack on Vicksburg. In 1864 he was transferred to the Atlantic coast, where he effected the capture of Fort Fisher; in 1866 was promoted vice-admiral, and in 1870 succeeded Farragut (q. v.) as admiral of the U.S. navy, a post which he still (1878) retains.

Porter, Noah, D.D., an American philosopher and author, born at Farmington, Connecticut, December 14, 1811, graduated at Yale College (1831), was a schoolmaster at New Haven (1831-33) and a tutor at Yale (1833-35). He became pastor of the Congregational church at New Milford (1836), removed to Springfield (1843), and was chosen Clark Professor of Metaphysics and Moral Philosophy at Yale College (1846), succeeding Dr. Woolsey in the presidency of that institution (1871). A scholarly metaphysician, and in particular well versed in modern German philosophy, P. has written *The Educational Systems of the Puritans and the Jesuits Compared* (1851), *The Human Intellect* (1868), *Books and Reading* (1870), *Elements of Intellectual Philosophy* (1871), *The Science of Nature versus the Science of Man* (1871), &c.

Porter, Sir Robert Ker, K.O.H., an English artist and traveller, brother to the novelists Jane and Anna Maria P., was born at Durham in 1780, and became a student in the Royal Academy in 1790. Two years afterwards he produced his first large work, 'The Storming of Seringpatam,' which was followed by 'The Siege of Acre,' 'The Battle of Agincourt,' 'The Battle of Alexandria,' and 'The Death of Sir Ralph Abercromby.' In 1804 he visited Russia, was created historical painter to the Emperor, and executed some important works, including the decoration of the Admiralty Hall at St. Petersburg. Here he became acquainted with the Princess Mary, daughter of Prince Theodore von Scherbatoff, whom he married in 1811. After accompanying Sir John Moore throughout the Spanish campaign to the final catastrophe at Corunna, P. returned to England, where he was knighted by the Prince Regent in 1813. From 1817 to 1820 inclusive he was occupied in making those extensive travels in Asia, of which he has given an interesting and valuable account in his work *Travels in Georgia, Persia, Armenia, Ancient Babylonia, &c.* (2 vols. 1821-22). From 1826 to 1841 he resided as consul at Caracas, Venezuela, where he painted three of his best pictures, viz., 'Christ at the Last Supper Blessing the Cup,' 'Our Saviour Blessing the Little Child,' and an 'Ecce Homo.' In 1841 he revisited St. Petersburg in company with his sister Jane, and died there, May 4, 1842. His other books are *Travelling Sketches in Russia and Sweden* (2 vols. 1808); *Letters from Portugal and Spain, Written during the March of the Troops under Sir John Moore* (1809); and *Narrative of the late Campaign in Russia* (1813).—**Jane P.**, sister of the preceding, was born at Durham in 1776, and educated at a school in Edinburgh, and afterwards in London. In 1803 she published her first novel, *Thaddeus of Warsaw*, which was translated into several languages, and led to her being afterwards elected 'lady canoness' of the Teutonic order of St. Joachim. In 1809 appeared *The Scottish Chiefs*, which greatly added to her fame as a 'historical' novelist. The best known of her other works

are *The Pastor's Fireside*; *Duke Christian of Lunenburg*; *The Field of Forty Footsteps*; *Sir Edward Scaward's Diary*. She also wrote along with her sister *Tales Round a Winter's Hearth*. In 1842 she went with her brother to St. Petersburg, returning to England after his death. She died at Bristol, 24th May 1850.—**Anna Maria P.**, sister of the two preceding, was born in 1780, and died at Bristol, 21st June 1832. Like her sister, she wrote tales chiefly of a historical character, of which the principal are *Octavia* (1798); *The Hungarian Brothers* (1807); *Don Sebastian* (1809); *The Barony* (1830), and *Artless Tales* (1793).

Portfire, in artillery, a case of paper, usually about 16 inches long, filled with a composition of saltpetre, sulphur, and mealed gunpowder, used for firing guns. This P. burns at the rate of a little more than an inch per minute. Paper impregnated with saltpetre and rolled into a solid cylinder of 16 inches makes a slow P., burning from two to three hours. Paper dipped into solution of nitre, two ounces to the gallon, and rods of wood boiled in a solution of nitrate of lead and subsequently in spirits of turpentine, are also used.

Port Glasgow, a thriving seaport of Scotland, in Renfrewshire, on the S. bank of the Clyde, 2½ miles E.S.E. of Greenock, and 20 N. by W. of Glasgow, on the Glasgow and Greenock Railway, which is here carried across the beach on a viaduct. The Clyde is here 2½ miles wide, but its bed is in great part dry at low water. Immediately behind the town two successive ridges rise to a height of 400 feet, their steep slopes clad with trees. The place was the property of the Maxwells, till in 1668 it was bought by the Corporation of Glasgow to form an outer port for that city. It was made the chief customhouse port for the Clyde in 1710, a municipal borough in 1775, and a parliamentary borough in 1832, in association with Kilmarnock, Rutherglen, Dumbarton, and Renfrew. Although much of its commerce has been diverted to Greenock and to Glasgow since the deepening of the Clyde, the place is still of importance, and its trade, both coasting and foreign, is now increasing. In 1878 the harbour, consisting of three docks, had an area of about 5 acres, and there was a total of 1000 yards of wharfage. The ship-building yards are extensive, and are provided with the newest appliances for the construction of large vessels. In 1876 they turned out 53 vessels of 27,406 tons. On 1st January 1875 the port was incorporated as an out-station with that of Greenock, but according to the last separate returns for 1874 there entered the port 330 vessels (with cargoes only) of 52,415 tons (225 steamers of 10,797 tons), and cleared 145 of 56,760 tons (69 steamers of 11,961 tons). In 1874 the imports amounted in value to £282,990, the exports to £70,462, and the gross customs revenue to £1185. P. G. has a large export trade; manufactures cordage, sailcloth, chain-cables, and anchors. Pop. (1871) 10,823. In the vicinity is Newark Castle, the interesting old seat of the Maxwells.

Porthole, in naval language, denotes the opening in a ship's side from which guns are pointed. The P. is usually square, and must be wide enough to allow of the guns being pointed at different angles. In a ship at sea it is defended by hinged covers, the rope fastening these being called 'port lanyards.'

Portici, a town of S. Italy, province of Naples, on the W. slope of Vesuvius, 5 miles S.E. of Naples by rail. It has a small harbour formed by a mole and defended by a fort. The high-road from Naples to Salerno traverses the town, and leads through the court of the palace built by Charles III. in 1738. P. produces much macaroni and a variety of ribbons, and has some coral and other fishing. Since 79 A.D. Vesuvius has poured its lava seven times over the town, which has been rebuilt as many times. Pop. (1874) 11,792.

Portico, in architecture, a range of columns in front of a building supporting a roof connected with the main edifice. It is called tetrastyle, hexastyle, octostyle, or decastyle, according as the columns number four, six, eight, or ten.

Portioners. See HEIRS-PORTIONERS.

Port Jackson, an inlet on the coast of New S. Wales, forming one of the finest harbours in the world. It is 18 miles long, with an average width of three-quarters of a mile, and is deep, sheltered, and easy of access. The entrance, which is 2500 yards wide, is between two lofty perpendicular headlands.

That on the S. side is crowned by a lighthouse, whose light is visible for 25 miles. The scenery on the shores of P. J. is of the loveliest description. The N. shore is composed of rocky wooded hills, while on the S. shore stands the city of Sydney. Both sides are indented by a succession of beautiful little bays, and the lower half of the inlet is studded with rocky islands, on several of which, as well as on the mainland, batteries of heavy guns have been erected. P. J. is named after a sailor on board Cook's ship, by whom the entrance was first sighted on 5th May 1769. It was then supposed, however, to be a mere boat harbour, and its true character was not discovered till 1788, when Governor Phillip transferred to its shores the settlement mistakenly made at Botany Bay (q. v.).

Portland, Dukes of. See BENTINCK.

Portland, the largest city of Maine, U.S., is situated on a small peninsula of 1666 acres, jutting into Casco Bay. It is connected by rail with Boston, Montreal, and New York, and in 1876 a new railway was opened to the W. through the Notch of the White Mountains. P. is the winter post for the ocean steamers which run in connection with the Grand Trunk Railway at Montreal in summer, and ply between Liverpool and Glasgow. There are two steamers daily to New York, and daily boats to Boston. P. has two public libraries, several scientific societies, and 25 churches. On the 18th October 1877, a new Episcopalian cathedral was consecrated here. It measures 140 feet by 65 feet, and is built of blue stone, finished with Nova Scotia freestone. The value of the imports (molasses, fish, coal, salt, &c.) in 1876 was £2,812,639; of the exports (bacon, lumber, fresh and preserved meats, cheese, &c.), £4,108,298. In the same year there entered 405 vessels of 173,250 tons; and cleared 530 of 223,166 tons. P. supports three daily and nine weekly newspapers, and contains manufactories of locomotives and marine engines, carriages, furniture, &c. Pop. (1875) 35,031, or, with the immediate environs, about 50,000.

Portland Beds form the central group of the Upper or Portland Oolites, which is the highest British representative of the Oolitic or Jurassic Period. They lie between the Kimmeridge Clay below and the Purbeck Beds above, and consist in their lower portions of sands and sandstones, which, becoming calcareous, pass finally into limestone, which is sometimes Oolitic. This limestone is known as Portland Stone. These beds are well developed in Dorsetshire and Wiltshire, and can be traced as far N. as Oxfordshire and Buckinghamshire. Marine shells (lamellibranchs, gasteropods, &c.) and fish and reptilian remains occur as typical fossils.

Portland Cement. See MORTARS.

Portland, Isle of, a peninsula projecting from the Dorset coast into the English Channel, 4 miles S. of Weymouth by rail. It is connected with the mainland by the Chesil Beach, 10½ miles long and from 270 to 170 yards wide, a bank of siliceous pebbles loosely thrown together by the action of the sea, and gradually increasing in size as one proceeds from W. to E. P. itself is about 9 miles in circumference, being 4 miles long by 1½ miles broad. Area, 1408 acres; pop. (1871) 9907. Consisting of one solid mass of Oolitic limestone, P. is girt, except on the Weymouth side, by beetling cliffs, which terminate to the S. in P. Bill, with two lighthouses, 120 and 197 feet above the level of the sea. From the northern angle of the 'island' extends the P. breakwater, the two portions of which, with a respective length of 600 and 3000 yards, are separated by an opening of 400 feet. The first stone of this great work was laid by the Prince Consort, July 25, 1849; the last by the Prince of Wales, August 10, 1872; and its total cost, exclusive of convict labour, was £1,033,600. The artificial harbour formed by it is one of the largest in the world, having a sheltered anchorage of 6745 acres. Verne Hill (490 feet), the highest point of P., is crowned by Fort Victoria, with casemated barracks, garrisoned (1871) by 615 men, and surrounded by a dry ditch, to form which 1,500,000 tons of stone had to be blasted. Nature and art have combined to render P. second only to Gibraltar in strength; £400,000 having been expended on its fortifications up to 1875, and it has one great advantage over Gibraltar, that its batteries being all in the open air, the smoke clears off more readily than in rock-hewn galleries. P. prison (1848), consisting of eight blocks, is the largest in England, with (1871) 119 officials and

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1508 convicts. These, like the 'islanders,' are chiefly employed in the Crown quarries, from which some 50,000 tons of 'P. Stone' (see P. BEDS) are annually exported. The 'P. sheep' are a small black-faced breed, whose flesh resembles Welsh mutton. There are two churches in the parish of P., and of its nine villages Castletown is the largest. Amongst the lions of the 'island' are Bow and Arrow Castle, a pentagonal tower, ascribed by tradition to William Rufus; Pennsylvania Castle, erected by a grandson of William Penn; and P. Castle (1520), formerly the residence of the governor, and converted into a Royal Engineers' depôt since 1875. See Hutchins' *History of Dorsetshire* (3d ed. 1861-74).

Portland Sago. See ARUM.

Portland Vase, formerly known as the Barberini Vase, is a unique ancient Roman cinerary urn composed of two layers of glass, of a rich deep blue translucent ground, being decorated in relief with beautifully wrought white opaque figures, representing, it is believed, the marriage of Thetis and Peleus. It is round, 10 inches high and 7 in diameter, and has two handles. The P. V. was found in the 16th c. near Rome in a marble sarcophagus, supposed to be that of Alexander Severus, and for two centuries it was preserved in the Barberini Palace at Rome. It was purchased in 1770 by Sir William Hamilton, and subsequently it became the property of the Duchess of Portland at a price of 1800 guineas. In 1810, the Duke of Portland being one of the trustees of the British Museum, placed it in that institution for exhibition, where it remains, though not now exposed to public view. In 1845 a visitor maliciously dashed it to pieces, but it has since been skilfully repaired. A full description of the vase is given in *Archæologia* (vol. viii.). Josiah Wedgwood, the potter, modelled the P. V. in jasper ware with white bas-reliefs. He made fifty copies of it, which were disposed of at fifty guineas each, and their value is now greatly enhanced.



Portland Vase.

Portlaw (Ir. Gael, *Port-lagha*, 'the landing-place' or bank 'of the hill'), a town of Ireland, county of Waterford, on an affluent of the Suir, 6½ miles S.E. of Carrick-on-Suir. The town, formerly a mere village, took its rise on the introduction of the cotton industry by the Malcolmson family, whose cotton-mill still employs most of the inhabitants. Pop. (1871) 3143.

Port Louis, the capital of Mauritius, is situated on the N.W. coast of that island, hemmed in by rugged hills, and divided into three parts, inhabited by the whites, creoles, and Hindu Coolies (q. v.) respectively. The streets are straight, well kept, and usually lined with trees. Some of the public buildings are handsome, and there is a fine botanical garden. The harbour, which is fortified, is roomy, but difficult to enter, and unsafe in the hurricane season. The trade of P. L. is very extensive, and is nearly identical with that of Mauritius (q. v.). The climate is very hot, and the death-rate in 1876 was 35.1 per 1000, which was much higher than that for the island generally. Pop. (1871) 63,274.

Port Mahon (*Portus Magonis*), capital of the island of Minorca (q. v.), is a beautiful little town built in the form of an amphitheatre, and situated upon one of the finest harbours of the Mediterranean, which is defended by three forts. In 1873 the imports (leather, cotton, sugar) amounted to £49,283, and the exports (boots, cotton stuffs, wheat, and cattle) to £177,850. In the same year 385 vessels entered the port, with a total tonnage of 53,848. Pop. 12,800.

Porto Ale'gre, a town in the S.W. of Brazil, capital of the province of São Pedro do Rio Grande, at the N. end of the Lagoa dos Patos, on the right bank of the Guayba. It is the seat of a bishop, has a cathedral, a gymnasium, a hospital, good wharves, and regular steamboat communication with other ports in Brazil. Its imports in 1872 amounted to \$634,145; its exports to \$193,531. Pop. (1872) 25,000 (including 3000 Germans).

Portobell'o, a favourite watering-place on the S. side of the Firth of Forth, 3 miles E. of Edinburgh by the North British Railway. It is pleasantly situated in a level district, and has fashionable crescents and rows of elegant villas. A handsome marine parade stretches for a mile along the shore, and a fine iron pier, 1250 feet long, with a spacious saloon and band-stand at its far end, was erected (1870-71) at a cost of £11,000. The firm, gently sloping sands are covered by an animated crowd in summer. Among the best buildings are the town-hall (1863), the Free church, with a steeple 100 feet high (1876-77), and the School Board schools (1877). P. has also six other churches, several good hotels, a skating-rink, &c. There are extensive manufactures of earthenware, bricks, bottles, &c., and the railway station is the principal goods depôt between Edinburgh and Newcastle. The first house built here was called P. from the circumstance that it was erected about the time (1739) of the seizure of Puerto Bello in Panama. Pop. with the adjoining village of Joppa (1871) 5481, increased in summer by not fewer than 8000 visitors. P., together with Leith and Musselburgh, sends one member to Parliament.

Porto Ferrajo, a seaport, on a beautiful bay enclosed by mountains, on the north coast of the island of Elba. It is strongly fortified with six batteries, and is a well-built town, though several of the streets are narrow. The Piazza d'Arme is the largest square. P. was the place of residence of Napoleon I. from May 5, 1814, to February 26, 1815. It has exports of sardines and tunny-fish. Pop. (1875) 5779.

Porto Maurizio, a town of N. Italy, capital of a province of the same name, 58 miles S.W. of Genoa. It stands on a bold headland, has a fine church and a good harbour, and carries on a large trade in olive oil, grain, &c. Pop. (1874) 7038.

Porto Novo (Parangipetta), a town in the district of S. Arcot, Madras Presidency, British India, at the mouth of the estuary of the Fellaur, on the Coromandel or E. coast, 116 miles S. of Madras, and 63 N.E. of Tanjore. Pop. (1871) 7182. It is celebrated for the battle won by the British, under Sir Eyre Coote, over Hyder Ali, 1st July 1781. The result was the delivery of the Carnatic from the Mohammedan invaders. A few years ago an extensive iron foundry was established here with European capital; but though the ore is abundant, the enterprise did not prove a permanent success.

Portpatrick, a burgh of barony and watering-place in the county of Wigtown, Scotland, situated on the N. Channel, 8 miles from Stranraer by rail. It is the nearest point of Scotland to the Irish coast, being 21½ miles distant from Donaghadee. It was a mail-packet station for Ireland from 1662 till 1849, and in 1774 a quay was formed, with a reflecting light, 37 feet high. A new pier was built by Rennie at a cost of £160,000. A lighthouse was erected in 1832, which was, however, demolished by the Government in 1869. The harbour, though small, has (1878) a depth of 10 feet at low water of spring tides, and was formerly the scene of an active trade, chiefly in the exportation of fish, and the importation of Irish cattle and horses (20,400 cattle and 600 horses yearly about 1820). About half a mile to the S. is Dunskey Castle, an imposing ruin, on the brink of a precipice projecting into the sea. The Government works, on which during fifty years £250,000 had been expended, were abandoned in 1869. The town has recently been greatly increased by the erection of villas for summer visitors. Pop. (1871) 1488.

Port Phillip, an inlet on the S. coast of Victoria, measuring 30 miles from N. to S., and 35 miles from E. to W., with an area of 900 sq. miles. The entrance, which is easy of access, is 2 miles wide, and is fortified. The N. extremity of P. P. is called Hobson's Bay, and receives the river Yarra-Yarra (see MELBOURNE). On the W. side is another indentation, known as Corio Bay, on which is situated the town of Geelong (q. v.). P. P. was discovered by Acting-Lieutenant Murray, on 15th January 1802, and again, independently of him, by Flinders, on April 26th, in the same year. Murray named it Port King, after the Governor of New South Wales at that time, but the latter changed the name to P. P. in honour of the first governor. Till 1851, the district now forming the colony of Victoria was known by the name of P. P.

Portreeve (Lat. *portus*, 'a harbour,' and Old Eng. *gerfa*, an 'overseer'), in England formerly the chief magistrate of a seaport.

Portrush, a post town and seaport of Ireland, county of Antrim, stands at the extremity of a basaltic peninsula, nearly opposite the Skerries, 5 miles N. of Coleraine, and 50 N.N.W. of Belfast by rail. It is a seaport of Coleraine, and the terminus of a branch line of the Northern Counties Railway, has a good harbour and pier, and carries on some export trade. Lying only 6 miles S.W. of the Giant's Causeway, it is visited by great numbers of tourists, and is one of the places on the circular route of the North British Railway Company. Pop. (1871) 1106.

Port Said, a town in Egypt, at the Mediterranean entrance to the Suez Canal (q. v.). To this fact it owes its existence, which dates only from 1863. P. S. stands on a narrow strip of beach which divides the Mediterranean from the salt Lake Menzaleh, the ancient Gulf of Pelusius. Its harbour is artificial, and is divided into an inner and an outer anchorage, the former of which consists of a channel dredged between two stone piers, the western one being 7000 feet long. At the entrance to the inner harbour is a lighthouse 180 feet high, with an electric light. The chief trade of the port is in coal and stores for the use of steamers passing through the Canal. 260,000 tons of coal were imported in 1876. In the same year the number of vessels, not in transit through the Canal, which visited the port was 368, whose aggregate tonnage was 401,910. Of these vessels about two-thirds were British. P. S. has a very evil reputation for murders, robberies, and other crimes of violence, but since the lighting of the streets with gas in 1876 lawlessness has decreased. Pop. with Kantara (1872) 8671.

Port-Royal was the most celebrated of all monastic establishments. Two nunneries bore the name—one at Chevreuse, near Versailles, and the other in the capital, in the Faubourg de St. Jacques. The latter was called P.-R. de Paris, the former P.-R. des Champs, and is said to have dated from the time of Philippe-Auguste, who, having lost his way in the chase, found a shelter or *port* in the neighbourhood of Chevreuse. The nunnery was founded in 1204 by Mathilde de Garlande of the Montmorency family. The nuns were of the Order of St. Bernard de Citeaux. In 1223 Honorius III. conferred on it the privilege of an asylum for seculars. The rules of St. Bernard were soon after departed from. The P.-R. gained notoriety first in the time of the great Jansenist leader, the Abbé de St. Cyran, who was father confessor to the nuns. The abbess, Marie Jaqueline Angélique Arnauld, with nearly the whole of her celebrated family, became devoted Port-Royalists. Under the management of the 'Mere Angélique' the establishment grew so rapidly that Madame Arnauld, mother of the abbess, purchased the large Hôtel de Clugny in the Faubourg de St. Jacques at Paris, whither her daughter removed in 1665. The house thus left deserted became the abode of a celebrated set of men known as 'Les Solitaires de P.-R.' Of these were Antoine Lemaitre, nephew of Angélique, Claude Lancelot, Simon Séricourt, Isaac de Sacy, and Antoine Arnauld, Angélique's brother. Antoine, the great friend of Pascal and Nicole, was the indefatigable foe of the Jesuits, and gave Pascal the materials for the *Provincial Letters* (see ARNAULD). The life of these Port-Royalists was very austere; and because of their piety and their learning pupils flocked to them for instruction. For their school they prepared the celebrated P.-R. handbooks in grammar, classics, logic, geometry, &c. In 1664 the community was dispersed by force; in 1669 the P.-R. de Paris was reorganised under the Jesuits. The nuns in the P.-R. des Champs still refusing to subscribe the papal condemnation of Jansen, were dispersed in 1709 (many of them to suffer imprisonment in other convents), and their abbey was levelled to the ground. Many celebrated men have written the history of this interesting society. It may suffice to mention the *Mémoires* by Fontaine (1736); *Histoire Générale de l'Abbaye de P.-R.*, by Clémencet (Amst. 1755-57); *Histoire de P.-R.*, by Racine (Par. 1767); *Geschichte von P.-R.*, by Reuchlin (Hamb. 1839); *P.-R.*, by Saint-Beuve (5 vols. Par. 1840-60); *Memoirs of P.-R.*, by Schimmelpenninck (Lond. 1858); and *P.-R.*, by Beard (new ed. 2 vols. Lond. 1873).

Port'sea Island, the peninsula on which are situated the towns Portsmouth and Portsea, lies in an inlet of the English Channel, and off the S. coast of Hampshire, a little to the E. of the Isle of Wight. It is bounded on the W. by Portsmouth Harbour, and on the E. by Langston Harbour, while on the N.

it is only separated from the mainland by a narrow channel, crossed by railway and passenger bridges. It is about 4 miles long, with an extreme breadth of $3\frac{1}{2}$ miles. On the W. it approaches to within 220 yards of the mainland promontory, and there this narrow entrance to Portsmouth Harbour is defended on the E. by Southsea Castle and on the W. by Monckton Fort. Langston Harbour is also entered by a narrow, strongly-defended channel, and on its W. side is Hayling Island, beyond which are Emsworth Channel and Chichester Harbour, separated by Thorney Island. The town of Portsea is included in the borough of Portsmouth.

Portsmouth, the principal naval arsenal of England, and an important seaport and borough in the county of Hampshire, is situated on the S.W. of the island of Portsea (q. v.), 26 miles S.E. of Southampton, and 75 S.W. of London by rail. It stands on the entrance to P. harbour. From the entrance to the harbour a sandbank called the Spit extends 3 miles S.E., having beyond it the splendid roadstead of the Spithead, where as many as 1000 ships of the line can anchor. Until within the last four or five years the town of P. was completely encircled by a belt of formidable fortifications, the approaches from Portsea town, Southsea, Landport, and the other suburbs being through four massive gateways. The town of Portsea was similarly fortified; but within the time mentioned the whole of the ramparts, bastions, embrasures, moats, drawbridges, and gateways, which gave the whole place the appearance of a huge and impregnable fortress, have been swept away, and the immense space thus created has been turned to excellent account by Her Majesty's War Department, under whose directions spacious recreation grounds have been constructed for the use of the officers and men of the army. Several wide and well-made roads have also been laid out, and various other improvements effected. The defences facing seaward now remaining, include the forts built at Spithead, while on the land side the dockyard and arsenal are protected by four forts on the heights of Portsdown and by the lines of Hilsea. P. is quadrangular in shape, and covers 1100 acres. Most of its streets are mean and narrow, much inferior to those of Portsea, which has several handsome terraces, and one fine square called St. George's. Southsea is the fashionable district of the borough. It has a fine esplanade and pier. Though it sprang into existence almost entirely during the last half-century, it is now the largest, and is rapidly becoming the most popular, watering-place in the S. of England. To the E. of Southsea, distant about a mile, are the headquarters of the Royal Marine Artillery at Eastney. It is a gigantic establishment, and is looked upon by military critics as a perfect model of completeness. Great improvements have been carried out in P. of late years, £160,000 having been spent on drainage alone, while the Victoria Park was opened 24th May 1878. The parish church of St. Thomas A'Becket, in the Early English style, was founded by Richard Tocliffe, Bishop of Winchester, 1173-1189. Only a portion of the original structure now remains, the additions being of various later periods. In the chancel is a monument, with an urn, to George Villiers, Duke of Buckingham (q. v.), Lord High Admiral, who was assassinated at his residence (which still exists) in the High Street by John Felton in 1628. The next church in importance is the Royal Garrison Church, formerly called the church of Domus Dei, in the Early English style, founded in 1210, and lately restored at a cost of £5000. Other buildings are the Royal Naval Club, the Seamen and Marines' Orphan School, the townhall, theatre, custom-house, the Cambridge Barracks, Colewort Barracks, Clarence Barracks, and Artillery Barracks, Railway Station, the Gas Company's offices, and the excellent new hotels at Southsea. Portsea town is celebrated as the locality of P. dockyard, which is entered through a gateway situated at the end of the famous Common Hard. The old dockyard contains upwards of 115 acres, upon which are erected gigantic foundries, workshops, storehouses, &c. It also contains several spacious docks, together with a steam and repairing basin. During the past few years the dockyard has been extended to the N.E., the ground necessary for such extension having been mainly reclaimed from the mudlands of the harbour, the area of the extension ground alone being 178 acres. There are six basins, each capable of floating the largest ship ever yet built or likely to be built; and in order to convey some idea of the vast character of the works, it may be stated that the basins alone cover 70 acres. The cost has been upwards of £2,250,000. The

docks are unsurpassable; the whole of the bricks (many millions in number) required for the construction of the massive walls of the basins, together with the numberless erections all over the works, were manufactured by convict labour, with the aid of powerful steam-machinery, from clay excavated on the ground. The erection of permanent storehouses, workshops, &c., has not yet (1878) been proceeded with. There is no naval establishment in the world in any way approaching this in general extent. Between Portsea town and P. stands the Gun Wharf, a very large depôt for all descriptions of ordnance and war material. There are two armouries in this establishment, containing together about 40,000 stand of arms, arranged somewhat after the plan of those in the Tower of London. In the wood mills are several machines invented by Brunel, capable, with the aid of four workmen, of making annually 150,000 blocks. The entrance to the docks is 80 feet wide, and 27 feet deep at low water. The shipbuilding slips cover 15 acres, and the 'steam-basin,' for the repair of ships' machinery, is 900 feet by 400, and has 26 feet of water at spring tide. The trade of P. is chiefly dependent on its dockyard. It has, however, extensive breweries; while coals, corn, cattle, and sheep are imported. In 1876 there entered the harbour 1947 vessels of 190,978 tons, and cleared 1172 of 54,849 tons. The gross amount of customs revenue received in the same year amounted to £25,770, and the total value of imports of foreign and colonial merchandise was £343,173. In 1877, 311 vessels of 20,170 tons belonged to the port, besides 189 fishing-boats. P. has a constituency of 15,409, and returns two members to Parliament. Pop. (1871) 112,954; estimated pop. (1878) 129,461. P. was a naval station in the reign of King John. Burned by the French in the reign of Richard II., it was fortified by Edward IV. and Henry VIII., being already, in the reign of the latter, the chief station of the English fleet. Its defences were greatly extended under Charles II., William III., and George III., and are now believed to be impregnable.

Portsmouth (1), a city of Ohio, U.S., situated at the confluence of Scioto River with the Ohio, and at the S. terminus of the Ohio and Erie Canal, is the place of export for the mineral regions of Ohio and Kentucky. It has twelve churches, an opera-house, six banks, three foundries, besides numerous factories, and three newspapers. Pop. (1870) 10,592.—**P.** (2), a city and port of Virginia, on the E. bank of the Elizabeth River, opposite Norfolk (q. v.), with which it is connected by ferry, has one of the best harbours in the United States, and is the seat of a navy-yard, dry-dock, and naval hospital. Lines of steamers sail from here to the principal Atlantic seaports. P. contains thirteen churches, a court-house, scientific academy, and a daily newspaper. The exports include cotton, oak staves, naval stores, and pig iron. Pop. (1870) 10,492.—**P.** (3), a city and port of entry of New Hampshire, U.S., lies on the right bank of the Piscataqua River, $3\frac{1}{2}$ miles from the Atlantic. It contains two libraries of about 14,000 vols., ten churches, two breweries, several weaving establishments, two daily and two weekly newspapers. The United States Navy-Yard, situated about half a mile distant, is built upon two islands lying on the Kittery side of the river, and comprises 170 acres. P. is the only seaport of New Hampshire. Its harbour is one of the best in the United States, having a depth of 40 feet at the entrance at low tide, and never freezing. Shipbuilding is the chief industry, and many celebrated war-vessels have been constructed here. The first settlement was made by the English in 1623. Pop. (1870) 9211.

Portugal, the most westerly European kingdom, is physically one with Spain, occupying the Atlantic margin of the Iberian peninsula, in lat. $36^{\circ} 57'$ — $42^{\circ} 8'$, and long. $6^{\circ} 12'$ — $9^{\circ} 32'$. It is surrounded on the N. and E. by Spain, and on the W. and S. by the Atlantic, and, with an average breadth of only 100 miles, it has a length from N. to S. of 370 miles. The coast, 500 miles long (100 miles facing the S.), is little indented, and is for the most part flat and either marshy or sandy; but in some places, as between the capes Roca and Mondego, it rises in a bold rugged line of cliffs. The chief headlands are Cape Carboeyra, Capes Roca and Espichel, on either side of the Tagus estuary, Cape de São Vicente, forming the S.W. angle of P., and in the extreme S. Cape de Santa Maria. Nearly all the harbours have bars, and with a breeze from the sea a terrible surf breaks along the whole

coast-line. The following table is from the *Anuario Estadístico do Reino de P.* (Lisbon, 1877) :—

Provinces.	Area in sq. miles.	Pop. (1875).	Chief Towns.
Minho, Entre Douro e, Traz-os-Montes, . . .	3094	967,578	Oporto.
Beira (Alta and Baixa), Estremadura, . . .	3999	372,349	Bragança.
Alemtejo,	8586	1,314,684	Colimbra.
Algarve,	6873	855,351	Lissbao.
	9982	345,394	Evora.
	2730	191,754	Faro.
	35,264	4,047,110	

Physical Aspect.—The surface of P. is in great part mountainous, the scenery combining highland grandeur of form with the bright subtle colours of a southern clime. Many irregular offsets of the Cantabrian range enter the northern provinces, and one of these, the Serra de Alcoba, taking a S. and then a W. direction, extends through Beira, and terminates in Cape Mondego. (The Portuguese *serra*, Sp. *sierra*, is not the Lat. *serra*, 'a saw,' as is commonly supposed, but the Arabic *sehrah*, the same as *sahara*, meaning 'uncultivated tract.') Another range of greater elevation and extent traverses Beira and Estremadura, and ends near Lisbon in the Cabo de la Roca. It bears in Beira the name of Serra de Estrella, and in Estremadura receives several names, the main range being called the Serra de Junto. The Serra de Estrella is the highest range in P., having an elevation of 7524 feet. As the range approaches the sea, it forms a series of ridges, running E. and W., and occupying the whole space between the coast and the Tagus to 30 miles N. of Lisbon. Behind Lisbon rises Cintra, the summer retreat of the wealthy Portuguese and of the English residents. To the N. of Cintra stretches the broken hilly plateau across which Wellington drew the famous lines of *Torres Vedras*, that saved Lisbon from the French in 1810. In the S., a range known partly as the Serra de Caldeirão, and partly as the Serra de Monchique, crosses from E. to W., and separates Algarve from Alemtejo, terminating in the Cape de S. Vincente. It is a continuation of the Spanish Sierra Morena, from which it is separated only by the narrow valley of the Guadiana. Of the valleys the largest is the basin of the Mondego, between the Serra de Alcoba and Serra de Estrella. Fine valleys of lesser extent are those of the Lima and Cavado in Entre Douro e Minho, and the upper course of the Vouga in Beira. The most extensive plain in P. is the Campo de Ourique, in Alemtejo. All the great rivers of P., the Douro, Tagus, and Guadiana, have a Spanish source. In the extreme N. the Minho (q. v.) separates the province Entre Douro e Minho from Pontevedra in Galicia. The Douro (q. v.) first forms part of the Spanish frontier line, and then the boundary between the two most northerly provinces and the province of Beira. In P. the Tagus (q. v.) has a course first due W. and then S.W., and before reaching Lisbon expands into a magnificent and nearly land-locked harbour. Along its banks, from Lisbon to Abrantes, where navigation ceases, there is a succession of luxuriant gardens and vineyards. Entering from Spain near Badajoz, the Guadiana (q. v.) flows in a southerly direction, partly in P. and partly on the boundary. The Mondego (in Beira), the largest purely Portuguese river, although only 100 miles long, is subject to terrible inundations. The rivers, indeed, are all liable to flooding, and the freshets on the Douro have been known to raise the level of the water at Oporto 20 or even 30 feet in six hours. Of the minor rivers, the chief are the deep and rapid *Lezere*, that joins the Tagus below Abrantes, and the Sado or *Sadão* which waters the Campo de Ourique. Near Aveiro in Beira, and in the vicinity of Setuval, are extensive salt-marshes.

Geology and Climate.—The base of the mountain chains is formed of granite and other eruptive rocks. Granite appears in the lofty peaks of the Serras de Estrella and Monchique, and the town of Oporto stands on a mass of this rock some five miles wide. Further to the E. syenite takes the place of granite. The flanks of the Serra de Estrella are covered with strata of clay-slates and mica-schists. Clay-slates overlie the whole district of the upper Douro, where all the fine port wine is produced, the line of junction with the granite marking the limits within which are cultivated the finer qualities of the wine. About 12 miles E. of Oporto and near Volongo, a hard, dark-coloured slate of the finest quality is quarried extensively. In the same locality several beds of anthracite have been long wrought at various

points for the market of Oporto. Throughout P. there is great diversity of climate, but the dry, oppressive heats of Central Spain are unknown. Atlantic rains abundantly fertilise the country, especially from October to April. The mean temperature at Lisbon is 61° F. Snow falls heavily on the mountains of the two northern provinces, but in the S. winter is seldom accompanied by snow, and the summers are hot and long. In the lowlands of the S. spring begins in January and harvest is over by midsummer.

Soil and Productions.—The soil is in great part highly productive, but agriculture is still conducted in a manner at once indolent and primitive. The lowlands produce rice, and in the more elevated districts are cultivated wheat, barley, oats, maize, hemp, and flax. Fruits are exported, the central and southern provinces producing abundantly oranges, lemons, figs, almonds, &c. The staple product of P. is the celebrated rich, red, *port* wine, so called from being shipped at Oporto. Next to it comes the olive, which is grown extensively in the S., but the oil is not of the finest quality. The oak prevails among the trees of the N., the chestnut among those of the centre, and among those of the S. the cork, date, and American aloe. In the two northern provinces are reared the finest cattle, while Beira is noted for its horses, and Alemtejo for its sheep. Oxen are employed for draught, and the beasts of burden are chiefly asses and mules. In the highlands are reared large herds of goats and swine. The rivers abound with fish, and the southern province of Algarve has extensive fisheries of pilchards, tunny, and anchovy. The mineral wealth of P. is considerable, but there is little mining enterprise. Salt, the only mineral exported, is evaporated largely in the coast marshes, and is specially prized in England in ship victualling, for which use it is peculiarly fitted by its superior hardness.

Industries, Commerce, &c.—The chief, almost the only, industrial centres, are Lisbon and Oporto, and in both places trade predominates greatly over manufacture. The industrial products of P. are mainly gold and silver ware, silks, woollens, cottons, linens, pottery, tobacco, gloves, paper, and chemicals. P. has not a single canal, and it is only in the present century that a carriage-road has been completed between Lisbon and Oporto. Now, however, railways connect the principal towns, and in 1877 the total length of lines completed throughout P. was 1559 miles. In 1874 the exports—wine, oil, cork, oranges, lemons, pyrites, and wool—amounted to £5,250,000, and the imports—textiles, yarn, metals, leather, cattle, cereals, and colonial produce—to £6,494,000. In 1877 as much as 7,721,028 gallons of port wine were shipped to England from Oporto, the greatest quantity exported since 1801. England receives some seven-elevenths of all exported wine. The cotton goods imported from Great Britain in 1876 amounted to £940,191, woollen fabrics to £152,644, wrought and unwrought iron to £245,269. The value of the total exports to Great Britain (1876) was £3,361,071, and of the imports thence, £2,231,191.

Government, Law, and Finance.—The government is a constitutional monarchy, hereditary in both male and female lines, and is based on the *Carta de Ley* of 1826. The *Cortes Gares*, or representative assembly, consists of a chamber of peers and a chamber of deputies. The *Camara dos Pares* is composed of about 100 members, nominated by the king for life. The *Camara dos Deputados* is popularly elected, and comprised 108 members in 1869. The king is aided by a cabinet of five ministers, and by a council of eleven members chosen for life. The deputies (elected directly by all citizens with an income of £22) must have an income of £89, unless they belong to any of the learned professions, in which case all such conditions are set aside. The *Titulados* are the titled classes, or higher nobility. On account of the poverty of a great number of the *Fidalgos* or provincial aristocracy, a law was passed in 1864 by which transmission of the dignity became dependent on an academical degree and an income of £500. There are 110 courts of justice, five courts of appeal (*Relaches*), and a supreme court at Lisbon. The Alfonsine Code of the 5th c., and the code of Philip IV. of Spain (*Codigo Filippino*), are still in use, except in commercial cases. Trial by jury is adopted in some suits. In 1877-78 the budget gives the national income at 25,262,124 milreits (1 milreits = 4s. 7d.), and the expenditure at 26,424,685 milreits. The public debt amounted to £79,061,780 on the 30th June 1876. A budget without a deficit has been unknown in P. for nearly half-a-century. The debt, which includes foreign loans to the amount of £30,188,700, bore £2,250,768 of interest in the financial year 1875-76. The budget of the colonies (not in-

cluded in the above) gave the receipts at 2,027,154 milreis, and the expenditure at 1,930,164 in 1875-76.

Army and Navy.—The fundamental military law of 1864 was supplemented by an act of 26th April 1877. The army is raised partly by conscription, and the period of service is eight years, of which three are in reserve. On August 31, 1877, the effective army comprised 1671 officers and 34,062 men, and 4210 horses and mules. It can be raised on a war footing to 74,141 men and 2649 officers. In 1875 an army of the colonies (*do ultramar*) was 7845 strong. The fleet in 1877 comprised 27 steamers of 4255 horse-power, with 144 guns; and 12 sailing vessels with 36 guns. The largest vessel, the *Vasca da Gama*, was launched on the Thames in 1876, and is a 'ramming' corvette of 450 horse-power, clad in 10-inch armour, and carrying two 18-ton guns. The coast and frontier are guarded by 55 fortresses, most of which, however, are mere castles.

Religion and Education.—The religion of P. is Roman Catholicism, and the Church is governed by the Cardinal Patriarch of Lisbon, the Archbishop of Braga (primate of the kingdom), the Archbishop of Evora, and 14 bishops. Some 18,000 clergy hold cures. The convents were suppressed in 1834, and the revenues and buildings were appropriated by the State. The property confiscated comprised 632 monasteries, 118 nunneries, and an annual revenue of nearly a million sterling, which was applied to the national debt. There are Protestant chapels in Lisbon and Oporto. Education, which is in a very backward state, has been recently receiving the earnest attention of the State. The system, as reorganised in 1836, was modified by a law of 1875. There are now two classes of elementary schools, only one class being free. In 1869 there were 2359 elementary schools, with 117,305 pupils on the rolls, but of these only 62,937 were in attendance. In 1869 the Lyceums or secondary schools, 21 in number, had 3744 pupils. There are 6 normal schools (one for females), 19 theological seminaries, 3 medico-surgical schools, 2 fine-art academies, a music conservatoire, a military college, &c. The only university, one of the oldest in Europe, was originally founded at Lisbon in 1290, and was finally transferred to Coimbra in 1537. It has 46 professors and some 900 students. Education is controlled by a supreme council, which has as president the Minister of the Interior, and as vice-president the Rector of the University. The grant for education was 870,683 milreis in 1878.

Ethnology.—The Portuguese are mainly the descendants of the ancient Celtic inhabitants of Iberia. Thick-set and light-complexioned, they differ no less in appearance than in language from the swart, stately Spaniard, whom they resemble so closely in the love of ceremony and display, in dignified suavity of manner, and confirmed indolence of life. As a rule, the people, urban as well as rural, are dirty, ignorant, and superstitious, but the peasants of the uplands are distinguished by superior vigour and self-reliance. In the S. a large infusion of Arab blood shows itself in the tall, lithe figure, and dusky, well-cut face. Music is the only fine art in which excellence is attained by the Portuguese.

Colonies.—The foreign possessions, according to the *Diário* for 1877, had an estimated area of 709,469 sq. miles, and a pop. of 3,201,833. In *Africa* these include the Cape Verde Islands, Bissão, Cacho, and Bolama (in Senegambia), Princes and St. Thomas Islands, Lower Guinea (from Loango to Benguela), Mozambique, Sofala, &c.; in *Asia*, Goa, Salcete, Bardez, Damão, Din, Timor, and Cambing (Indian Archipelago), and Macao in China. In terms of a law of 1858, domestic slavery ceased in the colonies on 29th April 1878.

History.—The name P. is a corrupted form of that of the hill fort, *Portus Cale* (*Portugale*), which stood on the S. bank of the Douro, and is now one of the suburbs of Oporto ('the harbour'). A place of thriving trade before the invasion of the Romans, who named it *Portus*, 'the harbour' was the key of the Christian position during the long occupation of the south by the Moors. Limited at first to the lower basin of the Douro, the name P. was gradually extended as the country was recovered from the Infidels. A sketch of the ancient inhabitants of the peninsula is given in the article HISPANIA. The Carthaginians under Hamilcar subdued the region, and were followed by the Romans. Under Augustus the peninsula was divided into the three provinces *Bætica*, *Tarraconensis*, and *Lusitania*, the last comprising great part of modern P., and parts of Leon and Spanish Estremadura. In the 5th c. A.D., *Lu-Itania*, like the rest of the peninsula, was overrun by the Visigoths, and in the

8th c. was conquered by the Arabs. The resistless tide of Moslem invasion broke on reaching the precipitous Asturian mountains, and a remnant of the Christian Visigoths, who had retreated to the highland recesses, maintained perfect independence throughout the long period of Moorish dominion, and founded the Christian kingdoms of N. Spain. The warlike Fernando, king of Leon and Castile, in the course of marauding expeditions conquered and occupied the important city and stronghold of Coimbra in 1064. His son Alonso IV. seized his brother's territory of Galicia, which included part of the N. of P. Meanwhile the long wars were attracting to the Christian courts and camps of Spain the flower of European chivalry. Two knights of the house of Burgundy, Counts Raymond and Henri, acquired the highest favour with Alonso. Count Raymond received with the hand of the king's daughter the government of Galicia and P.; but after a terrible defeat near Lisbon in 1095, he was deemed too weak to hold the outlying viceroyalty, which was given to Count Henri, the husband of Alonso's natural daughter. Henri was made governor of the whole district between Minho and Tagus, and died in 1114. His queen, Traja, subsequently alienated the nobles by the favours showered on her paramour, Fernando Perez, and was displaced by her son, Afonso Henrique, a young prince of singular skill, valour, and energy. Afonso I. defeated a large Saracen army in the plain of Ourique, Alemtejo, in 1139, took the great stronghold of Santarem, and with the aid of a fleet of English, N. German, and Flemish crusaders, carried Lisbon itself by siege in 1147. The restless warrior, crowned almost at every step by victory, was recognised as an independent sovereign by Pope Lucius II. in 1144, and his deeds thrilled with admiration every court in Europe. Before his death, in 1185, he had kindled the fire of patriotic loyalty in the nation, which his sword had extended to the Mediterranean Sea. The Burgundian dynasty founded by him continued to rule P. till 1580. The war with the Infidels was continued by Afonso's immediate successors, and Afonso III. (died 1279) was called the Restorer, on account of his reconquest of Algarve. His son Dinis, the founder of the university at Lisbon (1290) and a liberal patron of learning, laid the foundation of the commercial greatness of P. in the next century. The following reign, that of Afonso IV. (1325-57), was taken up mainly with Castilian and Moslem wars. Pedro I., son of Afonso, is chiefly remembered for his secret marriage with Ines de Castro, which led to such a tissue of crimes. With Fernando I., whose whole reign was a struggle for the Castilian crown, the direct male Burgundian line became extinct in 1383. His daughter, the wife of Juan I. of Castile, was excluded, though lawful heiress, on account of the aversion of the Portuguese to a connection with Castile, and the states proclaimed a natural son of Pedro I., Dom João, king in 1385. João wisely reformed the administration, transferred the royal residence from Coimbra to Lisbon, and inaugurated the enterprises of foreign conquest and discovery, which shortly raised P. over all the maritime powers of Europe. But to his third son, Henrique the Navigator (q. v.), is P. chiefly indebted for this suddenly acquired pre-eminence. Stirred from boyhood with an enthusiasm for geography, he gathered together voyagers and men of science, and sent forth the various expeditions which explored the W. coast of Africa, and discovered the Azores, Madeiras, Canaries, Cape Verde, and other islands. The prince bore the expense of these expeditions till a national interest was awakened in the W. African trade. Maritime discovery and colonisation continued during the reign of Afonso V. (died 1481), and culminated during that of João II., one of the ablest of Portuguese monarchs. In 1486-87 Bartholomeo-Diaz doubled the Cape of Good Hope, and sailed along the Kafir coast as far as the Great Fish River in two small vessels fitted out by João. In 1495 Manoel succeeded João, and in his reign Vasco da Gama (q. v.) made his famous voyage to India, and Cabral discovered Brazil (1500). The great navigator Magalhaens, though he entered the service of Karl V., was a Portuguese. The cradle of discovery and home of commerce, P. at this period attained its greatest intellectual eminence. Its plate and goldsmith's work had great artistic value, its Burgundian Gothic style in architecture was noted for nobility of proportion and richness of tracery, and, above all, its glory had been sung in the *Lusíads* of Camoens. When João III. ascended the throne in 1521, P. was one of the first kingdoms in Europe, and Lisbon one of the wealthiest cities; but in 1536 the Inquisition was put

in force against the Jews, and this was followed by the first admission of the Jesuits. The expulsion of the rich enterprising Jews was a deadly blow to industrial prosperity, but the rapid decline of the nation was due in a greater degree to the bigotry and ambition of the Jesuits. Under their influence João's grandson Sebastian, a youth of fourteen years, started on a Quixotic expedition to Africa against the Infidels, which ended in the defeat of the Portuguese and the loss of their king at Alcazar in 1578. Cardinal Henrique, Sebastian's uncle, reigned only till 1580, and his death marks the extinction of the old Burgundian line. The nation clung to the hope that Sebastian was still alive in the hands of the Infidels and would return, but meantime numerous aspirants were struggling for the throne, and eventually Philip II. of Spain annexed P. to his own dominions. P. was now worse ruled than ever, and was burdened with much of the expense and misery of the Spanish wars in Germany and the Netherlands. Moreover, as a penalty of its identification with Spain, it lost to the Dutch great part of its foreign possessions. But at last, after a shameful union of 60 years, P. regained its liberty by a conspiracy which placed João de Bragança, a descendant of the royal family, on the throne in 1640. After a war which lasted till 1668, Spain ceded all claims to P. by the treaty of Lisbon. The Dutch also restored Brazil to the Portuguese, and in 1683 a commercial alliance was entered into with England; but nothing could bring back to P. her old prosperity. In the reign of José I., the minister Pombal (q. v.) effected certain reforms and procured the expulsion of the Jesuits in 1759. But P. lapsed into mal-administration during the reign of Maria Isabella (1777-89). In the war between France and Spain, João VI. was ordered by Napoleon to seize the British merchandise in P., and on his refusal was declared to have forfeited the throne. He solicited the protection of England, and, setting sail with his family, transferred the seat of government to Rio Janeiro in 1807. The French occupied P., but were forced to withdraw on their defeat at Vimiera by the English and Portuguese allies, under Sir Arthur Wellesley, in 1808. Wellington's defence of the triple lines of Torres Vedras against Marshal Massena (1810) completed the deliverance of P. from Napoleon's tyranny. João continuing to reside in Brazil, a revolution took place at Lisbon in 1820, when without bloodshed a constitution was proclaimed in place of the old absolute monarchy. In 1821 João returned, but was not allowed to land till he had ratified the acts of the Cortes. Adopting a liberal policy, he accepted the constitution, and in 1825 acknowledged the independence of Brazil, under his brother Dom Pedro, retaining himself merely the imperial title. João was succeeded in 1826 by Pedro IV. (q. v.), who organised the state and then abdicated in favour of his daughter, Doña Maria da Gloria. In 1828 Miguel (q. v.) the 'absolutist,' uncle of Doña Maria, usurped the throne, and plunged P. into three years of anarchy. In February 1832 Dom Pedro landed with a strong force (partly English), and, after a feeble resistance, Miguel capitulated, and was allowed to leave the country. Pedro died in 1834, and Doña Maria, who had assumed royal authority, married Prince Ferdinand of Saxe-Coburg in 1836. The disorders of her reign were checked, but only for a time, by the armed intervention of the great powers in 1847. As a result of one of many insurrections, the Marquis de Saldanha, grandson of Pombal (died in London 21st November, 1876), was appointed minister, but the popular hero succumbed to court influence. Maria died in 1852 and her son ascended the throne as Pedro V. On the death of the latter in 1861 his brother became king as Luis I. Under constitutional government, P. remains tranquil and prosperous. In recent years, P. has taken honourable part in the work of African exploration. See the historical works of Fortia D'Orbay and Mielle (10 vols. 1828-29), Schäfer (5 vols. 1836-54), Rebello da Silva (for 17th and 18th centuries, 3 vols. 1860-67), Bollaert (19th c., 1870), and Diniz (6 vols. 1871); also Lavaigne, *L'Espagne et le P.* (Par. 1867), and Latouche, *Travels in P.* (Lond. 1875).

Portuguese Language and Literature. Portuguese, one of the six literary descendants of the *Lingua Romana Rustica*—the so-called Romance Languages (q. v.)—claims for itself seniority in the group, and boasts the title of the 'eldest daughter of Latin.' It is, however, only saved from ranking as a dialect of Castilian, with which its vocabulary is almost identical, and of which it has been described as a weakened and contracted

form, by the possession of certain grammatical peculiarities, the most marked of which, its power of affixing personal endings to the infinitive (*ter, ter-es, ter; ter-mos, ter-des, ter-em*), appears in the oldest monuments of the language. Its seemingly archaic superlative, on the other hand, was a restoration of Sá de Miranda in the 16th c.; and similarly the large admixture of French words, which has misled Sayce into saying that 'Portuguese is more closely related to French than the intervening Spanish,' may be ascribed to the numerous retinue of Henrique of Burgundy, the founder of the monarchy. Though far less mixed than Castilian with Oriental elements, Portuguese, according to Sousa's *Vestigios da Lingua Arabica em Portugal* (Lisb. 1789), contains no less than 270 Arabic and Persian words. Some of these, however, Diez refers to a Latin or Teutonic origin (e.g., *camisa*, 'shirt'), and the remainder all denote either sensible objects or scientific ideas, with the single exception of the interjection *axala*, 'would to God,' from the Ar. *inshá Alláh*. So that it seems that the relations of Islam to Christianity were limited to outward communication, and permitted none of the closer intercourse that had existed between Goths and Romans. Among the distinguishing features of Portuguese are its retention of the Latin *j*, as in *filho* (Sp. *hijo*) from *filius*; its elimination of middle consonants, as *dbr* from *dolor*, and *pai* from *pater*, a process also at work in French; its assimilation of *l* to the succeeding consonants, as *Affonso* for *Alfonso*, or change of it to *r*, as *frasco* for *flasco*; its rejection of the gutturals and harsh aspirants of Spanish, and possession of five nasal vowels (approximately pronounced *ang, eng, ing, oung, oong*) and of five double consonants, *ch, lh, nh, ph, and rr*. Bearing these differences in mind, a student who is familiar with Spanish will find but little difficulty in deciphering the meaning of Portuguese, as may be seen by comparing the Spanish version of Luke xv. 12, 'Padre, dame la parte de la hacienda que me toca. Y él repartió la hacienda,' with the Portuguese, 'Pai, dá-me a parte da fazenda qua me toca. E elle repartio a fazenda.' Portuguese is spoken, with certain dialectic modifications, in Brazil and parts of the E. Indies and Western Africa; whilst of its home dialects the most strongly marked are those of Beira and Minho. There are English-Portuguese grammars by Vieyra (13th ed. Lond. 1869), J. D. D'Orsey (Lond. 1868), and A. Elwes (Lond. 1877), and dictionaries by J. de Lacerda (2 vols. Lisb. 1871) and Vieyra (Par. 1873). The first part of a dictionary, embracing the dialects of Brazil, Cape Verde, &c., and to be concluded in 3 vols., was published at Lisbon by the Academia Portugueza on 1st January 1878. See Diez, *Grammatik der Romanischen Sprachen* (3d ed. 3 vols. Bonn, 1870-71).

Throughout the whole course of its history Portuguese literature has of necessity been closely associated with that of Spain. Portuguese poets have written in Castilian, and Spanish poets more rarely in Portuguese, whilst for nearly a century the language of the greater seemed likely wholly to supplant that of the smaller country. Nevertheless Portuguese writers have been strongly affected by other than Spanish influences, and have successively taken for their models the literatures of Provence, of Italy, of France, England, and modern Europe generally. That a native ballad poetry existed prior to the coming of Henrique of Burgundy is probable, though all traces of such have long since disappeared. He, fresh from the land of the Troubadours, brought with him their courtly and artificial poetry, before which the homely utterances of the people would soon be hushed; and the earliest monuments of Portuguese literature that have come down to us are the *Cancioneiros* or song-books, composed in the Gallican dialect, but plainly formed on a Provençal pattern. Of these, the most ancient is the *Cancioneiro d'el rei Dom Dinis* (circa 1300, latest ed. 1878). To a somewhat later period belongs the *Amadis de Gaul* (q. v.) of the Portuguese Lobeira, which, if really written in its author's native speech, is the first known prose composition in Portuguese, and also one of the few works that are famous beyond the Lusitanian frontier. During the 14th and 15th centuries the muse of Portugal continued to dwell in courts, enjoying the patronage of Afonso IV. and his half-brother Pedro, the reputed author of the *Cancioneiro do Real Collegio dos Nobres* (ed. by Varnhagen, Madr. 1849), and after them of the two Joãos. From the scanty remains of Marcias el Enamorado (circa 1425), and from Resende's *Cancioneiro Geral* (edited by Kausler, 3 vols. Stuttg. 1846-52), it seems that trifling lyrics and brief didactic pieces formed the staple productions of this age, its chroniclers—Lopez, Azurara,

Pina, &c.—being few and far between. The epochs of Portugal's political and literary glory were identical. As the age of the great English navigators was also the age of Shakespeare and Ben Jonson, so Da Gama and Magalhães were contemporaries of Bernardin Ribeyro, who restored the eclogue to modern poetry and wrote prose romances, half pastoral, half chivalrous, entitled *Alenina e Moga*; of Sá de Miranda (1495-1558), author of sonnets, pastorals, poetical epistles, and a couple of 'erudite' comedies; and of Antonio Ferreira (q. v.), whose tragedy, *Inez de Castro*, was only preceded by the Italian Trissino's *Sofonisba*. These, with Caminha, Bernardes, and Cortereal, formed the Coimbra school of courtly poetry, and drawing their inspiration from the Italian writers of the Renaissance, had little influence on the national mind. From the nation's self arose the greatest poets—Camoens (q. v.), of whose *Lusiads* an English verse translation by Aubertin, more faithful than Meikle's, has just been published with the text (2 vols. Lond. 1878); and Gil Vicente (q. v.), the model of Calderon and Lope de Vega, to read whose *autos* and *farças* Erasmus is said to have mastered Portuguese. Had he known their contents, he would perhaps have spared his pains, for with their grotesque jumble of Venus and the Virgin, St. Peter and Bacchus, they can hardly but strike the foreign reader as ridiculous. To the first half of the 16th c. also belongs the best historian—João de Barros (q. v.). The field of Alcazar (1578) proved fatal alike to Portuguese arms and literature. Thenceforth the cobler Pandarra might vainly prophesy the resurrection of his country's greatness, or Brandan in his *Elegiada* (1588) mourn over its decay, but most of their fellow-poets either wrote in Spanish, or gave themselves up to slavish imitation of the Cordovan Gongora (q. v.) with his eternal loves of Polyphemus; and the only national productions were Castelobranco's pedantic *Afonso Africano* (1611), the pastorals of Oriente, Lobo, and Tagarro, a few *autos* and *entremeses*, and the sermons of the great Jesuit missionary Vieira (1608-97), published at Lisbon (15 vols. 1748). Even after the revival of political liberty Spanish plays continued to rule the Portuguese stage, and the works of Sousa (see FARIA Y SOUSA), Bacella, Bahia, and the nun Violante do Ceo are stuffed with that 'Gongorism' which Andrade alone had wit and courage enough to satirise. The adoption of French Classicism as a new standard of taste was inaugurated by the foundation of the Academia Portuguesa (1741), and by Ericeyra's *Hewiquilla* (1740), a wearisome epic based on Boileau's style, in which its author sought, but failed, to combine the beauties of Homer, Virgil, Lucan, Ariosto, and Tasso. Down to the present century, Gallomania continued to be fostered by the Portuguese Arcadia, a literary coterie comprising Garçao, Dimiz, the barber Quita, the lyricist Nascimento (1734-1819), and Manoel de Bocage (1771-1805), the mannerisms and extravagances of whose idylls, sonnets, and epigrams are redeemed by fiery patriotism and passionate earnestness. By the Peninsular War Portugal was brought into close contact with England, and through translations became acquainted with several of our leading writers; and Scott and Byron have exercised an unmistakable influence over many of her later poets and novelists. The best known of these are the dramatist Almeida-Garrett (1799-1834), a complete edition of whose works appeared at Lisbon (16 vols. 1854-55); Alexandre Herculano (1810-77), author of religious and political poems, and of an able *Historia de Portugal* (4 vols. Lisb. 1851); the lyricist and romance writer Palmeirim (born 1825), and Ferreira, whose epic *D. Jayme* (Lisb. 1862) ranks high in the estimation of his countrymen. In the field of science the most celebrated writers are Soares, on medicine; Giraldes, on geography; Freitas, Da Silva, and Castro, on politics; and Gonçalves and Ferreira, on philology. But the printing-presses of to-day teem chiefly, it must be owned, with translations of the worst French novels, with reprints of ancient mystics, or with religious and anti-religious pamphlets; and their most creditable productions are the renderings of Shakespeare's plays, on which Dom Luis, the reigning king, is at present occupied. See Sismondi, *Literature of the South of Europe* (Eng. trans. by Roscoe, 2 vols. Lond. 1846); Lopes de Mendoga, *Memorias de Literatura Contemporanea* (Lisb. 1855); F. Wolf, *Frohen Portugiesischer und Catalonischer Volksromane* (Vien. 1856), and *Studien zur Geschichte der Portugiesischen Nationalliteratur* (Berl. 1859); Francisco da Silva, *Diccionario Bibliografico Portuguez* (7 vols. Lisb. 1858-62); F. Dietz, *Ueber die erste Portugiesische Kunst und Hoffpoesie* (Bonn, 1803); and the *Historia dos Estabelec-*

mentos Scientificos, Litterarios e Artisticos de Portugal (vol. v. Lisb. 1876).

Brazilian literature, an offshoot of the Portuguese, though commencing as far back as the 16th c. with the poet Panto, remained in complete vassalage to the mother country down to the close of the succeeding century, when the historical writings of Rocha Pitta, and the poems of Santa-Maria and the brothers Mattos, discovered the first germs of native colouring and independent thought. The epic *Uruguay* of De Gama (1740-95) and *Caramuru* of Durão (1737-84), describing the races of America, denote the progress of the movement to nationality, which gained an immense impulse from the removal of João VI. to Rio de Janeiro (1808), and the elevation of Brazil into a separate kingdom. Since 1822 a school of writers has arisen, full of the youth and ardour of a New World, and striving successfully to free themselves from the trammels of the Old. Conspicuous among them are Macedo (born 1820), novelist and playwright; Diaz (1823-64), of whose melodious *Cantos* a complete edition appeared at Leipzig (2 vols. 1865); Araujo Porto-Alegre (born 1806), author of the epic *Colombo* and lyrical *Brasilianitas*; and Magalhães, whose epic *Confederação dos Tamoyos* (Rio de Janeiro, 1857), presents a singular blending of Romanticism and national feeling. The best Brazilian historians are Da Silva and Varnhagen. See Wolf, *Le Brésil Litteraire* (Berl. 1863); and Da Silva, *La Littérature Portugaise* (Rio de Janeiro, 1866).

Portulaca ceæ, or **Portula'ceæ**, is a natural order of herbs, or rarely small shrubs, in close affinity to the extensive order *Caryophyllaceæ*. It consists, according to the *Genera Plantarum*, of 125 species, chiefly American, but some cosmopolitan. In Britain it is represented by the little *Montia fontana*, or water-blinks, common in ditches and grassy swamps. Besides Purslane (q. v.), they possess no particular properties or uses. Some, however, are sufficiently ornamental or botanically curious to warrant cultivation, e.g. Chilean or Californian species of *Calandrinia*, *Claytonia Virginica*, from the United States, &c. Two species of *Claytonia* are gradually becoming established as weeds in England, and already find a place in British Floras.

Port Wine is the produce of the Douro district of Portugal, and it takes its name from Oporto, the place of shipment. Pure P. W. is rich and full flavoured, slightly astringent, with a pinky colour; it requires some years to mature, and with age becomes tawny—alcoholic strength, 16 to 20 per cent. Till of late years, however, most of the P. W. shipped to England was largely adulterated with a purple compound called 'jeropiga,' containing elderberries, syrup, and brandy. Adventitious spirit, in the proportion of from 3 to 17 gallons to the pipe of 115 gallons, is added to all export P. W., to hasten its marketable condition by checking fermentation, and to promote keeping qualities. The vintage takes place at the close of September, and extends over a fortnight. The P. W. trade was established in 1678. For some years thereafter the shipment did not exceed 600 pipes; in 1747 it reached 17,000 pipes, and during the period subsequent to 1757, when the trade first became a monopoly, the average annual shipment was 33,000 pipes. The second monopolising company was abolished in 1867, and since then the exports have gradually increased, culminating in 60,549 pipes in 1875.

Posaune, a reed organ-stop. The pipes in connection with the manuals are generally metal, 8 feet in length; those in connection with the pedals, metal or wood, 16 or 32 feet in length. The tone is peculiarly rich and resonant.

Poseidon (connected with Gr. *potos, pontos, potamos*) is in Greek mythology the supreme god of the sea. He was a son of Kronos and Rhea, and a brother of Zeus, Hades, Hera, Hestia, and Demeter. From his palace in the depths of the sea, near Ægæ in Eubœa, he rode in his chariot over the waves, drawn by horses with brazen hoofs and golden manes, and bearing a trident or three-pointed spear, with which he would rend rocks, produce earthquakes, and raise or lull storms. A Life of P. in German by Deetz appeared at Leipzig in 1876. In Homer P. appears as the equal of Zeus in dignity, though his inferior in power. He usually submits to Zeus, but resents his threats, and refuses to be coerced. He stands in the same relation to Nereus as Phœbus to Helios. P. was said with the aid of Apollo to have built the walls of Troy for Laomedon, on whose refusing

the promised reward, he sent a sea-monster, which was about to devour Laomedon's daughter, when it was slain by Hercules. In the war of Troy P. sided with the Greeks, but the *Odyssey* describes him as the enemy of Odysseus, who had blinded Polyphemus, his son by the nymph Thoosa. P. was held to have created the horse in a contest with Athena as to which should bestow on mankind the more useful gift. He was believed to have taught the use of the bridle, and to have originated horse-races. P. appears in numerous legends. In the struggle with the giants he aided Zeus, and pursuing Polybotes, hurled on him the Isle of Cos. He crushed the centaurs under a mountain in the island of the Sirens. At first a rival of Zeus for the hand of Thetis, he retired when Themis told him that Thetis' son would be greater than his father. His worship extended over Ionia, Greece, and Southern Italy; in his honour horse and chariot races were held on the Corinthian Isthmus, and near Mycale the Pan-Ionic festival. P. is often represented in groups with his wife Amphitrite (the mother of Triton), tritons, nereids, dolphins, &c.

Posen, a province of Prussia, bounded N. by Preussen, W. by Brandenburg, S. by Silesia, and E. by Russian Poland. Area, 11,126 sq. miles; pop. (1875) 1,606,084. The S. is a continuation of the Upper Silesian mountain-land, rising to 722 feet, and from this the land slopes N. to the valley of the Netze, which, as well as the Prosna and Obra, is an affluent of the Warthe. The greater part of P. is well cultivated, and lies in the level basin of the navigable Warthe, but lakes abound, there is much marsh land, and 455 sq. miles are barren plain. Cattle-breeding and agriculture are the main occupations of the people, and the principal products are wheat, rye, oats, barley, hops, wood, wool, hides, tallow, honey, and wax. The industries include weaving, brewing, distilling, and the manufacture of furs and leather. A salt mine was opened at Wapno in 1872, and operations have recently been commenced on another at Inowracław. Education in P. is lower than in any other province of Prussia. In 1871, of 303,685 children bound to attend school, only 250,372 actually did so. In 1874 there were in P. 2294 common schools, three Catholic, and as many Protestant seminaries for teachers, four first-class 'Real' schools, thirteen higher girls' schools, three 'progymnasien,' and thirteen 'gymnasien.' In 1871 there were in P. 1,009,491 Catholics, 511,292 Protestants, and 61,892 Jews. P. is a part of the Catholic archbishopric of P. and Gnesen, the see of which has remained vacant from the deposition of Ledochowski (April 15, 1874). P., originally a part of Great Poland, was at the partitions of Poland in 1772 and 1773 taken possession of by Prussia, belonged 1807-18 to the Grand-Duchy of Warsaw, and in 1815 was restored to Prussia at the Vienna Congress. From that date, and particularly from 1830, the Prussian Government has constantly striven to Germanise P. by encouraging German immigration, and making German the language of the schools. In February 1846 a rising was planned under Mieroslawski, but the attempt miscarried, and many persons were imprisoned. These prisoners were set free by the Revolution in Berlin (1848), after which the request of the Poles that they should have a distinct national position was nominally granted. On the 26th April P. was divided into a Polish and a German part, and the latter was incorporated with the German 'Bund.' This partition being set aside (February 1850), the whole of P. was in 1866 included in the North German 'Bund,' and in 1871 became a part of the new German Empire. See A. Bock, *Statistisches Handbuch der Provinz P.* (Posen, 1865), and H. Wuttke, *Städtebuch des Landes P.* (Leips. 1864-66).

Posen (Polish, *Poznań*), capital of the Prussian province of the same name, is a fortress of the first rank, situated at the confluence of the Cybina with the Warthe, 102 miles N. of Breslau by rail. Among its fifteen Catholic churches are the Cathedral (1775), in the 'Golden Chapel' of which are bronze statues by Rauch of Mieczysław I. and Bolesław I., and the Maria Magdalena or Stanislaus' Church, 175 feet long by 98 broad. P. has also three Evangelical churches, a Greek chapel, and several synagogues, two gymnasia, a first-class 'Real' school, and seminaries for priests and teachers. The town-house (1512-30) is a fine building of Renaissance style. Noteworthy also are the theatre and Raczyński Palace, with a public library of 20,000 vols., and the Government offices and archiepiscopal palace. The fortifications were commenced in

1828, and the chief forts are named *Wilda*, *Rochus*, and *Winiary* (the citadel). P. has a large trade in corn, and manufactures linens, woollens, machinery, leather, furniture, oil, tobacco, brandy, and beer. It was made a bishop's see by Otto I. in 968, and in 1253 became a city of the Empire. Here Napoleon I. concluded peace with Saxony (11th December 1806).

Poses Plastiques, another name for *Tableaux Vivants* (q. v.).

Posilipo, the hill which bounds Naples on the W., derives its name from Pausilypon ('*sans-souci*'), the villa of the epicure Vedius Pollio, afterwards the property of Augustus. It is chiefly remarkable for two ancient tunnels of unusual size. The first, which is called the Grotta di P., is upon the Strada di Piedigrotta, is 757 yards in length, 21 to 32 feet in breadth, and of a height varying from 20 to 87 feet. It is mentioned by Seneca and Petronius, and probably dates from the time of Augustus. Medieval superstition attributed its origin to magic arts practised by the poet Virgil, whose villa stood at the foot of the hill. The second, situated on the Strada Nuova di P., is known as the Grotto of Sejanus. It is hewn through the rock, and is 990 yards in length. The construction of this tunnel is ascribed by Strabo to M. Cocceius Nerva (B.C. 37). While being recently cleared of rubbish an inscription was found to the effect that the tunnel had been repaired by the Emperor Honorius about 400 A.D.

Positive Philosophy. See **COMTE**.

Positive Printing (in Photography) is the process pursued in multiplying prints on paper from a negative on glass. Albuminised paper—the kind generally employed—may be readily procured from any respectable dealer; it is rendered smooth and structureless on one side by a coating of albumen impregnated with chloride of sodium or ammonium. The paper is sensitised in the 'dark room' by floating on a solution of nitrate of silver (60 grains to 1 ounce of water), by means of which a chloride of silver surface, which blackens on exposure to light, is obtained. When dry, the sensitive paper is placed in close contact with the collodion side of a negative in a *printing* or *pressure frame* and exposed to sunlight. The printing-frame is simply a shallow oblong box with a plate-glass front and a movable wooden back, hinged across the centre, and provided with transverse bars with screws by which it may be fastened down closely. An image of proper darkness being obtained, allowing for a reduction in the depth of colour in subsequent operations, the print is taken from the frame and washed to remove free nitrates, and it is then toned to a rich hue in a gold salt bath (terchloride of gold, 1 grain; bicarbonate of sodium, 4 grains; water, 6 oz.). In this bath the metallic silver of the print is replaced by finely-powdered gold of a rich purple tint. The print is next washed in water, and is afterwards transferred to the fixing bath (hyposulphate of sodium, 4 oz.; water, 1 pint), in which the unaltered silver is dissolved, and after frequent washing in water the print is dried and mounted. Silver printing, as the process just described is called, has of late years been superseded to a considerable extent by carbon or pigment printing, by which greater permanence is ensured (see **PHOTOGRAPHY**), but for ordinary photographic prints it is still largely practised. More recently some progress has been made in platinum printing, and what has been accomplished in this direction augurs well for the employment in the future of the most stable metals in P. P. Prints in platinum are obtained by washing the photographic paper with chloride of platinum and ferric oxalate; and under the action of light the latter substance is reduced to the ferrous state, with the formation of a feeble image. The paper is then floated on a neutral oxalate of potash, which instantly precipitates metallic platinum on the ferrous oxalate image, with the effect of intensifying it to a rich warm black velvety colour. The print is fixed by removing free ferric oxalate with a weak solution of oxalic acid, which at the same times purifies the whites, and washing in water concludes the process.

Posse Comitatus, the whole power or people of the county, which the sheriff may summon to his aid for the maintenance of the public peace, and for the pursuit and seizure of felons.

Possession (in Law). Mere P., without a written title, conveys no right to real property. But the ownership of a personal thing creates a presumption of right, which any other

claimant will require to overturn, by proving that the article was once his, and showing how he came to lose P. Hence, when an article whose ownership is in dispute has been taken from the holder by force or fraud, the judge will order it to be restored before entering on the question of right. Any one trying to get P. by force may be opposed by force; but when P. is lost by force or fraud, the original holder must reclaim judicially. See IMMEMORIAL USAGE, PRESCRIPTION, LIMITATIONS, STATUTE OF.

Post Captain (in the British navy), a title now disused, but formerly applied to a captain properly so called, as distinguished from a commander, frequently called captain by courtesy.

Postern (Old Fr. *posterne*, now written *pôterne*; Low Lat. *posterna*, *posterula*, from *post*, 'behind'), a small door affording private entrance or egress at the back of an enclosed building. In fortification, the P. is the vaulted passage, closed by a gate, from the ditch to the interior of a fortified place.

Post-Horn, a wind instrument formed by a simple metal tube.

Post'ing, travelling along the public road with hired horses, either with or without carriages. As a means of conveyance, P. has been almost entirely superseded by stage-coaches and railways. On the Continent of Europe P. is generally a Government monopoly. See POST OFFICE.

Postique (Fr. *postiche*, 'superadded', Ital. *posticcio*, *apposiccio*, from Lat. *appositum*, 'placed beside'), in sculpture, an ornament *superadded* after the completion of the original design.

Post Nuptial Contract is a pecuniary settlement between husband and wife after marriage. It is effectual if the husband be solvent at the time; but it is ineffectual against creditors at the date when the contract is made.

Post Ob'it Bond is a bond over a reversionary interest in consideration of an immediate advance of money. The bond is valid unless fraudulent. See HAND.

Post Office, a place for the transaction of postal business, such as the receiving and distribution of letters, newspapers, and book-packets; and sometimes also for the transmission of telegrams, granting of money-orders, and banking of savings with Government. In a larger sense, the P. O. is one of the most important departments of the Civil Service, and the transaction of its business is the most extensive and successful undertaking which has ever been carried on by the State. In its present position, it is emphatically a 19th c. institution, a product of the age of steam, electricity, and scientific invention, and in the last hundred years the postal system has made greater strides than in all its history since the days of Cæsar. The name *post* (Lat. *positum*, 'placed') arises from the posts placed along the public roads in ancient states, at which mounted couriers were in readiness to convey imperial edicts from hand to hand. Such posts were known in the Persian and Assyrian monarchies. Communication between ancient Rome and its conquered provinces was kept up by posts, fixed at short distances along the leading highways; a larger post, with full equipments and guards, marking the termination of each day's journey. A similar system is described by Marco Polo as having existed on a gigantic and elaborate scale in China in the 14th c., and that more primitive nations have found posts a necessity is proved by the fact that the Spanish invaders of Peru in 1527 discovered a regular organisation of the kind along the great road from Quito to Cuzco. With the fall of the Roman Empire, posts in Europe fell into disuse. Karl the Great made a temporary establishment of stations for couriers about 807, which was not revived in France until, in 1464, Louis XI. organised a system of mounted posts, 4 leagues apart, for the conveyance of letters of state and public despatches. Private letters in those days were sent by special messengers, and no national arrangements for their transmission were made in France till 1524. The University of Paris formed in the 13th c., and continued for 400 years, a special corps of messengers for its teachers and students, and many of the large educational and commercial institutions of Europe followed its example. A regular system of posts was established between the Hanse towns in the 13th c. In 1516 Franz von Thurn und Taxis instituted communication between the extremities of Karl V.'s dominions, and the successors of his house, extending his system all over Germany, acquired a monopoly of

the posts in that country which they retained till 1806. In England the state-messengers were anciently called nuncii, and some posts for their accommodation were in existence as early as the reign of King John. Edward IV. organised a system of relays between England and Scotland, to convey the news of his wars, but this was only a temporary expedient. Under Henry VIII., Brian Tuke was appointed to the newly created office of Master of the Postes, his duties being the adequate furnishing of post-horses. A complete organisation of the postal system was not made until the reign of James I., who extended the sphere of the postmaster's home labours, and also appointed a postmaster for foreign parts. A post between London and Edinburgh, to make the double journey in six days, was started in 1635, the postmasters on the route being bound to supply horses at 2½ a mile. In 1649 Edward Prideaux, the Attorney-General for the Commonwealth, established a P. O., with arrangements for the weekly conveyance of letters to all parts of the kingdom. The rates for a single sheet were fixed about that time at 2d. for 80 miles, 4d. for from 80 to 140 miles, 6d. for above 140 miles, and 8d. for letters for the Borders and Scotland. In 1656 they were altered to rates ranging from 2d. for 7 miles to 14d. for more than 300 miles, and although 150 Acts relative to postal affairs were passed in the interim, these charges were not materially changed till 1838. Government officials and members of Parliament had their letters franked, a privilege which was much abused. A post set up in London in 1685 for delivery of letters in the metropolis at 1d. each, first as a private speculation, was subsequently taken on hand by Government, and continued separate from the General P. O. till 1854. A P. O. for Scotland was established in 1695, and a penny post for Edinburgh in 1766. In 1710 the postal service of the British Empire was consolidated, and branches of the General P. O. in London were formed at Edinburgh, Dublin, and New York. Until 1784 the conveyance of letters through the post was often sluggish and unsafe. Post-boys lazily plodded along at the rate of 3 miles an hour, and the robbery of the mails was alarmingly frequent. Consequently the public frequently availed themselves of the services of private carriers and coaches, particularly when letters were pressing, or when they contained valuables. This system was remedied on the recommendation of John Palmer, who, when a theatrical manager at Bath, urged the employment by the P. O. of well-protected mail coaches. His plan was adopted by Government; the first mail coach ran between London and Bristol on August 24, 1784, and Palmer was appointed comptroller of the P. O., in which he proved himself a valuable and efficient organiser. To his efforts the increase of revenue of the P. O. from £150,000 in 1784 to £1,600,000 in 1815 (at about which figure it remained for twenty years) was mainly due. But by far the greatest postal reform is due to Rowland Hill (q. v.), whose scheme of a uniformity of tariff for all distances in the United Kingdom was undertaken by Government under his care in 1840, the inland postage rate for a single half ounce being fixed, after an experimental charge of 4d., at 1d. as advocated by him. His reforms also included the abolition of franking, with the exception of petitions to Parliament, and prepayment by stamps, a double payment being levied on the delivery of unpaid letters. Penny postage gave an immense impetus to trade, and enormously increased the conveniences of private correspondence. The anticipated temporary falling off of the revenue soon disappeared, and the P. O. became a substantial source of income to the nation, while there can be no doubt that the scheme of Rowland Hill has also indirectly increased the revenue to a great extent. In the last forty years the development of the postal system has been marvellous, and this country has taken the lead in all important postal improvements. In 1838 the Money-Order Office became an official department of the P. O. For about forty years previously a money-order business had been carried on by P. O. officials as a private speculation, but in addition to the high commissions levied (8d. per pound), a stamp duty of 1s. was imposed if the order was above £2, and letters containing money-orders were charged double postage. These burdens were removed on the transference of the business to Government, and the commissions on orders were substantially reduced. The introduction of the railway system prodigiously accelerated the speed and aided the regularity of postal transmissions in this country, while the contracts entered into between Mr. Cunard and other great ship-owners for the conveyance of foreign mails produced most beneficial results, so that now there is communication with every

portion of the habitable globe by swift mail steamers. Postage stamps were introduced in 1840, the system being adopted in 1848 by France, and in course of time by all European countries. In 1848 the system of sorting letters in railways and steamers as an economy of time was begun, and in the same year the transmission of books by post was undertaken. Henry Archer's invention for perforating sheets of stamps was purchased in 1852 for £4000. Pillar letter boxes were introduced in 1855. In this year also London was divided into ten postal districts, eight of which are now in existence, viz., Eastern Central (E.C.), Western Central (W.C.), Western (W.), Eastern (E.), North (N.), North-Western (N.W.), South-Western (S.W.), and South-Eastern (S.E.). By arrangement with the National Debt Commissioners, P. O. savings banks were opened in 1861, and the transaction of Government life insurances and annuities for small amounts was begun in 1865. The P. O. acquired power to purchase all the telegraph wires in the country in 1868, and commenced telegraphic business in 1870. Halfpenny post-cards came into use in 1870, and sample post was virtually abolished in 1871 upon the reduction of charges for heavy letters and newspapers.

The *British Postal Guide* published quarterly (price 6d.) by command of the Postmaster-General, contains the chief regulations of the P. O., and is full of valuable information as to rates of postage, &c., the despatch of mails, and other matters. Local postal guides are also published in the principal towns of the kingdom. Some of the more important points in the *British Postal Guide* for April 1878 may be here very briefly summarised.

Inland Letters.—(1) The present rate of postage for a letter not above 1 ounce in weight is 1d.; above 1 ounce but not above 2 ounce, 1½d.; above 2 ounce but not above 4 ounce, 2d., and ¾d. additional for each 2 ounce further, till the weight amounts to 12 ounce, when each ounce which the letter weighs is charged 1d. (2) If a letter is unpaid or underpaid, double the amount of the deficiency is charged upon delivery. (3) No letter may be above 18 inches long, 9 inches wide, or 6 inches deep.

Post Cards impressed with a halfpenny stamp may be transmitted between places in the United Kingdom with letters printed or written upon the back. The stout cards are sold at 4d. the half-dozen, the thin at 3½d.

Inland Newspapers and Book-Post.—Inland newspapers may be sent through the P. O. for ½d. for each newspaper, but a packet containing two or more registered newspapers is not charged at a higher rate of postage than a book-packet of the same weight. No packet may be above 14 lbs. in weight, 2 feet long, 1 foot wide, or 1 foot deep. The rates for book-post are ¾d. for every 2 ounce, but no book-packet may be above 5 lbs. in weight, 18 inches long, 9 inches wide, or 6 inches deep. Book-packets may contain any number of separate books or other publications, and any quantity of paper printed, written, or engraved upon, but not any communication of the nature of a letter. Circulars, however, *i.e.*, that is letters which, according to internal evidence, are being sent in identical terms to several persons, may be sent by book-post. Newspapers and book-packets may be posted either without a cover or with a cover open at both ends.

Colonial and Foreign Letters, Newspapers, &c.—A table of rates for these, and a calendar showing the mails, are given in the *British Postal Guide*. A postal conference of several nations was held on the invitation of Germany at Bern in 1874, in order that some uniformity in foreign rates should be secured, and a treaty was carried into operation on 1st July 1875. The postal union now includes (a) Europe, the United States, Egypt, and some other places, the rates to those countries being 2½d. per ¼ ounce for letters, 1d. per 2 ounce for book-packets, and 1d. per 4 ounce for newspapers; and (b) British India and most European colonies, for which the rates are 6d. per ¼ ounce for letters, 2d. per 2 ounce for book-packets, and 1d. per ounce for newspapers, but an extra charge is made for transmission *via* Brindisi. Prepayment is compulsory in some cases of foreign postage, and optional in others. When it is optional, however, an extra charge is made for unpaid letters upon delivery. There is a pattern and sample post to some colonies and foreign countries, and a special Indian parcel-post (the rate of the latter being 1s. per ounce). The rates for colonial and foreign post cards are in all cases half the rates of single letters.

Registration.—The fee for registration of a letter, newspaper, or book-packet passing between any two places in the United Kingdom is 2d. The same fee is payable for a registered letter to

most colonies and foreign countries. The Postmaster-General is not by law responsible for the safe delivery of registered letters or packets, but he is prepared to make good the contents of a registered letter lost while passing through the British P. O. to the extent of £2 in certain cases, provided the conditions as stated in the *British Postal Guide* have been observed. This regulation came into force on 1st January 1878, and was made in order that the public might avail themselves of registered letters for the remittance of small amounts, in preference to money-orders, there having been in the year ending 31st March 1877 a loss of £10,000 on the money-order business of the P. O.

Telegrams.—The rates for inland telegrams are 1s. for the first 20 words and 3d. for every additional 5 words, the names and addresses of the sender and receiver not being counted. Telegrams may be repeated at half cost. The charge for press telegrams is 1s. for each 100 words during the night (6 P.M. to 9 A.M.), and for each 75 words during the day, with an additional 2d. per 100 or 75 words for the same telegram to every additional address. The regulations as to foreign telegrams are founded upon the St. Petersburg Convention of 1875, and will be found with the rates for each country in the *British Postal Guide*. Business firms and private persons may rent private wires from their residences to a telegraphic office at from £5 to £8 per mile per annum.

Money-Orders on post offices in the United Kingdom are granted at the rate of 2d. for sums under 10s., 3d. for sums of 10s. and under £2, and 1d. extra for each additional pound. Money-orders may also be issued payable in France, Germany, Italy, Belgium, Holland, Denmark, Norway, Switzerland, the British Colonies, &c., at rates varying from 9d. to 4s., according to the place and amount of the order.

P. O. Savings Banks are established at many post offices. Deposits of 1s. or any number of shillings are received, but no one may deposit more than £30 in one year, or make a further deposit when the total amount reaches £150. Interest is granted at the rate of 2½ per cent. per annum (¾d. for each complete pound in each month), until a deposit accumulates to £200, when interest ceases to be allowed.

Government Insurances and Annuities.—Under Act 27 and 28 Vict. cap. 43 the Postmaster-General may insure lives between the ages of 16 and 60 for not less than £20 or more than £100, and may also grant immediate or deferred annuities of not more than £50.

Miscellaneous business for the Inland Revenue Department is transacted by the P. O., such as the sale of receipt stamps and the granting of dog, gun, game, and other licences.

The P. O. is presided over by the Postmaster-General, who must be a member of either House of Parliament. The office changes with the Government, being given to a supporter of the Ministry in power, who has sometimes a seat in the Cabinet. The General P. O. in St. Martin's le Grand was built in 1825-29, and the buildings for the telegraph department 1869-73. The principal departments of the P. O. are the secretary's office, the solicitor's department, the telegraphing engineering department, the receiver and accountant-general's office, the money-order office, the savings banks department, the circulation department (divided into the controller's office, the inland branch, foreign branch, newspaper branch, the travelling P. O. branch, and registered letter branch), and the returned letter office. The staff of officers attached to the head offices at St. Martin's le Grand amounts to 5500 persons. 400 mail bags leave London daily, having an average weight of 280 cwt. (219 cwt. being newspapers). The night mails leave the General P. O. at 8 P.M., and arrive at all important towns in England and Wales, and also at Edinburgh, Glasgow, and Dublin, in time for delivery next morning before nine o'clock. In the night mails the sorting process is carried on, machinery for exchange of letter-bags at the stations along the route, while the train proceeds at its usual speed, being attached to these travelling post offices. The number of pouches delivered daily in this manner in 1877 was 521, while 478 were received. There is a mail train service to France, which admits of the delivery in Paris of the English correspondence by the first distribution, and the despatch of letters thence to the provinces by the morning mails. The arrangements for deliveries in London are the most complete in the world. Twelve deliveries are made daily in the Eastern Central District, and eleven within the town limits of each of the other districts. According to the 23d Report of the Postmaster-General for the year ending 31st

March 1877, it was stated that there were at that date 13,447 post offices in the United Kingdom, of which 896 were head offices, and 10,724 road letter boxes, the number of postal receptacles being thus 24,171, as compared with 4500 before the introduction of penny postage. There were 3734 post offices for telegraphic business, in addition to 1636 telegraph offices at railway stations, 5498 offices for money-orders, and 5448 offices to which savings banks were attached. The employees of the P. O. numbered 45,024, of whom 11,654 were in the telegraph department. Returned letter offices were attached to the post offices at London, Manchester, Liverpool, Birmingham, Leeds, Edinburgh, Glasgow, and Dublin. The General P. O. for Scotland is at Edinburgh, and for Ireland at Dublin.

The following table shows the estimated number of letters, post-cards, book-packets, and newspapers which passed through the post in 1876, as also the rate of increase on the previous year, together with the proportion of letters to population:—

	Number of Letters in 1876.	Increase p. cent. on No. in 1875.	Number of Post Cards.	Increase per cent. on 1875.	Number of Book Packets and Newspapers.	Increase per cent. on 1875.	No. of Letters per head.
England and Wales, . . .	856,042,400	1.1	78,412,100	6.9	241,866,100	6.7	35
Scotland, . . .	91,120,700	0.2	9,640,100	4.7	32,778,100	1.09	26
Ireland, . . .	71,792,100	1.7	4,883,500	7.5	24,146,600	3.0	13
United Kingdom, . . .	1,018,955,200	1.0	92,935,700	6.7	298,790,800	6.8	31

The total estimated number of newspapers was 125,065,800. The number of letters registered in the United Kingdom during 1876 was 5,095,116, or about 1 registered to 200 ordinary letters. The estimated number of letters delivered in each country during the last ten years is in millions as follows:—

	England and Wales.	Scotland.	Ireland.
1867	640	76	59
1868	673	78	60
1869	683	79	62
1870	704	79	64
1871	721	80	66
1872	737	82	66
1873	756	84	67
1874	804	90	73
1875	847	91	71
1876	856	91	72

In the year ending 31st March 1877, 17,822,921 inland money-orders were issued for £27,516,698, the average value being £1. 10s. 10d.; 145,838 money-orders were exchanged between this country and the colonies, and 211,163 between this and foreign countries. The sums deposited in P. O. savings banks (in 3,116,136 deposits) amounted to £8,982,350, and the total amount of deposits at the end of the year was £28,111,565; 3970 insurance contracts for £315,211 and 6682 contracts for annuities of £82,390 were in force on 31st December 1876. In the fifteen months ended 31st March 1877, the number of telegraphic messages sent was 26,440,439 (England and Wales 13,485,279, London 8,188,107, Scotland 2,905,242, and Ireland 1,861,811), being an increase of 960,000 on the preceding fifteen months. The length of the postal wires in March 1877 was 107,600 miles, 5800 of which were rented by private persons. Among the most curious statistics of the Postmaster-General's Report (1877) are the announcements that 14,346 letters reached the Returned Letter Office during the year destitute of covers; that 78,575 postage stamps were found loose in the different post offices, and 33,100 letters were posted without addresses. In a period of fifteen months the number of letters received in the Returned Letter Office was 5,897,724, and it was found possible to return to the writers or to re-issue nearly nine-tenths of the whole number received. The revenue from the P. O. for the year ended 31st March 1878 was £6,150,000 (an increase of £150,000 from the previous year), and £1,310,000 from the Telegraph Department. The expenditure was £3,185,346 for the P. O., £1,137,000 for the telegraph

service, and £763,000 for the packet service. The net revenue from the P. O. has been quadrupled since 1840. In the packet service the most important home contract is for the mail service between Holyhead and Kingstown, which costs the country at present £85,900 per annum. The most important foreign contract is for packets to the E. Indies, China, and Japan (£430,000). For conveyance of mails to the United States there are three excellent services in each week to New York.

Most foreign countries have modelled their postal system on that of Great Britain. The following table affords a comparison of the number of letters, newspapers, and book-packets passed through the post in the year 1874 in the great powers of Europe and the United States:—

	Number of Letters.	Number of Newspapers and Book Packets.	Number of Letters per head of the Population.
Great Britain, . . .	967,000,000	259,000,000	30
Germany, . . .	697,000,000	359,000,000	17
Austro-Hungary, . . .	313,000,000	104,000,000	8
France, . . .	334,000,000	331,000,000	9
Russia, . . .	63,000,000	24,000,000	1
Italy, . . .	104,000,000	94,000,000	4
United States, . . .	973,000,000	...	23

In all these cases the receipts considerably exceeded the expenditure except in the United States, where the expenditure was \$33,611,000, and the receipts \$27,441,000. The deficit in the United States was due to the low postage on newspapers and book-packets, and to the vast extent of the mail services in America through thinly populated districts.

References.—Besides the works already alluded to, see *Her Majesty's Mails*, by W. Lewins (Lond. 1864); *History of Banks for Savings*, by W. Lewins (Lond. 1866); *Geschichte der Preussischen Post*, by H. Stephan (Berl. 1859); *Notice sur l'Origine du Prix Uniforme de la Taxe des Lettres* (Par. 1872), and *Histoire de la Poste aux Lettres*, by Arthur de Rothschild (Par. 1873). The United States *Official Postal Guide* is published by Houghton & Co. of Boston, by authority.

Laws Regarding the P. O.—Letters may be detained and opened by warrant from the Home Secretary of State, but severe penalties are imposed on any one wilfully detaining or opening a letter addressed to another without this authority. The Postmaster-General is not a common carrier for hire, therefore he is not liable for constructive negligence, and no action can be maintained against him for the loss of bank-notes, bills, or other articles sent by post. Anything not dangerous may be sent by post. Petitions and addresses to the Queen are exempt from postage, so are petitions to Parliament, if sent to a member of either House in an open cover.

Any one illegally conveying a letter incurs a penalty of £5 for every offence, and £100 for every week during which the practice is continued. The sender also incurs a penalty of £5.

Postulate (Lat. *postulo*, 'I demand') is a proposition which must be granted as a preliminary to establishing a system or pursuing an argument. Thus elementary geometry, as developed in the books of Euclid, makes nominally three postulates. In reality, however, it is based on four, since the so-called axiom concerning parallel lines is by no means self-evident, and is strictly a P.

In *Philosophy*, a P. is neither a hypothesis nor a corollary, but is connected intimately with some other proposition which cannot be denied, and which involves the acceptance of the P. Kant's postulates are three:—1st, I am under obligation, and therefore I am free; 2d, Practical reason tends necessarily to the sovereign good, and this supposes continuity of existence; 3d, The sovereign good supposes happiness, and this results from conformity of all things with a will. These three postulates are freedom, immortality, and God. The logical postulates are the laws of thought.

Postures. In the primitive Church four P. were generally practised and allowed in the adoration of God. (1) The usual posture of devotion at their ordinary morning and evening services on week-days and on fast-days was kneeling; but (2) on the Lord's day and the fifty days between Easter and Pentecost standing

was the posture used, as a symbol of Christ's resurrection. (3) Bowing down the head, or an inclination of the body between standing and kneeling, was chiefly used in receiving the bishop's or priest's benediction. (4) Prostration, or lying in the humblest manner on the ground, was the proper posture for extraordinary humiliation, when men had some singular request more earnestly to recommend to God, e.g., when the lapsed were suing for admission to Penance (q. v.).

Potail' (patil), the name used in India, especially in the Bombay Presidency, for the village headman. It is of uncertain derivation, but evidently of Mahratta origin. The Bengal equivalent is *mundul* or *pradhan*. Where the village system still retains vitality, the headman has control of the financial affairs of the villages, is superintendent of the police, and exercises certain magisterial functions. He is also the chief medium of communication with the Government or the landholder, and is always treated with great respect. The office is generally hereditary, and to a certain extent saleable.

Potash. See POTASSIUM.

Potash. Pharmaceutical Preparations and Medicinal Properties of. The salts of potassium are very poisonous to the lower animals, and their action upon man, as upon other mammals, results in great feebleness of pulse and lowering of temperature, the most marked action being upon the heart. When a frog is killed by salt of P., the heart is arrested in diastole, and the action upon the heart has been heretofore supposed to be a local one, the diastolic arrest being due to a direct impression upon the cardiac muscles. Dr. Ringer and Dr. Murrell have recently conducted a series of exhaustive experiments on the action of the P. salts, and they conclude that P. paralyzes the central nervous system, the nerves, and the muscles, and that this paralysis is not due to the action of P. salts arresting the heart's action. Regarding the action of chloride of potassium they give the following summary of the conclusions arrived at:—(1) It paralyzes all nitrogenous tissues; (2) it acts by an equal affinity for all protoplasm, and it destroys the tissues in the order of their vital endowments; (3) it arrests the heart, owing to its common action on all protoplasm, not from a special action on that organ; (4) arrest of the circulation, itself a paralyzing influence, must in some degree assist the direct action of the P. on the tissues; (5) by arresting the circulation, P., probably at an early stage, depresses the reflex function of the cord in the summer months indirectly through arrest of the circulation in the brain. In explanation of the slow paralysis of muscle induced by P., Dr. Ringer says that P. being a powerful poison both of nerve and muscle tissue, when absorption takes place and the P. salt reaches the heart, this organ becomes paralyzed, and thus the passage of the salt through the circulation is prevented. It then spreads slowly by diffusion through the tissues, and thus by degrees very tardily poisons them. The effects of other nerve and muscle poisons are doubtless thus modified, and the rate of paralysis will depend not only on their poisonous action, but likewise on their diffusibility, and the distance the nerves and muscles are situated from the point of subcutaneous injection.

The British Pharmacopia contains the following preparations of P.—*Caustic P.*, sometimes called *hydrate of P.*, prepared in the form of hard white pencils, is very deliquescent, and powerfully alkaline and corrosive. It is chiefly employed as an escharotic for the destruction of tumours and malignant ulcers, and for making caustic issues. *Liquor potassæ*, or *solution of P.*, contains in 1 fluid drachm, 3½ grains of anhydrous P., and is prescribed in doses of from 15 to 60 minims three times a day in milk or *mistura amygdalæ*. *Liquor potassæ* is an antacid, diuretic and antilithic, and is useful in dyspepsia, in skin diseases dependent on a morbid condition of the stomach, as an alterative in inflammation of the serous membrane, as in pleuritis, pericarditis, and periostitis, and also in syphilis and chronic rheumatism. It is also used externally as a lotion in certain chronic skin diseases, and as a stimulating lotion generally. The antidotes to a poisonous dose of liquor potassæ are dilute acetic acid, citric acid, lemon juice, vegetable acids generally, fixed oils and demulcents. *Potassa sulphurata*, or *sulphurated P.*, is given internally for scabies in doses of from 3 to 8 grains; but it is chiefly employed externally in the form of ointment (3¼ to 3i) in various skin affections, such as scabies, lepra, and psoriasis; and

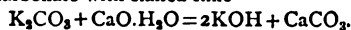
for the formation of sulphur baths, the strength of which should be from 2 to 6 ounces of the drug in 30 gallons of water. The baths should be taken warm, the patient remaining in them for twenty minutes to two hours; they are recommended in cases of chronic rheumatism. The *acetate* of P. is given in doses of from 10 to 20 grains as a diuretic, and from 120 to 180 grains as a laxative, and is best administered in simple solution, with a little sugar. Acetate of P. has been prescribed with great success in acute rheumatism. *Bicarbonate* of P. is given in doses of from 10 to 20 grains as an antacid or antilithic, 60 grains as a diuretic, and 30 to 40 grains, freely diluted, every four hours in acute inflammatory rheumatism. The best mode of administration is in aerated water, or some bitter infusion. *Carbonate* of P. is given in doses of from 10 to 30 grains as an antacid, antilithic, and diuretic, and is contained in decoctum aloes compositum, liquor arsenicalis, and *mistura ferri composita*. It is frequently employed in the preparation of effervescing draughts, 20 grains being neutralised by 17 grains of citric acid, 18 grains of tartaric acid, or by half a fluid ounce of lemon juice. *Chlorate* of P. is given in doses of from 10 to 20 grains in water three or four times daily, as a stimulant and diuretic in the low stage of typhus fever, smallpox, and scarlatina, and in all forms of disease due to blood-poisoning. Chlorate of P. is of great value in various forms of stomatitis, and especially in the follicular or aphthous stomatitis of children. When used locally it acts as a stimulant to the various mucous membranes, and it has been recommended in the form of enema in dysentery and cholera infantum. It is prepared in the form of lozenges, each containing 5 grains. An agreeable and useful gargle may be prepared with 1 drachm of the carbonate of P., ¼ oz. of honey, and 8 oz. of water. The *citrate* of P. may be given in doses of from 20 to 60 grains in water, as a refrigerant, diuretic, and mild alkaline laxative, in cases of gout, rheumatism, uric acid gravel, and also as a drink in scurvy. C. of P. is eliminated in the urine, rendering it neutral or alkaline. An excellent method of administering C. of P. is in the form of an effervescing draught, which may be prepared as follows in two solutions, one consisting of lemon juice and water, equal parts; or of citric acid ℥i, water ℥iv; the other carbonate of P. ℥i, water ℥iii. An ounce of each of the solutions to be put together, and the whole to be drunk during effervescence. *Nitrate* of P., or *nitre*, is given in doses of from 5 to 20 grains, as a refrigerant and diuretic; and from 20 to 30 grains as a vascular sedative in acute inflammatory diseases, and especially in acute rheumatism. Combined with tartar emetic and calomel it is given to promote the secretions of the liver and skin, and to lessen febrile excitement. Nitrate of P. is used for inhalation in cases of asthma, by soaking porous paper in a saturated solution, and then drying it, and burning it in a candlestick. *Sulphate* of P. is given in doses of from 10 to 20 grains as an alterative; and 60 grains as a purgative in combination with rhubarb, in jaundice and dyspeptic affections. It forms an ingredient in the compound colocynth pill, and in compound ipecacuanha powder. *Tartrate* of P. is prescribed as a diuretic in doses of from 20 to 60 grains; and, as a purgative, 120 to 200 grains. *Acid tartrate* of P., known popularly as *cream of tartar*, is much used in febrile and dropsical affections. As a refrigerant or diuretic, it is given in doses of from 20 to 60 grains; as an aperient, 60 to 120 grains; and as a hydragogue cathartic ½ drachm to 1 ounce.

There are several other preparations of P., the medicinal properties of which depend more upon the substances with which it is combined. The *bromide* of P. is given in doses of from 20 to 60 grains in the twenty-four hours, in cases of chronic glandular enlargements, as of the liver, the spleen, and in bronchocele and scrofula. It is also highly efficacious in keeping off attacks of epilepsy. The *iodide* of P., in doses of from 2 to 10 grains, is more efficacious than the bromide, in cases of glandular enlargements, and it is also used in chronic rheumatic affections, and in cases of secondary syphilis, in drachm doses, in the twenty-four hours, in combination with tincture of bark. Iodide of P. is contained in the liniment and the tincture of iodine. The *permanganate* of P. is prescribed in doses of from 1 to 2 grains in diabetes, and to correct offensive evacuations; but it is more generally used as an antiseptic and deodoriser. Externally it is applied as a caustic and deodoriser to offensive ulcers and cancers. It is also much used as a disinfectant. The *liquor P. permanganate* is given in doses of from 2 to 4 drachms; and, diluted with 40 parts of water, it is used as a gargle or as a

cleansing wash for diseased surfaces. When used as a disinfectant, it should be added to the matter operated upon until the characteristic purple colour is apparent. This preparation is the same as Condy's Fluid, but half the strength. For the action of the P. salts, see the *Journal of Physiology*, March No., 1878, p. 73.

Potash Water. See AERATED WATERS.

Potassium (K=39.1), the most typical of all the metals of the alkalis. These metals are, beginning with the lowest atomic weight, lithium, sodium, P., rubidium, cesium. They are soft, white, light, and easily fusible. They oxidise rapidly in the air, their affinity for oxygen increasing with the atomic weight. Consequently they all decompose water, evolving hydrogen and forming a soluble hydrate, an action which is accompanied by a development of heat. Excepting lithium and sodium, their action generates sufficient heat to inflame the hydrogen. In the case of P., the flame gives a purple light because of the presence of the vapour of the metal. The hydrates of all are very soluble in water, can be fused and volatilised at a high temperature, hardly decomposing by heat, absorb carbonic acid from the air, and are useful in the arts for saponifying oils and fats and forming soluble soaps. The chlorides, sulphides, sulphates, phosphates, and carbonates are soluble in water; and the sulphates form with the sulphates of aluminium and the allied metals characteristic double salts known as *alums*. These, excepting lithium-alum, which has not yet been crystallised, crystallise in octahedra. They are all monads, and the type of their salts is MCl, where M stands for the metal. The oxides then have the composition M_2O , and the hydrates or *caustic alkalis* the composition MOH. Besides the oxide, however, which is a strong base in all, P. forms other two, the peroxide K_2O_2 and the tetroxide K_2O_4 , both of which are unstable and of little practical interest. Caustic potash (KOH) is prepared by mixing a solution of the carbonate with slaked lime—



It is a valuable agent in the laboratory, decomposing the salts of all metals which form oxides insoluble in water, and precipitating this oxide in the form of the hydrate. Potash is found in all fertile soils, and is necessary for the growth of plants, in the tissues of which it exists, combined with the radical of some vegetable acid. When the plant is burned the salt is decomposed, and in the ash that remains the P. exists chiefly in the form of the carbonate. This ash washed and evaporated forms the *potash* of commerce. From the carbonate thus obtained, the metal may be prepared by distillation in the presence of charcoal at an intense heat, when P. vapour is given off, accompanied by carbonic oxide. A bicarbonate ($KHCO_3$) is also known. It is less soluble than the carbonate, and is prepared by passing carbonic acid gas through a strong solution of the latter. Another important salt which occurs native is the nitrate (KNO). It is found as an incrustation on the surface of the soil in some parts of India, and is believed to be the result of decomposition due to fermentation. For a discussion of its other sources, and of its use in the manufacture of gunpowder, see NITRE. The chloride (KCl) occurs in certain saline deposits associated with the sodium chloride (NaCl). It is useful for preparing other P. salts. Thus, it decomposes the chlorate of calcium, made by saturating hot milk of lime with excess of chlorine, so as to give chloride of calcium and P. chlorate ($KClO_3$). This salt is important as a source of Oxygen (q. v.). P. was discovered in 1807 by Sir Humphrey Davy, who obtained it by electrolysis of caustic potash. Its spectrum, like the spectrum of all the metals of the alkalis, is easily recognised, consisting of three well-marked bright lines, two in the red and one in the extreme violet.

Pota'to is the equivalent of the Spanish 'Batatas,' a name originally applied to the plant now distinguished as Sweet-P. (*B. edulis*, q. v.), but on the subsequent introduction of the widely different *Solanum tuberosum*, transferred to the latter. This important species of *Solanaceæ* (q. v.) is a native of the Andes of S. America, particularly of Chili, but is not absolutely trans-equatorial, as it extends into Columbia; it is also wild in the Argentine territory. The Spaniards are believed to have first brought it to Europe early in the 16th c. It afterwards found its way into Italy, and from that country was carried to Flanders, whence in 1598 it was sent (from Mons) to

L'Ecluse at Vienna, who records that in a short spread through Germany. Meanwhile it had been introduced by English adventurers—first, some say, by Sir John Drake in 1563, certainly ten years later by Sir Francis Drake (a statue is erected at Offenburg, in Baden, inscribed 'immortal introducer of the P. into Europe'), and by colonists, under the auspices of Sir Walter Raleigh, from Virginia in 1586. The plant was grown from 1586 on Raleigh's estate near Cork, and became known as 'Irish' long before it was cultivated in England. Gerard's *Herbal* (1597), gives a figure of it under the name 'Virginia', and it is noteworthy that in the title-page of his *logus* of 1596 and 1597, he has the plant under the name 'orbiculatus, bastard potatoes. In 1619 it appears in articles provided for the household of James I., and its valuable properties having become more generally known the Royal Society took measures to encourage its cultivation long time elapsed before it was grown to any extent in England. The P. was introduced in 1725, and a few years later a labourer named Prentice gets the credit of first cultivating it in the neighbourhood of Kilsyth, whilst Lord Kaimes and others were active advocates of the extended cultivation. For a long period prejudices existed against it—its use was believed to injure the land, and its use as food to be dangerous. Only after long-continued exertions on the part of Parmentier, and within the present century, did it become popular in that country, where it now forms, as also throughout the temperate British dominions, the most useful article of food next to the cereals. As an esculent the P. is valuable in whatever way it may be dressed, whether plain boiled, fried, or roasted. For cattle it is used raw or boiled. In addition to these services the tubers give about 15 per cent of starch equal to arrow-root, which, combined with wheat flour, makes a good bread, is the basis of certain farinaceous foods, and when being heated with mineral acids or malt, can be converted into dextrin and dextro-glucose, useful for many purposes as a substitute for gum, is also obtainable by subjecting starch to a heat of 400° F. By distillation a strong alcohol is obtained from it, which passes under the name of 'potato brandy'; it is prepared in large quantities in Germany and other countries of Europe. The skin of the P. contains a substance called *solanine*, which is dissipated or destroyed by the process of boiling or steaming. Being rather deficient in forming properties, the P. cannot be used as a substitute for pulse, but is best employed as an addition to pulse, lean meats, and nitrogenous foods' (*Church*). The tender tops of the P. are eaten as spinach in Canada, &c., and the unripe tubers sometimes pickled, or when ripe prepared like the tomato. The varieties of P. are very numerous, and some late; these again differing considerably in foliage or habit, but in size, form, colour, and quality of the tuber. As new sorts are constantly being raised, the old sorts long in unchanged culture degenerate, the special characteristics changing from year to year, and as a rule each district has its particular favourite. Only such varieties should be chosen as are floury, that ripen early, that will keep late, and that give a good crop. The propagation is by cuttings of the tubers, or sometimes small undivided ones are used. The planting should be as early in March as circumstances permit, and should be made in open ground, full of light. It is a great disadvantage to set so late that the tops grow the plants smother or shade each other. For the production of young potatoes during winter, or early supply, special methods of cultivation are used. To keep the stock after it is taken up in autumn, frost or 'pits' are necessary, in which the tubers are laid in ridges of moderate thickness, when they will prevent sprouting or losing flavour. Of the various diseases to which it is subject to, the most momentous is that common P. Disease (q. v.). What is called by growers 'the scab' is general be prevented by employing healthy sets, and proper attention to soil and culture. The 'scab' is caused by certain manures and soils. Other species of P. have recently been recommended for development, as P.; of such is *S. Fendleri* of New Mexico, which



of bearing a temperature of zero; four or five species from the elevated districts of Mexico; *S. Maglia* from Chili, and *S. immitis* from Peru.

Many different kinds of insects attack the P., and of these by far the most destructive is the Colorado P.-beetle (*Doryphora decem-lineata*). It is a hemispherical, yellow insect, about a third of an inch long, with ten black stripes on the elytra. First described by Thomas Say, who found it in Missouri in 1824, it was little heard of till 1859, but since then it has rapidly spread, always advancing eastwards. In 1875 it was common from Virginia to Maine, and even abounded in the streets of the larger cities. The insect hibernates, and the period of oviposition covers about a month for each female, the average number of eggs produced by each being about 500. The chief means as yet adopted to check the ravages of the beetle are (1) destruction of the beetles and eggs by hand; (2) isolation of the P. fields; and (3) the use of Paris green, either in the form of a powder (mixed with ashes, bran, or lime), or dissolved in the proportion of a tablespoonful in three gallons of water.

Potato Disease, or Potato Murrain. This scourge—threatening the existence of the potato as a food-crop by the importance there was every probability of it assuming—first made its appearance in England in 1845, having been experienced somewhat earlier in America. The year following it created the Irish famine, and since that period has caused a variable but immense annual destruction of the valuable esculent in all districts of Britain and of Europe. The murrain has been equally bad in the wettest and the hottest seasons, and thus far has baffled all researches of practical and scientific men to discover a remedy. Innumerable plans have been suggested, some of which for a time have seemed to answer, but the extended result has always been disappointment. The matter has been decided to this extent—that the disease is the work of a little mould called *Peronospora infestans*, which penetrates into the substance of the leaf, its conidia-bearing filaments projecting through the stomata; that it works its way down the stem, resulting in the rapid putrescence of both roots and suckers; and infests the tubers, producing in them a characteristic brown mottled appearance, and brown spots on their surface—sure precursors of their more or less deferred decay. It attacks the potato in the last stages of growth in August or September, so that it is rational to recommend the cultivation of early varieties, to plant early, and get the crops safely harvested before the period of visitation. We do not fully know the circumstances that induce the appearance of the fungus at the particular time above specified, but peculiar electric conditions of the atmosphere are strongly suspected of having something to do with its development. The recent researches of Mr. Worthington Smith have shown that the 'resting spores' of the *Peronospora*, and of an allied fungus (*Fusisporium solani*), which almost invariably accompanies it, lie dormant in the remains of the foliage and in the tubers of the potato during a period of ten or eleven months, then burst into activity, and carried far and wide by the wind, repeat their course of destruction on the new crops. The seat of danger is therefore manure heaps and other accumulations of diseased potato litter—clearly pointing to the advisability of its absolute destruction. The starch even in badly diseased potatoes is but little affected by the *Peronospora*, and may be obtained from the pulped mass by washing it on a cloth in a stream of water.

Potato-Fly (*Anthomyia tuberosa*), a species of flies or *Diptera*, the larvæ of which infest potatoes. The adult fly is about half an inch long, and is coloured of a greyish-black hue.

Potchinky, a town in the Russian government of Nijni Novgorod, 115 miles S.S.E. of the city of that name. It exports corn and potash. Pop. 7554.

Potemkin, Grigorij Alexandrovitch, the most powerful and famous of the favourites of Catharine II. of Russia, was born near Smolensk, September 1739. Though at first destined for the Church, at an early age he entered the Russian army, and having attracted the notice of the susceptible Empress at a review in 1762, was appointed colonel and gentleman of the bedchamber. In 1774 he succeeded Orlov as her avowed lover, and gave place to a successor in 1776, without, however, losing his influence over the Empress. His intimate knowledge of her character, and his power of adapting himself to circumstances, enabled him to retain his political

power, and made him until his death the most important person in Russia. He constantly promoted territorial increase in the S., and was the main promoter of the Turkish war in 1771-72 which cost the Turkish Empire the Crimea and Kuban, and first gave Russia a footing on the shores of the Black Sea. He was now appointed governor of the Crimea and Grand Admiral of the Black Sea, while the indulgent Empress built him a magnificent palace in St. Petersburg, styled from the new name of the conquered province, Taurida, and conferred upon himself the surname of Taurisschesky. In 1787 she visited his government, and was received by the skilful courtier with the greatest magnificence, villages and towns of painted wood even being erected along her route and filled with people, to give the appearance of prosperity. He did much, however, in reality to improve his province, building the towns of Kherson, Kertch, Nicolaiev, and Sebastopol, and fitting out a fleet to defend the coasts. When the Turkish war broke out in 1787, P. was put at the head of the army, with Suvarof and Repnin as his lieutenants. His career was one of continued victory, and after the capture by storm of Otchakov, in which 25,000 Turks were put to the sword, P. returned to St. Petersburg, March 1790. Here he was received with the most magnificent fêtes, and presented with 100,000 roubles. He soon returned to the camp, but his ambitious wishes were checked by the determination of Catharine to make peace. The preliminaries were signed August 11, 1791, and P. died on the 16th of October following, of an epidemic raging at Jassy. In 1830 the town of Kherson erected a monument to its founder. See *Privatleben des Fürsten von P.* (Graz, 1793); Cérenville, *Vie du Prince P.* (1807-8); Prince de Ligne, *Mémoires de la Cour de Russie* (Par. and Berl. 1859).

Potent (Fr. *potence*, Low Lat. *potentia*, 'a crutch'), in heraldry, is one of the eight furs, and implies that the field is covered with figures of 'potents,' an old word signifying 'crutches.' P. is of the alternate tinctures of argent and azure. In *P-counter-P.*, or *vary-cuppy*, potents of the same tincture are ranged base to base and point to point.

Potentée, in heraldry, one of the divisional lines, formed by a row of crutch-shaped figures.

Poten'tial is a function of great importance in the theory of attractions. Its value was first recognised by Laplace in his investigations upon the figure of the earth, but it received its present name from Green, who applied it with great power to electrical problems; and now it forms the central conception of the mathematical theory of attraction. Sir W. Thomson has defined the P. of a conductor charged with positive electricity as the work which must be spent in removing unit of negative electricity from the surface to an infinite distance, supposing the distribution to remain constant during the operation. With a slight modification the definition may be made to apply to the cases of magnetism and gravitation. Further, the P. at any point with reference to the attracting body is the work which must be done to remove unit quantity from that point to an infinite distance. Hence the work done upon unit quantity in removing it from one point to another is measured by the difference of the potentials at these points. If the points are very close together, then the work done may be represented by the product of the distance into the average force overcome through that distance; and therefore the force at any point in any direction due to an attracting system is the rate of increase of the P. at that point per unit of length in the given direction. In electrokinetics there cannot be a transfer of electricity without a difference of P. Accordingly, P. is in the theory of electricity what temperature is in the theory of heat, what pressure is in hydrodynamics. As heat flows from a body of higher temperature to a body of lower temperature, as fluid flows from the place of greater pressure to the place of less, so does electricity flow from the region of higher P. to the region of lower. In the mathematical theory of attractions, the existence of a P. for a given system of forces is the criterion that that system is a conservative system—i.e., that it satisfies the principle of the conservation of energy. All known forces belong to this category. See ELECTRICITY, ENERGY, MAGNETISM.

Potentilla is the representative genus of the tribe *Potentilleæ*, of the natural order *Rosaceæ*, having much in common with the strawberry, but differing in this, that the achene

('seeds') are arranged upon a dry, instead of a fleshy receptacle. It includes about 120 species of perennial herbs or rarely shrubs, nearly confined to the temperate, Arctic, and mountainous regions of the northern hemisphere. *P. fruticosa*, a much-branched shrub with golden-yellow flowers, a very local British plant, but extending from W. America across Europe to the Himalaya, is often planted in shrubberies. The rootstock of *P. Comarum*, a strong perennial of bogs and marshes, is powerfully astringent, and yields a yellow dye; and that of *P. Tormentilla* with like properties is used for tanning and in rustic medicine. *P. anserina*, called silverweed from the soft, silky, silvery appearance of its pinnate leaves, is a common roadside plant of a very wide range; and its rootstock in times of scarcity has served for food in the Hebrides. About seven other species are natives of Britain, and various others are frequently seen in gardens. The name *P.* comes from the Latin *potens*, alluding to the powerful medicinal effects formerly ascribed to some of the species, and the common name of 'cinquefoil' is given to the genus from a number of the species possessing leaves of five leaflets.

Poten'za (*Potentia*, an ancient Lucanian town), a city of S. Italy, capital of the province of P. or Basilicata, 54 miles E. of Salerno. It is a bishop's see, and has considerable trade in silk, honey, and cheese. P. was much shaken by earthquakes in 1273, 1694, and 1812, and all but totally destroyed by that of December 17, 1859. Its walls, however, and fine Doric cathedral were not seriously injured. Pop. (1874) 18,513.—**P. Picena**, in Central Italy, province of Macerata, on the Adriatic, 23 miles by rail S.S.E. of Ancona, had once considerable trade, but its harbour is now almost wholly silted up. Pop. (1874) 6763.

Pot'-Herbs include the plants of secondary importance cultivated for culinary purposes, such as parsley, fennel, chervil, coriander, &c.

Po'ti, a fortified seaport of Russia, in Transcaucasia, government of Kutais, on the S. branch of the Rion, near its mouth in the Black Sea, 190 miles W. of Tiflis, with which it is connected by railway. A great harbour is being (1878) constructed here to meet the increasing trade, and 80 fathoms of the N. wall and 120 of the S. have been run out, and have proved effective in heavy gales. It is proposed to curve the S. wall northwards and to extend it until a depth of 30 feet is obtained at the entrance. The construction of an iron bridge across the Rion had in 1876 seriously interfered with the trade of the port, ships having to load and unload at the bar. In 1875 the exports amounted in value to £746,928, and the imports to £698,707, while the port was entered and cleared by 476 vessels of 124,358 tons, of which 47 were English of 31,015 tons. The imports are sugar, tobacco, groceries, salt, iron, and ammunition, the exports wine, hides, leather, tallow, silk, cotton, woollen, boxwood, and bristles. Boxwood of the finest quality will be largely procured in the Abkassian forests when the Government prohibition is removed, as it will probably be shortly. The town is fever-stricken and destitute of sanitary works. Pop. (1876) 4500.

Potichomanie is a process by which pretty and tasteful imitations of opaque painted porcelain can be made from vases, &c., in plain clear glass. It consists in gumming painted or printed designs, cut out of paper, to the inside of the glass article, coating the paper with size, and afterwards applying white or tinted oil paint over the whole internal surface.

Pot-Metal is the name given to a kind of glass which has been coloured by the addition of the colouring matter while the glass was still in a molten condition.

Potomac, a river of the United States, rises in the Alleghanies in two branches, which unite 20 miles S.E. of Cumberland, Maryland. After a S.E. course of 400 miles between Maryland and Virginia and W. Virginia, it falls into Chesapeake Bay. P. is navigable as far as Cumberland, and for men-of-war as far as Washington, to which point (125 miles from the mouth) the tide ascends. It is from 6 to 8 miles broad for the last 100 miles. Above Washington are several cataracts; the river falling 1160 feet in the 220 miles between Westport and that city. The scenery here is very picturesque, especially at Harper's Ferry, where its largest tributary, the Shenandoah, joins the P. on the right. Other tributaries are the Savage,

Monacacy, and Acquia Creek. The whole course of the P. formed an important strategical line during the American Civil War.

Potoroo. See KANGAROO RAT.

Poto'si, the third largest town in Bolivia, is situated at an elevation of 13,024 feet above the sea level. The surrounding country is barren and desolate, and the climate is very trying, extremes of heat and cold being experienced within twenty-four hours. According to Captain Musters, the cold is so intense at P. that children born there are generally dead or blind. The mineral wealth of the district is immense, consisting principally of silver. Gold and copper are also plentiful, but are now little worked. The silver mines were accidentally discovered in 1545 by an Indian while hunting, and between that date and 1800 there were coined at P. \$823,950,509. The ore is extracted chiefly from a conical mountain called the Cerro de P., 15,977 feet high, and honey-combed to within 125 feet of its summit by thousands of workings. The upper half being now nearly worked out, and the difficulty of keeping down the water in the lower portion being great, the mines are in a languishing condition, and the average amount coined annually is now only \$2,000,000. The population of P., which was once as high as 170,000, had fallen at the last census in 1861 to 22,580; and much of the town is in ruins. The principal buildings are those of the Government, the Mint, and the Church of the Matriz, which is said to be, next to the Cathedral of Lima, the finest ecclesiastical edifice in S. America.

Pot-Pourri (Fr.), in perfumery signifies a mixture of dried flowers and crushed spices, placed in a vase for the purpose of diffusing a fragrant odour through a room. P.-P. also denotes a medley of music, and a mess of meat and vegetables; in the latter signification P.-P. is synonymous with the Scotch *hotch-potch*.

Pots'dam, capital of the Prussian province of Brandenburg, is beautifully situated at the influx of the Nuthe into the Havel, on the Potsdamer Werder, an island formed by the Havel (which here expands into a series of lakes), and surrounded by woody hills, 16 miles S.W. of Berlin by rail. It is divided into the old and new towns, has five suburbs, and is partly fortified with ramparts. The Brandenburg Thor is a fine triumphal arch, designed from that of Trajan at Rome. The Havel and canal are crossed by seven bridges. The streets of P. are broad and straight, and are adorned with many splendid buildings. Of the squares, the finest are the Wilhelms-Platz, in which is a statue of Friedrich Wilhelm III., the Lustgarten, serving as a military parade ground, with fourteen bronze busts by Rauch, of York, Blücher, Alexander I. of Russia, &c.; and the Altmarkt, in the midst of which is an obelisk of red and white marble 80 feet high, with medallion busts of the Great Elector and the first three kings of Prussia. The principal building is the royal palace, built 1660-1701, and forming an oblong parallelogram with a colonnade 370 feet long. The rooms of Friedrich the Great are preserved in their original condition, and contain numerous interesting relics. Other buildings are the Rathhaus, erected by Friedrich II. in 1754; the military orphan asylum, 426 feet long, in four stories, with a tower 158 feet high; the opera-house; and the hussars' barracks. The Garnisonkirche has a fine chime of bells in a tower 298 feet high, and a marble pulpit, surrounded by trophies captured from the French in 1813-15 and 1870-71, and under which are the graves of Friedrich Wilhelm I. and Friedrich the Great; the church of St. Nicholas, N. of the Palace, erected 1830-37, has an iron cupola 261 feet high, added 1843; and the Friedenskirche, situated at the entrance to the park of Sanssouci, (completed 1850), is in the Basilica style, with a quadrangular entrance-court and detached clock tower. The garden and park of Sanssouci are beautifully laid out, and are noted for their grand trees and maze of delightful walks. Within the park is a fountain which rises to a height of 120 feet, and ascending from it a broad flight of steps 66 feet high, intersected by six terraces, leads to the Palace, built by Friedrich the Great (1745-47), afterwards his principal residence, and in which many relics of him are preserved. To the W. is the Orangery, in the Florentine style, 990 feet long, adorned with many fine marble statues, amongst them one of Friedrich Wilhelm IV., unveiled in 1873. At the back of Sanssouci is the famous Windmill, which the miller refused to sell to Friedrich the Great, and which is still

the property of the miller's descendants. The park is intersected by an avenue a mile in length, at the W. end of which stands the New Palace (1769). A mile to the S.E. is the Charlottenhof, a royal country residence. The Palace of Babelsberg (1835-38), the property of the Emperor Wilhelm, is a picturesque Gothic structure, situated in a beautiful wooded park, overlooking the Glieniker Lake. N. of P., three-quarters of a mile from the Jäger Gate, is the Russian colony of Alexandrowka, founded in 1826, and near it the New Garden with the Marble Palace, founded in 1786, and adorned with frescoes of the Nibelungen Lied. P. has a gymnasium, high school, various special schools, and an institution called the Luisendenkmal for providing a marriage-outfit for poor girls of good character. The manufactures are considerable, and include linen, earthen and zinc wares, veneer, leather, glue, soap, candles, tobacco, sugar, oil, vinegar, beer, and brandy. There is also a Government factory of small arms. Pop. (1875) 45,041; garrison, 7000. P. was a town of the ancient Wends, but owes its importance to the Great Elector. Its modern splendour is due to Friedrich the Great and the succeeding Prussian kings. See Schmidt, *Geschichte und Topographie der Residenzstadt P.* (Potsd. 1825); Griebner, *Wegweiser durch P.* (Berl. 1854).

Potsdam, a town of New York, U.S., on the Racket River, 22 miles E. of Ogdensburg, is noted for the extensive quarries of sandstone of a geological formation which has taken its name from the town. There are in the town six churches, one weekly newspaper, numerous foundries, and manufactories of furniture and agricultural implements. Pop. (1870) 7774.

Pot'stone, a massive schistose rock, composed chiefly of chlorite, with an admixture of quartz, felspar, mica, or talc. The name is derived from its capability of being turned in the lathe and worked into various articles for domestic use.

Pott, August Friedrich, an eminent philologist, born at Nettelrode in Hanover, November 14, 1802. He studied theology and philology at the University of Göttingen (1821-24), was a teacher in the gymnasium of Celle (1825-27), and became a *privatdocent* in the University of Berlin (1830), whence in 1833 he was called to Halle, first as extraordinary, and since 1839 as ordinary professor of comparative philology. Among P.'s works are *Etymologische Forschungen* (2 vols. Lemgo, 1833-36; recast in 3 vols. 1859-71), *De Borussia-Lithuanica tam in Slavicis quam Leticis Linguis Principatu* (2 vols. Halle, 1837-41), *Die Zigeuner in Europa und Asien* (2 vols. Halle, 1844-45), *Antikaulen oder Mythische Vorstellungen vom Ursprunge der Völker und Sprachen* (Lemgo, 1863), &c. His *Zigeuner*, crowned by the Institute of France, is a monument of German industry, embracing as it does all that was then known concerning the Gypsies, though its author never but once conversed with a member of the race. On December 17, 1869, P. was elected a correspondent of the French Academy of Inscriptions.

Potter, Cipriani, an English musician, born in London in 1792, was principal of the Royal Academy of Music from 1832 to 1859. He composed nine symphonies, a number of overtures, the cantata of *Madora e Corrado* (1830), several violin quartets, and a great quantity of works for the piano. P. greatly improved the English school of pianoforte playing, and trained many of the most distinguished players and teachers of that instrument. He died September 26, 1871.

Potter, John, born at Wakefield, Yorkshire, in 1674, passed from the free school of his native town to University College, Oxford (1692), and was elected a fellow of Lincoln College (1694). Having taken orders (1697), he became successively chaplain to Archbishop Tenison (1704) and to Queen Anne (1706), Regius Professor of Divinity (1708), Bishop of Oxford (1715), and Archbishop of Canterbury (1737). He died at Lambeth, October 10, 1747. Besides editing Lycophron's *Alexandra* (1697) and the writings of Clemens Alexandrinus (1715), P. was author of *Archæologia Græca, or Antiquities of Greece* (2 vols. 1798-99), which was long a standard work, and passed through innumerable editions, and of a *Discourse of Church Government*, and other treatises, collected in his *Theological Works* (3 vols. Oxf. 1753).

Potter, Paul, was born at Enkhuisen in 1625. His father, Peter P., was an artist, and instructed his son so well, that in

his fifteenth year his cattle pieces were sought after. At the age of twenty he went to the Hague, married the beautiful daughter of Balkenende, an architect, and six years later removed to Amsterdam. Many of his best works were executed for Frederic Henry, Prince of Orange. His best pictures are small, exquisite in finish, yet free in handling. A picture of his, representing oxen in a meadow, sold in 1750 for £25, was bought by the Emperor of Russia in 1815 for £900. He produced a few good etchings. P. undermined his health with hard work, and died at Amsterdam, January 15, 1654. See Bartsch, *Le Peintre-Graveur*, vol. i., and *Le Carpentier's P. P.* (1818).

Potter's Clay, a highly plastic variety of clay used in the manufacture of porcelain and Pottery (q. v.). Owing to its containing proportions of lime and oxide of iron it is comparatively fusible, and consequently resolves itself into a slaggy mass at temperatures which vary according to the proportion of these constituents present.

Pottery and Porcelain. Under these terms, which are embraced in the single name Ceramics (Gr. *keramos*, from *keras*, 'a horn,' the material of early drinking vessels), should properly be included all manufactures of baked clay, from the coarsest bricks and tiles, up to the most artistic products of the potter's art. There is really no dividing line or break in the series which may be traced between these extremes, and it is only a matter of convenience to treat of bricks, &c., by themselves as building materials, and include only among pottery vessels non-structural substances and ornamental ware. The potter's art and its products possess supreme historical interest; they occupy an important place from an artistic point of view, and the manufacturing processes connected with them are varied and complex, while in industrial utility pottery is second to no other product of human labour.

History.—That which gives pottery its great historical value is the practically indestructible nature of the material, whereby substances made in the most remote ages show to us their material, design, ornament, and impressed characters almost as when they were newly elaborated. The art of making pottery was certainly among the earliest developments of human industry. Rude vessels of pottery belonging to the stone age of prehistoric times—before the use of any metal was understood—are not uncommon, and it is quite probable that our primitive forefathers understood and practised the art at a time when the mammoth was an inhabitant of Central Europe. The earliest made pottery was certainly very rude in material and workmanship, being simply masses of coarse clay rudely fashioned by the hand and sun-dried. Such pottery, not having undergone the change which results from exposure to a high temperature in kilns, is soft and perishable. Remains of this primitive pottery in the form of urns containing bones, &c., are frequently found in tumuli and the graves of the ancient inhabitants of Britain. Sun-dried pottery was probably long in use before the art of kiln-baking the moulded clay was discovered. Pottery clay, when baked in a furnace, undergoes partial fusion and chemical union of its component elements, whereby it ceases to be affected by water, and cannot again be worked up into a plastic mass, as is the case with merely sun-dried clay. Thus kiln-baked pottery, although it can be broken and crushed to powder, is in itself an imperishable substance; and in other properties, as hardness and closeness of texture, tenacity, and strength of body, the process of hardening by fire constituted an enormous advance on the primitive sun-drying. The introduction of the potter's wheel marked another important era in the progress of the art. When and by what race this notable implement was first used it is impossible to determine; but it was in use among the Egyptians not less than 2500 years before the Christian era. With the help of the wheel, the ancient potters were enabled to mould their pottery with a symmetry of form and an equality of thickness unapproachable by mere hand-moulding. Latest of all the great improvements came the art of glazing and enamelling, or covering the naturally porous body of the P. with a glassy coating of either a transparent or an opaque character. The stages in this important advance are thus excellently epitomised by the learned Dr. Birch:—'The invention of glass has hitherto been generally attributed to the Phœnicians, but opaque glasses or enamels as old as the eighteenth dynasty, and enamelled objects as early as the fourth, have been found in Egypt. The employment of copper to pro-

duce a brilliant blue coloured enamel was very early used both in Babylonia and Assyria; but the use of tin for a white enamel, as recently discovered in the enamelled bricks and vases of Babylonia and Assyria, anticipated by many centuries the re-discovery of that process in Europe in the 15th c., and shows the early application of metallic oxides. This invention apparently remained for many centuries a secret among the Eastern nations only, enamelled terra-cotta and glass forming articles of commercial export from Egypt and Phœnicia to every part of the Mediterranean. Among the Egyptians and Assyrians enamelling was used more frequently than glazing, and their works are consequently a kind of fayence consisting of a loose frit or body, to which an enamel adheres after only a slight fusion. After the fall of the Roman Empire the art of enamelling terra-cotta disappeared among the Arab and Moorish races, who had retained a traditional knowledge of the process. The application of a transparent vitreous coating or glaze over the entire surface, like the varnish of a picture, is also referable to a high antiquity, and was universally adopted, either to enhance the beauty of single colours or to promote the combination of many. Innumerable fragments and remains of glazed vases, fabricated by the Greeks and Romans, not only prove the early use of glazing, but also exhibit in the present day many of the noblest efforts of potters' art.

Artistic Development.—The earliest appearance of ornamentation on pottery consists merely of rude thumb marks and nail scratchings, to which, of course, the plastic substance readily lent itself. These scratchings gradually become more elaborate till they assume the appearance of incised patterns, and at an early stage ornaments in relief appear. A distinct advance in ornamental conception is found in the introduction of coloured ornament, which first appears as simple bands or chequers of brown or dark colour on a white ground. Artistic form in the higher sense is first found in the beautiful vases of the ancient Greeks, popularly known as Etruscan vases; on those of the best period, between the 6th and 4th centuries, B.C., the figure painting and other ornamentation show the perfection of Greek art. A prodigious number of these, in perfect condition, have been recovered from graves in S. Italy, and from them a flood of light is thrown on the history, dress, habits, and religious practices of the races who made them. From the earliest periods the island of Samos was celebrated for its pottery, and under the Roman Empire a knowledge of its products was not only widely spread throughout Europe, but local manufactories of Samian ware were established at localities widely apart throughout the extended dominions of the empire. The ware was generally fashioned into bowls, the body being thick



Greek Pottery.

and of a peculiarly rich coralline red colour, and the ornamentation moulded in relief on the lower part of the exterior. A very perfect and characteristic example was found in Glasgow Green in October 1876. It is now preserved in the Kelvingrove Museum, Glasgow.

The art of making porcelain is undoubtedly a Chinese invention, in which country, at a very early date, the manufacture of pottery attained a remarkable development. According to Oriental records, porcelain was first made in China during the Han dynasty, between B.C. 206 and A.D. 87, so that it may be said the manufacture began with the Christian era. For seventeen centuries porcelain continued to be an exclusively Oriental product, and it is not till about the beginning of the 13th c. that we find any record of examples of the manufacture being even seen among Western nations. Oriental decorative ware, while it exhibits the peculiar artistic instincts of the races producing it, served very largely to furnish models for European potters, Delft pottery furnishing a notable example of decoration drawn direct from Chinese ware. The pottery and porcelain of China and Japan are varied in their decorative treatment, different

periods and separate centres of manufacture showing distinctive styles of decoration, so that the classes of ware are more numerous than are those of European nations and periods.

For a period of about one thousand years, corresponding to the so-called dark ages, the making of pottery having any artistic



Majolica.

value was practically extinct in Europe. Early in the 14th c. the Italian pottery now well known as 'Majolica,' from having been originally made in the island of Majorca (known also as Majolica), began to be manufactured, and with the renaissance of art it attained high excellence from a decorative point of view. The distinguishing feature of Majolica is found in the enamel or opaque glaze with which it is covered, being in this respect like the earlier Persian pottery. The manufacture flourished in many of the smaller states of Central Italy from the latter part of the 15th c. well into the 17th, when its products began to be neglected in favour of Oriental porcelain, then introduced into Europe. In the decoration of the earlier specimens bright blues and yellows with iridescent lustre prevails, thereafter comes prevailing yellow tints without iridescence, and mythological subjects, and during the decadence Arabesque scrolls were much employed. In the 16th c. a peculiar variety of stoneware or dense pottery was made in Germany. The leading types were a white ware made into tall cylindrical jugs with raised figures and ornaments, glazed brown jugs or bottles with coats of arms, and grey ware with relief ornaments in blue and marone. In the same century two classes of pottery were produced in France, both of which are of singular artistic interest and value. The first is the enamelled fayence of the famous Bernard Palissy (q. v.) the leading peculiarity of which lies in the marvellous grace and fidelity with which he modelled in full relief upon his dishes the forms and colours of fishes, reptiles, insects, plants, &c. Genuine Palissy ware is very rare and valuable, but much more precious and scarce is the so-called Henri Deux or Oiron ware made about the same period, of which there exists only about eighty specimens. Oiron ware consists of a delicate yellowish glazed body decorated with inlaid ornaments in coloured slip and relief figures, masks, shells, wreaths, &c., in the manner characteristic of renaissance ornamentation.

Porcelain (soft paste—the *plâtre tendre* of the French) was first manufactured in Europe in 1580 at Florence under the auspices of Francis I., Grand Duke of Tuscany. The true Oriental porcelain (hard paste), however, was not discovered till about 1715, in which year it was manufactured at Meissen in Saxony by Böttger. Böttger's famous discovery gave an enormous impetus to the art, and notwithstanding the most

strenuous efforts to keep his discovery secret and to confine the manufacture to Dresden, it soon spread to the principal Conti-



Reptile Dish—Pallissy.

ental capitals, in which it was encouraged by the patronage of the ruling princes. In Vienna the manufacture was begun in 1720, Berlin in 1751, and at Sèvres (q. v.) for hard paste in 1759, although there the famous French *porcelaine tendre* had been manufactured from 1756. Among other famous European centres of manufacture may be enumerated Höchst in Mainz, Fürstenburg in Bavaria, Ludwigsburg or Kruenburg, Venice, and Capo di Monte, near Naples.

In Great Britain the first potter who deserves mention on account of the artistic excellence of his productions is Josiah Wedgwood (born 1730); in his hands British pottery attained an elegance of form, perfection of material, and beauty of ornamentation which neither before nor since have been rivalled. The characteristic production of Wedgwood was his jasper ware, a beautiful smooth and delicate biscuit ware, which by the admixture of metallic oxides fired into clear velvety colours formed an admirable surface on which separately moulded white figures and ornaments in relief were attached. The Wedgwood works are still continued at Etruria in Staffordshire by the descendants of Josiah Wedgwood. The manufacture of porcelain (soft paste) was begun in England about 1730 at Chelsea and Stratford le Bow, but hard paste was not made till the Plymouth factory started in 1760. The other centres from which porcelain of artistic worth was sent out in the 18th c. are Derby, Worcester (still continued), Bristol, and Swansea. At the present day the 'potteries' district in Staffordshire is the great centre of artistic and commercial pottery and porcelain, and nowhere in the world are artistic works of a higher



Wedgwood Vase—Blue Jasper.

class produced than by such firms as Minton's, Copeland's, and Wedgwood's. The Royal Porcelain Works at Worcester also produces porcelain of distinctive character and the highest decorative excellence.

Manufacture.—From what has been already said, it will be obvious that P. and P. may be separated into many classes according to the nature of the paste or materials, the peculiarities of ornamentation, the kind of glazes employed, and their presence or absence, and many other circumstances. The following classification, partly abstracted from Wagner's *Technologie*, embraces the leading distinctive varieties:

I. HARD OR DENSE WARE

- A. Hard porcelain or true china.
- B. Soft or European porcelain.
- C. Biscuit porcelain or Parian.
- D. Stoneware, including ironstone or fine glazed stoneware, salt glazed stoneware, and unglazed jasper and basalt ware of Wedgwood.

II. SOFT OR POROUS WARE.

- a. Fine Fayence with transparent glaze (Delft).
- b. Fayence with enamel or opaque glaze (Majolica).
- c. Common earthenware, glazed (Rustic ware).
- d. Terra-cotta vases, flower-pots, &c.

The materials which are employed in the fabrication of all these classes of ware are clays of varying degrees of fineness and purity of colour, some of which are refractory or fire-resisting in the highest degree, as Kaolin or China clay, while others are more fusible, such as ordinary potter's clay, owing to the presence of lime, oxide of iron, and other similar fluxing agents. To these natural clays are added ground felspar, calcined flints or fine sand, burnt bones and chalk. The dense wares are semifused in burning, and the hard porcelain differs from the others in containing a higher proportion of the infusible Kaolin. It consequently must be submitted to a much higher temperature than the others in order to produce that semi-fusion which yields a dense non-porous body. Fayence or earthenware, although made of fusible materials, is not fired to the fusing point, and consequently is porous in structure; and to render it impervious to liquids, the body must be glazed. The glaze in all cases must be composed of materials which form a glaze at a lower temperature than that required for firing the body, and consequently glazes which may be used for hard porcelain cannot be applied to earthenware. For hard porcelain the glaze employed consists of a mixture of felspar and quartz. Salt is generally employed for glazing common stoneware; while for fine qualities the transparent glaze contains lead and borax. For common earthenware the principal constituent of the transparent glaze is also lead, but in opaque or enamel glazes oxide of tin is added to the lead. These substances, either by themselves or in combination with the siliceous materials of the bodies to which they are applied, all form thin coatings of real glass over the ware, partly penetrating, and always adhering firmly to the body. In the case of hard porcelain, body and glaze are fired in one operation; soft porcelain and earthenware undergo two firings—first, in the biscuit oven, and second, in the gloss or glazing oven; and salt glaze is applied to stoneware by throwing moist salt into the kiln containing the articles at the highest temperature in process of firing.

With the exception of distinctions already alluded to, the operations involved in the manufacture of ware of all kinds are essentially the same. For porcelain and fine ware much care is expended to secure the purity and intimate subdivision of materials employed, and correspondingly less care is required in proportion as the fineness of body becomes an object of less regard. The mechanical processes necessary for the fashioning of the clay vary according to the form and external appearance of the articles to be made. Globular or cylindrical vessels, having a smooth exterior, are worked upon the potter's wheel, which is simply a plane surface or table revolving horizontally. Handles, or other accessories to such an object, however, are formed in moulds made of plaster of Paris, as are also all angular objects, and such articles as are irregular of form or have impressed ornaments. For plates and like articles, cakes or bats of clay rolled out are laid on moulds having the form of the interior of the plate, &c., against which they are pressed by profiles which possess the outline of the exterior of the article. Hard porcelain, after being fashioned, is allowed to remain in the 'green' or unfired state for some time, till a certain amount of its moisture has evaporated. The glaze is then applied, and the articles, protected in seggars or fireclay vessels against direct flame, are placed in the oven. In some cases, porcelain is painted or coloured under the glaze, but more commonly coloured decorations are applied above the glaze, and the colours being mixed with fluxing agents, are burned in upon the glaze, as is also the gilding. The burning in of ornamentation and gilding is effected in a muffle at a much lower temperature than is necessary for body and glaze firing. The great proportion of common earthenware, and sometimes wares of higher quality, are decorated under the glaze by transfer printing. The objects are first fired in the biscuit oven, and in the biscuit or unglazed condition they are extremely porous, and readily absorb any fluid material. The pattern to be impressed in the ware is printed in a suitable medium, according to the colour desired, from a copper plate on a thin tissue paper. The tissue paper, with its newly impressed and wet pattern is applied to the surface of the biscuit ware, to which it adheres, and the porous pottery attracts the wet ink,

and absorbs a sharp, well-defined impression of the pattern. Thereafter the paper is washed off; the article, with the pattern now transferred to it, is dipped in the glazing slip, and thereafter placed in the gloss oven, from whence, after one firing, it is withdrawn a complete decorated and glazed piece of P. The following table shows the chemical composition of typical examples of P. and P. :—

	Chinese Porcelain.	English Porcelain.	Wedgwood Ware.	Lambeth Stoneware.
Silica	71.04	40.60	66.49	74.00
Alumina	24.15	26.00	26.00	22.04
Oxide of iron	22.46	3.82	6.12	2.00
Lime	3.82	14.22	1.04	0.60
Alkali	2.68	5.28	0.20	1.06
Magnesia		0.43	0.15	0.17
Bone-earth and oxide of iron		15.32		
	100.00	100.00	100.00	99.87

The works treating of P. and porcelain are very numerous, but the following are among the most eminent standard authorities: Brogniart's *Traité des Arts Céramiques* (Par. 1844), Marryat's *History of P. and P.* (Lond. 2d. 1857), Jacquemart and Le Beau's *Histoire de la Porcelaine* (Par. 1862), Jacquemart's *Histoire de la Céramique* (Par. 1873, English translation by Mrs. B. Palliser, Lond. 1873), and Chaffers's *Marks and Monograms on P. and P.* (6th ed. Lond. 1878). *The Ceramic Art of Great Britain, from Pre-historic Times down to the Present Day*, by Llewellyn Jewitt (1878), is a work of very high value. Another of unequalled beauty and merit, *Keramic Art of Japan*, by G. A. Audsley and J. L. Bowes of Liverpool, is at present (1878) in course of publication.

Pott'inger, Eldred (Major), the hero of the siege of Herat, was born in 1811 at Mount Pottinger in County Down. At the age of seventeen he went out to Bombay as an artillery cadet. His uncle, Sir Henry P., was Resident in Scinde, and under his patronage he started from Peshawur in 1837 as an independent traveller to penetrate Afghanistan. He adopted the disguise of a *Syud* or holy man, which he did not put off till he had reached Herat, after many risks. This town, then held by an Afghan prince, was forthwith besieged by the Persians, led by the Shah in person, and it held out for almost a year, until relieved by a British diversion in the Persian Gulf. The successful defence is entirely attributed to the exertions and courage of P. As political agent during the disastrous Afghan war of 1841-42, he was compelled to sign the treaty which Lord Ellenborough repudiated. In 1843 he died of fever at Hong-Kong, while on a visit to his uncle, Sir H. P. See *Lives of Indian Officers*, by Sir J. W. Kaye (Lond. 1867).—**Sir Henry P.**, uncle of the preceding, born in 1789, was also a distinguished Indian officer in the political or diplomatic department. For his services in Scinde he received a baronetcy in 1839. He was ambassador to China (1841-42), governor of Hong-Kong (1843-44), of Cape Colony (1846-47), and of Madras (1847-54). P. died at Malta, 18th March 1856.

Pott'o (*Cercoptes candidivolvulus*), a species of carnivorous quadrupeds formerly classed with the Lemur (q. v.), and inhabiting S. America. It attains the size of a large cat, and is of a light brown colour, its fur being marked with thin dark bands. The tongue is very long and flexible, and is employed in obtaining honey from the nests of wild bees, and in the capture of insects.

Potts'ville, a city of Pennsylvania, U.S., on the N. bank of the Schuylkill River, 93 miles by rail from Philadelphia, is of some importance as the centre of the anthracite coal trade for the Schuylkill district. There are large deposits of iron ore in the neighbourhood, and two shafts were sunk in 1877 to a depth of 1500 feet, in order to reach the underlying coal-vein. P. contains eighteen churches, an opera-house, a free reading-room, two daily and five weekly newspapers. Pop. (1870) 12,384.

Pouch (Fr. *poche*), in military equipment the name given to a strong leather case lined with tin, in which the soldier holds his ammunition. It is carried across the back appended to a belt.

Pouched Rat, a name given to more than one species of Rodent, having cheek-pouches which seem to be used as receptacles for food. The Canada P. R. or Gopher, is a familiar species, attaining a length of 7 or 8 inches. Its fur is of a brownish red colour on the upper parts, and whitish brown below. The cheek-pouches are large. The Fur Country P. R. (*Saccophorus borealis*) is another well-known species. Its length is 10 inches, and its colour a yellowish grey above, and white below. The cheek-pouches are very large.

Poughkeepsie, a city of New York, U.S., on the E. bank of Hudson River, 75 miles N. of New York, and 69 miles S. of Albany by rail. It is one of the most agreeable places of residence in the United States, and is celebrated for the large number of its educational institutions, which include a commercial college. There are in the town twenty churches, a public library, and three daily and five weekly newspapers. The principal manufactures are dyewoods, carpets, pins, iron, and shoes. Pop. (1870) 20,080.

Poulpe (from the Gr. *polyppous*, a form of *polypous*, 'many-footed'), a name restricted in zoology to indicate the *Octopus*, or eight-armed cuttlefish. It has eight feet or arms surrounding the head and mouth, and may be regarded as representing typical species of the group to which it belongs. The P. is a *Dibranchiate*, or two-gilled Cephalopod, and is able to swim backwards through the water by the ejection of the water used in breathing from the anterior funnel or *infundibulum*. Like other Dibranchiate cuttlefishes, the P. secretes an inky fluid, which it pours out when irritated or alarmed, and thus darkens the surrounding water. The P. is now successfully kept in large aquaria.

Poultice. See CATAPLASM.

Poultry (from Fr. *poule*, a 'hen'; Lat. *pullus*, 'a young fowl'), the collective name of the Rasorial and Natatorial birds domesticated by man. Of these, the common fowl, turkey, guinea-fowl, duck, and goose are the species or genera most usually chosen. They are reared not merely for the sake of their flesh but for their eggs—the trade in eggs, indeed, having become well-nigh as important a branch of industry as that in P. itself. The breeding and rearing of P. form a subject of very wide extent, but of somewhat empirical nature. There is no lack of material it is true, but the results and methods of rearing P. have rarely been collated and arranged with the exactitude necessary to bring the results clearly before the mind. Of the so-called 'sitting' fowls, the Cochin-China, Malay, and Dorking breeds are the best known. The Spanish and Hamburg breeds rarely 'sit.' In Britain P.-keeping is generally regarded as a mere accidental appendage to the functions of a farmer. Continental farmers on the contrary find it a profitable enterprise, and give it a much greater amount of attention.

The P.-house should be built of brick or similar material, the floor especially should be hard and easy to clean thoroughly. It should have a special court attached to it, protected by wire-netting, and its floor bricked, whilst feeding-troughs and water-dishes should form part of the furniture. The hatching boxes should be kept separate and distinct from the ordinary living boxes, and special attention to ventilation is as necessary as attention to cleanliness. P. suffer materially when confined in badly-ventilated pens, and the only sure method of preventing them from being infested with parasites is to thoroughly and frequently purify the P.-house. The courtyard itself should possess a shade or covered portion to protect the birds from wet or the heat of the sun.

Regarding the housing together of P., turkeys and geese should be kept separate from hens; ducks and hens agree perfectly; the former of course require frequent access to water. Ducks, in fact, will thrive best if allowed an infinite measure of liberty. Their food consisting largely of worms, &c., is picked up readily in the mud of ponds and brooks; but their wandering habits to some extent interferes with the regular deposition of the eggs. After the young are hatched, the mother and her brood should for some time be shut up at night in a special box or pen. With regard to food, it may be said that there is no more profitable way of disposing of a large proportion of kitchen refuse than in a P.-yard. But in addition, P. require to be fed with corn, bran, and other substances, even

when they have free access to green vegetables and other food. The importance of a constant supply of pure water cannot be over-estimated, and unless P. have access to gravel, for the purpose of obtaining small pebbles to aid the action of the gizzard in triturating the food, they generally fail in health. A due supply of lime is also necessary for P., as affording the materials used in the formation of the shell of the egg, &c. See *The Henwife, her own Experience in her own P.-yard*, by Mrs. Ferguson Blair of Balthayock (Edin. T. C. Jack; 10th ed. 1877).

Pound (Old Eng. *pynd*, from *pyndan*, 'to shut in'), in English law, means an enclosure belonging to a parish or manor, in which stray cattle may be legally detained until damage done by them is paid for. *P.-breach* is the offence of liberating cattle lawfully impounded, or of damaging the P. The offender is liable by statute to a penalty of £5. 12 and 13 Vict. c. 92 provides for the punishment of persons assaulting the keeper of a P., and for the recovery of the expense of food given to cattle impounded.

Pound (Old Eng. *pynd*; Lat. *pondus*, 'weight'), is a standard unit of mass common to all the western and central states of Europe. It is ordinarily spoken of as a standard measure of weight; but the weight of a pound is strictly the force with which it is attracted towards the earth. The weight varies according to the locality, but the mass is always the same. At present the standard English P. is the mass of a certain piece of platinum, and is equivalent to 7000 grains. It is called the P. avoirdupois to distinguish it from the P. troy, which is equal to 5760 grains. The latter P. is employed exclusively by jewellers and apothecaries. The P. sterling is a coin equal in value to 20 shillings. The name was so applied at a time when 20 shillings were coined out of a P. of silver; and though there are now 66 coins to the P., the name is still retained in its original signification.

Pound'er, a technical term used to denote the force of a cannon firing solid shot. Thus we speak of a '100-P. Arm-strong gun.'

Poussin, Nicolas, a great French painter, was born near Grand-Andely in Normandy, probably on the 15th June 1593. After studying drawing in his native province, he repaired to Paris in 1612, and after suffering years of obscure misfortune and penury in the prosecution of his art, reached Rome in 1624. Here, having formed a friendly and professional alliance with Du Quesnoy, the sculptor, he devoted himself, in company with that artist, to the study of the ancient statues and bas-reliefs, though even at this time he preserved that loyal devotion to the works of Raphael which he had evinced from an early age. For some years, in spite of most patient and profound study, he was utterly ignored, but gradually friends gathered round him. The earliest and staunchest of these was Cassiano del Pozzo. Cardinal Barberini was his first patron, and his 'Death of Germanicus' and 'The Capture of Jerusalem,' painted for that liberal ecclesiastic, made P.'s reputation. The court of Rome gave him a commission to execute a mosaic of 'The Martyrdom of St. Erasmus' (in the Vatican Museum). It is the only work of P.'s that bears his signature. From 1630 to 1640 P. toiled incessantly in his great vocation. Among the fruits of his noble industry during these ten years are 'The Appearance of the Virgin to St. James the Less,' 'The Triumph of Flora,' 'Camillus handing over the Schoolmaster of Falisci to his Pupils,' 'The Rape of the Sabines,' 'The Manna of the Hebrews,' 'Four Bacchanals,' 'The Striking of the Rock,' 'Rinaldo and Armida,' 'The Passage of the Red Sea,' &c. Louis XIII. invited him to Paris in 1639, and lodged him in the Tuileries, where he painted his great work the 'Last Supper,' but from which, as a result of professional pique, he fled again to Rome in 1642, to return to France no more. He died at Rome, 19th November 1665, after a life of simplicity and devotion to art. P.'s lifelong admiration of Raphael was rewarded with something of the genius and spirit of that great master, and a Raphaelite grace and power mark the forms and expressions of his later works. His spirit is essentially classic, and one fault of his pictures is that they seem in some cases to be painted bas-reliefs—wanting in light and shade. In landscape he is admirable, and he is classed with Salvator as among the earliest great landscape painters. See Eugène Delacroix, *Le P., Moniteur* (1853); E. David, *Discours sur la Vie du P.*; *Lettres de N. P.*; and H. Lemonnier, *Docu-*

ments relatifs à N. P., in the *Annuaire de la Société Philotechnique* (1858).—**Gaspard P.** (properly Duchet), brother-in-law of Nicolas P., was of French extraction, but was born in Rome in 1613, studied under his brother-in-law, and achieved the highest reputation as a landscape painter. He is singular as being remarkable at once for fidelity and facility; his foliage is always true to nature, yet he could paint a landscape in a day. His composition is simple and impressive, and his tone usually sombre. He may be studied with advantage in the National Gallery, which contains several of his *chefs d'œuvre*. P. died in 1675.

Povin'dahs, or Bunn'ers. The name of the Lohani traders in N.W. India, mostly in the Punjab district of Bunnu, who from time immemorial have had extensive dealings with Bokhara and Central Asia. They are said to number 12,000 fighting men with 60,000 camels, and their trade by the Gomul Pass in Afghanistan amounts to £60,000 a year. They only make one journey in the year, for they have to force their way by fighting or by paying black-mail. They regularly lose a hundred or more men, and about 2 per cent of their beasts. In Afghanistan they pay dues varying from £1 to £9 per camel-load. The P. bring down shawl-wool, raw silk, gold and silver wire, dried fruits and horses; and carry back piece-goods, brocades, metal ware, indigo, spices, tea, gold coin, and gold thread.

Pow'an (*Coregonus cepedel*), a species of Teleostean fishes, allied to the Salmon family, and belonging to the same genus as the Pollan, Vendace, &c. It occurs only in Loch Lomond, in Scotland, and is familiarly named the 'Freshwater Herring.' It may attain a length of 16 inches. The P. is caught in quantities in August and September by means of nets. Its flesh is very palatable.

Powdered, or Semée, in heraldry, an epithet applied to a shield bearing any number of small charges exceeding six, scattered over the field, as the ancient shield of France in Westminster Abbey.

Powell, Baden, born at Stamford Hill, near London, August 22, 1796, entered Oriel College, Oxford, and graduated with first-class mathematical honours (1817). He took orders (1820), was presented to the vicarage of Plumstead in Kent (1821), became a F.R.S. (1824), and was appointed Savilian Professor of Geometry (1827). In 1854 he removed from Oxford to London, where he died, June 11, 1860. P. did much to promote the study of physical science at Oxford, and published treatises on the *Differential and Integral Calculus* (1829-30), on *Elementary Optics* (1833), and on the *Undulating Theory of Light* (1841), &c. He was also author of various theological works, all strongly tinged with Rationalism, amongst them being *Religion and Science* (1833), *The Connexion of Nature and Divine Truth* (1838), *Christianity without Judaism*, and *On the Study and Evidences of Christianity*, the last one of the famous *Essays and Reviews* (1860).

Power, in law, means an authority given to some one to do an act which, without the authority, he would not be entitled to do. When given to an agent, the writing and authority which it conveys are called a P., or Letter, of Attorney (q. v. under LETTER). The similar term of Scotch law is *Faculty*, which is also a term of English law (see FACULTY). Applied to the disposition of property, as leases, portions, &c., a P. may be either given or reserved, and the possessor is called the donee. The doctrine of *powers* comprehends the most technical and abstruse part of the law of property.

Powers, Hiram, an American sculptor, was born at Woodstock, Vermont, U.S., 29th July 1805. The son of a small farmer, he had received but a scanty education when he was obliged to provide for himself. He went to Cincinnati, where he was successively employed in a hotel, a store, and a clock-maker's shop. While in this latter situation he became acquainted with a Prussian sculptor, who was engaged at the time on a bust of General Jackson, and got from him some lessons in modelling. In this he made such rapid progress that he soon felt he had found his proper vocation. After some years' employment at the Cincinnati Museum, he went to Washington in 1835, and passed two years there in making busts of various eminent personages. The liberality of a patron, Mr. Longworth, enabled him to carry out a design he had long

cherished of visiting Italy. In 1837 he went to Florence, where he produced in the following year his statue 'Eve.' This was followed by the 'Greek Slave,' the best known and most admired of all his works. It was exhibited in the London Exhibition of 1851, and gained for P. a place in the foremost rank of living sculptors. Among his other works may be mentioned 'Il Penseroso,' 'The Fisher Boy,' 'California,' 'America,' statues of Washington and Calhoun, and busts of Marshall, Adams, Webster, Van Buren, and others. P. died 27th June 1873.

Poyning's Law, or Statute of Drogheda, passed in 1495, provides that all Acts then or lately passed in England concerning its common weal should be effectual in Ireland. It further provided that no parliament should be held in Ireland until the Lord-Lieutenant had certified to the English crown the cause for holding it, and licence had been given by the sovereign. P. L. was repealed, and the Irish Parliament emancipated, in 1783.

Pozzo di Borgo, Carlo Andrea, born at Alala, in Corsica, May 8, 1764, studied at the University of Pisa, became an advocate, and hailing the outbreak of the Revolution, sat for Ajaccio in the French National Assembly (1791-92). He returned to Corsica to attach himself to the party of Paoli, and on that leader's fall (1796) withdrew to London, and thence to Vienna (1798). Animated by a fierce hostility to the house of Bonaparte, P. next entered the service of the Emperor Alexander (1803), was a zealous promoter of the Russo-Austrian coalition terminated by Austerlitz (1805), and after the peace of Tilsit was again compelled to take refuge in Austria (1809-10). With the catastrophe of 1812 commenced the most important period of his diplomatic career. He urged Alexander to a continuance of the war, won over Bernadotte, opposed all overtures of peace that might prove favourable to Napoleon, and was appointed Russian ambassador to the court of Louis XVIII., sitting in this capacity at the Vienna Congress. After the battle of Waterloo, in which he received a wound, P. resumed his post of ambassador at Paris (1816-32), there doing all he could to dissuade the Bourbons from their reactionary policy, was created a Russian count (1826), and transferred to London (1834). In 1839 he retired into private life at Paris, where he died, February 15, 1842. See Vuhner, *Notice Biographique sur le Comte Pozzo di Borgo* (Par. 1842).

Pozzuola'na, a pulverulent volcanic product, originally obtained near Pozzuoli (q. v.), in the vicinity of Mount Vesuvius, and now procured from other European localities, enters, with rich lime, into the composition of some hydraulic mortars. It is mainly composed of burnt silica and alumina, which eminently fit it for mortar-making. P. may be made artificially from sand, clay, lime, and iron oxide. P. was employed by the Romans for mortar, and Smeaton first used it in England in the construction of the Eddystone lighthouse.

Pozzuoli, a town of S. Italy, province of Naples, 6 miles W. of the city of that name, situated on a projecting hill and at its base, overlooking the bay of P., which forms part of the Gulf of Naples. Although no longer a place of importance, it is intensely interesting on account of its marvellous vicissitudes, and its memorials are full of singular interest alike to the historian, the artist, and the student of natural phenomena. It was founded at an early period by the Greeks, and called by them *Dicalarchia*, a name changed to *Puteoli* by the Romans, who subdued the place in the Samnite wars. It repulsed Hannibal in 214 B.C., and subsequently became the chief Roman commercial city. As the principal depôt for the trade with Egypt and the East, it received Oriental forms of worship, and St. Paul spent seven days here (Acts xxviii.). Destroyed by Alaric, Genseric, and Totila, P. was rebuilt by the Byzantine Greeks, but the work of devastation was completed by earthquakes and volcanic eruptions. The ruined temple of Serapis (an Egyptian god) consists of a square court enclosed by 48 massive marble and granite columns, with 32 small chambers adjoining. The portico rested on six Corinthian columns (three of which remain), bearing a rich frieze, while in the interior of the court there stood a circular temple, and here were founded the statues of Serapis, now in the Naples Museum, and two inscriptions, which mention the restoration of the temple by Marcus Aurelius and Septimus Severus. The lower parts of

the ruin were long under water, and interesting observations have here been made of the various changes in the level of the sea. The Amphitheatre, which affords a clear idea of the design and arrangements of such structures, has an arena 369 feet long by 216 broad, which could be laid under water for the representation of naval combats. Other remains are those of the so-called Temple of Neptune, a few pillars rising from the sea, of the sea-covered Temple of the Nymphs, from which have been recovered a number of columns and sculptures, and of the Puteolaneum, the delightful villa of Cicero. Of the ancient pier of 25 buttresses, which supported 24 arches, 16 are left, 3 being under water. They are constructed of bricks and puzzolana earth, and bear an inscription recording that the pier was restored by Antoninus Pius. A common but mistaken belief is that they were connected with the bridge of boats which Caligula threw across the bay of Baia. The Solfatara (*Forum Vulcani*), near P., is the crater of an extinct volcano, an oblong space, enclosed by hills of pumice stone, from fissures in which ascend vapours and sulphurous gases. The only eruption of lava on record was in 1198. A stucco factory is now established here. To the E. are the white hills (*Colles Leucogei*), whose light-coloured dust was so prized by the ancients for tinting groats and other kinds of grain. Several streamlets which contain alum, and are used for cutaneous diseases, rise here, and fall steaming into a ravine near the Lago d'Agnano. The inhabitants, employed in soap and cement making and fishing, numbered in 1874, 11,751.

Prac'tice is an arithmetical method which aims at simplifying the process of compound multiplication. It is a growth of the British system of coinage, and could have no existence under a truly decimal system. The method is explained in all English text-books on arithmetic.

Præd, Winthrop Mackworth, a kinsman on his mother's side of the 'Father of Massachusetts,' was born in London, July 26, 1802, and sent in his ninth year to Langley Broom School, near Colnbrook. Thence he passed to Eton (1814), where his career was singularly brilliant, his editorship of the *Etonian* (1820-21) revealing to Charles Knight, its publisher, 'an unbounded fertility of mind and readiness of resources.' Entering Trinity College, Cambridge (1821), he gained six university medals for Greek and English verse, came out third in the classical tripos (1825), and was elected fellow of his college (1827). At Cambridge, with Macaulay, Moultrie, and Sidney Walker, he wrote for Knight's *Quarterly* (1822-23), and during a residence at Eton as tutor to the Marquis of Ailesbury's son (1825-27) had the chief management of the short-lived *Brazen Head*. In 1829 he was called to the bar at the Middle Temple, and travelled the Norfolk circuit with high success; but a seat in Parliament had always been his ambition, and in 1830 he stood for St. Germans as a Conservative, he and Macaulay having changed places in politics since the days when they debated at the Cambridge Union. This borough was disfranchised two years later, and P. afterwards sat for Yarmouth and Aylesbury, in 1834 filling the post of secretary to the Board of Control. His parliamentary career was hardly equal to the expectations formed of him, and its possibilities were closed by his early death, July 15, 1839. P.'s mock heroics, charades, *vers-de-société*, and political pasquinades, many of which appeared in the *Literary Souvenir*, are admirable in their kind, sparkling with subtle wit and polished sarcasm, while their freedom from the least taint of bitterness reflects the lovable nature of their author. Some of them were collected and reprinted at New York in 1844 and 1859, but the first complete edition is that published at London (2 vols. 1864), with a Memoir prefixed by Derwent Coleridge.

Præfect (Lat. *praefectus*), the title of various officers and magistrates in ancient Rome. The most important were:—(1) *Praefectus urbi*, the warden of the city, who possessed the imperium in the city in the absence of the consuls. The office, which had become superfluous by the appointment of the *praetor urbanus*, was revived by Augustus with greatly extended powers and the entire control of the police department. (2) *Praefectus praetorio*, who commanded the imperial bodyguard; (3) *Praefectus annonae*, an extraordinary magistracy for the distribution of public charity in times of scarcity; (4) *Praefectus aquarum*, the superintendent of the water supply; (5) *Praefectus aerarii*,

custodian of the treasury; (6) *Prefectus vigilum*, captain of the night watch.

Præmunire, in English Law, is an offence of a kind tending to promote Papal power, in diminution of that of the crown. It subjects the offender to forfeiture of estate, and to confinement during the will of the sovereign. Many statutes regarding P. are repealed, and prosecutions under it are now unheard of. There is only one instance of a prosecution in the *State Trials*. In that case the punishment of P. was inflicted on some persons for refusing to take the oath of allegiance to Charles II.

Prænes'te. See PALESTRINA.

Prætor (Lat. from *præire*, 'to go before'), at first the title of the Roman consuls as leaders of the state army, became a special official designation in 366 B.C., when, to indemnify the Patricians for the admission of the Plebeians to the consulship, it was decreed that a third officer should be elected from among the Patricians, in the *Comitia Centuriata*, immediately after the consular election. Not till 337 B.C. was there a Plebeian P. The P.'s functions were mainly judicial, and to the edicts of the successive prætors is mainly due the splendid development of the Roman law. Sometimes the P. led the state army, and during the absence of the consuls with their armies acted for them in the city. The P., originally a consul of the year before, was styled *Collega Consulibus*, was a curule magistrate, possessed imperium, and was attended by six lictors, though later by only two. Subsequently, the consuls were chosen from among the ex-prætors. In 246 a second P. was appointed to give judgment in suits between Romans and resident aliens, hence called *Peregrinus*, the original P., who retained only cases exclusively Roman, being styled *P. Urbanus*. In 227, two prætors were added for the administration of Sicily and Sardinia, two more for the Spanish provinces in 197, two more by Sulla, while Julius Cæsar raised the number successively to ten, twelve, fourteen, and sixteen. Augustus fixed it at twelve, but Tiberius had sixteen, and Pomponius speaks of eighteen under Nerva. The *P. Urbanus*, the first in rank, could never leave the city for more than ten days at a time, and besides his judicial functions, superintended the *Ludi Apollinares*. Those prætors who held office in the city were often at the end of the year sent to rule provinces with the title of Proprætor or Proconsul (q. v.). The prætorian provinces were fixed by the senate and distributed among the prætors by lot.

Prætorian Bands, or **Co'horts**, were a body of Roman troops distinguished from the rest by double pay and superior privileges. Originally they were simply the select guard of a general in battle; but Augustus constituted them a special order. In his time there were nine cohorts (each consisting of a thousand men, horse and foot), three in Rome, and the others distributed throughout the principal towns of Italy. They were composed of picked soldiers from the old Umbrian, Etrurian, and other colonies. Tiberius recalled those in the country and assembled them in a permanent camp at Rome, increasing their number and entirely changing their discipline. The officer who commanded them was called the prætorian prefect; and in the days of military despotism this prefect wielded almost imperial power. The prætorians served for sixteen years; the private soldiers ranked equally with centurions of the common army, and on retirement received 20,000 sesterces each. This celebrated band in later times degenerated into a company of robbers, who had to be bribed into peace by all political candidates for the empire. In 193 A.D. they actually sold the 'purple' to Didius Julianus; but in the same year Severus deprived them of their privileges. In 312 Constantine disbanded them.

Præ'ga, a suburb of Warsaw (q. v.).

Pragmatic Sanction or Rescript, a solemn decree promulgated by the supreme head of a state, is a term derived from the Byzantine court. In European history it is applied to (1) the ordinance by which Charles VII. of France, in 1438, secured the liberties of the Gallican Church (q. v.); (2) the instrument by which Karl VI., Emperor of Germany, vested in 1713 the Austrian succession in his male or (failing such) his female descendants, with reversion to his brother Joseph (see MARIA THERESA); and (3) to the law of inheritance by which Carlos III. of Spain abdicated the throne of the Two Sicilies in favour of his third son and his descendants (1750).

Prague (Czech *Praha*, Ger. *Prag*), the capital of Bohemia, and one of the most picturesque and interesting cities of Europe, is magnificently situated on the Moldau, 118 miles S. by E. of Dresden by rail. The Moldau here curves to the E., and the main part of the city, including the Altstadt, Neustadt, and Judenstadt, lies on the level right bank, while the Kleinseite and Hradschin (palace district) are built on the steep, hilly W. bank. The river contains several beautiful islets (the Sophien and Schützen being great public resorts), and is crossed by some nine bridges, of which the most celebrated is the Karlsbrücke (1357-1507), with sixteen arches, and a span of 540 yards. The buttresses are adorned with thirty statues and groups of saints, and a slab of marble on the coping marks the spot where John of Nepomuk, the patron saint of Bohemia, is said to have been cast into the river by order of the Emperor Wenzel in 1383. According to the legend, the saint floated on the Moldau, while over his head shone five brilliant stars. The Franz-Josephs-Brücke, leading to the grand new promenade on the left bank, was opened in 1868. Both parts of the city are girt with walls and bastions, and the citadel (*Wyssehrad*) in the extreme S., occupying the ancient castle of Libussa, is strengthened with modern fortifications. P. has many fine mediæval buildings, and its seventy-seven towers and its monuments give it a singularly imposing appearance. On the E. bank are the Gothic Rathhaus, erected 1838-48 on the site of an old building, of which the chapel and great tower of 1474 (with a curious clock) still remain; the Teynkirche, the old church of the Hussites of the 15th c., in which Georg Podiebrad was crowned in 1458, and which contains the statues of Cyril and Methodius, the apostles of Bohemia, the tomb of Tycho Brahe, &c.; the Rathhaus of the Neustadt (1370, greatly altered in 1806), the storming of which by the mob under Ziska began the Hussite wars in 1419; and the old palace of the Nostitz family, now the Bohemian National Museum, comprising a library with MSS. of Ziska, Huss, &c., art collections, and antiquities. In the Jews' quarter, or Judenstadt, at the turn of the Moldau, are nine synagogues, the most interesting, the Altneschule, a Gothic structure, dating from the beginning of the 13th c. On the high W. bank are the Jesuit church of St. Nicholas (1722), rich in gilding and marble; the cathedral of St. Vitus (begun 1344, repaired 1874), with a tower 323 feet high, the tombs of many Bohemian kings and several emperors, frescoes by the early P. school (Thomas of Mutina, Theodor of P.), &c.; the Burg or imperial palace, founded by Karl IV. in the style of the Louvre, and completed by Maria Theresa; the rich abbey of Strahow (Premonstratensian), on the highest site in P., containing among other pictures a valuable work painted by Dürer in 1506; the pilgrim chapel of St. Loreto, an exact imitation of the famous Italian Casa Santa; the Palace of Count Nostitz, with its rare collection of statues and casts, and about 400 pictures; and Count Czernin's palace, one of the largest in Germany, now used as barracks. The university, the oldest in Germany, was founded in 1348, and in the 15th c. attracted students from all parts of Europe. It has now (1878) 123 instructors, 1780 students, and a library of 130,000 vols. and 7762 MSS., rich in Czech literature. There are many benevolent and educational foundations, a German and a Bohemian theatre, and fine public gardens. Carolinenthal in the N.E. and Smichow in the S.W. are busy industrial suburbs, the former intersected by a railway viaduct two-thirds of a mile long. The centre of Bohemian commerce, P. manufactures cottons, linens, leather, hosiery, Bohemian glass, machinery, &c. Pop. (1870) 157,275, of whom four-sevenths are Bohemian, three-sevenths German, and 13,000 Jews. P. is said to have been founded by Libussa, first Duchess of Bohemia, in 722. The prosperity of its university was checked by the attempt of Wenzel to limit the privileges of foreign students, a measure which led to the founding of universities at Leipsic, Rostock, Cracow, &c. P. is famed in history as the sphere of action of Huss (q. v.) and Jerome (q. v.), the great heralds of the Reformation, and as the earliest stronghold of Protestantism in Germany. It suffered much from the Hussites under Ziska (q. v.), especially in 1424, and in 1620, soon after the opening of the Thirty Years' War, the victory of the Catholic League over Friedrich V., the Elector Palatine, on the White Hill (Weisse Berg, $\frac{3}{4}$ of a mile W.), sealed the doom of Protestantism in Bohemia. During the Seven Years' War, P. was taken by Friedrich the Great in 1744, but his troops were expelled in the same year. The 'Battle of P.' was a victory of Friedrich

over the Austrians, 6th May 1757. The Austrian troops suppressed a rising here in 1848. The treaty of P. settled the terms of peace between Austria and Prussia, 23d August 1866. See Tomek's *Geschichte der Stadt* (Prag, 1865), *Geschichte der Universität* (1849), and Ambro's *Der Dom zu P.* (1859).

Prahran, a suburb of Melbourne, on the S.E. side of that city, but forming a distinct municipality. It contains several important educational and charitable institutions, and a town-hall which is a prominent landmark for miles around. Pop. (1875) 16,309.

Prairie (Fr. *prairie*, 'meadowland,' from *pré*, 'a meadow') is a term used to denote any large expanse of grass-covered country without trees. There is much prairie-land in different parts of the world. In Europe a large portion of the Russian steppes, in Asia the greater part of Southern Siberia, in S. America the *llanos* bordering the Orinoco and the *pampas* of Buenos Ayres come under this definition. The term is, however, practically limited to the great central plains of N. America, covering an area of 400,000 sq. miles, and including Western Ohio, Southern Michigan, Wisconsin, and Minnesota, and the whole States of Indiana, Illinois, Missouri, Arkansas, Iowa, and Kansas, along with the territories of Nebraska and Dakota. These plains are sometimes flat, but generally undulating, of rich and finesoil, and drained by the great navigable rivers Ohio, Mississippi, and Missouri. They are rapidly being opened up by the spread of railroads, and already bear large crops of wheat and maize. Their indigenous animals—the buffalo, antelope, P.-hen, P.-dog, &c.—are fast dying out along with the Indian tribes. The absence of trees, except in the river-beds, has been attributed to the fineness of the soil, but is more probably due to climatic reasons, such as the smallness of the average rainfall, together with the periodical P.-fires. In several parts of the prairies remains of cities and fortifications have been discovered, which seem to indicate that the Indians who held them when first invaded by Europeans had themselves dispossessed a more highly civilised race.

Prairie-Dog (*Spermophilus Ludovicianus*), a species of Marmot (q. v.) or Rodent, found in the prairie-lands of N. America, especially near the Missouri and its tributaries. It occurs in the prairies (whence its name), and lives in burrows. The association of the rattlesnake and a species of burrowing owl (*Athene cunicularia*) with the P.-D. does not appear to be other than accidental. The owl appears to establish itself in the disused burrows. The average length of the P.-D. is 16 inches. It has a short tail and cheek pouches. The incisor teeth are large and protrusive. The body is reddish-brown above and white below; grey and black tints mingling with the red of the upper parts. Prairie-dogs do not appear to hibernate. They are exceedingly lively creatures, and gambol in front of their burrows, frequently sitting at rest on a little mound of earth placed in front of the entrance to their home. On the slightest alarm, they enter their habitations and disappear from sight as if by magic.

Pra'krit ('natural,' 'vulgar'), the name given to the group of Indian languages which are immediately derived from the Sanskrit. Properly speaking, the modern vernaculars now used ought not to be included, the term being strictly confined to those dialects, of various degrees of degradation, which can still be plainly recognised as of pure Sanskrit origin. In classical literature the P. is used by the subordinate personages in the dramas, and is found in the oldest inscriptions. See *Institutiones Linguae Pracriticae*, by Lassen (Bonn, 1837), and *An Introduction to the P. of the Sanskrit Dramas*, by E. B. Cowell, Professor of Sanskrit in the University of Cambridge (1875). The term *prakriti*, derived from the same root, is used in the Sankhya philosophy for the evolver, the primal cause of all existence.

Prase (Gr. *prason*, 'a leek'), a variety of chalcidony possessing a dark green colour due to the presence of copper. It occurs in the iron mines of Breitenbrunn, Saxony, and, in fine crystals, in the Cedar Mountains, Cape Colony. The *prasius* of the ancients was a pale leek-green stone, and was extensively engraved for signets.

Pra'ti, Giovanni, an Italian poet, born at Dascindo, near Trent, January 27, 1815, studied jurisprudence in the University of Padua, and in 1841 published the sorrowful love-poem *La Edmenegard*, which won so wide a popularity that its author resolved henceforth to devote himself entirely to the Muse.

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Early inspired by the vision of a united Italy, he nevertheless incurred the suspicion of his countrymen by his devotion to the House of Savoy, and on the outbreak of the Revolution of 1848 was hunted from Padua to Venice, and from Florence to Turin. In 1849 P. was appointed *Poda Cesareo* to Charles Albert; in 1862 he was elected a deputy in the Italian Parliament. Of late years he has resided at Rome. P.'s earlier romantic and political poems are infinitely superior to his later productions, in which he seeks to develop a mystic philosophy, though both are marked by a grace of thought and diction which go far to make up for a lack of spontaneity and original conception. To the former class belong *Canti Lirici*, *Canti per il Popolo*, and *Ballate* (1843), *Memorie e Lacrime* (1844), and *Passagiate Solitarie* (1847); to the latter, the epics *Rodolfo* (1855), *Il Conte Riga* (1856), and *Ariberto* (1860). A complete edition of his works appeared at Milan (1862). See Marchese, *Le Poete P. in the Revue des Deux Mondes* (March 1856).

Pratique (Fr.; Ital. *pratica*, Span. *practica*), a term used chiefly in the S. of Europe to denote the limited quarantine which the captain of a ship is held to have performed when he has proved to the authorities of a port that his vessel is free from infection.

Prato ('the meadow'), a town of Italy, province of Florence, 10 miles N.W. of the city of Florence, lies in a fertile plain on the right bank of the Bisenzio, and is a station on the Florence and Pistoja Railway. It has an ancient citadel, a magnificent cathedral, manufactures of straw-plait, silk, and woollen fabrics, and important publishing works. Pop. (1874) 39,594.

Prawn (*Palaemon*), the name of various species of *Decapodous* Crustaceans allied to the lobsters and crabs. The prawns are distinguished by a long *rostrum* or beak projecting from the front of the *carapace* or shell. The legs are well developed, the second pair being the most powerful, and the inner pair of antennæ having three divisions. The common P. (*P. serratus*), familiar on the British coasts, is a table delicacy. The flesh is much more palatable than that of the shrimp. The body is almost transparent, and has various tints and markings of orange and purple. The shell, like that of the lobster, turns red and opaque after boiling. Other species of P. belong to the genus *Hippolyte*. Of these, the best known is White's *Æsop* P. (*H. Whitei*); the Ring Horned P. is the *Pandalus annulicornis*, distinguished by the curvature upwards of the rostrum or beak.

Praxiteles, whom we know chiefly from the writings of Pliny and Pausanias, was a famous sculptor, and the founder of a school of sculpture in Greece in the 4th c. B.C. He is said to have commenced his artistic career in 364-360, and to have practised it to an extreme old age. He worked both in bronze and marble, but was more successful, more splendid in the latter material (*P. marmore felicior et clarior fuit*.—Plin.). Of many of his works we know nothing save from the descriptions of ancient writers, but they appear to have been in the highest style of art for beauty of form and vivacity of expression. An ancient copy of his 'Apollo the Lizard-Killer' is regarded as one of the treasures of the Vatican. Lucien states that his 'Venus of Crinolus' was the finest of his works. It was destroyed by fire at Constantinople in the 5th c., and its loss is regarded as one of the most deplorable sustained by art. The 'Bacchanalian Dance,' one of his masterpieces, together with other distinctive specimens of his work, is in the National Gallery. Poliorcetes, besieging Rhodes, where the treasure was, withheld his hand, lest in destroying the city he should also destroy this triumph of genius. Other works were the 'Nausicaa,' and the 'Paralus,' the latter a human figure, classed by Cicero among the most famous statues and pictures. P., whose nature was of a sunnier and more joyous character than that of Phidias, eschewed the grave subjects and the severe heroic forms in which his predecessor delighted. His art was liberal, luxurious; expressing itself in rich, if also somewhat effeminate forms of beauty.

Prayer (Fr. *prière*, from Lat. *precatio*) is the expression of the feelings implied by Religion (q. v.), which is the due apprehension of the character of God, and of our relation to him as our Creator, Preserver, and Redeemer: reverence and love for his divine perfection, gratitude for his mercies, penitence for sins, hope in his forgiving love, and desire for his favour and the blessings needed for ourselves and others. It assumes (1) the personality of God, (2) that he is near us,

and both able and willing to hold intercourse with us; and, (3) that he has the personal control of things out of himself. It thus appears that people's notions of the efficacy of P. will depend on their notions of God; and accordingly various theories on the subject might be enumerated. 1. That of the Peculiar People, who are the only consistent believers in the supernatural efficacy of P. to accomplish physical as well as mental and moral effects, and who, trusting entirely to the divine action, seek the aid of no human means, *e.g.*, medical skill to help the recovery of the sick. 2. That of those who use the proper human means along with P.: the one extreme of this theory being that God answers P. by natural means appointed for this purpose from the beginning, and that the P. and its answer were in the counsel of God, and if there had not been the one there would not have been the other; the other extreme, that the human means alone may be effectual, but that P. may assist, *e.g.*, the recovery of a sick person, by exciting his faith and hope. 3. That of those who, 'knowing the intelligent order that pervades the universe, believe in it, and, with true filial piety, would never suggest a petition for a change in the Great Will, as touching any childish whim of their own.' Of those who hold this last theory, some (1) believe that P. is entirely useless. (2) Others, admitting that it is so in the domain of natural phenomena, which are regulated by inviolable laws, hold that in the mental and moral universe there is conscious disorder which is a proof of the need and reasonableness of interference with it; otherwise, that the Mind and the Will may be influenced by P., through a direct action of the divine upon the human spirit. (3) And still another class hold the only effect of P. to be its reflex action on ourselves; a theory which has been held by some along with the belief in a personal deity (*cf.* Blair's *Sermon on James i. 17*, and a sermon by Dr. Leechman, Glasgow, 1744). But those who hold the theory in modern times generally regard the Deity as the infinite personification of our purest ideal, and P. as a yearning of the human spirit after that ideal. See Hodge's *Syst. Theol.* (Edinb. 1873), *Contemp. Rev.* (October 1872, January 1873, October 1876).

P. for the dead was practised in the Christian Church from the earliest times, having been probably practised among the Jews (*cf.* 2 Macc. xii. 43-45, Matt. xii. 32). It was common in the 2d c., and in the 4th c. it was reckoned a heresy to deny its efficacy. The reasons for the practice were various. See PURGATORY.

Pre-Adamites, the name of a supposed race of human beings who inhabited the earth prior to the creation of Adam. This theory, which gave rise to a short controversy in the Reformed Church in the 17th c., was started by Isaac Peyrerius, who was at first a Protestant, but died a Roman Catholic priest, and who published a work, *Preadamite* (1655), to prove from the *Epistle to the Romans* (v. 12-14) the existence of men in the world before Adam.

Prebend (Lat. *præbenda*, 'fuel and salt furnished to a royal envoy'), in canon law, is a stated income derived from some fixed source. Generally it is the right of receiving certain revenues for the performance of certain duties in a cathedral or collegiate church, the right to a stall in choir, and a vote in chapter. A P. may be held by a layman, and took its origin in the 11th c., when the commune formerly devoted to the support of the bishop and chapter was divided in equal portions among the latter. The holder of a P. is called a prebendary. See Blunt's *Dict. of Doct. and Hist. Theol.* (Lond. 1872).

Precedence, the order of general and social rank admitted on public occasions and in society. A table of P. both for men and women will be found in Burke's *Peerage*, where peers and baronets are numbered also with regard to their P. A particular place on the scale is an honour derived from the Crown or Parliament, or confirmed by authorised and ancient custom. The leading authorities are the statute 31 Henry VIII., the 'Act for placing the Lords,' which was of the nature of a declaration confirming ancient and pre-existing usage in the marshalling of dignities, an 'Order of all Estates of Nobles and Gentry of England' having been framed in 1339; the statute 1 Edw. VI. c. 7, s. 3, which enumerates the then names of dignity thus—duke, archbishop, marquis, earl, viscount, baron, bishop, knight, justice of either bench, or serjeant-at-law. Letters patent 9, 10, and 14 James I., which *inter alia* decided that younger sons of viscounts and barons should take P. of baronets; 1 Will. and Mary, c. 21; and the Acts of Union, 5 Anne, c. 8, and 39 and

40 Geo. III. c. 67, which defined the order of the various classes of peers thus—(1) Peers of England, (2) peers of Scotland, (3) peers of Great Britain, (4) peers of Ireland, and (5) peers of the United Kingdom. The sovereign ranks first, the Prince of Wales and the princes of the blood-royal next. The place after the sovereign's relatives is assigned to the Archbishop of Canterbury, the Lord High Chancellor, and the Archbishop of York, in order. Various high dignitaries of the Crown precede and intersperse the order of dukes, marquises, earls, viscounts, bishops, barons, judges, baronets, knights, &c. The eldest sons of peers of one rank come in P. after the peers of the next rank, the younger sons after the peers of the second following rank. A similar precedence exists among ladies, the P. of the husband being that which is regarded, except when the daughter of a peer marries a commoner, when she retains her rank by right of birth. The wives and children of great officers of state, however, have no P. on account of that official rank alone. Widows of peers married to commoners retain their old P. by courtesy. The daughters of peers, &c., rank in order after the wives of their eldest brothers. Dowager peeresses rank before the wives of existing peers. It is a leading principle of the law of P. that P. emanates from the father or husband, and cannot be derived from a female except in the case of a peeress in her own right. Thus the daughter of a duke confers no P. upon her son any more than the daughter of a citizen. Baronets, whether of England, Scotland, Great Britain, Ireland, or the United Kingdom, take P. according to the dates of their patents. Ambassadors yield P. only to the members of the royal family of the court to which they are accredited, and to the sons and brothers of crowned heads. Foreign ministers and envoys are assigned places in this country between dukes and marquises, although it was settled at the Congress of Vienna that they had no real claim to P. Lord-lieutenants and high-sheriffs of counties have no P. from these offices. The clergy, the bar, the army, navy, and other classes have amongst themselves a certain P. and relative rank, which gives them, however, no position on the general or social scale. The question of P. of the great officers of state of Scotland and Ireland with reference to similar officers of England has never yet been definitely settled. At the coronation of William IV. the Lord Chancellor of Ireland was placed next to the Lord Chancellor of Great Britain. The members of the College of Arms, who are the council of the Earl Marshal of England, are usually referred to on questions of P., and have charge of the arrangement of processions on state occasions. The Lyon Court is the authority in Scotland.

Precentor (Lat. *praecentor*), an officer in a cathedral. In cathedrals of old foundation the P., who ranked next in order to the dean, was intrusted with the charge of the inferior clergy and of the choir, and with other important duties. In modern cathedrals the dignity is held by a minor canon, who regulates the musical services. In monasteries, the P. is the monk who presides over the conduct of the service, keeps the books, sends out the briefs, and settles the prayers to be said for departed brethren. The leader of the psalmody in Presbyterian churches is called a P.

Precept, a term of Scotch law denoting an order to some one to do some legal act. Thus a P. of arrestment is a warrant by a judge to an officer of court to arrest the person named in the writing.

Precession of the Equinoxes is an astronomical phenomenon which is a dynamical consequence of the fact that the earth is not a true sphere. It is known that the earth's axis of rotation is inclined to the plane of the earth's orbit; and accordingly the great circles in which the equatorial plane and the orbital plane may be supposed to cut the sphere of the heavens must intersect in two definite points, which are called the equinoxes. These great circles are called respectively the celestial equator and the ecliptic; and their poles are separated by an arc which is equal to the angle contained by these two intersecting planes. Looked at in the direction in which the pole of the ecliptic lies, *i.e.*, from the same side on which the celestial N. pole is, the circumsolar motion of the earth is in the positive direction, is in other words contrary to the motion of the hands of a watch. Now the phenomena of P. consists of a slow negative rotation of the equinoxes round the ecliptic. This necessarily requires the revolution of the

pole of the equator round the pole of the ecliptic, so that the earth's axis describes a cone whose axis passes through the pole of the ecliptic. The revolution is accomplished in 25,800 years; or, the equinoxes have a mean annual retrogression of 50".2. For this reason Aries, the first sign of the zodiac, no longer coincides with the constellation of the same name. The true explanation of P. was given by Newton, who accounted for it by the action of the sun and moon upon that portion of the earth's mass which, owing to its spheroidal state, bulges out beyond the inscribed sphere. If the earth did not rotate about its axis, this action would bring the equatorial plane and the plane of the ecliptic into coincidence; but since rotation exists, the dynamical effect is the continual shifting of the line of intersection of these two planes. If the sun alone acted, the curve of precession would be an accurate ellipse. The action of the moon, however, modifies this in a peculiar way, so that the curve becomes a wavy ellipse. This secondary variation, which has a period of nineteen years, was discovered by Bradley, who called it Nutation (q. v.). The cause of P. is dynamically the same as the cause of the motion of the moon's nodes. See LUNAR THEORY and PERTURBATIONS.

Precious Stones. By this term, which is sometimes used as a synonym for jewel stones, is properly understood those ornamental stones that are found in comparatively large masses, and possess in a modified degree only the fire or lustre, hardness, transparency, and other characteristics for which the real jewels are so highly esteemed. Thus while the term *jewels* comprises the diamond, sapphire, ruby, spinelle, emerald, beryl, topaz, zircon, garnet, chrysoberyl, &c., the name P. S. is held to embrace amethyst, opal, agate, carnelian, jasper, rock crystal, malachite, lapis lazuli, &c.

Precipitation, in Chemistry, is the separation in the solid form of some compound from what was at first a solution. As a general rule most soluble salts are more soluble in hot than in cold water. Consequently P. often results from boiling the solution so as to evaporate it and render what remains stronger, and then letting it cool, when crystals of the salt crystallise out. Natural evaporation, by diminishing the quantity of the solvent, frequently leads to a like P. Again, it is well known that different salts differ widely as to their solubilities, some being quite insoluble in water; and it is a recognised truth in analysis, that if two saline solutions be mixed, double decomposition always takes place, if by the mutual actions of the two salts a less soluble salt than either results. This less soluble salt frequently appears as a precipitate, and it is upon the nature of the precipitates formed by the action of a known agent upon a given salt that the rules of chemical analysis are based.

Recognition, a term of Scotch criminal law denoting the examination of witnesses under superintendence of the Procurator Fiscal (q. v.) when a crime has been committed. The object is that the public prosecutor may have full information to enable him to frame the charge and carry on the prosecution.

Predestination is a theological term which is used in several somewhat different senses:—(1) In the general sense of foreordination, having equal reference to all events; (2) as referring to the general purpose of redemption, without regard to individuals; (3) to express the purpose of God in relation to the salvation of particular men, including the election of some to be saved and the leaving of the rest to perish. According to Calvinistic theology, the Decrees of God (q. v.) are—1. All reducible to one purpose, *i. e.*, out of the series of possible events God determined on the actual occurrence of the existing order from the beginning of time to all eternity. 2. They are eternal, so that history in all its details is but the evolution of the eternal purposes of God. 3. They are free, in respect of being founded on sufficient reasons, of being formed purely on the council of his own will, or of being absolute, or in no case conditional. 4. They render certain the occurrence of what he decrees. 5. They relate to all events, necessary or contingent, good or bad. With special reference to redemption, P. includes—(1) God's purpose to create the universe; (2) after Adam, by his fall, had brought all his posterity into a state of condemnation, the election of a certain number to eternal life and the leaving of the rest to perish; and (3) the complete salvation of all those whom he has thus chosen to life, for whom Christ specially died, and in whose behalf the certain efficacy

and saving power of the Holy Spirit is exercised. See Hodge's *Syst. Theol.* (Edinb. 1873).

Predicables (Lat. *pradicabilia*), in Logic, the kinds of terms or attributes always *predicable* of any subject. They are five in number, viz., genus, species, difference, property, and accident. See Mill's *Logic*, Book i. chap. vii.

Predicate. See PROPOSITION.

Pre-existence is a theory regarding the origin of the soul, in contradistinction to other two theories:—(1) That the soul of the child is derived from the parent as much as the body—a theory (called Traducianism, from the phrase *per traducem*, 'by transmission') which was held by Tertullian (q. v.); and (2) that it owes its existence in each individual to the direct creative power of God (Creationism). According to the Platonic philosophy, the ideas that constitute the essence and life of all external things have been eternally in the divine mind; but Origen (q. v.) went much further, in declaring that the souls of men have a separate, conscious, personal existence in a previous state. Creationism was from the first the orthodox doctrine of the Eastern Church, and subsequently of the Western as well. The Protestants generally adhered to this view, although most of the Lutheran divines of the 17th c. adopted Traducianism, which has found numerous able advocates in modern times, especially in Germany, where the theory of P. has also been revived. See J. Müller's *Christl. Lehre v. d. Sünde* (Eng. trans. Edinb. 1856).

Préfet, in France, is the name of various state officials, who are so called because their duties in some degree resemble those of the Roman *Præfct* (q. v.). The officials to whom the name of P., without any distinctive office, is usually applied, are the *Préfets des Départements*. The old *Maîtres des Requêtes*, subsequently called *Intendants*, exercised control of the administration in the provinces, till the country was divided into departments at the Revolution. In 1800 they were replaced by *préfets*, whose principal functions are to give local effect to government measures, to superintend the election of deputies, and to appoint *sous-préfets* over *arrondissements* and other officers, and who have power on occasion to declare a state of siege, and call out the military. They are, however, responsible to a kind of appeal court, called the *Conseil de la Préfecture*. In 1878 there were 86 such *préfets* in France, and 3 in Algeria. In addition, there is a *P. de Police*, and at the head of each of the five *divisions maritimes* into which France is now portioned, there is a vic-admiral bearing the title of *P. Maritime*.

Pré'gel, an important navigable river in the province of E. Prussia, formed near Insterburg by the confluence of the Pissa and Angeraff, flows in a westerly direction, and after passing Königsberg enters the Frische Haff, while it communicates with the more northerly Kurische Haff by the canal of the Deime. It is 120 miles long, and 720 feet broad at Königsberg, and its chief affluents are the Alle from the S. and Inster from the N. Below Taffian the stream divides into two channels, the Old and New P., which after a nearly parallel course of 18 miles, unite again at Königsberg, and thus enclose a long strip of land nowhere more than 3 miles wide. The valley of the P. is traversed by the Southern Railway of E. Prussia, which brings to Königsberg vast quantities of grain and timber from Russia.

Pregnancy, Concealment of. If a child be found dead, and its mother has concealed her pregnancy, the legal presumption is that she has murdered it. The burden of proving that it was born dead or died from natural causes is thrown on her.

Præhn'ite is a member of the zeolite group of minerals which includes all the hydrated double silicates containing no magnesium, or, at most, a very small quantity. P. is a double silicate of calcium and aluminium combined with one molecule of water. It is almost always found associated with calcite, so that it is probably formed in the presence of an excess of lime, being like all zeolites a hydrated felspar.

Præ'l'ate (Lat. *prælatus*, 'one set over'), means an ecclesiastic having jurisdiction over other ecclesiastics, and was primarily and properly applied to bishops, who in the primitive church received various titles of honour, as princes of the Church, presidents, inspectors, chief-priests, popes, &c. But in the ordinary sense, the superior of a religious order, an archdean, &c., is also a P.

Prell'er, Friedrich, a German painter, was born at Eisenach, 25th April 1804, and educated at Weimar, Dresden, and Antwerp. He resided from 1827 to 1831 at Rome, whence he returned in the latter year to become a professor at Weimar. Among the chief works of P., who excelled equally as a landscape and historical painter, are the series of mural paintings from the *Odyssey* in the museum at Weimar, the landscapes from Wieland's *Oberon* in the 'Wielandzimmer' of the grand-ducal palace of Weimar, and his sixteen cartoons from the *Odyssey* in the museum at Leipsic (reproduced by M. Jordan, Leips. 1875, and chromo-lithographed by Steinbock, Mun. 1876 *et seq.*). P. produced another series of forty illustrations to the *Odyssey* (engraved on wood by Brend'amour and Oertel; 2d ed. Leips. 1873), and more recently a series of similar cartoon illustrations to the *Iliad*. He died in April 1878.—**Ludwig P.**, born at Hamburg, 15th September 1809, after studying (from 1828) philology at Leipsic, Berlin, and Göttingen, settled first (1833) as a 'privat-docent' at Kiel, then as a professor at Dorpat (1838-43), and in 1844 became professor at the University of Jena. Appointed in 1847 chief librarian at Weimar, he travelled in 1852 through Greece and Asia Minor, and died at Weimar, 21st June 1861. P.'s chief works are *Demeter und Persephone* (Hamb. 1837); *Griechische Mythologie* (3d ed. by Plew, 2 vols. Berl. 1872-75); *Römische Mythologie* (2d ed. Berl. 1865); *Historia Philosophia Græca et Romana*, which he wrote in conjunction with Ritter (5th ed. by Teichmüller, Gotha, 1875); and *Aufsätze aus dem Gebiet der klassischen Alterthumswissenschaft* (edited by R. Kohler, Berl. 1864).

Prél'ude (Lat. *præludo*, 'I play before'), a movement played as an introduction to the performance of a musical work. It is usually written in the same key with the piece which follows.

Prem'ises, is an English law term denoting 'that part in the beginning of a deed, the office of which is to express the grantor and grantee, and the land or thing-granted.' It is further said that no person not named in the P. can take anything by the deed, though he be afterwards named in the *habendum*. In Scotch law, the word P. is applied generally to the subject-matter of a deed, and sometimes it is used to signify the lands or houses which are the subject of the right or conveyance. The name is said to have been given from the circumstance of the subject-matter being first described in full, and afterwards referred to as the P. (Lat. *pramissa*, 'things mentioned before').

Prem'iss is a proposition *going before* a conclusion. A regular syllogism consists of two premisses and a conclusion. The two premisses are sometimes called antecedents, while the conclusion is called the consequent.

Prem'ium Pudic'it'is is a consideration given to a previously chaste woman by the man who has seduced her. Equity will enforce payment of the bond. But the law distinguishes between an obligation for consideration *passed* and consideration *in futurum*. A bond for passed cohabitation is good; but one to live in a future state of concubinage is void. Regard is also had to the previous character of the woman in whose favour the bond is given.

Premonstratens'ians, or **Norbertine Monks**, were a religious order which was founded (1121) by Norbert, Archbishop of Magdeburg, at Prémontré (Isle de France), with the object of re-establishing the obsolete discipline of the regular canons. The rule which Norbert gave to the order was that of St. Augustine, with some slight alterations, and the addition of certain severe laws. By the sobriety of their life and manners, their learning, and cultivation of the useful arts, the P. soon became extremely popular, and spread over Europe. But, just as with the other orders, popularity brought them favour and riches, and riches brought in their train arrogance, luxury, and vice. At first so poor that their only property was an ass which carried the wood which they cut daily and sold for their subsistence, they soon received many donations, and in thirty years they had 100 abbeys in France and Germany. In course of time, in all parts of Christendom they had 1000 abbeys, 500 nunneries, and 300 provostships, besides a large number of priories. The P. came to England in 1146, where they were known from their habit as the White Canons, and where in the reign of Edward I. they had 27 monasteries. They had 6 in Scotland—at Stranraer,

Holywood, Whithorn, Tongland, Dryburgh, and Ferne (Ross), and several in Ireland. See Helyot's *Histoire des Ordres Monastiques* (Par. 1714).

Prenz'low (Ger. *Prenslau*), a town of Prussia, province of Brandenburg, lies on the Uker, where it flows into the Ukersee. It has a fine Gothic church (Marienkirche) of the 14th c., foundries, machine factories, and spinning mills. Pop. (1875) 15,731.

Prep'osition (Lat. *præpositio*, from *præ*, 'before,' and *ponere*, 'to place') is usually defined, in accordance with its etymology, as 'a word placed before a noun or a pronoun to show its relation to some other word in the sentence.' But it can easily be shown that such a definition is not sufficiently precise. A conjunction, for example, may express a relation between two words in the same sentence. The etymology itself is defective. A P. is not always 'placed before' the word whose relation it fixes; sometimes, even frequently, it comes after it. Innumerable attempts have been made by grammarians to give a more exact expression to the notion of a P. Most of these are failures. The least unsatisfactory is that of Mason:—'Prepositions are words placed before substantives, by means of which we show the relation in which things and their actions and attributes stand to other things.' Or, better still, 'Prepositions are words used to mark or determine the relations in which things and their actions and attributes stand to other things.' In the sentence 'I heard a foot on the stair,' 'on' is a word marking a relation of place between 'stair' and 'foot.' Again, in the sentence, 'I looked in his face,' 'in' marks the same relation between 'face' and the 'act of looking.' The principal relations which a P. marks are those of place, time, and causality. It is an almost universal practice of English grammarians to say that the P. governs the 'objective case.' Nothing can be more erroneous. To speak of 'case' here is absurd, but it is doubly absurd to employ the term 'objective,' which has no meaning except in connection with a transitive verb. In English parsing, pupils should be taught to exercise their intelligence in discovering the actual relations marked or determined by every P., and should not be taught to repeat a phrase into which it is impossible to import a vestige of intelligibility. See Bain's *Companion to the Higher English Grammar* (Lond. 1874), and Mason's *English Grammar* (19th ed. 1877).

Prerog'ative Court, was the court in England in which wills were proved and administrations taken out. In 1858 its functions were transferred to the *Probate Court* (q. v.).

Pres'burg (Mag. *Posony*, Slav. *Presburck*, Lat. *Posonium*), a town of Hungary, beautifully situated on the Danube, and on the spurs of the Little Carpathians, 41 miles E.S.E. of Vienna by rail. It consists of the inner town, Altstadt, the walls of which were demolished in 1778; the Ferdinandstadt and Neustadt on the N.; the Franz-Josephstadt on the Danube; and the Theresienstadt, Schlossberg (the Jews' quarter), and Zuckermünde on the W. The town lies on the N. bank of the river, which is crossed by a fine bridge of boats. The principal buildings are the Gothic cathedral of St. Martin—the former coronation-church of the kings of Hungary—begun in 1090, completed in 1452, restored 1865-67; the Landhaus, in which the imperial diets were held 1802-48, but which is now a court of justice; the Rathhaus; the Franciscan church, founded in 1293; and the Primatial-Gebäude, the winter palace of the Primate of Hungary. Besides those already named, P. has 23 other churches, a theatre, Natural History museum, several academies and high schools, an hospital, and a library of 50,000 volumes. On the Schlossberg, a plateau 273 feet above the Danube, stand the ruins of the royal palace, burned in 1811, and never restored. The industries of P. are important, and include silk-spinning and weaving, tobacco, leather, sugar, paper, and glass manufacture; while there is considerable transit trade in corn, wine, flour, fruit, rosoglio, chemicals, and timber. Pop. (1870) 46,540 (one-fourth Magyars, one-third Protestants, 7000 Jews). P. became the capital of Hungary in 1446, when the Turks had obtained possession of Ofen, but in 1784 the government was carried back to Ofen by Joseph II. A treaty was signed at P. in 1805, after the battle of Austerlitz, by which Venice and the Tyrol were ceded to France. See *Führer durch P.* (Presb. 1862); *P. und seine Umgebungen* (Presb. 1865).

Presbyo'pia, a term used in ophthalmic science to denote long-sightedness. The opposite condition of vision is termed *Myopia*, or short-sightedness.

Presbyte'rianism. Presbyter (Gr. *presbyteros*, 'elder') was a title for the rulers of the Church, borrowed from the Jews, and indicative rather of the wisdom than the age of the person. Presbyterians hold it to be synonymous with Bishop (q. v.). Episcopalians, on the other hand, maintain that presbyters or priests were from the first an order distinct from and inferior to the bishops, who were the successors of the apostles. However this may be, it is a fact that in the 3d c. there were three orders of clergy in the Church—deacons, presbyters, and bishops, and that the Church was finally organised on the principle of Episcopacy.

The distinctive tenets of P. are chiefly two:—1. It differs from Episcopacy (1) in having lay elders ordained, with equal powers to rule (hence called 'ruling' elders) with those of the ministers or teaching elders; and (2) in placing all its Church rulers on the same footing of rank or dignity. It is maintained that there is a distinction made in the New Testament between the two classes of elders—teaching and ruling (cf. Rom. xii. 8; 1 Cor. xii. 28; 1 Tim. v. 17), and that there is no ground in it for the threefold ministry of Episcopacy. The nature of the office of Deacon (q. v.) is held to be defined by the account of its institution in Acts vi., and hence the duties of deacons are confined to the oversight of the poor, and of the outward business of the house of God, while the titles of bishop and presbyter are regarded as equivalent (cf. Acts xx. 17, 28; Phil. i. 1; Tit. i. 5-7; Tim. iii. 1). 2. P. differs from Congregationalism (q. v.), which makes each worshipping assembly independent, by carrying out to the widest limits the principle of subordination and centralisation. There is a kirk-session in every parish, consisting of the minister and a body of lay elders. The ministers within a certain district, with one ruling elder from each session, constitute a Presbytery. Professors of divinity within the same district, if they be ministers, are also members. Several neighbouring presbyteries again combine to form a Synod, in which all the members of the included presbyteries may meet. The highest court is the General Assembly, the members of which are representative ministers and ruling elders from each presbytery, in proportion to the numbers in each. The country in which P. has always had the strongest hold, being the only one in which it has been the national form of Church government from the Reformation, is Scotland. Accordingly the history of P. in that country is the history of the Established Church, with its various offshoots. See SCOTLAND, CHURCH OF; FREE CHURCH OF SCOTLAND; REFORMED PRESBYTERIANS; UNITED PRESBYTERIANS.

Presbyte'rian Church—1. *In the Colonies.*—*Canada.*—Every shade of Presbyterianism which has prevailed in the mother country has had its representatives in this colony, but the different branches have been at length united. A union took place between the United Presbyterians and the Free Church in 1861, and in 1875 between this united Church and the branch in connection with the Church of Scotland. In 1877 the Presbyterian population was 600,000, the number of congregations 1008, and of ministers 733.

Australia.—The history of Presbyterianism in this colony is almost the same as in Canada. The different branches identified with the Church of Scotland, the United Presbyterian, and the Free Church were united—in Victoria, 1859, Queensland, 1863, New South Wales and South Australia, 1865. The total number of parishes or charges in Australia in 1877 was 278, and of ministers 262; and in all the British Colonies, including South Africa (the P. C. of which has had a connection with Holland, France, and Scotland) and New Zealand, the same year, 1641 charges and 1291 ministers.

2. *On the Continent of Europe.*—The following are the statistics for the various countries in 1877, Germany being omitted because the form of government of the Reformed Church in that country is only partially Presbyterian:—

	Par.	Min.		Par.	Min.
Switzerland	898	1038	Italy—Vaudois	56	56
France—Reformed Ch.	540	595	Free Italian		9
Union of Free Chs.	46	46	Hungary	2007	2017
Holland	1309	1583	Bohemia and Moravia	68	67
Belgium	13	15	Russia	40	40
Christian Mission Church	34	18	Spain	12	12
			Norway	3	3

3. *In England.*—The history of Presbyterianism in England begins with Wiclif (q. v.) and the Lollards (q. v.), who in the 14th and 15th centuries rejected episcopal authority. An attempt was made by some of the Puritans of the 16th c. to model the Church of England on that of Geneva. The first separate congregation of Presbyterians was formed at Wandsworth, near London, 1572, but no great number of congregations existed till the Civil War (1642). The system was established under the Commonwealth, but had to give place to Episcopacy again at the Restoration (1660). The organisation and discipline of Presbyterianism were never very stringent in this country, and laxity of doctrine prevailed to such an extent that in the 18th c. it drifted bodily into Unitarianism. A few congregations only remained in the northern counties, between whom, under the title of 'The Synod of the P. C. in England,' and the Church of Scotland there was an unsuccessful attempt to form a union in 1836. A union was formed in 1876 with about an equal number of United Presbyterians, and in 1877 the Church comprised 43,434 enrolled members, in 258 congregations, and 10 presbyteries. Of Welsh Calvinistic Methodists (q. v.) there were in 1875, 1098 congregations, with 522 ministers, in 24 presbyteries.

4. *In Ireland.*—Presbyterianism first obtained a permanent footing in Ireland in 1642 among the Scotchmen who had previously settled in the country. After the Restoration (1660) the Church suffered much persecution, which came to an end at the Revolution (1688). The Regium Donum (q. v.), a grant of £600 which had been given by Charles I., was now doubled, and in 1719 the protection of the Toleration Act (q. v.) was obtained. As in England, Unitarianism began to prevail about the end of the 17th c., and led to a schism (1726). A party who opposed subscription to the Westminster Confession formed themselves into the Presbytery of Antrim, and the more orthodox party remained as the Synod of Ulster. A union was formed in 1840 between this latter body and the Secession Church, which had been founded about a century before by Scotch seceders. The united body, which assumed the title of 'The General Assembly of the P. C. in Ireland,' reckoned in 1877, 560 congregations, 600 ministers, 37 presbyteries, and 5 synods. The Reformed P. C., which was founded in Ireland in 1763, had about 5500 members in 41 congregations, with 31 ministers.

5. *In the United States.*—I. *Of promiscuous origin.*—(1) The first congregation of English-speaking Presbyterians in America of which we know was formed in Maryland by a minister of the Irish P. C., who came from Barbadoes in 1684. In 1705 a presbytery was formed, and in 1716 the Church assumed the title of 'The Synod of Philadelphia.' The adoption by the Church in 1729 of the Westminster Confession, and the revival produced by Whitfield, led to a disruption in 1741, and the formation of the *old side* Synod of Philadelphia and the *new side* Synod of New York, which, however, reunited in 1758. In 1766 they entered into friendly relations with the Congregationalists, but, although a 'Plan of Union' was adopted in 1801, the two Churches never amalgamated. The Plan was abrogated in 1837, and in 1838 the Church itself, owing chiefly to disagreements on this subject, was divided into the Old and New School Presbyterian Churches; but the two were reunited in 1869. This is the P. C. in the United States of America (North). (2) The P. C. in the United States (South) was formed by the withdrawal from the Old School Church of all the congregations in the Southern States on the outbreak of the Civil War in 1861, to which acceded in 1867 the Synods of Kentucky and Missouri, and part of the Presbytery of Chesapeake. II. *Of Continental origin.*—(1) A branch of the Reformed Church was founded by the Dutch emigrants who settled on the Hudson in 1619, which, however, remained dependent on the Church of the home country till 1771. In 1785 it assumed the title of 'The Synod of the Dutch Reformed Churches,' from which the prefix *Dutch* was dropped in 1867. The Huguenots established churches in the country shortly after 1685. (2) The Reformed German Church was founded in the beginning of the last century by Palatines, Huguenots, and some Swiss. III. *Of Scotch origin.*—(1) A branch of the Associate Church was founded by Scotch emigrants who sympathised with the seceders of 1733. This Church, which was organised in 1754 as 'The Associate Presbytery of Pennsylvania,' united in 1782 with the Reformed P. C., the united body taking the name of the Associate Reformed Church. In 1858 another union took place with the Associate Church, which had grown out of a minority which stood aloof

from the union of 1782, the name now adopted being the United P. C. of N. America. The Associate Reformed Synod of the South was formed in 1821 by the Synod of the Carolinas separating itself from the Associate Reformed Church. (2) The Reformed P. C., which had been formed by Scotch and Irish emigrants, and organised as an independent presbytery in 1774, united with the Associate Church in 1782; but a minority, who refused to accede, got ministers to form a presbytery in 1792, which was organised into a Synod in 1809. A minority, who held it to be right to act as citizens of the States, seceded in 1833, and formed the General Synod of the Reformed P. C., being popularly known as the New Light Covenanting Church. The following statistics are for 1877:—

	Charges.	Ministers.
P. C. (North)	5077	4744
" (South)	1821	1004
Reformed German	1347	650
Reformed Dutch	506	346
United Presbyterian	783	640
Reformed Presbyterian	104	200
General Synod of Reformed P.	55	24
Associate Reformed Synod of the South	100	80
Welsh Calvinist Methodists	..	75

See *Report of the Pan-Presbyterian Council* held in Edinburgh in 1877. See PRESBYTERIANISM.

Presbytes, a genus of *Catarrhine* or Old World monkeys, represented by the Simpai of Sumatra (*P. melalophos*), or Black Crested monkey; by the Entellus (*P. or Semnopithecus entellus*), and by the Proboscis monkey (*P. larvatus* or *Kahau*). In these monkeys the cheek-pouches are rudimentary, the thumbs short, and the tail may exceed the body in length.

Prescot ('the priest's cot'), a town of England, in Lancashire, 8 miles E. of Liverpool, and 2 miles from the Rainhill station of the London and North-Western Railway. It has important manufactures of watch movements, tools, and files, and in or about the town are extensive cotton and flax mills, breweries, drain-pipe works, potteries, and coal mines. Pop. (1871) 5990.

Prescott, William Hickling, D.C.L., an American historian, was born at Salem, Massachusetts, 4th May 1796. He was descended from an old Massachusetts family, his grandfather, Colonel William Prescott, having been an officer in the Revolution. P. received his early education at Boston, where his father held a distinguished position as a lawyer, and entered Harvard College in 1811, with the intention of following the same profession. He graduated in 1814. An accident during his college course deprived him of the use of one of his eyes, and his intense application having greatly impaired the other, he was forced to abandon all idea of becoming a lawyer, and spent the next two years in travelling through England, France, and Italy. On returning to America he married, and commenced a systematic study of history, contributing at the same time some papers to the *North American Review*. Finally he resolved to devote himself to Spanish history, and his friendship with Mr. Everett, then United States Ambassador at Madrid, enabled him to acquire a unique collection of original MSS. and rare books bearing upon the events of the period he had chosen for investigation. Supplementing his defective vision by the constant use of a reader and secretary, and working in the most rigidly methodical way, he got through an amount of work which is astonishing, even if we take no account of the disadvantages under which he laboured. In 1833 appeared his *History of the Reign of Ferdinand and Isabella the Catholic* (3 vols.), which was received with great applause both in Europe and America, and was translated into French, Spanish, and German. After six additional years of labour, he published his *History of the Conquest of Mexico, with a Preliminary View of the Ancient Mexican Civilisation, and the Life of the Conqueror Hernando Cortes* (3 vols. 1843), which was followed by the *History of the Conquest of Peru, with a Preliminary View of the Civilisation of the Incas* (2 vols. 1847), *History of the Reign of Philip II., King of Spain* (vols. i. and ii. 1855, vol. iii. 1858), a work which P.'s death prevented him from completing; and an edition of Robertson's *History of the Reign of Charles V.* (1856), with notes, and an account of the Emperor's life after his abdication. P. was a member of most of the learned societies of Europe, and had the degree D.C.L. conferred on him by Oxford in 1850. He died at Boston, January 28, 1859.

P.'s works rank as standard authorities on the periods of which they treat, a position to which they are entitled not more by the large amount of original information which they contain, than by the fair and judicious spirit which has reduced that information to an historical form. There is a certain easy and picturesque elegance in the language, but it lacks force, brilliancy, and beauty. P. was not a great historical genius, but he was a great student; and his writings show how much can be achieved by patient and intelligent labour. A cheap edition of P.'s historical works was issued by Routledge (4 vols. 1866). A new edition of his complete works, superintended by his last secretary, John Foster Kirk, was published at Philadelphia in 15 vols. (1874-75). See *Life of W. H. P.*, by George Ticknor (1864).

Prescription, in law. A right may be acquired or lost by P. By 3 and 4 Will. IV. c. 27, no person shall make an entry or distress, or bring an action to recover any land or rent, unless within twenty years after the time at which the right to make the entry or distress or to bring the action accrued. In case of tenants at will, the right of action may accrue at the end of the tenancy, or at the end of one year from its beginning, at which time the tenancy is supposed to finish; but no mortgagee or *Cestui que Trust* (q. v.) is within the clause. Money charged on land or rent must be claimed within twenty years. No arrears of rent or of interest arising from money charged upon or payable out of land or rent, or in respect of any legacy, is recoverable after six years from the date of falling due. (See IMMÉMORIAL USAGE; LIMITATIONS, STATUTE OF; MERCANTILE LAW AMENDMENT ACT; EASEMENT.) In Scotland, P. is divided into *positive* and *negative*, the former being a mode of acquiring property, or rather of protecting the right from challenge on account of the possessor having continued his possession for the period which bars challenge; the latter, which is the converse of the former, is the loss of a right from not having used it for a certain length of time. Forty years' uninterrupted possession of heritage bars challenge. The statute (Scotch) of 1617 enacts that all actions competent by law upon heritable bonds, reversions, contracts, &c., shall, unless under special circumstances stated in the Act, be begun within forty years from the date of the same. There are also what are called the lesser prescriptions. The decennial P. is in favour of tutors and curators, limiting the right of the pupil or ward to call them legally to account to ten years after the expiration of the office. The sexennial P. limits the right of action on bills of exchange and promissory notes, except bank-notes, to six years from their date. The Act 1579 enacts a triennial P. with regard to tradesmen's accounts, servants wages, and similar debts.

Prescription, in medicine, is the term applied to the written direction or receipt of a medical practitioner to be given to the chemist for the preparation of a medicinal substance. The P. may be for an official compound, the formulæ for which are contained in the British Pharmacopœia, and are therefore supposed to be kept in preparation by all dispensing chemists, or for an extemporaneous compound devised specially for the patient under treatment.

Dr. Paris lays down *five objects* which the physician should have in view in the construction of an extemporaneous formula or P. They are—(1) To promote the action of the principal medicine, or, as he terms it, the basis of a formula; (2) To correct the operation of the basis; (3) To obtain the joint operation of two or more medicines which act in totally different ways; (4) To obtain a new and active remedy not afforded by any single substance; (5) To select an eligible form. The first object may be attained by combining different preparations of the same substance, as a tincture with an infusion; or by combining different substances having a similar action; but in all such cases care must be taken not to prescribe incompatibles. The second object is to render certain medicinal substances more agreeable in their action by adding a corrective: thus by adding a due proportion of the extract of hyoscyamus to the extract of colocynth, the griping tendency of the latter is obviated without interfering with its purgative action. The third object is to act upon a diseased part by the administration of medicines which, when administered separately, act in different modes; thus, in certain cases of dropsy, which is a mere symptom, cathartics and diuretics may be combined, and by such means the symptoms may be more effectually removed than by either the one or the other administered separately. The fourth object

is usually attained by extemporaneous chemical decomposition; thus by prescribing perchloride of mercury with iodide of potassium, biniodide of mercury is formed; or an action may be produced by two medicines prescribed simultaneously different from what would be produced by either when taken singly, or within a short interval of each other. The physiological effect of Dover's powder, a mixture of opium and ipecacuanha, is very different from that of either one or other taken separately. The fifth object is to present the medicine in an agreeable form, so as not to cause nausea. This is certainly one of the most important objects to be had in view, for there is no reason why a medicine should be given in a nauseous form, more particularly to children. The active ingredients of many medicines can be given in small bulk, in the form of pills, and the pills may be coated and thus rendered tasteless. Castor-oil and codliver-oil, the taste of which is repugnant to many, may be given in the form of emulsion, and so rendered almost tasteless. It was formerly the custom to write elaborate prescriptions containing an immense number of different ingredients, but medicinal compounds are not now generally so complicated. It is the custom to write out prescriptions in Latin, but many physicians have adopted the practice of writing out the directions in plain English.

Presenta'tion, the name given to the act by which the patron of a living in the Established Church of Scotland appointed a minister. The name has fallen into disuse through the abolition of Patronage (q. v.).

Present'ment is the notice taken by a grand jury of any offence, from their own knowledge, without any bill of indictment laid before them. There may be the P. of a nuisance or a libel, upon which the officer of the court must afterwards frame an indictment, when the party presented against can be put on trial.

Preserves' for game has no privileges beyond other private grounds, the occupiers of which may hinder others from sporting in them, unless there is a right of chase or free warren. If any one enter on the ground of another he is a trespasser, and if he refuse to go away, he may be forcibly ejected.

Preserved Food. The subject of the preservation of food is one of great and increasing interest in a country like Great Britain, whose native food resources are quite inadequate to meet the wants of the population. It is of almost equal importance in colonies and foreign states capable of producing food much in excess of the necessities of their inhabitants, and wherever distant markets must be resorted to for the disposal of surplus produce. With many and most important food products no difficulty arises, as cereals, starches, sugar, spices, and other substances can be conveyed to and used in all parts of the world in as good a condition as in the regions of their production. But there are numerous important products which undergo putrefactive changes with such rapidity that unless their tendency to change is counteracted by artificial means they are only available as food within a limited time after their collection or preparation. The substances which thus demand some means of artificial preparation are succulent vegetables and fruits, and all kinds of animal food. The latter is by far the most important section, and as regards vegetable products it may be sufficient to remark that the physical conditions which tend to preserve animal substances are generally applicable to vegetable products, while 'preserves' of fruits boiled with sugar are universally known as jams, jellies, or candied fruits.

The trade in P. F. is not of recent origin, but within the past few years it has rapidly attained great dimensions and importance. The number of schemes propounded and patents secured for food preservation are almost countless; but hitherto comparatively few and simple processes have been found practically available. The various methods suggested resolve themselves into four principal classes—1st, the use of chemical antiseptics; 2d, desiccation or drying; 3d, exclusion of air; and 4th, refrigeration or exposure to cold. In many cases combinations of these classes of agencies are employed.

Chemical Antiseptics.—The typical example of these agencies and that which has been employed from very remote times is salting or curing with common salt. The salt acts chiefly by the removal of watery juices from the tissues of animal food, and in so doing it drives off a certain proportion of the nutritive ingredients. Other substances have been associated with salt, and other processes are superadded to salting with the view of

effecting a mild cure. Among the chemical agencies proposed, the most hopeful have been sulphurous acid, acetate of potash, and bisulphite of lime. The latter, as patented and employed by Messrs. Bailey & Son of Wolverhampton, has been found to be an inoffensive and efficient agent for preserving butchers' meat for short periods. Vinegar is used to a small extent as a pickle for animal substances, but largely for vegetables. Smoking depends for its efficiency partly on the antiseptic properties of the smoke, and partly on the drying and coagulation of albumen in the process.

Desiccation or Drying is a method which has been successfully practised with fish, and in tropical countries with other animal food. In S. America beef is cut into strips and exposed to the sun until quite dry and brittle, when it forms *charqui* or jerked beef, a form of food at one time introduced into this country from the River Plate, without any great success. Except for special purposes, no greater success has attended the powdered meat proposed by Dr. Hassall. Meat biscuits are prepared with powdered meat and farinaceous materials; and Pemman (q. v.) is another form in which desiccated meat is employed. The process of drying is applied with most satisfactory results to vegetable substances, as evidenced by the compressed vegetables of Chollet & Cie. of Paris and other firms.

Exclusion of Air.—This process is a practical exemplification of the truth of the germ theory of putrefactive change, its success depending upon first heating the material to be preserved to such a degree as to kill living germs, and then hermetically sealing it in tins with the exclusion of all atmospheric air. Tinned meats, fish, soups, and stews prepared on these principles now occupy a most important position in the list of food supplies. Mutton and beef so prepared were first largely imported from the Australian colonies, but now the United States and Canada supply large quantities, while enormous supplies of salmon tinned with oil come from the Columbia River off the Pacific coast. Sardines cooked in oil is another and old-established form of food preserved by tinning.

Refrigeration.—The most recent and altogether most satisfactory process for the temporary preservation of fresh alimentary substances is found in the artificial application of cold during transit. The principle has been long known and acted on to a limited extent, as in preserving and transporting salmon to distant markets, &c., but now on a great scale it is worked with such certainty and success that fresh meat can be transported from and through tropical heat to any distance in perfect condition. The British markets are now supplied with a considerable proportion of this fresh meat from the United States by means of refrigerating appliances fitted up in the great ocean steamers. The trade was begun only in October 1875, and already it has attained enormous proportions, with the prospect of such further expansion as will materially affect the economical conditions of large classes. The ordinary method of transmission consists in sewing up the carcasses in canvas and hanging them in specially constructed chambers, which are maintained at a temperature of 37° by a constant current of cold air blown into it by a fan blast set in motion by steam. The air admitted to the chambers is cooled down to 37° by passing it over ice; and maintained at that temperature, the meat is delivered in London quite as fresh and in as good condition as it can be shown in New York.

Pres'es of Meeting. In Scotland, the business of a meeting of creditors cannot proceed without a P. He has no power beyond that of constituting the meeting and preserving order in it. His vote is only that of one creditor.

Pres'idency, the name given by the East India Company to their settlements at Fort William, Fort St. George, and Bombay, each of which was placed under a Governor and Council, who exercised a delegated authority over the neighbouring commercial factories. Ultimately the P. of Fort William or Bengal being interpreted to include all the rest of British India which was not either Madras or Bombay, owing to the supremacy of the Governor-General, became unwieldy and has been split up into five manageable provinces, under Lieutenant-Governors or Chief Commissioners. The threefold division, however, survives in the administration of the army, and the nominal organization of the Covenanted Civil Service; and the three capitals are still known as the P. towns.

President of the Council is the fourth great officer of state. His office is to attend on the Queen, to propose business

at the Council table, and to report the transactions there to Her Majesty.

Pressen'sé, Edmond de, D.D., a French Protestant minister, born at Paris, 27th January 1824, was educated there, at Lausanne under Vinet, and at the Universities of Halle and Berlin. He settled in Paris as pastor of the Taitbout Chapel, and soon became celebrated as an eloquent, learned, and liberal preacher. In 1863 the degree of D.D. was conferred upon him by the University of Breslau. He is the author of numerous works, many of which have been translated into English:—*Histoire des Trois Premiers Siècles de l'Église Chrétienne* (4 vols. 1858-61; Eng. trans. Edin. 1862); *Jésus-Christ, son Temps, sa Vie, son Œuvre* (1866; Eng. trans. Lond. 1866, 3d ed. 1869); *Discours Religieux* (1859; Eng. trans. Edin. 1864, Boston 1867); *L'Église et la Révolution Française* (1864; Eng. trans. Lond. 1869), and *Études Évangéliques* (1867). P. is the founder of the *Revue Chrétienne*, and the *Bulletin Théologique*.—**Madame de P.**, wife of the preceding, is favourably known as a writer of religious and educational works.

Press, Freedom of the, is a phrase used to describe immunity from the official censorship which was formerly exercised over publication. Soon after the discovery of Printing (q. v.) it was seen that the P. was likely to become a powerful instrument in the formation of opinion, and both kings and priests tried hard to keep it under safe control. Acts were passed conferring a monopoly of publication on certain parties, who required government sanction before they could issue a line. In England, Henry VIII. was as tyrannical in this as in other respects. No more would the Puritans in their hour of triumph tolerate opposition. As they shut up the playhouses, so they exercised a stern censorship over the P., and the genius of Milton pled in vain for 'the liberty of unlicensed printing.' The Restoration enforced the censorship with increased rigour, but with diminished regard to public morality. In 1693 the House of Commons voted the abolition of official or Government censorship of the P., and since that date it has been unknown in Great Britain. In most parts of Europe it is still practically in force, for although no formal surveillance *previous* to publication may exist, yet the authorities do not scruple on occasion to seize and confiscate newspapers, pamphlets, or books which they choose to consider objectionable, and to prosecute authors and publishers for the expression of political or religious sentiments. The only countries in the world where the principle of the 'freedom of the P.' is frankly and absolutely accepted are Great Britain (including her colonies) and the United States. Although the P. is free from official censorship, it is not exempt from the authority of law. One is at liberty to publish what he likes, but he must take the consequences. If he outrages public morality by obscenity, or inflicts in any way malicious injury on another's character, he may be prosecuted—in the former case criminally, in the latter civilly. In this respect the usage of the United States permits much greater latitude than is allowed in England. See **LIBEL**, and **OBSCENE PUBLICATIONS**.

Pressing to Death. See **PEINE FORTE ET DURE**.

Pressiro'stres, a group of *Grallatorial* or Wading Birds, in which the bill is of moderate length, and has its tip compressed. The legs are long, but the toes are short, and most frequently connected by membrane at their bases. The great toe may be rudimentary or wanting. The wings are well developed. To the P. belong the bustards (*Otidæ*), the plovers (*Charadriadæ*), lapwings, pratincoles, &c.

Prester John is the name given by the Europe of the Middle Ages to a supposed Christian potentate in the heart of Asia. About the beginning of the 11th c. it was reported that a king beyond Persia and Armenia had been met by the spirit of a departed saint in the depths of a forest, that the king had been converted, and that his subjects, to the number of 200,000, had been commanded to adopt the Christian religion. In the 13th c., some Nestorian priests asserted that he was Jung Khan, a Tartar chief in the Karakorum range, who was slain in 1202 by Genghis Khan. Giovanni Carpini, a Franciscan friar engaged on a mission to the grandson of Genghis in 1246, did not discover this Christian potentate, but supposed him to live still further eastward. As late as the 15th c., P. J. was searched for by the Portuguese, who had reached India by the Cape of Good Hope. Mosheim conjectures that he may have been a Nestorian

priest who gained a throne in Eastern Tartary. Some have supposed him to be merely the Grand Llama. P. J. was supposed to govern his people as a priest, after the patriarchal fashion; and hence his name. See *Father Rubruquis' account of his search at the instance of St. Louis (1253), in Purchas' Pilgrims; Assemani's Bibliotheca Orientalis; Curious Myths of the Middle Ages*, by S. Baring-Gould (new ed. Lond. 1876); and Oppert, *Der Presbyter Johannes in Sage und Geschichte* (2d ed. Berl. 1870). The opinion of Gibbon that P. J. was a khan of the Keraites, a Mongol clan, is adopted by the latest writer on the subject, Mr. H. H. Howorth, in his *History of the Mongols* (1st vol. 1876).

Pres'to (Ital. fast), a direction in music. *P. assai*, very fast, *prestissimo*, as fast as possible.

Preston, a considerable seaport and important manufacturing centre in the county of Lancaster, on the N. bank of the Ribble, 27 miles N.N.E. of Liverpool, and 210 N.W. of London by rail. Built on an eminence 120 feet above the river, and approached from the S. by either of two main systems of railways, it presents a picturesque appearance, the lines intersecting two fine public parks, Avenham and Miller, the latter containing the Lancashire memorial statue of the late Lord Derby, one of Noble's best efforts. P. has a third park on the northern confines of the borough—Moor Park. The river is crossed by two bridges and a railway viaduct 68 feet high. The Lancaster Canal intersects the town, and the Ribble is navigable here for vessels of 400 tons. P. has five Established churches, besides Dissenting and Catholic chapels. The parish church is a Gothic structure with a tower surmounted by a spire, containing eight bells, and was dedicated to St. John at its restoration in 1723. Christ Church, in the Norman style, with two octagonal towers, was erected in 1836 and enlarged in 1852. St. Peter's (1824) and St. Paul's (1826), both in the Gothic style, were built by grants from the Parliamentary Commissioners, the former at an expense of £6500, the latter of £7000. Of the Roman Catholic churches, the finest are St. Ignatius', in the Gothic style, completed 1836, and St. Walburge's, 160 feet long by 55 feet wide, having a tower and spire 300 feet high. Among the other buildings, the chief are the Gothic townhall, reckoned one of the late Sir Gilbert Scott's best minor works, containing the Guildhall and Exchange, and erected at a cost of £60,000; the Royal Infirmary, built 1869; the Corn Exchange (one of the largest buildings in the county); the Institution for the Diffusion of Useful Knowledge, with a library (1878) of 12,000 vols.; the theatre; the House of Correction; and, in the vicinity, Fullwood Barracks for cavalry and infantry, accommodating 1500 men, and recently considerably enlarged. County constabulary buildings are now (1878) being erected at a cost of £20,000. P. has several public libraries, one weekly and two bi-weekly newspapers, and returns two members to Parliament. It adopted the Free Libraries Act in 1878. The chief manufacture of P. is cotton, there being in the town 90 cotton-mills, which in 1871 employed 8271 men and 12,023 women. Lately the cotton trade has shown signs of falling off, and attention has again been drawn to the capabilities of the river, which at an outlay of some £100,000 for docks, dredging, &c., might be rendered navigable for vessels of 500 tons. Shipbuilding is an important industry; in 1877, 20 vessels, from yachts of 10 tons to ocean-going steam and sailing ships of 500 tons, were built. Linen manufacture is carried on, besides tanning, malting, brewing, rope-making, shipbuilding, and brass and iron founding. In 1876 there entered the harbour 335 vessels of 24,427 tons, and cleared 195 of 14,005 tons. The gross amount of customs revenue received in 1876 was £55,858, and the value of total imports of foreign and colonial merchandise £20,421. Pop. (1871) 85,427. P., popularly styled 'Proud P.', is supposed to have derived its name from the number of religious houses it formerly contained. It was held by Tostig, brother of Harold, and was partly destroyed by Robert Bruce in 1322. Its devotion to the Stuarts led to its capture by Fairfax in the Civil War, and to its being held, unsuccessfully however, by Foster in 1715. The town has received fourteen royal charters, the first in the reign of Henry II., and the last in that of George IV. P. is the birthplace of Richard Arkwright (q. v.). See C. Hardwicke's *History of the Borough of P. and its Environs* (Prest. 1857).

Prestonpans, a coast village of Haddingtonshire, Scotland, near the W. boundary of the county, 3 miles E. by N. of Mussel-

burgh, and 9 E. of Edinburgh by the North British Railway. It was formerly a place of greater industrial importance, but now only produces a light table-beer, and a considerable quantity of oysters and salt. Saltpans are said to have existed here since the 12th c. Pop. (1871) 2064. The battle of P. was fought in the vicinity on the 21st September 1745. It consisted of a single charge of the Highlanders under Prince Charles, by which a fully-equipped English force, 2000 strong, led by Sir John Cope, was broken and cut to pieces, while the victors, with the trifling loss of 130 men, were left in possession of the costly appointments of a complete army. The victory had the effect of at once doubling the force of the Jacobites. A brilliant description of the battle is given in *Waverley*.

Pretence, Shield of, or Escutcheon Surtout, a small shield *pretended* or placed on the centre of another shield. A wife who is an heiress usually wears the arms of her own family on a small shield of P. It is also used to display the proper arms of elective sovereigns in 'surtout' over those of their dominions. From 1801 to 1837 the arms of Hanover were placed on a S. of P., covering the centre of the royal arms of Great Britain and Ireland.

Pretoria, the capital of the Transvaal territory, S. Africa, is situated in 25° 50' S. lat., 28° 40' E. long, 1050 miles N.E. of Capetown. It derives its name from Pretorius, one of the Boer leaders (see TRANSVAAL), and is a thriving place, well-built and with a considerable trade. Since the annexation of the Transvaal by Great Britain, the progress of P. has been so rapid that its population can only be approximately stated. It is probably (1878) 5000. P. is the see of a Bishop, who was consecrated in 1878. The surrounding district is very fertile, being capable of producing wheat, tobacco, indigo, coffee, cotton, and the sugar-cane. Coal and other minerals are also found within it.

Prévost-Paradol, Lucien Anatole, a French journalist and critic, was born at Paris, August 8, 1829, studied at the Collège Bourbon and the École Normale, and in 1851 obtained the Academy prize for rhetoric by his *Eloge de Bernardin de Saint-Pierre*. In 1855 he was appointed to the Chair of French Literature at Aix, but gave it up in the following year to become editor-in-chief of the *Journal des Débats*. In that capacity he wrote countless leaders under the Bonapartist régime, consistently advocating the establishment of an Executive submitting in good faith to a Parliament elected by fair means. He made two unsuccessful attempts to obtain a seat in Parliament. In 1864 he published his *Études sur les Moralistes Français*, which contain much delicate and penetrating criticism. He was elected in the following year to the Academy. P. lectured with great éclat at the Philosophical Institution, Edinburgh, in 1869, the result being published in his English volume, *France*. He accepted the office of envoy to Washington in 1870, where on the outbreak of the Franco-Prussian War he committed suicide, July 19, 1870. In 1877 a son did the same thing at Paris. P. was one of the most temperate and well-informed of French journalists, and had the rare distinction of knowing something about English life.

Priamus (Gr. 'ransomed'), Laomedon's son and successor in the kingship of Troy, changed his name from Podarces ('swiftfoot') to P., because he alone of Laomedon's six sons was ransomed by Hermione from the vengeance of Heracles. By Arisbe he was the father of Æsacus, and by his second wife Hecuba, of Hector, Paris, Cassandra, and sixteen other children. He aided the Phrygians in their war with the Amazons, but took no active part in the Trojan War, nor does Homer make any mention of his death. Later writers say that he was slain by Pyrrhus at the altar of Zeus Herceius.

Price, Bonamy, born in Guernsey, May 22, 1807, entered Worcester College, Oxford, gained a double first in classics and mathematics (1829), became an assistant master at Rugby (1831), and was appointed Professor of Political Economy in the University of Oxford (1868). He is author of *The Anglo-Catholic Theory* (1851), *The Principles of Currency* (1869), *Currency and Banking* (1876), *Chapters on Practical Political Economy* (1878), &c., and has been a frequent contributor to the *Edinburgh* and other reviews.

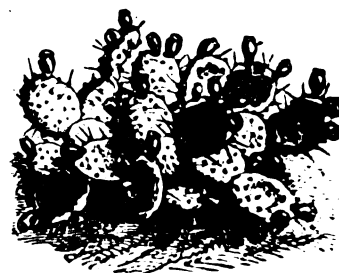
Price, Richard, was born at Langeinor, Glamorganshire, February 23, 1723. In his eighteenth year he proceeded from a Dissenting seminary at Talgarth to Coward's Academy in London,

was private chaplain to a Mr. Streathfield of Stoke Newington (1743-56), and afterwards officiated as pastor in various Presbyterian meeting-houses—at Hackney, Newington Green, Edmon-ton, &c. He became a fellow of the Royal Society (1765), was created D.D. of Glasgow (1769) and LL.D. of Yale College, Connecticut (1783), and received the freedom of the city of London (1776). P. died in London, March 19, 1791. Howard, Priestley, and Franklin were among his friends, and Pitt is said to have taken many hints from his financial and political writings. These included the *Treatise on Reversionary Payments* (1769), *Observations on Civil Liberty and the Justice and Policy of the War with America* (1776), a work which gained its author an immense popularity in the revolted colonies; *An Essay on the Population in England and Wales* (1779), and *The State of the Public Debts and Finances* (1783). As a metaphysician P. combated both the empiricism of the school of Locke, and the materialism and 'philosophical necessity' of Priestley, and himself upheld the twofold origin of human knowledge, in his *Review of the Principal Questions and Difficulties in Morals* (1758), Sermons, and sundry pamphlets. See the Memoirs by his nephew William Morgan (Lond. 1815).

Prichard, James Cowles, the founder of scientific ethnology, was born at Ross, in Herefordshire, February 11, 1786, and studied medicine in Bristol, London, and Edinburgh, at the last-named place selecting as the subject of his M.D. thesis the 'Variety of the Human Race.' He commenced practice at Bristol in 1810, and there towards the close of 1813 brought out his celebrated *Researches into the Physical History of Mankind*, in which, whilst upholding the original unity of the human species, he advanced the theory that the first pair were blacks, and that civilisation has been the operative cause in the production of white varieties. The results of a study of the Teutonic and Celtic languages, of Greek, Latin, Sanskrit, and Hebrew, were incorporated in the second and third editions (1826, and 5 vols. 1836-47), in which P. ably demonstrated the importance of philology in ethnological investigations. In his *Eastern Origin of the Celtic Nations* (1831), he anticipated several of the discoveries of Zeuss, and his *Analysis of Egyptian Mythology* (1823; enlarged ed. 1838) established his reputation as an Egyptologist. The *Natural History of Man* (1843; 4th ed. 1855) was a popular résumé of the *Researches*. Meanwhile P., far from neglecting his profession, filled various important posts in the Bristol hospitals, and published a large number of medical treatises—*On Diseases of the Nervous System* (1822), *On Insanity* (1835), *On the Different Forms of Insanity in Relation to Jurisprudence* (1842), &c. He was also a frequent lecturer and contributor to scientific journals, a zealous member of the Aborigines' Protection Society, and one of the chief founders of the Bristol College. In 1844 he was appointed a Commissioner in Lunacy, and removed to London, where he died, December 22, 1848, being at the time of his death a M.D. of Oxford, a fellow of the Royal and Geographical Societies, and a member of the Institute of France, the Vienna Academy, and other learned bodies. See T. Hodgkin's *Biographical Sketch of James Cowles P.* in the *Edinburgh New Philosophical Journal* for October 1849.

Prickles (in Botany). See HAIRS.

Prickly Pear, or Indian Fig, is the name given to the genus *Opuntia*, belonging to the Cactus family, and consisting of about 150 species, inhabiting hot arid districts in America. All are more or less fleshy when young, have erect or decumbent branching stems, the branches consisting of flat, convex, or round growths joined end to end, and are generally armed with strong sharp spines. Brilliant-coloured flowers arise from the branches, followed by pear or egg shaped succulent fruits. Several of these remarkable plants have been introduced from America, and are now spread over a large portion



Opuntia vulgaris.

of the warmer regions of the Old World; e.g., *O. vulgaris*, a native of Central America, northward to Georgia, and southward to Peru, is thoroughly established in S. Europe, N. Africa, and the Canaries, its almost smooth fruit forming an article of food; *O. tuna*, belonging to Central America and the West Indies, attaining a height of 20 feet, is abundant in parts of Europe, Asia, Africa, the Canary Isles, &c., and fifty years ago the cochineal insect, which feeds on the plant, was successfully introduced by Bertholet into the Canaries, where it has since formed an important article of trade. The sweet juicy fruit is largely used for food. *O. ficus Indica*, another species with edible fruit, is also widespread. A dye is prepared from the pulp of some of the *Opuntias*, while some of the species with strong spines are commonly used for constructing impenetrable hedges, as also barriers against forest fires. In parts of India *O. Dillenii* has become, through distribution by birds, an intolerable nuisance. The specific names and characters of the plants constituting this genus are at present in much confusion.

Pri'deaux, Humphrey, D.D., born at Padstow, in Cornwall, May 3, 1648, passed from Westminster School to Christ Church College, Oxford (1668), and his *Marmora Oxoniensia* (1675) having attracted the attention of Lord Chancellor Finch, was by him presented to the rectory of St. Clement's, Oxford (1679). He was installed a prebendary of Norwich (1681), held in succession the rectories of Bladen with Woodstock, Oxfordshire (1682), and Saham-Toney, Norfolk (1686), became archdeacon of Suffolk (1688), vicar of Trowse (1696), and dean of Norwich (1702), and died in that city, November 1, 1724. Among P.'s works were *The True Nature of Imposture fully Displayed in the Life of Mahomet* (1679); *Tythes* (1710); and *The Old and New Testament Connected in the History of the Jews and Neighbouring Nations* (2 vols. 1715-17; ed. by A. M'Caul, 2 vols. Lond. 1845), a profound and scholarly compendium of information, which has been translated into French, German, and Dutch. A Life of P., prefixed to some posthumous tracts and letters, appeared in 1748; and his *Letters to John Ellis, sometime Under-Secretary of State*, were edited for the Camden Society by E. M. Thompson (1875).

Pri'deaux, John, born at Stowford, Devonshire, September 17, 1578, entered Exeter College, Oxford, as a servitor (1596), obtained a fellowship (1602), took orders (1603), and was elected rector of his college (1612). In 1615 he became Regius Professor of Divinity, canon of Christ Church, and rector of Ewelme, and in 1641 was consecrated to the see of Worcester. The outbreak of the civil war, and P.'s adherence to the king, lost him its revenues, and he was forced to find bread for himself and his children by the sale of a precious library, 'becoming,' says Gauden, 'a *verus librorum helleus*.' He died at Bredon, in Worcestershire, July 12, 1650. Besides *Tabula ad Grammaticam Græcam Introductoria*, P. published various treatises, collected in his *Opera Theologica Omnia* (Zürich, 1692).

Priessnitz, Vincenz, born at Gräfenberg, in Austrian Silesia, October 5, 1799, was the son of a farmer and himself engaged in agriculture. Having cured himself of a broken rib by the constant application of cold water, he extended the treatment to the ailments of his neighbours, and gradually developed a regular system of Hydropathy (q. v.). In 1833 he gave up farming, and thenceforth devoted himself to the great water-cure establishment at Gräfenberg (q. v.) till his death, November 28, 1851. See Selinger, *V. P.* (Vien. 1852).

Priests (Old Fr. *prestres*, contraction of Lat. *presbyteri*) are a class of men who have always been created by a tendency of the human mind in connection with worship of a deity. The first form of worship among men in an uncivilised state is always that which is prompted by fear and awe. In ignorance of the order of nature, they believe all its phenomena to be directed by the arbitrary will of beings swayed by the same feelings and impulses as themselves, and, overlooking the beneficent side of nature, or ascribing it to good deities who need no prayers, they live in terror of the unfavourable aspects, or in other words, of the manifestations of the displeasure of the irascible or evil beings who have them at their mercy. But supposing also that these deities may be propitiated on the same principle as themselves, they bring them offerings of the best they have; and thus arises the system of Sacrifice (q. v.). The most primitive manner of offering sacrifice is for each man to

present his own gift to the deity for himself, as was done, according to the Hebrew Scriptures, by Cain and Abel, or for himself and family, as was done by Noah, Abraham, Jacob, Job, &c. The patriarch was priest for the tribe (cf. Gen. xii. 8, xviii. 23, xxvi. 25, xxxiii. 20), or the king for the nation (cf. 2 Sam. vi. 12-18; 1 Kings iii. 15). It is only another step in the same direction now, when certain persons are appointed by the worshippers to offer their prayers and sacrifices, as being more acceptable than themselves. These are the P., who are thus in the position of mediators between gods and men; the representatives of the latter in things pertaining to God, and, on the other hand, the interpreters of the gods, teaching men all the ceremonies used in divine worship. In virtue of these duties they were honoured with the next place to the kings or chief magistrates, and in many places wore the same habit.

Perhaps the most elaborate and thoroughly organised priesthood in the ancient world was that of the Egyptians, among whom the P., along with the military men, held the highest position in the country after the royal family. To one or other of these two professions the king always belonged, and when he belonged to the military it was his duty on ascending the throne to be instructed in the mysteries of the religion, and the various offices of the chief priest. The view that has hitherto prevailed regarding the priesthood among the Israelites is, that the whole system, with the High Priest (q. v.) and the Levites (q. v.), and all their respective duties and maintenance, was appointed and regulated by Moses in the Pentateuch, with the admission that certain items of the Hebrew ritual had been borrowed from the Egyptians, or at least corresponded with theirs; e.g., shaving of the body (Num. viii. 7), the wearing of linen garments (Exod. xxviii. 39; Ez. xlv. 18), the practice of going barefooted (the Egyptian priest wore sandals of byblus), multiplied ablutions, a public maintenance, besides a share of the flesh of the victims offered, hereditary succession, and one high priest (Herod. II.). But regarding the priestly legislation of the Pentateuch, modern criticism is beginning to hold some very revolutionary opinions. It has been noticed that there is a remarkable distinction between Deuteronomy and the Levitical legislation in Exodus, Leviticus, and Numbers. According to the latter the tribe of Levi was appointed to minister to the P., the sons of Aaron (Num. iii. xviii.), they had certain cities assigned to them out of each of the tribes (xxxv.), and also the tenth, not only of all vegetable produce, but of the annual increase of the flocks and herds; such tithes, diminished by a tenth paid to the P., to be eaten by the Levites in whatever town they lived. Deuteronomy, on the other hand, knows no difference between Levites and P.; they are 'the P. the Levites,' 'the P. the sons of Levi,' and allows the Levites to do things which the Levitical law allowed only to the priests (Deut. xvii. 9, xviii. 1, xxi. 5). They have no cities of their own, but are poor and houseless (xiv. 27, 29, xvi. 11, xviii. 1-8, xxvi. 12). Any provision they have is the tithes of vegetable produce, from which of course nothing is subtracted for the priests, but which are to be eaten in the town where the central sanctuary was. These differences have been explained by supposing that the two accounts refer to the same system at two different periods of development, and the question of their relative priority is thought to be decided by the history. Some of the most characteristic features of the Levitical legislation are held to be ignored and even contradicted by the history—e.g., in the time of David there was not one high priest, but two chief P. of equal authority, Zadok and Abiathar (2 Sam. xx. 25); indeed, the first high priest named is Hilkiah in the time of Josiah (2 Kings xxii. 4). Again, the Levites seem never to have got their cities, but to have dwelt all over the country, and there is not a hint of Levitical territorial possessions; while sacrifices are mentioned as offered by a great number of persons who did not belong to the tribe—Gideon, Saul, David, Solomon, Uzziah. A strong point is made of the omission from the history of all mention of the Day of Atonement, the tenth of the seventh month (Lev. xvi. 29, xxiii. 27-32). When the Jews returned from Babylon under Zerubbabel (B.C. 538), on the arrival of the seventh month they assembled at Jerusalem and offered the sacrifices prescribed, beginning on the first day and observing the Feast of Tabernacles on the fifteenth; but there is no allusion to the Day of Atonement (Ezra iii. 1-6). Similarly, when the Law was read to the people (B.C. 445), they observed the Feast of Tabernacles on hearing the directions therefor, and also a solemn fast on the twenty-fourth, but no notice is taken of the tenth (Neh. viii., ix.). The general result arrived at by

critics who look at the history in this light is that the priesthood was only organised on the building of Solomon's temple; that the simpler system of religious and ceremonial duties in Deuteronomy is the earlier, that book in fact being virtually 'the book of the Law,' which was found by Hilkiah in the days of Josiah (about B.C. 580—2 Kings xxii.); and that the Levitical code in Exodus, Leviticus, and Numbers cannot have been completed even in the early days of Nehemiah, and may probably be assigned to about B.C. 400, corresponding to which latest development are the vision of Ezekiel (xl.—xlviii.) and the Books of Chronicles.

In the Christian Church, any idea that there was of a priesthood at first was that it consisted of all believers, Jesus Christ being the High Priest and Mediator for all. But with the development of the episcopal system the idea gradually gained ground that the Church was the same as the Old Testament theocracy, requiring a sacerdotal caste through whose mediation alone it could be established in the world. The idea that the priest actually performed sacrificial functions was fully developed in the doctrine of the Mass (q. v.). Protestants took up the position that the ministers of religion are not P. in the official sense; that all believers are P. in the only sense in which there can be such under the Gospel; and that Christ is the only Mediator between God and man. See Kalisch's commentary on *Leviticus* (Lond. 1867 and 1872), Kuenen's *Religion of Israel* (Eng. trans. 1874—75), Potter's *Antiquities of Greece* (4th ed. Lond. 1722), and Hodge's *Systematic Theology* (Edin. 1871—73).

Priestley, Joseph, son of a draper, was born at Fieldhead, near Leeds, 13th March 1733, lost his mother in his seventh year, and passed under the tuition of an aunt who had strong theological leanings. By her he was sent to school, and early distinguished himself by the ease with which he learnt languages, having, in addition to the ordinary study of classics, familiarised himself with Syriac and Arabic, German, French, and Italian. The polemical atmosphere of his aunt's home, to which local theologians crowded, induced him to give to the knottiest problems of that science a full and interested attention. After passing through a Dissenting seminary P. became a minister, and received a call to Needham Market in 1755, from which, having preached his church empty in three years, he went to Nantwich, in Cheshire. In the former place he wrote the *Scripture Doctrine of Remission*, in which he argued for the divine nature of the Scriptural revelation, whilst rejecting the doctrine of the Trinity and the Atonement and holding by the purely human conception of Christ's life. It was published in 1761, in which year he went to Warrington, where he married, still, however, devoting himself with the most fruitful industry to language, science, and politics. In 1762 appeared his *Theory of Language and Universal Grammar*, and in 1765 the *Essay on a Course of Liberal Education for Civil and Active Life*, and *Chart of Biography*. In 1766 he was made a member of the Royal Society and LL.D. of Edinburgh University, and in 1767 was called to Millhill, near Leeds. The same year appeared his *History and Present State of Electricity*, a work suggested to him by Franklin during a visit he had made to London. He next threw himself with eagerness into the study of chemistry, his mind being directed to it by the proximity of his house to a brewery. His *Observations on Different Kinds of Air* gained him in 1772 the Copley Medal. At the same time he accepted the offer to accompany Captain Cook on his second voyage of discovery, but the appointment was cancelled owing to his heterodoxy. In 1773 he was appointed librarian to the Earl of Shelburne, and next year he went abroad with him, his intercourse with the Parisian *philosophes* resulting in his *Letters to a Philosophical Unbeliever*, in which he developed a scheme of Christian apologetics. It was followed in 1777 by a *Disquisition Relating to Matter and Spirit*. Three years later he left the service of Lord Shelburne and took up his residence at Birmingham, where he found congenial spirits in Watt, Withering, and Bolton. Here he again pursued clerical labour and turned to theology with renewed ardour. In 1781 appeared his *Institutes of Natural and Revealed Religion*, in 1782 the *History of the Corruptions of Christianity*, and in 1786, *History of Early Opinions Concerning Jesus Christ*. P. felt himself highly honoured by being elected a French citizen because of his *Reply to Burke's Reflections on the French Revolution*; but a different sentiment was expressed by a mob of brutal fanatics, who wrecked his house, destroying his books, manuscripts, and scientific instruments. P.

then departed for London, where he took Dr. Price's church at Hackney in 1791, but in 1794 he crossed the Atlantic and settled at Northumberland, Pennsylvania. In 1802 he dedicated to President Jefferson his *General History of the Christian Church*. He died February 6, 1804. P. was a most guileless and earnest searcher after truth. His mind had an extraordinary versatility and fecundity. In the face of much misrepresentation he led a blameless life. See the *Memoirs of J. P.* prefixed to Rutt's edition of the *Theological and Miscellaneous Works of J. P.* (25 vols. Hackney, 1817—32), *Life of J. P.*, by John Corry, and a Bibliography, comprising over 300 of P.'s writings (Washington, 1875).

Priluki, a town of Russia, government of Poltava, on the Udai, 75 miles E. by N. of Kiev. It has six churches, a considerable manufacture of tobacco (Machorka kind), and a thriving trade in grain, cattle, brandy, &c. Pop. (1870) 12,878.

Prim, Juan, a Spanish soldier and politician, born at Reus, in Catalonia, December 6, 1814, rose rapidly in the army of the Christinos to the rank of colonel (1837), and as a *Progresista* aided Narvaez in his overthrow of the regent Espartero (1843). By the new government he was created count, general, and governor of Madrid, but in 1845 his opposition to Narvaez led to his arrest and condemnation to six years' imprisonment. Christina, however, pardoned him, and he held the governorship of Puerto Rico, till, being dismissed in 1848, he rejoined the opposition, and in 1853 was banished to France. He served as a volunteer in the Turkish army (1854), under O'Donnell's ministry was returned to the Spanish Senate (1858), and in the war with Morocco won by his services as commander of the reserves the title of Marquis de los Castillejos (1860). Appointed to the command of the Spanish contingents in the Mexican war of the Allied Intervention, he formed with Juarez the Convention of Soledad (1862), which measure he barely justified by his three days' defence before the Cortes. In 1864 he was banished to Oviedo on a charge of conspiracy, and after an abortive rising at Aranjuez (1866) fled to Portugal, thence to England, and finally to Belgium. From Brussels he directed the insurrection of 1868, which resulted in the flight of Isabella and in his own triumphal entry into Madrid, where he was minister of war in Serrano's provisional government, and became marshal, commander-in-chief, and president of the cabinet (1869). As such he had successfully offered the vacant throne to Espartero, Prince Leopold of Hohenzollern, and Amadeus, when on December 27, 1870, he was shot in his carriage by some unknown assassins, and three days later died at Madrid. A splendid monument was consecrated to his memory in the Atocha Basilica, June 5, 1875.

Prima Donna is the chief female singer in an opera; *prima viola*, the first viola; *prima vista*, at first sight, &c.

Primary, in geology, is now applied to all rocks older than the Triassic, and is synonymous with the word Palæozoic. In the early days of geology, however, P. or *primitive* rocks included granite, gneiss, mica schist, and such like, which were looked upon as the original source of the ordinary stratified sandstones, clays, and limestones. The term *transition* rocks was then found necessary to include rocks which apparently were intermediate in character to the first two great groups. With the growth of knowledge, the terms primitive and transition were gradually abolished, and P. came to be used in the general chronological sense given above.

Primary Schools. See PUBLIC SCHOOLS.

Primate (Lat. *primatus*, from *primus* 'first'), was originally the same as a Metropolitan or chief bishop of a province. Metropolitan is now synonymous with Archbishop (q. v.), and the P. is the superior of a number of ordinary archbishops, presiding over the ecclesiastical capital of a country. In England there are two primates, the Archbishops of Canterbury and York, who by a nice distinction have the titles P. of All England and P. of England respectively. The title of P. had been applied to these two from there having been formerly other archbishops; as there were of Lichfield (in the 8th c.) and of St. David's till 1148. There are also two primates in Ireland—the Archbishop of Dublin (P. of Ireland), and the Archbishop of Armagh (P. of All Ireland).

Primates, the division of Mammalia formerly constituted by Linnæus to include man and the quadrupana, or

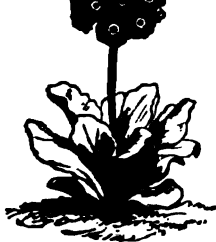
Apes. This division has been revived, along with the Cheiroptera or Bats—minus the bats—in recent zoological classifications. The differences between the human and ape type are recognised by the division of the *P.* into four subdivisions—*Prosimia* (Lower Quadrumana, such as the Lemurs, &c.); *Simia* (the Quadrumana proper); and *Bimana* or *Anthropoidea* (man). See QUADRUMANA, MAN-MONKEY, &c.

Primaticcio, Francesco, the founder of the Fontainebleau school of painting, was born at Bologna in 1490, and became a pupil of Giulio Romano, whom he helped in the decoration of the Palazzo del Tè at Mantua. In 1531 Duke Federigo Gonzaga recommended him to François I. of France, who, after employing him to collect statues and casts, bestowed on him the office of court-painter, with the abbacy of St. Martin de Troyes. He was appointed Superintendent of the Royal Buildings by François II. (1559), and died in 1570. The grace and harmonious colouring of P.'s allegorical frescoes at Fontainebleau go far to redeem their tasteless and often obscure subjects and their frequent faultiness of design. Other works by him are the 'Contenance of Scipio' in the Louvre, 'Moses striking the Rock' at Vienna, and 'An Angel showing a Young Man the way to Heaven' at Darmstadt.

Prime. See CANONICAL HOURS.

Primogeniture is the rule of law under which the eldest son of a family, or person in his right, succeeds, on the death of the father, to his real estate. The right does not apply to personal property. See BIRTHRIGHT, HEREDITARY RIGHT. Regarding female succession, see COPARCENARY.

Primrose (*Primula*, from Lat. *primus*, in reference to the early flowering) is the type genus of *Primulaceae*, consisting of about 50 species of perennial herbs ranging through the temperate, arctic, and mountainous regions of the northern hemisphere, and again appearing in Chili and Fuegia. *P. vulgaris*, the favourite spring wild-flower in England, decking the copses, hedgebanks, and pastures with a profusion of pale yellow-blossoms, grows also in most countries of Europe as well as N. Africa, and in affectionate remembrance of home scenes has been carried by British emigrants to southern colonies. It is subject to much variation, and between it and



Primula auricula.

P. veris, the cowslip, a number of hybrid forms occur, which are often called 'oxlips.' *P. elatior*, the real oxlip, is in England very rare. A pretty species named *P. farinosa* has its leaves covered on the under side with a mealy substance, and its umbels of lilac flowers with a yellow centre have originated for it the name Bird's-eye *P.* Very similar to it, but of more northern range in Britain, is the arctic *P. Scotica*, found in Caithness, Sutherland, and Orkney. *P. helvetica*, *P. nivalis*, *P. viscosa*, and *P. integrifolia* are European species that find a place in gardens. *P. marginata*, when planted in shady situations, is lavish of its pale and delicately beautiful flowers. The curious *P. verticillata* and the splendid *P. sinensis* are inmates of greenhouses amongst horticulturists; and *P. japonica*, a recent introduction, is aptly termed the queen of primroses. See AURICULA, COWSLIP, and POLYANTHUS. The flowers in *P.* are usually dimorphic, having long styles, and anthers deep-seated in the tube—or the reverse of these conditions; for perfect fertilisation, the pollen from the deep-seated anthers has to reach the stigma of the short-styled plant—and *vice versa*. The elucidation of this phenomenon was the beginning of Darwin's great publications on plant life.

Primulaceae is a natural order of about 200 species of perennial or rarely annual herbs, of which representative genera have already been given under PIMPERNEL and PRIMROSE. A few species occur in the southern countries of S. America, otherwise the distribution is confined to the temperate and arctic zones, and Alpine situations in the northern hemisphere. The properties are unimportant. In collections of 'Alpine plants' various species of *Androsace*, *Cyclamen*, *Soldanella*, and *Primula*

are much esteemed; and other genera, such as *Lysimachia* and *Dodecatheon*, furnish good hardy garden plants. See HOTTONIA.

Prætorium Mobile. See PTOLEMAIC SYSTEM.

Prince (Lat. *princeps*, from *primus*, 'first,' and *caput*, 'a head'), a title attached at different epochs to widely different dignities. Under the Roman republic, the citizen whose name was inscribed first by the censors on the senatorial roll was styled *Princeps Senatus*, and this title was subsequently assumed by the emperors. In the Middle Ages the chief officers of state termed themselves princes, and their territories principalities, whilst at the present day the title of *P.* is borne by younger members of the royal families of Europe, by a few inferior potentates, as the Princes of Monaco and Orsini, and by the descendants of the marshals whom Napoleon elevated to the princely rank—the so-called 'Princes of the Holy Empire.' The eldest son of a reigning sovereign is usually distinguished by a special territorial title, being styled in England *P. of Wales*, in the Netherlands *P. of Orange*, in Spain *P. of the Asturias*, &c., but in Germany and Austria he is simply the *Kronprinz*, as in France he was the *P. Impérial*. In England, dukes and marquises are princes only in ceremonial language; and in Germany, members of the royal family or of ruling houses dating from the Holy Roman Empire alone are *Prinzen*, a *Fürst* (which we also translate by 'P.') ranking after a *Herzog*, and holding no sovereign dignity.

Prince Edward Island, a province of the Dominion of Canada, N. America, lies in the S. of the Gulf of St. Lawrence, and is separated on the S. and W. by Northumberland Strait from Nova Scotia and New Brunswick. The latitude is about 45° 56'–47° N.; the longitude 62°–64° 23' W. The island is crescent-shaped, 130 miles long, from 4 to 34 broad, and has an area of 2173 sq. miles. Pop. (1871) 94,021 (Indians 302). An isthmus 4 miles wide joins the smaller western portion to the rest, and 24 small islands also belong to the province. The red sandstone cliffs, from 20 to 100 feet high, which encircle the island, are broken by many inlets, of which Cardigan Bay on the E. and Hillsborough Bay on the S. are safe ports for large vessels. Bedeque, Cascumpec, Malpeque, New London, and Murray harbours are also considerable, and there are very many lagoons. The surface of P. E. I. is slightly undulating, the chain of hills which crosses the country seldom exceeding 300 feet in height. The rivers are very numerous, and the soil, which is generally a layer of vegetable matter above light loam resting on the stiff clay underlaid by Silurian sandstone, produces cereals, fruits, and vegetables about twice as much as is needed for home consumption. Cattle, horses, swine, and sheep are extensively bred. The climate is milder than that of the mainland in the vicinity (the range of temperature in 1874 being from 88° to 18° F.), and is especially favourable to wheat-growing. Of the whole area of the island, amounting to 1,365,400 acres, only 52,252 are uncultivated; but agriculture has improved greatly since 1854, when the provincial government commenced to buy up the great landed estates, and to re-sell them to small well-to-do farmers. The exports in the year 1874–75 amounted to £272,596, consisting chiefly of oats (£151,945), fish (£64,174), timber (£21,976), eggs (£12,129), and vegetables (£10,421). The imports in the same year amounted to £408,541, being mainly iron and hardware (£75,853), woollens (£54,967), tea (£34,289), cottons (£33,966), and spirits (£9033). The number of vessels entered and cleared in 1874 amounted to 100,597 tons (39,631 British). The tonnage registered in the island on December 31, 1876, was 50,677 (355 vessels). Shipbuilding is carried on to a considerable extent, but the formerly magnificent forests of birch, beech, maple, elm, ash, pine, spruce, fir, juniper, cedar, willow, and poplar are vastly reduced. Cloth is made, but the manufactures are trifling. Few valuable minerals are known to exist, only copper and bog iron being found, and in but small quantities. The peat-bogs are easily converted into hay fields, and the fisheries, mainly of mackerel, herring, and cod, are exceedingly rich. P. E. I. is divided into three counties, King's, Queen's, and Prince, of which the respective capitals are Georgetown, Charlottetown (capital of the Province), and Summerside. In 1874 there were 355 schools in operation, of which 18 were grammar schools. The number of pupils was 16,292, and of teachers 453. There are also several private schools. Higher

education is provided in 'Prince of Wales College' (Protestant Episcopal), 'St. Dunstan's' (Roman Catholic), and the Wesleyan College, all at Charlottetown. Except in the colleges, tuition is free, the outlay from the colonial treasury upon education in 1868-69 being £19,793. P. E. I., discovered by the Cabots in 1497, began to be settled in 1715 by the French, who named it the Isle St. Jean. It fell under English rule in 1764, and many of the French left. The island was then apportioned to 67 grantees, who agreed to colonise it with numerous non-English Protestant settlers. These conditions they never fulfilled, yet the British Government, in spite of popular discontent and the hindrance to material progress, maintained them in possession till 1854, when it commenced to force a sale of the large estates. Things are now much better. The Roman Catholics, never fully tolerated till 1830, have a bishop at Charlottetown, and form the most numerous religious body in the island (40,442 in 1871). P. E. I. first received its present name in 1798, in honour of the Duke of Kent, father of Queen Victoria. It became a part of the Dominion of Canada in 1871, and sends six members to the Dominion Parliament.

Prince of Wales, the principal title of the eldest son, or, in the event of his death, the grandson, of the reigning sovereign of England, but not necessarily of the heir-apparent to the crown, e.g., James I., William IV., or Ernst August of Hanover. The last native who held it was Llewelyn ap Gruffyd (1246-82), two years after whose death it was conferred, so runs the story, by Edward I. on his second son, in fulfilment of his promise to the Welsh chieftains that he would give them a prince born in their midst and unable to speak a word of English. Presenting to them the infant Edward of Caernarvon, he pronounced the words *Eich Dyn* ('This is your man'), the origin of the motto *Ich dien*, which another tradition refers with equal probability to the German motto *Ich diene* ('I serve') of King John of Bohemia, slain by the Black Prince at Cressy (1346). As a matter of fact, Edward II. was not created P. of W. till 1301, nor was the title ever borne by his son, Edward III., being first revived in the person of the Black Prince in 1343. Since him it has been bestowed on fourteen heirs-apparent by patent, investiture, or proclamation; but like him, five out of these fifteen have never succeeded to the throne—Edward, son of Henry VI., slain at Tewkesbury (1471); Edward, son of Richard III. (died 1484); Arthur, elder brother to Henry VIII. (died 1502); Henry, son of James I. (died 1612); and Frederick Lewis, father of George III. (died 1751). Edward VI. and Charles II. seem never to have been invested with the dignity, and it is a moot question whether Mary was or was not styled Princess of Wales in her own right up to the birth of a son to Henry VIII. Neither of course was the title borne by the six sovereigns who came irregularly to the throne (Henry IV., Edward IV., Richard III., Henry VII., William III., and George I.); so that the curious fact remains that out of the twenty-three kings of England since Edward I. only twelve have been Princes of Wales. To the principedom of Wales are annexed, in England, the duchy of Cornwall and earldom of Chester; in Scotland, the duchy of Rothesay, earldom of Carrick, barony of Renfrew, and lordship of the Isles, with the titles of Prince and High Steward of Scotland; and in Ireland, the earldom of Dublin. By 26 Vict. c. 1, an annuity of £40,000 was settled on the P. of W., to whom in 1877 the sum of £70,375 was paid over, including £29,452 from the revenues of the duchy of Cornwall. The same statute further settled £10,000 on the Princess of Wales, to be increased to £30,000 in the event of her widowhood. See *Doran's Princes of Wales* (Lond. 1860).

Prince of Wales Island. See PENANG.

Prince'ton, a small town in New Jersey, U.S., 49 miles S. of New York. It is the seat of the College of New Jersey, founded by the Presbyterian Synod of New York at Elizabethtown, New Jersey, in 1747, and removed to P. in 1757. In 1875 the college had 483 students, and endowments to the amount of \$600,000. The Presbyterian Theological Seminary, founded in 1812, had, in 1878, 114 students. It is under the supervision of the famous Dr. Hodge, author of *Systematic Theology*. P. was the scene of a battle, 3d January 1777, in which the Americans under Washington defeated a part of the army of Lord Cornwallis. In 1783 the Continental Congress assembled here. Pop. 3986.

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Prince Rupert's Drops, so named after their discoverer (see RUPERT, PRINCE), are formed by dropping molten glass into water, when they are almost immediately solidified. They have a general resemblance to tadpoles, and resist pretty violent hammering on their thick end. The nipping off of the smallest fragment of the tail, however, at once reduces the whole to fine powder. The change takes place violently and with an appreciable evolution of heat. The explanation is that the mass is in a state of strain, so that the arrangement of the molecules is very unstable. The only stable portion is the outside film which had hardened before the rest had time to cool. Break the continuity of this film at any part, and the drop, free from restraint, is shattered by the violence of its pent-up energies. Bologna's phial acts in exactly the same way. It is shaped like a test-tube with thin walls and thick extremity, and has been rapidly cooled by immersion in cold water. A round, smooth body may be dropped into it from a considerable height; but the slightest scratch by a sharp irregular fragment is at once followed by dissolution of the whole.

Prince's Metal, or **Prince Rupert's Metal**, is a kind of brass, being an alloy of copper and zinc in the proportions of three to one.

Prin'cipal (in music), the name of the chief open metal stop in English organs, 4 feet in length on manual, 8 feet on pedal. The pitch is one octave higher than the diapasens. We speak of the P. violin or vocalist in a musical performance, and of the P. theme in a composition.

Prin'cipal and Ac'cessary. In criminal law a principal is either the actual perpetrator of a crime, or one aiding at the spot of commission, or in its neighbourhood. See ACCESSARY.

Prin'cipal and A'gent. See AGENT AND FACTOR.

Prin'cipal Sure'ty. See GUARANTEE, CAUTION, &c.

Print'ers, Law Regarding. A printer has no right to publish a work in his hands. He has, however, a *Lien* (q. v.) on the printed sheets for the price of his work, and on the last sheets undelivered for the price of the whole. It has even been decided in England that his lien for the price of volumes delivered extends over undelivered volumes. 32 and 33 Vict. abolish certain former statutory restrictions on printers and typesetters. A printer must print his name and address on every book or paper issued by him, under a penalty of £5 for each omission, if sued for by the crown. The mere printing of immoral matter is probably not contrary to law, but the publication is. See OBSCENE BOOKS. See also COPYRIGHT, LAW REGARDING.

Print'ing, Lett'erpress, the art of producing one or more impressions from types or stamps, bearing a reverse image of that from which a copy is desired, as it now exists, cannot be said to have a very long history, yet there is no question but that some idea of the process prevailed many centuries ago. Long before the Christian era, as relics from Assyria and Babylon as well as from Egyptian cities show, bricks and cylinders were stamped with symbolical figures and hieroglyphics, preserving till now the history of their country and the records of their attainments, being at once manuscripts and pictures—illustrated books, so to say, speaking alike to eye and to mind. These impressions, especially in the Egyptian bricks, were produced with wooden blocks carved in the required manner and stamped upon the plastic clay, the hollow being occasionally tinted with a coloured pigment. These bricks are not the only evidence we possess of there having existed in Egypt an idea of this method of taking impressions—the signet-rings of the Egyptians, and other articles, such as smooth wooden boards rubbed over with wax, leaves and bark from trees, skins and intestines, as well as the soft cellular tissue of the papyrus, prove it. The Greeks and Romans also made use of stamps with the characters reversed—one especially exists, the signet of C. Cæcilius Hermias, cut in bas-relief, which, if covered with ink, would leave an impression similar to our modern type. The Chinese again, a people whose civilisation early reached a point far beyond that of any other, had ages ago a system of printing which might easily have developed into a method similar to that now in use; but fruitful as the Chinese were in rudimentary ideas, they do not seem to have had energy to advance farther. Long before printing was known in Europe they had invented a method

of wooden block-printing of their own, which nevertheless stagnated in stereotyped editions of the works of Confucius. It is believed that it was in the 10th c. they first began to print, but an old Chinese work contains a passage to the effect that on the 8th day of the 13th year of Wen-ti (593) it was ordered by a decree that the old worn-out drawings and inedited texts should be collected that they might be engraved and published. 'This was,' says the work referred to, 'the commencement of printing from wooden blocks.' As early as 904, blocks of stone were used, on which the writing was engraved—a method of printing by which the ground of the paper was made black, and the writing left white. The general method, however, was by means of wooden blocks. The text to be printed was first written on thin paper, which was fastened face downwards on the block, and the characters being legible through the paper, the surrounding parts were cut away, and the words left in relief. These words being inked over, the paper was laid on, a soft brush gently applied, and the process was complete. Each page of a book would of course by this method require a new block, and could only serve for the one unvarying purpose, not being, like types, susceptible of a new arrangement. This process, with the characteristic conservatism of the Chinese, is still maintained to this day, though movable types are now being gradually introduced; but an almost insuperable difficulty exists in their language, which has not an alphabet made up of a few characters by which any book may be printed, a separate type being required for almost every word.

A similar method of printing from wooden blocks having been the first pursued in Europe, has very naturally led to the conjecture that the idea came from China; but this is not likely to have been the case, as at the time of its introduction there was very little intercourse between that country and Europe. It was not until long after the return of Marco Polo from the East, to whom some authorities give the credit of having brought the art from China, that the first attempts at block-printing were made in the production of rude pictures of saints, and also of playing-cards, the impression being taken by placing the paper upon the inked block, and rubbing the back with a burnisher. From this the transition was easy and simple to productions of another kind. The earliest book-prints of this nature were usually of a sacred or devotional character, and were of two classes—books of pictures without text, and books of pictures with text, being thus more artistic than literary, and generally printed in a dull, rusty-brown pigment or ink. One only exists which has any certain date, and is a representation of St. Christopher carrying the infant Saviour across a water, bearing the date 1423, which was found in a German convent, pasted within the cover of a Latin MS. of 1417: this print eventually came into the possession of the Spencer family, and the volume containing it was on view at the Caxton Exhibition in 1877. Following this came the curious work called the *Biblia Pauperum* (q. v.), or *Bible of the Poor*, of 40 pages, printed on one side of the paper only, in a brownish ink, the blank backs being pasted together. It resembled children's toy-books, having an illustration with texts and explanations on each page. The *Biblia Pauperum* is the most famous specimen of the early block-book, and seems to have received its name to distinguish it from the Bible proper, a fair MS. copy of which in France, about 1460, sold for 400 crowns of gold. It was followed by the 'Image Books,' such as the *Apocalypse*, the *Canticles*, the *Eight Roguerics*, &c., some of which are still extant, and are of great value as curiosities. The block-books did not altogether go out of fashion when types were invented, as some were printed so late as 1512, but they gradually deteriorated in merit, and in the course of the 16th c. became practically obsolete. The cutting-up of these blocks into their separate words was next thought of, so as to be capable of new arrangement, and thereby forming fresh pages.

This brings us to the year 1438, and to Gutenberg (q. v.), to whom the invention is generally attributed, and who was previously occupied in the production of prints from wood blocks at Strassburg, which city he left for Mainz between 1444 and 1448, where he entered into partnership with Fust (q. v.). The Dutch, however, make a claim in favour of Laurens Koster (q. v.) as being first in the field, maintaining that he invented the process as early as 1420 or 1426. Koster copied closely the MS. writing of the clergy, whose productions he imitated even to the abbreviations, and this may account for his name not appearing on his books. He worked in secret at

first; till, his custom increasing, he required to take an apprentice, who (according to the Dutch), at Koster's death in 1439, purloined his types, fled to Mainz, and gave the secret to Gutenberg. There is a proof at least of the independent nature of Koster's work in the fact that some of his books resemble the Dutch handwriting of the first half of the century, and also that they are printed on one side of the paper only, like the first proofs of a beginner, while those of Gutenberg are in a more finished style, and are models of impression. Four names have figured in the controversy in regard to the first printer by means of movable type, and the cities of Haarlem in Holland, and Mainz and Strassburg in Germany, all claim to be its birthplace. Those who favour the theory of an invention of typography in Holland refer to the *Speculum Humane Salvationis*, a very curious book, popular as a MS. two centuries before type-printing, which dates as a printed book from about this time, and is generally believed to be the work of a Dutch printer. It consists of pictures with descriptive text printed on one side of the paper—the first twenty pages from wooden blocks, in brown ink of glutinous quality to prevent it from spreading, the remainder being in brown ink also, with the text below in black, evidently from movable type, so that it is by no means impossible that printing was independently invented both in Holland and Germany; for whoever printed that book had evidently passed from 'the shoals of experiment to the broad sea of successful practice.' Besides the *Speculum*, there are a number of fragments of other books printed from movable types, which can scarcely be looked upon as the production of men who learned the art from Gutenberg; but the probability is in regard to Koster, that he was among the earliest to practise block-printing, and that he never attempted the system of movable type. It is, therefore, to Gutenberg, Fust, and Schöffer, 'the Grand Typographical Triumvirate,' as they have been termed, that we must look for the first use of movable type, primarily of wood, and then of metal. Strassburg puts forth its claimant in the person of John Mentell or Mentelin, whose tombstone bears the following inscription, carved beneath the figure of a printing-press: 'I repose here, John Mentelin, who, by the grace of God, was the first to invent in Strassburg the characters of printing, by means of which a man may write more in a day than formerly in a year.' He is now generally believed to have gained his knowledge of the art from Gutenberg before the latter left Strassburg, and neither Mentelin's books nor the records of Strassburg give warrant to the hypothesis that he was the inventor of printing. The goldsmith Fust, according to one German antiquary, was first indebted for his idea of the art to seeing the footprints of a horse on the soft mud of a road on which he was walking. He went home thinking on this circumstance, and 'from that day printing was invented.' Little value, however, is to be attributed to this story, as in all trustworthy evidence Fust only appears as the capitalist by whose pecuniary aid Gutenberg brought the art into working operation. The goldsmith and his associate worked long in secret at the wooden blocks with which Gutenberg commenced, till Schöffer, an illuminator of MS. and a confidential person in their employ, hit upon the expedient of the punch and matrix, by which types were cast in separate single letters—this being the greatest step in advance of the science of typography, and the fundamental basis of the new art. The first book they printed on the new system, passing over some small ones which are of doubtful authenticity, seems to have been the *Biblia Latina Vulgata*, generally known as the 'Mazarin Bible,' on which they expended 1200 florins before they had produced twelve sheets, and which was not completed within three years. This, the first perfect book ever issued, was a folio in two large volumes, of 637 leaves, printed in large Gothic or German characters, now generally called *Black Letter*. The same year that the Latin Bible was finished (1455), Fust took Gutenberg to law for repayment of money lent to further the work, and the printer not being able to pay his debt, was deprived of his press and printing materials. Shortly after, Gutenberg, with the aid of Konrad Humery, Syndic of Mainz, began anew, and issued in 1460 the *Catholicon*, a folio volume of 373 leaves. The art began to be made public about 1462, and gradually spread throughout Europe; but so slow was its progress that at the close of the century not more than 200 presses were at work.

The method used by these early printers for applying the ink

to the types was by means of hand-balls of skin stuffed with wool, a plan which continued with little modification till within the last forty years, when they were superseded by the 'rollers' now in use. For many years the old Gothic or black letter was the uniform type used, till in 1465 an edition of Lactantius was printed at Subiaco in a kind of semi-Gothic of great elegance, and approaching very nearly to the present Roman type. Two Italian brothers named De Spira (1469) acquired a high reputation for the beauty of their printing and the fineness of their type, so much so that printers at Rome and elsewhere furnished themselves with similar founts of type. The perverted taste of the time, however, compelled these printers to again change in 1477 their beautiful Roman type for the old and disagreeable Gothic, an example in which the De Spiras were followed by Nicolas Jenson, a Frenchman following the occupation of a printer at Venice, who is said to have brought the art to its utmost perfection. The attempt to use the Roman character was also made by Gering, a printer who had established himself in the Sorbonne at Paris—his works being all done in a handsome type, imitating the character of the Augustan age. In 1483 this printer also found himself obliged to discard the Roman type and conform to the prevailing fashion by using the 'clumsy and ill-formed Gothic,' being compelled to 'sacrifice taste to interest, and comply with the perverse inclinations and prejudices of the age,' arising very much from the preference the learned then showed for the old character from its resemblance to the writings of the old monks, which were held in great veneration. The introduction of the new type, however, would not be hindered, for not many years after we find Jean Petit, another Parisian printer, using types 'commonly denominated Roman,' and also occasionally a species of semi-Gothic and abbreviated characters, formed in imitation of MS., and much in use among the early French printers. In France, more perhaps than in any other country, resistance was displayed to the new art—the MS.-writing clergy bringing all their influence to bear against it, fearing the loss of their power as well as their means of livelihood. See TYPES AND TYPEFOUNDING.

Title-pages to books were first used about 1480. None of Caxton's books have any, with one doubtful exception, but titles to chapters were employed as early as 1470, appearing first in an edition of the *Epistles of Cicero*. Ornamental title-pages came in about 1490, the usual embellishment at first being a figure of 'the author at his desk.' Signatures, or letters at the bottom of the first page to guide the bookbinder in the arrangement of the sheets, began with a Terence printed at Milan in 1470. Catch-words, now altogether disused except in law-papers, were first applied to printing by De Spira at Venice, and the earliest system of numbering was applied to leaves, not to pages, a figure being placed at the top of the *recto* in each leaf. The only marks of punctuation at first used were the comma and full stop; Aldus improved upon this by giving a better shape to the comma, which till his time was only an oblique stroke, and also added the semicolon.

Caxton, the first English printer, is believed to have gained his knowledge of the art while in Bruges from Colard Mansion, one of the fugitive workmen of Fust—who had found it expedient to leave Mainz, owing to that city being involved in some of the Continental wars. Claims have been urged in favour of Friedrich Corsellis, a German, who had his press at Oxford, as the first who printed in England, from a book with the date of 1468 having been found which is supposed to be his work. But experts who have examined the book agree that from its style and workmanship it could not have been printed so early, but probably ten years later, and that the workmen omitted an X in the title date, an error of which this is by no means a solitary instance. The first work published by Caxton with Mansion's aid was the *Recueil des Histoires de Troy*, a book which he had translated and circulated in MS. some years before. It was followed soon after by *The Game and Playe of Chess*. Returning to England in 1476, he soon after set up his press at Westminster, and early in the following year published the first book ever printed in this country, *The Dictes and Sayings of the Philosophers*, a folio of 76 leaves. No fewer than 54 books are known of Caxton's, and 'the total produce of his press,' says Blades, 'not reckoning the books printed at Bruges, reaches to above 18,000 pages, nearly all folio size,' one of which at least was written and 22 translated by himself. He printed in a mixture of 'Secretary' and Gothic type, designed to imitate the hand-

writing of the time, and seems not to have been able to procure, or may have rejected, the Roman letter, even after it had been used with excellent effect by Continental printers. His successor, Wynkyn de Worde, showed great skill in his art, and is believed to have cut punches and cast his own type, and was the first to introduce the Roman letter into England, making use of it originally to distinguish any emphatic word or phrase. De Worde was also the first to use Greek letters in this country (1519), these being at that time cut out of wood. Richard Pynson, an associate of De Worde under Caxton, set up a press of his own at Temple Bar, and in 1499 published a book called *Promptorium Parvulum*, in which he used a type equalling, if not excelling, in beauty any produced in modern type-foundries. After the days of these Caxtonian associates the art progressed with giant strides in this country.

The earliest book in which both printing and engraving are combined is a Dante, published at Florence in 1481, and from that city came also what is known as *Italic* types, an imitation of the *curstive* character then in use at the Roman chancery. These have also been called Venetian letters, from the punches from which the types were cast being cut at Venice. The earliest specimen of printing in Scotland is *The Porteous of Nobleness, translated out of Frenche in Scottis* (Edin. 1508), a licence having been granted by James IV. to two merchants in that city to establish a press in 1507. The progress of the art in Scotland must have been slow, as in 1574 the Privy Council found it necessary to levy a contribution of £5 from each parish in the kingdom to enable Thomas Bassendyne to print an edition of the Bible. He became bound under penalties to deliver copies 'weel and sufficiently bund in paste or timmer' for the sum of £4, 13s. 4d., the remainder of the enforced contribution being detained to defray the cost of collection. Having 'guid characters and prenting irons,' the Council thought the work, great as it was, would go quickly on. The hope was not realised, for Bassendyne found it necessary to petition for longer time in 1576; and in the following year he was ordered by the Council to deliver up his printing-office and Bible to Alexander Arbuthnot, who finished the work and had it in circulation in 1579. The sale of this work was rather enforced, for the Council soon after enacted that all persons worth £500 should possess a Bible in the vulgar tongue, under a penalty of £10.

Printing was first practised on the Continent of America in the city of Mexico by Juan Cromberger, between 1536 and 1540, the latter year being the date of the earliest printed book from Cromberger's press. The second press was put up by Stephen Daye at Cambridge, near Boston, U.S., and the first work issued was *The Freeman's Oath*, dated 1639. In 1785, Mr. Wilkins, a young Indian merchant, translated the *Bhagavadgitha*, and soon after the *Hitopadesa*, being the first to print in the Sanskrit character, actually casting his own types. The history of the art need not be followed further; its onward progress has been rapid and successful.

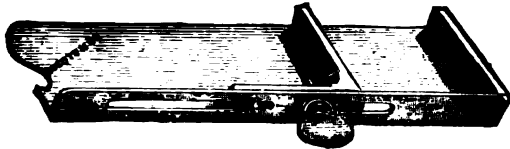
Turning now to the practical details of the art, the workmen employed are known as compositors and pressmen or machinemens. First in order comes the 'compositor,' who arranges the types into lines, and then into pages. Reckoning that there are rather over 60 separate pieces of metal, appearing and non-appearing, in a single line of this work, there will be about 10,000 in the page, it follows that considerable skill and patience are required in the process of setting up the types, which are contained in two 'cases,' mounted one higher than the other in a sloping position on a high stand or 'frame.' The diagram annexed shows the 'lower-case' in common use, with the



Lower-Case.

arrangement found most suitable for the various types, those most in use being nearest the hand, the boxes containing no

letters in the cut being set apart for the spaces, which are put between the words, and fill up the blanks at the ends of short lines. The upper-case is of the same size, but the boxes in it are smaller, are equal in dimension, and number 98, containing CAPITALS, SMALL CAPITALS, accents, &c. The compositor, standing in front of the cases, with the author's MS. or 'copy' before him on the upper case, picks up letter by letter the words in his copy and ranges them in his 'composing-stick,' which is



Composing-stick.

adjusted to the width of the line by a small screw, each type having a small notch in front to show him how to place it, 'justifying' or spacing-out to the proper width each line as it is completed. Proceeding thus, he gathers together, line upon line, page after page, till sufficient is in type to make a sheet of the work in progress. It is then put into pages, and placed in the proper position for printing within an iron frame or 'chase,' with wooden 'furniture' between and round the pages to allow the proper margins at back, front, top, and bottom of the book. The 'forme,' as it is now termed, is then taken to the press, where a 'proof' is printed, handed to the 'reader,' who with the aid of a boy compares the author's MS. with the printed proof, and marks the errors in spelling, punctuation, &c. After these are corrected, the reader again revises the proof, when it is sent to the author, whose alterations having been given effect to, the types are prepared for finally printing.

During the last half-century many attempts have been made to introduce type-composing machines, but for various reasons these have never yet attained complete success—one requiring special types cast for it, another proving not cheaper in labour, while a third was so complicated and fine in its details that mishaps were daily occurring; and, generally speaking, the working of such machines has been found even more irksome and fatiguing than the ordinary work of a compositor. One of the earliest type-composing machines was that invented by Sorenson, a Danish printer, and exhibited at the Great Exhibition of 1851. It has been adopted in various Continental offices, but has the defect of the types requiring a special notch. The 'compositor' of Mr. Hattersley of Manchester was first patented in 1857, but has since gradually been improved. In his machine the types are placed in metal boxes placed horizontally over the top, and divided into numerous rows by strips of brass, each row containing a separate type. Rows of keys, marked with a letter or other sign, are in front of the machine, and when one of these keys is depressed by the compositor, a type is pushed from the corresponding row down through the tubes of a V-shaped guide-plate into a slide below. The types are thus set up in one long line, and are then passed into the composing-stick and justified to the proper width of line. In 1865 Mr. Mackie took out patents for composing and distributing machines—the distributor required, however, a special notching of the type, and from this cause so far has not met with the success which its ingenuity merited, and thus has been practically a comparative failure. His compositor has been more successful, and is in use in various parts of the country. It consists of two distinct parts—the first being fitted with ivory and ebony keys like a cottage piano, and manipulated very much in the same way. The copy being placed where the pianist would put the music sheet, the workman spells out his copy upon the keys letter by letter—each touch of a key causing a small round perforation in a narrow strip of paper of unlimited length; and so quickly can this be done that an average of about 15,000 perforations has been attained in an hour. The perforated strip is now taken to the second machine, which looks like a round table with a series of upright boxes or pockets fixed upon its outer edge all the way round. These upright pockets contain the types, eight kinds in separate compartments of each box; and on a wheel underneath are a number of little platforms having a row of holes through which pins or 'pickpockets' project from below. The wheel

being made to revolve, as the perforated paper goes round with it, the pins pass up through the holes and pick out the letters corresponding to those with which the first machine perforated the paper. Eight separate letters being in one pocket, it happens sometimes that when the paper shows three, four, or five perforations in a line across, that a whole word will be picked out at once by the pins. As the wheel in its revolution reaches a certain point, the gathered words are carried away on a band and deposited in a long line, from which they are taken up and justified to the proper measure of the page.

Another of these compositors is that of Kastenbein, which is now in use at the *Times* office. Like Hattersley's, than which it is more compact, the types are placed in long metal tubes lying over the top of a heart- or V-shaped conducting-plate, with rows of keys for each letter or sign below. The keys being touched, the types are withdrawn from the tubes above, and falling by their own weight through the channels in the guide-plate, are received at the bottom in a long line, from whence they are taken and justified. The lighter letters, such as *i* and *l*, are placed right over the opening of the conducting-plate, giving only a short distance to travel, while the capital *W* is placed farthest away, as the latter having greater momentum might arrive otherwise too soon at the bottom, and come in where it was not wanted. One column and a quarter per hour is the nominal rate of the type-setting by this machine, and several are in daily use in the *Times*, where it is frequently put to a novel use: being placed close to a special Continental telegraph wire, as a message is received from abroad, it is read off by the telegraphist and set up at once from his dictation. Kastenbein is the only one who has succeeded in attaining anything like success with the distributing machine for returning the letters to their places when done with. The types to be distributed are placed at the top where they can readily be seen by the operator, who, touching key after key, causes the letters to drop through corresponding grooves into the tubes ready to receive them, and the tubes as they are filled are transferred to the composing machine. The composer of Neill & Co., Printers, Edinburgh, has also obtained considerable favour, and is in principle similar to those already noticed.

In no department of printing have there been more efforts made in regard to improvement in speed than in the press-work. Within the last twenty years, indeed, this has been so rapid that it would be almost impossible to enumerate the various printing-machines placed in the market. Till the beginning of the present century that in use was but a common screw-press, hardly any improvement having taken place since the early days of block-printing. The type being placed on the bed of the press, it was rolled in under the *platen*, which, on the screw being turned by the bar, was brought down on the type and the paper was printed. In the beginning of the 17th c., Jansen Blaew added a contrivance for releasing the impression when the bar was let go, giving it somewhat of a spring. In 1800, Earl Stanhope constructed a press of iron, and brought the impression to bear on the types by a system of levers which gave the use of a platen of double the former size, thus printing a much larger sheet, and obviating what was necessary in the old wooden press, a double pull before the whole sheet was printed. All subsequent presses more or less copied that of Stanhope, till 1817, when Clymer of Philadelphia invented the *Columbian*, which still holds the primary place among hand-worked presses, although the *Albion* of Mr. Cope (1824) is preferred by some for small-sized sheets. These various presses were soon followed by many others, among which may be named the *Napier*, *Imperial*, and *Britannia*. In 1790, some ten years before Stanhope's invention, Mr. William Nicholson took out patents for improvements in printing, and his specifications comprised almost every principle which has since been so successfully adopted in the making of printing-machines—proposing the use of a travelling type-bed, impression cylinders, and even spoke of printing from a web of paper by a cylinder surrounded with type acted upon by another covered with soft leather. Nicholson also invented the roller for applying the ink to the types instead of the hand-balls formerly used, and showed how 'grippers' could be used for holding the sheet to be printed, but he himself does not seem to have carried out any of his proposed improvements.

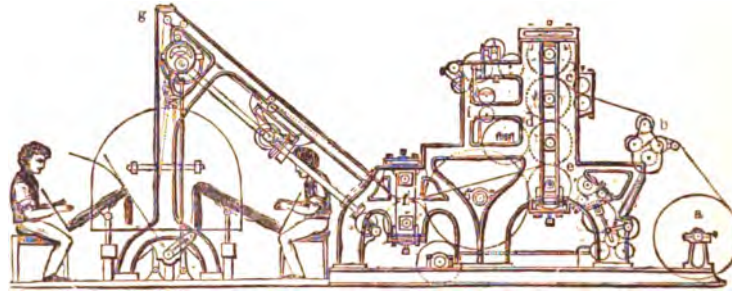
The first sheet ever printed by a machine, was one in a volume of the *Annual Register* for 1810, this machine being the inven-

tion of Koenig, a Saxon printer, who came to London in 1806, having in his own country received no encouragement in his belief that a press could be worked by mechanism. His partial success in England induced him to proceed further, and Koenig made a press which had a travelling type-bed passing under a series of ink-rollers, and an impression-cylinder which made a half-revolution when the type-bed was brought below it, standing at rest while the sheet was fed in. This attracted the attention of Mr. Walter, the proprietor of the *Times*, who commissioned Koenig to make a two-feeder machine for him, which he was ultimately successful in doing. It was first used with steam-power on November 28, 1814, attaining a speed of 1100 impressions per hour, and Koenig added yet further improvements which brought this number up to 2000. This machine was greatly simplified and improved by Messrs. Cowper and Applegath in 1818, and the same parties in 1824 produced a 'perfecting' cylinder-machine for book-work, in which both sides of the paper were printed in one revolution—that is to say, the pages on one side were printed exactly, 'registered,' on the back of the pages on the other side, and this was effected by the introduction of two drums between the impression-cylinders. The sheet being carried by a series of endless tapes over the first cylinder, was brought round to meet the face of the type on the travelling-bed as it passed from under the ink-rollers to the impression-cylinder, when it was taken up to the first drum and reversed: being then caught by the second drum, it was next passed round the second cylinder in exact time to meet the travelling type-bed from the other end of the machine. This machine was the prototype of those in common use in most book-printing offices at the present day. Mr. David Napier about the same time produced his machine, in which there was a rising and falling cylinder, and this invention was held in high repute by printers for many years. At first he had only a single cylinder; another was afterwards added, and this has latterly developed through improvements by French makers into what is now known as the 'Anglo-French.' The best machine on the cylinder principle at the present date (1878) is that of M. Marinoni of Paris, and it is now rapidly superseding all others in the production of book-work of the finest kind. Koenig's first attempt was on the platten or flat-pressure principle in 1810, but it was not until 1829 that machines of this kind attained anything like success, when they were introduced by Messrs. Spottiswoode and Brown; for the finer kinds of book-work they are even yet preferred. Flat-pressure machines of many kinds are numerous now, while there are others in use which are a combination of both the platten and cylinder principle.

With newspaper machines, however, the rapidity of improvement has been something marvellous. Messrs. Cowper and Applegath in 1827 supplanted Koenig's machine in the *Times* with one having four impression-cylinders, which produced 6000 an hour, and this remained in use till 1848, when Applegath invented another, which had the type affixed to a rotary cylinder revolving on a vertical axis surrounded by eight impression-cylinders, and capable of producing 12,000 per hour. This vertical principle was discarded by Mr. Hoe of Philadelphia, who devised a machine in which the cylinders were placed horizontally, and which being more compact was driven at a higher speed. In Hoe's machine the types, and latterly stereotype plates (see STEREOTYPE), formed a segment of a large cylinder with a rotary motion, the sheets getting the impression between it and a series of smaller cylinders placed at equal distances round the main cylinder. Near each of the small ones a man was stationed with a pile of paper heaped up on a board before him, and a sheet was pushed in between the small and large cylinders at each revolution, the type-cylinder receiving its ink from rollers placed at certain intervals between the impression-cylinders. This machine had

also an ingenious contrivance attached, which dispensed with the manual labour of taking off the printed sheets, through the agency of 'fliers,' which laid hold of the papers and placed them on the delivery table. It could also be adapted so as to be fed with from two to ten sheets at one revolution, by enlarging the type-cylinder, and increasing the number of impression-cylinders, the latter turning out 20,000 an hour. Much of the ingenuity-exercised both in the Applegath and Hoe machines was directed to the 'chase,' which had to hold securely upon the curved face of the cylinder the mass of movable type required to form a page. The complicated contrivance by which this was effected was entirely superseded by the use of stereotype casts of the whole page in one piece.

All these newspaper machines hitherto noticed only printed on one side at a time, the second side being done subsequently or on another machine, and it remained for M. Marinoni to invent one to print both sides at once. This 'perfecting' machine could also be adapted for several feeders, and produced 10,000 perfect newspapers per hour. The difficulties attending the feeding-in of so many sheets was always a drawback, and the idea of one that would mechanically feed itself from a roll of paper miles in length, which should print both sides at once, and deliver the printed papers folded or unfolded, long occupied the attention of printing engineers. At last three of these web-machines were produced in rapid succession. The first was an American one, the 'Bullock,' which has never attained any great success in this country. The real difficulties in the way were at length overcome by Mr. Macdonald, the printing manager of the *Times*, by whom and Mr. Walter the 'Walter Press' was first brought into operation in 1868, after several years of fruitless endeavours. In this reel or web of tightly-rolled paper, nearly 4 miles in length, and weighing about six hundredweight, is placed at one end of the machine. The paper is led from the reel (*a*) into a series of small cylinders (*b*), where it is damped, a process required with all paper that is to be printed, to enable it to take on the ink properly. It is then carried between the first and second (*c*) of four cylinders placed one over the other, where the first impression is received from the top cylinder, on which are fixed stereotype casts from the pages of one side of the newspaper. The paper then passes between the second and third (*d*), and resumes its forward direction in passing through the third and fourth cylinders (*e*), from the latter receiving the impression from the stereotype plates of the other side. It continues its course straight onwards till it reaches two other cylinders exactly in the centre of the machine (*f*), where by ingenious mechanism it is cut into sheets, each of which forms a single newspaper.



Sectional Diagram of Walter Press.

At *i* is the ink supply, from which, by a number of rollers, the ink is carried to the type-cylinders. Adjoining the cutter *f* is a self-acting index which counts the sheets as they are separated. The single sheets are now carried by tapes upward till they reach the apex of the triangle at the left side (*g*), whence they descend perpendicularly, and are thrown alternately backwards and forwards on to the boards, at which are seated the two boys,

who, with the exception of one man who starts the machine and looks after the rolls of paper, are all the attendants the machine requires; and even these boys may be dispensed with, as a folding apparatus can be fitted in where they are shown to be seated. 12,000 copies are printed in an hour at the lowest average, and the paper travels at the rate of about 1000 feet each minute. Other machines are now in operation very similar in principle to the 'Walter,' among these being the 'Prestonian,' the 'Donnison,' and the 'Victory,' the latter differing very little from the *Times* invention—mostly perhaps in this, that while the web paper in the 'Walter' is damped as it passes through two cylinders on first entering the machine, in the 'Victory' it is

carried over two water-troughs, spray from which, by a peculiar action, damps the paper, which is then partially dried upon hot rollers, after which it reaches the impression cylinders. To these machines there is generally a folding apparatus attached, which by a series of knives and grippers folds the papers ready for circulation. M. Marinoni, about two years ago, also adapted his machine, already noticed, to the web principle, and it is now also very much like the 'Walter' in its action, both in the printing and the cutting of the paper, as well as in the alternate delivery, the latter process always a special difficulty with fast-printing machines, where sheet succeeds sheet with great rapidity at intervals of only three or four inches at most. See *Horne's Introduction to the Study of Bibliography* (Lond. 1814); *Johnson's Typographia, or Printer's Instructor* (Lond. 1824); *Hansard's Typographia* (Lond. 1825); *Timperley's Dictionary of Printers and Printing* (Lond. 1839); *Beckmann's History of Inventions, &c.* (Lond. 1846); *W. Blades' Biography and Typography of William Caxton* (Lond. 1877); but the best general treatise on the early history of the origin of printing which has yet appeared in English, or perhaps in any language, is that of Theo. L. De Vinne, *The Invention of Printing* (New York, 1876).

Printing of Music is of various kinds, the most common being (a) by plates composed of pewter or soft metal, on which the notes and characters are stamped with punches, and (b) by an ordinary press, the music and common type being printed together. The latter system is much used by publishers of cheap music. Movable music types are believed to have been invented about 1503 by Ottaviano Petrucci, of Venice, who obtained a patent for their use from Leo X. in 1513. The method of tying a number of quavers and semiquavers together by a common stroke was originated by John Playford of London in 1660. At the beginning of the 18th c., engraving music came into fashion. John Welsh, London (1710), was the first printer who substituted pewter for copper plates.

Prinsenraub ('The Stealing of the Princes') is the name specially given to the notable exploit of Kunz von Kaufungen, who, with the help of certain accomplices, seized and carried off in the night of the 7th July 1455, from the castle of Altenburg (q. v.), Ernst and Albrecht, the two sons of the Elector Friedrich of Saxony, and the respective founders of the Ernestine and Albertine branches of that House. Kunz was instigated to the deed by a desire for private revenge, because he was obliged to deliver up certain possessions, given to him at one time as compensation for losses in the *Bruderkrieg* ('War of the Brothers'). On the way to Bohemia he was seized, near Geier, by a collier named Schmidt (afterwards Von Triller), handed over to justice, and beheaded at Freiberg, 14th July 1455. See Schreiter's *Geschichte des P.* (Leips. 1804); Gersdorf's *Einige Actenstücke zur Geschichte des P.* (Altenb. 1855); and, in English, Carlyle's singularly graphic and powerful narrative of the incident in his *Miscellaneous Essays*.

Pri'or. See MONASTERY.

Pri'or, Matthew, born July 21, 1664, either at Wimborne or in London, received his education at Westminster School under Dr. Busby, and in 1682 was sent at the cost of the Earl of Dorset to St. John's College, Cambridge, where he graduated B.A. (1686), and was elected to a fellowship (1688). His patron brought him under the notice of William III., who employed him as secretary to various embassies, and successively created him a Gentleman of the Royal Bedchamber, Under-Secretary of State, and one of the Commissioners of Trade. In 1701 he was returned to Parliament by East Grinstead as a Whig, but ratted on Anne's accession, and in 1711 was despatched to Paris by the Tory Government to negotiate a peace. He revisited Paris in the following year as Bolingbroke's secretary, and remained behind him as vice-ambassador (1713), his conduct in this capacity leading, on the fall of the Tories, to his impeachment and two years' imprisonment (1715-17). On his release, P. had nothing but his fellowship to support him, till the publication of his poems by subscription, and Harley's generosity, brought him £8000, and he died, well-to-do and disreputable, at Wimpole, Lord Oxford's Cambridgeshire seat, September 18, 1721. It is as a poet that P. is chiefly remembered, but his poetry is almost utterly forgotten. It includes *The Town and the Country Mouse* (1687), written in conjunction with Montague, and meant

for a satire on Dryden's *Hind and Panther*; the *Carmen Seculare* (1690), full of bombastic praises of the 'Protestant Hero'; *Alma, or the Progress of the Soul*, a metaphysical *Hudibras*, without its wit; *Henry and Emma*, a feeble echo of *The Nut-brown Maid*; *Solomon*, moral and lugubrious; the highly-spiced but diverting *Tales*; and some neatly-turned *Epigrams*. The latest, and probably the last, edition of P.'s complete works is that by Mitford (2 vols. Lond. 1835), to which a memoir is prefixed.

Priscianus Cæsariensis, one of the most famous of the Latin grammarians, was born or educated at Cæsarea, and probably was contemporary with Cassiodorus (468-562 A.D.). His teacher was Theoctistus, and he himself taught grammar at Constantinople, receiving a salary from the government, a fact which goes to prove that he was a Christian. P.'s great work, commonly called the *Commentariorum Grammaticorum Libri XVIII.*, and addressed to his friend and patron, the consul Julianus, treats in the first 16 books of the eight parts of speech of the ancient grammarians, of letters, syllables, &c., and in the last two of syntax; the latter, in one MS., are placed as a separate treatise with the title *De Constructione*. This work, in which P. is most indebted to Apollonius Dyscolus, is learned, sensible, and of wide scope. It is specially interesting for its parallel between the Latin and Greek languages, which contains many quotations from writers whose works have otherwise utterly perished. The epitome by Rabanus Maurus, a German bishop of the 9th c., was extensively circulated. P. wrote ten other works, of which the most important are his *De Accentibus*, *De Duodecim Versibus Æneidos Principalibus*, *De Declinatione Nominum*, *De Terentii Metris*, *De Sideribus*, and *De Laude Imperatoris Anastasii*. The best edition of P. is by Krehl (2 vols. Leips. 1819-20). See Bähr, *Geschichte der Römischen Literatur*.

Priscillianists were a Gnostic sect which appeared in Spain in the 4th c., and the first heretics who were persecuted. Their founder was Priscillian, who is said to have been influenced by one Marcus, a native of Memphis, but who began at anyrate to teach his heresy about 379. The bishops Idacius and Ithacius procured the condemnation of his doctrine at the Council of Cæsar-Augustus (380), and subsequently prevailed on the usurper Maximus to put him to death at Trier, 385. The sect continued to exist till the 6th c.

Prism, in solid geometry, is a figure bounded by planes which intersect in parallel lines, or, in other words, which are all perpendicular to a given plane. Consequently, the sections of a P. by any series of parallel planes are similar and equal; and the volume of any portion intercepted between two parallel sections is equal to the area of either section multiplied by the distance between the intersecting planes. A cylinder may be regarded as the limit of a P. whose sides increase in number and diminish in size indefinitely; and a P. may be regarded as a pyramid whose apex is removed to an infinite distance. It is evident that the minimum number of sides—i.e., the bounding faces exclusive of the ends—which a P. can have is three. In this form, it constitutes a most valuable instrument of research in physical optics. See REFRACTION and SPECTRUM ANALYSIS.

Prisoners of War. By the usage of modern civilized nations, officers made P. of W. are liberated on parole; that is, on giving their word of honour not to act against their captors during the existing war. Till that end, common soldiers taken prisoners are either retained in the country of their enemy, or exchanged. Non-combatants in the power of their enemy are not usually made prisoners, but they may fairly be required to contribute money and provisions to the enemy's maintenance. See ARMIES.

Prisons in Great Britain belong to the Crown. In every county there must be at least one common prison and one house of correction. The houses of correction are for the custody of vagrants, and of those summarily convicted by magistrates, or at quarter sessions. They are under the keeping of justices of the peace. Felons are imprisoned in the common gaol, of which the sheriff has the custody. The Queen's Bench division may commit any one to any prison in England; and the person committed by it cannot be removed or admitted to bail by any other court. 28 and 29 Vict. c. 126 consolidates and amends the law regarding the maintenance, government,

discipline, enlargement, and rebuilding of P. In Scotland, P. are under the management of the Department of P. and Judicial Statistics, established under the P. (Scotland) Administration Act, 1860, and the Judicial Statistics (Scotland) Act, 1869. The general prison for Scotland is at Perth, where convicts, prisoners under sentence of nine months and upwards, and criminal lunatics are confined. Several of the minor P. in Scotland were abolished in May 1878. An international congress on the subject of P. was held in Sweden in 1878. See JUVENILE OFFENDERS, REFORMATORY, CONVICT.

Prisren (*Peserim*), a town in a vilayet of the same name, in Albania, Turkey, at the N. base of the Shar Dagh, on the small Bistritza, an affluent of the Drin, 30 miles S. by W. of Pristina, and 80 E. of Scutari. It is one of the richest industrial towns of Turkey, and has a citadel, 15 mosques (one with three cupolas), 1600 bazaars, and numerous caravanserais. The trade is chiefly in flints, pottery, glass, steel wares, and saddlery. In the vicinity is much swampy pasture, with poor villages and small vineyards. Pop. 35,000, of whom four-fifths are orthodox Greek Servians.

Pristina, a town of Turkey, vilayet of Prisren, lies in an amphitheatre of hills, 30 miles N.N.E. of Prisren. The chief town of Old Servia, it has twelve mosques, several of which are imposing structures. Pop. 11,000.

Private, a common soldier in the cavalry and infantry regiments of the British army. His daily pay varies from 1s. in the infantry to 2s. ½d. in the Life Guards.

Privateer, a ship of war fitted out by a private individual in a belligerent state, and empowered by letters of marque from the government to make war upon the enemy's shipping, security being frequently taken for the due observance of the rights of neutrals and the law of nations. Such vessels were not considered pirates, and were often used as auxiliaries to the combatant naval forces of a country, till the Treaty of Paris (1856) abolished their use among European nations. During the American Civil War, the privateers commissioned by the Confederate States made great havoc among the trading vessels belonging to Federal owners.

Privet (*Ligustrum*), a genus of *Oleaceae*, consisting of about ten species of shrubs, or rarely trees, distributed over a wide area in Europe and several parts of Asia, chiefly in the colder or temperate regions. The Common P. (*P. vulgare*) is a native of thickets in England, and is a generally familiar shrub in consequence of its frequent use to form garden hedges, which stand clipping without injury. Though of small size, its hard white wood is used by turners. The globose purple-black berries yield a rose dye, as also a bland oil employed in Germany for cooking purposes. Various Asian species of P. have been introduced into cultivation, being valued for their evergreen or sub-evergreen leaves and their profusion of handsome spikes of more or less fragrant flowers. The Shining-leaved P. (*L. lucidum*) was brought to England from China in 1794; *P. Nepalense* from Nepal in 1823; Japan P. (*L. japonicum*) in 1846; and a dwarf species, with dark, glossy, leathery leaves (*L. coriaceum*), also from Japan, in 1864. The foliage of these is often prettily variegated. *L. robustum* grows in India to a height of 40 feet, and its bark is used to put into toddy to cause immediate fermentation.

Privilege (Lat. *privus* and *lex*) originally signified a law passed against, afterwards one in favour of, an individual. In the latter acceptation, privileges may be positive, as patents and monopolies; or negative, granting exemption from ordinary jurisdiction, e.g., Benefit of Clergy (q. v.), and the feudal immunity of nobles from taxation. They are said to be personal when granted to a special individual, and real if attached to an office, as in the case of freedom of arrest enjoyed by members of Parliament, counsel, witnesses, &c. P. also attaches to place. No civil arrests can be made in the royal presence; nor within the verge of the Palace of Westminster; nor within the precincts of Holyrood Palace. In republics, real privileges can hardly be said to exist, and in other states they are continually decreasing in number, the division of the community into privileged and non-privileged classes no longer existing in any European country.

Privileged Debts are in Scotch law those which are preferable on the funds of a deceased person, and which an executor

may pay without decree. They are deathbed and funeral expenses, according to the rank and fortune of deceased; mourning for widow and children; and a year's rent of the house, with servants' wages since last term.

Privileged Deeds are deeds held legal without the general statutory execution. The most important classes are Holograph (q. v.) deeds, mercantile letters, and bills and promissory notes.

Privy Council, a body of natural-born British subjects, appointed on the nomination of the sovereign as his advisers in state affairs. The council is supposed originally to have been a small permanent committee of the Great Council, and was composed, when summoned by Richard II., of the prelates, nobles, bannerets, &c. of the kingdom. It had very extensive powers during the reigns of the Plantagenets. Though the Crown had the prerogative of appointing its members, the parliament exercised considerable influence in their selection. The P. C. for a long period of time was composed of twelve members who sat continually and exercised great administrative, political, and judicial functions. The number gradually increased till in the reign of Charles I. that sovereign attempted to limit it to thirty, consisting of the great officers of state, the archbishops, and about fifteen others. The council has subsequently had an almost unlimited membership, and many of its duties have accordingly been assigned to committees of the great body. The 'Star Chamber' and 'Court of Requests' are such committees which have made themselves historical. The P. C.'s tendency to exercise jurisdiction in questions affecting the rights and liberties of private individuals was checked by 16 Charles I. c. 10, which declared such acts 'intermeddling' and 'illegal;' but subsequent to this statute the council was empowered to act in matters affecting the property of individuals arising out of the jurisdiction of the courts of the kingdom. A final separation of the P. C. from strictly political duties was made in the reign of William III., these being intrusted to the Cabinet, which is really a committee of the P. C. without recognised legal powers, consisting of the leading members of the existing administration. Among the various committees of the P. C. at present existing are the Board of Trade (q. v.), the Committee on Education (see below), and the Judicial Committee. The *Judicial Committee* was formed by Acts 3 & 4 William IV. c. 41, and had its powers confirmed and extended by 6 & 7 Vict. c. 38. It was entrusted with appeals from the Ecclesiastical and Admiralty Courts, in dealing with which it had powers of enforcing its decrees as great as those of the Court of Chancery. It was also the Court of Appeal for all cases from the colonies. It consisted of a number of the great legal officers, and by Act 34 and 35 Vict. c. 91 (1871) four additional judges were appointed as paid members of the Judicial Committee, at salaries of £5000 each. By the Supreme Court of Judicature, Act 36 and 37 Vict. c. 66 (1873), appeals from the High Court of Admiralty were transferred to Her Majesty's Court of Appeal, but it has still control of appeals from the Vice-Admiralty and Prize Courts abroad, from the Courts of the Isle of Man, the Channel Islands, India, and the Colonies, and from the ecclesiastical courts of England. Its functions also include the licensing of the republication of books and the authorising of the prolongation of patents. It sits daily except on Mondays and the usual legal vacations. It consists now (1878) of the Lord President, the Lord Chancellor, the Lord Justices of the Court of Appeals, the Master of the Rolls, the Lord Chief Justices of the Queen's Bench and Common Pleas, the Lord Chief Baron of the Exchequer, the Judges of Probate and Admiralty Divisions of the High Court, all privy councillors who have held any of these offices, certain puisne judges, and the four paid judges. Such prelates as are members of the P. C. are on the committee in ecclesiastical appeal cases.

The duties of a privy councillor as defined by oath are to advise discreetly for the Queen's honour and the public good, to keep secret her counsel, to avoid corruption, to help and strengthen that which shall be resolved, to withstand attempts to the contrary, and to do all that a true councillor should do for his sovereign. By 9 Anne c. 15, an unlawful assault on the person of a privy councillor was felony, but this has been repealed by 9 Geo. IV. c. 31. He enjoys the title of Right Honourable, and ranks in precedence after a Knight of the Garter. The Lord President of the Council is the fourth great officer of State, and a member of the Cabinet, with a

salary of £2000 a year. The Council usually includes the members of the royal family, the English archbishops, the Lord Chancellor, the Bishop of London, the judges mentioned as belonging to the Judicial Committee, the Speaker of the House of Commons, the ambassadors, many ministers plenipotentiary and colonial governors, the Commander-in-Chief, Cabinet Ministers, the Vice-President of the Board of Trade, the President of the Poor-Law Board, and other officers, in addition to all who have held any of these offices. Meetings of Council are held every few weeks at the sovereign's residence, at which only those councillors attend who have been specially summoned, and the Queen's decisions are then called her 'Acts in Council,' including as they do all her important personal resolutions. The P. C. inquires into all offences against Government, and commits offenders for trial. The Queen in Council may issue proclamations binding on her subjects, if consonant to the laws of the land, and also 'Orders in Council' on mercantile and international affairs. The Council has the power of appointing Sheriffs in England and Wales, and the framing of laws for such of the colonies as have not representative assemblies. It exists during the life of the sovereign, and for six months longer, unless dissolved by his successor. It is assembled on the proclamation of the new sovereign, and its members are then re-sworn, when the sovereign subscribes the required oaths on his assumption of the crown. On 1st January 1878 there were 204 Privy Councillors, 10 of whom were princes and high dignitaries, 10 dukes, 7 marquises, 28 earls, 7 viscounts, 1 bishop, 16 titular lords, 32 barons, and 93 commoners.

Privy Council, Committee of, on Education. See PUBLIC SCHOOLS.

Privy Purse, Keeper of the, an officer in Her Majesty's household charged with the payment of her private expenses and charities. The annual vote in the Civil List for the Private Purse amounts to £60,000.

Privy Seal, is the seal of state, by which documents of minor importance are authenticated. Those of high import require the Great Seal (q. v.). The keeper is called the Lord P. S. He has usually a seat in the Cabinet. There is a P. S. in Scotland, under which the sovereign transmits such rights as a subject transmits by assignation.

Prize-Fighting and sword-playing are illegal, and if either of the parties be killed, the act is a felony.

Prize in War. Regarding military prize-money, see BOOTY. On a ship being taken, it must be sent to a port belonging to the capturing power, whose law courts must decide whether or not the vessel is a lawful prize. In the United Kingdom, this jurisdiction belongs to the Court of Admiralty. Appraisements and sales are to be made by agents appointed by the commanders and other commissioned officers. A certified list of those entitled to share in the prize is to be transmitted to Chelsea Hospital by the commanding officer making the capture. Agents are to remit the proceeds and amount of sales within one month after their date, under penalty of £1 per cent. per month. The net produce of the sale of a captured ship, approved by the court, is divided into eight parts, three of which go as P.-money to the captain, or if he is under a flag officer, one to the flag officer and two to the captain, one to the superior officers, one to the junior commissioned and warrant officers, one to the petty officers and mid-shipmen, and two to the general ship's crew. Due notice of division of funds and other practical details is appointed to be made in the London *Gazette* and in two of the London morning papers. See CAPTURE.

Prizzi, a thriving town of Sicily, province of Palermo, near the river Caltabelotta, 30 miles S. by E. of Palermo, and 10 W. of Lercara, a station on the Girgenti railway. It has manufactures of iron, copper, cotton, &c., and a pop. (1874) of 8535.

Pro's (Span. and Port. 'a prow,' Fr. *proue*, Lat. and Gr. *prora*), or **Prahu**, a narrow sail canoe used by the Malays and Ladrone Islanders. It is about 30 feet long by 3 broad, carries a lugsail of matting, and has both ends paddled, and of exactly similar form. The lee-side of the P. is straight and flat, and from the other, which is rounded, there projects several feet a framework, to which a canoe-shaped float is attached. The float prevents the vessel from oversetting, while the framework

supports a weight to counteract the pressure of the sail. The P. is a fast sailer, its peculiar construction enabling it to move easily between two places with a side wind.

Probabilis Causa, a Scotch law term denoting that a party wishing to sue, or defend, *In Forma Pauperis* (q. v.), has reasonable legal ground to stand on. The counsel for the poor determine the question of P. C.

Probabilism is one of the three cardinal propositions of Jesuitical casuistry; the other two being Mental Reservation and Justification of the Means by the End. P. was the A. B. C. of Jesuit morality in the time of Pascal (*Provincials*, 1656), and remains so to the present day, the very same maxims which were riddled by Pascal being taught yet in every Roman Catholic seminary in which Jesuit influence prevails, *i.e.*, in the great majority. It is the system which applies to the guidance of conscience, the *opinio probabilis*, which is defined in authorised works on moral theology as 'any judgment resting on some really grave motive, though with fear of the opposite; that is to say, any opinion for which a grave motive can be adduced may be acted upon, notwithstanding an inward impression that it is opposed to the truth. Explicit tests are further given for what constitutes a 'probable opinion.' For persons 'of learning and uprightness' an opinion is 'assuredly probable' for his own guidance if he be 'conscious of having thought it out diligently,' and persuaded himself to his own satisfaction of its correctness. For ordinary people any opinion is probable which they may find expressed, though it be but by a single author, if he be 'of exceptional superiority.' For a person unversed in letters any opinion is probable, if it be that of one whom 'he himself deems to be possessed of learning and insight.' See *Compendium Theologiae Moralis*, auctore P. J. P. Gury (Romæ, 1872); Pascal's *Provincial Letters*; Cartwright's *Jesuits* (Lond. 1876, or *Quart. Rev.* Nos. 274, 275).

Probability is the branch of algebra which investigates mathematically the chance of occurrence of any one of a given number of related possible events, some one of which at least must occur. For instance, if a die with six equal faces is thrown, there is evidently as much chance of any one face turning up as of any other. Limiting our attention to any one particular face, say the *ace*, it is clear that of the six equally possible ways in which the event may happen, one only is favourable to this event, being the turning up of the ace, the five others are unfavourable. Hence the P. of the ace turning up is one-fifth the P. of its not turning up. But, since the ace must either turn up or not, the sum of these probabilities must equal certainty; and therefore, representing certainty by unity, it follows that the mathematical expression for the P. of the ace turning up is the

fraction $\frac{1}{6}$, since $\frac{1}{6} + \frac{5}{6} = \frac{6}{6} = 1$. More generally, the theorem

is thus expressed. If an event may happen in a ways, and fail in b ways, any one of these being equally probable, the chance of its happening is $\frac{a}{a+b}$, and the chance of its failing $\frac{b}{a+b}$.

Suppose a bag filled with 12 balls, 7 of which are white and 5 black. If two are drawn at once, find the P. that they shall both be white. The number of favourable events is the number

of combinations of 7 taken 2 together, or $\frac{7 \cdot 6}{1 \cdot 2}$; and the total number of possible events is similarly 12 taken 2 together, or $\frac{12 \cdot 11}{1 \cdot 2}$. Hence the required P. is $\frac{7 \cdot 6}{12 \cdot 11} = \frac{7}{22}$. Now the P. that

one white ball should be drawn is evidently $\frac{7}{12}$; and after the one is drawn the P. that a second should be drawn is $\frac{6}{11}$, since now there

are only 11 balls left, 6 of which are white. But $\frac{7}{12} \times \frac{6}{11} = \frac{7}{22}$,

the P. that two white balls should be drawn. This would lead us to expect the next general theorem in probabilities, that, if the P. that one event (A) should happen is p , and the P. that the second (B) should happen q , then the P. that both should happen together is $p \cdot q$. This may be established by rigorous reasoning, but the following indirect proof may be regarded as sufficient. The P. that A should not happen is $1 - p$; and the P. that B should not happen is $1 - q$. Assuming the theorem

that the P. that A and B should happen together is pq , it follows of necessity that the P. that A should happen and B not is $p(1-q)$, that the P. that B should happen and A not is $(1-p)q$, and that the P. that neither should happen is $(1-p)(1-q)$. But since every possible event is contained in these four methods of combining, the sum of the probabilities should equal unity, or $pq + p(1-q) + (1-p)q + (1-p)(1-q) = 1$. This is true identically, and therefore we are assured of the truth of the theorem. Generally, if $p, q, r, \&c.$, are the probabilities that certain events should occur independently, the P. that all should occur at once is the product $pqr \dots$. Thus the P. that a half-

penny should turn up heads in 10 successive throws is $\frac{1}{2^{10}}$; and this is evidently the P. that all of ten coins thrown together should turn up heads. Hence the P. that one at least tails is

$1 - \frac{1}{2^{10}} = \frac{1023}{1024}$. Another important theorem which hardly

requires further proof is that if an event may happen in different independent ways, the P. of its happening at all is the sum of the probabilities of its happening in the different independent ways. For instance, in the former case of the 7 white balls and the 5 black balls, what is the P. that the two drawn shall be of one colour? This may happen in two ways, either by both being white or by both being black. The P. of both being white is $\frac{7}{22}$; and the P. of both being black is $\frac{5}{33}$;

hence the P. of both being of the same colour, whether white or black, is $\frac{7}{22} + \frac{5}{33} = \frac{31}{66}$. Let p be the P. of an event happen-

ing once, and q the P. of its not happening, so that $p+q=1$; then p^n is the P. of its happening every time in n trials. The P. of its happening all but one assigned time is $p^{n-1}q$; hence the P. of its happening $(n-1)$ times out of n trials is $np^{n-1}q$, since its not happening may be in any of the n ways, for each of which the P. is $p^{n-1}q$. Similarly the P. of its happening $(n-2)$ times is $\frac{n(n-1)}{1.2} p^{n-2}q^2$, since its not happening may be in any of the

$\frac{n(n-1)}{1.2}$ ways (n things 2 together), for any assigned one of which the P. is $p^{n-2}q^2$. And generally, the P. of an event happen-

$(n-m)$ times exactly out of n trials is $\frac{n(n-1)(n-2)\dots(n-m+1)}{m!} p^{n-m}q^m$.

Hence the P. of an event happening m times exactly out of n trials is given by the $(n-m+1)$ th term of the binomial expansion $(p+q)^n$, which is of course identically equal to unity. Thus the P. that an ace turn up three times out of six throws with a die is $\frac{6.5.4}{1.2.3} \cdot \frac{1}{6^3} = \frac{625}{11664}$. Further applications and theorems will be found in any of our standard text-books on algebra. The whole theory has an intimate connection with all questions regarding annuities, insurances, &c. See also Toddhunter's *History of the Mathematical Theory of Probabilities*.

Probate, Probate Court. P. is the showing and proving of a will before the proper authority. All powers formerly vested in the ecclesiastical courts regarding wills and letters of administration are now transferred to the P. C. If the evidence for the will is sufficient, it is deposited in court and registered, and letters of administration granted to the executors. When a person dies intestate, or without naming executors, the court will grant power of administration to the next of kin. See EXECUTOR.

Proboscidea, an order of *Mammalia*, represented by the elephants. Formerly the P. were regarded as merely a group of the heterogeneous division *Pachydermata*, but the characters of the elephants are so well marked that their separation to form a distinct order is perfectly justifiable. Only two living examples of elephants exist, but the order P. includes the extinct *Mammoth*, *Mastodon*, *Deinotherium*, &c. See ELEPHANT.

Proboscis Monkey. See NASALIS.

Probus, Marcus Aurelius, a Roman Emperor, was born at Sirmium, in Pannonia, about 232 A.D., and early attracted the notice of Valerian, by whom he was rapidly promoted to the rank of tribune. As such he signally defeated

the Sarmatians, at the same time saving the life of a near kinsman of the emperor's; and having served with distinction in Asia, Africa, and Germany, was appointed by Tacitus commander-in-chief of all the eastern provinces. On Tacitus' death in April 276, P. was raised to the imperial purple by the legions of the East, and their choice was ratified by the Senate when, three months afterwards, Florianus, the late Emperor's brother, was murdered at Tarsus by his own soldiers. To the Senate P. committed the civil administration of the empire, and himself achieved the deliverance of Gaul by the recovery of seventeen flourishing towns and the slaughter of 400,000 Franks, Burgundians, and other German invaders (277). He next carried his arms into the heart of Germany, built a wall extending from the Danube to the Rhine, and forced the vanquished tribes to furnish a contingent of 16,000 recruits, whom he distributed amongst the armies of the empire. P. also subdued the Blemmyes and Isaurians, crushed the revolt of Saturninus at Alexandria (279), and of Bonosus and Proculus in Gaul (280), and finally, returning to his capital, there celebrated a splendid triumph. Strangely enough, the hopes of this great conqueror all tended towards a Utopia where standing armies should be no longer a necessity—hopes whose utterance cost him his life by rousing the jealousy of the soldiery. He was superintending some troops employed in the drainage of the Sirmian marsh, when they suddenly rose against him, dragged him from the tower in which he sought to escape their fury, and stabbed him with a thousand wounds, August 282. 'Just by name and just by nature, a conqueror both of tyrants and barbarians,' is the epitaph with which Vopiscus, our chief authority, closes his brief biography of P. See ch. xii. of Gibbon's *Decline and Fall*.

Process, in law, is a term comprehending all the writings, forms, and pleadings by which an action, civil or criminal, is brought under judicial cognisance. It includes all that takes place, from the first step down to the final decree in a civil action, and to the conviction or acquittal in a criminal prosecution.

Processional was a service-book containing rules for the arrangement of processions, which originated in the Western Church about the middle of the 5th c., though used in the East perhaps a century earlier, and formed a very prominent feature in the ritual of the Medieval Church.

Procession of the Holy Ghost is the term used to express the relation of the Third Person of the Trinity to the Divine Essence, being analogous to the term Eternal Generation, which is applied to the Second Person. See FILIOQUE.

Processions formed a prominent feature in the ancient festivals of Bacchus, Ceres, and other divinities, as also in the Jewish worship. They were introduced in the 4th c. A.D. into the Catholic Church, where their character is threefold—of supplication, as on the Rogation Days (q. v.); of atonement, on Good Friday; and of praise and thanksgiving, on all the higher feasts. In Protestant countries they are generally confined to the churches, but elsewhere they are often conducted through the streets, the procession at Munich on the feast of Corpus Christi being one of the most splendid on the Continent. At the service of Solemn Benediction, during the singing of the *Pange Lingua*, P. of the Blessed Sacrament are made round the church at Easter, Christmas, on the feasts of the Blessed Virgin Mary, &c. Minor P. are those of the Asperision, the Stations of the Cross, and at the opening and closing of service.

Pro'cida, the *Prochyta* of the Romans, a small island about a mile from the W. horn of the Bay of Naples, and midway between the mainland and Ischia. It is composed of pumice-stone and lava, and consists of the only remaining sides of two contiguous craters, forming two semicircular bays. It is 3 miles long, varies much in width, and has a somewhat flat surface. Its inhabitants (13,800 in 1874) are engaged in fishing and in cultivating the vine and other fruits. The town, at the N.E. extremity, has a good harbour, a castle perched on a precipitous rock, and a memorial to twelve Procidians who were executed during the reaction of 1799, erected in 1863.

Proclamation, Royal. In former times it was held that a P. R. under the Great Seal had the force of an Act of Parliament, and it was so declared by statute 31 Hen. VIII. c. 8.

This was repealed in the following reign. The doctrine was, however, maintained by the Stewart kings in their disputes with their parliaments. It was finally abandoned by the royal assent to the Act 1 Will and Mary, c. 2.

Proclus, the last of the Neoplatonists, was born at Constantinople, February 8, 412 A.D., passed his childhood at Xanthus, and coming whilst still a youth to Alexandria, learnt grammar from Orion and rhetoric and law from Leonas. With the latter he revisited the city of his birth, and on his return to Egypt abandoned the study of jurisprudence for that of mathematics and philosophy, in which his instructors were Hero and Olympiodorus. About 431 he removed to Athens, where Plutarchus and Syrianus initiated him in the Aristotelian and Platonic systems, and where by the age of twenty-eight he had published a commentary on Plato's *Timæus*, with other treatises. On Syrianus' death, P. succeeded to his chair, and lectured with profit to himself at least, till, by his open observance of pagan rites, incurring the suspicions of the Christian government, he was forced to retire for a year to Asia. This interval he employed in mastering the mysteries of the East, and for five years after his return to Athens he laboured at a compilation of the Chaldean oracles. Thenceforth P. lived more circumspectly, veiling his esoteric doctrines from the vulgar, though secretly practising a rigid asceticism, and holding in reverence every creed but one, the Christian. Worn out with fastings, he died April 17, 485, and was buried near Lycabettus. In his philosophy P. pushed Plotinus' mysticism to its logical absurdities, teaching that a hierarchy of ideas, with a ceaseless generation from the abstract to the concrete, presented the perfect pattern of a hierarchy of existence, where unity incessantly gave birth to individual phenomena. Plato's maxim, 'Know thyself,' he interpreted as meaning that self-knowledge is the only means towards knowledge of any kind, and must be obtained, neither from others nor by personal investigation, but by illumination from above, from Hermes the messenger of Zeus. Faith with him was paramount to science, enabling mankind to appreciate the good, that is, the one; and reason was faith's expositor. In his interpretation of the Orphic poems and Chaldean oracles, which he regarded as the revelation of heaven, he sought less to strike out novel conceptions of his own than to elaborate the doctrines of Aristotle, whom he termed 'the philosopher of the understanding,' and of Plato, 'the philosopher of reason,' at the same time allegorising the latter's every word and action. There is no complete edition of the twenty-two extant works of P., the fullest, by Cousin (6 vols. Par. 1820-27), containing his commentaries on Plato's *Parmenides* and *Alcibiades*, his *Decem Dubitationes circa Providentiam*, and *De Malorum Subsistentia*. Taylor's English translation (2 vols. 1820) gives his commentaries on the *Timæus*, *Alcibiades*, and *Theologia*, his treatise on the first book of Euclid, *Institutio Theologica*, and five of his hymns. See Ritter, *Geschichte der Philosophie* (12 vols. Hamb. 1829-53); Brandis, *Geschichte der Entwicklung der Griechischen Philosophie* (2 vols. Berl. 1862-64); and Lewes, *History of Philosophy* (2 vols. Lond. 1867).

Procoelia, a division of the order *Crocodylia*, including all the living members of the group, and named from the form of the bodies of the vertebræ or joints of the spine, these being hollow, or concave in front and convex behind. Extinct crocodiles had *amphicalous* or fish-like vertebræ (*i.e.*, hollow at either extremity) or *opisthocalous* vertebræ—the opposite of the procoelous.

Proconsul, a Roman officer, who, though not consul was invested with consular powers (*imperium et jurisdictio*) except in the city and its immediate vicinity. The first P. was Q. Publius Philo, whose *imperium* was prolonged in 327 B.C. in the second Samnite war to enable him to follow up his victories. At a later period it was usual for the consuls, on the expiry of their office in Rome, to be despatched to conduct a war in some of the provinces, or to carry on its government. A year was the legal period, but the Senate might extend it. Sometimes, as in the case of young P. Cornelius Scipio in the Spanish war, a man was made P. who had not been consul. This was very common towards the close of the Republic. Later still, parts of the dioceses established by Constantine were ruled by proconsuls.

Procop, the name of two celebrated Hussite (*q. v.*) leaders. After the death of Ziska in 1424, part of his followers, naming

themselves the 'Orphans,' chose as their leader **P. the Little**, while the main body of the Taborites (*q. v.*) followed **Andreas P. the Great**, or **The Shaven** (Czech, *holy*, 'bald,') so called from his having been a monk. They defeated the citizens of Prague in 1425; the Germans at Aussig on the 16th June 1426; in March of 1427 took Mies, and drove in flight from that city an army of 'Crusaders,' and in December occupied Kolin. From 1428 to 1430 they ravaged Moravia, Hungary, Silesia, Austria, Bavaria, Lusatia, Thuringia, and Franconia; even during the negotiations for peace at Eger in the spring of 1432, they led forays through Brandenburg as far as Berlin. Their struggle with the moderate Calixtines after the conclusion of the 'Compact of Prague' at Basel (30th November 1433), ended in the defeat and death of both leaders in the bloody battle of Lipan and Hrzib, near Böhmis-Brod (30th May 1434).

Proco'pius, a Byzantine historian, was born at Caesarea, in Palestine, about the beginning of the 6th c. B.C. Coming early to Constantinople, he became secretary to Belisarius (527), whom he attended on his campaign against the Vandals (534), and in the Gothic war (535-40) was placed at the head of the Byzantine navy and commissariat. After his return to Constantinople (541) the Emperor Justinian raised him to the rank of senator, with the title *illustris*, and in 562 created him prefect of the city. P. died about the year 565. He wrote the history of Justinian's wars, in eight books, with strict impartiality; next to the emperor's glorification described his splendid buildings in the *Kitimata*; and finally retracted all his praises in the *Anecdota*, a *chronique scandaleuse* of the Byzantine court, whose authorship, however, has been questioned. The best complete edition of his works is by Dindorf (3 vols. Bonn, 1833-38). See Dahn, *P. von Cæsarea* (Berl. 1865).

Procrustes (Gr. 'the stretcher,' from *prokrudō*), the surname of the Attic robber Polypemon or Damastes, who forced all travellers that fell into his hands to lie down on a bed of torture, to suit whose length he lengthened their bodies by racking, or shortened them by cutting off a part of their legs, till himself subjected to the same treatment by Theseus. Hence 'the bed of P.' is a term figuratively denoting unfair extension or abbreviation.

Procter, Bryan Waller, better known as 'Barry Cornwall,' was born either in Wiltshire or London, November 21, 1787. He was educated at Harrow, where Byron was his contemporary, entered the office of a solicitor in Wiltshire, but returned to London in 1807, and devoted himself to literature, gradually becoming intimate with Hunt, Lamb, Hazlitt, Keats, &c. In 1831 he was called to the bar by the Society of Gray's Inn. He held for some time the post of Commissioner of Lunacy, but resigned it in 1861. Jerdan, editor of the *Literary Gazette*, says in his biography that P.'s first poems appeared in that periodical. He published *Dramatic Scenes and other Poems* in 1819. This volume was followed by *Marcian Colonna* (1820); *A Sicilian Story* (1820); *Mirandola, A Tragedy* (1821); *The Flood of Thessaly and other Poems* (1822); *English Songs and other Poems* (1832). His *English Songs and Smaller Poems* appeared in 1852. P. likewise edited Moxon's edition of Shakespeare (1839-43), and an edition of Ben Jonson (1838). He wrote a pleasant *Memoir of Charles Lamb* (1866); *a Life of Edmund Kean* (1835); *Effigies Poeticae, or Portraits of British Poets* (1824); and *Essays and Tales in Prose* (1851). He died in London, October 4, 1874. P. belonged to the school of Keats and Hunt, and did much to revive a taste for the simple beauty of the earlier English poets. His lyrics were equalled among his contemporaries only by those of Moore; and, like Moore's, his style is sometimes defective in taste. See *Bryan Waller P.: an Autobiographical Fragment, and Biographical Notes, with Personal Sketches of Contemporaries, Unpublished Lyrics, and Letters of Literary Friends* (Lond. 1877).—**Adelaide Anne P.**, daughter of the preceding, the 'golden-tressed Adelaide' of her father's poems, was born in London, October 30, 1825, and early developed a poetical taste like her father's. Her *Legends and Lyrics* appeared in 1858-61 (new ed. with preface by Charles Dickens, 1866), and besides contributing to the magazines, she wrote some of the pieces contained in the *Victoria Regia*. Miss P., who had become a Roman Catholic, died in London, February 2, 1864.

Proc'tor is the name given to the practitioners in the civil and ecclesiastical courts. The functions of a P. correspond with those of an attorney in the courts of common law. Proctors had privileges which were abolished by recent statute, compensation being given to them.

Proc'tors, at each of the universities of Oxford and Cambridge, are two masters of arts, nominated yearly by the colleges in rotation, and charged with the censorship of the morals of the undergraduates. They have the power of fining students whom they find smoking in the public streets, or walking them after dusk without their academic dress, dining in taverns, driving tandem, or otherwise infringing the university statutes. Their authority, as that of their deputies, the pro-proctors, extends over the townspeople, and they possess official votes in the election to several professorships and other offices. Proctor is also the title of the deputies returned by the parochial clergy to Convocation (q. v.).

Proc'urator-Fis'cal is in Scotland a legal officer of the crown. He superintends precognitions (see **PRECOGNITION**), and it is at his instance that criminal proceedings may be instituted before sheriffs and inferior magistrates. They have the functions also of coroners in England. Though appointed by the sheriffs, they are accountable to the crown counsel, and in cases of difficulty it is their duty to communicate with the crown agent. The P.-F. may prosecute for the public interest, on the ground of a private complaint; but when he believes that the complaint is made rather in furtherance of private than of public interest he should decline to take the initiative. To obtain damage for prosecution against a P.-F., malice must be proved. Procurators-fiscal are now paid by salary. See in English law under **CRIMINAL**, **CRIMINAL PROCEDURE**, and **PROSECUTION**, **CRIMINAL**.

Pro'cyon. See **RACON**.

Procyon, a star of the first magnitude in the constellation *Canis Minor*. It is readily found from its proximity to Orion, which it follows through the heavens. It forms with Sirius and Betelgeuse a nearly equilateral triangle.

Prodd, a light crossbow used in sporting, especially by ladies, during the 16th and 17th centuries. Queen Elizabeth is reported to have been very expert in shooting deer with it. In the reign of Charles I. the P. was sometimes combined with the petronel.

Producta, a well-known genus of Brachiopodous shells, forming the type of the family *Productula*. In this group, which includes only fossil forms, the shell was free, or was attached to rocks directly, and without the intervention of a stalk. No 'carriage-spring apparatus' existed for the support of the arms. The genus P. itself first occurs in a fossil condition in the Devonian period, and ranges through the Carboniferous to the Permian rocks. It is thus exclusively Palæozoic in its distribution. *P. Cora* of the Carboniferous is a typical example. The shell is long, crosswise, and may have ear-like processes. The hinge-line is straight, and the ventral valve is convex. The shell surface is marked with prominent lines.

Professor, a title among the Romans borne by public teachers of grammar and rhetoric, at the medieval universities was almost synonymous with *Doctor* and *Magister*. Gradually, however, as the taking of a degree ceased to entail the duty of instruction, there arose a regular body of lecturers in the various faculties, to whom the name Professors was distinctly applied. In the Scotch, Continental, and American universities the education of the students is almost wholly intrusted to the professors, their lectures being the only recognised channels of instruction; but in the English Universities of Cambridge and Oxford (q. v.) the professorial functions have gradually been usurped by college and private tutors, and a student can at present obtain his degree without having attended a single P.'s lecture. The tendency, however, of recent legislation has been to increase the activity of the professoriate, and to establish new chairs of languages, science, &c. See **UNIVERSITIES**.

Profile (Fr. *profil*, Ital. *profilo*, from Lat. *filum*, 'a thread') denotes generally a view of the perpendicular section of a body. In architecture, it is the contour of the different parts of an elevation; in fortification, the vertical cross section of a work; in

painting, an outline drawing of the side of the face. See **SILHOUETTE**.

Prognosis is the term employed in medicine to indicate the opinion of the physician or surgeon regarding the probable termination of a disease. In forming a P. the physician takes into consideration the nature of the disease, and also numerous modifying circumstances, such as age, sex, mode of life, previous state of health, &c. Some diseases and injuries are necessarily fatal; and a tolerably accurate P. regarding the duration of life may be made; but many diseases terminate fatally through complication, and on account of unfavourable circumstances. In such cases the difficulties in the formation of a correct P. are greatly increased.

Progression, in mathematics, is the name given to certain algebraic series, whose succeeding terms are related in a particular manner to each other. Thus, in the arithmetical P., the difference between any two contiguous terms in a given series is constant for that series; in the geometrical P. their quotient is constant; in the harmonical P., the reciprocals of the terms form an arithmetical P.

Progression, in music, is a succession of notes in the same key, forming a melodious sequence. Harmonic P. is the movement of one chord to another. The P. is direct when the parts rise or fall together, contrary when they move in different directions, oblique when one part repeats the same note while the other varies.

Progress of Titles, in Scotch law, means a chain of title-deeds to heritable (real) estate sufficient to constitute a valid feudal title. In case of a sale, the seller is bound, unless there is a stipulation to the contrary, to give the purchaser a sufficient P. of T.; but as difference of opinion sometimes arises as to what are sufficient, an intending purchaser will do well to satisfy himself regarding titles before making an offer.

Prohibition, in English law, is a writ from a superior court of law to prohibit an inferior court from further procedure in a cause. In Scotch law the word denotes a clause in a deed of entail restricting the power of the heir of entail.

Projectiles, The Motion of, is a study of growing importance in modern warfare. Though ordinarily limited to the case of a projection in a more or less horizontal direction, the theory includes all cases of falling bodies. We shall consider those simpler cases first in which there is only vertical motion. When a mass is raised above the surface of the earth, experiment shows that if left to itself it will inevitably fall down in virtue of the attraction which exists between it and the earth. Though this attraction diminishes as the distance increases in accordance with Newton's law of gravitation, yet, for the comparatively small variations of distance which are considered in studying projectiles, the variation in the force of attraction is inconceivably small, and is fairly negligible in discussing the motion. We may therefore regard the force with which a body of given mass is pulled downwards towards the earth as constant for that body, and this force we conveniently call the *weight* of the body. Consequently the body suffers a constant acceleration; and the product of the mass into the acceleration is the measure of the weight. It was established by Galileo that every body suffered the same acceleration; and hence the weight of a body at any one place on the earth's surface is directly proportional to its mass. Subsequent experiments have shown, however, that the acceleration varies from place to place on the earth's surface, so that the weight of a body is a function of the latitude. Let g then represent the acceleration produced in one second upon a falling body under the action of its own weight. Then $W = Mg$, where W is the weight and M the mass. Suppose the body to fall from rest, then its velocity at the end of t seconds is gt ; and the space described, being the product of the *average* velocity and the time, is $s = \frac{1}{2}gt^2$. If the body has a velocity V to begin with, its velocity at time t becomes $v = V + gt$. The average velocity is $\frac{1}{2}(V + v) = V + \frac{1}{2}gt$; and hence the space described is $s = Vt + \frac{1}{2}gt^2$. If the body is projected *upwards* with velocity V , the acceleration acts against the motion so as to diminish it. In this case the velocity at time t is $v = V - gt$; and the space described is $s = Vt - \frac{1}{2}gt^2$. As time goes on, v diminishes uniformly until, when $V = gt$, it is zero. The space described is then $s = gt^2 - \frac{1}{2}gt^2 = \frac{1}{2}gt^2$; or, in words, any

body projected upwards with a given velocity ascends to that height from which, if it were allowed to fall, it would reach the earth with a velocity equal to the velocity of projection. Again, since $v - V = \pm g t$ and $\frac{1}{2}(v + V)t = s$, we have at once

$$\frac{1}{2}(v^2 - V^2)t = \pm g s t,$$

or $v^2 = V^2 + 2gs$, a formula expressing the space described in terms of the initial and final velocities. These equations afford the means of working any given problem on falling bodies as long as there is simply vertical motion. The problem is considerably more complicated when the velocity of the projectile has a horizontal component as well as a vertical. It may be generally expressed thus. What is the path of a body, projected in any direction, and under the influence of a constant force acting in one direction? In the case of a projectile, the force is its own weight and acts downwards. There is no horizontal force, and therefore no horizontal acceleration. Let

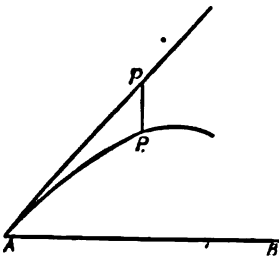


Diagram showing Trajectory of Projectiles.

AB represent the horizontal so that there is acceleration only perpendicular to AB. Let a body be projected from A in the direction Aβ, with a velocity V. Let Aβ be the space described in time t if there were no acceleration, i.e., Aβ = Vt. The body, however, under the action of a constant vertical force, will evidently be at P, where ρP is perpendicular to AB, and is clearly the distance through which the body would fall from rest during the same interval of time t. Hence ρP = $\frac{1}{2}gt^2$. But Aβ is the tangent at the point A to the curve

AP, and, combining the two last equations, $\rho P = \frac{1}{2} \frac{g}{V^2} A\beta^2$, or

ρP is proportional to the square of Aβ—a property of the common parabola. Hence the path described by a projectile is in general a parabola, provided that there is no force acting but that due to gravitation. Practically this latter condition does not exist, since the air offers to the motion of the projectile a resistance which is a function of the velocity. For moderate velocities the resistance is approximately proportional to the square of the velocity; but for the high velocities obtainable by our modern ordnance, a much more complex relation holds, which can be expressed only by an empirical formula established by experiment. For details of experiments made at Woolwich, see Bashforth's *Motion of P.*

Projection of a given figure with reference to a given point is the section by any plane of the pyramid or cone formed by drawing right lines from every point in the figure to the given point as vertex. It thus appears that any one conic section may be regarded as the P. of another. The plane in which the cone is cut is called the plane of P.; and it is easily seen that a P. on a plane parallel to the original plane is a figure exactly similar to the original figure. Since the section of a plane with another plane is always a straight line, a right line will always be projected into a right line. Further, from the construction it is evident that to any point in the one figure there will correspond a point in the other. Further, the original figure is a P. of one of its own projections; and if it is possible in any way to reason from the known properties of the figure to corresponding properties of its projections, it is equally possible to deduce the properties of the figure from any particular P. It is in this that the real power of projections as an analytical method lies. Thus, from any known geometric property of a circle, we may pass by P. to a general theorem which holds for all conics. We thus reason from the simpler to the more general theorem; whereas, in ordinary algebraic analysis, the former is inferred as a particular case of the latter. It has been seen that to every point and line in one figure there corresponds a point and line in the other; but this corresponding point or line may in certain cases become imaginary. As a familiar instance we may mention the hyperbola, whose points of intersection with certain right lines through the centre are wholly imaginary, and yet they correspond to real points on an elliptic or circular P. Now the method of projections recognises these, and by the *principle of continuity*, as it is termed, asserts the properties of a figure in

which certain points and lines are real to be true even when some of these become imaginary. If the vertex of the cone of P. is removed to an infinite distance, the projections of the figure are sections of a cylinder; and the section made by a plane perpendicular to the axis of the cylinder is called the *orthogonal P.* of the figure. It may also be defined as the locus of the points where perpendiculars upon a given plane from every point of a given figure meet that plane. Any ellipse may be orthogonally projected into a circle; and the orthogonal P. of a sphere is always a circle.

Prolapsus Ani consists in an inversion of the lower part of the rectum, the protrusion being in the form of a ring of red, tumid membrane. In slight cases, the protrusion consists of the mucous membrane only, but in more formidable cases the whole bowel sometimes protrudes for several inches. The causes of P. A. are constitutional and local. In cachectic children any intestinal irritation may cause P. A., and even among healthy persons it may depend on any cause of straining, as stone, stricture, or enlarged prostate. In the treatment of P. A. the first thing is to ascertain and remove the cause, and the P., if moderate, will soon disappear with a little attention. The protruded parts should be carefully returned with a little pressure; and, should any difficulty be experienced, the operation will be facilitated by smearing the parts with a little oil or grease. The recumbent position should be maintained for a few hours, and the parts supported by a T-bandage. When the protrusion is very large the mucous membrane should be pencilled over with nitrate of silver, or smeared with nitric acid. In very severe cases an operation similar to that for piles must be performed, portions of the inverted gut being tied at opposite parts of the circumference of the bowel, so that the intestine may be kept in position by the resulting cicatrisation.

Prolapsus Uteri, Procidentia, or Decensus Uteri, consists essentially in a depression of the womb below the natural level in the pelvis, and is popularly known as 'falling down of the womb,' or 'bearing down.' P. U. occurs most frequently in females beyond the middle age who have borne children; but it happens frequently to women after their first confinement, and disappears after the second altogether, owing to the greater care displayed during convalescence. Cases, however, are not uncommon among those who have never borne children, even in maids, and in children of tender years. The prolapsus is termed *imperfect* when there is no external protrusion, and *perfect* when the womb is protruded externally. The immediate causes are—1. Relaxation of the broad and round ligaments above; 2. a want of due tone in the vagina below. By the first the uterus is permitted to fall; and, by the second, the uterus is allowed to be received into the cavity. The relaxed condition of the vagina is probably the chief cause, and the descent will be accelerated by any condition causing increase in the weight of the womb, such as congestion, hypertrophy, fibrous growths, &c. The symptoms of P. U. are principally mechanical, arising from pressure upon other organs, from their being involved in the displacement, or from the sympathies of other organs with the uterus. The earliest symptoms are a sensation of fullness in the pelvis, of weight and bearing down, dragging from the loins and umbilicus, and pain in the back extending to the groins. These symptoms are aggravated by standing or walking, and are most severe in the evening.

Treatment.—The preventive treatment of P. U. consists in causing the patient to maintain a recumbent position when suffering from any form of uterine disease in which there is enlargement of the organ, and while under treatment for the same. A relaxed condition of the vagina may be treated by the application of cold, and the injection of astringents; or the insertion of astringent suppositories; but such agents should be applied with caution, as they would do harm when there is any degree of acute or chronic inflammation of the vagina or uterus. The improvement of the general health will often have a remarkable influence upon the P. U. in the first stage. When the prolapsus is complete, the part should be reduced and retained in its proper position by a pessary. The most important part of the treatment, in cases of extreme P. U., is rest in the horizontal position with the uterus completely reduced. If this can be insisted on for a sufficient length of time, the patient will be restored to fair comfort and a certain amount of activity by the use of the pessary.

Prolétaires has been commonly adopted in European literature from the French as a term of designation for the poorest labouring class. It is not so low as the 'residuum,' rendered famous by Mr. Bright in 1866, but it still retains much of the early Roman meaning—'a citizen of the lowest class, who, from his poverty, was useful to the state only by producing children' (*proles*).

Prome, the chief town of the district of the same name in British Burmah, on the left bank of the Irawaddy, 175 miles N. of Rangoon; pop. (1872) 25,631. It was captured in the first Burmese war of 1825, and permanently annexed after the second war in 1852. P. has considerable commercial importance, as the highest station in British territory of the steamboat traffic on the Irawaddy, and the frontier town towards Independent Burmah. In 1877 a state railway was opened from Rangoon to P.—The district of P., which lies on the E. bank of the river, has an area of 2887 sq. miles, and a pop. (1872) of 274,872.

Prometheus, in Greek mythology, was son of the Titan Iapetus by Clymene, and brother of Atlas, Menœtius, and Epimetheus. According to Hesiod, the gods and men were disputing at Mecone regarding the parts of animals which should be offered in sacrifice. P. divided a bull into two parts, the flesh and entrails in the skin for one, the bones covered with fat for the other. Jupiter, being asked to choose a portion for sacrifice, selected the latter, and, enraged at the success of the artifice, withheld fire from mortals. P. then stole fire from heaven in a tube. For this theft P. was fastened to a pillar, an eagle every day feeding upon his liver, which every night grew again. At length Hercules killed the eagle, and freed the prisoner. This myth underwent many changes in the hands of the poets. In the *Prometheus Victus*, P. is represented as the great benefactor of men, the teacher of all the arts, as well as the fire-bringer. But in this he has disobeyed Zeus, and hence his terrible punishment on Caucasus, which he sublimely, but from the Greek point of view rebelliously endures, refusing firmly to divulge the secret on which Zeus's safety depends. The *Prometheus Unbound* of Shelley deals with the phase of the myth supposed to have formed the subject of the last play of the Æschylean trilogy, but in a different spirit from that of Æschylus. In the latter, Zeus and his victim are reconciled; but Shelley 'was averse from a catastrophe so feeble as that of reconciling the champion with the oppressor of mankind,' and he sets before us a Zeus-defying hero who survives the fall of the deity dragged into 'the abyss' by the awful shape of Demogorgon, and who is liberated by Hermes from his rocky prison on Caucasus amidst the rejoicings of the Powers of Earth. See the learned disquisitions of Welcker in his *Æschylische Trilogie Prometheus* (Darmstadt, 1824), and Professor Blackie's essay in the *Horæ Hellenicæ*.

Prom'ise. See OFFER AND PROMISE.

Prom'issory Note. See BILL.

Prom'otion in the Army and Navy. In the British army, since the abolition of the Purchase System (q. v.) in 1871, P. has been by 'seniority tempered by selection.' First commissions are given (1) to successful candidates at the Civil Service Commissioners' open examinations, whose ages must range from seventeen to twenty; (2) to university students or lieutenants in the militia, aged seventeen to twenty-two, who have passed certain examinations; (3) to non-commissioned officers aged seventeen to thirty specially recommended; and (4) to Queen's and Indian cadets and pages of honour. By far the greatest number enter the army from the first class. On receiving commissions as sub-lieutenants they are sent to the Military College at Sandhurst (or to their regiments if in India), and at the end of a course of military instruction and the passing of an examination are eligible to be promoted as lieutenants. Before P. to a captaincy at least two years' service as lieutenant is required, the usual period being from eight to eleven years. Regimental vacancies, as a rule, are filled up by P. from the regiment if they occur by death, the step being given to the senior officer of the next grade, and according to the discretion of the Secretary of State for War and Commander-in-Chief if they occur otherwise. To qualify for a captaincy the passing of an examination in regimental duties, drill, military law, tactics, fortification, &c., is required, and in the case of a majority an

examination in subjects connected with the command of a regiment, or of a small mixed force in the field. The appointment of major is for five years, but is renewable. A brevet-majority is obtained by seniority in the army, or granted for distinguished services. Regimental P. ceases with the rank of lieutenant-colonel. A lieutenant-colonel becomes colonel by brevet after holding the command of a regiment, or a similar staff appointment, for five years, or after eight years under certain conditions, or on appointment as aide-de-camp to the Queen. P. of colonels to the rank of general officers is by seniority regulated by fixed establishment, except in cases of P. for distinguished services. Field-marsals are appointed at the will of the sovereign without reference to seniority. In the artillery and engineers first appointments are granted through the Royal Military Academy at Woolwich, entrance to which is obtained by open competitive examinations. After a three years' professional course commissions are granted according to standing on the examination lists. The engineers go through a further course of instruction at Chatham. P. then follows purely by seniority. Brevet promotions are on the same footing as in the other branches of the service. There is a separate establishment of general officers for the artillery and engineers.

The P. of non-commissioned officers in the army and of petty officers in the navy is by selection. For officers in the navy the rule is P. up to the rank of captaincy by selection and beyond it by seniority.

The retirement of officers in the army is now regulated by the army warrant of 1877 which is calculated to ensure a more rapid flow of P.

In countries where military service is compulsory, and which lack the large middle class which characterises Great Britain, it is a natural consequence that P. from the ranks should be more extensive. In the *French* army many officers still rise from the ranks, though not to the same extent as in the days of the first revolution and the wars of the great Napoleon. Cadets are educated for the line at St. Cyr, and for the artillery and engineers at the Polytechnique. Below the rank of captain two-thirds are promoted by seniority and one-third by selection, while promotions to majorities are half by seniority and half by selection, and above the rank of major by selection in all cases. Before P. to a higher step the minimum periods of service are two years as second lieutenant, two as lieutenant, four as captain, three as major, and two as lieutenant-colonel. To facilitate P. various ages of retirement have been fixed, varying from fifty-two in the case of a lieutenant, to sixty-five for a lieutenant-colonel.

P. from the ranks is rare in the *German* army. First appointments are obtained by cadets from schools on the nomination of the crown, or by *avantageurs* on the nomination of the colonel of a regiment. *Avantageurs* enter the army as candidates for the rank of officer, and after six months' service as privates, and the passing of an examination, receive the rank of sword-knot ensign. After six months' further service they are sent to a military school for ten months, and after passing an examination at the end of that time are eligible for regular commissions. P. is at the will of the crown, but is mainly by seniority in the regiment to the rank of captain, and above that rank by seniority throughout the branch, or by selection. Great care is bestowed in the selection of officers for the general staff.

In the *Austrian* army a considerable number of cadets are taken from the ranks, but all officers have to pass severe tests.

In *Russia* the officers are largely drawn from the nobility, but in the line there is a good deal of P. from the ranks.

Pronghorn, or **Prong-buck** (*Antilocapra Americana*), also termed the *Cabrit*, a species of Antelope, differing from ordinary antelopes, first, in having no accessory hoof, lachrymal sinuses, and inguinal pores; second, in the horns of the male having snags or branches in front; and, third, in the *sheath* of the horn being annually cast or shed and reproduced. The female is hornless. The P. is gregarious, and is common in the Saskatchewan and Missouri districts. It attains the size of a roe deer.

Pro'noun literally means a word used instead of a noun, and this is the explanation of the term commonly given. But, as in the case of other parts of speech, the name inadequately describes the various functions of the P., which is not always a substitute for a mere noun; e.g., it may stand for an infinitive or a clause; the definition would therefore require to be extended at least to

whatever is the grammatical equivalent of a noun. But even this is not satisfactory. Interrogative pronouns representing something yet unknown cannot be supposed to be used 'instead' of that unknown. If we consider the most prominent class of pronouns, viz., the personal, we shall perhaps find in a consideration of their exact force the ground of an acceptable definition. Take the sentence, 'I am weary.' Here the P. 'I,' unquestionably stands instead of the name of the speaker; but it does more than that. It signifies that the person referred to is *in the act of speaking*, a fact not indicated by the use of the name of the person. For this reason Dr. Findlater in his admirable treatise on English grammar in Chambers's *Information for the People*, regards pronouns as 'symbols or highly generalised marks, applied to objects to signify not any inherent attribute, but merely their relation to the act of speaking;' and therefore proposes to call them '*relational names*.' It seems to us that no better definition could be given.

The division or classification of pronouns has been the cause of much unprofitable ingenuity, and sometimes of absolute nonsense. Their division into 'Substantive' and 'Adjective' is a mischievous error. What are supposed to be 'adjective' pronouns are not pronouns at all, simply 'adjectives,' and should always be parsed as such. A less objectionable division is that into 'Personal' and 'Relative,' but even this is not precise or exhaustive, though it may be difficult to substitute a better classification. Grammarians are not agreed as to what are the personal pronouns in English. These are usually said to be (1) 'I,' with the plural form 'we;' (2) 'thou,' with the plural forms 'ye' and 'you;' and (3) 'he,' 'she,' 'it,' with the plural form 'they.' About the first and second there can be no doubt; they can stand only for persons. But the so-called third person does not invariably do so. The neuter 'it' represents either an inanimate object or a creature to which personality is not assigned. Hence it is sometimes called the 'neuter,' or 'impersonal' P. Dr. Latham, Mr. C. P. Mason, and Professor Bain prefer to regard 'he,' 'she,' and 'it' as 'demonstrative' pronouns, because they point at the subjects of discourse between two parties, Professor Bain remarking that 'in assigning the class of "he" and "she," though their reference is to persons, the demonstrative function must be held to be the overruling consideration; the use of different words to point to individuals possessing the attribute of sex is an entirely subordinate convenience.' The 'relative' pronouns in English are 'who,' 'which,' and 'that.' Mr. Mason admits that the term is 'bad,' because it is 'insufficient.' He says that the personal pronouns are also 'relative;' i.e., that they relate or refer to some antecedent substantive, but pleads in defence of the term that 'who,' 'which,' and 'that' are 'relative' in a peculiar sense, i.e., that they have a 'grammatically connective force,' since they can 'attach subordinate adjective clauses to some word in the principal sentence.' In regard to the use of 'who' and 'that' there is considerable carelessness exhibited by speakers and writers. 'That' should always be used when the clause which it introduces is restrictive. If this be not done, ambiguity arises; e.g., the sentence: 'It is requested that all members of Council, who are also members of the Lands Committee will assemble in the Council-room,' might mean that all the members of Council are members of the Lands Committee, while the true meaning expressed by the use of 'that' is that *such* members of the Council as are members of the Land Committee will assemble, &c.

The interrogative pronouns 'who,' 'which,' and 'what,' used to ask questions, are in a sense 'relative,' but here too it may be urged that their special function warrants their distinctive name. The second and third may be viewed as adjectives, as also the first when in the possessive case. Indefinite pronouns form a doubtful class. These are variously enumerated. Mason gives 'one,' 'aught,' 'any,' 'other,' and 'some.' Most, if not all of these, can be properly parsed as adjectives. The first only has a fair claim to be considered a P. When used as follows, 'one may be allowed to say,' it is derived from the French *on* (a corruption of Old Fr. *hom*, Lat. *homo*), and means any person whatever. The so-called 'possessive pronouns' are rather adjectives formed from pronouns than pronouns themselves.

The P. expresses the most abstract relation in language, and has been called 'the highest effort, apparently, of man's generalising powers.' Yet in its origin the P. was by no means an impalpable abstraction. The study of comparative grammar leads to the conclusion that pronouns were originally demonstrative particles

marking relations of place, and in this form were among the earliest elements of language.

See Mason's *English Grammar* (Lond. 1874); Findlater's treatise on 'Grammar' in Chambers's *Information for the People*; Professor Bain's *Companion to the Higher English Grammar* (Lond. 1874).

Proof. See EVIDENCE.

Proof, in engraving, is an early impression from an engraved copper or steel plate, and when it is taken on thin paper, of a pale buff colour, prepared from bamboo stalks, and imported from the East Indies, it is called an *India-P.* In printing, the first impression is called a *first-P.*; after correction, the second is termed a *clean-P.*; then follows a *revise*; and finally a *press-P.*

Proof of Firearms. With a view to the public security, the proving of all barrels for small arms is rendered compulsory either at the proof-house of London or Birmingham. The proof consists in firing them with heavier charges than they are made for. Rifle barrels are proved twice—1st, after boring, with three times the ordinary charge of gunpowder, and a heavy bullet, and 2d, after rifling, with the lock attached, the charge being reduced one-third. When the rifle is quite complete it is again tested with its proper charge. Ordnance is submitted to a very searching proof by firing very heavy and gradually increasing charges, a close examination being made for cracks or flaws. The existence of crevices or honeycomb in the bore is ascertained by means of water, which is forced in under hydraulic pressure; the bore is afterwards wiped dry, and an examination made by means of a mirror for exudation of moisture.

Proof of Gunpowder. See EPROUVETTE.

Proof Spirit, commercial, consists of a mixture of absolute alcohol, 49.24, and water, 50.76 by weight, and its specific gravity is 0.920 at 60°. The name originated from the obsolete plan of testing the strength of spirit by means of gunpowder. Spirit was poured over the powder, and if, on applying a light, the burning alcohol set fire to the gunpowder, the spirit was considered *over-proof*; if it did not, owing to excess of water, the spirit was called *under-proof*. The weakest spirit capable of firing gunpowder in this way is commercial proof spirit.

Propagan'da is the popular name of a congregation of cardinals at Rome, the full name of which is *Congregatio de Propaganda Fide* ('concerning the propagation of the faith'), and which was originated by Gregory XIII. (1572-85). It was finally established forty years after, when it was fully authorised by a bull of Gregory XV., dated June 22, 1622. To this congregation was intrusted the whole superintendence of the missions of the Church to heathen countries, as well as the oversight of the Church in those civilised countries in which there is no properly established hierarchy. The successor of Gregory XV., Urban VIII. (1623-44), established (1627) a great missionary college in connection with the *Congregatio de Propaganda Fide*, in which Europeans are taught the various languages required in carrying on mission-work, and natives of the different countries to which missions are sent are trained for the work of preaching the gospel to their brethren. In connection with the same institution there is also a great establishment for printing Bibles and other literature for missionary purposes.

Propagation of the Faith is the name for missionary enterprise in the Roman Catholic Church. The principal organisation for this purpose is the *Congregatio de Propaganda Fide* at Rome, but in addition to this institution the Association for the P. of the F. was founded at Lyons, 1822, '(or the purpose of assisting by prayers and alms the Catholic missionaries who are engaged in preaching the gospel.' At various times since 1822 the association has been enriched with many indulgences by rescripts of different Popes, and especially by an Encyclical in 1840 which conferred the highest approbation which a work of charity could receive. To assist in carrying forward the work each member of the association says one *pater* and one *ave* every day, and pays a subscription of one halfpenny per week. Two councils, one at Lyon and one at Paris, distribute the funds, consisting of subscriptions and donations collected in all parts of the world, among the different missions, which are established in every quarter of the world. Six times a year the news received from the missions, and a report of the sums collected and distributed, are furnished to the members in a publication entitled *Annals of the Propagation of the Faith*.

Propertius, Sextus—one of the greatest names in Roman elegy—erroneously styled *Sextus Aurelius Propertius*, was born at Asisium (*Asisi*), in Umbria, near the sources of the Clitumnus, some time between 700 and 710 A.U.C. The exact year of his birth is unknown, but 705 seems a probable date, inasmuch as we know that P. was younger than Tibullus (q. v.) and older than Ovid (q. v.). His parents were of the middle class, and had owned an extensive and rich estate of which they had been deprived in the Agrarian division of 713 A.U.C. That P. was a gentleman (*ingenuus*) is clear from his mention of the *aurea bulla*—the toy or amulet worn by the children of the freeborn: that he was of patrician descent is a very different matter. In fact his own statement goes to show that he was not. His father died while he was quite a boy: for his training he was indebted to his mother. On assuming the manly gown (*toga virilis*) he repaired to Rome to finish his education. From lack of means the culture of Athens was beyond his reach. P. studied for, and meant to practise at, the bar; but the calling proved uncongenial. Poetry was his forte: to be called the Callimachus of Rome was the summit of his ambition. He wrote poems on archæological subjects after the manner of the bard of Cyrene, and herein he won high distinction. Love, however, that has so much to answer for, threw the youthful poet into another groove. The first love of P. was a slave girl, by name Lycinna; but this amour was of short duration. The next was a lady of a very different stamp, and to her we are indebted for a work of genius—a collection of elegies replete with tender appeal, sincere affection, burning jealousy, and bitter remonstrance. The lady's name was Hostia, according to Appuleius: her pseudonym in the elegies, Cynthia. Whatever the character of P. may have been, he was too good for her. Yet she had many recommendations, many charms. She was sprung from an ancestor of literary fame; she was clever, accomplished, musical, handsome, flax-haired, dark-eyed; in short, as far as P. was concerned, irresistible. This is the one side of the picture. The other reveals a very different phase of her character; she was extravagant, intemperate, overbearing, unfaithful. Such, we believe, was Cynthia—Cynthia fair and frail—the idol of his heart, the dream of his life, the well-spring of his genius. A woman of this type was sure to break the heart of any man, yet her graver faults, for long, were apparently unnoticed, while they caused wave on wave to well from the tender and forgiving heart of P. Meanwhile the publication of the first book of the Elegies, entitled *Cynthia*, won for P. a place in the brilliant literary coterie of Mæcenas. Like Virgil and Horace, he took up his abode on the Esquiline, where also lay the gardens of Mæcenas. His patron Mæcenas wished to enlist P. to sing the praises of Augustus, but this he again and again declined on the ground of lack of ability. Probably, after all, it was more from incompatibility with his subject and lack of continued application that he did not do so.

Among the literary men of the period P. was ever welcome. Virgil, Ovid, Ponticus, Lynceus, Bassus, Ælius Gallus, and Tullus he numbered among his special friends. The reference to Virgil's great epic (see *Elegy* 26th, bk. iii.) long before its publication is ample evidence of the friendship of the two poets; while the eulogy on the various works of Virgil in the same poem speaks volumes for the heart of P. Athens seems, for many years of the poet's life, to have been one of the sights—indeed, the sight above all which he longed to see. Yet whether he ever went to Greece at all is more than doubtful. He repeatedly threatens to leave Cynthia, and in the 24th *Elegy* of the fourth book Athens is clearly stated as his probable destination. There are no real grounds, however, to bear out the belief that he ever left his native shores. Of the poets who preceded him he mentions Ennius, Varro, Catullus, Calvus, and Gallus—the last four in connection with their loves;—the while avowing his own determination to enshrine Cynthia's name in the amber of imperishable song. To take up the *questio vexata* of Propertian chronology would be useless in an article like this. Those who are interested in the matter may compare the schemes of Barth, Kuinoel, Lachmann, Hertzberg, Paley, and Cranstoun. Suffice it to say that no theory as yet propounded is in all respects satisfactory. For the same reason we dismiss the question of the division of the writings of P. into books. For the general reader it matters not—supposing even all the elegies to be included—whether they are in four, five, or forty books. A much more interesting and crucial question is the

determination of the beginnings and endings of many of the pieces, and of the proper order of the distichs, especially in books iii. and iv.

This is not a biography of Cynthia, yet it is not unbecoming here to notice the end of that much-beloved and much-abused *meretrix*. At her death P. had deserted her. After she was burnt on the pile P. seems to have appropriated her little trinkets, such as brooch and personal ornaments, and to have given them to a disreputable frequenter of the *Via Sacra*. We can hardly imagine that after all this, P. contracted a lawful union, notwithstanding the Younger Pliny's express testimony that Passennus Paulus was a lineal descendant (*vera soboles*) of P., and also an inheritor of his genius. How P. spent his last years we know not. From his own writings we can trace his life no farther than A.U.C. 739. As to whether he ceased to live when he ceased to write it is vain to speculate. At the early age of thirty-four his sun had set for literature and poetry—four years after Virgil and Tibullus had gone to their rest, while Horace and Ovid were in the heyday of their popularity and fame.

A word as to the character, work, and genius of P. The value of the first a careful reader must by this time have learned. His failings in our eyes were venial in his period. His work is immortal. He is certainly, whatever may be said by connoisseurs and verse-makers to the contrary, the greatest of the elegiac poets of Rome. This is not the place to discuss the relative endings of the pentameter, whether the dissyllabic, trisyllabic, quadrisyllabic or pentasyllabic is the best; but it is surely the place in which to state the conclusion to which one has come after long study of the subject for or against the Tibullian and Ovidian distich. The distich of Tibullus is unequalled for tenderness, terseness, and pathos; that of Ovid has a melody peculiarly its own—sweet, winsome, fascinating. Both are very lovely, but they are apt to become tiresome. P. belongs, so far as his strings echo music, to an older school—the school of Lucretius. One word as to the genius of P. In the poetry of pure passion he is second to Catullus alone. He lacks the sweet grace and tender melancholy of Tibullus, the easy flow and melodious chime of Ovid; but his verse is his own—strong, nervous, sparkling: every line reflects the man. His originality is unquestionable and his music genuine. He is the heathen representative of Christian tenderness. He was born to suffer sorrow, to realise the worthlessness of transient pleasures and the vanity of voluptuous dreams. He had not, it is true, at thirty-four, any more than Burns at thirty-seven, attained his true moral stature; but he departed to the land of shadows with his native strength unabated, his youthful splendour undimmed, and the unfading laurel round his brow.

The *editio princeps* of P. was published in 1472; where is uncertain. The editions of Scaliger, Barth, Kuinoel, Lachmann, Jacob, Hertzberg, Haupt, and Müller show progressive degrees of advancement in Propertian criticism. Paley's edition—inaccurate in many respects, yet a wonderful mass of research—is by far the most valuable. The recent papers by Professors H. A. J. Munro and Robinson Ellis on P. possess an inestimable value for scholars generally. The only two English translations deserving of mention are those of Charles Robert Moore, M.A. (Rivingtons, 1870), and James Cranstoun, LL.D. (Blackwood, 1875), the latter being the only complete version of the Umbrian poet in the English language. Of French translations the best is that by St. Arnaud (Bourges et Paris, 1819). In German the versions of Hertzberg (Stuttgart, 1838), and of Jacob and Binder (Stuttgart, 1860), both in the original metres, are excellent. The reader may also consult with advantage the Rev. J. Davies' *Catullus, Tibullus, and P.*, in Blackwood's *Ancient Classics for English Readers* (1876-77). Cf. also Professor Munro's papers on P. in the *Journal of Philology* (vol. vi. *passim*).

Proph'ets, according to the popular idea, were men who predicted future events, the only difference between true and false P.—e.g., between the Jewish P. and those among other nations—being that in the case of the former the actual fulfilment of their prophecies proved that they had really been supernaturally enabled to foretell the events. But whatever truth there may be in this, it is beginning to be acknowledged that it is a false conception of the prophetic office to regard prediction as the chief function of P. This idea is in no way implied in the etymology of the various names. The meaning of the general Hebrew

title *Nabi*, is given by the best authorities as 'one in a state of ecstasy,' 'a clear, loud speaker,' 'a spokesman' or 'interpreter' (cf. Ex. iv. 16, vii. 1), and it indicated one to whom God manifested himself, so that he was able to declare the will of God to men. Indeed the meaning is thus defined by other phrases: 'interpreter' (Isa. xliii. 27), 'messenger of Jehovah' (Hag. i. 13), 'man of God' (1 Sam. ii. 27, ix. 6, &c.), 'man of the spirit' (Hos. ix. 7). Very much the same meaning attached to the Greek *prophētēs*, which was the term applied to those who understood the broken and dark sayings of the *mantis* or diviner when in a state of ecstasy, and explained them to others; although the latter was sometimes also called *prophētēs*. Even the other Hebrew names *Roeh* and *Choseh*, 'seer' (cf. 1 Chron. xxix. 29, in which all the three occur), have no special reference to the future, but merely imply that these men could see into the divine counsels and mysteries, and could thus explain them to others; what they uttered being called a 'vision.' The name *Roeh* seems to indicate the personal insight of individuals living in a state of seclusion; *Nabi*, to allude to the utterance of what they knew when they began to lead a more public life; and the latter came into general use in the time of Samuel (1 Sam. ix. 9), in whose time it was that they came to be regarded as a special class, although the name of seer continued in use after his time. The Hebrew names given above all denote the 'office of watching over passing events, and of lifting up the voice of warning, of reproving, of encouragement at the proper time.' The Greek *prophētēs*, in the sense of foreteller, was given as the equivalent of *Nabi* in the LXX. (about B.C. 280).

1. *First Period* (about B.C. 1100-800). The real prophetic age is held to have begun with Samuel (cf. Acts iii. 24; Heb. xi. 32); but it is not to be supposed that prophecy was called into existence at this time, far less that Samuel was the means of calling it into existence. On the contrary, it was distinctly recognised that there had been persons, male and female, before endowed with the same spirit; e.g., Abraham (Gen. xx. 7) and the patriarchs generally (Ps. cv. 15), Moses (Deut. xviii. 15, xxxiv. 10), Miriam (Ex. xv. 20), Deborah (Judges iv. 4); cf. also Judges vi. 8; 1 Sam. ii. 27. But it was in his time that associations began to be formed of zealous adherents of the national deity, analogous to those of the prophets of Baal and other Canaanitish deities (cf. 1 Kings xviii. 19). They wandered about in bands (1 Sam. x. 5, 10), and lived together in a kind of cloister (Heb. *naivah*, 1 Sam. xix. 18, 19), under a head or 'father' (like the first Christian monks under their *abbas*), being known as 'sons of the P.' The name given to those communities—'schools of the P.'—has misled people to think that the members received regular instruction, whereas prophecy, especially as understood in those primitive times, was an art or profession which could not be learned. For this very reason the official order of P. formed in Israel degenerated. The number of men whose spirituality of mind and intensity of moral nature raise them to such a level above their fellow-men as to render them in any real sense interpreters of the will of the deity are necessarily few, and a whole community of such is inconceivable. They would inevitably be inferior imitators of the first P., and generally of a lower standard. One distinct cause of degeneracy was the notion of the superstitious multitude that the P. were mere soothsayers, from whom information not obtainable by ordinary means might be conveniently got with respect to all possible matters—e.g., how something lost was to be found (cf. 1 Sam. ix. 6), whether an expedition should be made (Judges xviii. 5), or a campaign undertaken (1 Kings xxii.), &c., an official called the king's seer being part of the royal establishment, doubtless for consulting in such emergencies (1 Chron. xxi. 9; 2 Chron. xxix. 25).

2. *Second Period* (about 800-640). By the beginning of the 8th c. B.C., the official order of P. was identified with the aristocratic sacerdotal party, both in Judah and in Israel. The political tactics of this party was to maintain the national existence by means of foreign alliances—with Assyria and Egypt. The sacerdotal religion stood mainly by rites and ceremonies, many of which were common to the Israelites with the Canaanites. And worse than that, the religious conceptions of the great mass of the people were essentially Polytheistic. The God of Israel was simply one among the many deities worshipped by the neighbouring nations. The morality of the people generally had sunk to a low ebb. It was at this time, about the middle of the reign of Jeroboam II. (B.C. 823-873), that a new order of P.

appeared—including the names of Joel, Amos, Hosea, Micah, Isaiah, and perhaps Nahum—some of whom belonged to the lower orders (e.g., Amos and Micah), and not to the official order of P. at all (cf. Amos vii. 14), but all of whom identified themselves with the democracy. They condemned all foreign alliances (cf. Hos. v. 13, vii. 11, xii. 1, xiv. 3; Isa. xxx., xxxi., &c.). They brought accusations against kings, princes, judges, and even priests and prophets. They maintained that the true service of God consisted not in offering sacrifices and observing festivals, but in fervent piety, a pure morality, and kindness to the poor and friendless (cf. Isa. i. 10-17; Hos. vi. 6; Amos v. 21-24, &c.). And above all, their religious conceptions were a pure monotheism. Jehovah was the one God of the whole earth (Hos. xiii. 4, &c.). This period has been called the golden age of Hebrew prophecy.

3. The great P. of the third period (B.C. 640-400) were Jeremiah and Ezekiel, but in the writings of these two are perhaps best exemplified the nature of the decline which took place in this period. With the former P. writing was only the fruit of public speaking, a continuation and supplement of the true prophetic work, but in this last period the P. were writers chiefly. Hence the prophecies of the latter, although they may be more polished pieces of literature than those of the former, not being produced under the same fervent heat of inspiration, are of a lower type. Some critics profess to be able to detect another symptom of degeneracy in a compromise, on the Jehovistic side, between the P. and the priests in the time of Josiah (B.C. 640-609), the expression of which was the Book of Deuteronomy, and another compromise, on the sacerdotal side, after the Captivity, in the Book of Leviticus.

In the Hebrew canon, the P. are divided into the *former*—Joshua, Judges, Samuel, Kings—and the *latter*; the *latter*, again, into the *greater* (referring entirely to the size of their books)—Isaiah, Jeremiah, Ezekiel; and the *lesser*—Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, Malachi. In the New Testament times there was no regular order of P. like the Apostles, but certain men and women were endowed with 'the gift of prophecy' (cf. 1 Cor. xii. 10, 28, xiv. 6; Acts xxi. 9). It has been supposed that what properly corresponded to the old prophetic gift was the gift of tongues (Acts ii.), the connecting link between the two being the ecstasy or trance which accompanied both. Whatever was the form of the prophetic gift, the historian Eusebius informs us that it had ceased in his day (about A.D. 350). See Davidson's *Introduction to the Old Testament* (Lond. 1862), Stanley's *Jewish Church* (new ed. Lond. 1876), Ewald's *Die Propheten des alten Bundes* (Eng. trans. Lond. 1875), Kuenen's *Religion of Israel* (Eng. trans. Lond. 1874), and *P. and Prophecy in Israel* (Eng. trans. Lond. 1877).

Proportion, in Arithmetic, is a rule by which a number may be found which bears to a given number the same ratio which exists between other two given numbers. The whole theory of proportionality is a special branch of algebra, and as such will be considered here. Its only logical basis is to be found in the definition given by Euclid, which is as follows:—If there be four magnitudes, and if any equimultiples whatsoever be taken of the first and third, and any equimultiples whatsoever of the second and fourth, and if, according as the first is equal to the second, greater than it, or less, the third is likewise equal to the fourth, greater than it, or less—then the first of these magnitudes is said to have to the second the same P. which the third has to the fourth. For instance, let the four magnitudes be

$$\begin{array}{cccc} A, & B, & C, & D \\ \hline nA, & mB, & nC, & mD \end{array} \quad \text{and let}$$

be the equimultiples, taken in accordance with the definition. Then if, whatever n and m may be, nA and nC are similarly related, as regards magnitude, to mB and mD respectively, the proportionality must hold that

$$A : B :: C : D.$$

This definition, though at first sight lumbering, is the only perfect definition of P. which has yet been given, and all attempts at putting it in a shorter or simpler form have completely failed. Apparently qualitative only, it is rigidly quantitative when developed logically, as in the fifth book of the elements of Euclid, which is the foundation of the whole of algebra. The P. $a : b :: c : d$ is ordinarily written $\frac{a}{b} = \frac{c}{d}$, or $ad = bc$. A fraction is simply

another name for a ratio or P., and two fractions are equal when the numerators and denominators taken alternately satisfy the definition. See FRACTION.

Proposition (Lat. 'a placing before'), in Logic, the expression in words of the result of a comparison or act of judgment. It affirms or denies some word or combination of words of some other word or combination of words. These, respectively known as the *predicate* (Lat. *prædicatum*, Gr. *katēgoroumenon*, 'the thing affirmed') and the *subject* (Lat. *subjectum*, Gr. *hypokathēmenon*, 'the thing lying under'), are, after Aristotle, called the *terms* (Lat. *termini*, Gr. *horoi*, 'limits') of the P. The connecting verb, whether qualified or not by the negative particle, is named the *copula* (Lat. 'band'). The office of the P. being simply to express a judgment as to the compatibility or incompatibility of two notions, the Logical Copula (q. v.) is limited to the present tense of the verb 'to be,' apart from the notion of existence, and employed simply as a connecting particle. Many have argued that the copula may be so modified as to express the nature of the judgment and the degree of assent to or dissent from the P. (see Mill's *Logic*, vol. i. chap. 4. § 2), but it seems simpler to take the form 'A is' or 'is not B' as the ultimate form of all propositions (see Hamilton's *Review of Whately's Logic* in his *Discussions on Philosophy*, and Mansel's *Prolegomena Logica*, p. 63). A P. may thus, according to its quality, be either *affirmative* or *negative*. In quantity, i. e., according as the predicate is affirmed or denied of all or of only a part of the individuals denoted by the subject, it may be *universal* or *particular*. Combining the two divisions, we have four forms, viz., *Universal Affirmative* ('All S is P'), *Particular Affirmative* ('Some S is P'), *Universal Negative* ('No S is P'), and *Particular Negative* ('Some S is not P'). Sir W. Hamilton, maintaining that in thought the predicate is quantified as well as the subject, substituted for this scheme another of eight forms (see his *Lectures on Logic*, and the Appendices to his *Discussions*), fully criticised by Mill in his *Examination of Hamilton's Philosophy*, chap. xxii. An affirmative P., in which the subject is a common or an abstract term, may be either *verbal* (the 'essential' P. of the schoolmen) or *real* (the 'accidental' P. of the schoolmen), according as it states explicitly what is implicitly contained in the subject (as 'All triangles are three-sided figures'), or affirms what could not be gathered simply from the consideration thereof (as 'Some metals are elements'). The same distinction is expressed by the 'Analytical and Synthetical Judgments' of Kant, and the 'Explicative and Ampliative Judgments' of Hamilton. On the vexed question of the Nature and Import of Propositions, or Theory of Predication, see Hobbes' *Computation or Logic*, chap. iii., and Mill's *Logic*, chaps. v. and vi.

Prosecution, Criminal, in English law. See under CRIMINAL, CRIMINAL PROCEDURE. In England, there is no public prosecutor, as in Scotland, except, in certain cases, the Attorney-General (q. v.). Hence it happens that crime very often goes unpunished, private persons being naturally reluctant to take upon themselves the trouble and expense of prosecuting for the good of society. The expense is supposed to be repaid by the county, but the repayment is seldom a third or even a quarter of the real expense. But the prosecution may fail, even though morally entitled to succeed; then an action may be brought or threatened for malicious prosecution, or for false imprisonment. There are unscrupulous law-agents infesting the courts always ready to take up a case of this kind on speculation. The defendant then has this alternative before him, either to submit to an extortionate and wholly unjust demand under name of damage, or to enter upon the protracted anxiety of a lawsuit, should he lose which, he will not only have to pay the plaintiff say £100, but he will have to meet the whole enormous expense of a jury trial; and should he win, as he will probably find the plaintiff a bankrupt at the end of the business, he will at least have to pay his own costs, besides having had the anxiety, to many worse to bear than the pecuniary loss. In Scotland there is a well-organised system of P. C. See ADVOCATE, LORD; PROCURATOR FISCAL.

Proselytes is the name used in the New Testament and LXX. for converts from heathenism to Judaism, the Hebrew word (*ger*) being in the Old Testament translated 'stranger.' In the later times of Judaism there seems to have been a fanatical

desire to proselytise which did not exist at an earlier period, although provision was made in the Law for their admission (cf. Exod. xiii. 48; Lev. xvii. 8; Numb. xv. 15). And it seems that the artificial Jews thus made were anything but a credit to the nation. Very often they only exhibited the vices of the Jews engrafted on the vices of the heathen. A distinction has been drawn by Rabbinical writers between 'P. of Righteousness,' 'Sons of the Covenant,' or 'full Israelites,' and 'P. of the Gate,' the latter class being those who had become worshippers of Jehovah, and agreed to observe the seven so-called Noachic precepts against idolatry, blaspheming, bloodshed, uncleanness, theft, disobedience, and eating 'flesh with the blood thereof,' but had not submitted to circumcision. It has been denied, however, that the latter were found at all in Old Testament times, or that they were ever P. in any real sense. The rites for the admission of P. were circumcision and baptism, followed by the same offering as was made for a birth (Lev. xii.), the baptism being called a new birth.

Proserpina. See CERES.

Prosody (Gr. *prosōdia*, belonging to song) is that part of grammar which treats of quantity, accent, and harmony in metrical composition; in a word, it treats of Verse. M. Guyard, in his *Théorie nouvelle de la Métrique Arabe* (Par. 1877), has not only rendered intelligible Arabic P., but by his method, which applies equally to other languages, has for the first time reduced P. itself to the limits of an exact science.

Prossnitz (Czech *Prostějov*), a town of Moravia, Austria, on the river Rumza, 14 miles S.W. of Olmütz by rail. It has manufactures of cottons, woollens, linens, sugar, brandy, rosoglio, and has considerable trade in flax, corn, cattle, asparagus, and geese. Pop. (1875) 15,787.

Prostitution, Female, is not a legal offence, but in the metropolis, a statute of Elizabeth has been revived for the purpose of bringing the keepers of brothels under magisterial notice. 2 and 3 Vict. c. 47 authorises the police of London to apprehend, without warrant, any woman loitering and annoying passengers in the street during the night. In all the large cities of the United Kingdom the local authorities have, it is believed, power to enforce similar regulations, and to suppress houses of bad character causing annoyance to the neighbourhood.

Prostyle, in Grecian architecture, a building in which the pillars of the portico stand free from the front wall. A building with a portico at each end is called *amphistylus*.

Protagoras, a celebrated Greek philosopher, born about 480 B.C. at Abdera in Thrace, was once, according to the popular but probably baseless story, a poor porter, who attracted the notice of Democritus by the skill with which he poised a bundle of wood upon his shoulders, and from him received his earliest instruction in philosophy. He seems to have come to Athens prior to 445, here formed a close intimacy with Pericles, and was the first to assume the name of 'sophist' and teach for hire, amassing thereby a fortune which became proverbial. We gather that he was an eyewitness of the plague (430), but the date of his visit to Sicily and many of the towns of Greece is unknown, as also is that of his expulsion from Athens and the burning of his books in the Agora. The impeachment of which this sentence was the result, according to Diogenes Laertius, was founded on a passage in P.'s treatise *Peri Theōn*: 'Of the gods I am not able to know either that they are or that they are not; for many things prevent us from knowing it, the darkness and the shortness of human life.' Frei, however, maintains with some plausibility that P. was accused by Pythodorus during the government of the Four Hundred, i. e., in 411, and that his death must be ascribed to the same period, as Euripides (who died in 406) alluded to it in the *Ixion*. Starting from the Heraclitean maxim that motion is the all-pervading principle, and that nothing exists, but everything is constantly coming into existence, P. proceeded to distinguish two kinds of motion, an active and a passive, from whose concurrence come sensation and what is felt, perception and what is perceived. For the individual or sensation-receiving subject, that only can be true which he himself perceives, and since to one man an object may present itself as good in which another sees only evil, either view being equally justifiable, knowledge becomes impossible. From this dilemma P. sought to escape by postulating a better or worse

condition in the percipient subject, a condition, moreover, for whose improvement rules might be prescribed; and he explained how the virtues, of which he admitted five, were due to innate modesty and justice, developed by education and instruction. P.'s writings have perished, but from a list of them preserved by Diogenes Laertius (ix. 55) we see that they comprised ethics, politics, and miscellaneous subjects, the chief treatises probably being the *Altheia* ('Truth'), and *Peri Theon* ('Concerning the Gods'). See J. Frei's *Quaestiones Protagorae* (Bonn, 1845), and Wayte's edition of the *P.* of Plato (Lond. 1871).

Protea is an extensive order of dicotyledonous large or small trees or shrubs, almost entirely confined to the southern hemisphere, where they have a wide range as well in latitude as in longitude and elevation, forming in Australia and S. Africa one of the most striking features of the flora. The plants are remarkable for their rigid foliage, and the union of an extraordinary diversity of aspect (hence the name *P.*), with a more than ordinary similarity in the structure of the organs of reproduction. But a small number yield useful products beyond their timber for firewood, or in some species in which it is beautifully mottled, for cabinet work; many, however, are much admired as botanical curiosities; and have been introduced into public and amateur collections in Europe—Kew, for instance, at one time possessing 155 species. The most familiar genera are *Banksia* (q. v.), *Dryandra*, *Grevillia*, *Hakea*, *Persoonia*, *Protea*, *Telopea*, &c.

Protection. See CORN-LAWS and FREE TRADE.

Protector, in English history, a title borne by four regents, viz., William, Earl of Pembroke (1216-19), regent for Henry III.; Humphrey, Duke of Gloucester (1422-47), regent for Henry VI.; Richard, Duke of Gloucester (1483), regent for his nephew, Edward V.; and Edward Seymour, Duke of Somerset (1547-49). The title of Lord P. was conferred by Parliament on Oliver Cromwell, December 16, 1653, and after his death in 1658 passed to his son Richard, who voluntarily resigned it, May 25, 1659.

Protein, the name given by Mulder to what he conceived to be an essential constituent of albumen, fibrin, casein, and albuminoid substances generally. The word now exists only in its adjective form, the proteic group being synonymous with the albuminoid group.

Protest, Notarial, is a legal instrument drawn up by a notary, intimating some legal penalty against a party who has failed in an obligation. It is most commonly applied to the notarial evidence of presentation and failure to pay a Bill of Exchange (q. v. under BILL).

Protestants was the name applied to the minority in the second Diet of Speier (1529), who protested against the substitution for a resolution passed at the first Diet (1526), which had granted to the German princes the management of religious affairs within their own dominions until the meeting of a general council, of an edict declaring all change in doctrine, discipline, or worship unlawful until they had been sanctioned by a general council. The P. were the Elector of Saxony, the Markgraf of Brandenburg, the Dukes (Ernst and Franz) of Brunswick-Lüneburg, the Landgraf of Hessen, and the Graf of Anhalt. Their appeal to the emperor and a general council of the German nation was afterwards subscribed by fourteen cities—Strassburg, Ulm, Nürnberg, Constanz, Reutlingen, Windsheim, Memmingen, Lindau, Kempten, Heilbron, Isny, Weissenburg, Nördlingen, and St. Gall. The name was afterwards assumed by the Lutheran and other Reformed Churches generally, to distinguish them from the Roman Catholics.

Proteus, in Greek mythology, the old man of the sea who tended Poseidon's flocks of seals, and with the gift of prophecy combined the power of assuming a hundred different shapes. At noonday he rose from the waters to slumber on the shore of Pharos or Karpathos, and then was the time to come upon and hold him fast, till, wearied with fruitless metamorphoses, he consented to reveal the future. A later myth made P. an Egyptian king, who took from Paris the true Helen, and gave him a phantom in her stead.

Proteus, a remarkable species of *Amphibian* Vertebrates belonging to the order *Urodela* and group *Perennibranchiata* (q. v.), or that in which the gills of early life remain, so that the

animal breathes by gills and lungs in its adult state. The *P. anguinus* (or *Hypochthon anguinus*) is the only well-defined species. It inhabits certain underground caves in Central Europe, and is found in the caves of Adelsberg. Its length is about 12 inches, the body being long, slender, and of a pale flesh colour. Three bright red external gills spring from each side of the neck. The eyes are small, and the teeth rudimentary. The front limbs have three, and the hinder limbs two toes. The P. is allied in its nature to the curious Axolotl of Mexico and to the Sirens or mud-eels of the Carolina rice swamps.

Proteus Animalcules, a name formerly applied to the various kinds of *Amabe*, animals belonging to the class *Rhizopoda*, of the sub-kingdom *Protozoa* (q. v.). The *Amabe* exist as minute specks of structureless *protoplasm* or sarcode, and derive their name from their habit of continually altering the shape of their body by pushing out processes of their body-substance.

Prothallus (Gr. *pro*, 'forth,' and *thallos*, 'a young shoot'), a term used by botanists to denote the first results of spore germination in the higher cryptogams. This is a kidney-shaped membrane in ferns, a bulb-like form in adder's tongues, and a bundle of adnate threads in horsetails. In all these cases the new plant springs from the impregnation of a cell in peculiar organs called archegonia.

Protococcus (Gr. 'first grain'), is a genus of minute unicellular *Algae*, consisting of species composed of single cells more or less enveloped in a gelatinous covering of cellulose, through which protrude two vibratile cilia. They move rapidly, and are multiplied with great rapidity while in motion by cell division. Eventually the individual becomes quiescent, retaining, however, its vitality even when dried up, and resuming activity even after a lapse of years when placed in water. P. is abundant in mud where rainwater collects, and in like situations. The colour varies from bright green to bright red, according to the colouring matter diffused throughout the protoplasm, or occurring in the form of granules. See RED-SNOW PLANT.

Protocol (Low Lat. *protocollum*, late Gr. *prōtollon*, from *prōtos*, 'first,' and *kolla*, 'glue'), was originally the outer leaf attached to the Byzantine papyrus rolls, and bearing an inscription stating by whom and under what 'comes largitionum' each was issued. The name was afterwards given to the public records, which, by edict of Justinian, were always accompanied by a P. In France a P. is a formulary for public documents. In Scotland it formerly meant the record book in which a notary-public was required to insert copies of the instruments he executed. In diplomacy, it denotes the original copy of a despatch or treaty, as the P. prepared in London during the visit of General Ignatieff in March, and repudiated by the Turks in April 1877.

Protogene (Gr. 'first-born'), a granitic rock very abundant in the Alps, differing from true granite in having the mica replaced by talc. It derives its nature from having been at one time regarded as the earliest formed granite.

Protogenes, a famous Greek painter, was born at Kaunos in Caria, and was a contemporary of Apelles and Aristotle. He lived for the most part at Rhodes, where he was not sufficiently appreciated until Apelles publicly offered to buy his numerous unsold pictures for a large sum, after which the Rhodians purchased P.'s pictures for the sums Apelles had offered. All his pictures were remarkable for careful and brilliant finish. The chief was the 'Inlysus and his Dog,' others were 'A Satyr Resting and Holding his Pipes,' 'The Paralos and Ammonias,' and 'The Thesmothetæ.'

Protonotary (Low Lat. *proto-notarius*, 'first notary'), an officer at Rome, appointed by the Pope, and charged with registering the acts of the Church. Their number was fixed at twelve by Sixtus V., and they enjoy many special privileges.

Protoplasm, the name applied to the homogeneous living matter of which the bodies of animals and plants in their earliest stages of development consist. P. is also found within the cells of animals and plants in their young and active condition. It was first clearly demonstrated to occur as the delicate inner

lining of plant-cells by Schleiden and Mohl, and succeeding chemical and microscopic research revealed its uniform composition and its widely diffused nature throughout the bodies of all animals and plants. Thus the essentially living part of a yeast plant, the body of an *Amaba*, or *Foraminifer*, or other low animal, the cell-contents of higher animals in their perfect condition, and the cell-contents and active parts of plant structure, consist equally of P. A minute speck of P. (as seen in an amoeba) may constitute of itself a complete animal. P. is also known as *sarcodæ* and *bioplasm*. Chemically it is an *albuminous* compound, composed of carbon, hydrogen, oxygen, and nitrogen, with minute traces of sulphur and phosphorus. The community of P., when viewed microscopically or chemically, and wherever found, forms one of its most remarkable features. Physically it coagulates when exposed to a high temperature (40° to 50° C.), and contracts when electrical currents are passed through its mass. The interest which has centred around this substance chiefly arises from the consideration of its relations to *life* and *vital action*. One view of these relations is that life is a *property* of P., just as contractility may be assumed to be a quality of this substance. Carbon, hydrogen, oxygen, and nitrogen—so runs Huxley's argument—are lifeless bodies; when brought together in certain proportions they form P., and this P. exhibits vital phenomena. Thus these vital phenomena are regarded as the sequence of the formation of P. from inorganic or lifeless elements. 'We do not assume,' says Huxley, 'that something called "aquosity" enters into and forms water when its component gases, hydrogen and oxygen, are brought together.' What better reason, then, is there for assuming a principle of 'vitality' than of 'aquosity'? The reply to this is that we know fully and perfectly the laws and conditions under which water is formed; and require to postulate no force, other than the chemical affinity of hydrogen and oxygen in order to account for its formation. But the living body is the seat of forces which, as far as science has yet demonstrated, can be explained or produced by no known combination of physical and chemical forces. We are obliged to postulate the existence of a new force in accounting for the actions and development of living matter, and this force we term *vital force* or *life*.

Protornis (Gr. 'first bird'), a genus of fossil *Insectorial* or Tree-Perching Birds. The *P. Glarisiensis* of the Eocene deposits of Switzerland represents the oldest known fossil of Insectorial birds. P. appears to have been related to the existing Larks.

Protozoa (Gr. 'first animals'), the lowest sub-kingdom or group of animals. The characters of these animals (represented by the *Amæba* or 'Proteus-animalcule,' *Foraminifera*, *Sponges*, *Infusoria*, &c.) are mostly negative. They are destitute of digestive, circulatory, and nervous systems. Only in the highest group, that of the Infusoria, is a mouth present. Their bodies consist of masses of *protoplasm*, or *sarcodæ* in its simplest and most primitive condition, and a mere speck of this material may constitute at once a living animal or a *protozoön*. Many of the P. are still doubtfully regarded as animals. Some of the *monads*, for example, may be either animals or plants. The protoplasm of which the bodies of P. are composed may be contractile and highly mobile in its character, as in amoeba and foraminifera, or the body may have a definite outline, as in the infusoria, and the protoplasm cannot be protruded as in amoeba. Locomotion in such cases is subserved by the minute vibratile filaments known as *cilia*. Digestion in the P. appears to be subserved by the formation of temporary spaces in the sarcodæ or protoplasm of the body; such spaces being named *food-vacuoles*. Certain clear spaces are also seen in the bodies of P., and are noticed to exhibit pulsations. These are accordingly termed *contractile vesicles*, and are supposed to represent *rudimentary hearts*. Pigment spots exist in Infusorians, and may represent rudimentary sense organs; but no traces of nerves are present. *Reproduction* in P. may take place by *fission* or simple division of the body-substance (as in amoeba and infusoria); by *gemination* or *budding*, in certain infusoria; and by a third process, the nature of which is as yet imperfectly understood, but which appears to be allied to sexual reproduction. In the latter instance, the body appears to undergo encystation and segmentation, the particles set free by the subsequent rupture of the body developing into young P.

The classification of the P. varies according to the structures

taken as the basis of arrangement. They may be divided into the *Stomatous*, or 'mouth-possessing P.,' represented by the Infusoria; the *Astomatous* P. including the other groups of the sub-kingdom. The P., however, are usually divided into three or four classes. The following table gives the most recent classification of the group:—

Classification of P.	Section A.—MONERA (P. destitute of a nucleus).	Classes. 1. <i>Monera</i> . 2. <i>Foraminifera</i> (?). 3. <i>Radiolaria</i> . 4. <i>Gregarinida</i> . 5. <i>Rhizopoda</i> . 6. <i>Spongida</i> . 7. <i>Infusoria</i> .
	Section B.—ENDOPLASTICA (P. possessing a nucleus).	

Proud-Flesh is the popular designation for too luxuriant granulations arising from wounds or ulcerated surfaces. P.F. should be treated by astringent applications, as with nitrate of silver or sulphate of copper, either in the solid form or in strong solution.

Proudhon, Pierre Joseph, son of a cooper, was born at Besançon, January 15, 1809. His earlier years were spent in herding cows and picking up coppers necessary for his subsistence as one of a poor family of five. Some education, however, he received at a local school before entering a printing-office, where he improved his leisure by reading. At the same time his own poverty drew his thoughts towards the whole problem of social inequality, and gave a bias to all his subsequent speculations. Until 1837 he continued to labour in different provincial workshops, where he introduced a new feature in topography along with MM. Lambert and Maurice, and made his first serious contribution to literature in his *Essai de Grammaire Générale*. General theological productions followed, for which he was rewarded by the Academy at Besançon giving him a three years' pension of 1500 francs. In 1840 appeared his most characteristic book, *Qu'est-ce que la Propriété*, in which he broached the startling theory in political economy that property is robbery. Next year he published *Avertissement aux Propriétaires*, was prosecuted for it at Besançon and acquitted. He then worked at Lyon for five years in the direction of a water-transport system on the Saône and Rhône, publishing meanwhile two volumes on political economy. In 1848 he was attracted to Paris by the outbreak of the February revolution, accepted the editorship of a newspaper *Le Représentant du Peuple*, and attained so rapid a popularity that he was returned in June for one of the departments of the Seine to the Assembly. Here he attempted to realise in practice his doctrine of property, but representatives declined to listen to him, so that he was compelled by means of a thrice-suppressed journal to agitate elsewhere. He established, January 1849, a *Banque du Peuple*, with the object in view of suppressing capital, but being compelled to fly to Geneva for a press offence, it was brought to a summary close. Having returned, he married in 1850 whilst a prisoner at U'Pelagie, continuing to pour forth treatise after treatise on financial and revolutionary subjects. In 1858 appeared *De la Justice dans la Révolution et dans l'Église*, which contained so many political and religious heresies that he had to retire to Belgium, from whence he continued to issue pamphlets obnoxious to authority. P. died at Paris, January 19, 1865. See Clement's *P., sa Vie, ses Œuvres, et sa Correspondance* (1872).

Prout, Father. See MAHONY, FRANCIS.

Provence (Lat. *Provincia*), an old province of France, now divided into the departments of Bouches-du-Rhône, Basses-Alpes, Var, and part of Vaucluse. It has always been famous for its fine climate, its roses, and its fruits; but the fact is that the climate, especially in Upper Provence, is very changeable. Though the spring is very early, it is often checked by a series of cold N.W. winds, known as the *Mistral*, which retard and destroy vegetation.

Provençal Language and Literature. The two Romance dialects of Gaul, French (q. v.) and Provençal, appear to have been originally almost identical, none of the divergent features peculiar to the latter, or shared by it with Spanish or Italian, being sufficiently important to constitute an essential difference. The northern dialect, however, was more exposed to Teutonic influences than the southern, and accordingly Provençal still retains certain archaic features, both in its grammar and vocabulary, which bring it closer to Latin, so that it holds a position between Italian and French much the same as geo-

graphically Provence holds between France and Italy. Mutual jealousy, so common to near neighbours, helped to widen the breach between the *Francigena* and *Provinciales*, and in 1229 we find a notary of Albi pleading his inability to decipher the inscription on a seal, because it was written 'in lingua Gallica vel alia nobis extranea,' just as the *Leys d'Amor* of the 14th c. classes French with English as a foreign tongue. To the two rival if kindred dialects were given the name *Lengua d'Oc* and *Langued'Oil*—*oc* (Lat. *hoc*) being the sign of affirmation in Provençal, as *oil* (Lat. *hoc illud**) in French; whilst by the Troubadours their language is sometimes styled *Romans* or *Lemos* (Limousin). It was spoken in Southern France from the Loire to the Mediterranean and from the Alps to the Pyrenees, extending beyond these limits eastward as far as Venice, and in a south-westerly direction over north-eastern Spain and the Balearic Isles. Of the sub-dialects of Provençal, that of Toulouse was the most harmonious, that of Piedmont the first to be committed to writing, if the *Nobla Leyczon*, a Vaudois paraphrase of portions of the Gospels, really belongs to the opening years of the 12th c. Mr. Bradshaw, however, who in 1862 discovered this along with the other Vaudois MSS. of Morland, Cromwell's secretary, in the Cambridge Public Library, has established almost beyond a doubt the 15th c. as the period of its composition. The earliest monument of Provençal itself, anterior to the 10th c., is the fragment of a poem on Boethius, edited by Raynouard (Par. 1817). To Raynouard belongs the credit of having been the first to study the language of his country critically, though his archaisms misled him into believing that it only was the daughter of Latin; French, Italian, and Spanish being modifications of Provençal. His theory was successfully refuted by August von Schlegel and Sir Cornewall Lewis, who pointed out that in some points the *Langued'Oil* was more archaic than the *Lengua d'Oc*—e.g., that *sommes*, *estes* (*estes*), and *sont* could never have come from *sem*, *ets*, and *son*. The Albigensian Crusade, the removal of the Papal See from Avignon, and the final absorption of Languedoc into the French monarchy, degraded Provençal from a literary language to a mere patois, its employment in public documents being forbidden by a decree of François I. in 1527. But though the modern Gascon and Languedocian dialects are but wrecks of the old 'doux parler' of the South, Provençal has left in French many traces of its influence in the shape of some fifty seafaring and miscellaneous terms—*autan*, *mistral*, *corsaire*, *ballade*, *croisade*, &c. There are Provençal dictionaries by Raynouard (6 vols. Par. 1838-44) and Honorat (3 vols. Digne, 1846-47), and Diez gives a masterly sketch of the grammar in his *Grammatik der Romanischen Sprachen* (4th ed. 3 vols. Bonn, 1876). See also P. Barbe, *La Vieillesse sur la Langue d'Oc* (2 vols. Toul. 1873).

Provençal literature consists exclusively of poetry, and this poetry is chiefly lyrical in character. Of the popular epic no traces survive, if indeed they ever existed; and the fragment *Flamenca*, which Hueffer styles an 'artistic epic,' is simply a metrical romance like the *Fierabras* or *Geoffroy de Brunissende* of Borneilh. The favourite forms of composition with the Troubadours (q. v.) were the amorous *Canço*, marked by a slavish regularity of rhyme and pause; the freer *Sirventes* or 'service-lay,' employed for eulogies or satires; the sonnet, like Petrarch's, of fourteen lines; the *Tenson*, or amœbean strain; the *Planh* or 'plaint,' and *Frotola*, a forerunner of Tupper's *Philosophy*; and a species of macaronic verse, whose invention was ascribed to Raymond de Vaquieras, where the first stanza might be in Provençal, the next in Tuscan, the third in French, the fourth in Gascon, the fifth in Catalan, and the sixth and last in all five languages together. But if the forms of Troubadour poetry were manifold, its themes were singularly few. Love was the one absorbing subject alike of *Canço* and *Tenson*, if love may be called that shallow wantonness which only deepened into crime, and oftener when repulsed sought for itself another and an easier course. From the Arabs, with whom Provence was brought in contact by its fusion with Catalonia in 1092, the poets of the South derived their voluptuous chivalry and courteous contempt of womankind. Doubtless to them Guillem de Poitou, the earliest of the Troubadours, refers in his poems (circa 1095), as his masters in the poetic art; for only thus can we explain the artificial character of all Provençal literature, which with its thou-

sand repetitions and wearisome extravagances reads like a bundle of old valentines; exquisitely harmonious, it may be, but stale and pointless save to the ears to whom they were first addressed. Love was the prompting spirit of the very satires, most of them being aimed at scornful fair ones or successful rivals. They were rarely levelled by Churchmen against heretics, or by heretics against the Church; more rarely still against all sorts and conditions of men, like the famous *Sirventes*, ascribed to Folquet de Lunel, which roundly abuses emperors, kings, nobles, farmers, and peasants, popes, monks, and heretics, innkeepers and usurers, with all and every one besides. We say 'ascribed,' because our knowledge of the Troubadours, based chiefly on the naïve *Vies des plus Célèbres et Anciens Poëtes Provençaux* (Lyon, 1575) of Nostradamus, brother of the astrologer, is vague in the extreme. Common consent, however, ranks the following as the best:—Bernard de Ventadour (12th c.), the grace and melody of whose fifty surviving *Canços* bear out the eulogy pronounced on them by Petrarch in the fourth canto of his *Trionfo*; Arnould Daniel (12th c.), who, says Dante (*Par.* c. 26), 'in love ditties and the tales of prose without a rival stands.' He was the reputed inventor of the *sestine* or six-lined stanza, and Tasso attributes to him the epic romance of *Lancelot of the Lake*, only preserved to us in the German translation of the minnesinger Ulrich von Zazichoven; Gaucelm Faidit (12th c.), of whom we have sixty pieces, besides a satirical play against Rome, acted at the court of the Marquis of Montferrat between the years 1193-96; Jaufre Rudel (12th c.), 'the songster of Toulouse' (*Par.* c. 26), who, in his own words, 'loved a stranger to his eyes,' the Countess of Tripoli, at sight of whom he died; Bertrand de Born (1145-1215), author of warlike *Sirventes* and glowing songs of love, the evil counsellor of John of England, whom Dante saw in hell bearing his severed head lanternwise (*Inf.* c. 28); Giraud de Borneilh (1160-1219), of whose *Canços*, which gained him the title of 'Master of the Troubadours,' no less than eighty-two have been preserved; Peire Vidal (died 1229), whose mad adventures as a gallant and crusader rang through all Europe, and who died in a madhouse, leaving some sixty compositions, amongst them a treatise on the art, to him unknown, of holding the tongue; Folquet de Marseille (1160-1231), who from a profligate became a monk, and is said to have been Bishop of Toulouse and De Montfort's ally in the Albigensian Crusade. Dante calls him the 'jewel, lustrous and costly, that great renown hath left, and not to perish ere these hundred years five times absolute their round' (*Par.* c. ix.); Peire Cardinal (13th c.), author of seventy poems, remarkable for the variety of their rhythms and their fierce invectives against parvenus, dissolute priests, and *femmes galantes*; and lastly, Giraud Riquier, whose ninety pieces include a pastoral, a sonnet to the Virgin, and a supplication to Alfonso X. of Castile praying that the jongleur of a troubadour might in some way be distinguished from jongleurs exhibiting learned pigs. As in old fairy tales King Oberon's gallant courtiers change at the cockcrow to withered leaves, so did the 'gay science' vanish suddenly before the inrush of a stern outer world on the earthly paradise of Provence. The *Noëls Provençaux* (Avig. 1669) of the clerky Nicolas Saboly were almost the sole productions of the Provençal lyre from the 14th c. down to our own day. Recently there has arisen a little band of poets headed by Jasmin, the 'barber of Agen' (1798-1864), who have essayed once more to touch its long-hushed strings. But though Jasmin's *Papillotes* (Par. 1860) and Mistral's *Calendau* (Avig. 1867) are popular amongst their authors' countrymen, they are none the less anachronisms, impotent to arrest the forces which have rendered French the language of culture and progress throughout the length and breadth of France. See Diez, *Leben und Werke der Troubadours* (Zwick. 1827), and *Die Poesie der Troubadours* (Zwick. 1827); Fauriel, *Histoire de la Poésie Provençale* (3 vols. Par. 1846); Mila y Fontanals, *De los Trobadores en España* (Barc. 1861); J. Rutherford, *The Troubadours* (Lond. 1873); C. Bartsch, *Chrestomathie Provençale, accompagnée d'une Grammaire et d'un Glossaire* (3d ed. Elberf. 1874); Saint-René Taillandier, *Les Destinées de la Nouvelle Poésie Provençale* in the *Revue des Deux-Mondes* for December 1875; F. Hueffer, *The Troubadours, a History of Provençal Life and Literature in the Middle Ages* (Lond. 1878); and A. Birch-Hirschfeld, *Ueber die den Provençalischen Troubadours der 12 und 13 Jahrhunderten bekannten epischen Stoffe* (Halle, 1878).

* Such are the etymologies accepted by Diez and Brachet, though Grimm derives *oc* (Old Fr. *o*) from the Ger. *ja*, and compares *oil* with the M. H. Ger. *jâ* &c.

lining of plant-cells by Schleiden and Mohl, and succeeding chemical and microscopic research revealed its uniform composition and its widely diffused nature throughout the bodies of all animals and plants. Thus the essentially living part of a yeast plant, the body of an *Amaba*, or *Foraminifer*, or other low animal, the cell-contents of higher animals in their perfect condition, and the cell-contents and active parts of plant structure, consist equally of P. A minute speck of P. (as seen in an amœba) may constitute of itself a complete animal. P. is also known as *sarcode* and *bioplasm*. Chemically it is an albuminous compound, composed of carbon, hydrogen, oxygen, and nitrogen, with minute traces of sulphur and phosphorus. The community of P., when viewed microscopically or chemically, and wherever found, forms one of its most remarkable features. Physically it coagulates when exposed to a high temperature (40° to 50° C.), and contracts when electrical currents are passed through its mass. The interest which has centred around this substance chiefly arises from the consideration of its relations to *life* and *vital action*. One view of these relations is that life is a *property* of P., just as contractility was assumed to be a quality of this substance. Carbon, hydrogen, oxygen, and nitrogen—so runs Huxley's argument—lifeless bodies; when brought together in certain proportions they form P., and this P. exhibits vital phenomena and vital phenomena are regarded as the sequence of the combination of P. from inorganic or lifeless elements. 'What,' says Huxley, 'that something called "aqueous" forms water when its component gases, hydrogen and oxygen, are brought together.' What better illustration of the principle of vitality than this is that we know fully and definitely under which conditions water is formed, and no force, other than the chemical, is necessary to account for its oxygen in order to account for its hydrogen. The seat of forces of physical and chemical development of life is the seat of forces of physical and chemical development of life.

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Pro

Thus, our 'Liars should have good memories' (*Mendaces memores esse oportet*); 'in olden times' (*Mendaces memores esse oportet*); 'we recognise the saws concerning "hungry bellies," and the rolling stone, "with scores of others, "in a classic or medieval garb. Where, in the history of the world, the same idea is conveyed by the P. of different nations, it is difficult—often impossible—to determine whether it was struck out independently, or whether one nation has borrowed it from the other. We feel at once that a common conception underlies the Greek 'Owls to Athens,' the Rabbinical 'Enchantments to Egypt,' the Eastern 'Pepper to Hindustan,' the medieval 'Indulgences to Rome,' and our own 'Coals to Newcastle'; but it would be rash to affirm that the English proverb was consciously copied from the Greek, because each so unmistakably bears its special local imprint. Frequently, indeed, the nationality of a proverb may be decided on internal evidence. 'When thy house is on fire, warm thy hands at the blaze' presents an admirable picture of Spanish dignity; 'Revenge is a morsel for God' is plainly a country-man of Machiavel; none but Eastern slaves could have enunciated 'When the monkey reigns, dance before him,' or 'Kiss the hand that thou canst not bite'; whilst 'A hedgehog will open when he is wet' is the formula by which the hedgehog-eating Gipsy expresses the truth '*In vino veritas*.' The number of P., and the estimation in which they are held, vary greatly with different races and times. Trench rates the entire stock of Spanish P. at 'the almost incredible number of from five and twenty to thirty thousand,' but this number is far exceeded by the P. of Germany, amounting, according to Wander, to some 145,000, whilst the prominent part these play in *bauer* philosophy has been charmingly illustrated by Auerbach in his *Dorfgeschichten*. Classical P. have been collected by Polydore Virgil (Ven. 1498), Erasmus (Par. 1508), Leutsch and Schneidewin (2 vols. Gött. 1839-51), and Kruse (1863); Arabic by Freytag (3 vols. Bonn, 1838-43); Finnish by Lönnrot (Hels. 1842); Dutch by Harrebomée (3 vols. Utr. 1858-65); French by De Lincy (2d ed. 2 vols. Par. 1859) and Cahier (Par. 1856); English by Bohn (Lond. 1855) and Hazlitt (Lond. 1869); Scotch by A. Hislop (Edin. 1870); and German by Wander (5 vols.

taken as the basis of arrangement. The *Stomatous*, or 'mouth-possessors' of the P. of Ger-fusoria; the *Astomatous* P. in sub-kingdom. The P., however, or four classes. The following classification of the group:—

Classification of P.

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ars a superscription ascribing it to Kings iv. 29-34 shows that Solomon of the maxims or aphoristic sentences always been fond, and renders it his sayings have been preserved in this whole book was not composed by him is in itself, and by the superscriptions of the believed by critics that the original portion are many genuine proverbs of Solomon, is 16, to which chap. xxv.-xxix., till then floating as proverbs of Solomon, was added in the of xxv. 1). It is doubtful whether the portions 22, and xxiv. 23-34, belonged to the original work at this time. Chap. xxx.-xxxi. was probably added time, as also i.-ix., which is an introduction to the collection, probably composed by the last editor. See *Einleitung in der A. T.* (Eng. trans. 1869).

Providence is the name given to the order of nature in reference to the provision made beforehand for the existence and well-being of all living creatures, especially mankind. In a wider sense P. is made to refer also to inanimate nature, and is sometimes used as a synonym for God.

Providence, the second city of New England, U.S., the seaport and one of the capitals of Rhode Island, is at the head of navigation on Narragansett Bay, 178 miles by rail N.E. of New York, and 44 S.S.W. of Boston. P. occupies 14½ sq. miles on both sides of the river, which in the geographical centre of the city expands into the ellipse-shaped 'Cove,' a mile in circumference, and surrounded by a park of fine shady trees. P. has 80 churches, among them one built in 1638 by Roger Williams, the oldest Baptist church in America. There are also Rhode Island Hospital, Butler Hospital for the insane, with many other hospitals and asylums, 12 state banks, 25 national banks, 9 savings banks, 1 high school, 11 grammar, 31 intermediate, and 36 primary schools; Brown University, a Baptist Institution with 16 professors and over 250 students, and a library of 45,000 volumes; a large and well-endowed boarding-school of the Society of Friends, with about 200 pupils; the Athenæum, with a library of 35,100 vols.; 18 insurance companies, several railways meeting in one central station, several lines of steamboats, a state prison, county jail, and reform school. The Butler Exchange, the Arcade, the State House, and the Narragansett Hotel are fine buildings; and P. is famous for its many beautiful private residences surrounded by extensive grounds. P. is the centre of a large manufacturing district, and has great trade, especially in cloths, chemicals, dye-stuffs, and coal; of print cloth alone in 1875, 3,324,780 pieces of 40 yards each were sold. The iron manufacture is also large, there being 26 works for engines, boilers, locomotives, &c., and 3 screw factories. There are 86 jewellery and silverware factories. P. has four daily, one semi-weekly, six weekly, and two monthly newspapers. Pop. (1875) 100,675.

Provincial of a monastic order is the superior of the abbots, priors, or other superiors of the religious houses in a province, corresponding to a Metropolitan (q. v.) among the secular clergy.

Proving the Tenor. In Scotland, the terms of a deed lost or destroyed may be proved before the Court of Session by an action of P. the T.

Provins, a town in the N.E. of France, department of Seine-et-Marne, 29 miles E. by N. of Melun, is situated on the Durelin and the Vouzie, which turn some fifty or sixty corn-mills in the district. P. is surrounded by ancient fortifications, and is divided into two parts. The upper town contains the Tour de César of the 15th c., and the church of Saint-Quiriace of the 12th c. In the lower town is

the church of Sainte-Croix, and dating from the 13th c., the cloister of the convent of the Grey Friars, and the Grange-aux-Dîmes. P. is famous for its roses. Pop. (1872) 7596.

Pro'voost (Old Fr. *prevost*, Lat. *præpositum*, 'one placed over') is in England the chief dignitary of a cathedral or collegiate church, ranking next after the archbishop or bishop. The heads of Eton College and Kings College, Cambridge, are also provosts. In Scotland, a P. is the chief magistrate of a royal burgh, the title corresponding to the English *mayor*. The provosts of Edinburgh and of Glasgow are styled 'Lord P.' In a written address, the Lord P. of Edinburgh is entitled to have 'The Right Honourable' prefixed to his Christian name. The Lord P. of Glasgow is styled 'The Honourable the Lord P.'

Provost-Marshal, in the navy, is an officer who has charge of prisoners taken at sea, and of a prisoner before a court-martial. In the army, the P.-M. is an officer whose duties are to see to the maintenance of military discipline, to seize and secure deserters and other criminals, to preside over and enforce their punishment, and to check marauding.

Prox'y (cont. from obsolete Eng. *Procuracy*), the name given to the agency by which one person may lawfully act or vote for another in his absence. Every member of the English House of Lords possesses this power, but no peer can hold more than two proxies, nor use them either in judicial cases or when the House is in committee.

Pruden'tius, Aure'lius Clem'ens, a Christian poet, born 348 A.D., was successively a pleader, judge, and soldier under more than one Roman emperor. What we know of P. is derived exclusively from a short autobiography in verse written by the poet at the age of fifty-seven, and designed as an introduction or preface to his writings, of which it contains a catalogue. From this we learn that P. was born in the reign of Constantius II. and Constans. After receiving a liberal education he frequented the schools of the rhetoricians, led a gay life, practised as a forensic pleader, discharged the duties of a civil and criminal judge, and obtained from the Emperor—whether Theodosius or Honorius is uncertain—a military appointment at court, which placed him in a position next to royalty. Eventually P. became tired of earthly pomp, sensible of the emptiness of human honours and display, and earnest in the cause of the Christian religion. We hear nothing of him after 405 A.D., but the year of his death is not known. His principal extant writings, all of a devout character, and in a great variety of metres, are:—(1) *Præfatio*, autobiography and catalogue of works; (2) *Cathemerinon Liber*, twelve hymns proper to be said or sung by the sincere Christian; (3) *Apotheosis*, on the divinity of our Saviour, and his relation to the Father; (4) *Hamartigenia*, on the origin of sin; (5) *Psychomachia*, the conflict of virtue in the soul of the Christian; (6) *Contra Symmachum, Lib. I.*, on the worthlessness of the heathen gods, with an account of the conversion of Rome to Christianity; (7) *Contra Symmachum, Lib. II.*, a refutation of the arguments in the petition of Symmachus to Valentinian, praying for the restoration of the altar and statue of Victory cast down by Gratian; (8) *Peristephanon Liber*, fourteen poems in honour of saints, mainly Spanish, who had won the martyr's crown; (9) *Diptychon*, on remarkable characters and events in Bible history, a series of forty-eight poems of four verses each; (10) *Epilogus*, consisting of thirty-four lines, apparently written after P. had withdrawn from public life. The style of P. is confessedly impure, his prosody faulty, his themes destitute of creative power; yet he was immensely popular in the Middle Ages. This is easily understood, but how Bentley, a scholar and critic of great acumen, should have styled him 'the Horace and Virgil of the Christians' is not so clear. The *editio princeps* of P. was printed at Deventer in 1472.

Prud'hommes, Conseils de, tribunals for arbitration in trade disputes, existed at Marseille in 1452, and at Lyon in 1464, and were re-established in the latter city (1806) and in Paris (1844). They are now regulated by the decrees of May 27, 1848, and March 2, 1852, are composed of workmen elected by masters and masters by workmen, and have the power of inflicting small pecuniary fines and short terms of imprisonment, their jurisdiction being restricted to cases where the sum at issue does not exceed 200 francs.

Prunell'a, the scientific name of a genus of small hairy perennial herbs, with whorled flowers in dense terminal heads, belonging to the natural order *Labiatae*, and found in the temperate regions of both hemispheres. *P. vulgaris*, which occurs in the four continents, as also in Australia, is a very common British plant of pastures and waste places. Formerly it was in sufficiently high repute to obtain its existing popular name of 'self-heal';—no surgeon was wanted when it could be made use of: it still holds a place amongst rustic herb-medicines.

Prunes. The ordinary kind of P. of grocers' shops are the fruit of the St. Julian variety of the common Plum (q. v.), dried either by exposure to the sun, or by artificial means, or by these processes alternately. For their production, the tree is largely grown in France. In some districts P. are still much used stewed, or in pies or puddings. Medicinally, P. are a mild laxative; they are also one of the ingredients of *confectio semina*. The best dessert P. or 'French plums' are carefully prepared from the yellow fruits of a variety called the Brignole plum; they come from Provence. In Germany the Zwetschen variety is cultivated to supply P.

Pruning consists in depriving a plant of a portion of its stem, branches, buds, leaves, bark, or roots in order to produce particular effects on the remaining part of the plant. There are different kinds of P., named after the manner, extent, and implement used, such as lopping, clipping, knife-pruning, disbudding, disleafing, disbarking, &c. The object is to concentrate the action of the sap for the benefit of the part that is left, and to give a stimulus to vitality. The amount of P. must be determined by the exigencies of each particular case and the judgment of the operator, it being borne in mind that P., not mutilation, is in all cases the object to be attained—conservative surgery, not reckless hacking. For forest-trees P. is of the greatest use in modifying the quantity of timber produced. For ornamental trees it is chiefly employed to remove diseased branches, because much of the effect of these trees depends on the development of their natural form and character. For ornamental shrubs it cannot be dispensed with, since many of them are grown for their flowers, which are produced much stronger and of brighter colours when shoots are thinned out, or shortened, or both. In fruit-trees and shrubs, P. is by far the most important part of their cultivation, and if unattended to, the shoots and fruit would gradually diminish in size, and the produce, though numerous, would be deficient in succulence and flavour. Such we find to be the case in neglected orchards. The application varies according to the species. Herbaceous plants are often pruned, both roots and branches, when transplanted. Root-pruning is performed to check the formation of wood-shoots, and induce the formation of bud-shoots. It is chiefly employed to check the luxuriance of young fruit-trees and throw them into blossom. Clipping is principally applied to hedges, and to dwarf shrubs used for borders of garden walks. Thinning is performed when plants stand too close together, or when branches, leaves, flowers, or fruit, are too numerous on an individual plant to be properly nourished, and to receive due exposure to sun and air. Coppice-woods consist of trees and shrubs cut down periodically, their stems and branches thus being constantly renewed.

Seasons for P. vary according to the object in view. The worst season is the spring, just before the expansion of the leaves, as at that time the sap is rising with the greatest vigour.

Prun'us. See PLUM.

Pruri'go is a chronic papular affection of the skin, the most prominent symptom of which is intense itching. The skin is thickened and discoloured, and the eruption of isolated and scattered papulæ does not differ in colour from the general surface. P. is unaccompanied by constitutional symptoms. There are three principal varieties of P., viz., *P. mitis*, *P. formicans*, and *P. senilis*. *P. mitis* makes its appearance in the spring and summer months, without premonitory symptoms, and generally declines at the end of two or three weeks; but it may be prolonged for several months. In *P. formicans*, the itching is incessant, frequently insupportable, and is compared by patients to the piercing of the skin with red-hot needles, or to having the flesh devoured by thousands of ants. *P. senilis* is similar, but the disorganisation of the skin is more complete.

In the treatment of P., great attention should be paid to diet, and improper and over-stimulating diet and stimulating drinks

should be avoided. Baths, at a temperature not higher than 70° Fah., consisting of simple water and soap, or the alkaline or sulphur bath, should be daily used; and the cold-water bath and sea-bathing may be found useful. Mercurial lotions and ointments, or lotions of sulphuret of potassium, and prussic acid lotions have the greatest reputation. The greatest attention should also be paid to personal cleanliness.

Prussia (Ger. *Preussen*, a name derived from that of the old Slavic *Prussi*), by far the largest and most powerful kingdom of the German Empire, of which it is the dynastic and military head, extends in lat. 49° 8'-55° 50' N., and long. 6°-22° 50' E. Its extreme length from N.E. to S.W. is 720 miles, while its breadth from N. to S. varies from 180 to 470 miles. Including Schleswig-Holstein, it is bounded N. by the German Ocean, Denmark, and the Baltic, E. by Russia, S. by Austria (Galicia, Schlesien, Mähren, and Böhmen, by Sachsen, by the Thuringian states of Bayern, Hessen-Darmstadt, and Elsass-Lothringen, and W. by Luxemburg, Belgium, and the Netherlands. Outlying parts of P. are Hohenzollern (q. v.), encircled by Würtemberg and Baden, and the Jahdegebiet, at the mouth of the Jahde, surrounded by Oldenburg, to landwards. The Jahdegebiet was purchased in 1853, with a view to the establishment of the naval station of Wilhelmshafen. A somewhat complex appearance is given to the map of P. by the number of minor states and their sub-sections included within its political outline. Of these, the chief are the grand duchies of Mecklenburg and Oldenburg, the district of Hamburg, the duchies of Braunschweig and Anhalt (in eight sections each), the province of Upper Hessen, and the principalities of Waldeck, Pymont, Lippe-Detmold, and Schaumburg-Lippe. P. has over 1000 miles of coast-line, of which three-fourths are on the Baltic. The N. Sea coast is indented by the estuary of the Elbe and the inlets which receive the Ems, the Weser, and Jahde; the Baltic coast by the fjords on the E. side of Schleswig, the Gulf of Lübeck, the Kleine and Grosse Haff at the mouth of the Oder, the Gulf of Danzig (including the Frische Haff), and in the extreme N.E. by the Kurische Haff. To P. belong the E. and N. Frisian Islands, and, in the Baltic, Alsen, Fehmern, Rügen, Usedom, and Wollin. P. is divided into eleven provinces (subdivided, again, into thirty-five *Regierungsbearke* or administrative districts), of which the areas and populations are as follows, according to the census of 1st December 1875:—

Provinces.	Area in sq. miles.	Pop. 1875.	Chief towns.
Preussen (proper) . . .	24,123	3,199,171	Königsberg.
Brandenburg . . .	15,595	3,126,425	Berlin.
Pommern . . .	11,627	1,462,290	Stettin.
Posen . . .	11,126	1,606,084	Posen.
Schlesien . . .	15,556	3,843,699	Breslau.
Sachsen . . .	9,745	2,169,931	Magdeburg.
Schleswig-Holstein . . .	7,218	1,074,085	Schleswig.
Hannover . . .	14,855	2,017,393	Hannover.
Westfalen . . .	7,799	1,905,697	Münster.
Hessen-Nassau . . .	5,943	1,467,898	Kassel.
Rheinland . . .	10,415	3,804,257	Köln.
Hohenzollern . . .	439	66,466	Hechingen.
	134,411	25,742,496	

The former duchy of Lauenburg, united since 1865 to P. by *personal union*, was formally annexed to the province of Schleswig-Holstein in 1876. Berlin is the capital of both the Prussian kingdom and the German Empire.

Physical Aspect.—P. may be divided into two sections, corresponding to the well-marked physical character of two great sections of the country. (1) The greater part of P., comprising portions of Hannover, Schleswig-Holstein, part of Sachsen, Brandenburg, Pommern, Posen, Schlesien, and E. and W. Preussen, belongs to the sterile plain of N. Europe, which extends E. and W. from Russia to the Netherlands. This flat region has a loose, sandy soil, and is strewn with erratic boulders of granite. Except in the more favoured districts, or along the green river-margins, the surface defies cultivation, and is in great part occupied by heath and morass, while the open sand-flats show here and there thin belts of stunted pine. In some districts the roads are lined by straggling rows of plum and poplar trees. E. of the Elbe small lakes are very numerous, especially in E. Preussen, where the surface rises considerably. The coast, like that of Holland, is defended from the sea by dykes, and many of the rivers, such as the Vistula and Niemen, are in great part lined

with embankments. The *haffs* ('bays') of the Baltic are lagoons formed at the mouths of rivers by islands or sand-spits. Having a slight northward slope, the great plain is traversed by several large navigable rivers—the Elbe, the Oder, with its great affluent the Warthe, the Vistula, which has a course of 160 miles in W. Preussen, and the Niemen, in the extreme N. of E. Preussen, through which it flows for 70 miles. Minor streams are the Pregel, the Weser, and the Ems, the last being the only river of any size entirely within Prussian territory. The northern plain is separated on the S. from Böhmen by the Riesengebirge (q. v.), and from Sachsen and several minor German states by the Thüringerwald. To the N. of Thüringia, and standing well within the limits of the great plain, are the Harz Mountains (q. v.) of Hannover. Further W. the Teutoburgerwald extends between the Weser and Ems. (2) The S.W. part of P., including Westfalen, Rheinland, and Hessen-Nassau, differs from the rest of the country, for the plain here swells into uplands, intersected by bold mountain ranges. Along both banks of the Rhine there are narrow strips of level land, hemmed in on the W. by the Vosges or Hardt Mountains, and on the E. by the Westerwald, Taunus, &c. The scenery of the Rhine valley from Bonn upwards as far as Prussian territory extends, is singularly picturesque. Vines clothe the banks and climb the hillsides, which are often terraced for their support, while romantic strongholds crown the most commanding positions.

Climate, Botany, and Agriculture.—The great plain, more especially in the E., is exposed alternately to hot summers, accompanied by severe droughts, and to rigorous winters. The winters are less severe as we advance from E. to W., and the rainfall is correspondingly greater. The mean annual temperature at Königsberg is 43° F., at Berlin 46° 5, and at Hannover 48°. The Rheinland is the most northerly wine district in Europe. Its wines are acidulous, because of the want of heat to develop the saccharine matter in the grape. The clusters, however, are mellowed by the first frosts of the Rhine winter, which is so severe that the navigation of the river is suspended for a time almost every winter because of floating ice. In 1875 the forests throughout P. covered an area of 19,889,300 acres (those belonging to the state 5,752,180 acres in extent, yielding to the revenue £2,750,000 in the year ending March 1878.) The chief trees are pines, firs, beeches, alders, birches, and oaks, and the most thickly wooded parts are in the districts of Arnberg, Koblenz, Wiesbaden, Kassel, Frankfurt, and Liegnitz. Much of the most productive and best cultivated land in the Empire belongs to P., the area of which in 1875 comprised 50·1 per cent. of land under grain and fruit crops, and 18·3 per cent. of meadow and pasture. In 1877 the state domains had an area of 856,893 acres, and yielded a revenue of £1,071,190. The state, by the abrogation of land-taxes, the encouragement of special schools, &c., has greatly advanced the condition of agriculture and improved the position of the agriculturists, who number about one half of the inhabitants. Perhaps the most thoroughly cultivated part of P. is Schleswig-Holstein, which has 64·1 per cent of its area under the plough. Other highly cultivated districts are to be found in Sachsen, Posen, Pommern, and the Rheinland. Of the common crops, the proportion of rye is 24 per cent., of oats 16, of potatoes 12, of wheat 10, and of barley 8. Wheat is chiefly produced in Hannover and Schleswig-Holstein, along the lower courses of the Oder, Vistula, and Warthe, and in the fertile district of Magdeburg. Oats and barley are the principal crops in the bleak, sandy, eastern provinces. Flax and hemp are great staples, while minor crops are buckwheat, oil-seeds, woad, and safflower. Chicory is extensively grown; also beetroot for the manufacture of sugar, particularly around Magdeburg. The yield of tobacco, which is chiefly produced around Potsdam, and in Posen, Sachsen, Hannover, and Rheinland, amounted in 1874 to 65,697 tons. Of the greatest importance is the wine-culture, mainly carried on along the banks of the Rhine (see RHINE WINE). Throughout P. the yield of wine in 1874 amounted to 441,056 gallons.

Zoology, Live Stock, &c.—The larger wild animals, including the bear, stag, fallow-deer, boar, wolf, and lynx, are confined to the remoter highlands, while among the common animals of lesser size are otters, beavers, badgers, foxes, martins, and weasels. Game is abundant; pheasants and partridges are especially plentiful in Schlesien, while the marshes of Pommern and W. Preussen literally swarm with wild geese. P. is unsurpassed by any country for the rearing of horses, the excellence

of its breeds being in great part due to the organisation of the royal studs, of which there are fourteen, including the three principal studs at Trakehnen, Neustadt, and Graditz. In 1873 there were in the whole monarchy (including the army) 2,278,724 horses. The finest cattle are bred along the marshy coast of the North Sea, where there is plenty of luxuriant pasture. The total head of cattle in P. was 8,612,150 in 1873. In 1873, out of a total of 19,624,758 sheep, as many as 8,160,189 were merinos. Pommern is the chief sheep-farming province. Sachsen, Hessen-Nassau, Rheinland, and Westfalen are noted for their swine (of which Saxony bred 4,278,531 in 1873) and goats. Honey and wax are produced in large quantity in the heathy parts of Hannover, Brandenburg, &c., while in the latter province some silk culture is carried on, the total produce in 1873 being 5046 lbs of cocoons. The sea-fisheries employed in 1872, in the Baltic, 9575 fishermen; in the North Sea, 1313 boats; and in the lagunes, 5042 fishermen. Sturgeon are caught in the Elbe and trout in the mountain streams, while the Oder abounds with eels.

Geology and Mineralogy.—The great plain mainly comprises Tertiary formations, supporting extensive layers of lignite (*braunkohle*), and mud and sand of recent date. In Rheinland occur Primary beds, while parts of Westfalen and Sachsen are covered with Oolitic formations, here and there erupted with igneous rocks. Schlesien, Westfalen, Rheinland, and Sachsen are the chief mining provinces, and the districts in these particularly distinguished for mineral wealth are Dortmund, Breslau, Klausthal, and Halle. The most important minerals of P. are iron and true coal, and in 1876 there were 448 coal-pits in operation, employing 158,902 persons, and producing 43,364,968 tons, valued at £11,329,111, and 737 iron-mines, with 19,322 hands, the product of which amounted to 2,572,250 tons, value £867,336. In addition, 553 lignite mines yielded 8,985,122 tons, of the value of £1,574,985. The coal-pits in the Ruhr-Düsseldorf district, which extend over more than ten miles, supply nearly a half of the total produce, while those in the basin of the Sar, in the S.W. of Rheinland, furnish about a sixth. P. raises 93 per cent. of all the coal produced in Germany. Iron is found more or less in all the provinces except in Pommern and Schleswig-Holstein, and is most abundant in Westfalen, Rheinland (Koblenz and Düsseldorf), and Schlesien (Oppeln). P. stands among the first zinc-producing countries of the world, having 70 mines, the output of which amounted to £647,760 in 1876. In the same year, the produce of other minerals was:—lead, £1,005,195; copper, £347,246; salt, £306,252. Among the minor minerals found are cobalt, antimony, manganese, arsenic, sulphur, alum, nickel, plumbago, gypsum, petroleum, jasper, onyx, and amber. Silver and gold are procured in small quantities in conjunction with other metals. Freestone and slate are widely distributed; marble is quarried in Schlesien and Westfalen; and mill-stones are procured along the Rhine. In 1876 the state had 17 mines for coal, 12 for lignite, 19 for ironstone, 12 for lead, silver, and copper, &c. The more celebrated of the many mineral springs of P. are those of Aachen, Ems, Wiesbaden, and Selters.

Industries, Commerce, &c.—The great industrial centres of P. are in Ober Schlesien, Westfalen, and Rheinland, all in proximity to the rich coal and iron deposits. After these in importance come Brandenburg, Sachsen, and Hessen-Nassau. In 1876 there were in P. (principally in the provinces named) as many as 1074 smelting works and furnaces, which employed 121,792 men and produced 3,268,367 tons (value £29,219,756). Cast and wrought iron alone was manufactured to the value of £19,931,598, and this special industry employed 87,989 men. The iron industries are the most important, and are carried on most extensively in the districts of Oppeln, Frier, Düsseldorf, Aachen, and Arnsberg. Essen (q. v.), in the district of Düsseldorf, is the seat of the Krupps' vast steel works, while Witten, Bochum, and Spandau, are also noted for the production of steel ordnance. Machinery and locomotives are manufactured extensively at Königsberg, Elbing, Stettin, Berlin, Hannover, and Kassel; scientific instruments at Berlin, Kassel, Aachen, Bielefeld, Bonn, &c.; musical instruments at Berlin, Breslau, and Kassel; gold and silver wares at Berlin, Hemeelingen, and Hanau. Of the woollen manufactures of Germany, P. produces 65 per cent.; while of 458,000 looms for the manufacture of linen throughout the whole empire, as many as 250,000 belong to P. Fancy wools are a speciality of Berlin, which is also noted for its carpets and shawls. The district of Düsseldorf (including Barmen, Elberfeld, &c.), Münster, Liegnitz,

Erfurt, and the province of Hannover, are remarkable for the extent of their cotton and silk manufactures. In 1873 P. had 221 paper-mills, mostly in Rheinland, Westfalen, Sachsen, and Schlesien. In 1874, 337 mills produced 291,041 tons of beet-sugar, and 10,412 breweries 14,241,024 hogsheads of beer; while the total yield of spirits was 3,558,472 hogsheads. Other important manufactures are wine, leather, tobacco, and cigars, porcelain, glass, fancy goods, and articles in vulcanite. The chief shipbuilding ports are Kiel, Stettin, and Danzig. P. carries on direct trade with foreign countries mainly through the Baltic ports, but a large amount of trade passes through Hamburg and Bremen, and by rail through the Netherlands. In 1876 P. had in the mercantile service 3254 sailing vessels of 504,145 tons, with a personnel of 19,703, and 130 steamers of 28,539 tons, with a personnel of 1605. There entered the ports in 1875 with cargo, 26,370 vessels of 2,734,833 tons, and in ballast, 8624 of 611,093 tons; and cleared with cargo, 22,736 of 213,649 tons, and in ballast, 10,366 of 10,504,43 tons. The official trade returns are included in those of Germany (q. v.). P. has a very extensive and complete railway system, the portions of which in Hannover and Hessen-Nassau belong entirely to the state. In 1877 the total length of the railways was 10,454 miles, those belonging to the state having a length of 2854 miles, and those owned by private companies but under state administration, 1223 miles.

Education and Culture.—An account of the Prussian educational system is given in the article GERMANY. Despite all that the state has done and is doing to spread and equalise education, the older eastern provinces, lagging behind the younger and more vigorous ones to westward, are accounted among the least enlightened parts of the empire. In 1875-76, out of 85,507 recruits, 2749, or 3.214 per cent., were unable to read or write. Of those raised in Posen the percentage of the totally uneducated was 13.972, in Preussen, 8.78, and in Schlesien, 3.35; while in Westfalen it was 1.056, in Pommern, 1.528, in Hannover, 0.84, Hessen-Nassau, 0.53, Sachsen, 0.322, Brandenburg, 0.66, Schleswig-Holstein, 0.26, and Rheinland, 0.74. In 1871 P. had 34,988 elementary schools, with 4,495,040 pupils and 17,264 teachers. In 1877 there were, for higher education, 228 gymnasia, 33 pro-gymnasia, 84 real schools, 90 Bürgerschulen, 215 higher girls' schools, 68 Protestant and 31 Catholic teachers' seminaries, 4 Jewish teachers' seminaries, 9 universities, the Academy at Münster, and the Lyceum at Braunsberg. In the summer semester of 1878 the nine universities, the Münster Academy, and the Braunsberg Lyceum had a staff of 906 teachers, of whom 470 were ordinary, 7 honorary, and 202 extraordinary professors, and 227 privat-docenten; while the matriculated students amounted to 8219, comprising 3636 in the faculty of philosophy, 2261 in law, 1349 in medicine, and 684 in Protestant and 289 in Catholic theology. The non-Prussian students numbered 1080. In 1878 the University of Berlin had 201 docenten (including 63 ordinary and 57 extraordinary professors, and 77 privat-docenten) and 2237 students. In 1874 the departmental schools of P. were 155 in number. The fine arts were represented by 3 royal musical institutes, 10 music conservatories, 4 art academies, and 3 drawing-schools. There were also 120 professional and technical schools, 15 schools for the blind, and 35 for deaf-mutes. The universities are rich in libraries and scientific collections, and the art-treasures of Berlin are of European fame. In 1874 P. had 809 newspapers. The political press is under a strict censorship, and in the years 1876-77 as many as 115 editors and publishers were brought before Berlin law courts for the propagation of socialist opinions.

Constitution, Government, and Finance.—According to the charter of 1850, P. is a constitutional and hereditary monarchy. The king is assisted by a council of ministers, and shares the legislative authority with a representative assembly, consisting of two chambers—(1) the Herrenhaus, or House of Lords, composed of certain princes and nobles, life peers named by the king, noblemen elected in the provinces by all landowners, and representatives of the universities, of towns with a pop. of above 50,000, and of various other interests; (2) the Abgeordnetenhaus, or Chamber of Deputies, comprising 433 representative members, elected indirectly by all Prussians above twenty-five years of age. Bismarck's Districts Administration Act of 1873 reformed the aristocratic rural economy of P., abolished the old feudal county assemblies, and conceded self-government and representative institutions to villages and rural circles. This measure, regarded

by many as revolutionary, was pressed by the Chancellor as necessary to the due amalgamation of P. with the new empire in temper and principles. The law code mainly in force in the eastern provinces is the *Landrecht für die Preussischen Staaten*, compiled under Friedrich the Great, and introduced in 1794. Old Polish, Swedish, and German law is still common in certain parts, while the Köln district is under the *Code Napoléon*. Over 125 magistral courts there are 12 provincial courts of appeal, and from these cases may be carried to the upper tribunal in Berlin, the supreme court of law. In 1878 the Budget gave the revenue and expenditure as each £32,581,920, and the total national debt was £52,927,523 on 31st March 1877.

Army and Navy.—The military organisation is described in the article GERMANY. In 1876 the Prussian army comprised 13,804 officers and 319,824 men, of whom 203,760 were infantry. The mobilisation of the reserves is possible in ten days' time. In point of fact, within twelve days of the declaration of war by France in 1870, the mass of the troops were conveyed to the Rhine. The Prussian navy is that of Germany (q. v.).

Religion and Ethnology.—The royal family of P. belongs to the Protestant faith, but Roman Catholic as well as Protestant clergy are in part maintained by the state. In 1875 there were in P. 16,636,990 members of the Evangelical State Church (64.64 per cent.). In the older provinces of P. the members of the State Church are formed by the compulsory fusion of Lutherans and Reformed effected by Friedrich Wilhelm IV.; they amount to 13,266,620. But in Hannover and other recently acquired parts the Lutherans (2,995,250) and Reformed (465,120), though embraced in the State Church, do not acknowledge the union. There were 8,625,840 Roman Catholics and Old Catholics (33.51 per cent.), besides 1450 Greek Catholic, and 4800 German and Christian Catholics (separatists from the Roman Catholic Church). Of Lutheran separatists there were 40,630; of Reformed separatists, 35,080; of Moravian Brethren, 3710; of Irvingites, 2620; of Baptists, 12,210; of Mennonites, 14,650; and of Jews, 339,790. The population of P. is somewhat rigidly divided into the three classes of the nobles, the burghers, and the peasants, the first embracing as many as 200,000 persons. Some seven-eighths of the inhabitants are Germans; the non-Germanic element amounts to 2,897,200 souls, of whom 146,800 are Lithuanians, 2,432,000 Poles, 50,000 Czechs, 83,000 Wends, 10,400 Walloons.

History.—The Baltic coast region, still known as *Preussen* (P. Proper), was from pre-historic times the home of the Borussi or Prussi, a 'strong-boned, irascible, herdsman and fisher people,' of the Lithuanian family. From a very early period P. was famed throughout the world for the amber of which it still possesses unequalled supplies. That the Prussians came into conflict with the Goths prior to the migration of the latter southwards is all that is known of the people till the 10th c., when various attempts were made by the kings of Poland and the Polish clergy to introduce Christianity. Dreading political annexation, the Prussians opposed all missionary enterprises, killed, among other preachers, St. Adalbert, Bishop of Prague (997), and latterly alarmed Poland by their fierce and frequent incursions. A long and uncertain struggle between the Poles and Prussians ended at last only in the appeal of Konrad, Duke of Masovia, for aid to the Teutonic order of the Knights of St. George. Hermann von Salza, general of the order, promptly acceded to the request, only stipulating that all lands conquered by the knights should fall to the order. Then ensued a steady, systematic war of conquest (1230-83), conducted with great military skill and courage, and far less than the usual cruelty, and ending in the complete subjugation of P. to the order's rule. The civilising influence of the knights was soon seen in the foundation of towns and schools, the erection of strongholds, the improvement of agriculture, and the extension of commerce. So highly was the possession of P. valued by the order, that in 1309 its headquarters were removed from Venice to the new palace of Marienburg, which still stands a memorial of artistic refinement and regal splendour. About the year 1400, the period of their greatest prosperity, the knights held sovereign sway over a kingdom extending far into Kurland and Livonia, and owned 55 walled cities (including several great commercial centres), 48 castles, and 19,000 villages, while their revenue amounted to the then vast sum of 800,000 Rhenish guilders (£65,000). But soon prosperity led to luxury and dissension among the knights, and in a single defeat at the hands of an allied Polish and Lithuanian force at Tannenberg

(1410) their independence was broken. An honourable peace secured by the brave general of the order was sacrificed by still further internecine strife, and in 1466 Ermland and the western portion of P. were ceded to Poland by the Treaty of Thorn, while the eastern territory was only retained in fealty. In this extremity the knightly commonwealth adopted the policy of strengthening itself by electing as master scions of powerful German dynasties, and in 1511 the choice fell on the Markgraf Albrecht (q. v.) of Brandenburg-Kulmbach, and nephew of the King of Poland, tracing his descent from the Franconian line of the Hohenzollern family. Albrecht, having refused to take the oath of allegiance, was at once attacked by the King of Poland, and on the conclusion of a truce (1521), hastening to Germany to invoke the aid of his kin, he failed in his immediate object, but returned with the gift of the Reformation doctrines. With the consent of several of the bishops, and to the joy of nobles and people, he proclaimed his acceptance of the new tenets, and when his religious order was dissolved in 1525, he was acknowledged hereditary duke of secularised P. His long reign was marked not only by wise legal and financial reforms, but by the publication of important translations, the inauguration of an educational system, and above all by the foundation of the famous university of Königsberg. He died in 1568, and was succeeded by his son, Albrecht Friedrich, who subsequently became insane. The dukedom remained under a regency till Albrecht's death in 1618, when his son-in-law, Johann Sigismund (q. v.), Elector of Brandenburg, after having held the regency for several years, took possession of Eastern P. (the western part still remaining a province of Poland), which from this time was always joined to the Mark of Brandenburg. The Hohenzollern family allowed the opportunity to slip of uniting the N. and S.W. of Germany (which also was almost wholly Protestant) in a powerful league, and in the later years of Johann Sigismund there broke forth (1618) the dreadful Thirty Years' War, 'from the effects of which Germany seems only now to be recovering herself.' Johann Sigismund's successor, Georg Wilhelm (1624-40), the first incompetent ruler in his family, was completely under the influence of Count Schwarzenberg, an extreme Papist, suspected of acting for Austria. In attempting to remain neutral at a time of fierce contention, he only exposed the country to the ravages of imperial and Swedish armies alternately, and the havoc begun by war was completed by pestilence. On the accession of Friedrich Wilhelm (q. v.), trade and commerce were annihilated, agriculture was at a standstill, towns stood in blackened ruins, and wide tracts of country were entirely destitute of inhabitants. But out of chaos and ruin, by stern adherence to a wise policy, the 'Great Elector' raised his country into the position of a great European power. Perceiving the danger of dependence on the empire, he quietly and quickly raised a small but efficient army, with which in many an arduous campaign he carved out for himself the reputation of a bold, brilliant, dexterous leader. By playing off Swedes against Poles, he rid his duchy of P. of its allegiance to Poland, and on the revocation of the Edict of Nantes, introduced into this part of his territory some 20,000 French refugees, and with them the germs of flourishing industries. He abandoned the old system of military levies in his own states, and though he raised an army of 40,000 men, was enabled by strict economy to spare the finances of the country. Pursuing his supreme object of state unity, he stamped out the beginnings of constitutional life both in Brandenburg and P. so effectively, that from his reign may be dated that absolutism which continued almost unbroken till the middle of the present century. At his death in 1686, he left to his son Friedrich a strongly organised state of 50,000 sq. miles, and a million and a half inhabitants. After much intrigue and bribery, P. was raised to the rank of a kingdom (1701) by the Emperor Leopold I., who thus procured the support of Friedrich's well-drilled battalions in his French wars. On the day of his coronation Friedrich I. established the famous order of the Black Eagle. Though he augmented P. by peaceable acquisition, he was a vain, pompous, extravagant, splendour-loving king, and strikingly contrasts with his son Friedrich Wilhelm I. (1713-40), who, harsh, tyrannical, arbitrary, given to outbursts of brutal rage, frugal even to parsimony, carrying his contempt of ceremony and display to learning and its professors, living in the plainest style, enjoying coarse practical jokes, and spending his evenings in his 'tobacco-college,' was still animated by a love of the *sans rei publicæ*, and of his 'Potsdam Guard,' a regiment of giants recruited (occ-

sionally by kidnapping) from all parts of Europe. This erratic ruler raised the army to 80,000 men, acquired the city of Stettin and part of Pommern from Sweden, encouraged immigration to such an extent as to increase the pop. to 900,000 (on an area of 5000 sq. miles), abolished for ever witchcraft trials, and left a treasure of nine million thalers (£1,350,000). Friedrich II. (q. v.), called Friedrich the Great, one of the most powerful of all European rulers, succeeded to this heritage, and after a long and eventful reign of a thoroughly despotic character, and throughout which the king displayed in singular union the highest qualities of the statesman and the general, P. was raised to the position of the rival of Austria in Germany, disputing with that power the sway over the minor states. The first Silesian War gained, and the second secured, to P. the whole of Upper and greater part of Lower Schlesien. In the Seven Years' War, Friedrich, with England for an ally, maintained his crown against the combined forces of Austria, France, Sweden, Russia, and Sachsen. He further extended his territory in the first partition of Poland by the addition of what was called West P., excluding the towns Thorn and Danzig. The vigour with which he carried on war was equalled by the zeal with which he strove to remove every vestige of its evil effects. The latter part of his life (1763-86) was spent in unremitting labours of peace—in aiding the ruined with gifts, stimulating immigration by bounties, simplifying and bringing jurisdiction within the reach of the poor, and by manifold ingenious schemes directing the energies of his people into new channels. His nephew and successor, Friedrich Wilhelm II. (1786-97), a weak king, acting under the dominion of favourites, joined Austria in the attempt to turn back the tide of the French Revolution, which ended in the disasters of Valmy and Jemappes; excited the jealousy of Austria by the acquisition of the larger part of Great Poland, with the cities Thorn and Stettin on the second partition of Poland (1793); and received New East P., with Warsaw, on the third partition (1795). Suspicious of the secret policy of Austria and Russia, he concluded the Treaty of Basel, by which France received all her possessions on the right bank of the Rhine. The gain of territory to P. during his reign was counterbalanced by the imposition of an enormous debt. P. temporised for selfish ends during the struggle with Napoleon, and Friedrich Wilhelm III. (q. v.) had the mortification of seeing his supremacy in N. Germany threatened by the institution of the Confederation of the Rhine (q. v.). Jealous of the independence of P., Napoleon forced Friedrich Wilhelm into the war which ended in the occupation of Berlin and the humiliating Peace of Tilsit (1807). By this treaty the better part of Prussian territory was lost, with no fewer than 5,000,000 subjects. The army was permanently reduced to 42,000 men, and the country saddled with an indemnity of 140,000,000 francs. But this bitter experience bore excellent fruits. Stein, one of the ablest of all statesmen, abolished serfdom, threw open civil offices to all classes, and induced the king to grant municipal rights to the towns. The school system was placed, mainly by the efforts of Wilhelm von Humboldt, on a basis which makes it even yet the envy of other nations. Under Gneisenau and Scharnhorst, the provision limiting the army was evaded by training bodies of men and disbanding them, while keeping the figure at 42,000 nominally. The *Tugendbund*, or League of Virtue, formed by men of all ranks, but especially by professors and students, stirred the people to the deliverance of the Fatherland. At last the struggle came, and the power of Napoleon was finally broken in the battle of Leipzig (1813). The Congress of Vienna gave to P., in addition to the territory lost at the Peace of Tilsit, the Grand Duchy of Posen, Swedish Pommern, the Duchies of Westfalen and Berg, and the country between Aachen and Mainz. The growth of a national sentiment, which showed itself in a fervent desire for unity and constitutional government, was strengthened by the war of freedom and the achievements of Germans in literature, art, and science. The Zollverein (q. v.) brought P. into closer commercial relation with various states. But it was not till the Revolution of 1848 that Friedrich Wilhelm IV. called together a National Assembly. The Assembly of Frankfurt, the opening of which raised the eager hopes of patriotic Germany, fell into contempt on the refusal by the Prussian king of the imperial title. Bismarck, the able minister of Friedrich Wilhelm Ludwig I., openly declared that a great German parliament could only be founded by 'blood and iron.' The antagonism between P. and Austria, brought to war heat in the

dispute over Schleswig-Holstein (1864), was finally and rapidly settled by Von Moltke at Sadowa in 1866. The chief authority in the Fatherland, for centuries in the hands of Austria, passed now to her rival, with the territory of Hannover, Hessen-Kassel, Nassau, and Frankfurt. Under the presidency of P. was formed the North German Confederation (q. v.), the constitution of which satisfied all but the 'National Liberal' party, whose leading aim was to bring in South Germany. The chief opponents of this party were the Democrats and Ultramontanes. Suddenly the Franco-Prussian War (see GERMANY) swept aside all political faction, and welded together North and South in one common Fatherland, over which, with loud acclaim, King Wilhelm was placed as Emperor. From the brilliant victories of France, Bismarck was called immediately to defend the united Empire against Social Democrats and Ultramontanes. Meantime the party of scholarly Roman Catholics, who, rejecting the dogma of Infallibility, were excommunicated in 1871, had formed the sect of Old Catholics (q. v.), who in 1877 had 21,797 Prussian adherents. The first great event in the conflict of Church and State was the passing of a bill (November 1871) making it penal to preach 'political sermons,' and this was followed in 1872 by the expulsion of the Jesuits. The Ecclesiastical Laws (1873), identified with the name of Dr. Falk, struck at every claim made by the Romish Church in its dealings with the state. They regulated the education of priests, their appointments, and their behaviour to other priests and laymen, while controlling the discipline of the Church, and enforcing by the penalty of heavy fines the filling up of vacant incumbencies. Within two years there were imprisoned five bishops and 1400 priests, while about 100 were driven out of the country, and fines imposed on great numbers. The Falk laws not only meet the temporary emergency of disaffection caused by the abolition of the Temporal Power, but assert the principle that priests must submit themselves to the influence of a lay German training. Later Acts have abolished convents, rendered civil marriages obligatory, and withdrawn state grants from recalcitrant Catholic bishops (1875). The Press Law of 1876 was mainly aimed at Socialism, which has developed so rapidly of late years. In 1877 there assembled at Gotha eighty-eight Socialist delegates, representing 171 local societies, numbering 30,335 members, and in the same year they registered 497,000 votes and returned twelve members to the legislature. The attempts of Hödel (May 1878) and Nobiling (June 1878) to assassinate the Emperor have been taken advantage of to bring forward a measure for the suppression of all Socialist journals, pamphlets, and meetings, by summary process, and while the parliamentary elections are pending (July 1878) Socialists are being prosecuted by hundreds. A correspondence which passed between Pope Leo XIII. and the Crown Prince (June 1878) only demonstrated the hopelessness of any attempt at reconciliation between the Vatican and the Empire. P. preserved strict neutrality during the recent Russo-Turkish war, but the final settlement of the Eastern Question was effected at Berlin by the Congress which was presided over by Prince Bismarck, and which concluded its labours 13th July 1878.

See Voigt, *Geschichte Pr.'s bis zum Untergange der Herrschaft des Deutschen Ordens* (9 vols. 1827-39); Lancizolle, *Geschichte der Bildung des Preuss. Staates* (1828); Stenzel, *Geschichte* (5 vols. 1830-54); Manso, *Geschichte vom Frieden zu Hubertusburg bis zum Zweiten Pariser Frieden* (3 vols. 1835); Droysen, *Geschichte der Preuss. Politik* (4 parts, 1855-72), and *Friedrich der Grosse* (8th vol. of a series tracing the rise of the House of Brandenburg, 1874); Von Cosel, *Des Preuss. Staates und Volkes unter den Hohenz. Fürsten* (8 vols. 1869-76); Ebertz, *Des Preuss. Staates* (7 vols. 1867-73); Ranke, *Zwölf Bücher Preuss. Geschichte* (5 vols. 1874); *Genesis des Preuss. Staates* (1874), and *Zwei Biographien—Friedrich der Grosse: Friedrich Wilhelm der Vierte* (1878).

Prussia (*Gr. Preussen*), the largest and most north-easterly province in the kingdom of P., bounded N. by the Baltic, E. by Russia, S. by Russian Poland and Posen, and W. by Pommern and Brandenburg. Area, 24,880 sq. miles; pop. (1875) 3,199,171. It consists of the two former provinces (now administrative districts) of *Ost- and West-preussen*, and is mainly level land, interspersed with tracts of sandy heath and bleak morass. The coast-line is indented by the Gulf of Danzig, the Frische Haff and Kurische Haff, and the chief rivers are the Niemen, Pregel, and Vistula. Of the whole area the percentage of arable land is 48, of

forest 19, and of meadow and pasture 20. The principal crops are wheat, rye, barley, and flax. While cattle and sheep are bred extensively, special attention is devoted to the rearing of horses, of which the province possessed 541,510 in 1873. The industries, which are considerable, include brandy distilling, beer brewing, the spinning and weaving of linen, corn and oil-seed milling, iron smelting, engineering, &c. In 1874 there entered the ports 7237 trading vessels of 1,305,084 tons, and cleared 7144 of 1,288,935 tons. The largest towns are Königsberg, Danzig, Elbing, Tilsit, Memel, Thorn, Insterburg, Graudenz, and Braunsberg. The people, of whom two-thirds are German, comprise 2,202,913 Lutherans, 874,579 Roman Catholics, 41,057 Jews, 11,683 Mennonites, and 4682 Baptists.

Prussian Blue is a deep blue precipitate obtained by adding to prussic or hydrocyanic acid a slight excess of potash, then a mixture of ferrous and ferric sulphate, and finally treating the mixed precipitate of ferric and ferrous oxides, which results with hydrochloric acid. Its formula is Fe_3FeCy_6 . It also results from the action of the ferrocyanide of potassium upon ferric chloride, and forms, therefore, a useful analytical test for ferric salts.

Prussic Acid is the popular name of hydrocyanic acid. Its formula is HCN; but in discussing the cyanogen compounds, of which this is the type, the radical CN is written ordinarily Cy. The acid is intensely poisonous, and is very volatile, boiling at $26^\circ.5$ C. It cannot be formed by direct union of its elements, but is usually obtained diluted by the action of sulphuric acid upon the cyanide of potassium. See CYANOGEN.

Pruth, a tributary of the Danube, rises near Mount Rusky, in the Carpathian mountains, in Austrian Galicia, and flows S. and S.E. in a narrow valley through the Bukowina, almost parallel with the Sereth, joining the Danube at Reni, 12 miles below Galatz. It forms the boundary between Moldavia and Russia from Bojana for about 130 miles, and receives on the right the Czeremosz. Near its influx into the Danube it forms the Bratysch Lake. The P. becomes navigable at Jassy, and has a total length of 390 miles.

Frynne, William, the Puritan confessor, was born at Swainswick, Somersetshire, in 1600, and in 1616 proceeded from Bath Grammar-school to Oriel College, Oxford. After taking his B.A. (1620), he entered Lincoln's Inn, where he formed a close friendship with the schismatical Dr. Preston, and wrote his *Perpetuitie of a Regenerate Man's Estate* (1627), *Vn-louelinsse of Lowe Lockes* (1628), *Healthes Sickness, or a Compendious and Briefe Discourse prouing the drinking and pledging of Healthes to be sinfull and utterly vnlawfull vnto Christians* (1628), and other anti-Arminian treatises. The first of these Laud contented himself 'with burning in private, without any sentence passed against it;' but at length the four words, 'Women actors notorious harlots,' occurring on p. 1104 of the *Histrio-Mastix, the Player's Scourge, or Actor's Tragadie* (1633), were construed, with an odd compliment to the queen, into a necessary reflection on her virtue. For this libel and other railings against stage-plays, huntings, 'devil's Christmas,' bonfires, Maypoles, 'cringing and ducking to altars,' and church music, which P. described as 'a bleating of brute beasts, where choristers bellow the tenor as it were oxen, bark a counterpoint as a kennel of dogs, roar out a treble like a set of bulls, grunt out a bass as it were a number of hogs,' he stood arraigned in the Star Chamber, February 7, 1633, and was sentenced to have his book burnt by the common hangman, to stand twice in the pillory and lose both his ears, to be put from the bar and degraded in the university, to pay £5000, and to suffer perpetual imprisonment. Four years after the infliction of this punishment, P. was again brought up with two others, Burton and Bastwick, to answer for fresh libels, when, to a repetition of his former sentence ('involving,' says Kennet, 'a cropping of the very remainder of ears'), was added the clause 'that he be stigmatised on the cheeks with two letters, S. and L., for Seditious Libeller,' but which P. interpreted as *stigmata Laudis*—the stamps of Laud. The account in Howell of how he, Burton, and Bastwick were, on June 30, 1637, pilloried and curtalised like curs, is as pitiful as anything contained in Foxe or Challoner. From the castle of Mont-Orgueil, in Jersey, whither he had been shifted from Caernarvon, P. in 1641 addressed a petition to the House of Commons, which resulted in the reversal of both sentences and in his triumphal return to London, in time 'to strike proud Canterbury to the heart.' Of the £4000 voted him as compen-

sation, he never received a farthing, but he was returned by Newport to the Long Parliament, and created Recorder of Bath (1647). He got on, however, no better with the new than the old regime, and, 'rankled with a contrary heat,' was again imprisoned in 1650 and 1652, in the latter year being also deprived of his recordership. After the Restoration, which he had zealously promoted in the Convention Parliament, Charles II. proposed 'to keep busy Mr. P. quiet by letting him write against the Catholics, and pore over the records in the Tower,' with whose keepership he was accordingly intrusted. In July 1661 he for the last time incurred the censure of the House for a seditious libel, being *Sundry Reasons against the Corporations Bill*, and, having no longer stomach for the fight, thenceforth employed himself 'in clearing the Augean stable of our national antiquities' down to his death at Lincoln's Inn, October 24, 1669. 'Voluminous P.,' as Wood happily styles him, well earned the epithet by some 200 treatises, bristling with squadrons of authorities. A little over-parted in the great drama of his times, he played with wearisome painstaking and stubborn boldness, and the single light feature in his character is an occasional touch of cunning. See vol. iii. of *Howell's State Trials*, and *Documents relating to William P., with a Biographical Fragment by the late John Bruce* (edited by S. R. Gardiner for the Camden Society, 1877).

Przemysl, one of the oldest towns of Galicia, kingdom of Austria, on the San, an affluent of the Vistula, 55 miles W. of Lemberg by rail. It has several fine Gothic churches, and a ruined castle of the princes of P., who ruled a great Russian principality of that name. There are linen and leather industries. Pop. (1870) 15,185.

Przi'bram, a town of Austria, in Bohemia, on the Litawka, an affluent of the Moldau, 35 miles S.S.W. of Prague. It is the seat of a mining school, and in the vicinity are silver mines, the yield of which amounts to from £2000 to £2500 yearly. Pop. (1870) 9825.

Psalmana'zar, George, the name assumed by a notorious impostor, supposed to have been born in the South of France in 1679. After receiving a good education from the Jesuits, and holding a tutorship at Avignon, he commenced a vagabond life, now as an Irish pilgrim, now as a native of Formosa. In the latter character he met at Sluys one Innes, a knavish army chaplain, who, hoping thereby to advance his own preferment, baptized the soi-disant heathen, and brought him to London. Here P. found a patron in Bishop Compton, for whom he wrote a *History and Description of Formosa off the Coast of China* (1704), with maps of the island and copious specimens of the Formosan language, and by whom he was sent to Oxford to complete his studies. Detection or repentance led him in his thirty-second year to abandon the cheat, and he turned hack-writer, leading thenceforward a sober, studious life, which earned him Johnson's praises as a modest, pious, and amiable man. He died in London, May 3, 1763, leaving behind him an *Essay on Miracles by a Layman* (1793), and *Memoir of ———, commonly known as George P., a reputed Native of Formosa* (1764).

Psal'mody is the act or the art of singing religious songs in the worship of the Deity, coeval with society itself. Prizes were given at the Pythian Games in Greece to those who sang the best hymns to the gods. Julian the Apostate said the best hymns to the gods were composed by the gods themselves, or by men inspired by a divine spirit. And among the ancient Egyptians a chief part of their worship consisted of singing hymns to the gods. The name of P. is derived from the Psalms or sacred songs of the Hebrews, who are supposed to have derived their music from Chaldea. The Book of Psalms (q. v.) was the hymn-book of the second temple.

In the Christian Church, singing formed a part of divine service from the very first. The Psalms were sung (1) sometimes by one person alone; (2) sometimes by the whole congregation, led by a precentor; (3) sometimes alternately, by the congregation divided into choirs; (4) sometimes by one person singing one part of the verse and the rest joining in the close of it. As to the mode of singing, it was of two kinds: plain song, something like intoning, and a more artificial mode, with a variety of notes. The first to place P. on a popular footing was St. Ambrose (340-397), who partially introduced the Greek musical

system into the Church. But Pope Gregory the Great (540-604) is regarded as the actual composer and organiser of modern P., as well as the author of a regular system of music.

P. was a universal characteristic of the Reformation. Indeed the Lollards (q. v.), precursors of the Reformation in the 14th c., seem to have received their name from their constant practice of praising God with psalms or hymns. A great impetus was given to P. when the Psalms were rendered into verse, which was first done in the 16th c. by Marot (q. v.), the court-poet of France, who thereby unintentionally helped forward the Reformation. Sternhold published a metrical version of fifty-one psalms in 1549, and the remainder were translated by Hopkins, Whittinghame, &c. This version was supplanted in England about the beginning of the 18th c. by one made by Tate and Brady, and in Scotland about the middle of the 17th c. by one made by Rous. Among the Presbyterians of Scotland no hymns, chanting of the prose psalms, or anything but the metrical psalms, was permitted in P. till very recently.

Psalms, Book of, in the Hebrew canon is a collection of 150 songs of a religious character. The Greek *Psalmos* (a lyric poem) corresponds to the Hebrew title *mismor*, which occurs in the superscription of a number. In that of others the name is *shir* (song), and the title of the book is *Tehillim* (songs of praise). The whole collection is divided, perhaps in imitation of the five-fold division of the Pentateuch, into five books, ending with (1) xli., (2) lxxii., (3) lxxxix., (4) cvi., and (5) cl. The first four are closed with a doxology—'Blessed be the Lord,' &c. (cf. xli. 13). The traditional view regarding the authorship of the P. is that they were all written by David, but the superscriptions of a number of them name other persons as their authors. Some critics, indeed, hold that no reliance is to be placed on the superscriptions as a clue to the authorship, since they are not authentic. Taking the superscriptions, however, for what they are worth, one psalm is ascribed to Moses, seventy-three to David, two to Solomon, twelve to Asaph (called a seer or prophet, 2 Chron. xxix. 30), eleven to the sons of Korah (a family of servants of the Temple, 1 Chron. ix. 19), one (lxxxviii.) to Heman the Ezrahite, a son of Korah (1 Chron. vi. 33), to whom it is also ascribed, one to Ethan the Ezrahite (1 Kings iv. 31), and forty-nine are anonymous. The collection bears every appearance of having been formed gradually. By the best authorities it is thought that the first two books (i.-lxxii.) were compiled before the Captivity, and that the whole was completed by Nehemiah. Taken as a whole, these P. are the most wonderful expression of religious emotion that literature can show. There is not a height of rapture nor a depth of agony which they do not reach. The variety and richness of their sentiment, including every phase of hope, joy, fear, grief, faith, reverence, and gratitude that can move the human heart in its relations to God, make them, next to the words of our Lord himself, the most precious heritage of the Christian Church; nor is it conceivable that a day will ever come when they will cease to be a light to the feet and a lamp to the path, or will fail to pour balm into wounded hearts, give rest to weary souls, and inspire with heavenly faith those that are walking through the valley of the shadow of death. See Bleek's *Einleitung in d. A. T.* (Eng. trans. 1869). The best commentaries are, in Latin, Calvin's (Gen. 1578); in English, Horne's (Oxf. 1771), Perowne's (Lond. 1860); in German, Hitzig's (Heidel. 1836; new ed. 1865), De Wette's (Heidel. 1836; new ed. 1856), Ewald's (Gött. new ed. 1866), Olshausen's (Leips. 1853), Hupfeld's (Gotha, 1855), Delitzsch's (Erl. new ed. 1867; Eng. trans. Edinb. 1873).

Psammēt'ichus (hieroglyphic *Psmtk*), King of Egypt from 671 to 617 B.C., was the founder of the Saitic dynasty (the twenty-sixth of Manetho). On his father Necho being put to death by Sabacon, the Ethiopian usurper, P. fled to Syria, where he remained till restored by the inhabitants of the Saitic district. Here he reigned as one of the *Dodecarchy*, or federation of twelve kings, who after Setho's death ruled Egypt in common, until, according to Diodorus, P. having acquired vast wealth by trade with the Phœnicians and Greeks, was enabled to raise a large force of Arabian, Carian, and Ionian mercenaries, and with them totally defeat all his rivals at Momemphis (about 652). Hence he assigned to the Greek soldiers a settlement below Bubastis, making a number of Egyptian children live with them, who thus learned Greek, and from whom sprang the class of interpreters. To the Greeks, too, he gave the

place of honour on the right wing, as in his Syrian expedition. Indignant at this, 240,000 of the Egyptian soldiers left Egypt, and founded in Ethiopia the kingdom of the Automoli (deserters). P., after a siege of twenty-nine years, took Azotus from the Syrians, and by large presents averted a Syrian invasion (626 B.C.). He first gave free access into Egypt to foreign traders and emigrants, e.g., the Jews (Isa. xix. 18, Jer. xlv. 1), encouraging especially the Greeks, by opening to them the west branch of the Nile, and forming an alliance with Athens. P. courted the priesthood, building many sacred edifices—e.g., the propylæa of the temple of Vulcan, and the aula and portico before the temple of Apis at Memphis. Sculpture, too, was revived, and learning, especially the study of languages, was vigorously promoted, and a new style of handwriting, the demotic, was introduced.

Psaid'ium. See GUAVA.

Psitta'oides. See PARROT.

Pskov, or **Pleskov**, a government of European Russia, surrounded by the governments of St. Petersburg, Novgorod, Tver, Smolensk, Vitebsk, and Livonia. Area, 17,069 sq. miles; pop. (1870) 717,186 (10,000 Esthonians). P. is an undulating plain, watered by the Velikaia and Lovat, the surface being generally flat and sandy, with here and there hills and swamps. The climate is temperate. About one-third of P. is forest, and one-half is under cultivation, the chief product being flax.—P., the chief town, on the Velikaia, 178 miles S.S.W. of St. Petersburg by rail, is well built, with broad streets and strong walls. The finest buildings are the Kremlin, the Cathedral, the Government Buildings, and the Priests' College. P. is the seat of a Greek archbishop, and has forty-two churches and four monasteries. Russia leather, linens, and sailcloth are manufactured, and there is a large trade with Narva and St. Petersburg. At the close of the Middle Ages P. was connected with the Hansa, and had a pop. of 60,000. From 1509 it has belonged to the Russian Empire. Pop. (1870) 18,331.

Psoral'ea is a large genus of shrubby or herbaceous *Leguminosæ* of somewhat variable habit. They have pinnate or tripartite leaves; blue, white, or purple flowers in spikes or racemes, and one-seeded pods. *P. esculenta* of N. America possesses tuberous farinaceous roots, which are much used by the Indians for food, and bear the name of 'prairie turnips.' In Chili the foliage of *P. glandulosa* is infused as a medicinal tea, and the root employed as an emetic, &c. Seeds of the E. Indian *P. corylifolia* are rubifacient, and are specific for leucoderma; the pods yield an oil. P. is predominant in America and Cape of Good Hope. Its name, from Gr. *psoraleos*, 'scurvy,' has reference to a sort of glandular coating of many of the species.

Psori'asis (Gr. *psora*, 'a cutaneous eruption'), is a common chronic skin eruption, characterised by thickened patches of skin varying in size, covered by silvery scales, and with a red base. In the ordinary non-syphilitic P. the patches are situated chiefly on the outer sides of the limbs, the elbows, and the knees. There are several forms of P., as *P. guttata*, in which the patches are very small, as if they had been dropped or dredged on the skin. When the patches assume a circular shape it is termed *P. diffusa*, and when peculiarly obstinate *P. inveterata*. The causes of P. are very obscure, and although non-contagious, it is often hereditary. It is common to both sexes, all ages, and every condition of life, although it is more frequent in middle and advanced life than in childhood. The treatment consists in the administration of saline purgatives, a vegetable and milk diet, and abstinence from all stimulants; a warm bath should be taken daily. In the syphilitic variety, mercury in some form is necessary, and when the eruption is secondary, a rapid cure may be effected by fumigation. In non-syphilitic cases the best remedy is arsenic, which should be given till the physiological effects appear; or arsenic may be given in combination with mercury, as in Donovan's solution. Tar capsules have also been given with advantage. Tar in some form is the best local application, as the *unguentum picis*, or the Barbadoes tar. Sulphur and vapour baths are also often useful.

Psy'che, in Homer means the departed spirit or ghost—the immortal part of man; from the time of Herodotus it is used to denote the soul *in* man, but the idea is first personified in Appuleius (q. v.). He tells us that a certain king had three

daughters, of whom P., the youngest, was very beautiful. To her were dedicated some of the altars of Venus, and this so excited the wrath of the goddess that she commanded Cupid to inspire her with love for a monster. But Cupid, becoming himself enamoured of her, bore her to a secret spot, where he visited her every night. Being told by her sisters that in the darkness she was nightly embracing some loathsome creature, P. at one of Cupid's visits lighted a lamp and beheld his beauty. A drop of hot oil from the lamp fell on Cupid's shoulder, and he fled with reproaches. P. then tried to destroy herself, and at last Venus entranced her with a sleep brought from Hades. Thus she slumbered until Cupid returned and touched her with the point of an arrow. Venus was reconciled, and Jove united the lovely pair.

Psychology is the science of mind based upon the facts of consciousness. The name first appeared in modern philosophy in the work of Goclenius entitled *Psychologia* (Marb. 1594). P. has been divided into empirical P. and rational P. The former has to do with the phenomena of consciousness; the latter with the nature of the soul. P. is in the present day mainly studied through physiology, the correlation of mind and brain chiefly engaging attention. See MIND, PERCEPTION, &c.

Ptarmigan (*Lagopus vulgaris*), a species of *Rasorial* birds belonging to the family *Tetraonidae*. The genus *Lagopus* also



Ptarmigan.

includes the Red Grouse (*L. Scoticus*), and is distinguished by having the legs and tarsi fully feathered. The P. is the smallest of British grouse. It occurs also in N. Europe, and is notable for the remarkable change in colour which its plumage undergoes in winter. In the latter season it is nearly all white; in summer its plumage becomes mottled with grey and black, so as to produce a colour which perfectly hides the bird from view, harmonising exactly with the tints of the stones and ground where it lives. The adult P. attains a length of 15 or 16 inches.

Pterichthys (Gr. 'winged fish'), a well-known genus of fossil Ganoid fishes belonging to the Old Red Sandstone series, and confined to Devonian rocks. They were first discovered by Hugh Miller, after whom the most familiar species (*P. Milleri*) is named. Other species are *P. cornutus*, *P. latus*, &c. The P. presents a highly typical arrangement of the ganoid covering. The head and front part of the body were covered with great bony plates, whilst a back-plate and breast-plate also formed a buckler-like shield. These ganoid plates were firmly united by sutures. The tail was also covered with ganoid scales of smaller size. A dorsal fin of small size was developed, and the tail-fin, as in all ganoids, was *heterocercal* or unequally lobed. The ventral fins were small, but the pectorals were large, and have given origin to the name 'P.' They consisted of a strong jointed process, covered with small scales, and according to Owen they must have been used in enabling the P. to shuffle along the sandy bottom or sea-beach left dry by the receding tide. The teeth were small.

Pterocles. See GANGA.

Pterodactyl (Gr. 'wing-finger'), a genus of extinct *Reptilia*, forming the type of the order *Pterosauria*, and named from the extreme length of the outermost of the fingers, which formed a support for a *Patagium* (q. v.), or *wing-membrane*. This patagium consisted (like that of the bats) of an expansion of the skin of the body, and stretched from the finger along the sides of the body to the hind limbs, and between the hind limbs and tail. The P. was enabled by this membrane to support itself in the air, and to fly as perfectly as the existent bat. No living reptiles have a true power of flight. The little *Draco volans*, or flying dragon of the E. Archipelago, has a parachute-like expansion of the skin in the front region of its body, supported on several of the anterior ribs; but this membrane does not invest the reptile with powers

of flight, and merely serves to support it in its flying leaps from tree to tree. The P. remains occur in Mesozoic rocks, and are found from the Lower Lias to the Middle Cretaceous rocks inclusive. The lithographic slates (or Oolite) of Solenhofen in Bavaria contain P. remains in great abundance. Most P. are of small size, but some specimens must have measured over 20 feet in expanse of wing. *P. crassirostris*, *P. longirostris*, *P. medius*, &c., are familiar species. No outer skeleton of scales existed in these animals. Their jaws were long, and were provided with teeth. The bones were pneumatic or contained air, and the breast-bone bore a medium ridge keel to which the great pectoral or wing-muscles were attached. The coracoid bones of the shoulder were of large size, and the collar-bones were undeveloped.

Pteromys. See FLYING SQUIRREL.

Pteropoda (Gr. 'wing-footed'), a small class of *Mollusca*, closely allied to the *Gasteropoda* (q. v.). They are represented by certain small organisms of oceanic habits found chiefly in the Arctic Seas. They are popularly known as 'sea-butterflies,' and appear to approach the surface of the ocean chiefly at night. The genera *Clio* ('Whales' food'), *Hyalæa*, and *Cleodora*, include the best-known genus of this group. The shell when present is a delicate vitreous body of conical shape. The gills may be imperfectly developed. Their characteristic name is derived from the possession of two wing-like appendages or *epipodia*, borne on the sides of the neck, and by the movements by which they swim through the sea. They occur in such numbers in the Arctic Seas that they appear to form the chief food of the Greenland whale, which draws them in shoals into its mouth, where they are retained by the *baleen* or whalebone plates. In their development they pass through stages identical with the early stages of *Gasteropod* development. The adult *Pteropod* is, in fact, an immature *Gasteropod*.

Pteropus. See KALONG BAT.

Pterosauria (Gr. 'winged lizard'), an order of extinct reptiles represented by the *Pterodactyl* (q. v.), &c., and which possessed powers of flight. Their fossil remains are limited to Mesozoic rocks. The chief genera besides the *Pterodactyl* are *Ramphorhynchus*, which had no teeth in the front of either jaw, and *Dimorphodon*, which had large well-developed front teeth. The tail in the latter genus was probably abortive; that of *Ramphorhynchus* was long and slender.

Pterygotus (Gr. 'wing-shaped'), a well-known fossil genus of *Crustaceans* belonging to the order *Euryptera*. *P. anglicus* attained a length of 6 feet. Its remains occur in rocks ranging from the Upper Silurian to the Upper Devonian. The front part of the body was covered by a carapace; two large compound eyes, and small single eyes were developed, and five pairs of legs were present. Thirteen segments succeeded the head, and the *telson* or tail-segment was frequently spinous. These extinct *Crustaceans* appear to be related to the living *Limuli* or King Crabs.

Ptolemaic System is the system of astronomy which was generally accepted by astronomers after the time of Ptolemy (q. v.). How much of the system is really Ptolemy's it is hard to say; but to him we owe its explanation, and probably much of its development and elaboration. The earth was supposed fixed in the centre of a huge sphere, the *primum mobile*, which carried the heavenly bodies along with it in its daily revolution. The annual motion of the sun and the monthly motion of the moon were accounted for by supposing these luminaries to travel in eccentric circles round the earth. The necessity for this was previously pointed out by Hipparchus. To explain the planetary motions, other complexities had to be introduced. Each planet was supposed to move uniformly in a circle (*epicycle*) round a point, which itself moved uniformly in an eccentric circle round the earth. Every planet required its own peculiar epicycle, and as observational astronomy advanced, new modifications and contrivances had to be introduced. The system, though cumbersome compared to the Newtonian system, is not to be regarded merely as a vain attempt to reduce all motion to uniform circular motion—the *perfect* motion of the ancients. It was an ingenious method for forecasting the positions of the planets. It was sufficiently accurate for the times, and abounded in beautiful geometrical applications. Even Copernicus had to introduce epicycles

into his system, when it became evident that assumed circular motion gave results not even approximately true. The Copernican system as first promulgated was hardly a logical refutation of the P. S.; an acute partisan of the latter could easily have held his own against a supporter of the former. The discoveries of Galileo, however, were irresistible to the candid mind, and the labours of Kepler and Newton secured the doom of the doctrine of the fixed central earth.

Ptolemaïs. See **ACRE**.

Ptolemy I. (Ptolemaios), surnamed **Soter** ('the Saviour'), born 367 B.C., was the son of Arsinoë, mistress of Philip of Macedon. He was the reputed son of Lagus, a man of humble rank, although Philip was probably his father. He became a great favourite at court, and a confidant of Alexander; but for encouraging the prince to seek in marriage the daughter of Pixodarus, King of Caria, Philip sent him into exile. Recalled by Alexander in 336, he followed that monarch through all his campaigns. At the death of Alexander, when his generals divided the empire among themselves, P. became governor of Egypt, and put to death Cleomenes, the former satrap. He had now to make sure his ground against Perdiccas, an old colleague. A war broke out in 321, and Perdiccas was slain. Marrying Eurydice, daughter of the regent Antipater, P. next seized Phœnicia and Coele-Syria, and took possession of Jerusalem on a Sabbath. In subsequent struggles with Antigonus, the most powerful of Alexander's generals, he lost Phœnicia in 311, and Cyprus in the memorable sea-fight near Salamis in 306. Antigonus proclaimed himself king, and P. followed his example. For enabling Rhodes to withstand the attack of Demetrius, son of Antigonus, the Rhodians bestowed on P. the title of Saviour. On the death of Antigonus in 301, the struggle for mastery ceased. Syria, Palestine, and Cyprus fell under Egyptian sway, and the rest of P.'s reign was peaceful. He governed in a liberal spirit, restored to the Egyptians the rights of their castes and priesthoods, and fixed his capital at Memphis. He laid the foundation of Egypt's prosperity, and made Alexandria the first commercial city in the world. He likewise encouraged letters, and in his palace could have been found the great Euclid, Stilpo the Megærean, Theodorus the Cyrenian, Diodorus Cronus, Philetas the poet, and Zenodotus the grammarian. He corresponded with Menander, and Antiphilus and Apelles painted for him. In 285 he announced that he had ceased to reign, and that his throne passed to his youngest son. The young king was hailed with enthusiasm, his elder brothers appearing at the coronation. The father died in 283.—**Ptolemy II.**, surnamed **Philadelphus**, the youngest son of the preceding and Berenice, was born in the island of Cos, 309 B.C. He had been educated with care, and developed his father's enlightened policy. But in order to secure his throne he put two of his brothers to death, an act which, some suppose, gained him the derisive name of Philadelphus. Others say that the title arose from his great affection for his sister Arsinoë, whom he married, after repudiating his first wife. He cleared Egypt of robbers, established traffic with tribes in Ethiopia, opened Southern Africa to Alexandrian merchants, constructed ports, and dug canals. He built and furnished magnificent museums, and gathered all the literary treasures procurable into the great Alexandrian Library, of which Zenodotus and the poet Callimachus were the first librarians. His court was the rendezvous of all men of talent. According to an ancient though long-discredited belief, the Septuagint (q. v.) or Greek version of the Hebrew Scriptures was drawn up at his command for the sake of the Alexandrian Jews. He built the celebrated lighthouse on the island of Pharos, and removed the ashes of Alexander to a magnificent mausoleum. He maintained a standing army of 200,000 foot soldiers and 40,000 cavalry, and a fleet of 15,000 vessels. He died 247, leaving colonies in various parts of his dominions, which comprised Coele-Syria, Palestine, Cyprus, Lycia, Caria, the Cyclades, portions of Ethiopia, Arabia, and Syria.—**P. III.**, surnamed **Euergetes** ('benefactor'), eldest son of the preceding, came to the throne in 247 B.C. To avenge the murder of his sister Berenice, wife of Antiochus III., King of Syria, he marched to Antioch, ravaged Syria, and conquered Babylonia and Mesopotamia. He returned with immense booty, and restored to the Egyptians the idols Cambyses had carried off. By this act he earned the title of Benefactor. Polybius says he died a natural death in 222, but Justin says that he was

poisoned by his son and successor.—**P. IV.**, son of the preceding, was born 242 B.C. He was surnamed **Philopator** ('lover of his father'), some say derisively, on account of his parricide, but this can hardly be, as he adopted the name on his medals. He commenced to reign in 222, putting to death his mother Berenice, his brother Magas, and his uncle Lysimachus. His minister Sosibius instigated him to these and many other crimes, and, enfeebling his master by all sorts of debauchery, obtained all but the name of king. Roused by the success of Antiochus the Great, who threatened an invasion of Egypt, P. sent an army and a fleet against the Syrians in 218. These were defeated; but in the following year he commanded in person, and completely routed Antiochus at Raphia. Returning by way of Jerusalem, and being refused admittance into the sanctuary, he conceived a deadly hatred of the Jews, depriving those in Alexandria of all their privileges, and even persecuting them. Relapsing into a vicious life, he left the power in the hands of Sosibius and Agathocles, brother of his mistress. These men governed so badly that the Egyptians revolted. During this reign Egypt greatly deteriorated, and it was a day of joy when the king died, in 205.—**P. V.**, surnamed **Epiphanes** ('illustrious'), born about 210 B.C., was placed on the throne at the age of five. During his minority the power fell into the hands, first of Agathocles, and next of Sosibius, son of Sosibius mentioned above, and finally of Tlepolemos, a brave soldier but a poor statesman. Philip, King of Macedon, and Antiochus III., King of Syria, took advantage of P.'s youth to regain their conquered possessions. Philip reclaimed the Cyclades and the maritime towns of Thrace, while Antiochus obtained Coele-Syria. At the intervention of the Romans a treaty was formed by which P. was to marry Cleopatra, daughter of Antiochus, and recover the Syrian provinces (199). Aristomenus became Egyptian prime minister, and the king was invested with full power (196). The coronation, which took place at Anactaria, gave rise to the inscription on the celebrated stone of Rosetta, the key to all hieroglyphs. For some time his reign was singularly peaceful, but, disregarding the wise counsels of Aristomenes, whom he caused to be put to death, he fell into habits of debauchery, and was poisoned in his thirtieth year.—**P. VI.**, surnamed **Philometor** ('lover of his mother'), eldest son of the preceding, ascended the throne in 181 B.C. He was then a minor, and his mother Cleopatra governed Egypt. After her death the power passed into the hands of two incapable ministers, Euiæus and Lenæus, who rashly engaged in a war with the King of Syria. The King of Syria defeated the Egyptians, and gained possession of P., upon which his younger brother was appointed at Alexandria to succeed him. But the King of Syria allowed Philometor to reign at Memphis, leaving the brother, Euergetes, at Alexandria. Euergetes at length drove Philometor from Memphis, and caused him to appeal to the Romans. At Rome he was received with honours, and an embassy which returned with him arranged that he should govern in Egypt, while Euergetes obtained Cyrene. Euergetes soon laid hold upon Cyprus also, and in this attempt the Romans to a small extent assisted him. He was taken prisoner at Lapethus, but liberated on condition that he contented himself with Cyrene. Then P. turned his arms against Demetrius Soter, King of Syria, in favour of the pretensions of Alexander Balas. He succeeded in placing this man on the throne, and gave him his daughter Cleopatra in marriage. Alexander was so little grateful as to connive at an attempted assassination of his father-in-law, and P. dragged him from the throne, took back his daughter, and made the son of Demetrius King of Syria. Alexander again struggled for the throne. In a battle between Alexander's forces and the Egyptians, P. fell from his horse and sustained such injuries that he died (146). It is said of this king that his humanity was great, and that he never put an Alexandrian to death for any offence.—**P. VII.**, surnamed **Euergetes II.**, or **Physcon** ('pot-bellied'), brother of the preceding, was raised to the throne in 146 B.C. He married his sister Cleopatra, widow of Philometor. His reign was one of cruelty and bloodshed. His conduct towards the Alexandrians was so bad that large numbers of them emigrated, and certain quarters of the town had to be peopled with foreigners. The incests and cruelties of the king were so outrageous that he was driven to Cyprus by his exasperated subjects, and only returned on suffrance in 127. He died ten years after his restoration. His single virtue was a

love of letters, and he left a set of Commentaries (*Hypomnemata*) which is lost to us. There were as many as thirteen of the P. dynasty.

Ptolemy, properly **Claudius Ptolemæus**, the mathematician, astronomer, and geographer, lived at Alexandria, Egypt, during the early part of the 1st c. of the Christian era. We know him only through his writings, the importance of which in the history of science cannot be over-estimated. In how far his works are original or simply collections of what had been made out before his time, it is impossible to say. He himself expressly states that he largely availed himself of the work of his predecessors, especially of Hipparchus. Indeed it is from his *Almagest* that we gain most of our knowledge regarding the discoveries of Hipparchus. This work contains all that was then known of astronomy. The theory which it advocates is noticed under **PTOLEMAIC SYSTEM**. The great discoveries of Hipparchus (q. v.) are supplemented by the discovery of the evection of the moon, the disentangling of which from the other lunar inequalities is the greatest triumph of ancient astronomy. The discovery was made by P. from the recorded observations of Hipparchus. There is little doubt that P., though a splendid mathematician, was a bad observer; but it is to his credit that he was the first, after a lapse of more than 200 years, who could appreciate the labours of Hipparchus. The 7th and 8th books of the *Almagest* are the most interesting to the modern astronomer, giving the longitudes and latitudes of 1022 stars. His great geographical work—*Geographike Hyphegesis*—was the standard treatise on the subject till the maritime discoveries of the 15th c. disclosed its deficiencies. He gives an estimation of the size of the earth, introduces an improved method of projecting a hemisphere upon a plane surface, and fixes all his places by latitude and longitude. There are other works ascribed to him bearing upon astrological subjects and upon the phenomena of the fixed stars; but his fame lives in his valuable treatises on astronomy and geography. He is the one authority among the ancients upon these subjects. The best edition of the *Almagest* is by Halma (Par. 1813-20). The catalogue of stars was published separately by Francis Baily in the *Memoirs of the Royal Astronomical Society* (1843). The best editions of the Geography are the *editio princeps* of the Greek text by Erasmus (1533), the Elzevir edition (1619), and the Latin versions of 1482 and 1490.

Pto'sis (Gr. 'a falling') signifies a drooping or falling of the upper eyelid, which may be the result of injury or of paralysis of the levator-palpebræ muscle. When P. is caused by paralysis it may be cured by treatment of the nervous affection on which the paralysis depends; but when this fails a surgical operation may be required to reopen the eye, and restore its power of vision.

Ptychodus, a fossil genus of *Elasmobranchiate* fishes allied to the Port Jackson Shark (*Cestracion Philippi*). Its remains occur in the Cretaceous rocks alone. The teeth were quadrate in shape, and had their summits thrown into folds or ridges of transverse shape.

Publicani (Lat. *publicum*, 'all that belong to the state'), were the farmers of the revenue of the Roman state, which never collected its own taxes, but sold them by auction through the censors. A company (*socii, societas, corpus*) of wealthy Roman citizens, never freedmen or slaves, bought up for a definite sum one, rarely more, of the provincial taxes, such as tolls, tithes, harbour dues, scriptura or rent of the state pastures, duties for the use of mines and salt works, &c., giving security for payment, and then collected the taxes for their own benefit. The usual lease was for five years (*lustrum*); from the time of Constantine only three. The responsible person in each company who contracted with the state was called *manceps*, the chief agent at Rome, annually elected, *magister*, and his representative in the provinces, *sub magistro* (of Luke xix. 2). The underlings, often freedmen and slaves, who collected the taxes, behaved usually with shocking fraud and rapacity. Such were the 'publicans' of the New Testament. As early as the Second Punic War, after the battle of Cannæ, we read of the P. accompanying the state with loans; about fifty years later the companies included almost none but Equites (q. v.), who had almost all the public revenue in their hands, served as a public bank, and were justly regarded as the very foundation of the state.

Public Burdens, a term of Scotch law denoting the taxes and assessments upon land. They fall on the landlord, when there is no stipulation to the contrary, except the schoolmaster's salary, which is equally divided between landlord and tenant.

Public Health Act (38 and 39 Vict. c. 55). This important Act, which became law on the 11th of August 1875, repeals and embodies the Public Health Acts, the Local Government Act, the Nuisance Removal Acts, the Sanitary Acts, the Sewage Utilisation Acts, and Diseases' Prevention Act, either entirely or partially, as detailed in the first and second parts of the fifth schedule of the Act. It does not extend to Scotland or Ireland, nor to the metropolis, except where expressly stated. It contains 343 sections, and is divided into eleven parts as follows:—I. *Preliminary*, is almost entirely composed of definitions and titles. II. *Authorities for Execution of the Act*, provides for the division of the whole of England into rural and urban sanitary districts, describes the authorities, and defines their powers. III. *Sewerage and Drainage*, provides authorities with the necessary powers for constructing sewers and dealing with sewage, and confers on local authorities powers to enforce drainage where necessary. It enacts penalties for building houses without necessary accommodation; provides for the scavenging and cleansing of streets, the removal of filth, and the purification of houses. It provides for the supply, storing, and protection of water; regulates lodging-houses; defines nuisances; forbids the establishment of unhealthy trades in urban districts; the traffic in unhealthy or unsound meat; and contains provisions as to the prevention of infectious and epidemic diseases, and the establishment of hospitals and mortuaries. IV. *Local Government Provisions*, relates entirely to urban districts, and regulates matters concerning highways, streets, buildings, markets, public pleasure-grounds, and police. V. *General Provisions*, deals with contracts, the purchase of lands, byelaws, conduct of business, and the appointment and duties of the officers of local authorities. VI. *Rating and Borrowing Powers*, defines and makes provisions for meeting the expenses by rates; gives power to borrow for certain sanitary purposes, and provides for the audit of accounts. VII. *Legal Proceedings*, details the legal procedure for the prosecution of offences, the recovery of penalties, and lays down the manner in which notices are to be served. VIII. *Alteration of Areas and Union of Districts*, gives power to the Local Government Board regarding such matters for sewerage and general purposes, and for the purpose of appointing medical officers of health. It provides also for the constitution, expenses, &c., of port sanitary authorities. IX. *Local Government Board*, relates to the powers, orders, and proceedings of the Local Government Board. X. *Miscellaneous and Temporary Provisions*, concerns entry on lands, penalties for obstructing the execution of the Act, and compensation in certain cases; the clerk and treasurer of certain authorities, special district rates, main sewerage and district sewerage boards, &c. XI. *Saving Clauses and Repeal of Acts*, contains various saving clauses, and is followed by the schedules.

The Public Health (Scotland) Act became law on 15th August 1867. It contains 122 clauses, and is divided into eight parts. Part I., *Local Authority and Board of Supervision*, defines the constitution and powers of these bodies. II. *Removal of Nuisances*, gives power of entry to local authority or their officers, and details proceedings by local authority where nuisances are ascertained to exist. It also deals with the sale of unwholesome meat, the purity of water supply, and offensive trades. III. *Prevention and Mitigation of Diseases under Order in Council*, confers powers upon the board to carry out orders of the Privy Council, to appoint medical officers of health, to provide for the interment of the dead, for house visitation, and for all that may appear advisable for preventing or mitigating epidemic, endemic, or contagious diseases. IV. *General Prevention and Mitigation of Disease*, relates to the providing of hospitals, means of disinfection, the removal of patients to public hospitals, regulations as to lodging-houses and under-ground dwellings, penalties on persons suffering from contagious diseases exposing themselves, infected houses and clothing, and provision as to ships within the jurisdiction of the local authority. V. *Regulation of Common Lodging-Houses*, confers powers on the local authorities to make rules and regulations. VI. *Sewers, Drains, and Water Supply*, provides for the purchase, construction, and cleansing of sewers, and the utilising of sewage; the formation

of drainage districts, the trapping of sewers and the drainage of houses; the supply of water for burghs; special water-supply districts; the purchase of lands, &c. VII. *Assessments*,—provides for special drainage and burgh assessments. VIII. *Enforcement of and Procedure under this Act*,—states conditions under which a local authority may be proceeded against in the event of neglect of its duty. The P. H. (*Scotland*) A. has, in many respects, been a great boon to Scotland in the way of sanitary improvement; but its chief defect consists in its permissive nature. The only amendments to the Act of 1867 have been two short Acts giving an increased power of assessment with regard to water supply, and extended provisions with regard to sanitary loans. See Spens' *Sanitary System of Scotland* (1876).

Public-Houses, Law Regarding. See BEER ACTS; HOTELS; INNKEEPER LICENSING ACTS, &c.; and for Scotch Law, FORBES MACKENZIE ACT.

Public Schools, The, of England, may be defined as schools held under a trust for the advantage of the public. They vary, however, considerably in their character, two, Eton and Winchester, being collegiate foundations, with a provost, a warden, and fellows; others charges upon cathedral chapters, e.g., Westminster and Canterbury; others entrusted to the care of municipal companies or civic corporations, as St. Paul's, Merchant Taylors, and Ipswich; others, especially those of recent origin, proprietary institutions, like Marlborough and Cheltenham. Several are grammar-schools, founded in the 16th c. for the yeomanry of the surrounding district; and of these Harrow from its position, and Rugby from its wealth, have risen to be among the greatest schools in England. In some education is free, or offered at a reduced rate to a limited or privileged number of scholars, e.g., at Eton or Dulwich; in others, as Birmingham and Manchester, it is free to all alike. The education furnished by these schools is everywhere much the same, classics forming the general basis of instruction, but mathematics, modern languages, and natural science gaining increased importance with every year. That university distinctions are not necessarily dependent on wealthy endowments, is shown by the fact, recorded in the Commissioners' Report, that Westminster in ten years produced but 2 first-class men and 1 wrangler, whilst Shrewsbury furnished 14 first-class men and 7 wranglers in the same period—a fact which becomes intelligible when we consider that some of our ablest scholars have held the head-masterships of smaller schools, Valpy of Norwich, Donaldson of Bury, and Kennedy of Shrewsbury. The real great distinction amongst these schools is wealth, the annual cost of sending a boy to Eton being often brought up by personal expenses (school subscriptions, pocket-money, &c.) to considerably over £200. In the following list, which is for the spring of 1878, such personal expenses are not taken into account, and it should be mentioned that at most schools an entrance fee is demanded of from two to ten guineas.

Bedford Grammar School, founded in 1552, endowed by Sir William Harpur in 1566, and recently reconstituted, has 1 exhibition of £70 and 1 of £60, each tenable for 4 years at a university or other place of continued education. Terms for boarders, from £72 to £75; for day-boys, from £9 to £12. Masters, 16; boys, 274.

Brighton Proprietary College, established in 1847, has 8 Council Scholarships open to boys at the school and tenable for 1 year, viz., 1 of £20, 1 of £15, and 3 of £10 for boys under 15; and 1 of £25, 1 of £20, and 1 of £10 for boys over 15. There are also 3 Soames Scholarships of £50, and 3 Council Scholarships of £30, tenable for 3 years at either Oxford or Cambridge, and 1 Wakeford Attree Scholarship of £60, tenable for 2 years at Cambridge alone. Terms for boarders, from £72 to £75; for day-boys, from £8, 10s. to £11, 10s.; sons of clergymen at reduced rates. Masters, 14; boys, 200.

Charterhouse (q. v.), removed under the Public Schools Act of 1868 to Godalming in Surrey, 4 miles S.S.W. of Guildford by rail, possesses 30 junior scholarships of £65, open for competition to boys between 12 and 14 not at the school, and tenable up to 16; 10 junior exhibitions of £20; and 30 senior scholarships of £85 for boys between 14 and 16, tenable up to the time of leaving. There are also 5 exhibitions of £80, to be held for 4 years at a university or other place of continued education. Terms for boarders, £100 to £110; for day-boys, £30. Masters, 31; boys, 500 (the full number).

Cheltenham Proprietary College, established in 1848, has annual elections to 12 scholarships, viz., 6 of £40 for 3 years, and 2 of £20 for 2 years, open to boys under 13 at the school; with 2 of £40, and 2 of £20 for 3 years, open to boys under 16. There are also the Dobson Scholarship of £60, tenable for 1 year after leaving school, and the Wyllie Scholarship of £50, tenable for 3 years at Trinity College, Oxford. Terms for boarders, from £68, 10s. to £88, 12s.; for day-boys, from £17, 10s. to £21, 10s. Masters, 42; boys, 647.

Christ's Hospital (q. v.), has on an average 6 university scholarships annually, of £90 for 4 years. Masters, in London, 29; at Hertford, 8. Boys, in London, 682; at Hertford, 372.

City of London School, established by the corporation of London in 1834, is one of the wealthiest institutions in the kingdom, possessing 19 scholarships and exhibitions tenable at the school, and ranging from £20 to £25, with free education; besides 25 of from £22 to £60, tenable at a university or other place of continued education. Terms for day-boys, who alone fall within the school system, £10, 10s. Masters, 27; boys, 671.

Clifton Proprietary College, established in 1867, has 9 scholarships varying from £25 to £50, viz., 2 entrance scholarships for boys of 12, 2 scholarships for boys under 15 and 2 for boys under 16, 2 Guthrie Scholarships for boys under 17, and the Cay Mathematical Scholarship. Terms for boarders, from £98 to £86; for day-boys, £25. Masters, 42; boys, 604.

Dulwich College has 35 scholarships of £20 for boys between 12 and 14, of which 3 are tenable for 3 years, the rest during continuance at school; and 8 exhibitions of £50, tenable at an English university, or by 'a student of some learned or scientific profession or of the fine arts.' Terms for boarders from £68 to £81; for day-boys from £15 to £18, or if sons of residents in St. Giles, Camberwell, St. Luke, Finsbury, St. Saviour, Southwark, and St. Bodolph, Bishopsgate, from £12 to £15. Masters, 32; boys, 560. See DULWICH.

Eton College (q. v.) has 70 foundation scholarships, open for competition to boys between 12 and 15, and tenable up to 19. There are also the Newcastle Scholarship, of £50 for 3 years at Oxford or Cambridge; 2 Chamberlayne Exhibitions of £50 for 4 years; 3 Reynold's Exhibitions of £48 for 4 years at Exeter College, Oxford; 2 postmasterships of Merton College, Oxford, tenable for 4 years, &c. Terms for Oppidians, £150; for Collegers, free. Masters, 50; boys, 938.

Haileybury College, near Hertford, established in 1864, has 2 scholarships of £30 and 1 of £20, open to all boys between 12 and 14, whether at the school or not; 2 classical exhibitions of £50 for 4 years at Oxford or Cambridge; and 1 mathematical of £50 for 4 years at any place where mathematics form the staple of instruction. Terms for boarders, there being no day-boys, from £74 to £110, or 10 guineas less for sons of clergymen. Masters, 21; boys, 360.

Harrow (q. v.) has about 6 entrance scholarships yearly of from £30 to £60, open to boys under 14; and there are also 1 Gregory Scholarship of £100 for 4 years, 1 Spencer of £30 for 3 years, and 1 Bothfield of £60 for 3 years, all tenable at either Oxford or Cambridge, besides 2 Sayer Scholarships of £52, 10s. for 4 years at Caius College, Cambridge; 2 Baring of £100 for 5 years at Hertford College, Oxford; 2 Neeld of £30 for 3 years at Oxford, and 1 Leaf at £70 for 3 years. Terms—for boarders, from £98 to £178, 10s.; for day-boys, £28, 10s., or with private tuition, £43, 10s. Masters, 32; boys, 512.

King Edward's School, Birmingham, founded in 1552, gives free education to boys above 8 whose fathers are inhabitants of Birmingham, Handsworth, Aston, Harborne, Edgbaston, or King's Norton, and has 10 Founder's Exhibitions of £30 for 4 years at Oxford or Cambridge, 3 Milward Scholarships of £50 for 4 years, 1 Leach Mathematical Scholarship (interest of £500 stock), and 1 James Exhibition of £50. Masters, 26; boys, 573.

King's College School, London, established in 1830, has 1 Forest Classical and Divinity Scholarship of £30 for 3 years, 1 mathematical of £30 for 3 years, and 1 Inglis for English literature of £20 for 1 year, besides 16 choral exhibitions, whose holders pay only half fees. There are no scholarships tenable after leaving school. Terms for boarders, from £88 to £94; for day-boys, who form the bulk of the school, from £24 to £30. Masters, 37; boys, 580.

Manchester Free Grammar School, founded in 1515 by Hugh Oldham, Bishop of Exeter, has 2 Shakespeare Scholarships of £20 for 2 years and 2 of £14 for 1 year, 20 Langworthy Scholarships

of £20 for 1 year, and 2 Walker Scholarships of £20 for 1 year. There are also 2 yearly scholarships of from £50 to £60 for 5 years at Brasenose College, Oxford; 5 exhibitions of £50 for 3 years at St. John's College, Cambridge; 1 Rickards Scholarship of £50 for 3 years at either university; 6 Brackenbury Scholarships of £45 for 3 years at Oxford; 2 exhibitions of £50 for 4 years at Wadham College, Oxford; and 3 exhibitions of £17 for 3 years at Owens College, Manchester. The education of the scholars, who are all day-boys, is free. Masters, 30; boys, 850.

Marlborough College has 15 yearly Foundation Scholarships of £30 for sons of clergymen between 10 and 15, whether members of the school or not, 2 Senior Scholarships of £50 for boys under 15, 1 Ireland Scholarship of £15 for sons of clergymen under 15, and 1 House Scholarship of £80 for boys under 14, all tenable during continuance at the school; besides 6 Junior Scholarships of £30 for 2 years, 2 Authors' Mathematical Scholarships of £15 for 1 year, and 2 Modern School Scholarships of £20 for 1 year. There are also 10 exhibitions of from £22, 10s. to £50 for 3 years at either Oxford or Cambridge. Terms,—for boarders, £85; for day-boys, £26. Masters, 34; boys, 565. See MARLBOROUGH.

Merchant Taylors' School, founded in 1561, has 6 Junior Scholarships of £15 for 2 years open to boys under 14, and 4 Senior Scholarships for boys under 16 of £30 during continuance at school. There are also 21 scholarships at St. John's College, Oxford, tenable for 7 years. Terms for day-boys, who alone are recognised by the school system, from £12, 12s. to £15, 15s. Masters, 21; boys, 500.

Repton Grammar School, 6½ miles S.S.W. of Derby, founded by Sir John Porte in 1556, has 1 yearly scholarship of £40 for 4 years, open to boys between 13 and 15, and 1 yearly exhibition of £50 for boys leaving the school. Terms for boarders—there being no day-boys—£87, 10s. Masters, 18; boys, 250.

Rossall School, near Fleetwood, Lancashire, founded in 1844, has 8 or 10 Entrance Scholarships annually, of from £10 to £40, 2 or 3 of them being Senior Scholarships (for boys under 15), tenable for 3 years, and the remainder Junior Scholarships (for boys under 14) tenable for 2 years. There are also 3 exhibitions of £50, and 3 of £30, for 3 years at Oxford or Cambridge. Terms for boarders—there being no day-boys—from £63 to £73, 10s., or 10 guineas less for sons of clergymen. Masters, 19; boys, 266.

Rugby (q. v.), besides its foundation benefits, has 9 public scholarships open to boys under 15, viz., 2 classical of £80, 2 of £50, and 1 of £20; 1 mathematical of £50 and 1 of £20; 1 French and 1 natural science, each of £20. There are also 3 Major Exhibitions of £60 and 3 Minor Exhibitions of £30, tenable for four years at any university in the United Kingdom or some other place of continued education. Terms,—for boarders, £120; for day-boys, £40. Masters, 27; boys, 460.

Sherborne Grammar School, founded in 1550, has 16 Foundation Scholarships of £22, 10s. (the fee for tuition), and one yearly exhibition of £40 for 4 years at either university. It is essentially a boarding-school, the terms being £78, 15s. Masters, 20; boys, 265. See SHERBORNE.

Shrewsbury Grammar School, founded in 1551, whilst possessing no scholarships tenable at the school, has 13 open to boys who are leaving it; viz., 4 Millington Exhibitions of £63 and 1 of £60, 2 Smyth's Exhibitions of £36, 1 Matthews' Exhibition of £40, 1 Taylor Exhibition of £23, and 2 others of £35, all tenable at either University; besides 1 exhibition of £10 tenable at Oxford alone, and 1 of £17, 10s. at St. John's College, Cambridge. Terms,—for boarders, £84; for day-boys, £21. Masters, 9; boys, 164.

St. Paul's School, founded in 1512 by John Colet (q. v.), has 77 Foundation Scholarships in the Classical and 76 in the Modern School, which confer on their holders exemption from all tuition fees, and 51 of which are awarded after competitive examination to boys between 12 and 14. Terms, for day-boys, of whom the school consists, £20. Masters, 9; boys, 180. Under a scheme approved by the Queen in Council, March 24, 1876, St. Paul's is hereafter to comprise a Classical School for 500 boys (a site for which, near the Addison Road Station, was purchased for £32,000 in June 1878), a Modern School for the same number, and a High School for 400 girls.

Tunbridge Grammar School, founded in 1552 by Sir Andrew Judd, according to a new scheme, is to have certain Judd Scholarships granting exemption from tuition fees for 2 years, and 4 Boarding Scholarships, open to boys under 14, of £50 for 4 years; besides

4 yearly exhibitions of from £50 to £100 for 4 years at any university or other place of higher education. Terms,—for boarders, £85; for day-boys, £21. Masters, 20; boys, 229.

University College School, London, established in 1832, has 1 Case Exhibition of £20, 1 Trevelyan-Goodall Art Scholarship of £20, and the Holloway Exhibitions, endowed from a bequest of £2000. There are no scholarships tenable after leaving the school, which is a day one. Terms, £25, 4s. Masters, 43; boys, 635.

Uppingham School, founded in 1584, has, besides its foundation benefits, 2 public scholarships of £50 and 2 of £30 for 3 years open to boys under 14, besides 2 scholarships of £50 for 2 years open to boys under 17. There are also 3 exhibitions of £60, £50, and £40 respectively, tenable for 3 or 3½ years at a university or other place of continued education, and a Mathematical Prize of £30. Terms,—for boarders, £110; for day-boys, £30. Masters, 24; boys, 300. See UPPINGHAM.

Wellington College, near Wokingham, Berkshire, founded as a memorial to the Duke of Wellington, gives free education to a certain number of orphan sons of commissioned officers in Her Majesty's army, or the army of the late East India Company. It further offers to boys between 12 and 14, whether members of the school or not, 2 scholarships of £50, 2 of £40, and 2 of £30, all tenable for 2 years; and to members of the school under 16, 2 of £50 and 1 of £40 for 3 years. There is another scholarship of £50 for 3 years, tenable at the school or at the universities, and 1 of £30 for 2 years, also tenable there, at Woolwich, or the universities. Terms for non-foundations, who, like the foundationers, are all boarders, from £80 to £135. Masters, 24; boys, 375.

Westminster School, founded by Queen Elizabeth in 1560, has 40 Queen's Scholarships, entitling their holders to free tuition, and open to all members of the school under 15; 2 exhibitions of £30 and 2 of £20 (or £50 and £30 in the case of boarders), tenable for 2 years, and open to boys between 12 and 14 whether members of the school or not; and 1 Mure Exhibition of £40 for boys between 15 and 17. There are also 3 junior studentships at Christ Church, Oxford, of £100 for 7 years; 3 exhibitions at Trinity College, Cambridge, of £40 for 3 years; and 2 exhibitions at either university of £50 for 3 years. Terms, for boarders, £100; for day-boys, £31, 10s. Masters, 21; boys, 196.

Winchester College (q. v.) has 70 foundation scholarships of £50, tenable up to 18, and open to all boys between 12 and 14, whether members of the school or not; besides 8 exhibitions of £50, and others of £21, for boys between 15 and 16, all tenable during good behaviour. There are 6 New College Scholarships, 1 Goddard Scholarship, and 1 Bedminster Exhibition. Terms for commoners, £107. Masters, 24; boys, 385.

To these may be added *Boteler Grammar School* (1526), with 6 masters and 100 boys; *King Edward's School* (1553), Bromsgrove, Worcestershire, with 6 masters and 75 boys; *Durham Grammar School* (1541), with 11 masters and 140 boys; *King Edward VI.'s School* (1542), Great Berkhamsted, with 11 masters and 144 boys; *King's School*, Canterbury, with 10 masters and 125 boys; *Leamington Proprietary College*, with 9 masters and 126 boys; *King Edward VI.'s School* (1547), Norwich, with 13 masters and 121 boys; *Queen Elizabeth's School*, Ipswich, with 9 masters and 85 boys; *Radley College*, near Abingdon, with 12 masters and 133 boys; *Richmond School* (1567), Yorkshire, with 9 masters and 86 boys; the *Royal Naval School* (1833), at New Cross, Kent, with 12 masters and 161 boys; *St. Andrew's College* (1853), at Bradfield, near Reading, with 12 masters and 126 boys; and the *Stationers' School* (1858), with 12 masters and 190 boys. See *Report of Commissioners on Certain Colleges and Schools* (4 vols. 1864); *The Public Schools Calendar* (Lond. 1866); T. Markby, *Public Schools*, in the *Contemporary* for 1867; K. Staunton, *The Great Schools of England* (new ed. Lond. 1875); and C. E. Pascoe, *Handbook to the Principal Schools of England* (new ed. Lond. 1878).

Public School System of the United Kingdom. In England the education of the common people originated in a religious and philanthropic movement. Robert Raikes of Gloucester (1735–1811) founded the Sunday-school system, in which at first secular as well as religious instruction was given. In 1808 the British and Foreign School Society, and in 1811 the National Society for Promoting the Education of the Poor in the Principles of the Church of England, were established (see JOSEPH LANCASTER and ANDREW BELL). Popular edu-

cation was maintained by the unaided efforts of these agencies till 1833, when for the first time state aid was given to education in England, in the form of a grant of £20,000, to be divided equally between the two great societies, and to be devoted to the building of schools. Meanwhile, numerous and vigorous efforts to induce Parliament to adopt a national system all signally failed. Mr. Whitehead in 1807, Lord Brougham in 1816, 1820, and again in 1835, and Mr. Wyse in 1835 and 1837, were compelled to succumb to clerical and obscurantist opposition. At length, in 1839, action was taken, but only on a denominational basis, and in a supplementary form. The government of Lord John Russell prevailed on Parliament to appoint a Committee of the Privy Council specially to administer a public education grant. In the first year, the applications for aid amounted to £48,590, made in behalf of 58,302 children, and the sum voted by Parliament amounted to £30,000. The Committee did much to stimulate local effort in the establishment and maintenance of schools by offering a capitation-grant of ten shillings for every child to be accommodated; and great improvement was effected in the quality of education by the appointment of inspectors, and by the foundation of normal schools, or training colleges. In 1846 the Committee of Council took another and most important step. With the view of inducing a higher class of men to become teachers, annual augmentation grants and pensions were promised to all that obtained by examination certificates of merit, and whose schools were from year to year reported as efficient; and the local authorities were required to pay to the teacher double the amount of the public grant. With the view of maintaining a supply of well-trained teachers, the system of paid pupil-teachers was commenced, and pupil-teachers were induced at the close of their apprenticeship to enter the training colleges by the offer of Queen's Scholarships. Under the minutes of 1846, an immense impetus was undoubtedly given to education; but a strong feeling of dissatisfaction gradually arose in the country from the rapid strides of the expenditure, the huge multiplicity of agencies, and the growing deficiency of results. Notwithstanding the special grants to poor rural schools, begun in 1853, and in 1856 extended to poor town schools, many districts, and these of course the most necessitous, were still without schools; while the grant that in 1839 had amounted to £30,000, and in 1849 to £125,000, had in 1859 increased to £770,000. Complaints, too, were heard, that as the grants were earned by general efficiency, clever children received special attention, and those less intelligent were comparatively neglected. In 1860 appeared the Revised Code of Regulations, the work of Mr. Robert Lowe, the then vice-president of the Committee of Council, by which grants were offered on the average attendance and the individual examination of the scholars, and were to be paid to the managers, not to the teachers of the schools. The introduction of this Code gave a serious shock to the education of the country. Difficulty was experienced in recruiting the ranks of teachers, and the tone of good schools was lowered by cram taking the place of education, and by the consequent neglect of the higher subjects of instruction. Nor was the scheme justified by its economical success; for though the grants fell to £693,078 in 1865, they had risen in 1870 to £914,721. The deficiency of proper school accommodation, moreover, was still so great, that upwards of a million of children were unprovided for. To supply this want, Mr. Forster's Act (1870) was passed, which established as near an approach to a national system as the ecclesiastical condition of the country permitted. Where school districts voluntarily supply the requisite accommodation, the schools remain under private management, and obtain the Parliamentary grant, provided that intellectual and religious education are separated, and that no scholar is compelled to receive religious instruction. Where districts neglect to supply the requisite accommodation, or where direct application is made for the purpose, by order of the Education Department, school boards are elected to do the work, and are empowered to use the local rates. Board schools are placed under the management of the boards, with the restriction that no distinctive religious catechism or formulary shall be taught; and boards are authorised to make bye-laws enforcing the attendance of children from five to thirteen years of age. This Act was supplemented in points of detail by the Elementary Education Act (1873), and by the Elementary Education (Orders) Act (1874). School boards have been formed in London, in 123 out of 223 boroughs, and in 1667 out of 2346 parishes, and

have under their jurisdiction 12,829,381 of the population. There are 1604 board schools, with accommodation for 556,539 children, and with an average attendance of 333,234. The Loan Commissioners have paid to school boards for works of a permanent character £5,152,274, and the amount of school rate for 1876 was £868,318. Bye-laws enforcing school attendance have been sanctioned for London, for 109 municipal boroughs, and for 612 civil parishes, comprising 11,221,363 of the population. Accommodation having been thus fully supplied, it became necessary to create extended compulsory powers with the view of filling the schools. This was done by Lord Sandon's Act (1876), by which school-attendance committees were to be formed by Town Councils in boroughs, and by Boards of Guardians in parishes which have no school board. These committees are armed with threefold compulsory powers, partly direct, partly indirect. It is illegal to employ any child under ten years of age, and to employ a child between ten and fourteen, who does not possess a certificate of proficiency, or of previous school attendance. A parent who habitually neglects his child may be fined, and a child habitually consorting with vagabonds or criminals may be sent to a day industrial school. Attendance committees have the same power as school boards to frame compulsory bye-laws; but, at the date of the last report, out of 106 borough and 412 rural committees only 27 had communicated with the Department on the subject. Special reference must be made to the work of the school boards of London and Birmingham. The Metropolitan Board has under its control 242 schools, with 163,008 places, and a staff of 1816 adult teachers, and 1959 pupil-teachers; while it has received from the Loan Commissioners for building purposes £2,080,480.—Under the New Code now in operation, grants are made in aid of elementary schools and of training colleges. (See TRAINING COLLEGES). Elementary schools may earn grants of various sums on the average attendance of the scholars, the number of infants present on the day of examination, the number of passes obtained by individual examination, and the results of the class examinations. The subjects of individual examination are reading, writing, and arithmetic; and of class examination, grammar, history, elementary geography, and plain needlework. Special grants are made for passes in the following higher subjects:—English literature, mathematics, Latin, French, German, mechanics, animal physiology, physical geography, botany, and domestic economy. The highest annual grant per scholar obtainable under the Code is 27s. Grants are also made in respect of pupil-teachers. (See PUPIL-TEACHERS.)—Some idea of the recent progress and present state of education in England may be obtained from the following statistics. In 1870, the schools inspected for grants provided for 1,878,584 scholars, or 8·5 per cent. of the population, and in 1877 for 3,653,418 scholars, or 14·88 per cent. From 1871 to the middle of 1877, the population between the ages of three and fifteen increased 414,000, or 6½ per cent.; during the same period additional accommodation was provided in efficient public elementary day-schools for 1,413,639 scholars, an increase of 70 per cent. In 1870 there were on the school registers the names of 1,693,059 children, or 7·66 per cent., and in 1877 the names of 3,154,973 children, or 12·85 per cent. In 1870 there were in average attendance 1,052,389, or 68·06 per cent. of the registered scholars; and in 1877, 2,150,683, or 68·1 per cent. In 1870, the scholars in average attendance who were qualified by attendance to earn grants on individual examination numbered 923,842, or 80·16 per cent.; and in 1877 they numbered 1,436,008, or 66·75 per cent. Of the scholars qualified for individual examination who were actually examined, there were, in 1870, 765,584, or 82·86 per cent.; and in 1877, 1,335,118, or 92·96 per cent. Of those individually examined in 1870, there passed in reading 91·66 per cent.; in writing, 88·93 per cent.; in arithmetic, 78·31 per cent.; the corresponding percentages for 1877 being 85·78, 78·89, and 69·97. In 1877 there were examined in the following specific subjects:—English literature, 44,790; physical geography, 18,936; mathematics, 3806; animal physiology, 13,032; mechanics, 584; Latin, 616; French, 1850; German, 51; botany, 913. The certificated teachers number 25,292, the assistants 5168, and the pupil-teachers 31,780. The total amount of the education grant for England, for 1876-77, was £1,880,640, of which there was paid to Church of England schools £1,019,218; to British, Wesleyan, and other schools, £283,286; to Roman Catholic schools, £94,419; and to board

schools, £316,906. The cost of administration was £163,791, of which £109,832 was paid for inspection. There are 121 inspectors, and 98 inspectors' assistants. The average salary of certificated masters was £115, 7s. 2d., and of mistresses, £68, 16s. 0d.

The famous parish schools of SCOTLAND were founded throughout that country by an Act of the Scottish Parliament in 1696 re-enacting a former statute of 1646. Under this Act the heritors were bound to provide a commodious schoolhouse, and an annual salary not above £11, 2s. 2½d., nor under £5, 11s. 1½d. In 1803, and again in 1861, improved provision was made for the supply of school-buildings, and for the support of the schoolmaster. By the latter Act, the schoolmaster was also released from the obligation to sign the *Confession of Faith*, and certain modifications were made on the *ad vitam aut culpam* tenure under which he held office. In 1839, the Parliamentary grants administered by the Privy Council Committee were made to Scotland, and from 1839 to 1870 amounted to £1,452,538. The action of the Privy Council in England during that period applied also to Scotland, except that payments under the Code of 1860 continued to be made to Scotch schools until 1873. In 1872, Lord Young's Act, the seventh attempt to establish national education in Scotland, became law. It vests the general administration of the system in a Scotch Education Department of the Privy Council. The local management of the schools is entrusted to school boards, established in every parish and burgh, and empowered to raise funds by a local rate. Teachers appointed under the Act hold office during the pleasure of the boards. Religious instruction may be given in the schools under specified regulations, and with the protection of a conscience clause. Every parent is bound under penalty of fine or imprisonment to teach his children between five and thirteen reading, writing, and arithmetic; and if he is too poor to pay fees, his parochial board must do so for him. Certain of the old burgh schools were also included in the Act under the designation of Higher Class P. S., and school boards were enjoined to administer them exclusively with a view to promote the higher education. These schools have no share in the Parliamentary grant, but their buildings are maintained, their examinations conducted, and allowances granted to their teachers on retirement, at the expense of the school fund. They are now 18 in number—Aberdeen, Arbroath, Ayr, Dumfries, Dunfermline, Edinburgh, Elgin, Glasgow, Haddington, Hamilton, Irvine, Leith, Montrose, Paisley, Peebles, Perth, Stirling.—The educational progress of Scotland under the Act of 1872 may be estimated from the following facts. In 1873, the schools inspected for grants provided for 294,072 scholars, or 8.5 per cent. of the population; and in 1877, for 535,949 scholars, or 15 per cent. In 1873 there were on the school registers the names of 280,581 children, or 8.1 per cent. of the population, and in 1877 the names of 472,668 children, or 13.2 per cent. In 1873 there were in average attendance 220,508, or 7.5 per cent. of the registered scholars, and in 1877, 360,413, or 76.2 per cent. In 1873, of the scholars in average attendance, 134,483, or 60 per cent., were examined by the inspectors; in 1877, 249,661, or 69 per cent. Of those individually examined in 1873, there passed in reading, 97.8 per cent.; in writing, 91.4 per cent.; in arithmetic, 86.2 per cent.; the corresponding percentages for 1877 being 93.15, 88.05, and 80.58. In 1877, there were examined in the following specific subjects:—Mathematics, 1627; English literature, 10,265; Latin, 3958; Greek, 200; French, 1783; German, 78; mechanics, 62; chemistry, 217; animal physiology, 4019; light and heat, 133; magnetism and electricity, 646; physical geography, 9982; botany, 411; domestic economy, 6367. The certificated teachers number 4698, the assistants 289, and the pupil-teachers 4751. The total amount of the education grant for Scotland for 1877 was £482,017, 6s. 6d., of which public schools received £346,680, and denominational schools £106,695. There are 25 inspectors of schools, and 18 inspectors' assistants; and the cost of inspection was £21,691. The average salary of certificated masters was £135, 6s. 3d., and of mistresses, £71, 8s. 7d. In 1877 there were in all 2425 public schools, *i.e.*, schools under school boards. Since the Act came into operation, 858 new public schools have been built, and 500 old school buildings have been enlarged, the new accommodation thus provided being for 214,800 pupils. In addition, the Board of Education has, up till June 1878, sanctioned the erection of 243 new schools and 63 enlargements, providing together for 40,873 pupils.

The Board has sanctioned the application of 705 boards for leave to borrow, in all, the sum of £2,195,210, 9s. 9d. for the purpose of providing or enlarging schools.

After the conquest of IRELAND by the English, various statutes were passed to provide education for the Irish people, chiefly, however, with the view of proselytising them to the Protestant faith. In 1831, a united national and non-sectarian system of education for the lower classes was founded by Government. Its declared object was to afford a combined literary and a separate religious instruction to children of all religious persuasions; and its administration was vested in a Board of Commissioners, who now number twenty. The schools to which aid is granted are: (1) Vested schools, which are vested in the commissioners or in trustees for the purposes of the national system, and to the building, repair, and furnishing of which the Board has contributed; (2) Non-vested schools, the property of private individuals, to which the Board contributes aid only in the form of salaries, books, and requisites; and (3) Model schools which belong wholly to the Board. Concessions have repeatedly been made to the demands of denominationalists, and at the present time the fundamental principle of the system is carried out in its integrity in the model schools alone. The local government of the schools is entrusted to patrons or managers, subject to the approval of the Board. Teachers are arranged in three classes, the salaries ranging, for males, from £58 to £32 per annum; and for females, from £48 to £32. The wretched condition of Irish teachers recently engaged the attention of Parliament, and the National School Teachers Act (1875) was passed with a view of obtaining increased local contributions in response to special State grants, but all efforts to render the Act effective have failed. On the 31st of December, 1876, there were 7334 national schools in operation, of which 2127 were vested, and 5207 non-vested. The number of registered scholars in *bona fide* attendance was 596,427, and the average daily attendance 416,586. The number of registered scholars which made at least one attendance was 1,032,215, of whom 79.4 per cent. were Roman Catholics, 9 per cent. Episcopalians, and 10.8 per cent. Presbyterians. The model schools numbered 29, with a gross attendance of 16,029, of whom 4599 were Roman Catholics, 5449 Episcopalians, and 4755 Presbyterians. The workhouse schools were 158 in number, with 12,790 registered scholars. The number of teachers under the Board was—principals, 7072 (males, 4411, females, 2661); assistants, 3205 (males, 742, females, 2463); junior assistants, 127; work-mistresses, 327. There were also 4280 paid monitors. The total income of the teaching staff was £638,508, 16s. 8d., of which 27.6 per cent. was locally provided, and 72.4 per cent. paid by the State. The amount of the Parliamentary grant was £645,949.

England.—See *Reports of Committee of Council of Education, 1840-77*; *Reports of Royal Commission on Primary Education, 1861*, six volumes. Scotland.—*Reports of Committee of Council on Education, 1840-73*; *Reports of the Scotch Education Department, 1875-77*; *Reports of Board of Education for Scotland, 1873-77*; *Reports of Royal Commission, 1864-68*, nine volumes. Ireland.—*Reports of the Commissioners of National Education, 1833-77*; *Report of the Royal Commission, 1870*, six volumes.

Pubna (*Pābnd*), the chief town of the district of the same name, Bengal, British India, on the right bank of the Ichamutti, a channel which joins the Ganges and the Brahmaputra, 130 miles N.E. of Calcutta. Pop. (1872) 15,730. It conducts a considerable trade in jute and rice.—The district of P., which lies at the angle formed by the junction of the two great rivers above mentioned, has an area of 1966 sq. miles. Pop. (1872) 1,211,594, of whom 70 per cent. are Mohammedans. The staple crops are rice and jute. Besides the two great bordering rivers, the whole country is intersected with navigable watercourses. In 1876-77 the total exports were valued at £2,205,000, including jute £863,000, rice £142,000, oil-seeds £276,000; the imports were valued at £2,324,000, including piece-goods £421,000, salt £360,000, sugar £126,000. The trade is conducted both by country boats and by steamers. The manufactures are gunny, indigo, and paper. P. has for the last few years been the scene of a combination among the cultivators to resist enhancement of rent.

Puok'a (*pakha*), a word in universal use in Anglo-Indian phraseology, signifying complete, substantial, perfect of its kind, the contrast in every sense of *kutchu*. A P. appointment

is one that is confirmed; P. news is authentic; a P. house is built of brick or stone. The word is derived from a Sanskrit root, signifying 'ripe, mature, cooked;' cf. Gr. *pepo*, 'I cook.'

Pückler-Muskau, Hermann Ludwig Heinrich, Fürst von, was born of an ancient family at Muskau in Lausitz, October 30, 1785. After studying law at Leipzig (1800-1803), he entered the body-guard at Dresden, and subsequently travelled in Austria, France, and Italy, returning to Muskau to succeed his father in 1811. Here he lived in retirement until the war of 1813, when he entered the Russian service as major. He became adjutant to the Duke of Weimar, and a lieutenant-colonel. In 1815 he returned to private life, and soon after visited England, where he remained more than a year. After returning to Muskau he began to form his extensive and celebrated park-gardens, which he has himself described in his *Andeutungen über Landschaftsgärtnerei* (Stuttg. 1834). In 1817 he married the Countess of Pappenheim, but was separated from her in 1826. In 1822 he was elevated to princely rank by the king of Prussia, and in 1828 he again visited England, remaining there and in France for a year. Afterwards he travelled through Algeria and the N. of Africa, Greece, Egypt, and part of Asia. On his return he lived at Muskau, until he sold that property in 1845. He died at Branitz, February 4, 1871, without issue. As a writer, P. was first known by his *Briefe eines Verstorbenen* (4 vols. Mun. 1830, and Stuttg. 1831). This is a diary of travel in England, Wales, Ireland, France, Germany, and Holland, and contains vigorous painting of manners and customs. His other works are *Tutti frutti*; *aus den Papieren des Verstorbenen* (5 vols. Stuttg. 1834); *Jugendwanderungen* (Stuttg. 1835); *Semilasso's vorletzter Willgang*; *Traum und Wachen*; *aus den Papieren des Verstorbenen* (3 vols. Stuttg. 1835); *Semilasso in Africa* (5 vols. Stuttg. 1836); *Der Vorläufer* (Stuttg. 1838); *Südöstlicher Bilderraal* (3 vols. Stuttg. 1840); *Aus Mehemed-Ali's Reich* (3 vols. Stuttg. 1844); *Die Rückkehr* (3 vols. Berl. 1846-48). P.'s literary remains (letters and diaries) have been edited by Ludmilla Ausung-Grimelli (8 vols. Berl. 1874, et seq.), who has also written a biography of P. (Hamb. and Berl. 1872-74). See also Petzoldt's *Fürst H. von P.-M. in seinem Wirken in Muskau und Branitz, sowie in seiner Bedeutung für die bildende Gartenkunst Deutschlands* (Leips. 1874).

Pudd'ing, under this term is embraced an endless variety of food preparations which occupy an important though subsidiary place on the dinner-table. It is possible to classify the varieties of P. under three heads, meat P., fruit P., and sweet P., but all manners of combinations are made according to the skill and daring of the cook. Sweet P. embraces the leading kinds commonly eaten, and the monarch of all is the plum P., which is known and appreciated in every place where the English language is spoken. Plum P. within itself embraces the leading ingredients which go to the composition of all puddings—currants, raisins, suet, almonds, flour, bread, milk, spices, sugar, eggs, wine, and brandy. Rice, sago, tapioca, arrowroot, and similar starches are much employed as the bases of P. which are simply made with addition of milk, eggs, and flavouring essence, and baked in a P. dish.

Pudd'ing-Stone. See CONGLOMERATE.

Pudd'ing. See IRON.

Pue'bla, or La Puebla de Los Angeles, a city of Mexico, capital of a state of the same name, stands on a tableland 7137 feet above the sea-level, 76 miles S.E. of the city of Mexico. It was founded by the Spaniards in 1531, and its fine Doric cathedral, noted for the splendour of its interior, was commenced in 1552. The city, which stands at the foot of Mount Popocatepetl, and not far from the river Tlascala, is regularly built and well paved. The houses are flat-roofed, and many are three stories high, and profusely ornamented. There are 69 churches, 3 hospitals, 15 elementary schools, 20 religious houses, a theatre, a public library, and a museum. P. is one of the most important commercial towns of the Confederation, is connected by rail with Jalapa, Mexico, and Vera Cruz, and has large cotton and woollen manufactures. The Mexicans under Ortega were here besieged by the French under Forey and Bazaine from the 18th March to the 14th May 1863. Pop. 67,571.

Puerperal Fever is a disease belonging to the so-called zymotic class, the proximate cause of which is some peculiar

poison to which lying-in women are liable by contagion, or which is, under certain circumstances, developed in the puerperal state. The type and the symptoms of P. F. may vary, but the poison is an essential factor in its causation. In some instances peritonitis is the leading symptom; in others, metritis; in others, phlebitis; and, in the most fatal cases of all, sudden collapse from the intensity of the poison, without any local lesions being discoverable after death. P. F. is due to a peculiar poison of the nature of which we are ignorant; but the mortality from this cause has of late years been greatly reduced, chiefly as the result of the more advanced knowledge which modern hygiene has developed in regard to the laws relating to the spread of zymotic diseases generally. The aggregation of patients in lying-in hospitals of defective construction is a cause of greatly increased maternal mortality; and should the poison of P. F. once become developed, decimation of parturient women has not unfrequently been the result. There is some reason for supposing that the puerperal poison may be developed from other poisons of a similar kind, and that the cause is less specific in its nature than a septic influence operating upon the peculiar conditions of the puerperal state. The great danger which a woman incurs who, during the puerperal period, is exposed to contagious diseases, such as typhus and scarlet fever, is clearly recognised in the etiology of the disease. Smallpox contracted under similar circumstances is almost invariably fatal. P. F. is an eminently contagious disease.

Treatment.—The nature of the treatment to be adopted, in cases of P. F., must depend upon the type of the disorder, and also upon the stage at which the case is seen. Indiscriminate blood-letting is to be deprecated, but depletion is applicable when the earliest symptoms indicate acute inflammation of the peritoneum, of the uterus, or of both; but if the patient has passed the acute stage, bleeding is most injurious, and more especially in asthenic cases. When the bowels do not respond to an ordinary dose of medicine, it should be supplemented by an enema. Ipecacuanha has been recommended by some and calomel by others, but the latter is more efficacious when combined with opium. Blisters to the abdomen have been tried, but without any very satisfactory results. The external application of warm poultices or turpentine fomentations will be much more beneficial. When the type of the disease is asthenic, stimulant and tonic regimen should be prescribed from the first. Quinine, in doses of from 15 to 30 grains in the day, has been found beneficial.

Puerperal Ma'nia may be developed during pregnancy, after parturition, or during nursing; but the disease is invariably one of exhaustion, debility, and prostration. The symptoms of P. M. do not differ materially from those which are exhibited by patients who are subjects of the same disease unconnected with the puerperal state; but there are certain peculiarities which distinguish the disease from ordinary cases of acute mania, the chief difference being that P. M. is essentially a disease of exhaustion and not of inflammation. The symptoms are most accurately and graphically described by Dr. Rambotham as follows:—'In P. M. there is almost always, at the very commencement, a troubled, agitated, and hurried manner, a restless eye, an unnaturally anxious, suspicious, and displeasing expression of face; sometimes it is pallid, at others more flushed than usual; an unaccustomed irritability of temper, and impatience of control and contradiction; a vacillation of purpose or loss of memory; sometimes a rapid succession of contradictory orders are given; or a paroxysm of excessive anger is excited about the merest trifle. Occasionally one of the first indications will be a sullen obstinacy, or listlessness, or stubborn silence.' In cases where there is no hereditary predisposition, the prospect of recovery is favourable. 'Within three weeks,' says Dr. J. B. Tuke, 'or more frequently earlier, the mania gradually subsides, and is replaced by a state of dementia, generally accompanied by delusions, which almost invariably assume the form of mistaken identity. These gradually disappear, leaving a haziness of apprehension, and a state suggesting the idea of awaking from a dream. The patient can now generally be induced to work, and otherwise employ herself. From that moment you may look with almost certainty to her recovery.'

Puerto Bell'o, a port in the United States of Colombia, has an excellent harbour, which was discovered and named P. B. by Columbus in 1502. The town dates from 1584, and was a

place of much importance till 1739, when it was bombarded and taken by Admiral Vernon. Since then it has decayed, and its present pop. does not exceed 1300.

Puerto Cabell'o, a seaport of Venezuela, on an island in the Golfo Triste. It is the outlet of a rich agricultural and cattle-raising country, and the port of clearance for the copper obtained from the rich mines of Aroa, the ore being shipped at the neighbouring port of Tucacas. The imports at P. C. in 1876 amounted in value to £1,078,495, and the exports to £1,535,757. The chief exports are cotton, sugar, indigo, coffee, cocoa, and hides. Pop. (1869) 12,000.

Puerto de San'ta Mari'a, commonly called *El Puerto* ('the port'), a seaport of Spain, province of Cadiz, in a richly productive district, on the Bay of Cadiz, and at the mouth of the Guadalete, 9 miles S.W. of Xeres by rail. It is the chief place of export for the Xeres wines, and characteristic of the town are the Bodegas in which the wine is stored, lofty buildings with very thick walls, pierced by narrow apertures. The Calle Larga, about a mile long, is the finest street, and the town is now girt by beautiful promenades. P. supplies drinking water to Cadiz, with which place it has communication three times daily by steamer. The May bull-fights of P. are among the most celebrated in Spain. In 1874 the total export of wine was 2,036,006 gallons, of which 1,126,461 were to England, including 835,401 to London. P. also manufactures leather, soap, hats, brandy, and liqueurs. Pop. 17,300. P. is the *Portus Menesthei* of the Romans.

Puerto Principe, a town in Cuba, W. Indies, 10 miles inland from its harbour, Las Nuevitas (on the N. coast of the island), but connected with it by railway. It was originally founded by Velasquez (1514) close by the sea, but has been thrice removed further inland. Pop. 30,000. Las Nuevitas exports tobacco, sugar, and molasses.

Puerto Rico, a Spanish island in the W. Indies lying E. of Hayti, and belonging to the group of the Great Antilles. It has the form of a parallelogram, and is 100 miles long by 40 broad. Area 3550 sq. miles, estimated pop. (1877) 635,000, rather more than half of whom are whites. (See *Consular Report*, 1877.) The interior of the island is occupied by a broad mountain mass with an average height of 1600 feet, but the highest summit of which rises to 3686 feet. On the S. and E. the mountains descend with steep slopes to the sea, but on the W. and N. the descent is much more gradual, and there is a fertile plain 5 to 10 miles wide between their bases and the sea. From the central chain many spurs run N. and S., separated by fertile valleys, which are abundantly watered and well wooded. Many small streams flow from the central watershed on all sides, of which the chief are the Manati, Loisa, Trabajo, and Arcibo on the N. The soil is remarkably fertile, and the higher districts are well suited for European products. The climate is healthy, and more favourable for Europeans than that of any other of the W. Indian islands. The principal crops are sugar, tobacco, coffee, and cotton, of which the finest qualities are produced. Cattle and sheep are also extensively reared. P. has great commercial activity, through the ports of San Juan, Ponce, and Mayaguez, in spite of heavy taxes and obstructive customs regulations. The means of communication within the island are still of the worst description, and public works are almost unknown. In September, 1876, the island was visited by a severe hurricane, which did much injury to property and destroyed many of the crops. For some years previous to 1876, severe droughts have materially interfered with the productiveness of the island, especially in the rich Guayama and Ponce districts. P. is independent of imported labour, with its vast population. Slavery is now quite extinct, the three years' term of enforced contract for the *libertos*, or freed slaves, having expired in April 1876. The relative wealth of P. may be seen by the fact that while its area is less than one-sixth that of Ceylon, it produces two-thirds as much; and though considerably less than Jamaica, it more than doubles it in the value of its products.

The total value of its exports in 1876 was:—Sugar, £988,834; molasses, £184,991; coffee, £1,178,949; tobacco, £197,157; cotton, £3179; hides, £13,702; rum, £498; cattle, £71,810; fruit, £2927; wood, £4032; total, £2,646,077. The total value of the imports for the same year cannot be ascertained, as they are included in those of Cuba. In 1876 there entered its ports,

in the direct trade from and to Great Britain and the British colonies, 143 vessels of 18,858 tons, with cargoes estimated at £199,468; and cleared 116 vessels of 18,577 tons, with cargoes valued at £259,330; and in the carrying trade in British vessels from and to other countries, there entered 173 vessels of 35,707 tons, and with cargoes valued at £89,112; and cleared 214 vessels of 41,377 tons, and cargoes with value estimated at £264,836.

P. was discovered by the Spaniards in 1493, and has since remained uninterruptedly under their rule. The government is administered by a captain-general, with an adviser for civil affairs. Police and municipal affairs are subject to two courts of Cabildo, and in each of the seven departmental towns is an alcalde mayor.

Puff Adder (*Viper* or *Clotho arietans*), a species of *Viperine* snakes, belonging to the family *Viperidae*, and distinguished by its habit of inflating the skin of the neck when irritated or alarmed. It occurs in S. Africa, and attains a length of 4 or 5 feet. The head is short, flattened, and even broader than is usual in the *Viperidae*. The P. A. is of a brown hue variegated with darker patches, and with white markings. It is a deadly reptile, and lies concealed amidst sand with its head protruding, but is said to be readily killed by oil of tobacco or tobacco-juice.

Puff Ball, from resemblance to a powder-puff, is a name that has been adopted for a genus of Fungi called *Lycoperdon*. *L. giganteum*, the giant P. B., has in the young state a soft and smooth outer covering like kid-leather, becoming a dingy olive when old. It occurs locally in pastures, attaining a very large size; and when quite young is one of the best fungi to eat, if cut into slices and fried. The dry mass of threads and spores is used as a styptic, and the fumes have the effect of chloroform. The genus is represented abundantly in most countries, *L. calatum*, or the collapsing P. B., and *L. gemmatum*, the warted P. B., being the most common in Britain.

Puff Bird. See BARBET.

Puffendorf, Samuel, was born at Chemnitz, in Saxony, January 8th, 1632. The son of a Lutheran clergyman, he studied theology and afterwards law at Leipsic, and in 1656 repaired to Jena, where he devoted himself to the study of the Cartesian philosophy, under the influence of Erhard Weigel. From Jena he went to Copenhagen as tutor in the family of the Swedish ambassador. At Copenhagen he occupied his leisure in the composition of a work on general law, to combine the principles of Grotius, Hobbes, and others with discussions of his own, and the result was the *Elementa Jurisprudentiæ Universalis*, published at the Hague in 1660. This book, harsh in style, but original and profound, was dedicated to the Elector-Palatine Karl Ludwig, who created at Heidelberg a chair of the law of nature and of nations, placed Puffendorf in it, and entrusted him with the education of his son. P.'s lectures drew crowds, and revived the languishing prestige of the University. His next work was *Severini a Monsambano De Statu Imperii Germanici* (Geneva, 1667), in which he severely criticised the constitution of Germany. It was quickly translated into the principal European languages, and was forbidden circulation in Austria, where it was burned by the hangman. P.'s greatest work followed, *De Jure Natura et Gentium*. This was published in 1672 at Lund, whither he had betaken himself two years before to avoid German persecution. Subsequently the King of Sweden appointed him Councillor of State and royal historiographer, and he removed to Stockholm. Of his other works only two are ever referred to now—*Commentarii de Rebus Suecicis ab Expeditione Gustavi Adolphi usque ad Abiicationem Christinae* (Utrecht, 1686); and *Commentarii de Rebus Gestis Frederici Wilhelmi Magni, Electoris Brandenburgici* (Berlin, 1695). P. died October 26th, 1694, at Berlin, where he had latterly lived in the court of the Elector of Brandenburg. The best edition of the *De Jure* is that of Leipsic (2 vols. 1744). There is an English version by Kennet (Lond. 1749); but Barbeyrac's French translation (Amsterdam, 2 vols. 4th, 1712), with notes, is most used.

Puffin (*Fratercula* or *Alca arctica*), a species of *Natatorial* or swimming birds, belonging to the *Alcidae* or auks, and common on many British coasts. It attains a length of 13 inches, and breeds in April and May. The colour is a general black or very dark brown variegated with white. The wings

are represented by mere rudiments, but although useless for flight they are serviceable in swimming and diving. The P. lays a single egg of white colour, the egg being deposited in some deserted rabbit-burrow. The beak of the P. is large, and somewhat ungainly. Hence the name of 'Coulter Neb' applied in Scotland to this bird from the resemblance of the bill to the 'coulter' of a plough. As in other auks, the legs in the P. are placed far back on the body, so that in a sitting posture the bird appears erect.

Pug Dog, a variety of dogs usually kept as pets, notable for the breadth of the muzzle and for the black snout. The hair is short, and in pure-bred dogs is of a yellowish colour mixed with black. Pug dogs resemble the bull-dogs in appearance. They are as a rule of gentle disposition and frolic with children. Foreign species of P. D. may have long silky hair.

Pughe, William Owen, born at Llanfihangel-y-Pennant, in Merionethshire, August 7, 1759, at the age of seventeen came to London, where he found a patron in Owen Jones (q. v.). With him he edited the poems of Dafydd ap Gwilym (1789), and at his cost produced a Welsh and English Dictionary (2 vols. 1793-1803), a work, says Williams, 'ruined by hobby-horisms, a horrid cacophony, and a barbarous orthography.' P. also wrote a *Cambrian Biography* (1803), translated into Welsh the *Paradise Lost* and other poems, and was editor of the *Cambrian Register* (1796-1818) and a Welsh magazine, *Y Greal*. He was a Fellow of the Society of Antiquaries, a D.C.L. of Oxford (1826), and one of Joanna Southcott's 'four and twenty elders.' In 1806 he returned to Wales, and died at Talyllyn, near Dolgelly, June 4, 1835.

Pugilism (Lat. *pugilatus*), fighting with the fists for money, according to the rules of the English prize-ring. Ancient pugilists fought with the cestus, strips of leather wound round the fist and the lower part of the arm, and sometimes with knobs of metal over the fist. The right arm was chiefly used to strike, and the left to ward off blows. Wrestling was not allowed. For many centuries the fist has played a leading part in single-handed encounters in England, but it was in the reign of George I. that P. developed the extraordinary and widely-extended popularity which characterised it for a century and a half. Broughton, for eighteen years champion of England, laid down about 1740 regular rules for P., in order to secure fair-play, which have not been greatly altered since. He is also said to have invented boxing-gloves. Jackson, champion in 1795, is esteemed as the most scientific boxer on record, and his classrooms in Bond Street were thronged with the golden youth. Lord Byron and Shaw the Life Guardsman among others first learned to use their fists under this master, who insisted as necessities of good boxing upon personal contempt of danger and self-confidence, accuracy in judging distances when striking, and great activity of limb as well as arm. The Regent was a warm patron of the 'noble art,' and the allied sovereigns, as well as the Emperor Nicholas were entertained on their visits to this country with exhibitions of this national sport. See article BOXING. But about twenty years ago the ring degenerated into a thoroughly vile state, and this brutal amusement is now viewed with such thorough aversion, that no prize-fight could take place without prompt and severe punishment. Professional pugilists, as may be imagined, are of a low class and character; and though the training they are obliged to undergo is of the most healthful description, they are exceptionally short-lived. With the stakes, sometimes very high in amount, which they win, they frequently retire to start public-houses, or to take chairs in back parlours where fisty encounters form the amusement of a 'Harmonic' evening. The ring has an extensive slang peculiar to itself, and its members are familiarly known as chickens, crushers, &c., by their admiring votaries. See Egan's *Boxiana*, or *Sketch of Ancient and Modern P.* (5 vols. Lond. 1818), *Fistiana* (Lond. 1863), *American Fistiana from 1816 to 1873* (New York, 1876). *Bell's Life*, London, and Wilkes' *Spirit of the Times*, New York, are the principal pugilistic papers in this country and America, and in their columns long and detailed accounts of all the great matches are given.

Pugin, Augustin, an architectural draughtsman, born in France in 1762, came to London after the Revolution, and was engaged for some time in the office of Nash the architect. He afterwards opened an architectural studio and school. P. published a number of works which did much to develop a widespread

taste for medieval architecture in this century; e.g., *Specimens of Gothic Architecture* (114 plates, 1821-23), *Architectural Illustrations of Normandy* (1825-28), &c. He died December 19, 1832. — **Augustin Welby Northmore P.**, a distinguished architect, son of the preceding, born in London, March 1, 1812, was educated at Christ's Hospital. Possessing a decided genius but erratic temperament, he became a proficient in various kinds of artistic work, and led a roaming life till 1834, when he joined the Roman Catholic Church and became one of its most devoted adherents and ablest adorners. His treatise on *Gothic Furniture and Iron and Brass Work* appeared in 1835. Such works as *Contrasts* (1836), *True Principles of Pointed or Christian Architecture* (1841), *Apology for the Revival of Christian Architecture* (1843), were published at the time of the great Tractarian movement, and his eloquent advocacy of Gothic architecture caused his services to be eagerly sought throughout the country. He refused, however, to lend his ecclesiastical services except to those of his own communion. He designed a vast number of Roman Catholic churches and buildings, including five cathedrals. Among his secular designs, the internal mouldings, fittings, furniture, and decorations of the Houses of Parliament hold a high place. He published a *Glossary of Ecclesiastical Ornament* in 1844 and a work on *Floriated Ornaments* in 1849. He served as a juror in the Great Exhibition of 1851. His herculean labours and probably his religious asceticism brought on an attack of mental aberration in 1852, and he died at Ramsgate, 14th September of that year. See *Recollections of A. W. N. P. and his father A. P.* by B. Ferrey (1861). — **H. Welby P.**, eldest son of the preceding, born in 1834, succeeded to his father's practice, and is well known as the architect of St. Michael's Priory, Belmont; the church of St. Peter and Paul at York; the magnificent mansion of Scarborough Hall, Lancashire, &c. For the erection of the church of Notre Dame de Dadezeille he received from the Pope the Order of St. Sylvestre. He died at Ramsgate, 5th June, 1875.

Pulci, Luigi, a famous Italian poet, was born at Florence 3d December 1431. He enjoyed the friendship of Lorenzo de Medici and Poliziano, and produced his best work *Il Morgante Maggiore* (Ven. 1481) at the bidding of Lorenzo's mother, Lucrezia Tornabuoni. It is a mock-romantic epic in twenty-eight cantos on the Quixotic deeds of Rinaldo and the giant Morgante. P. also wrote a number of sonnets. He died at Florence in 1487. His poems are written in a pure and rich Tuscan, but their versification is harsh and unequal. The best edition of *Il Morgante Maggiore* is that published, with a biography, at Florence 1732 and Milan 1806. — P.'s two brothers, **Bernardo** and **Luca**, have also made themselves known by their poetical efforts, the former by an elegy on the death of Cosmo de Medici and a poem on the passion of Christ; the latter by a pastoral romance, *Driadeo d'Amore* (Flor. 1479), and an epic romance, *Il Cirisso Calvano* (Flor. 1490), which was probably the first in the Italian language.

Pulex. See FLEA.

Pulicat (Palicat), Lake of, an extensive inlet of the sea, or salt-water lake, between the districts of Chingleput and S. Arcot, on the Coromandel or E. coast of the Madras Presidency, British India. The lake is 33 miles in length from N. to S., and 11 miles in breadth where widest; it receives the drainage of 6700 sq. miles. It contains several large islands, on one of which is the town of P., often mentioned in the history of the wars in the Carnatic. An important line of water communication leads through the lake into the district of S. Arcot. There is a good anchorage 2 miles off the sandy beach that separates it from the sea.

Pul'kova, a village 9 miles S. of St. Petersburg, the seat of the Imperial Nikolai Observatory (founded in 1838), whose valuable library contains an almost complete collection of the MSS. of Kepler. P. lies at the foot of the P. mountains, which slope steep down to the Neva valley, and afford a magnificent view of St. Petersburg. Pop. 600. See Piazza Smyth, *Three Cities in Russia* (2 vols. Lond. 1862).

Pull'ey is a simple machine consisting of a wheel movable about an axis, and having a groove cut in the circumference, over which a cord passes. The axis is supported by the *block*, which may be either fixed or movable. A single P. serves

merely to change the direction of motion; but if the cord is passed under a second P. and then fixed to the block of the first, a certain *mechanical advantage* is gained, in virtue of which a mass may be raised by the action of a force less than the weight of the mass. In this particular case suppose the upper P. fixed, and a mass *M* attached to the free extremity of the cord. Let also a mass *W* be attached to the lower P. It is required to know what relation must exist between *M* and *W*, so that there may be equilibrium; it being postulated that the system is frictionless. There will be equilibrium when the work which *M* would do in falling through a certain height is equal to the work done upon *W* in raising it through that height through which the lower P. moves when the free extremity of the cord is depressed through the former distance. Now, if the lower P. is raised through, say, one inch, each segment of the cord connecting it to the upper P. is shortened by the same amount, therefore the portion of the cord going round the pulleys is shortened by twice that amount, and therefore the free extremity falls through a distance of two inches. But the work which P does is the product of the weight of *M* into the height through which it falls; and the work done upon *W* is the product of its weight into the height through which it is raised, and this height is, as we saw above, equal to *twice* the former height. Hence, for equilibrium, the weight of *M*: weight of *W*: : 1 : 2 or the weight of *W*=twice the weight of *M*. By such an arrangement, then, it is possible to balance one force by another half its value; and by exerting a slightly greater force than the latter, it is possible to raise the former. By increasing the number of pulleys, the mechanical advantage is increased. There are various ways of arranging pulleys, which are known by special names and are applied to special purposes; but in all cases the advantage gained may be theoretically calculated by the application of the principle of work done. Practically, of course, the rigidity of the rope and the friction of the bearings considerably diminish the mechanical advantage. The various modifications usually known as systems of pulleys are given in detail in all text-books on elementary mechanics.

Pulmonaria, Pulmonifera, names applied in zoology (1) to the higher group of the *Arachnidans*, including the spiders and scorpions which breathe by means of *pulmonary sacs* or *lung sacs*, and (2) to the section of the class *Gasteropoda*, represented by the snails and slugs, which breathe air directly from the atmosphere. Air is admitted to the pulmonary sacs of the Arachnidans by apertures called *stigmata* or *spiracles*; and by a special aperture to the pulmonary sac or chamber of the Gasteropods.

Pulo Nias, the largest of a chain of islands lying off the W. coast of Sumatra. Area, 2751 sq. miles; pop. estimated (1878) at 500,000. The surface is mountainous, rising in the S. and S.W. to 2000 feet. The chief rivers are the Modjeija on the N., the Sohu and Idanoi on the E., and the Moroo and Nojo on the W. Earthquakes are frequent. The temperature ranges from 68° to 75° Fahr. The products are maize, sweet potatoes, sago, rice, and cocoa-nuts. The Dutch E. India Company in the 17th c., and the English in 1820, concluded commercial treaties with Nias chiefs, and in 1857 the whole island was taken possession of by the Dutch Government, who have yet (1878) only one fixed settlement therein—viz., at Gunong Sitoli on the E. coast. See Verbeek and Nagel in the *Jaarboek van het Mijnwezen in Ned. O. Indië* (1874 and 1876).

Pulo-Penang. See PENANG.

Pulpit (Lat. *pulpitum*, Gr. *loggeion*) in Greek and Roman theatres was the part of the stage nearest the orchestra, and elevated above it, from which the actors spoke. In the Christian Church sermons were first delivered from the altar steps, and this place was named P. This name was next given to the elevated stage in churches, monastery-refectories, cloisters, &c., formerly in the first always placed in the nave, attached to a wall, pillar, or screen. Of the ancient wooden and stone pulpits in England, the former are usually polygonal, having panels adorned with feathering, tracery, &c. After the Reformation the number of wooden pulpits here was immensely increased. The pulpits of Continental churches are often very large and most elaborately adorned with architectural and sculptured ornaments, especially the crucifix.

Pulque, a species of beer or fermented liquor prepared in Mexico and Central America from the juice of the *Agave Americana* and allied species. The juice is obtained in abundance by removing the flowering stem when it is on the point of expanding. P. is not a pleasant beverage to those unused to its peculiar smell and flavour. A spirit is also distilled from it.

Pulse, the name applied to the movement of the *arteris* or bloodvessels originating from the left ventricle of the heart, and carrying pure blood throughout the body. The muscular force of the left ventricle of the heart in propelling blood through the vessels is somewhat impeded by the capillary circulation—that is, the jet or flow of blood cannot pass at once and directly onwards into the smallest bloodvessels. Hence part of the force is expended on the elastic and contractile walls of the arteries, with the result of producing the movements which constitute the P. of each bloodvessel. When the artery is affected by the forcible contraction of the left ventricle, it increases in both length and diameter, but owing to the muscular and contractile structure of these walls the bloodvessels recoil after the ventricular contraction has passed away. The P. calculated as arising from any one particular part of the heart is not perceptible at the same time in all the arteries. The carotid P. in the neck, for instance, will be felt before the radial at the wrist, and the radial in its turn before the P. say in the dorsal artery of the foot. The differences in the time of pulsation of the arteries naturally vary with the distance from the heart. Probably, however, the greatest difference between the P. of any two arteries is not greater than the one-sixth or one-eighth of a second. By means of an instrument called a *sphygmograph*—consisting of a lever moved by the P. and of a clock-work arrangement causing a card to move whilst a second lever is made to trace a line (corresponding to the P.) in the card—the graphic 'form' of the P. can be ascertained. A healthy P. gives a tracing in which a short firm up-stroke exists with a slanting but firm down-stroke. A wavering and indented down-stroke, on the other hand, would indicate a weak P. The P. is affected by the various circumstances which modify the action of the heart; hence the value of the P. as a symptom of disease. Age, sex, mental condition, disease, temperament, and even posture, influence the heart's action and produce variations in the P. In some persons the P. appears to exhibit constitutional peculiarities with which the sphygmograph has made us familiar.

Pulse (Lat. *puls*, Heb. *phul*), a pottage of meal and peas; but is now limited to the seeds of various *Leguminosæ* cultivated for food. Of such, *Phaseolus* furnishes some of the most useful. *Cajanus* yields a P. in great and general esteem in India, forming in some districts the prevailing article of diet of all classes. *Dolichos*, *Lablab*, *Cicer*, and *Canavalia* also furnish important P. See KIDNEY-BEAN, CHICK-PEA, and PIGEON-PEA. The ordinary peas and beans may also be termed P.

Pulta'va, or **Poltava**, a government of S. Russia, bounded N. by Kiev, S. by Kherson and Ekaterinoslav, E. by Kharkov, and N. by Tchernigov. Area 19,261 sq. miles; pop. (1870) 2,002,118. P. belongs to the basin of the Dnieper, whose chief affluents are the Sula, Psiol, Vorskla, and (on the S. frontier), Orel. Except on the swampy flats on the left banks of the river the land is very fruitful, and yields abundant fruit, corn, tobacco, and pasturage for cattle. Seven per cent. of the surface is covered with forest.—P., the capital, on the right bank of the Vorskla, consists of an old part in the middle, with additions grouped around it in the form of a fan. It has a cathedral and twelve other churches. A monument commemorates the battle of 8th July 1709, in which Karl XII. of Sweden was decisively defeated by the Russians. The fair held at P. from the 20th to the 31st July is the third greatest mart for the internal trade of Russia. In 1871 the goods sold were valued at £2,448,800. Pop. (1870) 33,979.

Pultusk', a town of Russia, in the Polish government of Lomza, on the river Narev, 31 miles N. of Warsaw, has the castle of the Bishop of Plock, and a pop. of (1870) 7916. P. was (1703) the scene of a victory of Karl XII. of Sweden over a Saxon army under General Steinau, which was almost entirely taken prisoner; and here the French under Lannes, after a sharp action, compelled the Russians under Bennigsen to retreat (26th December 1806).

Pu'ma, or Cougar (*Felis* or *Leopardus Concolor*), a species of Feline Carnivorous animals occurring in N. and S. America,



Puma.

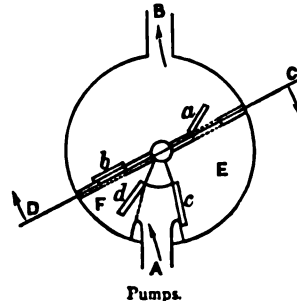
and by some naturalists named the 'American Lion.' In general appearance the P. resembles a lioness. It has no mane, and its colour is reddish brown above and white below. The average length of the animal is from 6 to 8 or even 9 feet. It is stealthy in its habits, but seldom or never openly attacks man. It effects great destruction in sheepfolds, and climbs and swims with facility. By American farmers the P. is named the 'Panther,' or 'Painter.'

Pu'mice (Lat. *pumex*, orig. *spumex*, 'what is spit or spumed out'), the name of the light cellular ejections of a volcano. It is very porous, has a fibrous appearance, and is so light as to float on water. Being almost wholly composed of silica and alumina, it is much used for polishing and cleaning purposes. The chief localities where it is abundant are the islands of Lipari, Ponza, Ischia, and Vulcano, lying in the Mediterranean, to the N. of Sicily.

Pump'kin, or Pom'pion. See GOURD.

Pumps depend for their action upon fluid pressure. There are various kinds of P.—air-pump, suction-pump, force-pump, &c., named according to the purpose for which they are used, or the principle upon which they work. The structure of the air-pump is described under that heading. The ordinary suction pump consists of a hollow water-tight cylinder, in which a movable piston fits, provided with a valve opening upwards. At the lower end of the cylinder, which dips into a reservoir of water, is another valve, also opening upwards. The piston is worked by a convenient lever handle. Suppose, to begin with, that the tube contains only air. When the piston is pushed down, the increased pressure will force a certain quantity of air out by the only possible outlet, the valve on the piston. If the piston is now raised, the pressure of the air on the tube is diminished, and the constant atmospheric pressure exerted upon the external surface of the water in the reservoir forces water through the lower valve into the tube. This water once in cannot escape again, because the lower valve opens only upwards. A second down and up stroke of the piston is followed by the influx of more water into the tube; and at length, after several strokes have been given, the column of liquid reaches above the lowest position of the piston, which then raises this upper portion during its up stroke to the opening in the side of the tube by which the water escapes. The true agent in the suction pump is therefore the pressure of the atmosphere. The water in the tube rises simply because a partial vacuum is formed above it by the motion of the piston. If it were possible to form a perfect vacuum, the water would rise to a height of about 33 feet, since the pressure of the air can support a column of water that height. Practically, however, suction P. are useless for depths exceeding 24 or 25 feet; consequently for greater depths other methods must be adopted. The force-pump is employed instead. It differs from the suction-pump in having the discharge pipe entering *below* the piston, which has no valve. A valve opens upwards as before into the piston tube, and a second valve opens outwards into the discharge pipe. When the piston is pressed down, the compressed air is forced through this valve into the discharge pipe. When the piston is raised, water pours in from below to fill up the partial vacuum. When the piston is again forced down, this water is pressed out by the side valve into the discharge tube. By a succession of strokes as much water is forced into the discharge pipe as may be required. In both these simple P., it is evident that the water is discharged in a series of jerks. For many purposes this is objectionable; and to remedy this fault various schemes have been devised. In the simplest double action force-pump, half the water which in the single action pump would be wholly forced into the discharge pipe, finds its way into the tube above the piston partially filled by the piston rod. When the piston is raised it forces this quantity of water into the discharge pipe. In this way water is being forced out

during both the up and the down stroke. There are many modifications of this principle, one of which, invented by Worthington of New York, merits special notice. In it the piston works horizontally in a chamber which is provided with a number of ingress and egress valves. Whatever the position of the piston, the chamber is divided into portions, which, during the reciprocating motion of the piston, are varying continuously in volume. The portion at that end towards which the piston is advancing at any instant is of course diminishing in volume, and the water in it, therefore, is being forced out by the egress valves, its ingress valves being closed. At the same time, the other portion, which is increasing in volume, is being filled, because of the diminishing pressure, by water pouring through the ingress valves from the reservoir. This water during the return stroke is then forced out, while the other portion of the chamber is filling. The old-fashioned hand fire-engine is a double action force-pump. It consists of a cylinder, in which the shaft CD works with a rocking motion. When C is moving down, the valve *c* is shut, and the water in E escapes by the valve *a*. D is at the same time moving up, and forces the water in the upper portion through the discharge-pipe B. Simultaneously the pressure is diminishing in F, and therefore the valve *d* is forced open by the intruding water from A. During the reversed stroke *a* and *d* are closed, and *b* and *c* are open, and water is impelled through B as before. This modification is due to Bramah. In the *centrifugal P.* of Appold, Gwynne, Bessemer, and others, water is introduced at the centre of a wheel which rotates in a cylinder; and by this rotatory motion the fluid is driven out to the circumference along the vanes of the wheel, and thus gains sufficient tangential velocity to impel it along the discharge pipe. In all P. there is always great loss, arising mainly from the velocity of the liquid and the friction of the bearings. The Archimedian Screw (q. v.) is a kind of pump which works by gravitation.



Pumps.

Pun (variously derived from Fr. *pointe*, 'a point or witticism,' and Old Eng. *punian*, 'to bruise') is defined by Addison (*Spectator*, No. 61) as 'a conceit arising from the use of two words that agree in the sound but differ in the sense.' It constitutes, according to Wendell Holmes, the crime of 'verbiicide, i. e., violent treatment of a word with fatal results to its legitimate meaning, which is its life.' But though most good and great writers concur with him in reprobating this '*sottise des gens d'esprit*,' it has been indulged in at all times and by all manners of men. Aristophanes' comedies are only less full of *doubles entendres* than a modern burlesque; Cicero bores one with his everlasting jokes on *Verris*; Elizabeth, rallying *Burleigh* on his *burlesqueness*, remarked that he would make *less stir* in our realm than my Lord of *Leicester*; grave Puritans *baited* the Pope's *bull*; and Shakespeare, ever faithful to nature, makes some of his characters punsters, as others are liars and braggadocios. Even Dr. Samuel Johnson, although he said that 'the man who would make a P. would pick a pocket,' himself fell into the fault which he had often condemned in others, and was guilty of one P., and that of a very heinous character. Those who have a taste for criminal literature, and would read of the exploits of those deliberate and professional punsters, Sydney Smith, Hook, Hood, Montmaur, and the Marquis de Bièvre, may study Rowley's *Puniana* (2 vols. Lond. 1874) and L. Larchey's *Les Joueurs des Mots* (Par. 1866). Then, as an antidote, let them turn to pp. 12, 15, and 293 of Holmes' *Autocrat of the Breakfast Table* (new ed. Bost. 1877).

Pu'na, the name given in S. America to the bleak tablelands of Peru and Bolivia, whose elevation above the sea-level varies from 12,000 to 18,000 feet. Their surface is stony, and devoid of vegetation, while animal life is represented only by the condor and rare specimens of the vicuña. The *Despoblado*, or unpeopled region of Peru, called also the Black P., has an average breadth of 150 miles, and is crossed only by certain tracks or trails, which are strewn with the skeletons or dessicated bodies of men and

animals that have perished in traversing this inhospitable region. Caverns, and a few wretched huts of refuge furnish the only shelter from the piercing winds which sweep over these dreary plains. The lower P. of Bolivia supports a scanty Indian population.

Punch, a tool of steel for piercing holes in various materials, or for cutting out shapes or designs by percussion or pressure. In its simplest form, as used by blacksmiths and other operatives for perforating thin metal plates, the P. is a short piece of solid steel, with a flat point, and it is driven through the plate to be perforated by striking the head with a hammer, there being a hole in the anvil or other support directly under the plate to receive the pieces punched out. In many cases the P. has its lower end in the form of a hollow cylinder with cutting edges, adapted for cutting out wafers, lozenges, paper discs, &c.; while in others the end of the P. is shaped as a letter, number, or ornamental design. A saddler's or shoemaker's P. has lever arms like pincers or pliers. Powerful punching-machines, worked by hydraulic or steam power, are in use for perforating boiler-plates, &c., for the reception of rivets or screws, and in connection with these machines, Kennedy's new spiral P. has recently been introduced into this country. This P., instead of being flat-ended, has its point constructed in a helical form, which cuts with a shearing action; and experimental tests on the tensile strength of steel boiler-plates perforated with the ordinary flat P. and with the spiral P. have yielded results greatly in the favour of the latter. P. is also the name given to an instrument used by die-sinkers in forming duplicate copies of an original coin or medal die. See DIE-SINKING.

Punch, the principal character in the favourite puppet-show of *Punch and Judy*. The name, though perhaps crossed in its orthography with the English word *punch*, is probably a diminutive of the Italian *Policinella* or *Pulcinella*, which is said in Gallani's *Neapolitan Vocabulary* to have been called after Puccio d'Aniello, a buffoon of Acerra, whose eccentricities became a common subject for dramatic treatment in Naples, the character being made the medium of local and political satire. The original puppet *Policinella* had a face like the ancient comic mask, the nose being like the beak of a bird. His functions were similar to those of the Vice of the old moralities and the clown of later date. He was a roguish chatterbox and an amorous cynic. The drama of *Policinella* owes its origin to Silvio Fiddello, an Italian comedian, who about the year 1600 made P. the perpetrator of a domestic tragedy followed by supernatural retribution, in a play of a broadly farcical character. *Policinella* was originally straight and erect in body, but in his travels through France and England he lost much of his personal comeliness. From a young and joyous Don Juan he was transformed into an obese and humpbacked Falstaff, and on his appearance in this country he threw away the gay satire of Italy for the rough practical humour of England. In the reign of Queen Anne he became a public and highly popular character. The *Tatler* and *Spectator* frequently prattled about him. A letter in No. 14 of the latter, purporting to come from the sexton of St. Paul's, Covent Garden, complains of the show outside thinning the congregation. In addition to his own legitimate drama, he played as clown in many other puppet-shows. Since then he has been a perpetual pet of the nursery, and the acknowledged prince of puppets. Two men are usually engaged in the street exhibition, one carrying the theatre, and the other the box of puppets. The forefinger is used to move the head of the puppet, and the second finger and thumb the arms. A full account of the history of P., with the words of his *Tragical Comedy or Comical Tragedy*, taken from the lips of a famous showman by Mr. Payne Collier, with 24 illustrations by George Cruickshank, is published under the title of *Punch and Judy* (5th ed. 1870). A similar show has been popular in China for many years.

Punch is an intoxicating beverage, now much less frequently seen than was the case about the beginning of this century. It is composed of alcoholic liquor, hot water, and sugar, flavoured with acid fruit juices. For spirits, wine is sometimes substituted, sometimes both are used, and the beverage becomes a complex preparation like modern American 'drinks.' Rum P. is a staple beverage among sailors. Scotch 'toddy' is a form of P. made with whisky, generally, however, without any fruit juice being employed.

Punctua'tion (Lat. *punctum*, 'a point'), the art of dividing written composition into sentences and clauses by stops or points, so as to bring out the sense and relation of the words, and help the reader to a proper enunciation. A method of P. is said to have been devised by the grammarian Aristophanes (3d c. B.C.), but the present system was the invention of the early printer Manutius (q. v.). To him we owe the period, colon (Gr. 'limb'), semicolon, and comma (Gr. 'segment'), the marks of interrogation and exclamation, the parenthesis and dash, as well as the hyphen, apostrophe, and quotation marks, which are sometimes, though improperly, included in P. These points are used almost everywhere in the same manner, the chief exceptions being that in Greek a turned full-stop (·) supplies the place of the semicolon, which stands for the sign of interrogation, and that in Spanish the marks of interrogation and exclamation precede the sentence.

Pun'dit (*pandit*), the Indian title for a learned Brahmin, especially one who makes some branch of Sanskrit learning his special study, and teaches it. Study and instruction form one common religious duty, and the same word is applied to the student and the teacher. The P. is highly respected; he is abundantly supported by charity or endowments, and demands no remuneration. Some of the students of the Veda are able to repeat the whole by heart, numbering more than 10,000 lines; others apply themselves especially to logic. P. has, in some cases, become a proper name.

Pu'nica. See POMEGRANATE.

Punishments of officers and soldiers in the army and navy are detailed in the Mutiny Act, the Articles of War, and the Queen's Regulations. The commanding officer has only the power of reprimanding a commissioned officer, who must be tried by a court-martial. He may be sentenced to death, degraded, or cashiered, or in the navy placed at the bottom of the list of officers of his grade. The men for minor offences may be admonished, imprisoned for short periods, undergo punishment drill or stoppage of leave and pay. For more serious offences, when they are tried by court-martial, they may be dismissed the service, imprisoned, or be sentenced to penal servitude, or death. The extreme penalty of the law takes the form of shooting if for an offence against discipline, or by hanging if for a heinous crime. Flogging has been abolished except when on active service in the army, but is still occasionally resorted to in the navy. A non-commissioned officer can only be reduced to the ranks and punished by sentence of court-martial.

Punjaub (*Panjab*, 'the area between the five rivers,' of Doab), a province on the N.W. frontier of British India, bounded S. by Scinde and Rajputana, N. by the upper ranges of the Himalayas, E. by the river Jumna, separating it from the N.W. Provinces proper, and W. by the Suleiman mountains, which shut off Afghanistan; area, 103,748 sq. miles, of which only 34,438 are cultivated; pop. (1868) 17,596,752, of whom 53 per cent. are Mohammedans, strongest in the N.W. and W.; 35 per cent. Hindus, chiefly in the N.E. and E.; and 6 per cent. Sikhs, centering round Lahore and Amritsar. Ethnically the Juts or Jats (q. v.), supposed to be of Scythic origin, number more than three millions, the Rajputs nearly one million, Brahmans 800,000, Pathans (q. v.) or Afghans 700,000, Gujars 500,000. This is apart from dependent and feudatory states and the frontier tribes. The native states, of which the chief are Cashmere, Bhawalpur, and Pattecala, are 36 in number; estimated area, 104,000 sq. miles; pop. 5½ millions; revenue, £1,800,000; military forces, 50,000 men; tribute to British Government, £28,000. The frontier tribes, of whom the principal are the Swatees, Afreedees, and Wazirees, and who are all either Pathans or Beluchees, are estimated to number 130,000 fighting men. The P., as an administrative unit, under a Lieutenant-Governor of its own, is divided into 10 divisions, 32 districts, and 132 *tahsils* or subdivisions. This tract, however, is in every direction more extensive than the old province known to geography and to history. This latter was strictly limited to the area watered by the five rivers, the Sutlej, Beas, Ravi, Chenuab, and Jhelum. But the kingdom acquired by conquest after the second Sikh war of 1849 extended across the Indus to the borders of Afghanistan, and N. up towards Chinese Tartary; while in 1858, after the Mutiny, a slice of Hindustan proper, including the capital of Delhi, was added to

the P. The climate is liable to extremes of heat and cold, and the rainfall is scanty. The soil is a vast expanse of alluvial clay and loam, everywhere covered or sprinkled with sand. Agriculture, therefore, is largely dependent upon irrigation, which is applied by the Persian wheel. Apart from the rivers and private canals, there were, in 1873-74, 991,000 acres irrigated; the total outlay by Government has been £1,827,000; and the net revenue (direct and indirect) £171,000, or more than 9 per cent. on capital. The chief Government canals are the Baree Doab and W. Jumna systems. The staple crops are—in the spring, wheat, barley, pulses, oil-seeds, vegetables, tobacco, and poppy; in the autumn, millets, maize, rice, cotton, sugar-cane, and indigo. Out of a total cultivated area of 19 million acres, nearly six millions were in 1874 under wheat, and more than four millions under *jowar* and *bajra*, the two kinds of millet. In Kangra district there were in the same year 28 tea-gardens, covering 3390 acres, and producing 526,000 lbs. The domestic animals are oxen, buffaloes, horses, camels, goats, sheep, and donkeys. The mineral products include iron, copper, antimony, gold, and lead; salt, saltpetre, and alum; building stone of all kinds, marble, slate, sulphur, petroleum, and coal. The total annual value of the manufactures is estimated at £5,300,000. The most important are cotton, silk, and shawl weaving; gold and silver lace, leather, iron, steel, jewellery, pottery, and glass. Careful statistics of all branches of trade are now collected. In 1874-75, the total imports were valued at £11,339,000, the exports at £5,612,000. The English piece-goods imported were alone valued at £7,000,000 sterling, of which much is redistributed from Delhi. The exports of grain of all kinds exceeded the imports by 131,000 tons; horns and hides were exported to the value of £1,043,000; *pashmina* or shawl goods were imported to the value of £233,000. There is a large transit trade with Central Asia, and also down the Indus to Kurrachi. The commercial centres are Delhi, Lahore, Multan, Amritsur, and Peshawur. Delhi has a pop. of 154,000, Amritsur 133,000, but Lahore with 98,924, the former capital of Runjeet Singh, is the seat of the British Government. In 1873-74 the imperial revenue was £3,458,000, of which about £2,000,000 came from land and £867,000 from salt; in addition, there were local receipts to the amount of nearly £1,000,000. The military force consists of 18,000 European and an equal number of native troops, with 97 guns under the commander-in-chief; and the P. frontier force of 12,000 men, maintained at a cost of £360,000, under the orders of the Lieutenant-Governor, for the control of the hill tribes. The police number 20,000 men, costing £300,000. There are altogether 1921 educational institutions, Government and aided, attended by 103,000 pupils, at a total cost of £124,000. The languages spoken are Hindustani, Punjabi, a dialect derived from the ancient Sanskrit, and akin to Hindi and Pushtu (q. v.), the language of the Afghan frontier, which has been ascertained to belong to the Iranian or Zend branch of the Aryan family. The length of roads, metalled and unmetalled, is 20,000 miles; of water communication, 2470 miles; and of railways, 687 miles were open at the close of 1875. Two important lines of rail are not yet (1878) finished—from Lahore to Peshawur, and from Multan to Kurrachi in Scinde. There are about 4000 square miles under the management of the forest department, the most valuable trees being deodara and other varieties of pine; in 1873-74 the receipts were £73,000, giving a net revenue of £13,000. The land settlement is made direct with the cultivators, grouped together in their indigenous village communities; the assessment is usually for a term of 30 years, and there are altogether about 2,000,000 cultivating proprietors, with recorded rights. The history of the P. is representative of the different races who have conquered India, and the plains between its rivers form the 'cockpit' of Hindustan. In 327 B.C. Alexander the Great advanced as far as the Sutlej, and the Græco-Bactrian dynasty founded by his general, Seleucus, which lasted till about 126 B.C., has left many remains. A Hindu dynasty was then restored, and the P. was at one time a stronghold of the Buddhists. In 1021 Mahmud of Ghuzni made Lahore the capital of a subject province; and the Mohammedans continued predominant, in successive waves of Tartar and Afghan conquest, until Runjeet Singh (q. v.) established a Sikh (q. v.) empire at the beginning of the present century. After his death, the recklessness of the *Khalsa* or Sikh army forced on a collision with the British; and after the second Sikh war, the P. was

permanently annexed, and the Maharajah Dhuleep Singh, the infant son of Runjeet, received a pension of £50,000 a year, which he now enjoys as a Christian country gentleman in Norfolk. A picked staff of civilians and military officers was chosen for the new administration, which has been of the most effective character. Even during the Mutiny of 1857-58 the civil population remained loyal throughout. The Bengal sepoys were either disarmed or promptly punished for rebellion, while the warlike Sikhs and Pathans reinforced the British army before Delhi. The chief names associated with this brilliant chapter in British annals are the Lawrences, Henry and John, Sir H. Montgomery, Sir H. Edwardes, Generals Nicholson and Abbot, Sir R. Temple, and Lord Napier. The P. is still administered as a non-Regulation province. It has recently (1878) been proposed to separate the outlying districts beyond the Indus, and form them into an independent frontier administration, together with the adjoining province of Scinde. See *Annual Blue Books on the Moral and Material Progress of India* (London); *Annual Administration Reports of the P. Government* (Lahore); Cunningham's *History of the Sikhs* (Lond. 1853); General Cunningham's *Ancient Geography of India* (Lond. 1874); *The Rajas of the P.* by Mr. Lepel Griffin (Lahore, 1870); *Handbook of the Manufactures and Arts of the P.* by Mr. Baden Powell.

Punjnud, the name given to the stream which conveys the united waters of the Punjab into the Indus. These rivers are the Sutlej, Beas, Ravi, Chenaub, and Jhelum. The total course of the P. is about 60 miles, in a S.W. direction, and it falls into the Indus opposite Mittunkote.

Punkah, the Indian name for a fan, derived from a Sanskrit word, meaning 'feather.' It is of two kinds—(1) The hand-fan, which is greatly in use among natives, and is not made to close like its European copy. It is sometimes highly ornamented, of peacocks' feathers, with a gold or silver handle, and it figures largely in state ceremonials. (2) The machine for cooling the air of rooms, universally used by Europeans. This consists of a framework fixed in the ceiling, from which depends a fringe or curtain. The framework moves on hinges, being set in motion by a rope pulled by a person outside. One of the grievances of Indian life arises from the fact that the 'P. puller' will fall asleep during the hot nights.

Punnah (*Pand*), the capital of a native state of the same name in Bundelcund, Central India, 110 miles S.W. of Allahabad. It is handsomely built of sandstone along the side of a tank, and contains many Hindu temples.—The *state* of P., which lies between the N.W. and the Central Provinces, has an area of 2555 sq. miles; pop. 183,000; revenue £50,000. The country is a tableland among the Vindhyan Mountains, and yields iron and diamonds.

Punt (Dutch *pont*, Fr. *ponton*), a small open boat of oblong form, flat-bottomed, and usually with square ends. It is mainly used in shallow waters, as on rivers and marshes, and is generally propelled by poles.

Pupa (Lat. 'a girl'), the second stage in the *metamorphosis* of insects. The P., or *chrysalis*, as it is also named, is quiescent and enclosed in a *cocoon* or in the larval skin. In some insects, however (e.g., grasshoppers, &c.), the P. is not enclosed, but active, and only differs from the adult by not having wings. The period during which insects remain in this state varies considerably.

Pupil. See AGE.

Pupil, Artificial, the name applied to an arrangement effected by oculists, in cases of disease of the eye, or where the vision is from whatever cause imperfect, with the view of rendering the pupil capable of adjusting itself perfectly to the admission or seclusion of light-rays. The formation of an A. P. is attended with difficulty. The pupil itself is the aperture in the *iris* (see EYE) through which the light-rays pass, the muscular fibres of the iris contracting or expanding so as to vary the size of the opening.

Pupillage, or Pupillar'ity. See AGE.

Pupils Protection Act. This is a Scotch 'Act of Sederunt' (see ACTS OF SEDERUNT), regulated and amplified by 13 Vict. c. 51, for the protection of the property of pupils (see AGE), and of those absent from Scotland, or of mental incapacity

(see CAPACITY, LEGAL). Under these Acts, every *Judicial Factor* (q. v.) must give security for his pecuniary transactions, and for performance of his general duties, regarding the estate of his pupil.

Pupil-Teachers are boys and girls in primary schools who are, in the first place, pupils, but who are also partly occupied in teaching. The English Elementary Education Act of 1870 requires that P.-T. be not less than thirteen years of age; that they be duly presented for examination to the inspector; and that they acquire certain certificates. Their engagement is for five years, at the end of which time they may be admitted into a training college. Their salary for the first year is about £10, and is increased at the rate of some £2, 10s. yearly. In 1874 there were in England and Wales 27,321 P.-T.

Puppets (Lat. *pupus*, 'a child,' Fr. *poupée*, 'a doll'), stage figures usually made of wood, worked by the hand or by wires or other mechanism. Their use is doubtless as old as the drama itself. The fantoccini (Ital. *fantino*, 'an infant') or puppet shows of Italy were very famous, and it was probably from this country that they were introduced into France and England. The old English name for puppet is motion, and motion plays were common before the institution of the regular theatre. Ben Jonson in his *Bartholomew Fair* makes Lantern Leatherhead convert the story of Hero and Leander into a motion play. From this writer's works we infer that two kinds of puppet shows existed at his time, one with dialogue and the other in dumb show. Even when theatres were firmly established in London, puppet shows continued to be held with *eclat* in Fleet Street and Holborn, where they frequently parodied the efforts of the legitimate drama. Old Testament stories and the lives of saints furnished a favourite field for puppet display—*David and Goliath*, *Noah*, and *The Prodigal Son* were extremely popular shows, while that of *Nineveh with Jonas and the Whale* is mentioned by Jonson and twenty other authors. The unfortunate P. suffered persecution like their friends the actors at the hands of the Puritans. Goldsmith refers to the show of *Solomon's Temple* in *She Stoops to Conquer*. Dr. Johnson declared that the play of *Macbeth* might be acted satisfactorily by P. alone, and a man named Henry Rowe acted upon his suggestion with some success. Puppet shows on scriptural subjects were long in vogue in Germany, where Dr. Faust was also a favourite hero. Goethe in the opening chapters of *Wilhelm Meister* makes the hero weary his beloved Mariana with a recital of his delight in P. to which he owed his earliest dramatic instincts. Towards the end of the 16th c. there were popular marionette (or puppet) theatres in France, and so late as the 18th c. they were a favourite amusement to the aristocracy of that country. Under this name of Marionettes (q. v.) some very ingenious puppet exhibitions are still made. There is a history of puppet plays in England in Cruickshank's *Punch and Judy* (5th ed. 1870).

Purāna (*Purāna*, from a Sanskrit word, meaning 'before, old'), the especial designation of a class of religious works in India, which rank second to the Vedas, and form the basis of the popular belief of the Hindus at the present day. They are 18 in number, with as many more minor or upa-puranas; and though they refer to, and evidently embody earlier works, none of them can be traced back in its present form for more than 1000 years. They are divided into three classes, each containing six books: (1) The *Rajasa P.*, relating to Brahma; (2) the *Sattvika P.*, relating to Vishnu, the most important class; (3) the *Tamasa P.*, relating to Siva. As opposed to the Vedas and other more ancient Sanskrit writings, they represent an exoteric teaching for the general community, and aim at spreading, in a sectarian form, the worship either of Vishnu or Siva. Their invariable form is that of dialogue, in which the chief speaker is usually Lomaharshana, who is represented as conveying the doctrines of his preceptor Vyasa, the supposed arranger of the Vedas and author of the Mahabharata. The earliest P. is assigned conjecturally to the 9th c., the latest to the 17th c. A.D.; but to the Hindus all alike are shrouded in the remotest antiquity. See *Collected Works* of W. W. Wilson (vols. iii. and vi. Lond. 1864), and Dr. John Muir's *Original Sanskrit Texts* (5 vols. 1858-70).

Purbeck, Isle of, the name given to the district of country which lies to the S. of Dorsetshire, and is bounded on the N.

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by the river Frome and Poole Harbour. In early times it was a royal deer forest. At the present day it is of great interest to geologists. See PURBECK BEDS.

Purbeck Beds constitute the upper members of the Jurassic or Oolitic Period, and are so named from the locality of greatest development. They overlie the Portland Beds, attain a thickness of 290 feet, and consist of argillaceous limestone alternating with schistose marl. The fossils are mainly freshwater, comprising cycads and conifers in the lower strata, and abundant and characteristic shells in all. Groups of marine shells, resembling the Kimmeridge and Portland fossils, occur near the base of the middle strata, thus indicating a gradual change of conditions towards the close of the Oolitic Period. Near the top, an impure freshwater limestone known as Purbeck Marble is quarried. It was formerly used for decorating the interior of churches, its ornamental appearance when polished being derived from the presence of *Paludina* shells in great abundance.

Purcell, Henry, one of the greatest of English composers, born in London in 1658, was the son of a gentleman-musician attached to the court. As a chorister in the Chapel-Royal, he was trained by Captain Cook and Pelham Humphrey, and he seems to have had some lessons from Dr. Blow. He became organist of Westminster Abbey at the age of eighteen, and during the next few years produced many anthems and choral works, which attained amazing popularity. About 1690 he began to write for the stage. Among his best compositions in this department were his music to *The Tempest* (1690), *King Arthur* (1691), and *The Indian Queen* (1691). One of his last works was a *Te Deum and Jubilate* (1694), a magnificent hymn. He died of consumption, 21st November 1695, and was buried under the organ at Westminster Abbey. A large collection of his songs and duets (*Orpheus Britannicus*) was published in 2 folio vols. after his death. Many of his odes, glees, catches, &c., are still favourites. An original and vigorous musician and thoroughly English in style, he was our first great song-writer. See Essay prefixed to a collection of his church-music by V. Novello (1826-36).

Purchas, Samuel, born at Thaxted, Essex, 1577, was educated at St. John's College, Cambridge, and in 1604 was appointed vicar of Eastwood in Essex. This position he resigned to his brother, and proceeded to London with a view to literary work. Receiving the rectory of St. Martin's, Ludgate, and being also made chaplain to Archbishop Abbot, he gave his whole attention to the collection of works of travel, and in 1613 he produced a thick folio entitled *P. his Pilgrimage, or Relations of the World, and the Religions observed in all Ages, and Places discovered from the Creation unto this Present*. A greatly enlarged edition, with maps by Mercator and Hondius, appeared in 1625. More than 1300 authors were laid under contribution for this work. In 1616 the manuscripts of Hakluyt fell into the hands of P., and continuing Hakluyt's plan, P. in 1625 produced four folio volumes—*Hakluytus Posthumus, or P. his Pilgrimes*. Vols. iii. and iv. relate to America, and contain the earliest narratives of English explorers of the W. P. is at pains to make it clear that the *Pilgrimage* is his own work, as to plan and language, while the *Pilgrimes* is simply compiled in the words of others. P. was buried in St. Martin's, Ludgate, 30th September 1626. Some say that he died in prison under debt contracted in the publication of his valuable books; but, according to Anthony Wood, he died in his own house. P. also wrote *Microcosmus, or the History of Man* (1619), and *The King's Tower and Triumphant Arch of London* (1623). He is a quaint, garrulous, metaphorical writer; and his immense stores of knowledge have been very useful to later authors.

Purchase, in English law. If an estate come to a man from his ancestor without writing, that is a *descent*; but when it comes by will or gift, that is a P.

Purchase System, in the British army, was the arrangement according to which promotion of officers was for many years regulated. It was of ancient standing, though not formally recognised till the reign of Queen Anne, and was finally abolished by royal warrant of 20th July 1871. Under this system first commissions were given to gentlemen whose names were on the commander-in-chief's list, and to cadets

from Sandhurst, on their passing the required examinations, and paying the price of a commission. Exceptions to the latter condition were made in favour of cadets who passed high examinations at Sandhurst, and sometimes to young men whose fathers had distinguished themselves. Regimental commissions had fixed regulation prices, varying from £450, the price of an ensigny in the infantry, to £7250, that of a lieutenant-colonelcy in the Life Guards; but in addition to this there was an over-regulation price according to the popularity of a regiment, contrary, indeed, to law, but sanctioned by long and universal usage, which sometimes exceeded the regulation price. On an officer retiring he received the regulation price of his commission from Government, and his place was filled in the regiment by the senior qualified officer of the next grade who was prepared to purchase it. When a vacancy occasioned several steps in the regiment, the price of the retiring officer's commission was made up by the various officers who were promoted, each subscribing the difference between the price of a commission in the rank they were promoted to, and that of the one they previously held. Officers who were too poor to purchase remained till they became senior of their rank, and held that position till a death vacancy or 'non-purchase step,' such as the appointment of the colonel to be a major-general, or the augmentation of a regiment, gave them promotion. Little can be urged in favour of the P. S. Its advocates were wont to compare the prices paid for commissions with the cost of a university education, and the fees required in entering the learned professions, and to say that it worked well, and that the officers of the army were drawn by it from the classes best fitted to be leaders of men. It stimulated, also, a rapid flow of promotion, and the poor officer benefited in the long run pecuniarily, as he was able, on his retirement after a number of years, to realise the commission of the higher rank he had been promoted to, although he had not purchased it. But there can be no doubt of the radical injustice of promoting officers according to the weight of their purses, and that, by the frequent sacrifice of the able man to the rich man, much injury was done to the efficiency of the service. The portions of the army which were not subject to the P. S. were the 19th, 20th, and 21st regiments of cavalry, the 101st to the 109th regiments of foot, and the artillery, engineers, and marines. The Army Regulation Act, 34 & 35 Vict. c. 86, provided for the compensation of officers who held saleable commissions at the time of the abolition of purchase. By the Regimental Exchanges Bill, 1875, an arrangement was made rendering legal the payment of money between officers who, on account of health or other reasons, might wish to make exchange of regiments or station among themselves, which is the only relic of the P. S. now in force. For the system of officering the army which now obtains, see PROMOTION.

Purified (from Fr. *pour*, 'for,' and *fil*, 'a thread'), or **Pur-flewed**, in heraldry, garnished or decorated with a rich bordure, as of fur. The word has a place in the older English literature, e.g.:

'I saugh his sleeves *purified* atte honde.'—*Chaucer*.

'*Purified* with gold and pearl of rich assay.'—*Spenser*.

Purgation. See ORDEAL.

Purgatives are medicines which produce evacuation of the bowels. Various divisions of P. have been proposed by different authors. Dr. H. C. Wood proposes the following as the most convenient:—(1) *Laxatives*—Medicines which simply unload the bowels, and are not able to cause active purgation, even when given in very large doses, as tamarinds, manna, magnesia, and sulphur. (2) *Purges*—Medicines which purge actively, but are not capable of acting as poisons, even in very large amount, as castor-oil, hydrargyrum, rhubarb, aloes, senna, and saline P., as salts of magnesium, potassium, and sodium. (3) *Hydragogues*, which produce very large watery stools without much irritation. In overdoses, medicines of this class assume some of the characters of those of the next. (4) *Drastics*, which cause great irritation of the alimentary mucous membrane, and in overdoses are violent poisons, as jalap, colocynth, scammony, podophyllum, elaterium, gamboge, croton-oil, black hellebore, &c. See CATHARTICS.

Purgatory, according to the Roman Catholic doctrine, is a state of suffering into which all those pass who die in the peace of the Church without being perfect. The design of the suffer-

ing, which is popularly supposed to be produced by material fire, although it is not so stated authoritatively, is expiation and purification; the duration and intensity being proportioned to the guilt and impurity of the sufferers. The time during which any soul remains in P. may vary from a few hours to the whole period till the day of judgment. It may be shortened as well as the sufferings alleviated by the prayers of the living, especially by the sacrifice of the Mass. And it is thus in the power of the Church to remit the sufferings of P., partially or altogether.

This doctrine was developed from certain ideas and practices which prevailed in the early Church, and more than all from the universal practice of offering prayers for the dead. This was done for various reasons. 1. From a belief in the immortality of the soul—that the deceased were not extinguished, but were still alive. 2. It was believed that the true happiness or final misery of the departed did not begin till after the resurrection and the general judgment. Till that time they were secluded in some invisible place (Gr. *Hades*, Heb. *Sheol*, see HELL), with the exception of martyrs, who went at once to Paradise. Hence, in offering prayers for the dead, it was desired that they might be brought to 'the glory of the resurrection' and 'the perfect fruition of happiness in heaven.' 3. It was conceived that all men die with some taint of frailty and corruption, and in prayers for them it was desired that God would deal with them not in strict justice but according to his mercy. 4. Again, according to the Millenarian ideas, which were almost universally held in the Church during the first two centuries, it was believed that the righteous dead would rise to take part in the Millennium (q. v.), some sooner some later, according to their merits and preparedness for it. Hence prayers were offered for them that they might be privileged to take part in 'the first resurrection.' In short, as has been said, 'the belief in a lasting desire after a higher degree of perfection, which death itself cannot quench, degenerated into a belief in P.' When the belief in the Millennium began to fade, as it did after the 2d c., the belief in the necessity for an intermediate state in the region of the dead seems to have increased. There came in, too, from the East and from Greek philosophy, the ancient ideas about the purifying properties and functions of fire (cf. Zech. xiii. 9, 1 Cor. iii. 13, 1 Pet. i. 7, Rev. iii. 18). The first idea which prevailed in the Church, however, regarding a purifying fire (Lat. *ignis purgatorius*), was that it would have to be endured by all at the last day. According to Augustine (354-430) it was located in Hades, i.e., the intermediate place of the dead. The first to set forth the doctrine of P. as an article of faith was Gregory the Great (540-604), who was also the first to propound the idea of deliverance from it by intercessory prayer, masses, &c. Such ideas were confirmed by lapse of time, and as these masses and ecclesiastical indulgences were paid for, the doctrine led to flagrant abuses in the Church; so that it was one of the chief doctrines attacked at the Reformation, and rejected by Protestants. See Neander's *Geschichte der Christlichen Religion und Kirche* (Eng. trans. Lond. 1858), Hagenbach's *Lehrbuch der Dogmengeschichte* (Eng. trans. Edinb. 1847), Hodge's *Systematic Theology* (Edinb. 1873).

Purification has been regarded by most Eastern nations from ancient times as necessary for the removal of certain kinds of uncleanness, which, without such P., cut off the unclean person from public worship. Such was the case among the ancient Egyptians; among the Persians, some of whose purificatory rites are preserved by the Parsees (q. v.) to this day; and among both ancient and modern Hindus and Hebrews. In the Mosaic Law the different forms of uncleanness requiring P. were (1) that caused by contact with dead bodies, both of man and beast; (2) the uncleanness of leprosy; and (3) that produced by both diseased and normal functions of the human organs of generation (Lev. xi.-xv., Num. v. 1-4). The lower grades of these could be removed by simply washing with water, but the higher needed sacrificial expiation also (Lev. xv.). The uncleanness caused by contact with a corpse was specially intense, and therefore required an extraordinarily stringent P., by means of a wash specially prepared with sacrificial rites (Num. xix.). A still more stringent law applied to the priests. They had to undergo P. when first set apart for the priesthood (Lev. viii.), and again every time they approached the altar of God (Ex.

xxx.). See Kitto's *Cyclop. of Bib. Lit.* (3d ed. Edinb. 1876), Ewald's *Allerthümer des Volkes Israel* (Eng. trans. Lond. 1876), Kurtz's *Der Alttest. Opfercultus* (Eng. trans. Edinb. 1863).

Purification of the Virgin Mary is a Holy-day observed by some churches on the 2d of February in memory of the presentation of Christ in the Temple (Luke ii. 22-24, Lev. xii.). When first introduced (about the beginning of the 6th c.) it seems to have been in honour of Christ himself, having been called Hypapante (Gr., from *hypantao*, 'I go to meet'), in reference to the meeting with Simeon (Luke ii. 25-35). Other names for it were the Feast of St. Simeon, the Presentation of the Lord, and Candlemas (q. v.). In the Greek Church it was always reckoned among the Festa Dominica.

Puritans were the popular party in England in the 16th and 17th centuries, corresponding to those who in other countries brought about the Reformation. In England, however, the authors of the Reformation were Henry VIII., Elizabeth, the Protector Somerset, and Archbishop Cranmer, and not the people. As first carried out by Henry, the Reformation was to consist simply of a transfer of the Papal supremacy to himself; all the Catholic rites and doctrines were to be retained. It was only by force of circumstances that the Government was driven at last to join the Protestants, and consequently the smallest possible concessions were made to their demands. The Reformation as completed under Elizabeth was essentially a compromise; and the Church of England 'continued to be, for more than a hundred and fifty years, the servile handmaid of monarchy, the steady enemy of public liberty.' The P. were the champions of religious liberty; and to them alone it was due that religion and liberty were not totally dissevered.

To Elizabeth the most important and valuable part of Protestantism was the Royal supremacy, and the basis of her policy towards the Church was the Act of Supremacy (1559), which placed all ecclesiastical jurisdiction in the hands of the State, and the Act of Uniformity (1559), which prescribed a course of doctrine from which no variation was legally permissible. In consequence of her rigorous enforcement of uniformity by means of an ecclesiastical commission, her reign is stained by cruel persecution. This persecution at last drove some of the P. from the Church (1567), and the first Presbyterian congregation was formed at Wandsworth, 1572. When the sect of the Brownists, who were afterwards known as the Independents, was formed (about the end of the century), there were three parties of P.—the moderate P. within the Church; the Presbyterian or Calvinistic party, who wished to have the Church modelled on that of Geneva; and the Separatists or Independents, who took up the position that a national Church at all is contrary to the Word of God. The Millenary petition, which was presented to King James on his accession (1603) by 800 Puritan clergymen, was not Presbyterian, and only asked for certain reforms in ecclesiastical matters. But James was as much opposed to any such changes as Elizabeth. Besides, he chose to confound the P. with the Presbyterians (as is yet done by High Church writers), by whom he had been withstood in Scotland. Hence, although he agreed to a conference between the P. and the Conservative party at Hampton Court, the former got no redress of their grievances. The High Church tendencies which prevailed under Charles I. (1625) drove a great number of moderate clergymen who had hitherto conformed to the law of the Church to side with the P. When the Church of England fell with King Charles (1649), the character of Puritanism necessarily changed, because the old grounds of contention had ceased to exist. From this time, accordingly, the P. are lost among the Presbyterians (q. v.) and the Independents (q. v.).

The peculiar tenets of the P. were briefly these: 1. That it did not belong to the State, but to the Church, to restore religion to its purity and dignity. 2. That the Holy Scriptures were the only source from which rules could be derived for regulating the Church, all the principles of Church government being therein laid down. 3. That the Church of Rome had become so corrupt as to have forfeited the rights of a true church. 4. That it was wrong to impose as necessary things those which Christ himself had left free, and that such rites as tend to superstition cannot be regarded as indifferent, but ought to be avoided as impious and profane. See *Works of the Reformers* (Parker Soc., Camb. 1841-54); *Foxe's Book of Martyrs* (1563); *Strype's Ecclesiastical Memorials* (2d ed. 1725-37); *Lives of Cranmer,*

Parker, &c.; Burnet's *History of the Reformation* (1679 seq.); Hallam's *Constitutional History of England* (1867); Neal's *History of the P.* (1732 seq.); S. R. Gardiner's *First Two Stuarts and the Puritan Revolution* (Lond. 1876); and Bayne's *Chief Actors in the Puritan Revolution* (Lond. 1878).

Purl, a drink prepared by heating ale or beer, adding to it a proportion of bitters, and strengthening the mixture with spirits. It is considered a tonic by those who indulge in hard drinking.

Pur'lin, in architecture, is a piece of timber placed on the main rafters of a roof, and supporting the common rafters.

Purmurende, a town of the Netherlands, province of N. Holland, between the two great polders of Purmer and Beemster, 10 miles N. of Amsterdam by the celebrated N. Holland Canal. Situated in a district noted even in Holland for the perfect system and productiveness of its dairy-farming, P. is a great market for cheese (1,500,000 lbs. yearly), butter, eggs, cattle, &c. Pop. (1873) 4545.

Pur'neah, the chief town of the district of the same name, in Bengal, British India, on the left bank of the Surah river, a tributary of the Ganges, 283 miles N.W. of Calcutta. Pop. (1872) 16,057. It is an unhealthy place, which has decreased in importance since it was the residence of a Mahomedan Nawaub. The district of P., which stretches from the Ganges to the Nepal frontier, has an area of 4957 sq. miles. Pop. (1872) 1,714,595. The W. part has been devastated by changes in the course of the Kosi river, and there are wide tracts of uncultivated pasture land. The crops are rice, oil-seeds, tobacco, jute, and wheat, which are largely exported down the Ganges. Indigo has been extensively cultivated for the last 100 years under European management. There are manufactures of blankets, gunny, and paper; and a speciality of inlaid metal-ware, of zinc mixed with copper. In 1876-77 the registered exports were valued at £496,000, and the imports at £640,000, chiefly piece-goods. The principal marts are Dulaganje and Caragola.

Purple (Fr. *pourpre*, Lat. *purpura*, Gr. *porphyrios*), a secondary colour compounded of red and blue, in which the red predominates. In painting, the tint is produced by mixing red and blue pigments, but certain purples are used direct, the chief of which is *madder P.*, a lake in which madder is the colouring ingredient. The Tyrian P. of antiquity, prepared from the *murex*, was a colour of great renown. P. of Cassius is an exceedingly rich colour, prepared from the chlorides of gold and tin, and used for giving a rich ruby tone to glass as well as for porcelain painting. P. is the colour of imperial and royal distinction.

Purple Emperor (*Nymphalis* or *Apatura Iris*), a species of butterflies found in Britain and attaining a large size—some measuring from 2 to 3 inches in expanse of wings. The P. E. is frequently to be found hovering near the top of oak trees. It derives its name from the preponderance of purple in its colours.

Purple Wood or **Purple Heart** of Guiana is the heart-wood of two leguminous trees named *Copaifera pubifera* and *C. bracteata*, and is exported from that country to Europe in small pieces, principally for the manufacture of gun ramrods. It is of a fine grain, and a peculiar puce colour. Trinidad P. H. is *Pitlogyne paniculata*.

Pur'pura, or the **Purples**, is a disease in which the blood or the capillary vessels throughout the system, or both, are altered. Small round spots of a dull red or deep purple colour, due to ecchymosis of the cutaneous capillaries beneath the cuticle, are visible on various parts of the surface. P. is frequently accompanied with hæmorrhage from mucous membranes, and extravasations of blood within the substance of the several viscera. The lungs, the brain, the liver, and the alimentary canal are most frequently affected. The spots of P. generally appear first on the legs, and afterwards on the thighs, arms, and trunk of the body. The colour of the spots is not altered by pressure, and they may be distinguished from fleabites by the absence of a central puncture. The spots are first bright red, in a day or two they become purple, afterwards brown, and finally they assume a yellowish tint. Sometimes

all these varieties of colour may be seen on a patient at the same time. The disease is generally ushered in by languor, faintness, and gnawing pains at the pit of the stomach. The tongue is coated with a viscid fur, and the complexion is sallow, dingy, or bloated, with swelling underneath the eyelids. In some cases there is giddiness or lightness of the head, or palpitation and irregular action of the heart with a tendency to syncope. The causes of P. have not been well ascertained; but it most frequently appears under the long use of a poor diet, much sedentary occupation, mental distress and anxiety.

Treatment.—Free evacuation should be first effected, and continued until the febrile symptoms disappear. The diet should consist of boiled rice with whey, or the light subacid fruits, as grapes, oranges, strawberries, baked apples, and the like, animal food being avoided. Tamarind water, or water acidulated with sulphuric acid, may be freely used. When the spots have disappeared and hæmorrhage has ceased, light soups should be given and tonics administered. During the hæmorrhagic stage, oil of turpentine, administered in moderate and repeated doses, has been recommended. The tincture of larch bark in fifteen drop doses may be taken every hour, or eight or ten drops three times a day, afterwards increasing the dose according to circumstances.

Purpura, a genus of *Gastropodous* Molluscs belonging to the Whelk family *Buccinida*, and represented by the Common Purple Whelk (*P. lapillus*) of the British coasts. They are the animals which supplied the famous Tyrian purple dye. The Purple Whelk of the British coasts has a whitish shell banded with brown. In this genus the aperture of the shell is of moderate size and is notched in front, while the inner lip of the shell-opening is flat.

Purpura, in heraldry, the colour purple, represented by diagonal lines drawn from the sinister to the dexter side of the shield.

Purpurin, one of the chief colouring matters of Madder (q. v.). It crystallises in red needles from the solution in alcohol of the red precipitate which results from treating with sulphuric acid fermented madder previously boiled in a strong solution of alum.

Purra. See DUNLIN.

Purroah, or **Peruah** (properly *Panduah*), a ruined city in the district of Maldah, Bengal, British India, 24 miles N.E. from Gûr, and 197 N. from Calcutta. It was the capital of an independent Mahomedan kingdom of Afghans in Bengal, in the 14th c., when the seat of government was temporarily transferred from the neighbouring metropolis of Gûr. The ruins are extensive, and have never been thoroughly explored, being overgrown with jungle, the haunt of man-eating tigers. It is now only inhabited by two confraternities of faquirs, who are the attraction of annual pilgrimages. There are ruins of many mosques and palaces, constructed out of carved stone fragments of Hindu buildings evidently brought from Gûr. Among these is the Adinah Masjid, the best example of Pathan architecture in India. See Fergusson's *History of Indian Architecture* (Lond. 1876).

Purse-Grub, or **Bobber Grub** (*Birgus latro*), a species of *Decapodous* crustaceans belonging to the section *Anomura* (q. v.), or that represented by the hermit-crabs. In the genus *Birgus* the abdomen is of firm consistence, and has two rows of appendages. The thorax is heart-shaped. These crabs inhabit the Indian Ocean. They can endure removal from their native waters for an extended period, their gill-structures presenting some analogies to those of the land-crabs. A large specimen of the P.-C. may attain a length of 2 feet; the general colour is light brown. The P.-C. is noted for the dexterous manner in which it opens the shell of the cocoa-nut, smashing one end of the nut, and then extracting the substance by means of its claws.

Purser (Gr. *byrsa*, 'purse'), the title formerly of the officer in the Royal Navy who acted as treasurer and purveyor. Since 1844 the name has been changed to Paymaster (q. v.).

Purulane (*Portulaca*) is the type genus of *Portulacaceæ* (q. v.), and is familiar in the common P. (*P. oleracea*), a dwarf glabrous annual that has been cultivated from very early times,

but is not now so much esteemed as formerly. It is more or less naturalised in many warm parts of the world; and may be seen also in English culinary gardens. The properties are antiscorbutic, the young shoots and succulent leaves being used in salads, as a potherb, and for pickling. Sea P. is the common name for *Obione*, and water P. for *Peplis Portula*.

Pursu'er. See PLAINTIFF.

Pursuivant (Fr. 'follower'), in heraldry, an officer of the third or lowest degree in the College of Arms. It was originally an order of probation, from which were taken the heralds and kings-at-arms. In the Heralds' College there are four pursuivants—*Rouge Croix* (of St. George), the most ancient; *Blue Mantle*, founded by Edward III. or Henry V.; *Rouge Dragon*, called after the 'red dragon,' dexter supporter to Henry VII.'s shield; and *Portcullis*, named after a badge of that king. The pursuivants of the Herald's College of Scotland are six, viz., *Dingwall*, *Bute*, *Carrick*, *Ormond*, *Kintyre*, and *Unicorn*.

Pus. See SUPPURATION.

Pusey, **Edward Bouverie**, D.D., a nephew of the first Earl of Radnor, born in 1800, passed from Eton to Christ Church College, Oxford, where he took a first-class in classics (1822), obtained an Oriel fellowship, and was appointed Regius Professor of Hebrew, with a Christ Church canonry (1828). Along with Newman he was one of the chief promoters of the religious movement variously known as Anglo-Catholicism, Puseyism, and Tractarianism (q. v.), himself writing Nos. 18, 66, 67, and 69 of the *Tracts for the Times* (1833-41). A university sermon on the Eucharist (1843) led to P.'s suspension for three years, but at the end of that period he from the same pulpit quietly resumed the thread of his suspended argument, and has since laboured unhindered by pen and word of mouth for the restoration in the English Church of its 'primitive purity.' Among P.'s writings, besides translations from St. Anselm, Avrillon, Scupoli, &c., are *Doctrine of the Real Presence Vindicated* (1855); *History of the Councils of the Church* (1857); *Nine Sermons preached in the University of Oxford, 1843-55* (1859); *The Minor Prophets, with a Commentary* (6 parts, 1862-77); *Church of England a Portion of Christ's one Holy Catholic Church: an Evirention* (1865); *Lenten Sermons* (1874); and *Advice on Hearing Confession* (1878).

Push'kin, **Alexander Sergeivitch**, a celebrated Russian poet, was born at Moscow, May 26, 1799, entered the 'Eton of Russia,' the imperial lyceum newly opened at Tsarsko Selo, in 1811, where he read and wrote much poetry; in 1817 became a clerk in the Foreign Office, and soon afterwards a member of the Arzamas Club, founded by Bloudoff in 1815. In 1820 the publication of his first poem of any length, *Ruslan and Ludmida*, provoked a literary controversy much like that which Wordsworth's *Ballads* raised in England, and called from Jukovsky the confession that he was 'outstripped.' Some bold utterances in unpublished poems led (1820) to his exile from St. Petersburg to Bessarabia, and afterwards to New Russia, during which he wrote *The Caucasian Prisoner* (1823), *The Fountain of Bakhchiserai*, and *The Gipsies* (1824). In the autumn of 1824 he was suffered to return to his estate of Michaelovsky, in Pskov, where he wrote, besides a number of lyrics, the first half of *Eugène Oneguine*, *Boris Godunoff*, and *Count Noulinc*. From 1826 P. was free to reside in any part of the empire. In that year he completed *Oneguine* at Moscow, and produced *Poltava*, the greatest and most finished of his poems. For four years after his marriage (1831) with Nathalie Nikolaeвна Gontcharoff, he lived in happiness. A number of anonymous letters in which his wife's name was coupled with that of one Dantés, an illegitimate son of Heckern, the Dutch Ambassador, being attributed by P. to Heckern and Dantés, led to a duel on the 27th January 1837, in which P. was mortally wounded. He died the next day. His wife and children were provided for by the Emperor Nicholas. The early years of P.'s literary life coincide with the energetic epoch in the history of modern Russia, when, compelled to exert her utmost strength against a powerful enemy, she first learned her own greatness. The full exponent of that period of transition, he scorned the 'affectations of classicism,' the 'weak offspring of a foreign school,' and for 'the cuckoo notes of elegists' employed a language of truthful simplicity.

There is a complete edition of his works in 6 vols. (1859-60). See Annenkoff, *Materials for the Biography of P.*, and *P. in the Reign of Alexander*; Gerdel, *Russian Poets*; and Galachoff, *History of Russian Literature*.

Pushtu (*Pakhtu*), the vernacular name of the language spoken in Afghanistan, and by the border tribes of the Dera Jat within the Punjab, British India. It was long supposed to be of Semitic origin, and thus to give a support to the cherished theory that the Afghans represent the lost tribes of Israel. But the labours of Dorn, Raverty, Trumpp, Bellew, &c., have now established that it belongs to the Indo-European family, being most closely allied to the Zend or Iranian branch, but having borrowed much from the Sanskrit. It forms a regular subject of examination for British officers at Lahore. The name has been plausibly connected with the Paktyes of Herodotus. See *Original Letters and Papers of the late Viscount Strangford upon Philological and Kindred Subjects* (Lond. 1878). For a list of P. proverbs, &c., see *Bannu, or Our Afghan Frontier*, by Mr. S. S. Thorburn, C.S. (Lond. 1876).

Pustule, Malignant. See MALIGNANT PUSTULE.

Pustular Diseases include those cutaneous diseases which are characterised by *pustules*, or circumscribed elevations of the cuticle containing pus. A certain degree of inflammation of the derma, greater than that which exists in the eczematous group of diseases, gives rise to the formation of pus, producing an elevation of the epidermis to a limited extent, termed a *pustule*. A true pustule contains pus from the first moment of its formation, and in this respect is essentially distinguished from a vesicle. Strictly speaking, there are but two P. D., viz., Impetigo and Ecthyma (q. v.), but the term is frequently loosely applied to various diseases which are at first papular or vesicular, and which afterwards become pustular.

Putchuck is the Bengal name for the root of *Aplotaxis Lappa*—the Costus of the ancients—an herb belonging to *Composita*, and found in the mountain-slopes of Cashmere. It is there collected in large quantity for export, the chief demand being for China, where it is used as an aphrodisiac, as well as for incense.

Puteaux, a town of France, department of Seine, on the left bank of the Seine, opposite the Bois de Boulogne. A favourite residence of Parisians, it has also thriving industries. Pop. (1872) 9491. Baron Rothschild's model farm is in the vicinity.

Putlogs, in architecture, short pieces of timber used to support the scaffold boards. They are placed at right angles to the wall, with one end resting on the ledges of the scaffold, the other in 'putlog-holes' (Lat. *columbaria*) left for them in the wall.

Putney, a town of England, in Surrey, $5\frac{1}{2}$ miles W.S.W. of the Waterloo terminus, on the S. bank of the Thames, which is here spanned by a wooden bridge 805 feet long. It has two churches, St. Mary's and St. John's (1859), almshouses, a convent, Jesuits' College, &c., and numerous villas have risen up round the Heath. Thomas Cromwell and Gibbon were natives of P., which is now a great boating place, being the point from which the university boat-race starts. Pop. (1871) 9439.

Putrefaction (Lat. *putris*, 'rotten,' and *facio*, 'I make') is the term used to denote certain chemical changes which spontaneously take place in dead animal matter, during which offensive gases are evolved. Immediately life ceases a general metamorphosis and decomposition of the highly complex elements of organic bodies takes place, and they are successively reduced to definite and simple compounds. The presence of warmth, moisture, and air is requisite for complete decomposition, and the change can only be prevented by the absence of such conditions. In the dry, sandy deserts of Egypt, bodies of dead animals are reduced to a fine powder, and in the frozen snows of Siberia antediluvian elephants have been discovered in an edible condition. P. proceeds with great rapidity under water at 50° F., and in the air at 77° F., and much more rapidly in animal than in vegetable matters. The P. of dead bodies takes place with variable rapidity, but it does not commence until after the cessation of cadaveric rigidity, and generally about the third day, though in some cases it may have advanced rapidly within sixteen hours after death. The process of P. is

in principle identical with fermentation, but in detail it is slightly different. According to the investigations of Schröder, Pasteur, Tyndall, and Lister, the process of decomposition depends upon the spores of some organism gaining access to the substance, and P. can be arrested for an indefinite length of time by destroying such organisms in the substance, and preventing by a variety of means their ingress. The gases evolved during P. are injurious to health. There are many instances in which gravediggers have been attacked by serious symptoms after exhuming a body, and there can be no doubt that putrid emanations have occasionally caused death. Putrid substances, when confined in small places, such as dissecting-rooms, cesspools, &c., are extremely dangerous, and putrid vapours, though dissolved in water, are none the less hurtful. When putrid emanations are introduced into the circulatory system, fatal effects immediately follow. The blood becomes very thin, owing to diminution of fibrine and increase of free alkali. The products of P. produce disease, *sui generis*, but evidence is certainly contrary to the belief that putrefying organic matter is capable of originating epidemics.

Putrid Fever. See JAIL FEVER and TYPHUS FEVER.

Putteala (*Pitidlia*), the capital of the native State of the same name, in N.W. India, in political connection with the Punjab Government, on a hill stream called the Kusilla, 23 miles S.W. of Umballa, and 1023 N.W. of Calcutta. It is a walled town, well built of brick, and clean. The Rajah's palace is in the citadel.—The State of P., which is much scattered, mostly lies between Ferozpur and Umballa, and on the hills around Simla; area, 5412 sq. miles; pop. about 1,586,000; revenue, £440,000; army, 8000 men, together with a contingent of 100 men furnished to the British for general service. No tribute is paid, but a *nuzzarana* or relief is due on the succession of collateral heirs. P. forms the most important of the Cis-Sutlej States founded by the Sikhs in Sirhind during the last century. It has always been faithful to the British, from whom it has received large accretions of territory. In 1830, the sanitarium of Simla, with the adjoining hill territory, was ceded to the British in exchange for 3 villages in the plains. During the Mutiny of 1857 the Rajah kept open the communication on the Grand Trunk Road, and was rewarded with a grant of land yielding £20,000 per annum. The late Rajah, who died in the summer of 1876, at twenty-three years of age, shortly after having entertained the Prince of Wales, was an enlightened ruler. He had introduced the British system of civil and criminal procedure. He presented £7000 to the University College at Lahore; and in 1873, offered £10,000 on the occasion of the report of famine in Bengal. He was also well known as a connoisseur of precious stones. In 1875, Lord Northbrook laid the foundation-stone of a college at P. town. See *The Rajahs of the Punjab*, by Lepel Griffin, B.C.S. (Lahore, 1870).

Puttenham, George, born about 1530, educated at Oxford, distinguished himself at the court of Edward VI. by composing an eclogue entitled *Elphine*, travelled on the Continent, and on his return became a gentleman-pensioner of Queen Elizabeth. P. mentions a dozen of his own works; but only two of these have reached us. *Partheniades*, a set of twenty little adulatory pieces, was offered to the Queen as a birthday gift in 1579. The other work extant is its author's best—*The Art of English Poesie*, in *Three Books; the first of Poets and Poesie, the second of Proportion, the third of Ornamente*. This book was published anonymously in 1589, but as early as 1605 was attributed to P. It is full of curious matter, and is of peculiar interest for its disquisition on shaped figures, as the lozenge, or rombus; the fuzie spindle, or romboides; the triangle, or tricquet; the square, the pilaster, the taper, or piramis, rondel, egg, &c. P. says an Eastern traveller informed him that the fashion of writing verses in these forms was brought from the courts of China and Tartary. The *Partheniades* and *Art of Poesie* were reprinted, with notice of the author, by Hazlewood in 1811. The *Art* also forms one of Arber's excellent reprints (1869).

Putty, used by glaziers, is a plastic mixture of fine dry whiting and linseed oil. For special purposes, as where the lap or hold is very narrow, a small quantity of white-lead is added. The ingredients are well kneaded, and after lying for some hours the mass is worked up in small pieces till perfectly smooth. Ochre, lampblack, or other pigment, is employed to colour it. P. may be softened by spreading over its surface a thin compo-

sition of pearl-ash and slaked lime. Plasterer's P. is thoroughly slaked fine white lime formed into a paste with water.

Putty Powder is an oxide of tin, and is much used in polishing hard substances, particularly glass for optical purposes. It is best prepared by dissolving metallic tin in diluted nitrohydrochloric acid, and precipitating the oxide with diluted ammonia. The precipitate is then thoroughly dried, exposed to a white heat in a crucible, and ground for use. Commercial P. P. is usually a mixture of oxidised tin and lead in equal parts.

Puy (Catalonian *puig*, probably from the Celtic *puoch*), a name given in Auvergne and the Cevennes to the conical volcanic mountains so common in these districts.

Puy, Le, or Le-Puy-en-Velay, the chief town of the department of Haute-Loire in France, 70 miles S.W. of Lyons, at the confluence of the Borne and Dolaison with the Loire, is a very ancient city, and one of the most picturesque in France. It is the seat of a bishop, and its cathedral, a building of the 10th or 11th c., contains a famous miracle-working image of the Virgin. The present image is modern, the ancient one, said to have been an Isis figure brought from Egypt in the 8th c., having been burned at the Revolution. Near the town is the *Rocher de St. Michel*, a natural basalt obelisk 265 feet in height, surmounted by a chapel of the 10th c. On the basaltic mass of the *Rocher de Corneille* stands a colossal statue of *Nôtre Dame de France*, cast from cannon taken at Sebastopol. The town is the centre of a great lace manufacture, employing 70,000 people in the surrounding districts, and producing over 10,000,000 francs' worth of lace in the year. Pop. (1872) 19,233.

Puy de Dôme, the most central department in France, bounded on the N. by Allier, on the W. by Creuze and Corrèze, on the S. by Cantal and Haute Loire, and on the E. by Loire. Area 3108 sq. miles; pop. (1876) 570,207. The Allier, a tributary of the Loire with its own tributary the Doré, flows through it northward. In the W. is the great volcanic chain of the Auvergne mountains, with the peak of P.-de-D. 4790 feet high, and the even higher peaks of the Mont-Dore groups. There are many warm springs in the mountains, which are rich in iron, coal, lead, antimony, arsenic, and good building-stones. Only about a fourth of P.-de-D. is cultivated land, rye being the principal product. Cattle and sheep breeding is much practised, and the principal industries are mining and the manufacture of paper and oil. The chief town is Clermont-Ferrand.

Puzzuola'na. See POZZUOLANA.

Pyæmia (Gr. *pyon*, 'pus,' and *hama*, 'blood') is usually defined as an affection of the mass of the blood, characterised by a peculiar form of fever, and resulting in the formation of abscesses in various parts of the body. The cause of P. is probably due to the absorption into the blood of putrefying matter, and it is possible that some molecular change in the blood itself may cause spontaneous P. There are two forms or modifications of P. described—(1) the systemic affection, termed *septicæmia*; and (2) the true P., characterised by local changes or 'secondary deposits.' Much diversity of opinion has existed regarding the essence of P., but it is now generally admitted that it consists in the imbibition, by the blood, of matters in a state of putrefaction, which act as a ferment on the blood, and cause it to stagnate in the capillaries, resulting in the formation of secondary deposits.

P. is distinguished from traumatic fever in that the temperature maintains itself above the normal, and is exacerbated from time to time when the rigors take place, falling again as the sweating goes on. In more advanced stages, the disease may be recognised by the occurrence of visible deposits or internal inflammation. In P., the prognosis is, as a general rule, bad; but cases of recovery do take place, more especially in spontaneous P. The treatment of P. resolves itself into prophylaxis. All that can be done is to support the patient's strength, and treat the symptoms as they occur.

Pycnogonum, a genus of lower *Arachnidans*, belonging to the order *Podosomata*. *P. littorale* is a familiar species found amongst seaweed. The legs number four pairs, and the abdomen is narrow and linear in form. The legs contain prolonga-

tions of the viscera, and the mouth is formed on the suctorial type. No distinct breathing organs are developed, but the heart is present. The legs are provided with hooks adapted for enabling these animals to adhere to the seaweed amidst which they live.

Pygmies (Gr. *pygmæ*, a measure of length, 1 $\frac{3}{4}$ inches, being the distance from the elbow to the knuckles), a diminutive race, the Lilliputians of the ancients, placed by Homer on the shores of Oceanus, by Ctesias and Pliny in India, and by Aristotle in Ethiopia. Their vain attack on Hercules, and ceaseless warfare with the cranes, formed the theme of countless stories. See GIANTS AND DWARFS.

Pym, John, born at Brymore, Somersetshire, in 1584, of a good family dating from the reign of Edward I., was a gentleman-commoner at Broadgate Hall, now Pembroke College, Oxford, (1599-1602), and there by his fine accomplishments earned from the poet Fitz-Geoffry the title of '*Phœbi deliciae*.' He quitted Oxford without a degree, and entering one of the inns of court, soon attracted the notice of the Earl of Bedford, to whom he probably owed his post in the Exchequer. In the 'Addled Parliament' (1614) he sat for Calne along with Eliot and Wentworth, like whom he joined the Country party; and again, after six short years of married life, in that of 1621, when he seconded Coke's motion to remonstrate with his majesty on the prevailing discontents. With eleven other members, he also carried to Newmarket the Commons' demands for a war with Spain and a Protestant match. 'Bring stools for the Ambassadors,' cried James ironically, as the deputies entered his presence; and the session of 1621 closed with P.'s imprisonment. He was foremost, however, in promoting the impeachment of Buckingham (1626), and in the Parliament of 1628 stood second only to Eliot, whom in the debate on the Petition of Right he supported with the eloquence of a Bacon and the irony of a Mirabeau, but whom he opposed in the matter of Rolle, rightly preferring the kingdom's liberties to a member's privilege. In the Short Parliament (1640), 'when men,' says Clarendon, 'gazed on each other, looking who should begin (much the greater part having never sat before), P. brake the ice' by a two hours' exhortation 'to see how much work they had to do to satisfy their country.' And lastly, in that Long Parliament, on whose eve he had ridden through England's length, rousing the voters to their duty, he moved the impeachment of Strafford, his old ally of twelve years back, whom on their rupture P. had promised never to leave while his head was on his shoulders. His promise kept, and supplemented by the fall of Laud, he set himself to 'sweep the house from floor to roof,' by reforms which, ending in the Grand Remonstrance, led to the attempted arrest of the five members, and thence to the outbreak of civil war. Placed at the head of the Committee of Safety, P. turned his knowledge of finance to good account, held bravely out when Essex seemed faltering and Hampden had fallen on Chalgrove field, was arranging terms with Scotland, and had just accepted the lieutenantancy of ordnance, when on December 8, 1643, he died at Derby House. 'King Pym' was buried royally in Westminster Abbey, whence at the Restoration his body was cast out into a pit in St. Margaret's churchyard, with Blake and Dorislaus and Cromwell's mother. Clarendon speaks of him as 'the most popular man, and the most able to do hurt, that have lived at any time;' and Mr. Gardiner says: 'It would be hard to find in the course of English history another man so fitted to his special task. A Conservative by nature, and instinctively opposed to the reception of new and unaccustomed ideas, he was the very man to head a revolutionary movement of which the object was to preserve as much as possible of the existing system in Church and State. To that task he brought untiring energy, great capacity for business, and knowledge of finance, combined with a delicate tact which enabled him to guide a large and fluctuating body of men.' See J. Forster's *Eminent British Statesmen* (vol. iii. Lond. 1837), Goldwin Smith's *Three English Statesmen* (Lond. 1867), and S. R. Gardiner's *Puritan Revolution* (Lond. 1876).

Pyne, Madame Louisa Bodda, an English soprano, was born in 1832, and made her first appearance in the opera in 1849. She was joint-lessee along with Mr. Harrison of Covent Garden from 1858 till 1862, and also the prima donna of the English Opera Company there. Wallace's *Lurline* and Benedict's *Lily*

of Killarney were produced under her auspices. She has since sung at concerts, and made operatic tours in the provinces. She is married to Mr. Frank Bodda.

Pyracon'tha. See CRATÆGUS.

Pyramid, in geometry, is a solid figure formed by drawing right lines from every point in the periphery of a plane polygon to any point outside its plane. Every side is therefore a triangle, having its vertex at the apex of the P.; and the number of sides will equal the number of sides of the polygon which forms the base. According to the form of the base different forms of P. correspond, which are distinguished by name. Thus we have the triangular P., the square P., the hexagonal P., etc. The triangular P. is ordinarily called the tetrahedron. The cone is the limiting form of P., as the sides are increased indefinitely in number, and diminished indefinitely in magnitude. The volume of a P. is one-third the volume of the prism which stands upon the same base and is of the same altitude; hence pyramids upon equal bases and of the same altitude are equal. The word is undoubtedly of Egyptian origin, but its derivation is very obscure. De Sacy regards it as denoting an edifice set apart for some religious purpose; and it is agreed almost universally that the remarkable structures known as the Pyramids of Egypt were originally sacred edifices. By extension the word has come to mean any object bearing a resemblance to these architectural works of antiquity.

The pyramids of Egypt number in all about seventy; but of these only three deserve particular notice on account of their magnitude. These, with six smaller ones, constitute the group known as the pyramids of Gizeh, 10 miles W. of Cairo. The Great P. was the sepulchre of the Cheops of Herodotus, and is also called the Cheops or Khu-fu P. It is 449 feet high, and its square base, each side of which is 746 feet long, rests upon Nummulitic limestone, about 100 feet above the level of the Nile. Its original height was 480 feet, but it has been much spoiled by the removal of the external stones for building purposes. The sides, which look directly to the cardinal points, are inclined to the horizontal at an angle of 52°, and the summit, from which a splendid view is obtained, is now a flat, square space, with a side of nearly 35 feet. There are three chambers, reached by galleries which branch from a main gallery opening at the middle of the N. side. The largest and highest chamber is 34 feet long, 17 broad, and 19 high. It is 300 feet below the apex, and contains a sarcophagus of red granite. The lowest chamber is below the base of the P., and the main duct leading to it is inclined to the horizontal at an angle of 26° 18'. This inclination has given rise to the supposition that it served to mark the meridian passage of some bright polar star. About 4000 years ago, a person stationed at the bottom of the gallery would observe the meridian passage of γ Draconis. This fixes the date of the Great P. at 2123 B.C. According to Sir G. C. Lewis, however, in his treatise on the *Astronomy of the Ancients*, there is no sufficient historical reason for placing any of the pyramids at an earlier date than the building of Solomon's Temple, 1012 B.C. The second P., that of Chephren or Schafra, is nearly as large as the Great P., and stands on higher ground. It has two openings, one on the N. and one on the S. side, and bears evidences of having been increased in size at different times after its first erection. The third P., that of Mykerinos or Menkera, is less than half as high as the first two, but in beauty of execution it surpasses those. The royal mummy found in it is now in the British Museum. Near this P. are three smaller ones, which are supposed to be the tombs of relatives of the king. At Abu-Sir, Sakkarah, Dashur, El-Metanieh, &c., are other interesting P.-groups. They are much smaller structures than those of Gizeh, but contain many valuable inscriptions in hieroglyphics. Pyramids are not confined to the Old World, but are found in Mexico. That of Cholula has a larger base than the Great P. of Cheops, but it is truncated, and not nearly so high. Its four sides face the cardinal points, and on its summit stood the temple of Quetzalcoatl, the god of the air. At Teotihuacan are two large pyramids dedicated to the sun and moon, and a number of small ones supposed to have been dedicated to the stars. The labour necessary to erect these immense structures must have been prodigious, seeing that machinery was unknown. The huge stones were probably raised to the proper height by being drawn up long inclined planes upon rollers. See Bunsen's *Egypt's Place in Universal History*, Gliddon's

Ancient Egypt, Piazza Smyth's *Our Inheritance in the Great P.*, Bonwick's *P. Facts and Fancies*, and Prescott's *Conquest of Mexico*.

Pyramus and Thisbe were two lovers in Babylon, whose story has been told in Ovid's *Metamorphoses*. They found means of escaping the jealousy of parents by conversing through a hole in the wall which separated their houses, and agreed to meet at the tomb of Ninus. Thisbe arrived there first, and, terrified by the sight of a lioness rending an ox in pieces, fled to a cave, casting aside her mantle. The lioness soiled the mantle with blood, and Pyramus, approaching, imagined that Thisbe had been devoured, upon which he fell on his sword. Thisbe, emerging from the cave, found her dead lover, and killed herself with the same sword. This scene was enacted beneath a mulberry tree, the fruit of which, before white, has ever since been of the colour of blood.

Pyrenees (Span. *Pirineos*, from Basque, *pyrge*, 'fire'), the mountain-system which separates France and Spain, extending from Cape Creuz on the Mediterranean to the S.E. corner of the Bay of Biscay, with a length of 267 miles and a breadth of 13 to 69 miles, and covering an estimated area of 12,756 sq. miles. The system is made up of two great parts, both of which have the same general direction, but do not form a continuous line. The P. are divided into three regions, East, West, and Middle P.—(1) The East P., 130 miles in length, begin near Cape Creuz and continue in an unbroken wall of granite to the source of the Tech, rising in Monte Castabon to 8085 feet, and N. of the main ridge, in the Aspres ridge in Monte Canigou to 9140 feet. Further W. are Pic de Carlitte (9583 feet), Pic de Pedroux (9290 feet), Pic de Serrère (9551 feet), Pic Siguer (9528 feet), Pic de Montcalm (10,105 feet), and Pic de Mont Ronch (9402 feet). Between two of the spurs is the valley of Andorra (q. v. l. (2) The Middle P., 69 miles in length, extend in two parallel chains, of which the northern rises in Pic du Midi de Bigorre to 9440 feet, and in Pic d'Arbizon to 9290 feet. In the southern chain the chief peaks are Puig d'Anethou (Maladetta, 10,848 feet); Pico Batoua (9961 feet); Vignemale or Villamana (10,798 feet); the three-crested Monte Perdido (11,001 feet), which, with Marboré (10,673 feet) and Cylindro (10,917 feet), forms the three *sorores* or *sorellas*, the central mass proper of the P., and the Pico Taillou (10,323 feet). W. of Vignemale, the general height sinks to 5250 feet, but rises in Pic du Midi d'Ossau to 9467 feet, and in Pésia Colorado to 9477 feet. (3) The West P. extends 64 miles in a single chain descending to the W. from Puerto de Gabardaille to St. Jean de Lüz, with a height varying from 5250 to 2130 feet. The highest point is Pic d'Anie (8218 feet), and the range terminates in the splendid granite cone of Mont Atchuria (2485 feet). The chief valleys of the P. are transverse. The head is termed a *col* or *port*. The principal are the valley of Aran, from which the Garonne flows to the N. through a cleft; the valley of the Fluvia, 27 miles long, containing near Olot and Castelfollit lava streams, and 14 volcanic cones with craters; the valleys of the Bidassoa and Baztan ('garden'). There are many narrow clefts without vale-bottoms, which communicate through rocky passages called *labats*. They usually begin on the height in circular basins, sometimes of considerable size and depth, which form lakes often at such a height as to be frozen eight to nine months of the year. Among these valleys the principal are the Orla de Gavarnie at the foot of Monte Perdido, from which flows the Gave de Pau, the Val de Ter, Val de Llobregat, Val de Segre, 92 miles long, Val de Andorra, and Val de Tena. The passes across the P. are nearly 100 in number, but of these only 7 are practicable for waggons and 28 for mules. The chief are those of Col de Pertus, over which runs the road from Perpignan to Barcelona, and by which Hannibal and Julius Cæsar crossed; Port de Canfranc; and Port de Salo, over which runs the road from Toulouse to Lerida. Some of the highest are those of Viella (8225 feet), through the Maladetta, the Port d'Oo (9856 feet), and the Brèche-de-Roland (9200 feet). Metamorphic rocks compose the great mass of the P., with red sandstone and Alpine limestone, and primitive rocks, chiefly granite and gneiss. Towards the middle of the range micaceous schist is found. Iron-ore is abundant, and copper, lead, and silver have been found. Excellent marble is obtained. The region of perpetual snow, which begins on the N. side at 8054 feet, and on the S. at 9998, contains no great ice-fields and few glaciers. The limit of trees in the Port de Canfranc is 4593 feet,

near Panticosa 5906 feet, and in the E. P. 7349 feet. To the S. it becomes higher. On the northern declivities middle European vegetation is found. On the S. side, considerably above the limit of trees, are found the box, and higher the *Pinus pyrenaica* and *abies*; in the W. the *Pinus sylvestris*, *Quercus ilex*, and *Tojja*. But in general the vegetation is not rich.

Pyrenées-Basses, a department occupying the S.W. corner of France, and of which the S. consists of the western Pyrenees and their spurs. In the N. are fertile undulating plains. The department is watered by the Adour, which in the latter part of its course forms the boundary between P.-B. and Landes, and to which flow from the Pyrenees the Nive, Bidouze, Gave de Pau, and the Gave d'Oloron, formed by the Gave d'Ossan and Gave d'Aspe. The Pyrenees have here no longer snow-clad peaks, but rather wooded summits, separated by richly-cultivated valleys. Along the Gave de Pau is fine arable land. The chief productions are wines, flax, hemp, maize, and rye. In the highlands, the breeding of cattle and horses is the principal employment. The chief industries are weaving, tanning, and the manufacture of paper, glass, and ironwares, while there is considerable export of wood, turpentine, tar, iron, wine, brandy, wool, hams, pigs, and horses, chiefly through Bayonne and St. Jean de Lüz. The chief minerals found are coal, peat, lignite, anthracite, rock-salt, marble, sandstone, and slate. There are many mineral wells, of which the most frequented are those of Cambo, Salies, and Biarritz. Area, 2943 sq. miles. Pop. (1876) 431,525.

Pyrenées-Hautes, a department of France E. of the Pyrenées-Basses, containing within it the loftiest part of the Pyrenees range. In the N. the surface is level and fertile, but in the S. it consists of steep mountains, with jagged, glacier-covered summits, separated by valleys covered with alternate meadow and wood. Many *gaves*, or mountain streams, with cascades, flow into the Adour and Garonne. The chief of these are the Gave de Pau, in its upper course flowing into the Adour, and the Neste, Gers, and Baise, which join the Garonne. The climate is mild, though sudden and destructive storms are frequent in the highlands. The chief crops are the ordinary cereals and leguminous plants, besides flax and fruits—including mulberries, figs, and grapes. Cattle, horses, pigs, sheep, and poultry, especially geese, are reared. There are some manufactures of linen, cotton, and woollen stuffs, paper, cutlery, nails, hides; and the chief minerals found are iron, copper, zinc, lead, manganese, nickel, cobalt, marble, slate, and granite. The principal mineral wells are those of Baréges, Cauterets, Saint-Sauveur, and the sulphur wells of Viscos. Area, 1749 sq. miles. Pop. (1876) 238,037.

Pyrenées Orientales, a frontier department of France, having E. the Mediterranean and S. the Pyrenees. A marshy and unhealthy plain extends along the coast, which has a length of 45 miles, and the interior is traversed by two ranges of mountains, one running from W. to E., dividing the Tet from the Gly, and the other starting from Mount Canigou and running S. and E., separating the Tech and Tet basins. The Segre, a tributary of the Ebro, drains the S.W. The climate is excellent and the soil generally rich and fertile. Mulberries, pomegranates, olives, and oranges, growing on the hill-slopes, indicate the Mediterranean vegetation. Much Roussillon wine is produced, two-fifths of which is exported, the most esteemed kinds being those of Rivesaltes, Collioure, Salces, and Saint-Nazaire. Numbers of horses, mules, and cattle are exported, and considerable quantities of fish, with which the coast-sea abounds. There is little mineral wealth, but mineral springs are frequent, the chief being at Améche-les-Bains, Vernet, Graus, d'Oilet, Vinca, and Moligt. Area, 1592 sq. miles. Pop. (1876) 197,940.

Pyrites, in mineralogy the name given to a group of metallic sulphides or arsenides, of which iron P. is the most important. It is a brittle, bronze-coloured ore, crystallising in cubes or related forms, but occurring also massive. It is of great industrial importance as the source of sulphate of iron and the sulphuric acid of commerce. See IRON. The name P. is derived from the Gr. *pur*, 'fire,' since the ordinary iron P. strikes fire with steel. *White iron P.* and *magnetic P.* are recognised varieties. *Arsenical iron P.* contains the arsenide as well as the sulphide.

It crystallises in rhombic prisms, is silver-white in colour, and also brittle. It is known as *mispickel*, and is ordinarily found associated with ores of silver, lead, iron, or copper. *Auriferous P.* contains a small quantity of gold. *Copper P.* is a brassy-yellow, iridescent mineral, crystallising in tetrahedra and octohedra. It yields easily to the point of a knife, and does not strike fire like iron P., with which it is usually associated. In composition it is a double sulphide of copper and iron. It is extensively worked for copper in Sweden, Cornwall, the Hartz, and other localities where it occurs, and is besides the chief source of sulphate of copper, the blue vitriol of commerce. See COPPER. *Variogated copper P.* is a variety which tarnishes rapidly on exposure. It contains a much greater percentage of copper than the ordinary kind. *Nickel*, or *capillary P.*, is brassy-yellow in colour, occurring usually in delicate capillary forms, but sometimes in rhombohedra. It is found in Bohemia, Saxony, and Cornwall. *Tin P.* is steel-grey or yellowish, occurring massive or in cubes. It is a triple sulphide of tin, copper, and iron, which are present in the proportions 27, 30, 13. It is very rare, and has been found in Cornwall, where from its frequently bronze appearance it is known as *bell-metal ore*.

Pyritz, an old walled town of Pomerania, kingdom of Prussia, 25 miles S. by E. of Stettin. It was an important stronghold of the Wends, of whom there are many interesting traces, including five high wall-towers. Here Otto of Bamberg baptized the first Pomeranian converts in 1124. P. has a trade in agricultural produce and some woollen and leather industries. Pop. (1875) 7443.

Pyrola and **Pyrolæces**. See WINTER GREEN.

Pyroligneous Acid is the crude acetic acid obtained by the destructive distillation of wood. The first acid liquor consists chiefly of P. A., wood naphtha, and acetone. The two last boil at 65° C. and 56° C. respectively, and distil over first, while the first boils at 117°. The various tarry impurities which are still present in the P. A. must be got rid of in order to prepare pure acetic acid. See ACETIC ACID.

Pyroligneous Spirit. See PYROXYLIC SPIRIT.

Pyrolu'site is an iron-black mineral, crystallising in small rectangular prisms, and sometimes occurring fibrous, radiated, massive, or reniform. It is the binoxide of manganese. See MANGANESE. It is extensively worked in Thuringia, Moravia, and Prussia, and is used for discharging the brown and green tints of glass. Usually associated with it is *Psilomelane*, which differs from P. in containing some barium or potassium, and is distinguished by its superior hardness. By some it is regarded as merely an impure variety of P.

Pyromancy, among the Greeks a species of divination by the flames of a sacrifice, good-luck being betokened by the quick consuming of a victim, and evil by the opposite.

Pyromania is an involuntary, motiveless impulse to destroy by means of fire. It is doubtful whether there is any such distinct form of mental disease; but there is undoubtedly a powerful disposition in many lunatics to destroy articles by fire, and also to commit suicide by such means.

Pyrometer is the name applied to any instrument which is capable of measuring temperatures higher than those indicated by the ordinary mercurial thermometer. In Muschenbrock's original apparatus (1730), the change of temperature was shown by the expansion of a metal rod. This, and the various improvements effected by Desaguilliers, Ellicott, Graham, Smeaton, and others, hardly deserved the name of P., for they were unable to measure high temperatures, and gave no accurate method of comparing the results for low temperatures with the standard mercurial thermometer. Wedgwood (1782) was the first to effect these ends with any degree of success. He measured the increase of temperature by the permanent contraction produced in a cylindrical piece of fine porcelain clay. His results were, however, uncertain and erroneous, and consequently his apparatus was soon abandoned. In 1804, a greatly improved form was devised by Guyton de Morveau. He measured the increase in temperature by the expansion of a bar of platinum, which rested in a groove cut in a plate of highly baked porcelain, the expansion being indicated by a lever, the short end

of which rested against the free extremity of the metal rod. Daniell's P., a still more trustworthy instrument, was constructed upon the same principle, with a mixture of black lead and clay instead of porcelain. The air thermometer (See THERMOMETER) was first employed by Prinsep in 1827; and Pouillet constructed one nine years later, the results of which he checked by other two ingenious forms of P. The one was by the production of the thermo-electric current at a junction of iron and platinum. This method, however, can never be applied with accuracy, since a difference in the constitution of a metal so slight as to be quite inappreciable to the most refined chemical tests is sufficient to make the metal a totally different substance thermoelectrically. The third method employed by Pouillet was by observing the rise of temperature of a given mass of water when a platinum ball at the required temperature was immersed in it. Knowing the specific heat of platinum and its mass, and also the resulting temperature of the water, the original temperature of the platinum can be easily calculated. Regnault, Deville, and Troost have made important researches in the expansion of bodies by heat, the property upon which the principle of all pyrometers depends. The platinum-palladium thermoelectric couple used by Becquerel (1863) is open to the objections indicated above. Siemens has suggested and utilised a method for determining the temperature by observing the change in electric resistance of a platinum wire. The empirical formula which he had deduced from experiment is

$$R = a\sqrt{t} \times bt + c$$

where R is the resistance, t the absolute temperature, and a , β , and c constants determined by experiment.

Pyrope, or **Bohemian Garnet**, occurs usually in rounded grains, and resembles in appearance a rich garnet. It is composed of silicates of aluminum, chromium, magnesium, iron, calcium, and possibly yttrium. It is found in Bohemia, in trap-tufa, and also at Elie, Fife; hence the popular Scotch name *Elie Rubies*.

Pyrophorus (Gr. 'fire-bearing') is any substance which takes fire spontaneously in the air. The metals iron, nickel, and cobalt obtained as a fine powder by the decomposition of the peroxyd by means of hydrogen, behave in this way, as also the finely divided lead prepared by heating the tartarate till the organic portion is charred. In these cases, on account of the great surface exposed, the oxidation is so rapid that the temperature is raised sufficiently to cause the substance to glow.

Pyrosis or **Waterbrash** is a form of dyspepsia or indigestion, connected with organic disease of the stomach, or with the taking of some particular kind of food, as oatmeal, and is attended with the eructation of thin, tasteless, sometimes sour watery fluid. P. generally occurs in paroxysms in the morning or forenoon, when the stomach is empty, the first symptoms being pain, often severe, at the pit of the stomach, or a burning sensation, followed by a discharge of fluid. P. most commonly recurs, and is usually accompanied with other symptoms of dyspepsia. A form of P. depends on the presence in the stomach of fungi, called *Sarcina ventriculi*, discovered by John Goodsir in 1842. They are small flat bodies having a rectangular outline and a somewhat oblong shape, resembling little packets tied lengthwise and across with a string. P. may be treated as a symptom by the compound kino powder, combined with a purgative, as Friedrichshall or Pullna water; and when depending on the presence of fungi, sulphite of soda in 20 to 60 grain doses may be given. Sulphurous acid being set free in the stomach destroys the sarcinæ.

Pyrosoma (Gr. 'fire-body'), a genus of *Tunicate* Mollusca, or Sea-squirts, of compound nature. They consist of an aggregation of Tunicate bodies, which are attached on each side of a central hollow stem or tubular structure. These animals swim freely on the surface of the ocean by means of the inhalation and expulsion of water from the tubular body. At night they shine with a brilliant phosphorescent light, whence their scientific name. *P. Atlanticum* is the familiar species. It attains a length of from 4 to 7 or 8 inches.

Pyrotechny (Gr. *pyr*, 'fire,' and *technē*, an 'art'), the art of constructing fireworks. P. had its origin in the East, and many centuries before it was introduced into Europe, firework displays

were well known in China, and to this day the Chinese and Japanese excel in the production of fireworks of great beauty, brilliancy, and charming novelty. In Europe, P. was first practised at Florence about the middle of the 14th c., and thence a knowledge of it was carried to France, and subsequently to England and Germany. Large pyrotechnic establishments are now to be found in most of the European capitals. England has had several important pyrotechnic displays on occasions of rejoicing, notably those celebrating the peace of Ryswick in 1697, the peace of Aix-la-Chapelle in 1748, the general peace of 1814, and the termination of the war with Russia in 1856. The principal ingredients used in P. are nitre, charcoal, and sulphur, and these materials pulverised are mixed in variable proportions, according as the combustion of the firework is intended to be quick or slow, with other substances which impart colour to the flame. Gunpowder, in the form of meal or fine powder, also enters into the composition of several kinds of fireworks. There are very many substances employed as colouring agents, but those chiefly resorted to are nitrate of strontium, which yields a red tint; nitrate of barium, green; powdered malachite, violet; nitrate of sodium, yellow; sulphate of copper, blue; sulphide of antimony, white; filings of steel, iron, copper, and zinc also yield various colours, and are added where sparkling effects are desired. Fireworks may be divided into four classes—(1) *Single*, comprising the most simple kinds, as squibs, crackers, serpents, wheels, stars, &c.; (2) *Terrestrial*, embracing those works of complex construction that are set upon the ground, as suns, mosaics, waterfalls, *pièce pyrique*, Chinese fountains, fire-globes, and wheels of great variety and elaboration; (3) *Atmospheric*, or those which rise into the air, of which the rocket is the type; and (4) *Aquatic*, those which are fired on the surface of water or below it, and which consist of fire-balls, fire-globes, floating-suns, water-mines, water-rockets, fire-fountains, &c. With regard to the preparation of pyrotechnic mixtures, and the mechanical details for forming the numerous devices with them, recourse should be had to the many cheap manuals that are published on the subject.

Pyroxyl'ic Spirit, or **Wood Naph'tha**, an important product of the distillation of wood. It is one of the more volatile liquid products, distilling over at 55° C., mixed with a considerable quantity of acetone and certain oily substances. It is chiefly composed, however, of methylic alcohol (CH₃O). To obtain this substance pure, chloride of calcium is dissolved to saturation in the crude wood spirit, when a crystallisable compound having the composition CaCl₂.4CH₃O is formed. Heated in a retort to a temperature of 100° C., the acetone and acetate of methyl present pass over; and the residue, when mixed with an equal mass of water and again distilled, yields methylic alcohol, the chloride of calcium remaining behind.

Pyroxylene, an explosive compound formed by the action of nitric acid upon wood, cotton, paper, and other forms of woody fibre. It is the active constituent of Gun Cotton (q. v.).

Pyrrhic Dance, according to Plato the most famous of all the Greek war-dances, was of Cretan or Spartan (i. e., Doric) origin; the accounts that it was invented by one Pyrrhicos, or by Neoptolemus, or Pyrrhus, son of Achilles, being quite fabulous. It was very quick and light (of the P. foot, ∪ ∪, and the Proceleusmatic, ∪ ∪ ∪ ∪), and was danced to the flute. Plato describes it as a preparation for war, imitating by its quick motions of the body the way to avoid missiles and blows, as well as the method of attack. But in non-Doric states it was purely mimetic, danced by the Athenian youths at the Panathenaic festivals, and often performed by women to entertain company. It was introduced into the Roman public games by Julius Cæsar, and was very popular with the Romans. Nero and Caligula both exhibited it. The armed dances of the mountaineers of Thessaly and Macedonia at the present day are thought to resemble the P. D.

Pyrrh'on, a famous Greek philosopher, was born at Elis in the first half of the 4th c. B. C. In his youth a painter, he was first attracted to philosophy by the works of Democritus, and along with Anaxarchus, his teacher, accompanying Alexander the Great on his Eastern expedition, he became acquainted with the Magians and Gymnosophists. From them, probably, he derived his aspirations after entire independence of everything external, and an imperturbable serenity

in place of his natural mobility. Such was the sole aim of his life; for, though despairing of the possibility of attaining scientifically certain knowledge, he never assailed the validity of moral obligations. This explains how the Eleans made him high-priest, and after his death raised a statue to him beside the agora, exempting on his account all philosophers from taxes; how his disciple Timon so highly extols his 'divine repose of soul,' comparing him to the 'imperturbable sun-god,' and how Cicero regards him as Socratic. Nothing is cited as written by P. except a poem addressed to Alexander; and the works of Timon being lost, our knowledge of P. comes mainly from Diogenes Laertius, Sextus Empiricus, Eusebius, Anus Gellius, and Cicero. See C. Mallet, *Études Philosophiques* (2 vols., 1837-38).

Pyrrhus, king of Epirus, was born about 318 B.C. His father Æacides, the cousin of Olympias (q. v.), had become king of Epirus on the death of her brother Alexander in 326, and P. himself, after chequered fortunes, finally secured the throne in 295. His career first becomes important in 281, when the Tarentines, against whom the Romans had declared war, in the name of all the Greeks of Italy, offered him the command of their forces. In 280 he set sail for Tarentum with 20,000 foot, 3000 horse, 2000 archers, 500 slingers, and 20 elephants, Milo, one of his generals, having preceded him with 3000 men. He at once shut up the theatres and other public resorts of the giddy and licentious Tarentines, and forced their youth to serve in his army. He then met the Romans under the consul M. Valerius Laevinus, at the river Siris, near Heraclea. The battle was long and bloody, both armies advancing and recoiling seven times, and finally only the charge of the elephants broke the Roman ranks. P. himself declared that another such victory would force him to return without a soldier to Epirus. Lucania was now lost to Rome; the Brutians, Lucanians, and Samnites, with all the Greek cities, joined P. at once. But not a single Latin, even of those captured at the Siris, could be induced to desert the Romans. So sagacious a soldier as P. could not be blind to the peril of his situation. Accordingly, while he himself advanced into Campania, Cineas, the Thessalian rhetorician, his confidential minister, was despatched to Rome with an offer of peace, on condition of all the Greek cities being freed, and their territory being restored to the Samnites, &c. The Senate wavered, but the blind and grey-haired consular Appius Claudius persuaded them to give the proud reply, that Rome could never negotiate while foreign troops were on Italian soil. P. now advanced to Anagnina, within 40 miles of Rome, but the closed gates of all the Latin towns, and two consular armies dogging his steps, with a third in the city preparing for battle under the dictator, forced him to retreat, after doing nothing, into Campania, and thence to Tarentum, where he wintered. In the spring of 279 he advanced into Apulia, and met the Romans near Asculum. P. was again victorious, but with heavy loss. He was wounded himself, and finally had to retire into winter quarters at Tarentum. At this point came a request from the Sicilian Greeks for aid against the Carthaginians, the Syracusans offering P. their sovereignty. In 278 he embarked, leaving Milo in Tarentum, and Alexander, his own son, in Locri. In Sicily, too, he gained victories; and in 276, with Carthage humbled, Sicily all but Lilybæum in his power, with Tarentum securing him a footing in Italy, and his newly-created war-fleet in the harbour of Syracuse, his dream of universal conquest seemed likely soon to be realised. But his Oriental-Hellenistic ideas of ruling cost him his popularity in Sicily; the Carthaginians again landed a strong army, and in the same year he was fain to cross into Italy, his chivalrous spirit prompting him to retrieve, if possible, the misfortunes which had befallen his allies after his scarcely honourable desertion of them. A sea-fight with the Carthaginians during his passage cost him many vessels, and the 20,000 infantry and 3000 horse whom he landed at Tarentum were not the experienced veterans of former days, nor did the Italians hail him with their former enthusiasm. Near Beneventum, a skilful stratagem of P.'s miscarried, a division of his army having lost its way, and the consul Curius Dentatus was thus enabled totally to defeat him. P. in despair now returned to Epirus, leaving a garrison in Tarentum, and after a short war with Antigonus Gonatas gained complete possession of Macedon. He next declared war against Sparta, and, invading the Peloponnesus, was slain at Argos in 272. P. was a general of rare genius, perhaps the most humane and chivalrous soldier of ancient times, a statesman of wide views and keen insight; but he was too compassionate, too honourable, and too unable to restrain his proud and vehement spirit to succeed in his great ambition of conquering the civilised world.

Pyrrhus is a genus of *Rosaceæ* consisting of about forty species of deciduous-leaved trees and shrubs, natives of the temperate and cold regions of the northern hemisphere, chiefly in Europe and Central Asia. Several are in very extensive cultivation. Under the section *eu-P.* are included the apple and pear; under *Sorbus*, the service, the rowan, and the white-bean; and under *Mespilus*, the medlar, all of which have separate articles.

Pythagoras, the celebrated Greek philosopher, was born, according to Isocrates, at Samos. His father, Mnesarchus, was a merchant or a signet-engraver, and P., probably born about 570 B.C., certainly flourished in the time of Polycrates. Pherecydes of Syros, Bias, Thales, Anaximander, &c., are stated to have been his teachers, and very probably the first really was so. P. is said to have travelled widely, learning geometry from the Egyptians, arithmetic from the Phœnicians, astronomy from the Chaldeans, religious formulæ and ethical maxims from the Magians, and getting other religious and scientific information even from the Arabians and Indians. Very likely he did visit Babylon and Egypt, but his philosophy and institutions were thoroughly Greek, and not even his doctrine of Metempsychosis must necessarily be ascribed to Eastern or Egyptian teaching. Returning to Samos after, it is said, thirty years of travel, P. found that the despotism of Polycrates there made it utterly impossible for him to realise his great scheme of obtaining a 'religious ascendancy in connection with a certain mystical religious system.' Settling eventually at Crotona, he speedily gained wide influence and very many adherents, chiefly from among the wealthy and noble. 300 of these formed a select brotherhood, somewhat like that of Loyola, bound together by oath, and subjected to a rigid ethico-religious regimen embracing the minutest details of everyday life. After passing an examination as to fitness, in which P. is said to have trusted much to his physiognomical penetration, the candidate had to endure a long probation of mute obedience and unconditional submission to the doctrine taught. All were bound rigorously to examine themselves daily, to be moderate in attire and food, especially animal food, to propagate the school doctrines among the people, and to keep profoundly secret from the uninitiated all that was done within the pale of the society. Among the 300 there were gradations, the division being usually described as one into *Esoteric* and *Exoteric*, though these terms themselves are probably late. All were instructed in ethics and religion, especially the doctrine of Metempsychosis—P. himself is said to have held that his soul had once been that of the Trojan Euphorbus—in mathematics (P. is said to have discovered the propositions of Euclid I. 47, III. 31), arithmetic, astronomy, music, and gymnastics. The specially *esoteric* teaching may have had reference to the orgies or more secret religious doctrines and usages, prominent features of the Pythagorean system. All the members had probably common meals, and there were other outward peculiarities of an ascetic kind, as well as a number of secret conventional symbols for mutual recognition. Among the less intimate adherents of P. were some women. Their whole discipline produced in the Pythagoreans a lofty serenity and self-possession, a devoted attachment to one another, and a boundless reverence for their master (*cf.* the well-known phrase *aulos epha, ipse dixit*). P. thus more than anticipated Plato, for he realised his idea in a society which for a time had great influence, and was even to some extent a type of the great moral society of the Christian Church. But just as their ruling idea of *Number* (see below) implied unity of plan and a calculating architect in the physical universe, so in the social system it led them to make supreme the principle of order, authority, and subordination, of conservatism as opposed to free and equal individualism. Oligarchical, thus, both by social position and principles, the Pythagoreans conceived an unbounded scorn for all the uninitiated, and thus inevitably came into collision with the democratic element so powerful in the Greek colonies of S.E. Italy. In the war between Sybaris and Crotona, the Pythagorean Milo commanded the Crotoniates, and under him Sybaris was totally

destroyed (510 B.C.). This so elated the Pythagoreans that they became harsher than ever towards the commons, till finally the latter attacked them while assembled in the house of Milo, and set fire to the building. Only the younger and more active members escaped. This blow was immediately followed by the universal suppression of the Pythagorean clubs as political organisations, though for religious observances and scientific pursuits the Pythagoreans were long united as a sect. P., according to some, perished with the rest; according to others, he fled first to Tarentum and thence to Metapontum, where he starved himself to death (504 B.C.), and where his tomb was shown in Cæsar's time. According to Aristotle, the central doctrine of P. was that *Number* is the essence of all things, and the organisation of the universe in its various determinations is a harmonious system of numbers and their relations. Number here is calculated number, not mere succession of units; it is almost synonymous with the 'law' of modern physicists. It is the method of operation of mind, or *logos*, 'an inner, invisible, moulding, formative principle, something which cannot be conserved as objective or material, in place of the 'sensible universal' of the Ionic schools. To P. as the late Professor Butler says, the universe 'was a living arithmetic in its development, a realised geometry in its repose.' P. was thus the great prophet and anticipator of modern scientific processes, 'first calling the world *cosmos*, a manifestation to sense of the everlasting order, and bringing the philosophical mind of his age into an entirely new position. As Hegel says, 'he first made thought and not sense the criterion of the essence of things.' Such a philosophy was truly metaphysical; it was hardly theological, as Professor Blackie calls it. Schopenhauer rather is right in styling it 'entscheidener Pantheismus,' but he is unjust in saying that the greatness of P. was due to what he learned, rather than to what he thought, echoing the sneer of Heraclitus that P.'s wisdom was 'eclectic and nothing better than polymathy and perverted art.' Connected with this doctrine of number was that of the *monas* (or *peras*, 'the limited'), the identity or feature of agreement in things, and the *aoristus dyas* (or *apeiron*, 'the unlimited'), the capacity of infinite diversity in things. From the combination of these two results corporeal substance. On the same fundamental idea P.'s theory of music was worked out. The Pythagoreans regarded fire as the noblest element, the enlivening principle of the universe, and accordingly their *cosmos* consisted of ten spheres (a counter-earth (*antichthon*) being supposed to complete the number), circling round a central fire. 'Their mutual distances were supposed to be arranged on a harmonic scale, hence in their calm, well-ordered courses waves of sound were sent forth according to the ratios of their intervals in space, whereby a mighty harmony was evolved.' The soul, also described as a number or harmony, as far as it is the life principle, emanated from the great central fire. There are in it two elements—a rational and an irrational, and the five senses (connected by the Pythagoreans with the five elements) are its instruments; but the only certain knowledge comes from number and its relations. The ethics of the Pythagoreans consisted more in ascetic practices, and maxims for restraint of the passions than in scientific theory. What they had of the latter was always clothed in the dress of mathematics. Virtue was the harmony or health of the soul, and Metempsychosis was regarded as a purification (*catharmos*), a means to attain this. The celebrated Pythagoreans of whom we have notices appear always to have been men of great uprightness, conscientiousness, and self-restraint. No writings of P., if he ever did write anything, have survived. Philolaus, probably a contemporary of Socrates, was the first to publish the Pythagorean doctrines in writing, and Aristotle gives many extracts from his works. Plato, Herodotus, Porphyrius, and Iamblichus also give us information. See Ferrier's *Works*, vol. i.; Ueberweg's *History of Philosophy*, vol. i.; Archer Butler's *Lectures on Ancient Philosophy*; Blackie's *Horæ Hellenicæ*.

Pythæas of Massilia in Gaul, a celebrated Greek navigator, probably a contemporary of Alexander the Great, said to have voyaged 334 B.C. from his native city to Cantium (now Kent), and from thence to Thule (q. v.), afterwards relating his adventures in his work *On the Ocean*. In this or another voyage P. coasted along the whole of Europe from Gadeira (Cadiz) to the

'Tanais' (for which he probably mistook the Elbe), and visited the 'Amber-land,' which, according to Ukert, was the Cimbric Peninsula, or Denmark. P. appears to have been the first to determine the latitude of a place by the sun. Certain fragments of his work called *Periplus* or *Periodos* have been collected and annotated by Arwedson (Upsala, 1824) and Schmekel (Merseburg, 1848). In modern times the voyages of P. have been discussed by many writers, as Adelung, D'Anville, Barth, Forster, Mannert, but especially Lelewel in his *Entdeckungen der Karthager und Griechen im Atlantischen Ocean* (Berl. 1831), and Strazewicz, in *P. de Marseille et la Géographie de son temps* (Par. 1836; Ger. by Hoffman, Leips. 1838). See also Fuhr, *De Pythæa Massiliensi* (Darmst. 1835); Redsløb, *Thule: Die phönizischen Handelswege nach dem Norden* (Leips. 1855); Bessel, *Ueber P. von Massilien* (Gött. 1858); Ziegler, *Die Keise des P. nach Thule* (Dresden, 1861).

Pythian Games, The, whose foundation was ascribed to Apollo, were held every fifth year on the Crissæan Plain, a little to the S.W. of Delphi. Restricted originally to musical contests, they also embraced from 586 B.C. horse, chariot, and foot races, gymnastic exercises, &c. The prize was a chaplet of laurel and a palm-branch, with permission to the victor to erect his statue on the plain. It is certain that the P. G. were still celebrated in the reign of the Emperor Julian (360–63 A.D.), and they were probably discontinued about the same time as the Olympic Games, *i.e.*, 394 A.D.

Python, the name given to various serpents of the family *Boide*, or that of the Boas. They are innocuous, and have no poison-glands, but attain a large size, and their immense muscular power enables them to crush the animals imprisoned in their folds. The halves of the lower jaw are united simply by ligament, and the lower jaw can be separated widely from the skull—two arrangements which serve to largely increase the capacity of the mouth. The pythons first crush their prey into a shapeless, sodden mass, which is swallowed slowly and gradually. But there is little doubt that many of the stories told of their swallowing large prey are simply exaggerations. The tail bears two rows of scales on its under surface. The pythons inhabit India. The *P. molurus*, or common rock snake of India, is a typical genus. The name is also indiscriminately applied to the Boas themselves. The Hortulia, or *P. Natalensis*, is the rock snake or P. of S. Africa.

Pyx (Gr. 'a box'), in the ancient Church, was an ark or wooden vessel kept beside or on the altar, for holding the remains of the consecrated elements after the celebration of the Eucharist, which were reserved for particular uses, and which were also kept sometimes in the silver dove which was suspended over the altar as a symbol of the Holy Ghost. A later name for the P. was the *ciborium* (Gr. a 'cup' or 'bowl' wider at the bottom than at the top). The ciborium-shape, in gold or silver, is the form of the P. still used in the Roman Catholic Church.

Pyx, Trial of the. From each 'journey' weight (15 lbs. troy for gold, and 60 lbs. troy for silver) of metal coined at the Royal Mint, the master of the Mint selects one coin and deposits it in a pyx (Gr. *pyxis*) or chest, kept in the Pyx Chamber at Westminster, and all the coins so deposited are, according to the terms of the Coinage Act of 1870, annually tested as to weight and fineness by ten jurymen (freemen of the Goldsmiths' Company), who are summoned by Treasury warrant, and presided over by the Queen's Remembrancer. This scrutiny is called the T. of the P. Although known to have been ordered as early as the reign of Henry II., the trial was first systematically established by the Mint Indenture of 18 Edw. III.; but prior to 1871 it was conducted at irregular intervals. The coins are weighed to see if they fall within the legal 'remedy' (see MINT) as to weight, and several of them are then melted into an ingot, which is assayed side by side with standard trial plates to test the fineness; some of the remaining coins are also individually assayed. The results of the trial are embodied in a verdict which, when favourable, discharges the Mint authorities from further liabilities, and is published as a guarantee of the intrinsic value of the coinage.

Q.



the seventeenth letter of the English alphabet, occupying the same place as in Latin, and corresponding to the archaic Greek *koppa* and the Semitic *koph*. It is properly a guttural mute, of the same series as K, C, and G, but with a more distinctly guttural sound. In Greek, *koppa* was dropped altogether at an early date in the history of the alphabet, and in Latin also there was a tendency to-

wards the disuse of Q, as may be seen in the use of *cujus* for *quojus* and *cum* for *quum*. In Latin Q was always followed by U, so that the two together may be regarded as constituting a single letter. The same is the case in the Romance languages derived from the Latin, as well as in English; but in French the U is not suffered to modify the pronunciation. In Oriental tongues, such as Arabic, Q retains its proper sound as distinguished from K; the 'Koran' is accurately written *Qur'an*. The most common change of Q is with its cognates C and K, and sometimes with G in the middle of words: as Lat. *equalis* = Fr. *égal*. There is another regular interchange with P and T: Lat. *quinque* = Gr. *pente*; *equus* = *hippos*; *quatuor* = *tettara*. As an abbreviation Q stands for *quintus*, and for *que*, in the phrase S.P.Q.R. = *senatus populus que Romanus*. In English law, Q.C. = Queen's Counsel, and Q. B. = the Court of Queen's Bench.

Quadrages'ima (Lat. 'fortieth,' scil. *dies*) is the first Sunday of Lent (q. v.), which in the 6th c. was extended to 40 days, and was called the Quadragesimal fast.

Quadrangle, an open square court with four sides. Large public buildings, such as palaces, colleges, universities, &c., usually inclose a Q., which is in many cases cloistered round wholly or partially.

Quadrant, the fourth part of a circle, or the arc subtending one right angle. A graduated Q. was the most usual form of the apparatus for ascertaining the altitude of the stars till the present c., when it was superseded by the Mural Circle (q. v.). Hadley's Q. is made upon the same principle as the Sextant (q. v.).

Quadratic Equation, in algebra, is an equation in which the square of the unknown quantity enters as the highest power. Its general form is

$$ax^2 + bx + c = 0$$

where x is the unknown quantity, and a , b , and c are constants. The general solution is

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If $c = 0$, x has the two values 0 and $-\frac{b}{a}$; if $b = 0$, x has the

values $\pm \sqrt{\frac{c}{a}}$; and if $a = 0$, the equation degenerates into a simple equation of one unknown. See EQUATIONS.

Quadrature, in mathematics, is the operation of determining the area of a given surface, or of finding a *square* whose area is equal to that of the assigned surface. The areas of figures bounded by straight lines are easily deducible; but the majority of curvilinear figures present difficulties which cannot be surmounted by ordinary geometry, and which in many cases are beyond even the power of the calculus. In analysis, Q. is applied to the process of approximating to the value of a given integral, which cannot be determined exactly; and hence the practical rules of mensuration, gauging, engineering, &c., are such cases of Q.

The Q. of the circle is one of the famous problems of antiquity, ranking with the trisection of the angle, the duplication of the cube, and the perpetual motion. The last is contrary to all experience. See PERPETUAL MOTION, THE. The trisection and the duplication are problems of pure mathematics, which depend upon the solution of a cubic equation, and are therefore irresolvable by the simple geometry of the straight line and circle. They can both be solved, however, if it be allowed that a conic may be described with a given focus and directrix. To find a simple expression for the side of the square which is equal in area to a given circle, or even to express it in a finite form, has hitherto proved beyond the power of the highest analysis. The incommensurability of the circumference and diameter of a circle is demonstrable, and was suspected by Euclid and the ancient geometers, to whom it was also known that the area of a circle was equal to the product of the radius and semi-circumference. See CIRCLE.

Quadrienn'ium U'tile, a term of Roman law, adopted into that of Scotland, denoting four years allowed after majority to one who had been a minor, under guardianship, to call his guardian to account.

Quadrilateral, in mathematics, is any figure bounded by four right lines. If the sides lie in one plane, the Q. is *plane*; if in different planes, *gauche*. A remarkable property of all quadrilaterals, whether plane or *gauche*, is that the six lines joining the points of bisection of the sides form a parallelogram with its diagonals.

In fortification, the word is technically applied to four fortresses, which, though not connected directly, are placed so as to mutually protect each other.

Quadrille', a popular set of square dances consisting of five movements, *Le Pantalon*, *L'Été*, *La Poule*, *La Pastourelle*, and *Le Finale*. Popular melodies and selections from the lighter opera form the basis of most quadrilles.

Quadriv'ium (Lat. *quatuor* 'four,' and *via* a 'way') was a name used by the medieval schools of the West in their classification of the liberal arts. These were seven in number, corresponding to the seven days of the week, viz., grammar, dialectic, rhetoric, arithmetic, geometry, music, and astronomy. The first three, or *Trivium*, a number adopted in honour of the Trinity, were taught in the elementary (*Trivium*) schools; the last four, recalling to mind the four rivers of Paradise, formed the higher course of instruction. The mnemonic line, *Lingua, Tropus, Ratio, Numerus, Tonus, Angulus, Astra*, enumerates the subjects first of the Trivium, then of the Q. The following two were used as giving definitions also:—(1) *Gram. loquitur; Dia. verba docet; Rhe. verba ministrat;* (2) *Mus. canit; Ar. numerat; Ge. ponderat; As. colit astra.*

Quadruman'a (Lat. 'four-handed'), a name given by Cuvier to the order of *Mammalia* represented by the various kinds of monkeys and apes, from the fact that the hinder feet become hand-like in function. The name must, however, be accepted with the qualification that the feet of an ape are really feet, and are only functionally like hands. The function of hands is performed by the feet of the Q. on account of the peculiar disposition of the toes. The great toe can be 'opposed' more or less perfectly to the other toes so as to permit of objects being seized or grasped by these members. In modern systems of Mammalian classification, the order Q. is made to form a subdivision of the order *Primates*. This latter group includes man and apes, and the association of the human and quadrumanous forms is justified by their close structural affinities. The

Bimana, or division including man, would be separated from the quadrumanous group of the Primates by the fact of the foot never becoming prehensile in man, whose *hallux* or great toe exists in the same plane as his other toes.

Quadrupeds ('four-footed'), a name popularly used as synonymous with *Mammalia* (q. v.). If, however, it be used in this sense, it must be borne in mind that all mammals have not four limbs. The whales, dolphins, and their kind have only the fore limbs. The name Q. is not of any zoological importance. If used in any scientific sense, it might be employed to designate those fishes which have pectoral and ventral fins, and all other vertebrate animals in which four limbs are developed.

Quæstor (from Lat. *quæro*, 'I seek') was the name given to two distinct classes of Roman officials. The *quæstores parricidi*, two in number, were first appointed in the regal period. In 366 B.C. their functions of prosecuting persons accused of murder, and executing the sentence given, was transferred to the *Triumviri capitales*, and the name Q. was henceforth restricted to the officers entrusted with the care of the public money (*Q. classici*), who were not elected till after the kingly period, and were also two in number till 421 B.C., when other two were added, and the office was opened to plebeians, though none obtained it till 409 B.C. Henceforward the consuls during war were always attended by one Q. each, who sold the booty, and acted as paymasters. The two who remained at Rome (*urbani*) superintended the treasury as before. In 265 the number of quæstors was again doubled to eight, one being always after this appointed to see to the corn supply of Rome (*quæstura ostiensis*). Sulla in his dictatorship raised the number to 20, and Julius Cæsar had at one time even 40. Ex-quæstors became members of the Senate.

Quagg'a (*Equus quagg'a*), a species of *Ungulate* quadrupeds belonging to the group *Solidungula* (q. v.), or that including the horses and asses. The Q. is nearly allied to the Zebra (q. v.), but is not striped on the limbs. Its colour is a dark or blackish brown on the head, the tints on the back and hind quarters being lighter. The body is banded with darker markings, and the tail is tufted. The Q. is smaller than the zebra. It is gregarious, but the herds are said to mingle indiscriminately with those of the zebra. The name is derived from the cry of the animal.

Quag'lio, a Munich family of Italian extraction, fourteen of whose members have distinguished themselves in the annals of art. Its founder, Giulio Q., born at Laino, on the Lago di Como, in 1601, studied painting under Tintoretto, and was ennobled by the Emperor Leopold I. His son and namesake (died 1720), painted some fine frescoes at Vienna and in Laibach Cathedral, and left a son (Giovanni-Maria 1700-65), who devoted himself to architecture at Milan, and filled the post of imperial engineer-in-chief. Giovanni's sons, Domenico (1723-60) and Lorenzo (1730-1804), were the one an historical painter, the other court-architect at Munich; and of Lorenzo's three sons, Giulio (1746-1801), Giuseppe (1747-1828), and Giovanni-Maria (1772-1813), the two first were court-architects, the last an architect, painter, and engineer. Giuseppe, again, had four sons—Angelo (1778-1815), a celebrated lithographer; Domenico (1786-1837), the reviver of architectural painting in Germany, and author of *Sammlung merkwürdiger Gebäude des Mittelalters in Deutschland* (2 vols. Karls.), *Ansichten merkwürdiger Gebäude in München* (2 vols. Mun. 1811), &c.; Lorenzo (1796-1869), a talented *genre* painter; and Simone (1795-1878) who was succeeded by his son Angelo (born 1829) in the office of Court scene-painter at Munich. Francesco (born 1844), a brother of the last, has produced some admirable *genre* and battle-pieces.

Quail (*Coturnix*), a genus of *Rasorial* birds, including various species. The Q. resembles the Partridge (q. v.) in general form, but wants the naked red space seen over the eye in the latter bird. The tarsi do not bear 'spurs' in the Q., and the tail is short. The wings are rounded, and the first quill is as long as the other feathers of the wing. The Common Q. (*C. dactylisonans*) occurs in Europe generally, in N. Africa, India, and China. It arrives in Britain in May, and migrates southwards in October. The male comes first, and appears to cry for its mate in a peculiar whistling tone, by the imitation of which it is sometimes snared. The average length of the Q. is about 5 inches. It is of a dusky brown colour, variously marked and

mottled with black and with darker shades. The males are said to exceed the females in numbers, and the statement that the birds are polygamous must therefore be received with some degree of reservation. The eggs vary in number from six to twelve, and are of a light greenish hue. Quails are captured in immense numbers on the shores of the Mediterranean Sea, during their migrating flights. They were celebrated in classical times, 'Q. fights' being an amusement of the Greeks and Romans. Other species are the Coromandel (*C. textilis*) and *C. Argoondah* or the Rock Q. of Deccan. The Virginian or American Q. is the *Ortyx virginianus*, a bird belonging to a different genus from that of the European Q. The American Q. is common in N. America. It attains a larger size than its European representative. The Andalusian Q. (*Turnix tachydromus*) inhabits both sides of the Mediterranean Sea, and belongs to a distinct genus.

Quakers. See FRIENDS, SOCIETY OF.

Quaking Grass (*Briza*) is the name of a small genus of handsome grasses with panicles of many-flowered compressed pendulous spikelets suspended on hair-like pedicles. They are met with in temperate districts of Europe, Asia, and Africa, and are familiarly represented by *B. media*, a common European and British species of pastures and heaths; it is not, however, of much agricultural importance. *B. maxima* and *B. minor* are frequently cultivated in gardens as ornamental annual plants, the last named reaching English soil as a native plant.

Quamaah', the Indian name for *Camassia esculenta* of the natural order *Liliaceæ*, occurring in great abundance in swampy plains of N.-W. America, where the bulbous roots form a very important article of food for the natives, and are extensively collected by them. After roasting, they are either dried or pounded and made into cakes, and preserved for winter use.

Quant'ic, in the higher algebra, is generally understood to be any rational integral homogeneous function of two or more variables, but includes also non-homogeneous functions which may be supposed to have resulted from substituting unity in place of one or more of the variables of a homogeneous function. Quantics are classified according to their dimensions. Thus, $ax^2 + by^2$ is of two dimensions in the variables, and is called a *quadratic*; and similarly we have *cubics*, *quartics*, *quintics*, &c., denoting quantics of the third, fourth, fifth, &c., degrees. Further, quantics are distinguished as *binary*, *ternary*, *quaternary*, &c., according as they contain two, three, four, &c. variables. Thus a ternary quintic is a rational integral and homogeneous function of the fifth degree in three variables. See Salmon's *Higher Algebra*, and the numerous memoirs of Cayley, Sylvester, and other analysts.

Quantification of the Predicate. In Aristotle's system of logic four kinds of propositions are recognised—the universal affirmative, the universal negative; the particular affirmative, and the particular negative. Of these, the following may be taken as types: All A is B, no A is B, some A is B, some A is not B. For more than two thousand years this system was accepted with little or no modification. Within the last half-century, however, it became apparent that a reform was necessary in order to make the syllogism an absolutely rigid system of logical deduction. The improvement was effected nearly contemporaneously by various writers, but notably by Sir William Hamilton and Professor De Morgan. The reform was, in the language of Hamilton, to *quantify the predicate*—that is, to state distinctly whether the whole or only a part of the predicate is considered in the proposition. For example, in the proposition all A is B the subject only is quantified; and it would be illogical to conclude that all B is A. All we can be sure of is that some B is A. If, however, we say that all A is all B, we at once quantify the predicate; and now the simple converse, all B is all A, is true. It appears, then, that by quantifying the predicate we may break up the ordinary universal affirmative into two; namely, all A is all B, and all A is some B. Treating the others similarly, we obtain eight propositions instead of four.

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| 1. All A is all B. | 5. Some A is all B. |
| 2. All A is some B. | 6. Some A is some B. |
| 3. No A is any B. | 7. Some A is no A. |
| 4. No A is some B. | 8. Some A is not some B. |

Of these, 4 and 8 are perhaps never used; and 2 is evidently the simple converse of 5, as 4 is of 7. When the predicate is thus quantified the process is much simplified, being merely a transposition; and the laws of the syllogism assume a corresponding simplicity. Hamilton maintained that in thought the predicate was always quantified as well as the subject. Certain logicians, however, have taken exception to this, and have urged that the peculiar forms of expression are not only unusual, but are really never used, so that there is no logical ground for believing that *in thought* the predicate is quantified. Again, some of the propositions are really equivalent to two, that the proposition all A is all B contains in a compressed form the two ordinary propositions all A is B, and all B is A; whereas, it is maintained, logic seeks to analyse our thoughts into their simplest elements, and not to express them in a condensed form. See Hamilton's *Discussions* and *Lectures on Logic*, and Mill's *Examination of Hamilton's Philosophy*.

Quaquaversal (Lat. 'turning every way') is the name given to strata which dip to or from a single point, so as to form a dome-like elevation or a basin-shaped depression. This kind of dip is produced by a local upheaval or subsidence.

Quarantine (Fr. *quarantaine*, 'a period of forty days') is an international regulation, by which neither persons nor goods in a vessel coming from a place where a contagious or infectious disease prevails, is permitted to land till a certain period, generally forty days, has elapsed without the suspected disease showing itself. By 6 Geo. IV. cap. 78 the Privy Council may order vessels to repair to certain places to be examined so as to determine their liability to Q. Masters of vessels liable to Q. are to hoist a yellow flag on meeting other vessels at sea and on coming within two leagues of the United Kingdom, under the penalty of £100. Where Q. is established, it is a high misdemeanour for any person to come on shore, or to disembark any goods from the suspected ship. Various regulations and restrictions, all more or less oppressive, have been and still are enforced in the matter of Q. in Spain, Portugal, Greece, and Turkey. Since 1866, four international sanitary conferences have been held, and at one held at Vienna in 1873 a resolution was carried, by a large majority, in favour of abolishing Q. regulations in Europe on rivers; but it was decided to continue the system by sea. In English law, Q. denotes the forty days during which the widow of a deceased landowner may remain in the chief house of the estate until her dower be assigned to her.

Quarles, Francis, was born in 1592 at Romford, Essex. He studied at Christ's College, Cambridge, and Lincoln's Inn, became cupbearer for a while to the Queen of Bohemia, and in 1621 went to Dublin, where he was appointed secretary to Bishop Usher. After several years he returned to England, was appointed chronologer to the City of London, and devoted himself to literary labours. His first published work was *A Feast for Wormes in a Poem on the History of Jonah*, with *Pentalogia*, or *the Quintessence of Meditation* (1620). In 1621 appeared *Hadassa, or the History of Queen Esther*, and soon after Q. published *Argalus and Parthenia*, founded on Sidney's *Arcadia*. These poems were written in decasyllabic couplets. Next came *Job Militant, with Meditations Divine and Moral*, and *Sion's Elegies, Wept by Jeremie the Prophet* (1624). In 1625 there followed *An Alphabet of Elegies*, and *Sion's Sonnets, sung by Solomon the King, and Paraphrased*; and a collection of his pieces, entitled *Divine Poems*, was printed in 1630. Two years later came *Divine Fancies, Digested into Epigrammes, Meditations, and Observations*. The quaintest and most truly poetical of Q.'s works, the *Emblems, Divine and Moral*, was brought out side by side with the *Emblems of Wither* (1635; new ed. 1877). The *Emblems* follow a fashion traced back to the great Italian lawyer, Andrea Alciati, and seem specially inspired by the *Pia Desideria* of the Jesuit Herman Hugo. They are distinguished by fantastical expression, sometimes by pathos, often by bathos, and are best described as conceits. Q.'s next work was *Hieroglyphics* (1638). In 1641 he collected a number of short essays and aphorisms into a volume entitled *Enchiridion of Meditations*. This book is full of pithy maxims, often overstrained; every sentence contains an antithesis, like a nut with two kernels. In the Civil War, Q. espoused the cause of Charles I., and gave offence to the Parliament in *The Loyal Convert*; and having joined the king at Oxford, he lost all his property, even his

books. He was twice married, and had eighteen children by his first wife. He died 8th September 1644, overwhelmed with troubles. After his death were published *Solomon's Recantation, a Paraphrase on Ecclesiastes; The Virgin Widow* (a feeble comedy); and the *Shepherd's Oracles*.

Quarrel or **Quarry** (Fr. *carreau*, from *carrier*, 'to square'; Lat. *quadrare*) signifies, in architecture, any square-shaped opening, and it also denotes a diamond-shaped pane of glass, or a square tile or paving-stone. A flat square-headed arrow-bolt for a crossbow was also known as a Q. or *quarrell*.

Quarry, an open excavation, whence stones for building and other purposes are procured. Although quarrying is essentially the same as Mining (q. v.), a mine differs from a Q. in being a subterranean working, always at a considerable depth. Where stone or slate is obtained from underground, the place becomes a mine in the official sense, and comes under the cognizance of the mine inspectors. Quarries were worked by the nations of antiquity, and the huge monoliths which the Egyptians succeeded in raising and transporting to great distances especially mark the great skill in quarrying possessed by them. Quarries of limestone, sandstone, granite (syenite), and red porphyry opened by the Egyptians are still exposed to view, and many of them contain half-quarried colossal blocks, bearing marks of the quarrymen's tools. The most celebrated quarries of ancient Greece were situated at Mounts Pentelicus and Hymettos, and in the Islands of Paros, Scio, Samos, and Lesbos; and with the beautiful white marble obtained from them, the Parthenon and other famous temples were constructed. The Pentelic and Parian marble quarries have recently been reopened. The travertine (*lapis Tiburtinus*) of which Rome is chiefly constructed has been quarried at Tivoli and its neighbourhood since the commencement of the Christian era; and the famous Carrara quarries, from which supplies of white statuary marble are still drawn for the whole world, were first opened in the reign of Augustus.

The operations of quarrying differ as the rock to be excavated is stratified or unstratified, and its intended use. In extracting whinstone for road-metal, or limestone to be burnt, for example, the most expeditious mode of detaching the rock, viz., by Blasting (q. v.), is resorted to. In quarrying building-stones, on the other hand, hand labour is preferred to blasting, for waste is thereby avoided. In stratified quarries the largest stones are detached and slid upon their *bed* by driving wedges into a series of picked holes on the natural face of the rock; but where the stratum is very thick, wedges are also driven in in a line parallel to the bedding. In sandstone quarries, having several beds of different and serviceable qualities, it is usual to lay out the beds in a series of steps, called bench or stage working, so that the excavation of the beds may be simultaneously carried on. Roofing-slates, though bedded, are more easily split with a broad chisel and hammer in the direction of its *cleavage* lines, which are often at right angles to the bedding. Unstratified rocks are usually quarried on a perpendicular face in hillsides, and in detaching the stones advantage is always taken of natural divisions or fissures, or of any peculiarity of structure, as the columnar forms of basalt, or the tabular and cuboidal forms of granite. All stones are generally roughly dressed or squared with the pick before leaving the Q.

Numerous quarries of sandstone, magnesian and common limestone, marble, granite, basalt, porphyry, roofing-slate, &c., constitute one of the sources of wealth of the United Kingdom. A revised table (first drawn up in 1839 by the commissioners for selecting a suitable stone for the Houses of Parliament) of the building-stone quarries is appended to Professor Hull's *Building and Ornamental Stones* (Lond. 1872). See also *Mine Inspectors' Report* for 1875.

Quart, a measure of capacity, being the fourth part of a gallon. It contains two pints. See GALLON.

Quar'tan Fever. See AGUE.

Quar'ter is the fourth part of anything. It is used as a definite standard measure of mass, when it is equivalent to 28 pounds avoirdupois, or the fourth part of a hundredweight. As a measure of capacity, it contains 8 bushels, or 32 pecks. In this latter sense its derivation is doubtful, but it is supposed to be of Norman origin.

Quarter, in heraldry, one of the ordinaries, or subordinaries, now superseded by the *Canton* (q. v.).

Quarter, in war, is to spare the life of a defeated enemy, an essential element in modern civilised warfare. The expression is an ancient one and its derivation uncertain. 'That every one should kill the man he caught, and keep no Q.,' Drayton's *Miseries of Queen Margaret*. According to De Brieux, a Q. was the portion of pay promised as ransom by soldiers to their conquerors in battle.

Quarter Days. These are, in England and Ireland, Lady Day, 25th March; Midsummer Day, 24th June; Michaelmas Day, 29th September; and Christmas Day, 25th December. House-rents are generally made payable quarterly, but if there is no stipulation as to time of payment, rent is only due once a year. See *LANDLORD AND TENANT, NOTICE TO QUIT*. In Scotland the legal terms are Whitsunday, the 15th of May, and Martinmas, the 11th of November; and if nothing is said regarding date of entry and payment of rent, Whitsunday is understood as regards houses, but by custom 25th May has come to be the day. Entry to arable land is at Martinmas. Rents and interests in Scotland fall due on 15th May and 11th November.

Quarterdeck, the part of the uppermost deck of a ship between the main and mizzen masts, where there is a poop, or between the mainmast and stern if otherwise. It is the parade on Her Majesty's ships. The Quarter of a ship is the after-part of its side, about one-fifth in extent of the entire length of the vessel.

Quartering, in heraldry, a method of Marshalling (q. v.) by dividing a shield into four parts by two lines, fess-wise and pale-wise, meeting in the centre, a distinct shield being allotted to each quarter. In the Q. of two coats the more important is placed in the first and fourth quarters, and in the case of three coats, the fourth quarter repeats the charge of the first, as on the shield of Queen Victoria, where England occupies the first and fourth, Scotland the second, and Ireland the third. Four coats of arms are placed in their proper order of succession, one in each quarter. In the Q. of any number greater than four, the number of lines drawn pale-wise is increased, and in the case of an odd number of coats being represented, the last quarter is always a copy of the first. The earliest English example of marshalling by Q. is the shield on the monument of Alianore, Queen of Edward I., in Westminster Abbey, bearing the arms of Castile and Leon, first quartered by her father Ferdinand III. on the union of those crowns. Symon de Montagu is the first subject on record who bore quartered arms (1311). By the end of the 14th c. marshalling by Q. had become a common fashion.

Quartermaster, Military and Naval. A quartermaster is attached to every regiment of cavalry, battalion of infantry, and brigade of artillery. His duties are to look after the quarters, clothing, rations, ammunition, stores, &c. of the troops. He holds the rank of lieutenant, and his pay varies from 4s. 8d. per day in the marines to 9s. 6d. in the Life Guards. In the cavalry it is 8s. 6d., rising after ten years' service to 12s., and in the infantry 6s. 6d., rising to 10s. A non-commissioned officer is usually promoted to the post. A quartermaster-sergeant assists the regimental quartermaster in his duties. The quartermaster in the navy is a petty officer who attends to the stowage of ballast and provisions, the steerage of the ship, &c.

Quartermaster-General is one of the principal staff officers in the British army, whose department is charged with the arrangements as to marching, billeting, quartering, embarking and disembarking of troops, strategical and topographical subjects, military questions as to barracks, hospitals, canteens, lights, fuel, cooking, &c. He has a sub-department in the Military Department of the War Office, and acts under the Adjutant-General. His salary is £1500. He has the assistance of an Assistant Q.-G. A Deputy Q.-G., an Assistant Q.-G., and several Deputy-Assistant Quartermaster-Generals are attached to the Intelligence Branch of the department whose functions include the preparation and maintenance of information regarding the defence of the empire and the mobilisation of the army, the collection of foreign army statistics, the charge of maps, plans, &c., and the translation of foreign documents, &c.

Quartern, the name given in some parts of Great Britain to the fourth part of a peck, or the fourth part of a pint. The Q. loaf is so called because it contains a fourth of a stone of flour, or about 4 lbs.

Quarter Sessions, the General Court of, is held in England by two or more justices of the peace, in every division of a county, once every quarter of a year, to try offenders against the peace. By 1 Will. IV. c. 70, these sessions, in the several counties, ridings, and divisions, are held in the first week after the 11th October, in the first week after 28th December, in the first week after 31st March, and in the first week after the 24th June. But justices may direct the April Q. S. to be held any time between March 7th and April 22d, so as not to interfere with the spring assizes. The sentences of any court of Q. S. take effect from the time of being pronounced, unless the court otherwise direct. Judges of Q. S. are unpaid. It has, however, been found expedient to appoint a paid officer to assist in their work. He is called a *Recorder* (q. v.). In Scotland, justices of the peace meet at the county town on the first Tuesdays of May, August, and March, and on the last Tuesday of October. At these quarterly courts they have the power of reviewing sentences passed at the occasional meetings of justices, called special or petty sessions, when the sentence is subject to review.

Quarter-Staff, a tough wooden stave about 8 feet long, formerly used by the English in attack or defence. It was grasped in the middle with one hand, and between the middle and the end with the other, and a twirling motion having been given to it, strokes were dealt with either end alternately. Q.-S. encounters are frequently described in the Robin Hood ballads; and down to last century sport with the Q.-S. was one of the chief amusements at English rustic games.

Quarters, Military and Na'val, (1) apartments in military stations for accommodation of officers and men. The rules regarding officers' quarters will be found in the Queen's regulations; (2) the stations of a ship's crew on entering into action.

Quartet', Quartette', or Quat'oor, a musical composition in four parts, or for four voices or instruments. Instrumental quartets are usually written in complete symphony form, containing four movements and sometimes an introduction. Two violins, a viola, and a violoncello are used for string quartets. One of the earliest string quartets was composed by Allegri about 1650. Haydn, Mozart, Beethoven, Schubert, Schumann, Onslow, &c., have enriched this form of composition.

Quartodecimans (Lat. *decimus quartus*, 'fourteenth') were those Christians, chiefly in the Eastern Church, who in the controversy which arose in the 2d c. respecting the time and mode of keeping Easter (q. v.), maintained that Christ ate the Jewish Passover with his disciples on the evening of the 14th Nisan, and was crucified on the 15th, as represented by the first three Gospels, in opposition to those in the Western Church, who maintained that he was crucified on the 14th, appealing in support of their opinion to the fourth Gospel.

Quartz, the generic name of all minerals which are composed of silica. It is a constituent of many rocks and composes most pebbles. It is colourless when pure, but presents a great variety of tints of yellow, green, red, blue, brown, &c., and is often marked with stripes or bands. It is of all degrees of transparency to opacity, and occurs coarse and radiated, or fine granular, or compact. The crystallisation is rhombohedral, and the six-sided prisms in which the mineral usually occurs are terminated by six-sided pyramids, and are in other respects often peculiarly modified. Notwithstanding the variety of forms which it assumes, it is readily recognised by its hardness, its infusibility before the blow-pipe, its insolubility in acids, and the absence of any cleavage. The varieties of Q. naturally fall into three groups. The *vitreous* varieties are distinguished by their glassy fracture. To this group belong Rock-crystal, Amethyst, Rose Q., False Topaz, Smoky Q., Milky Q., Prase (a leek-green massive mineral), Aventurine Q. (spangled through with golden scales of mica), and Ferruginous Q. The *chalcedonic* varieties have a sub-vitreous or waxy lustre, and are usually translucent. See *CHALCEDONY*. The *jasper* varieties are opaque, and have a doubtful glimmering lustre.

Jasper, Bloodstone, Lydian Stone, and Float Stone are the best known varieties.

Q. Rock is a light grey, reddish, or brown rock, compact in texture, and consisting chiefly of Q. It has resulted from the action of heat upon sedimentary sandstones. It is also known as Quartzite.

Quasimodo Sunday is the first Sunday after Easter, so called from the first words of the Introit of the mass for the day (1 Peter ii. 2), and otherwise called *Dominica in Albis*, from the practice in the ancient church of those who had been baptized at the preceding Easter giving up their white garments (*albes*) in the churches on that day.

Quass, or Kvass, a kind of beer made in Russia, and prepared from rye grain. Q. is also employed as vinegar by allowing the fermentation to continue until the material turns sour.

Quassia is a genus established by Linnæus in commemoration of a Surinam negro, who was notorious about 1760 for the cures of fever he effected by what is now called *Q. amara*, a native of that country. It is a shrub with beautiful crimson flowers, and has been introduced into hothouses. The *Q.* of materia medica is now, however, derived from *Picrana excelsa* (also belonging to the natural order *Simarubacæ*), common in the plains and lower mountains of Jamaica. It grows to the height of 60 feet, forms a spreading tree, and in appearance somewhat resembles the ash. The wood is intensely bitter, for which reason an infusion, extract, and tincture are used as a powerful tonic, chiefly employed in dyspepsia. Although prohibited by law, it is said to be frequently substituted by brewers for hops. On animals it appears to act as a narcotic poison, causing its use as an insecticide, and furniture made from it is insect-proof. Water allowed to remain in cups turned from it in a short time acquires tonic properties. *Quassia lignum* of the chemists consists of its yellowish-white chips, and the neutral principle on which the bitterness depends is called *quassin*. The names bitter-ash and bitter-wood are applied to the tree.

Quaternions, the name given by Sir W. R. Hamilton of Dublin to his new calculus, owes its immense power as a mathematical method to the importance which it attaches to *direction* as a fundamental conception. At the very outset two distinct kinds of quantities are recognised—directed quantities and undirected quantities. The simplest conception of a directed quantity is a straight line drawn in a particular direction from a given point. Such a line, when both its magnitude and direction are considered, Hamilton calls a *vector*. All undirected quantities, such as are employed in ordinary analysis, he distinguishes as *scalars*. A scalar, in fact, is neither more nor less than a number in its widest algebraic sense. In ordinary analytical geometry, a line drawn from the origin is fixed both in direction and magnitude when the co-ordinates of its other extremity are known. Here its direction is absolutely determined; but it is determined only indirectly through its relations to three arbitrarily chosen axes, and is kept distinct from the other leading conception of magnitude. Hamilton took the straight line as he found it, referred none of its properties in space to any arbitrarily chosen lines, but combined the conceptions of direction and magnitude into the one idea of vector. Since a vector is then fully determined in accordance with ordinary geometrical notions by the three co-ordinates of its further extremity, which co-ordinates are scalars, it follows that a vector involves three scalar quantities. We shall return to this point when we come to consider the nature of a *quaternion*. Meanwhile, as well-known examples of vectors, we may mention velocities, accelerations, forces, fluxes, &c., all of which are readily recognised as directed quantities. It is customary to symbolise vectors by the Greek letters, reserving the Roman letters for scalar quantities. In defining a vector, no notice is taken of its *position* in space, but simply of its direction and magnitude. Hence two equal and parallel straight lines are represented by the same vector symbol; and conversely a given vector may be drawn from any point, since it remains the same vector as long as its direction and magnitude are kept constant. Further, any two lines in space which are not parallel cannot be the same vector—thus, different radii of a sphere or circle, though equal in magnitude, must be represented by different symbols when they are considered as vectors. The addition of vectors is already familiar in dynamics under the name of the com-

position of velocities and forces. They are combined in precisely the same manner. Thus the vector $a + \beta$ (for the sum of a number of vectors is always a vector) is the diagonal of the parallelogram whose sides are a and β ; or it is at once obtained geometrically by drawing the vector β from the extremity of a , when the vector from the origin to the extremity of the new β is the sum $a + \beta$. In the same way it is readily shown that the sum of the vectors OA, AB, BC, CD, taken in order, is the vector OD. Hence the sum of the vector sides of any polygon taken in order must equal zero. Thus in the triangle ABC the sum of the vectors AB, BC, CA is zero; and remembering that the sum of the vectors AB, BC is the vector AC, we conclude that we may consistently regard the vector AC as being equal to *minus* the vector CA. In other words, reversing a vector is equivalent to changing its algebraic sign, or $+a - a = 0$. As long as a and β are really different vectors, the vectors $a + \beta$, $a - \beta$ are also distinct. These latter, indeed, are the diagonals of the parallelogram whose sides are a and β . Should $a = \beta$, however, $a + \beta = 2a$, and $a - \beta = 0$. The number 2 is here a scalar quantity; its effect, when a is multiplied by it, is to alter the magnitude without altering the direction. By employing a proper scalar factor, then, we may alter the *length* of a vector at will; and any two parallel vectors of different lengths may be expressed by the same vector symbol, multiplied, however, by a different scalar. To apply the foregoing principles to a simple geometrical theorem, let it be required to prove that the diagonals of a parallelogram bisect each other. Let the vector OA = a , OB = β . Complete the parallelogram OACB. Join OC and AB. Then the vector OC = $a + \beta$, and AB = AO + OB = $-a + \beta$. Let D be the point where the diagonals intersect, then OD is a multiple of OC = $p(a + \beta)$, say. Similarly AD is a multiple of AB = $q(\beta - a)$, say. From the figure it is evident that the various vectors are related by the equation

$$AD = AO + OD$$

$$\text{or } q(\beta - a) = -a + p(a + \beta).$$

Transposing, this becomes

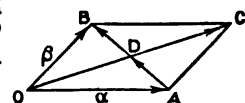
$$(q - p)\beta + (1 - q - p)a = 0.$$

This is of the form $b\beta + aa = 0$, where, if a and β are two different vectors, a and b must each be zero, since it is impossible to undo by moving in the direction β what has been already done by moving in the direction a . Hence, if $b\beta + aa = 0$, $b = 0$, and $a = 0$; so that in the particular case above we obtain the two equations

$$q - p = 0$$

$$\text{and } 1 - q - p = 0.$$

Solving, we find $p = q = \frac{1}{2}$; and therefore the diagonals of a parallelogram bisect each other. Consequently, the vector from the vertex of a triangle to the point of bisection of the base is half the sum of the vectors which represent the sides, all the vectors of course being drawn *from* the vertex. Take now any quadrilateral, ABCD, which may be plane or gauche. Take the vectors of its corners with reference to any origin O, and let a, β, γ, δ , be the vectors OA, OB, OC, OD. Bisect AB in P, BC in Q, CD in R, and DA in S. The vectors of these points of bisection are respectively $\frac{1}{2}(a + \beta)$, $\frac{1}{2}(\beta + \gamma)$, $\frac{1}{2}(\gamma + \delta)$, and $\frac{1}{2}(\delta + a)$. Hence the vector PQ = PO + OQ = $-\frac{1}{2}(a + \beta) + \frac{1}{2}(\beta + \gamma) = \frac{1}{2}(\gamma - a)$. Similarly QR = $\frac{1}{2}(\delta - \beta)$, RS = $-\frac{1}{2}(\gamma - a)$, SP = $-\frac{1}{2}(\delta - \beta)$, from which we see at once that PQ is equal and parallel to RS, and QR equal and parallel to SP, and that therefore the lines joining the points of bisection of the sides of any quadrilateral in space form a parallelogram. This example indicates the ease with which Q. attacks problems in three dimensions. We have seen that, to alter the length of a given vector, we have simply to multiply by the proper scalar factor. The value of this scalar depends upon the unit of length we have chosen, and should the given vector be a *unit* vector, *i.e.*, a vector whose length is unity, the scalar multiplier gives the



length of the new vector. Hence any vector a may be written $TaUa$, where Ta is the length or *tensor*, as Hamilton called it, of the vector a , and Ua is the unit vector in the same direction.

Generally, then, to pass from one vector to another which is parallel to it requires simply the introduction of a scalar multiplier to change the tensor. But how must we operate so as to change the direction of a vector; in other words, what operation will transform a into β , where a and β are different vectors? The simplest way to conceive of this transformation is to draw a and β from the same point, and then rotate a about an axis perpendicular to the plane in which the two vectors lie until it coincides with β . In establishing a new calculus, we may take any convenient and unambiguous symbol to represent this operation of rotation; and Hamilton has chosen for it a very simple and suggestive form; the quotient, namely, of the two vectors. The equation

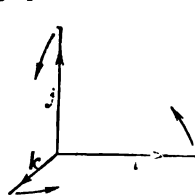
$$\frac{\beta}{a} \cdot a = \beta \quad \text{or} \quad \beta a^{-1} \cdot a = \beta$$

defines this quotient. $\frac{\beta}{a}$ is not a scalar; for multiplication by a scalar does not alter the direction of the vector, but only the length, while this operator alters both. Nor is it a vector; it is a *quaternion*, and was so named by Hamilton because it depends on *four* numbers. For when by rotation a is made to coincide in direction with β , we have to consider not only the magnitude of the angle through which a is rotated, but also its *plane*, or the direction of the axis of rotation. A rotation, then, is fully known when we know its amount or angle, and the direction of its positive axis. But to fix the direction of a line requires two numbers, and therefore a rotation involves three. Having brought a into coincidence with β , there is still another operation necessary so as to alter the tensor of a and make it equal in length to β . The quaternion, then, which transforms the vector a into the vector β , depends upon four numbers, the numerical ratio which alters the tensor, the magnitude of the angle of rotation, and the *two* elements which determine the direction of the axis of rotation. A quaternion may be regarded as composed of two operators, which may be considered separately and applied in succession. The first simply alters *length*; the second alters *direction*. These Hamilton called respectively the tensor and versor of the quaternion; and their relation is given by the equation

$$q = TqUq$$

where q is any quaternion, Tq its tensor, and Uq its versor. A similar formula we saw to exist for a vector, where, however, U signified unit vector. There is, however, no ambiguity occasioned by employing the same symbol for two apparently different ideas, for a unit vector is a right versor, *i.e.*, a versor whose angle is a right angle.

If we have three rectangular unit vectors i, j, k , the versor $\frac{k}{j}$, which transforms j into k , may be equated to i , the unit vector perpendicular to them both. Hence



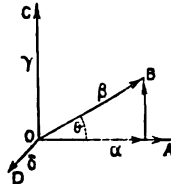
$ij = \frac{k}{j}j = k$; or i , considered as an operator, rotates j through a right angle in the positive direction till it coincides with k . Operate again by i ; then, since k is situated in a precisely similar manner to i as j is, it is also rotated in the positive direction through a right angle. Hence we have the equation
 $ij = ik = -j$
 $i^2 = -1$.

The square of a unit vector or of a right versor is a scalar, and is equal to negative unity. By symmetry we have also

$$\begin{aligned} jk &= i & kj &= -i \\ ki &= j & ik &= -j \\ ij &= k & ji &= -k \\ i^2 &= j^2 = k^2 = ijk = -1. \end{aligned}$$

These equations contain the whole theory of Q . The product of two rectangular vectors is a third vector perpendicular to both; and the product of two parallel vectors is a scalar, for $aa \beta a = a\beta a^2 = -a\beta$, where a is a unit vector and a and β are scalars. But what is the product of two vectors which are other-

wise related? Take two vectors, a and β , inclined to each other at an angle θ . The vector β may be split up into two other vectors, one of which is parallel to a and the other perpendicular to a . To avoid unnecessary complication, we shall take a and β as unit vectors. Hence the two projections of β are $a \cos \theta$ and $\gamma \sin \theta$, where γ is the unit vector perpendicular to a in the plane containing $a\beta$, the vector OC in the figure, and $\cos \theta$ and $\sin \theta$ are of course scalar multipliers. We may then write



$$\begin{aligned} \beta &= a \cos \theta + \gamma \sin \theta \\ a\beta &= a^2 \cos \theta + a\gamma \sin \theta \\ &= \cos \theta + \delta \sin \theta \end{aligned}$$

where δ is the unit vector perpendicular to a and γ . Multiplying β into a , the equation becomes

$$\begin{aligned} \beta a &= a^2 \cos \theta + \gamma a \sin \theta \\ &= -\cos \theta - \delta \sin \theta. \end{aligned}$$

The product of any two vectors, then, consists of two parts, a scalar part ($\cos \theta$) and a vector part ($\delta \sin \theta$). Its value, then, depends upon *four* scalars, and again we have a quaternion. To pass from unit vectors to other vectors, we simply have to multiply throughout by the scalar product $TaT\beta$; and then the equations take the form

$$\begin{aligned} a\beta &= -TaT\beta \cos \theta + TaT\beta \delta \sin \theta \\ \beta a &= -TaT\beta \cos \theta - TaT\beta \delta \sin \theta \end{aligned}$$

where a, β are not now unit vectors, but where δ is still the unit vector perpendicular to their plane. Hamilton writes the above equations symbolically thus

$$\begin{aligned} a\beta &= Sa\beta + Va\beta \\ \beta a &= S\beta a + V\beta a \end{aligned}$$

where $Sa\beta$ means the scalar portion of the product and $Va\beta$ the vector portion. Comparing with the original equations, we have the following identities:—

$$\begin{aligned} Sa\beta &= -TaT\beta \cos \theta, & Va\beta &= +TaT\beta \delta \sin \theta \\ S\beta a &= -TaT\beta \cos \theta, & V\beta a &= -TaT\beta \delta \sin \theta \end{aligned}$$

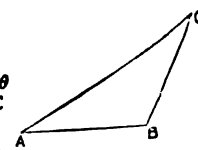
and therefore $Sa\beta = S\beta a, Va\beta = -V\beta a$
 and further

$$\begin{aligned} 2Sa\beta &= a\beta + \beta a \\ 2Va\beta &= a\beta - \beta a. \end{aligned}$$

The scalar of the product of any two vectors is the product of their tensors into the cosine of the angle between their directions; and the vector is the product of the tensors into the sine of the angle into the unit vector perpendicular to the plane of the two original vectors. $TVa\beta$, or the tensor of this vector, evidently represents the *area* of the parallelogram whose sides are the vectors a, β , and therefore twice the area of the triangle contained by these sides. $SaU\beta$ is the projection of the vector a in the direction of the unit vector $U\beta$. One marked peculiarity of Q lies in the non-commutative character of its products— $a\beta$ does not equal βa , nor does $a^{-1}\beta$ equal βa^{-1} .

Consider the triangle ABC , where vector $AB = a$, vector $BC = \beta$ and vector $AC = \gamma$. Then

$$\begin{aligned} \gamma &= a + \beta \\ \text{squaring, } \gamma^2 &= (a + \beta)(a + \beta) \\ &= a^2 + a\beta + \beta a + \beta^2 \\ &= a^2 + 2Sa\beta + \beta^2 \end{aligned}$$



or $-(T\gamma)^2 = -(Ta)^2 - (T\beta)^2 - 2TaT\beta \cos \theta$
 or $AC^2 = AB^2 + BC^2 + 2AB \cdot BC \cos \theta$
 a well-known formula.

Again, since $\gamma = a + \beta$
 $a\gamma = a^2 + a\beta$
 an equation between two quaternions. But if two quaternions are equal, their scalar portions must be equal to each other, as also their vector portions, since it is impossible for a scalar to be equal to a vector. Hence the above equation contains two equations—

$$\begin{aligned} Sa\gamma &= a^2 + Sa\beta, \\ \text{and} & \quad Va\gamma = \quad Va\beta \quad (\text{for } a^2 \text{ is a scalar}). \end{aligned}$$

Taking tensors, we have
 $TaT\gamma \sin \angle CAB = TaT\beta \sin \angle ABC$,
 or $AC : BC = \sin \angle ABC : \sin \angle BAC$,
 a fundamental theorem in trigonometry. The scalar of two rectangular vectors is zero, and conversely $Sa\beta = 0$ requires that a be perpendicular to β , since, when $\cos \theta = 0, \theta = \frac{\pi}{2}$ or

$\frac{3}{2}r$. Indeed, as we before saw, the product of two rectangular vectors is a vector perpendicular to both.

In applying Q. to the geometry of lines and surfaces in space, we must take a symbol to represent the variable vector. Let ρ then be any vector from the origin to the curve or surface. We shall discuss briefly what certain quaternion equations represent.

$$T\rho = c \text{ (a constant)}$$

means that however we draw OP, its tensor is always the same. The surface is therefore a sphere. Squaring, and remembering the $(T\rho)^2 = -\rho^2$, we have the transformation $\rho^2 = -c^2$. This then is the equation to a sphere whose centre is at the origin. Let the centre be at the extremity of the vector a , then the equation becomes

$$T(\rho - a) = c,$$

$$\text{or } (\rho - a)^2 = -c^2,$$

or $\rho^2 - 2Sa\rho + a^2 + c^2 = 0$. This is a quadratic equation, and therefore ρ has two values, or a line drawn from the origin cuts a sphere in two points. From the theory of equations we see that the product of the tensors of the vectors of these points is $(Ta)^2 - c^2$, a constant quantity. In other words, if OPQ be the line from the origin O intersecting the sphere in P and Q, the product OP.OQ = constant, a well-known property of the sphere or circle.

The equation $Sa\rho = 0$ represents a plane passing through the origin and perpendicular to a , because in whatever direction ρ is drawn it must be perpendicular to a , and its tensor is unlimited. The equation to any parallel plane is $Sa(\rho - \beta) = 0$, where β is the vector to any given point in the plane.

Similarly the equation $Va\rho = 0$ represents a straight line parallel to a , and the equation of any other parallel line is $Va(\rho - \beta) = 0$, where β is the vector to any point upon it. This last equation may be cast into the form $Va\rho = \gamma$ where $\gamma (= Va\beta)$ is a constant vector. The form $TVa\rho = c$ includes this case, but has a wider meaning. Put into ordinary geometric language, it means that the area of the triangle, whose sides are a and ρ , is constant for all values of ρ , which is therefore the vector of any point upon a right cylinder whose axis is a .

Any vector ρ may be expressed in terms of the rectangular unit vectors i, j, k in a way closely resembling Cartesian methods. If we measure the unit vectors i, j, k , along the axes X, Y, Z , and if we draw the vector ρ to the point P, whose ordinary co-ordinates are x, y, z , we have

$$\rho = xi + yj + zk.$$

Squaring, we obtain

$$\rho^2 = x^2i^2 + y^2j^2 + z^2k^2 + xy(ij + ji) + yz(jk + kj) + xz(ki + ik).$$

But, as was shown above, $i^2 = j^2 = k^2 = -1$, and

$$ij = -ji, \quad jk = -kj, \quad ki = -ik, \quad \text{and therefore}$$

$$-(T\rho)^2 = \rho^2 = -x^2 - y^2 - z^2.$$

Or the square of OP is equal to the sum of the squares of the co-ordinates. If $\rho^2 = -c^2$, a constant, we get at once the ordinary equation to a sphere

$$x^2 + y^2 + z^2 = c^2.$$

Take any other vector

$$\rho_1 = x_1i + y_1j + z_1k$$

Then

$$\begin{aligned} \rho\rho_1 &= xx_1i^2 + yy_1j^2 + zz_1k^2 \\ &+ (xy_1 - x_1y)ij + (yz_1 - y_1z)jk + (zx_1 - z_1x)ki \\ &= -xx_1 - yy_1 - zz_1 \\ &+ (xy_1 - x_1y)k + (yz_1 - y_1z)i + (zx_1 - z_1x)j \end{aligned}$$

since $ij = k$, &c. Here, again, the dual character of the quaternion $\rho\rho_1$, as made up of a scalar and a vector, is evident.

$$S\rho\rho_1 = -xx_1 - yy_1 - zz_1 = -rr_1 \cos \theta$$

where rr_1 are the tensors of $\rho\rho_1$ and θ the angle between their directions.

$$V\rho\rho_1 = (xy_1 - x_1y)k + (yz_1 - y_1z)i + (zx_1 - z_1x)j$$

and therefore

$$\begin{aligned} TV\rho\rho_1 &= \sqrt{-(V\rho\rho_1)^2} \\ &= \sqrt{(xy_1 - x_1y)^2 + (yz_1 - y_1z)^2 + (zx_1 - z_1x)^2} \\ &= rr_1 \sin \theta \end{aligned}$$

also a well-known formula. From these examples, the simplicity of the quaternion expression as contrasted with the ordinary analytical form is evident; and not only is the notation simpler, but it is infinitely more suggestive. Great as are the advantages gained in pure geometrical investigations, the tremendous power of quaternions is best displayed in physical applications. We cannot do more than point out a few of the more striking cases.

And first it must be remarked that differentiation of quaternions and vectors presents no new difficulty, provided the non-commutative character of multiplication be borne in mind.

Take for instance the equation to the circle

$$\rho^2 = -c^2 \text{ or } \rho\rho = -c^2$$

Differentiating, we obtain

$$\begin{aligned} \rho d\rho + d\rho\rho &= 0 \\ \text{or } Spd\rho &= 0 \end{aligned}$$

since $d\rho$ is itself a vector, the vector namely which added to the original ρ gives the new contiguous ρ . It is therefore the vector which joins the extremities of two infinitely near vectors to the curve. In other words, it is in the direction of the tangent at the point, and the equation $Spd\rho = 0$ proves that in a circle the tangent is at right angles to the radius. In dynamics, where time is the independent variable, instead of the symbol $d\rho$, Newton's fluxion expression $\dot{\rho}$ is adopted. Evidently, if ρ is the vector of a moving point, $\dot{\rho}$ is its velocity, and $\ddot{\rho}$ its acceleration. If the acceleration $\ddot{\rho}$ is in the direction of ρ , as is the case with all central orbits, then $V\rho\ddot{\rho} = 0$. In co-ordinate geometry, the equivalent of this simple form is the group of equations

$$xy'' - x'y = 0$$

$$yz'' - y'z = 0$$

$$zx'' - z'x = 0.$$

Consider again the trinomial expression for ρ , namely,

$$\rho = xi + yj + zk.$$

The operator

$$i \frac{d}{dx} + j \frac{d}{dy} + k \frac{d}{dz}$$

performed upon any function, scalar or vector, differentiates it in the direction of ρ . Repeated twice, it gives the operator

$$\left(i \frac{d}{dx} + j \frac{d}{dy} + k \frac{d}{dz} \right)^2$$

and the scalar portion of this is $\frac{d^2}{dx^2} + \frac{d^2}{dy^2} + \frac{d^2}{dz^2}$, a well-known operator in the mathematical theory of potential. Writing

$i \frac{d}{dx} + j \frac{d}{dy} + k \frac{d}{dz} = \nabla$, the quaternion form of Laplace's equation

$$\frac{d^2\phi}{dx^2} + \frac{d^2\phi}{dy^2} + \frac{d^2\phi}{dz^2} = 0$$

where ϕ is a given function is

$$S\nabla^2\phi = 0.$$

The directness with which Q. attacks all problems depending upon polarity in space is its great recommendation. It has done away with the artificiality of choosing arbitrary axes, and has given a definite meaning to the old imaginary of algebra, the *root of minus one*. $\sqrt{-1}$ is any unit vector in space; and hence Demoivre's theorems in analytical trigonometry are really quaternion forms. We have done no more than give the barest elements of the subjects, and have but touched upon the nature of a quaternion. For a fuller discussion, reference must be made to the various treatises on the subject. Hamilton's *Lectures on Q.* (1853), and his *Elements of Q.* (1866) are of course the first and foremost of these. The latter is, in its range and method, undoubtedly one of the most remarkable and original works ever written. It is perhaps too full as an introduction to the science; but as a compendium it is invaluable. Tait's *Treatise on Q.* (1867, 2d edition, 1872) is much shorter, and is chiefly confined to problems which bear upon practical or physical questions. Kelland and Tait's *Introduction to Q.* (1873) is elementary, and intended for beginners. Clifford's *Elements of Dynamic* (1878) is purely quaternionic in its treatment, and quaternion conception enters into Clerk Maxwell's *Electricity and Magnetism* (1873) and his small elementary work on *Matter and Motion* (1876).

Quathlam'ba, or **Kahlam'ba**, a lofty and rugged mountain-range forming a portion of the great dividing chain sometimes called in its entirety the 'backbone of S. Africa.' The Q. range divides Nomansland and Natal from Basutoland, and attains a height of 8000 to 10,000 feet. It is of interest ethnologically, as forming the line of separation between the Bechuana tribes of the interior and the Kaffir tribes inhabiting the coast region.

Qua'train (Fr. from *quatre*, 'four'), in poetry, is a stanza of four lines, which usually rhyme alternately, although sometimes

the first and fourth and the second and third rhyme together. A perfect Q. is very rare, for not only must the thought expressed be completed within the limits of four lines, but the facile turn of the epigram is to be avoided. The French poets furnish the best examples of the Q.; Landor's are perhaps the most graceful in the English language.

Quatre Bras (Fr. 'four arms'), a farm in Belgium, province of S. Brabant, 10 miles S.S.E. of Waterloo (q. v.), so called because near it the road from Charleroi to Brussels crosses that from Namur to Nivelles. Q. B. is famous as the scene of a bloody battle between the French under Ney and the English under Wellington (16th June 1815), in which the former lost 4140, the latter 5200 men.

Quatrefages de Bréau, Jean Louis Armand de, was born at Berthezene, near Valleraugue, February 10, 1810. In 1833 he was appointed assistant professor of chemistry at Toulouse, and there he published two treatises, *Recherches d'Embryogénie sur les Limnés et les Planorbes* (1834), and *Recherches sur les Axodontes* (1835). This last work led to his appointment as professor of zoology at Toulouse in 1838. In 1840 he threw up his post, went to Paris, and there pursued his studies, contributing with pen to the *Revue des Deux Mondes*, and with pencil to the *Règne Animal Illustré*. In 1852 he was appointed professor of natural history at the Henri IV. Lyceum, and was elected member of the Academy of Sciences. Five years after, he renounced the natural history chair at the Lyceum for that at the Museum. Q.'s popular works have nearly all passed through the *Revue des Deux Mondes* in serial form. The records of a scientific expedition, thus published, were collected under the title of *Souvenirs d'un Naturaliste* (2 vols. 1854), and translated into English (*Rambles of a Naturalist*; Bohn, 1857). Other contributions to the *Revue* specially worthy of mention are *Métamorphoses de l'Homme et des Animaux* (1855-56), and *L'Unité de l'Espèce Humaine* (1860-61). Q.'s most purely scientific articles were contributed to the *Annales des Sciences Naturelles* and the *Institut*. His various essays on *Les Mollusques Phlébentéris*, detailing the modifications of the digestive and circulatory systems of these animals, raised a discussion in which the greatest of European naturalists took part; and in the end Q. triumphed. Q. made many voyages in pursuit of his science, the most noted being that undertaken in company with Milne Edwards and Blanchard. They explored the coasts of Sicily between Trapani and Catania. Q.'s results were published under the title of *Recherches Anatomiques et Zoologiques faites pendant un Voyage en Sicile* (1855). The Academy of Sciences commissioned him to inquire into the diseases of silkworms, and in 1859 he produced *Études sur les Maladies Actuelles des Vers à Soie*, a work followed in 1860 by *Nouvelles Recherches sur les Maladies Actuelles des Vers à Soie*. In 1862 he published *Métamorphoses de l'Homme et des Animaux*; in 1869, *Histoire de l'Homme*; in 1870, *Charles Darwin*; in 1871, *La Race Prussienne*; in 1875, *Crania Ethica*.

Quatrefoil (Fr. *quatre-feuille*), in architecture, a panel or piercing, of any form, divided into four leaves or lobes by Cusps (q. v.), or featherings.—In heraldry, a Q. is a charge representing a four-leaved grass without a stalk. When represented with a stalk, it is called *Q. slipped*.

Quatremère, Étienne Marc, was born at Paris, July 12, 1782. When a child he plunged into study, and throughout his whole life he cared for men much less than books. In 1807 he was employed in the manuscript department of the Imperial Library; in 1809 he obtained the chair of Greek literature at Rouen; in 1815 he succeeded Porte-Duthail in the Academy of Inscriptions; in 1819 he became professor of Hebrew, Chaldean, and Syriac in the College of France; and in 1827 he changed this chair for that of Persian in the school of living Oriental languages. Such were the events which scarcely interrupted for one day a life entirely given up to scholarship as an end in itself. Q.'s first work was *Recherches sur la Langue et la Littérature de l'Égypte*. Here he proved that the way to the study of ancient Egyptian, and especially of hieroglyphics, lay through the Coptic. In 1810 appeared his *Mémoires Géographiques et Historiques sur l'Égypte* (2 vols.), and of his other writings the chief are *Mémoire sur les Nabatéens* (1835), *Mémoires sur la Topographie de Babylone*, *Mémoires sur*

Darius le Mède, *Histoire des Mongols de la Perse* (1836), *Prologomènes d'Ibn-Khaldoun*, *Histoire des Sultans Mameloucks* (translated from the Arabic of Ahmed-Makrizi, 2 vols. 1837-38), *Chrestomathie en Turc Oriental* (1842), and *Mélanges d'Histoire et de Philologie Orientale* (1861). For twenty years he poured treasures of learning into the *Journal des Savants*. He died at Paris, 18th September 1857. Q. was the most learned Orientalist of his day; as to facts he was the most reliable of authorities, because he worked slowly and for the mere delight of reading what others had not read; but his critical powers were feeble, and his opinions in philology too conservative. He would never admit the value of comparative philology, and declared that the use of Sanscrit as a key to Latin, Greek, &c., would be given up, as the similar use of Hebrew in a less enlightened age had been given up. He collected an immense mass of materials for a dictionary of Arabic, but, despairing of ever accomplishing the task of compilation, distributed his information in foot-notes throughout many miscellaneous volumes. He also amassed notes for dictionaries of Coptic, Syriac, Oriental Turkish, Persian, and Armenian. His splendid library of 50,000 volumes was purchased at his death by the king of Bavaria, and is now at Munich. Prefixed to the *Mélanges* is a notice of the author by Barthelemy St. Hilaire.

Quatremère de Quincy, Antoine Chrysostome, second cousin of the preceding, was born at Paris, October 21, 1755. After finishing his education at the college of Louis-le-Grand, he was sent by his parents to study law, but a passion for art developed at school led him to neglect law for architecture and sculpture. In 1776 he went to Italy, and carefully examined the treasures of Rome and Naples. In 1785 appeared his *Mémoire sur cette Question; Quel fut l'État de l'Architecture chez les Égyptiens, et qu'est-ce que les Grecs en ont emprunté?* This performance was crowned by the Academy of Inscriptions, and led to the author's being engaged to write the *Dictionnaire d'Architecture* for Panckoucke's *Encyclopédie Méthodique* (1st vol. 1788), which was followed in 1790 by *Considérations sur les Arts du Dessin en France, suivies d'un Plan d'Académie ou d'École Publique et d'un Système d'Encouragement*. Q. took an active part in the Revolutionary movement, and was for a time imprisoned. In 1815 Q. was elected perpetual secretary and professor of archaeology to the Académie des Beaux Arts, and was charged with the art department of the *Journal des Savants*. In that year he produced *Le Jupiter Olympien, ou l'Art de la Sculpture Antique*, and *Lettres écrites de Londres à Rome, sur les Marbres d'Elgin*. These letters were addressed to Canova. In 1824 Q. edited the letters of Poussin. Among his other works are, *Essai sur la Nature, le But et les Moyens de l'Imitation dans les Beaux Arts* (1823); *Histoire de la Vie et des Ouvrages de Raphaël* (1824); *Histoire de la Vie et des Ouvrages des plus Célèbres Architectes du Onzième Siècle jusqu'à la fin du Dix-Huitième* (2 vols., 1830); and *Histoire de la Vie et des Ouvrages de Michel Ange Buonarrotti* (1835). Q. died at Paris on the 28th of December 1849.

Quaver, a musical note, ♪ half the duration of a crotchet and one-eighth of a semibreve.

Quay (Fr. *quai*, Dutch *kaai*, 'a dyke or causeway'), a bank, dyke, or wharf along the side of a river, harbour, dock, or basin, or facing the sea, to which ships are moored while lading or unloading. A Q. is usually constructed of masonry, the retaining wall being strengthened at the back by counterforts at regular intervals, but in America timber quays are common. The dues exacted for the use of a Q. are termed *quayage*.

Quebec, formerly *Lower Canada*, or *Canada East*, a province of the Dominion, second in population to Ontario. It lies on both sides of the St. Lawrence, extending N. towards Hudson's Bay, and is bounded E. by Labrador and the Gulf of St. Lawrence, S. by New Brunswick, Maine, New Hampshire, Vermont, and New York, and S.W. and W. by Ontario, from which it is separated by the navigable Ottawa. Area, 193,355 sq. miles; pop. (1871) 1,191,516. The level country in the St. Lawrence basin, the 'Champaign of Canada,' is confined on the N. by the Laurentian range and on the S. by the chain of Notre Dame, continued by the Green and White Mountains. The great northern hill-region is composed of Laurentian rocks, and is barely habitable, except in the low, fertile valleys, but supplies

a vast quantity of timber. The St. Lawrence in flowing through Q. receives numerous affluents, of which the chief, all in the N. section, are the Saguenay, St. Maurice, Manicouagan, and Outarde. The Saguenay about the middle of its course expands into the great lake of St. John. In the W. there are many other lakes, including the Grand Lake, which is drained by a branch of the Ottawa. The Champaign, though injured by generations of bad tillage, is very productive, yielding wheat, oats, barley, potatoes, buck-wheat, and some Indian corn. The network of streams intersecting the province enables the timber industry to penetrate to the interior; and the spaces cleared are left available for colonization. Some 30,000 men are employed every winter as shanty-men or wood-cutters, while upwards of 4000 horses haul the logs and squared timber to the river banks. In the S. section of Q. and on the S.E. of the Champaign is the wooded hill country called the Seigniories, and still further E. and S. the 'eastern townships,' a series of fertile, populous valleys, between hills densely timbered and bearing copper ores, iron, galena, some silver and gold, various marbles and serpentine, and excellent granites, soapstones, and slates. The Gaspé Peninsula, at the S. of the St. Lawrence mouth, resembles the eastern townships, producing small quantities of gold, petroleum, limestone, sandstone, &c. The climate is generally severe, hot summers alternating with long winters, but on the lower St. Lawrence the summers are more temperate. The valley of the upper Saguenay is sheltered from N. winds, and is one of the most popular districts with recent settlers. Other newly-settled tracts are the valleys of the St. Maurice and Ottawa, part of the Eastern Townships, the Mantapediac valley in the E., and the peninsula of Gaspé. Crown-lands comprise three-fourths of the area, the timber of which is sold by agents, who also sell lands to settlers on easy terms. Small free-grant lands are gifted to actual settlers. The exports, chiefly to Great Britain, the United States, and W. Indies, are timber (\$10,000,000 yearly), fish, fish oils, wool, furs, horses, cattle, hides, grain, flour, and ores. In 1876 there entered the ports 1436 vessels of 1,061,782 tons, and cleared 1499 of 1,070,719 tons. The imports in 1876 amounted to \$35,035,091, and the exports to \$37,876,815. In 1871, Q. contributed 50.26 per cent. of the whole Dominion customs. There were built at the various ports 142 vessels of 27,943 tons in 1876. Internal affairs are under a lieutenant-governor, a legislative council of 24 members, and an assembly of 65 members. The pop. in 1871 comprised 1,019,852 Roman Catholics, who have an archbishop of Q. and five bishops. There is an Anglican bishop of Q. and another of Montreal (metropolitan of Canada). Jacques Cartier entered and named the St. Lawrence in 1535, but the first permanent settlement at Q. was not made till 1608. From 1640 to 1701 the French colonists were engaged almost constantly in encounters with the Iroquois, the allies of the English colonists of what is now part of the United States, and the old enemies of the Algonkians, the allies of the French. The famous war of 1759-60 ended in the surrender of Q. to the English. The Q. Act of 1774 secured civil and religious freedom to the Catholics, and the denunciation of this Act by the Philadelphia Congress alienated the Canadians during the American War of Independence. The jealousies between the English and French colonists arising from differences of religion and race led to the separation of Q. or Canada into E. and W. portions in 1791, and finally to the establishment of the Confederation of 1867.

Quebec, the capital of the province of Q., on the left bank of the St. Lawrence, 250 miles from its mouth, and at its confluence with the St. Charles at Point des Monts, 108 miles N. E. of Montreal by rail. It lies picturesquely between the two rivers, on the N.E. end of a narrow rocky plateau, which for about 8 miles forms the left bank of the St. Lawrence from Cape Rouge. Cape Diamond, the E. end of this promontory, is 333 feet above the river, to which it presents nearly a precipitous face, while the land slopes gently to the St. Charles. Opposite Cape Diamond the St. Lawrence narrows to 1133 yards, but immediately below it expands into a beautiful basin 2500 yards wide, forming a splendid harbour, in which the spring tides rise 18 feet. The magnificent scenery of the district, and the romantic associations of the city, attract tourists from all parts of the world. Some 8 miles off, the Montmorenci, the pride of Q., takes its magnificent leap of 250 feet to the St. Lawrence. Q. consists of an upper

and lower town, the former of which is surrounded by massive walls, and until recently had five highly picturesque gates. The citadel, which occupies about 40 acres on the plateau of Cape Diamond, was originally designed by Vauban, but recast on plans approved by the Duke of Wellington in 1823. Since the erection of the casemated forts at Levi in 1867-69, and the reception of its armament of rifled artillery, Q. has been regarded as the most strongly fortified town in N. America. It is the seat of a Roman Catholic archbishop and of an Anglican bishop, and has (1877) nineteen churches, of which 7 are Roman Catholic. Several of the churches are interesting buildings, and contain fine pictures by European masters. The public buildings, not excepting the massive pile of the House of Legislature, are of a very commonplace character. Q. is rich in educational and benevolent foundations. Q. Seminary, founded by M. de Laval de Montmorenci, first bishop of Q., in 1663, became, under imperial charter, the Laval University in 1854. The Jesuits' College (1635) has been used as barracks since 1761. The Ursuline convent dates from 1641, the Hôtel-Dieu from 1639, and the General Hospital from 1690. Earl Dalhousie founded the Literary and Historical Society in 1824, and Dr. Joseph Morrin endowed Morrin College in 1860. The lower town, the seat of wholesale commerce and of the shipping trade, is built round the base of Cape Diamond, on a narrow strip reclaimed by the construction of wharves. At the end of some wharves there is as much as 50 feet of water at low tide. On an average 1300 vessels enter the port yearly, and most of these are ocean steamers of large tonnage. In summer three Trans-Atlantic steamers leave Q. weekly. The size of the harbour may be estimated from the fact that it afforded secure accommodation to the Great Eastern in 1861. Extensive harbour-works are in course of construction (1878) at the mouth of the St. Charles. Various manufactures have recently sprung up in the suburbs, but the great industry is still shipbuilding, as many as 30 large ships of from 500 to 2000 tons each leaving the docks in one winter. Opposite Q. are Levis and South Q., two thriving towns, with which communication is maintained by steam ferries. South Q. is the dépot of the Grand Trunk Railway. Q. sends three members to the House of Commons at Ottawa. Pop. (1871) 59,699, of whom 52,337 are Roman Catholics, mostly French and Irish Canadians. The fort of Q., founded by Champlain in 1608, was surprised in 1629 by Sir David Keith, and held by the English for three years. Returned along with the Acadian peninsula and Cape Breton, it was unsuccessfully besieged by the English in 1690, but fell in 1759 after the victory of Wolfe on the Heights of Abraham. According to the Père-Lacombe, the name Q. is derived from the native word, *keppik* ('it is closed'); the river here appearing to be closed by Cape Diamond in ascending, and by the Isle d'Orléans in descending.

Quedlinburg, a town of Prussian Saxony, on the river Bode, at the base of the Harz Mountains, 32 miles S.W. of Magdeburg by rail. It is surrounded by a wall with towers and fosses, and has several suburbs. It has eight churches, the finest of which are the Schlosskirche (erected 1021; restored 1862), and the St. Wipertikloster, the oldest Christian building in Saxony. The castle, standing on a lofty sandstone rock, was once the seat of the abbesses of the convent of Q., which was founded by Otto the Great in 937, and attained to great prosperity, but declined after the Reformation, and was suppressed in 1803. The Rathhaus has a fine collection of antiquities and paintings, and the Gymnasium possesses a valuable library. The industries of Q. are dyeing, bleaching, the making of nets and damasks, and the manufacture of machinery, wire-ware, sugar, chemicals, starch, and paper. It has important nurseries and a trade in flower-seeds. Pop. (1875) 17,044. Q., founded by Heinrich I. in 929, was a favourite residence of the emperors of the Saxon line. A Hanseatic town until 1473, it passed then under the protection of the Electors of Brandenburg. It was the birthplace of Klopstock and Karl Ritter, to whom monuments have been erected in the Bruhl Park. See Fritsch, *Geschichte des vormaligen Reichsstifts und der Stadt Q.* (2 vols. Quedlinb. 1828); and Ranke & Kugler, *Beschreibung und Geschichte der Schlosskirche der Q.* (1838).

Queen (Old Eng. *cwæn*, from the same root as Goth. *quens*, Gr. *gynē*, Sans. *gani*, 'a woman,' and therefore identical with *queens*), a title borne by a female sovereign in her own right (Q. regnant), the wife of a king (Q. consort), or the widow of a king

(Q. dowager). In Great Britain and all other monarchies where the Salic Law (q. v.) does not prevail, a Q. regnant enjoys precisely similar dignities and privileges with a King (q. v.), the present Q. resting her title to the crown on the statute of 12 and 13 Will. III. cap. 3, by which the succession was settled on the Princess Sophia of Hanover and the heirs of her body, being Protestants. By the Statute of the Treasons, 25 Edward III., it was rendered treason to compass the death of a Q. consort, or to violate her person. She, if herself charged with treason, may be tried by the peers of Parliament, as Anne Boleyn, or proceeded against by a bill of pains and penalties, as Caroline, the wife of George IV. (See CONSORT.) By 6 Henry VI. no one can marry a Q. dowager, except with the king's permission, on pain of forfeiting lands and goods; and her revenue was fixed by 1 and 2 William IV. cap. 11 at £100,000 per annum.

Queen Anne's Bounty. See BOUNTY, Q. A.'s.

Queen Anne's Farthings, patterns of a coinage of farthings proposed to be issued by Queen Anne, for which high prices have sometimes been paid by collectors, under the mistaken notion that they are extremely scarce.

Queen Charlotte's Islands, a small group in the N. Pacific Ocean, about 80 miles off the coast of British Columbia, and 110 to the N. of Vancouver Island. By far the largest is Graham Island, which has an area of 3000 sq. miles and is 80 miles long. The only other members of the group of any considerable size are Moresby, Prevost, and North Islands. The group, though included in the territory of British Columbia, is little known, and is only sparsely inhabited by Indians of various tribes.—**Queen Charlotte Sound**, a long narrow channel, partly separates Vancouver Island from the mainland, and connects the Gulf of Georgia with the open sea in the N., as on the S. does the Strait of San Juan de Fuca.

Queen Charlotte's Sound, an inlet at the N.E. extremity of the Middle Island of New Zealand, discovered and named by Cook in 1770. It is about 25 miles long, has two entrances divided by a large island, and its shores are hilly, wooded, and indented with numberless bays. The Sound is very deep, and capable of sheltering any number of vessels of the largest size. Near its upper end is the port of Picton, which is connected by railway with the extensive pastoral districts of the interior.

Queen of the Meadow. See SPIRÆA.

Queen's Bench Division of the High Court of Justice. Determinations of the Common Pleas division, and of inferior courts of record in England, may be appealed to this division. Indictments removed into it may be tried either *at bar*, that is, at the bar of the court while sitting in term time, or at *nisi prius*, by a jury of the county out of which the indictment is brought, Queen's Bench having supreme criminal jurisdiction. The court may order indictments moved into the Queen's Bench to be tried at the Central Criminal Court, or order offences committed out of the jurisdiction of that court to be tried by it. See COURTS OF JUDICATURE, SUPREME ACTS.

Queen's College, Cambridge, founded in 1448 by Queen Margaret of Anjou, and refounded by Elizabeth Woodville, wife of Edward IV., in 1465, consists of a president, fourteen fellows, and eighteen scholars. The scholarships, ranging in value from £30 to £75, are tenable for three years, and there are also five exhibitions and various college prizes. Q. C. presents to eleven livings, and in 1878 had 159 members of the Senate, 49 undergraduates, and 257 members on the boards.

Queen's College, Oxford, founded in 1340 by Robert Eglesfield, chaplain to Queen Philippa, in whose honour the college received its name, consists, under the new statutes of 1858, of a provost, eighteen fellows, fifteen scholars, two Bible clerks, and four Eglesfield exhibitioners, which last must be natives of Cumberland or Westmoreland. The foundation scholarships are of £90 for five years, the Bible clerkships of £81 for a like period, the Eglesfield exhibitions of £81 for four years, and there are also twenty-four other exhibitions and a Jodrell scholarship (1866) of £100 for four years. Q. C. presents to twenty-five livings, and in 1878 has 245 members of Convocation, 109 undergraduates, and 458 members on the books.

Queen's Colleges, Ireland, established in 1845 to afford the highest education to all religious denominations, were opened in 1849 at Belfast (q. v.), Cork, and Galway. In 1850 the Queen's University was founded at Dublin, with power to confer degrees on students attending these three colleges, and a month later the whole institution was condemned by the Irish Catholic bishops at the Synod of Thurles, on account of its unsectarian character. A supplemental charter, granted in 1866, created much opposition, and was allowed to expire in 1868. Each college has several scholarships of from £40 to £20, and is governed by a president. In June 1878 there were 52 professors at the three colleges, and 886 students, of whom 230 were Catholics. A bill proposing to sectarianise Belfast in favour of the Presbyterian Church, with a view to ultimately making Cork and Galway Catholic colleges, was rejected in the House of Commons by a majority of 206, May 25, 1878.

Queen's Counsel. This is a rank conferred by the crown on certain barristers. It confers precedence and right of precedence over other barristers, the Queen's Counsels ranking among themselves according to their seniority in that rank. There is no salary attached to the office. A Q.C. can only act against the crown by special leave, which is, however, always given, on payment of a small fee. Queen's Counsels are now appointed among the advocates in Scotland.

Queen's County, an inland county of Ireland, province of Leinster, bounded N. by King's County, E. by Kildare and Carlew, S. by Kilkenny, and W. by Tipperary and King's County. Its greatest length from E. to W. is 37 miles, and from N. to S. 33 miles. Its area is 424,854 acres, of which 342,422 acres are arable. The pop. in 1841 was 153,930; but in 1871 it had fallen to 79,771, or scarcely one-half of the former number. 88 per cent. of the pop. are Roman Catholics, and 11 per cent. Episcopalians. The Barrow and its tributary the Nore flow E. and S. through the county. In the W. the Slieve Bloom mountains rise to the height of 1753 feet, while the Dysart Hills in the E. are not so high, but contain some not very deep seams of anthracite coal. Slate, sandstone, and marble are also worked. The manufactures are now confined to coarse flannels and friezes. It is traversed by a branch of the Grand Canal. Oats, barley, and potatoes are grown, together with a little wheat. The average rent of land is 12s. per acre. In 1876 there were 140,977 acres under crops, 218,765 acres in grass, 10,644 acres in plantation, and 54,382 in bog, waste, and water. Q. C. has (1876) 12,536 horses, 75,494 cattle, 91,879 sheep, and 32,626 pigs. Q. C. was anciently included in the districts of Leix on the N. and Ossory on the W., and was principally held by the clan of the O'Mores. After a revolt of the clan in the reign of Mary, the present county was incorporated and received its name in honour of the Queen, as also did its assize-town, Maryborough (pop. 6553). Other towns are Mountmellick, Mountralto, and Portarlington. The county has several antiquities, among them a cromlech and rath at Gracefield, and a round tower, almost perfect, at Timalsoe. It returns two members to Parliament.

Queensland, a British colony occupying the N.E. portion of Australia. It has a length from N. to S. of 1300 miles, and a breadth, S. of the Gulf of Carpentaria, of 900 miles. Its coast-line measures 2550 miles, and its area is 669,520 sq. miles, or 3½ times that of France. It is bounded on the N. by the Gulf of Carpentaria and Torres Strait, and on the E. by the Pacific Ocean. On the S. it is separated from New South Wales by the Macpherson Range, Dumaresq River, and parallel of 29° S. lat. On the W. it is divided from S. Australia by the meridian of 141° E. long., as far as the 26° parallel of S. lat., and thence to the Gulf of Carpentaria by the meridian of 135° E. long. Physically Q. may be divided into three large regions, each possessing a distinctive character. The first of these lies between the Pacific Ocean and the Dividing Range which forms a part of the great Australian Cordillera (see AUSTRALIA), and extends to the N. extremity of the continent at Cape York, in 10° 40' S. lat., receiving various names in different parts of its length. The breadth of the tract lying between this chain and the Pacific varies from 30 to 100 miles, but it is evident that it formerly extended as far as the Great Barrier Reef (q. v.) which stretches along the coast for 1200 miles. The coast region is fertile, heavily timbered, watered by numerous rivers, and has

an abundant rainfall. It possesses many good harbours, and is fringed by numerous islands, some of which are of large size. The second region lies immediately to the westward of the dividing range, and consists of table-lands from 1600 to 1900 feet above the sea-level, intersected by two or three ranges which run at right angles to the main chain. It is fairly watered, and possesses a deep, black, and astonishingly fertile soil, composed of decomposed volcanic rocks. In its southern portions this region is lightly timbered, but further N. it consists of rolling downs, which, though treeless, possess the same rich soil, and are clothed with magnificent natural pasture. The Darling Downs (q. v.), Peak Downs, and other rich tracts, are included in this region. The third principal division of Q. lies to the W. of the table-lands, and consists of low, flat, treeless prairies, covering an area of 200,000 square miles, and belonging to the Cretaceous system common throughout the interior of Australia. Recent explorations have shown that much less of this immense territory is desert than was formerly supposed. It is covered for the most part with grasses and salaceous shrubs, on which stock readily fatten, but it labours under the disadvantage of being very remote from a shipping port. At present the wool grown in this region is conveyed in drays to the upper waters of the river Darling (q. v.), and thence by steamer and railway to Melbourne, a distance of 1000 miles.

In common with the rest of Australia, Q. suffers from the want of a range of mountains rising above the snow-line. The dividing range varies in mean height from 2000 feet in its passes to 4500 feet in its peaks, the highest of the latter being the inaccessible Mount Lindsay (5700 feet) on the southern frontier, and the Bellenden Kerr Mountain (5400 feet) on the coast, in 17° S. lat. Nevertheless a number of the rivers of Q. are of considerable size, and several of them are navigable for 40 or 50 miles inland. Of the rivers debouching into the Pacific, the principal, from N. to S., are the Kennedy, Pioneer, Burdekin, Fitzroy (q. v.), Burnett, Mary, and the five which fall into Moreton Bay (q. v.). The chief rivers flowing into the Gulf of Carpentaria are the Mitchell, Gilbert, Norman, Flinders, and Albert. The courses of the eastern and north-western rivers are bordered by belts of the richest alluvial soil, but they are unfortunately liable to periodical inundations. Q. is destitute of lakes, but during part of the year large tracts of the level western country are covered with water.

The climate of so extensive a country as Q. necessarily varies much in dependence upon latitude and elevation. Two-thirds of the colony lie within the tropics, but the heat is greatly mitigated by the dryness and purity of the atmosphere, and Europeans are capable of much greater exertion there than in any other tropical region at the same height above the sea-level. Outside of the tropic the climate is remarkably salubrious, and the mean annual temperature of Brisbane, the capital, is almost identical with that of Funchal in Madeira. On the table-lands the climate resembles that of Southern Europe. Snow scarcely ever falls in Q., even on the mountains. Severe droughts recur at intervals of about seven years, one of the most serious being that of the summer of 1877-78. The rainfall steadily decreases to the westward of the dividing range.

The flora of Q., in those districts which are well watered, is very rich, and the forests contain a great variety of fine timber trees, among which, in addition to the various kinds of Eucalyptus (q. v.), Casuarina (q. v.), wattle, &c., common to the Australian colonies generally, the most distinctive are the giant fig (*Macrophylla*), Moreton Bay Pine (q. v.), cedar, cypress, bloodwood, &c. The tropical rivers are lined by thickets of mangroves, and their bosoms adorned with the pale-blue flowers and immense floating leaves of the *Nymphaea gigantea*, which has been pronounced to be 'the loveliest water-plant in the world.' Tropical fruits of every kind grow to perfection, and on the table-lands British fruits and vegetables are successfully reared. Cotton is indigenous, and, owing to its exemption from frost, is perennial, while in quality it is equal to the finest Sea Island. Sugar-growing has been carried on with entire success since 1867, and at the beginning of 1876 the number of acres under the sugar-cane was 13,460. The principal sugar plantations are on the banks of the eastern rivers between the parallels of 18° and 21°. Arrowroot, coffee, tobacco, maize, &c., are also cultivated. Wheat is grown chiefly on the high grounds, and is of good quality; but the area under this crop is small as compared with that of the southern colonies. This

remark applies, indeed, to agriculture as a whole in Q., in which the total area under crops of all kinds in March, 1877, was only 85,569 acres. This is due principally to the scarcity of labour suited to the climate, in spite of the importation of Polynesian natives to work on the sugar plantations. In January, 1877, there were 9500 Polynesians in the colony. Their interests are protected by Acts of the Imperial Legislature, passed in 1868 and 1874.

The native fauna of Q. resembles that of the rest of Australia, and almost all the mammals are marsupials. Owing to the decrease of the aboriginal inhabitants, the kangaroos of late years increased to such an extent that in 1877 it was found necessary to legislate with a view to a diminution of their numbers. The birds inhabiting the forest regions are numerous, and many of them beautiful. Venomous snakes are also common in the forests, while the tropical rivers are infested by a species of alligator, which attains a length of 25 feet. Q. being eminently a pastoral country, great numbers of sheep and cattle are reared on its vast grazing grounds. The wool of the former is lighter than in the S., but does not deteriorate in quality. In 1876 the total number of sheep in the colony was 7,241,810, and of cattle, 1,985,807.

The mineral resources of Q., though only beginning to be systematically developed, are known to be very great. Gold was discovered at Gympie (q. v.) in 1867, and has since been found in many other places, especially at Cooktown and on the Palmer river in the N. of the colony. The export of gold from Q. now exceeds £1,000,000 annually. Rich deposits of copper ore have also been wrought since 1865, especially in the Peak Downs, at Mount Perry, and Cloncurry. In 1877, however, copper-mining in Q. was almost suspended, and the Peak Downs mine, which in 1865-72 yielded more than £1,000,000 worth of smelted copper, and paid £200,000 in dividends, was sold for £3000. Tin has been remuneratively worked, principally in the southern districts, since 1872, and the annual export averages 5000 tons. The carboniferous beds of Q. are estimated to cover an area of 23,000 sq. miles, but as yet they are little worked. Iron and antimony are also found within the colony, together with fine opals, and diamonds, sapphires, and rubies of small size.

The total value of the imports of Q. in 1877 was £3,672,889, and of the exports £4,102,068. The revenue during the financial year 1876-77 was £1,557,000, and the expenditure £1,472,000. In 1877 there were 272 miles of railway opened for traffic, 200 miles under construction, and 232 miles authorised by the Colonial Parliament. In the same year there were 5041 miles of telegraph in operation. At the census taken in May, 1876, the pop. was 173,180, of whom nearly three-fourths were males. Besides the Polynesians above mentioned, there are (1878) in Q. about 30,000 Chinese who have been attracted by the richness of the Palmer River gold-diggings. 6655 arrived during 1877 alone, and to check this unwelcome immigration a special taxation of the Chinese was resorted to in 1878. The aboriginal inhabitants of Q. are a finer race than those living in New South Wales and Victoria, but their numbers are insignificant, being estimated at only 13,000 in 1871, and having decreased much since then. The principal towns of Q. are Brisbane, Cooktown, Rockhampton, Ipswich, Maryborough, and Townsville, most of which are described under their respective names.

The territory now known as Q. was discovered by Cook in 1770, and was first settled by convicts, who were stationed in or near Brisbane from 1825 to 1839. In 1842 the country was thrown open to free settlers, and in 1859 it was separated from New South Wales, and formed into a distinct colony, its name being changed from Moreton Bay to Q. The sovereign is represented by a Governor, who is appointed by the Crown and assisted by an Executive Council of seven members, who are responsible to a Parliament composed of two Houses, the Legislative Council and Legislative Assembly. The former consists of 21 members, nominated by the Crown for life, and the latter of 32 members, representing 22 constituencies, and elected for five years. See *My Wife and I in Q.*, by C. H. Eden (Lond. 1872); *Report of the Q. Commission to the Philadelphia International Exhibition* (Lond. 1877); *The Australian Handbook for 1877* (Lond. 1878); *Q. the Progressive, By a Forty Years' Colonist* (Lond. 1877); *Q. Almanac* (Brisb. 1878).

Queen's Metal, an alloy of tin intermediate in hardness between Pewter (q. v.) and Britannia Metal (q. v.). It is com-

posed of 9 parts tin and 1 each of antimony, lead, and bismuth, and is used for common spoons, teapots, and like articles.

Queen's Regulations, the instructions issued to the army through the commander-in-chief, and to the navy through the Admiralty, regulating the internal economy and discipline of the services. They interpret and temper for the time being the Mutiny Act and the Articles of War. Corrections and additions are frequently made to the Q. R. Every officer requires to possess a copy of them, and to be thoroughly acquainted with its contents. Financial affairs come under the scope of the Q. R. for the army, but not for the navy.

Queenstown, a seaport of Ireland, county Cork, 14 miles S.E. of Cork, was formerly called Cove of Cork, but received its present name on the occasion of Queen Victoria's visit in 1850. Previously to 1786 it was only a fishing village, but was made an admiral's station during the French war, and owing to its fine harbour rapidly rose in importance. 600 merchant vessels have been at anchor in the harbour at one time. Q. is built in parallel streets around a natural amphitheatre, and is noted for its equable and mild climate, which makes it a favourite resort for invalids. The finest building is the Roman Catholic Cathedral. Q. carries on little trade of its own, but is much used as a port of call. Pop. (1871) 10,340.

Queen's Yellow or Turbith's Mineral, a pigment consisting of a subsulphate of mercury. It is employed only as an artist's colour.

Quentin, St., a town of France, department of Aisne, on the Somme and the Canal of St. Q., which connects the Somme and Scheldt, 80 miles N.E. of Paris by rail. It is well built, has a fine townhouse and noble Gothic church, besides a lyceum, museum, theatre, and library of 15,000 vols. Q. is a great seat of the cotton and woollen manufacture, being the centre of a district employing in 800 factories 130,000 persons, and producing annually wares to the value of £3,500,000. Pop. (1872) 33,995. At St. Q., August 10, 1557, the French under Montmorency were defeated by the Spaniards under Duke Philibert of Savoy.

Quercitron is the trade name of *Quercus tinctoria*, a N. American species of oak, forming a fine forest-tree in the eastern United States, where its timber from its strength and durability is much esteemed for shipbuilding, and its bark is used for tanning leather and dyeing yellow. For dyeing purposes, the crushed inner bark is exported in considerable quantity to Europe.

Queretaro, capital of a state of the same name in Mexico, is situated 6364 feet above the sea, on the great road from Mexico to San-Luis Potosi, 110 miles W.N.W. of the former. It is a regularly built town, is surrounded with gardens, and has three large squares, many fine fountains and buildings, several churches, and eleven convents, the finest of which is that of Santa-Clara. It has several good schools, an hospital and lunatic asylum, and is supplied with water by an aqueduct (*cañeria*) 150 years old. Q. is the chief seat of the cotton manufacture in Mexico, but woollens and leather are also produced. Pop. 47,570. At Q. the Emperor Maximilian (q. v.) was shot, May 15, 1867, on the capture of the town by the Republicans.

Quern (Old Eng. *cwæorn*), a handmill used for grinding corn, and which in one shape or other is one of the most ancient and most widely used of implements. The ordinary Q. consists of two round stones, the lower and heavier of which may measure about 2 feet in diameter. Within a deep depression in the nether stone the upper and lighter stone is fitted so as to rotate easily when moved by a vertical handle placed towards its outer circumference. Through the centre of the upper stone is a round hole, and in using the Q. the corn to be ground is placed into the hole with one hand while the other rotates the stone. The corn by centrifugal force passes outward between the two stones, being crushed and ground as it moves out, and there is generally a small orifice in the side of the under stone by which the ground meal escapes. In certain kinds of Q. found in tropical Africa and India, the upper stone is rubbed with an oscillating motion in the cavity of the under stone. Thus the former is the prototype of the stones of the flour-mill,

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while the latter is analogous to the arrangement of mortar and pestle. The Q. is frequently referred to in Scripture under the name of millstones, and in Wickliff's translation of the New Testament the word itself occurs, 'Two wymmen schullen be gryndynge in oo queerne.' Till comparatively recent times the Q. was used in the W. Highlands of Scotland, and it is still used in the W. of Ireland.

Quesaltenango, capital of the province of Q., and the second city of Guatemala, in Central America, on the river Samala, 44 miles from the Pacific coast, and 65 miles W.N.W. of New Guatemala. It was founded by Alvarado in 1524 on the site of the ancient Felahuh, and is a well-built town. Q. manufactures cottons and woollens. Pop. 25,000, mostly Indians.

Quesnay, François, a French political economist, is said (*Mémoires* of the Academy of Sciences for 1774) to have been the son of an advocate, and to have been born at Mérey, near Versailles, June 4th, 1694. All other authorities describe him as the son of a peasant, and he was probably born at the village of Ecquivilly, in the Isle of France. At Paris he studied metaphysics and medicine—even painting and engraving—and in 1718 established himself as a surgeon at Mantes. Here he soon made himself known as a man of talent. In 1727 he refuted a work on blood-letting by Silva, who then reigned omnipotent in medicine at Paris; and this courageous performance gaining the attention of Peyronnie, the king's chief surgeon, Q. was appointed secretary to the new Academy of Surgery (1737). Six years after his appointment he produced the first volume of that Academy's *Mémoires*, with an elaborate preface; and for seven years he defended the interests of his society in its celebrated quarrel with the Faculty of Medicine. In 1745 he became consulting physician to Louis XV. Whatever his skill in medicine, he proved a witty companion to royalty, and Louis dubbed him *son penseur*. At the Court of Versailles he lived under the protection of Madame de Pompadour, and enjoyed ample leisure for study. He had already published two works in 1736—*L'Art de guérir par le saignée* and *Essai Physique sur l'Economie Animale*; these were enlarged in 1747. In 1748 he brought out an *Examen Impartial des Contestations des Médecins et des Chirurgiens de Paris*; in 1749, *Traité de la Suppuration, Traité de la Gangrene, Memoir sur la Sagesse de l'Ancienne Legislation de la Chirurgie en France*; in 1753, *Traité des Fictures Continues*. These are all the medical works certainly known as Q.'s. In 1756 he entered the field of Economics by contributing to the *Encyclopédie* the articles *Fermier* and *Grains*; and in 1758 appeared a work of his, now lost, the *Tableau Economique*. This book, printed by command of the king (Laharpe called it the 'Alcoran of Economists') had for epigraph the following remarkable sentence:—'Pauvres paysans, pauvre royaume; pauvre royaume, pauvre roi.' All Q.'s writings on Political Economy were gathered together by Dupont in 1767, under the title of *Physiocratie*. For Q.'s system of Economics, which founded wealth entirely on agriculture, see POLITICAL ECONOMY. He was head of the Economists, a set of men who did France great service in advancing free-trade and exposing the errors of the mercantile system, but who eventually drifted from economics into politics, and gave the world many fine, impossible schemes of government, such as the elder Mirabeau's. To Q., more than to any other, Adam Smith was indebted for guidance in drawing up his great treatise. Q. died at Versailles, 16th December 1774. He was a philosopher and a wit; and above all, in the corrupt Court of Louis—under the very roof of Pompadour—he lived a life of spotless virtue and unobtrusive charity. The best edition of Q.'s works, with life, forms the 11th volume of Guillaumin's *Collection des Principaux Economistes* (Par. 1846).

Quesnel, Pasquier, a French theologian, was born at Paris, July 14, 1634. After studying at the Sorbonne with great distinction, he attached himself to the Oratory, became priest in 1659, and in 1662 was appointed principal director of the Paris house. His first work was *Réflexions Morales sur le Nouveau Testament*; and in 1675 he published *Œuvres du Pape Saint-Leon*, founded on an old Venetian MS. which had belonged to Cardinal Grimani. Q. having embraced the doctrine of Jansen, was driven from his post by the Archbishop of Paris (who acted upon a bull of Alexander VII.), and in 1681 retired

to Orleans, but was soon after forced to take refuge in Brussels. At Brussels he associated with Arnauld, under whose direction he wrote a series of *Reflexions Morales* on the Acts and Epistles (1693-94), which excited the bitterest animosity of the Jesuits. At Arnauld's death he headed the Jansenists, and in Brussels, 1703, he was arrested by order of Philip V. of Spain. Escaping from prison, he fled to Holland, and there continued his work of encouraging his persecuted friends. In 1713 his *Reflexions* were condemned by the Unigenitus Bull. Q. formed a Jansenist community at Amsterdam, and died there 2d December 1719. The enumeration of Q.'s books occupies two pages of Moren. The principal are:—*Tradition de l'Église Romaine sur la Prédestination* (Köln, 1687); *L'Idée du Sacerdoce et du Sacrifice de Jésus Christ* (Par. 1688); *La Discipline de l'Église, tirée du Nouveau Testament* (Lyons, 1689); *Prières Chrétiennes* (1695); *Causa Arnaldina, seu Arnaldus a Calumniis vindicatus* (1697); *La Paix de Clément IX.* (1701). Several of Q.'s works have been translated into English, e.g.:—*Q.'s Reflections on St. Matthew's Gospel*; *Q.'s Reflections on the New Testament*; *Devotional Commentary on the Gospel of St. Matthew* (1869). See the various histories of Port Royal (q. v.), and Guettée's *Histoire de l'Église de France* (vols. x. and xi.).

Quetelet, Lambert Adolphe Jacques, was born at Ghent, February 22, 1796. He was educated at the lyceum of Ghent, and there became professor of mathematics in 1814. In 1819 he was appointed to the chair of mathematics in the Athenæum at Brussels. Sent by William I. to Paris to finish his astronomical studies, he was recalled in 1826 to direct the building of the Royal Observatory, and in 1836 was nominated professor of astronomy at the École Militaire. Elected a member of the Royal Academy in 1820, he became its secretary in 1834. Q. died at Brussels, 17th Feb. 1874. His chief works are:—*Correspondance Mathématique et Physique* (Brussels, 11 vols. 1825-39); *Astronomie Élémentaire* (Par. 1826), 4th edition, under title of *Éléments d'Astronomie* (Brussels, 2 vols. 1848); *Recherches sur la Population, les Prisons, &c., dans le Royaume des Pays Bas* (1827); *Résumé d'un Cours de Physique Générale* (3 vols. 1827-34); *Recherches sur la Reproduction et la Mortalité, et sur la Population de la Belgique* (1832); *Statistique Criminelle de la Belgique* (1832); *Mémoire sur les Variations Diurnes et Annuelles de la Température, et en Particulier de la Température à Diverses Profondeurs, d'après les Observations faites à l'Observatoire de Bruxelles* (1834); *Annuaire de l'Observatoire Royal* (1833-62), completed by the *Almanach Scientifique* (1854); *Sur l'Homme* (Par. 1835); *Annales de l'Observatoire Royal* (14 vols. 1843-59); *Lettres au Duc de Saxe-Gotha, sur la Théorie des Probabilités appliquée aux Sciences Morales et Politiques* (1846); *Du Système Social* (Par. 1848); *Théorie des Probabilités* (1853); *Académie Royal de Belgique* (1855); *Histoire des Sciences Mathématiques et Physiques chez les Belges* (1865); *Les Sciences Mathématiques et Physiques chez les Belges au Commencement du XIX. Siècle* (1866); *Météorologie de la Belgique* (1867).

Quett'a or Shawl ('fort'), a small fortified town in the independent state of Kelat, in Beluchistan, on the Scinde frontier of British India, 5600 feet above the sea. It stands in a little valley of the same name, and has great political importance as commanding the Bolan Pass, between Scinde and Central Asia. It was occupied for three years during the Afghan war by a British force, who used this route to reach Candahar. Part of the escort of the British political agent was stationed here during the winter of 1876; and in accordance with the treaty of 1877 it has been permanently occupied by a British garrison. A road has been constructed, and a telegraph laid. See also **KELAT**.

Queue (Fr. 'a tail'), the tie of a wig. See **PERIWIG**.

Quevedo y Villegas, Francisco Gomez de, was born September 26, 1580, at Madrid, where his father was an officer at the court of Philip II. He graduated a doctor of theology in the University of Alcalá as a boy of fourteen, and before he was of age had mastered six languages, four sciences, and canon and civil law, paying, however, for his assiduity by bleared eyesight and a deformed gait. At Madrid he killed his man in a duel in behalf of an unknown lady, and flying to Sicily, found a protector in the Duke of Ossuna. By him he was employed in various affairs of state; amongst others, on two missions to the Spanish court (1615-17), where not only was he pardoned for

his late offence, but received a pension of 400 ducats and the Order of Santiago. On his patron's translation to the viceroyalty of Naples Q. became his Minister of Finance, but on that patron's fall in 1620 he was banished for three and a half years to his ancestral estate of Torre de Juan Abad. Thenceforward, refusing all offers of preferment, he devoted himself to letters, till in 1639 a satire on the government, falsely imputed to his pen, brought him four years' imprisonment in a loathsome dungeon of the convent of San Marcos de Leon. Two years after his release he died at Villanueva de los Infantes, September 8, 1645. Few writers are more deservedly famous, few more undeservedly unread, than Q. His works were as multifarious as his attainments, an *olla podrida* of religion and comedy, filling eight stout volumes of prose and three of poetry, with a still larger quantity of unpublished matter. His poetry includes imitations of Anacreon, satires after Juvenal, parodies of Gongora and the Marinists, a sonnet on the Immaculate Conception, and probably a small volume of dainty odes, elegies, and eclogues, published by him in 1631 as by the 15th c. 'Bachiller Francisco de la Torre.' Amongst his prose writings are treatises on Providence and the immortality of the soul, translations of Epictetus and Seneca, and, finest of all, the satires *Vida de gran Tacaflo* (1627), the six *Suenos* (1633), *Cartas del Cavallero de la Tenaza* (1635), &c., where every class of society comes in for its special gibe—the doctor sits in Hell with the murderer, the fires of Purgatory boil the priest's pot, and notaries fly from the sound of their own lies, those only escaping who have lost their ears in the pillory. The best edition of Q.'s works is that by Guerra y Orbe (Mad. 1852). Of the English perversions of his satires by L'Estrange, Stevens, and others, it is enough to state that they all come through the French, and have lost most of their native wit and gained much foreign dulness on the way. See Ticknor's *History of Spanish Literature* (vol. ii. p. 237), and an admirable essay by James Mew in the *Gentleman's Magazine* for January 1878.

Qui'beron, a peninsula, with a small fishing village of the same name, stretching southward from the coast of the department of Morbihan, France. Here, in June 1795, Puisaye, the leader of the Chouan royalist rebels, attempted, with the assistance of a British fleet under Admiral Warren, to effect a landing. His force was, however, driven into the sea by the troops of the Convention under General Hoche. Many were drowned, some were saved by the British ships, and about a thousand, who surrendered, were summarily shot. Admiral Hawke defeated a French fleet under Admiral Conflans in Q. Bay, in 1759.

Quichua, an Indian race inhabiting Peru, as well as parts of Ecuador, Bolivia, and the Argentine Republic. With the Aymaras the Q. Indians formed the bulk of the population of the ancient empire of the Incas, in which the Q. language was predominant. Cuzco (q. v.), the Inca capital, continues to be the centre of Q. influence. At the present day the Q. language, which contains twenty-six consonants and eight vowels, is spoken by a million and a half of people in Peru, and by half a million more in Bolivia, &c. The word Q. signifies 'temperate climate,' as opposed to *puna*, or 'cold climate,' and derives its origin from its being in the first instance used to designate the inhabitants of the temperate portions of Peru, as distinguished from those of the punas, or cold table-lands. See **PUNA**.

Quickens (Old Eng. *cwic*, 'alive'), see **COUCH-GRASS**. Quicken or Quick-beam, or Wicken, are also names of the Rowan (q. v.).

Quicklime, pure oxide of calcium, is prepared by driving off by heat carbonic anhydride from marble, common limestone, or other carbonate of lime. It is a white caustic powder, which combines energetically with water to form *slaked lime*. Q. has many important uses, the chief of which are as an ingredient of mortars and as manure.

Quick Match, a combustible material used in pyrotechny. It is prepared by soaking cotton strands in a thin paste of gum-water and fine gunpowder; the cotton is then wound on a frame and sifted over with fine meal powder, after which it is set aside to dry.

Quick'silver. See **MERCURY**.

Qui'etism is a phase of Mysticism (q. v.), which, like the more general phenomenon, has manifested itself in connection

with almost every system of philosophy and religion by an excess or perversion of contemplation. The Quietists are those who resign themselves in a state of perfect mental inactivity, without thought, hope, or wish, to receive a divine manifestation, in order to bring the soul into direct and immediate union with the very nature of the Godhead. Q. made its appearance in the Christian Church in the 17th c., the leader in the movement being Molinos (q. v.), a Spanish Jesuit. Other eminent Quietists were Madame Guyon (q. v.) and Archbishop Fenelon (q. v.). A notable controversy on the subject took place between the latter and Bossuet (q. v.). See Molinos' *Spiritual Guide* (1688); *Life of Lady Guyon* (Bristol, 1772); Vaughan's *Hours with the Mystics* (2 vols. 1856; 2d ed. 1860).

Quilima'ne, or **Quill'imaine**, a Portuguese settlement in Mozambique (q. v.), 15 miles from the mouth of the Q. River, which during a fourth part of the year communicates with the Zambezi. Q. was founded in 1764, is the chief town of the military district of Zambezia, and in spite of a dangerous bar at the mouth of the river on which it stands, has a tolerable trade. Built in a mangrove swamp, it has the reputation of being the most unhealthy of all the Mozambique ports. Pop. about 15,000. The imports in 1875 amounted to £22,311, the exports to £21,780.

Quilla'ja is a small genus of S. American colossal evergreen trees, belonging to the wing-seeded section of *Rosacea*, and remarkable for possessing saponaceous qualities. The bark of *Q. saponaria*, called quillai or soap-bark, is often used in Chili for washing purposes as a substitute for soap. The European import is the chief ingredient in washes for promoting the growth of hair. *Q. Selloviana* is similarly utilised in Brazil.

Quillo'ta, a town in Chili, capital of a department of the same name. It is situated on the Aconcagua river and Valparaiso and Santiago railway, 20 miles from the former town. Rich copper mines are worked in the vicinity. At the census of 1875 the pop. of the town was 11,347; of the department, 45,211.

Quills. The quill of a feather is that portion of the shaft which is hollow, round, and translucent. Q. have several applications in the arts, and before the introduction of steel pens they constituted almost the only pens for ordinary writing. They are still in extensive demand for writing, in addition to which they form holders or tubes for artists' brushes, toothpicks, &c. Q. for writing are principally plucked from the wings of the goose, the five outer feathers of each wing being alone of use for this purpose. Swan Q. are also employed, and are in quality much preferable to goose Q., but owing to the comparative rarity of the bird they are scarce and very highly prized. Crow Q. are used to a limited extent for fine lines and drawings, and Q. from the turkey, the eagle, and other birds are occasionally seen. Q. for writing are cleaned and tempered by plunging them into hot sand, drawing them while soft under the edge of a blunt knife, and subsequently polishing with a cloth. Goose Q. are largely obtained from the Baltic provinces of Russia, where geese are kept for the sake of their feathers; and these, together with Q. from Holland, Poland, and the German Empire, are severally recognised as varieties in commerce.

Quilon, or **Coulan**, a considerable town in the native state of Travancore, S. India, on the sea-coast, 38 miles N.W. of Trivandrum, and 740 miles S. E. of Bombay. It had some historical importance in the early days of European settlements on the Malabar coast, and a small detachment of British troops is still stationed here.

Quil'tor, a term applied by veterinarians to an unhealthy or sluggish wound at the upper part of the foot of the horse. It may be caused by violence, or may arise from neglected abrasions, corns, &c. *Poulticing* is recommended as a means of cleansing the suppurating surface, and *astringent lotions* may afterwards be used to stimulate the formation of healthy granulations.

Quimper, chief town of the department of Finistère, France, at the confluence of the Odet and Benaudet, 34 miles S.E. of Brest by rail. The old part of the town is built in an amphitheatre with walls and towers; the new lies at the foot of rocks 656 feet high. The Gothic cathedral, commenced in 1424, is

the finest building. Q. has trade in corn, flour, fish, and cattle, and considerable brewing, tanning, and pottery, besides sardine-fishing. Pop. (1872) 13,159.

Quin, James, a celebrated English actor, of Irish extraction, was born in London 24th Feb. 1693. He first appeared at Dublin in 1714, after which he gradually won a reputation at Drury Lane and the Lincoln's-Inn-Fields Theatre. He achieved a great success in 1720 as Falstaff, a character in which he is said never to have been surpassed, and for the next twenty years—till the appearance of Garrick—he reigned without a rival on the English stage. Cato and Captain Macheath were two of his best impersonations. He played at Covent Garden from 1732 to 1740. Q. instructed the children of Frederick, Prince of Wales, including George III., in elocution. After his retirement from the stage in 1751 he made occasional gratuitous reappearances in the part of Falstaff till 1754, when his voice failed. He spent the last years of his life at Bath, and died January 21, 1766. Q. had an imposing figure, an expressive face, and a good voice. He was fond of the table, was a capital story-teller, and had a fund of pointed if coarse wit. His fiery temper led to two or three duels, in one of which he unfortunately killed his opponent. Otherwise his character was manly and not devoid of generosity. A compilation entitled *Q.'s Jest, or the Facetious Man's Companion*, appeared shortly after his death, but its authenticity is doubtful.

Quince (*Pyrus Cydonia*) is a hardy deciduous tree, with the extremities of the branches, the under side of the ovate leaves, the inflorescence and calyx, all coated with a white tomentum; the blossoms are large, pale-pink, and white; the fruit is pear-shaped, and the seeds are covered with a mucilaginous pulp. It is apparently wild in N. Persia westward to Greece; or perhaps to Italy, as Pliny states that some varieties of it in his time were growing wild in the hedgerows. The fruit, which on approaching maturity assumes a fine golden colour, has a powerful odour. The flavour is austere, so that it is unfit for eating raw, but is much esteemed stewed with sugar, or along with apples and pears in tarts; and in confectionery it forms an excellent marmalade and syrup—especially the Portugal variety. A wine is also made from it. The seeds are used for bandoline and as an emollient application to the skin. The tree itself is worthy of growth for its ornamental appearance both in flower and fruit, and the stock is much used in grafting for dwarfing the pear. *P. Sinensis*, the Chinese Q., yields an inferior fruit to the above. *P. Japonica*, sometimes called the Japanese Q., is a common ornamental garden shrub, producing in spring an abundance of glowing-red flowers.

Quincy, a town of the State of Illinois, U.S., on the Mississippi, 160 miles above St. Louis, and 263 miles S.W. of Chicago. Q. is the point of junction of eight railroads, has thirty churches, ten newspapers, a medical college, a Methodist seminary, and many other public institutions. The first Protestant bishop of Q. was consecrated May 15, 1878. Its manufactures employ 3500 operatives, and produce annually \$10,000,000 worth of goods. Pop. (1876) 37,000.

Quincy, Josiah, LL.D., a distinguished American lawyer and politician, born in Boston, Massachusetts, February 4, 1772. He was descended from a notable New England family, originating with Edmund Q., who went on an official mission to England in 1737. Q.'s father, also called Josiah Q., was a Revolutionary patriot, but died before the Revolution was accomplished, in 1775. Q. graduated at Harvard in 1790, and was admitted to the bar in 1793. He was member of the State Senate in 1804, and member of Congress from 1805 to 1813, when he strenuously opposed the war with Great Britain. He was among the first to attack the principle of slavery, and on the triumph of the Democrats about 1836 retired from Congress and devoted himself to local politics and to scientific agriculture. From 1823 to 1829 he was Mayor of Boston, and from 1829 to 1845 he was president of Harvard University. He lived to denounce the secession of the Southern States in 1860, and died at Quincy, Massachusetts, when the Civil War was at its height, 1st July 1864. His principal works are a *Memoir* of his father (1825); a *History of Harvard University* (1840); *Municipal History of Boston* (1852); *Life of John Q. Adams* (1858).—His second son, **Edmund Q.**, born 1808, an active Abolitionist, published his *Life* (1867), and edited his *Speeches* (1875).

Qui'net, Edgar, was born at Bourg, in Bresse, February 17, 1803. After finishing his schooling at Lyon, he went to Paris in 1820, studied law, and for a time entered the employment of a banker. In 1823 he produced a satire called *Les Tablettes du Fauf-Errant*. Having spent some time at Heidelberg, on his return he published the *Idées sur la Philosophie de l'Histoire de l'Humanité* (3 vols. 1826-27), a translation of Herder's well-known history, with an introduction of which both Goethe and Cousin spoke with admiration. He then took part in a scientific commission to the Morea, and published the results of his observations under the title of *De la Grèce Moderne et de ses Rapports avec l'Antiquité* (1830). His pen was next engaged in the service of the *Revue des Deux Mondes*, in the pages of which appeared his mystical prose-poem, *Ahasuerus*, afterwards published in book form (1833). On the death of his father, he made a tour through Italy and Germany, in the latter country marrying the daughter of a Protestant pastor. In 1835 appeared his poem *Napoleon*, and in 1838 his *Prométhée*, between which he published a *Histoire de la Poésie Epique* and an *Examen de la Vie de Jésus de Strauss*. From 1838 to 1842 Q. held the post of professor of foreign literature at Lyon, and delivered lectures on the history of civilisation, which took shape afterwards as *Le Génie des Religions* (1843). Then his republican tendencies broke out in the *Avertissement au Pays* (1841), which demanded, among other reforms, the abolition of the treaty of 1815; and although he was in 1841 appointed to the chair of the Literature of Southern Europe in the College of France, he attacked the Jesuits so fiercely, in company with Michelet, that he was suspended from his duties as professor. He then travelled in the south of Europe, and published *Mes Vacances en Espagne* in 1845-46. After writing a political pamphlet entitled *La France et la Sainte Alliance en Portugal*, Q. was sent to the Legislative Assembly by the department of Ain, and appointed colonel of the 11th legion of Paris. In the Assembly he spoke little, but he upheld his party, the Extreme Left, in pamphlets such as *La Croisade Autrichienne, Française, Napolitaine, Espagnole, contre la République Romaine* (1849); *L'Enseignement du Peuple* (1850); *L'Etat de Siège* (1850), and letters published in *La Presse*, *L'Instituteur sur le Capital dans la République de Florence* (1850). By decree of January 9, 1852, he was exiled, and fled to Brussels, where he married as his second wife a daughter of the Moldavian poet Assaki. In 1852 appeared his *Révolutions d'Italie* (3 vols.); in 1853, *Les Esclaves*, a companion poem to those already mentioned, the four forming a strange embodiment of political mysticism; in 1854, *L'Histoire de la Fondation de la République des Provinces Unies*; in 1856, a *Lettre à E. Sue sur la Situation Religieuse et Morale de l'Europe* (Brussels); in 1858, *Merlin l'Enchanteur*, a poem; in 1862, *La Campagne de 1815*; in 1865, *La Révolution*; in 1867, *La Question Romaine devant l'Histoire*; in 1874, *L'Esprit Nouveau*; in 1875, *Le Livre de l'Exil*. Q. died at Paris, March 27, 1875. The fragments of his unfinished work on ancient Greece were published in 1877 under the title of *Vie et Mort du Génie Grec*. His *Œuvres Complètes* were published in 1858 (11 vols.); and a re-issue of these, with additions, was begun in 1877. See *Revue des Deux Mondes* for July 1858, and Chassin's *E. Q. Sa Vie et Son Œuvre* (Par, 1859).

Quin'ia, or Quinine. The alkaloid Q. was first separated from the other ingredients of the cinchona bark by Pelletier and Caventou in 1820. Q. or its salts, in powder or solution, have little or no influence when applied to the skin, but they have a stimulant or irritant action upon the mucous membranes. Eulenburg found that Q., when applied to a nerve, did not produce contraction of the muscles supplied by it, but that it produced violent contractions when placed upon the muscles themselves; and he concluded that it was a muscle-irritant, but not a nerve-irritant. Q. acts upon the stomach very much as a simple bitter, stimulating digestion and increasing the appetite; but in large doses it may cause nausea and vomiting. Q. is extensively used in the treatment of intermittent fevers and agues, and it is useful in many chronic diseases in which intermissions do not occur, as in chronic catarrh, diarrhoea, scrofulous conditions, general debility, and also in the various forms of neuralgia and acute lumbago. When the system is fully under the influence of Q., the condition is called cinchonism, the first symptoms being ringing in the ears, slight fulness in the head, and deafness. With larger doses these symptoms are intensified, and the sense of distension in the head

may point towards a cerebral congestion; but in complete cinchonism giddiness and staggering in walking are very common. According to Eulenburg, Q., in poisonous doses, abolishes all reflex actions before it affects voluntary motion; in Q. poisoning, no stage of excitement of reflex activity precedes that of the depression of function. In 1867, Professor Binz found that Q. added to human blood in the proportion of one part to four thousand immediately checks, and in a short time arrests, the amoeboid movements of the white blood-cells; and on account of its power of arresting or preventing putrefactive fermentation, by destroying the entities which produce such changes, he recommended it in the treatment of the so-called *septic diseases*. The great value of Q. as a therapeutic agent consists in its specific action on all forms of disease dependent upon *malarial poisoning*. In the treatment of every form of malarial disease, the administration of Q. should be preceded by an active cathartic, and the dose of Q. may vary from 5 grains three times daily to 10 or 20 grains. When there is great irritability of the stomach, Q. may be given by injection per rectum, or by subcutaneous injection. The pharmaceutical preparations are *Pilula Q.*, dose, 2 to 10 grains; *Tinctura Q.*, dose, 1 to 1½ drms.; *Tinctura Q. Ammoniata*, dose, 1 to 2 drms.; *Vinum Q.*, dose, ¼ to 1 oz. The non-official preparations of Q. are the *arseniate*, the *carbolate*, the *citrate*, and the *valerianate*.

Quin'isext (Lat. *quini*, 'by fives,' *sextus*, 'sixth') is the name given to a Church council held at Constantinople in 692, and composed chiefly of Eastern bishops. By the Eastern Church it is counted as the seventh general council, and received the above name because its decrees were considered necessary as supplementary to those of the *fifth* and *sixth*. But as six of its canons were opposed to the opinions and customs of the Western Church, it was not counted among the general councils by that church. From the place of meeting, a hall in the imperial palace called Trullus, it was also called *Concilium Trullianum* or *in Trullo*.

Quinoa, or botanically *Chenopodium Q.*, is a tall annual, producing dense erect compound panicles of dense green flowers. A native of Peru and Chili, it is cultivated there for its seeds, which are used as an article of food, and are very nourishing. They are prepared as a kind of gruel, or are roasted like coffee and then boiled, the liquor forming a broth.

Quinquages'ima (Lat. 'fiftieth,' scil. *dies*), originally meant the fiftieth day after Easter (q. v.), or Pentecost (q. v.). It now means the Sunday before the beginning of Lent (q. v.), which happens to be the fiftieth day before Easter.

Quin'queremes were vessels with five banks of oars, manned, according to Polybius, by 300 seamen and 120 soldiers. Invented by the Salaminians, who made them for Dionysius shortly after 400 B.C., they were adopted by the Greeks after the death of Alexander, and somewhat later by the Carthaginians. From 266 B.C. the Romans kept fleets of Q., their first model being a Carthaginian vessel wrecked on the Bruttian coast in the first Punic War.

Quin'sy. See THROAT, DISEASES OF.

Quint, an organ stop sounding a fifth above the foundation stop, 5½ feet in length on the manuals, and 10½ feet on the pedal.

Quin'tal, a French standard of mass, equivalent to 100 'livres,' and thus corresponding to the English hundredweight. When the metrical system was introduced, the name was retained as equivalent to 100 kilogrammes, giving it about twice its old value.

Quinta'na, Manuel José, a Spanish poet, born at Madrid, 11th April 1772, after studying at Cordova and Salamanca, became an advocate in his native city. In 1791 he produced a poem on the dramatic art, exalting Corneille and Molière at the expense of Lope de Vega and Calderon. His own two tragedies, *El Duque de Visco* (1801), founded on Lewis's *Castle Spectre*, and *Phayo* (1805), are marred by Gallicisms, and far inferior to his *Oda al Mar* (1795) and fiery *Odas á España libre* (1808), in which, as in his journal, the *Semanario Patriótico*, he roused his countrymen to resist the Napoleonic aggressions. For his services during the War of Liberation he was rewarded by Ferdinand VII., to whom Liberal propagandism was an unpardonable offence, by six years' imprisonment in the fortress of

Pamplona (1814-20). Riego's insurrection released him, broken in spirit, to accept offices from his ungrateful master, whose praises he celebrated in a feeble ode (1828), and to become the tutor of Isabella, Spain's future queen (1840-43). Having held the direction of public instruction (1835-51), and been honoured with a public ovation (1855), he died at Madrid, 11th March 1857. In June 1877 his remains were removed to the National Pantheon. Besides his poems, Q. published *Vidas de los Españoles celebres* (3 vols. Mad. 1807-34), and edited *Poetas Selectas Castellanas* (3 vols. Mad. 1808; enlarged, 1830 and 1833). The best edition of his works is in the 10th vol. of the *Biblioteca de Autores Españoles* (Mad. 1852). See vol. iii. p. 285 of Ticknor's *History of Spanish Literature* (Lond. 1849).

Quintessence, literally the fifth essence, was the name given by the ancient philosophers to a substance higher and more subtle than the four recognised elements, fire, air, water, and earth. The alchemists used the words with a very similar meaning; but it is now employed in a purely figurative sense.

Quintet, a musical composition in five parts, for five voices or instruments. Instrumental (string) quintets are written in symphony form, and may be composed for two violins, two violas, and violoncello; two violins, a viola, and two violoncellos; or two violins, a viola, a violoncello, and a double bass.

Quintilianus, M. Fabius, the greatest of Roman rhetoricians, was a native of Calagurris (*Calahorra*) in Spain, in the upper valley of the Iberus (*Ebro*). His period extends from 35 A.D. to 95 A.D. (*Teuffel*). Whether he was reared in Rome or not is uncertain. He must at least have completed his education there. In his youth he attended the lectures of Domitius Afer, and, if not a pupil of his, was an eye-witness of the decline of his powers. Domitius Afer died 59 A.D. (*Tac. Ann. xiv. 19*). In 68 A.D., Q. commenced practice at the Roman bar. There his appearances secured for him a distinguished success. His forte, however, lay in his ability to teach rhetoric. In eloquence he had no rival. Pliny and the grand-nephews of Domitian were his pupils. From the Emperor (Domitian) he received the investiture and title of consul (*Consularia ornamenta*), and under an endowment by Vespasian he enjoyed a salary from the imperial treasury. That he devoted a long series of years to public teaching is evident; that he retired into private life is acknowledged; but that he lived to 118 A.D., as dictionaries generally state, is by no means certain. The pecuniary circumstances of the family, and more especially of Q., have afforded matter for considerable dispute. Juvenal considers him a child of good fortune (see *Sat. vii. 186 sq.*). Pliny, on the other side, distinctly states that he could but give a poor—it might be for him liberal—outfit to his daughter: 'te porro animo beatissimum, modicum facultatibus, scio.' We, of course, assume that the Q. of Pliny is the rhetorician.

The great work of Q. is entitled *De Institutione Oratoria, Libri XII*. It is dedicated to his friend Marcellus Victorius, himself an orator (*cf. Statius, Silv. iv. 4*), and was written during Domitian's reign, while the author held a tutorship in the imperial family. It is characterised alike by luminous insight and precision of criticism, and has laid down the canons of literary taste for the whole civilised world. Besides the *Institutions*, 164 *Declamations*, 19 of which are extant in full, the rest fragmentary, are ascribed to Q., but these are now generally held to be spurious. Internal evidence shows them to belong to different periods. The first MS. of Q. was discovered in the monastery of St. Gall by Poggio of Florence. The *editio princeps* of the *Institutions* was first printed at Rome (fol. 1470). Next followed the Venetian edition, 1471, and the Aldine (Ven.) 1514. The favourite editions of Q. are those of Burmann (2 vols. 4to. Leyden, 1720), and of Spalding and Zumpt (6 vols. 8vo. Leips. 1798-1829). The most useful editions are those of E. Bonnell (Leips. Teubner, 1854), and of C. Halm (Leips. Teubner, 1868). On the criticism and elucidation of the text of Q. the student may with advantage consult the *Questiones Quintilianæ* of F. Müller (Halle, 1840), the works of F. Bahlmann (Berl. 1859), F. Meister (Liegnitz, 1860), J. Ständer (Bonn, 1865), and above all the German version of Bossler and Baur (Stuttgart, Metzler, 1863). Translations in English, French, and Italian are numerous.

Quintin (Fr. *quintaine*), an ancient sport practised by those tilting on horseback with the lance. An upright post was erected, having a cross-piece on the top, turning on a pivot, with a board fixed at one end, and a sand-bag hanging from the

other. The play was to strike the board with the lance, and at the same time ride past at such speed as to escape a blow from the sand-bag as it swung round.

Quin'tuplet, in music, a group of five notes having together the value of four ordinary notes of the same kind.  It is seldom used in modern composition.

Quiri'nus literally means lance-bearer, from *quiris* or *curis*, 'lance,' and *ire*, 'to go.' Hence Mars and Janus are primarily characterised as divinities that hurl the spear. Specially under this name the deified Romulus (q. v.) was worshipped, and the festival in his honour was called *Quirinalia*. One of the seven hills of Rome (q. v.) bore the name *Collis Quirinalis*. It lay N. of the Palatine, and was one of the oldest quarters of the city. Here were the gardens of Sallust, the baths of Diocletian, the Prætorian camp, two circuses, and many temples.

Qui Tam, in English law, is the term denoting an action under a penal statute for the sake of the penalty. Generally, no procedure for recovery of a penalty or forfeiture under the stamp laws can be instituted against any one, except with the concurrence of the Attorney-General in England, or with that of the Lord Advocate in Scotland; or in the name of an officer of the stamp office. Proceedings for the recovery of penalties under the customs and excise laws must be instituted and conducted by the proper officers, under direction and control of the commissioners. In a Q. T. action the penalty is usually shared by the Crown and by the Informer (q. v.).

Qui'to ('the deep ravine'), the capital of the republic of Ecuador, S. America, is situated on a fertile plateau 9492 feet above the sea, and only 15 miles S. of the equator. It is surrounded by mountains—twenty peaks, of which eleven are snow-topped, being visible from its streets. The site of Q. is exceedingly irregular, being intersected by numerous ravines (whence its name), which are spanned by arches, and on these many of the houses stand. The latter are for the most part built of sun-dried bricks, but the principal edifices are of stone. They include the cathedral, the palaces of the president and archbishop, the university (with 300 students), two hospitals, and several convents. The climate of Q. is delightful, the mean annual temperature being 59°. The average annual rainfall is 70 inches. The city is, however, very subject to earthquakes, in one of which, on 4th February, 1797, 40,000 lives were lost; while another, in March, 1859, caused damage to the extent of \$3,000,000. Q. has some not very important manufactures of coarse cotton and woollen articles, lace, jewellery, and confections. It also exports grain and metals to Peru and Europe through its port, Guayaquil (q. v.). Pop. 76,000.

Quit Rent is in England a small rent payable by tenants of manors in token of subjection. In ancient records it is called *white rent*, because paid in silver.

Quiver, a case for arrows slung from the shoulder or from the waist-belt. In ancient Egyptian paintings the Q. is represented strapped to the side of the chariot. Although leather arrow-cases were used in England during the Old English period, the name Q. (old Fr. *cuivre*) seems not to have come into use till the 17th c., and its origin is obscure.

Quoits (Icel. *kuila*, 'to throw violently'?), a favourite game among the working classes of Great Britain, is played with a flat-iron ring about 9 inches in diameter, and having its outer edge sufficiently sharp to stick into the ground. This ring or quoit is projected with a whirling motion towards one of the *hoops* or pins which determine the range. Each player has two Q., and sides are formed and points made exactly as in bowling and curling.

Quorum (Lat. 'of whom'). Justices or Commissioners of the Q. are those whose presence is necessary to procedure in the Court. They are usually of greater experience or estate than the others. In Scotland, the word is used to denote the number of the nominees under a trust or similar deed, or of the judges of a Court, who must concur in an act, or be present at a meeting or court, to make the act, or business procedure, valid.

Quotidian Fever. See AGUE.

Quo Warranto, is an ancient writ calling on a person or corporation exercising any privilege to show by what authority they do so.

R.



the eighteenth letter of the English and Latin alphabet, corresponding to the Semitic Resh and the Greek Rho. It belongs to the class of liquids, and its proper pronunciation is that of a trill, caused by the repeated closing and opening of the passage of air proceeding from the larynx. R seems to be a peculiarly difficult letter to pronounce, especially for Englishmen. The Scotch experience less difficulty, and the well-known 'burr' of Northumbrians is merely a dialectical exaggeration of the proper sound. Corrupt sounds may be represented by 'ry,' 'th,' or 'w.' In English, also, it must be observed that there is a mute or vocal R; e.g., 'door,' as vulgarly pronounced, is scarcely to be distinguished from 'daw,' or 'lord' from 'laud.' By the Romans, R was called the dog's letter—*irritata canis quod 'rr' quam plurima dicit*. In Greek, R when beginning a word had the mark of an aspirate, and was regularly doubled in the middle of words. In Latin, R was often used as a euphonic substitute for S; as *arbor* for *arbos*, and the form *Furius* is historically known to have taken the place of *Fusius* in the 4th c. B.C. R interchanges with L; as Tivoli for Tiber, *apôtre* for *apostolus*; sometimes also with D. The R in such Indian words as Guicowar (q. v.) is philologically, though not phonetically, a D.

As an abbreviation, R. stands for royal; R.A., either Royal Academician or Royal Artillery; R.S.V.P., *respondes s'il vous plait*, 'reply if you please'; R.I.P., *requiescat in pace*.

Ra was the third of the chief gods of Lower Egypt, and represented the sun, being the offspring of Phthah (the god of fire) and Neith (nature.) The temple of R. was at On, called Heliopolis (city of the sun). He was represented in human form, with the head of a hawk; in the hieroglyphics, by the sun's disc. His sacred animal was the bull.

Raab (Magyar, *Gsör*), a picturesque town of Hungary, in a wide marshy plain, at the confluence of the smaller Danube (a branch of the Danube), the R., and the Rabnitz, 70 miles S. E. of Vienna by rail. The seat of a bishop, it has a fine cathedral, nine other churches, two convents, an arsenal, &c. A large trade in grain and horses is carried on both by rail and steamer, and there are cutlery and tobacco industries. Pop. (1870) 20,035. The adjoining village of R.-Szigeth has 4500 inhabitants, almost all gardeners.—The river R. rises in the Noric Alps, near Gratz, has a course N.E. of miles, and joins the Danube six miles below the town of the same name.

Raasay, an island of the inner Hebrides, county of Inverness, Scotland. It lies between Skye and the mainland, extends 14 miles in length and 3 in breadth, and attains its greatest altitude in Dunlan Mountain, 1500 feet above the sea-level. There is some arable land in the E. and S., but most of the surface is pasture and moorland. The ruins of Broichel Castle are situated on an almost inaccessible cliff in a small bay on the E. coast. The castle formerly belonged to 'John the Strong,' an ancestor of the present family of Macleod of Raasay. Pop. (1871) 389.

Rabat, a seaport of Morocco, on the left bank of the Bu-Regreb, the mouth of which forms a harbour enclosed by a bar, 115 miles E.S.E. of Fez. It is surrounded by walls, and has a decayed fort, *El-Mansur*, and an arsenal. The finest building is the Mosque of Hassan, in the best style of Moorish architecture, with a tower 192 feet high. The manufacture of carpets, mats, silk and woollen fabrics, laces, ropes, and earthenware, is actively carried on. The imports (cotton manufactured articles,

cutlery, and sugar) amounted in 1876 to £76,442, of which £72,888 came from Great Britain. The exports (chiefly wool) in the same year were valued at £41,468, of which Britain received £36,492. The amount of imports and exports in 1876 showed a decrease of 30 per cent. as compared with 1875, and of 25 per cent. as compared with 1874. In 1876 there entered the harbour 44 vessels of 12,322 tons, of which 23 of 9676 tons were British, and 6 of 1848 tons French. Pop. 20,000 (2000 Jews).

Rabb'a, a town of Africa, kingdom of Gando, on the left bank of the Niger, about 350 miles from its mouth. Formerly one of the chief slave-markets of the Sudan, it has suffered much of late years from tribal wars, but still has a considerable trade with Tripoli, Fezzan, &c., chiefly in ivory. It is noted for its fine horses. Pop. 40,000.

Rabb'i is a derivative from the Hebrew *rab*, a great man, one distinguished for age, position, office, or skill (*cf.* Job xxxii. 9), which is used in post-biblical Hebrew as a title for those distinguished for learning, the authorised teachers of the law, and the spiritual heads of the Jewish community. Various degrees of dignity are denoted by the addition of different suffixes to *rab*. Without any suffix, it corresponds to *master*, *teacher*. With the pronominal suffix, first person singular, R. (my master), it indicates a higher degree (*cf.* Matt. xxiii. 7, 8). The highest degree is indicated by the addition of the pronominal suffix, first person plural (Chaldee), Rabboni (our master). This was the title given to the patriarchs or presidents of the Sanhedrim, the first who obtained it being Gamaliel I. (patriarch in Palestine A.D. 30-50).

Rabbit (*Lepus cuniculus*), a familiar species of *Rodent* mammalia, belonging to the family *Leporida*. It is distinguished from the hare by its smaller size, and by the hind limbs especially being better proportioned. Its colour is darker, and the ears are shorter and uniformly brown. The animal is gregarious, and in this respect also differs from the hare. It is not markedly intelligent, the hare being more susceptible of domestication and training. The R. is very prolific, and may produce three or four litters in a year. The number of young in each litter varies from four or five to twelve. They are hairless and blind when born. The food of the R. consists of a variety of vegetable substances, but the creature is very destructive to young trees, which it frequently kills by stripping off the bark. Rabbits are shot and trapped for the market in large quantities, the flesh being palatable and readily digested, especially when young.

The R. shows a striking tendency towards variation, a feature absent in the hare. Of the fancy varieties, the *Angora R.* is perhaps the most valuable. The skin of this breed is utilised in France for the manufacture of a delicate leather from which gloves and other articles are made. A species of R., well known in N. America, and different from the common R., is the *Lepus sylvaticus*, common in the Southern States of America. This species does not appear to live in burrows.

Law Regarding Rabbits in the United Kingdom.—The lord of a waste in England over which there is a right of Common (q. v.) may make R.-burrows in it, and the holder of the right of common must not kill the rabbits, however numerous they become, but he may bring an action against the lord for surcharging. Rabbits belong to the tenant of land, unless there is a contrary stipulation in the lease. The owner or tenant of land, or persons authorised by either, may shoot rabbits without a game licence. Others require a licence. In Scotland it is, by statute, theft to take rabbits from a warren, or to shoot them without the proprietor's permission. Though rabbits are not

game, they are protected against poachers, who may be arrested on the lands, and if necessary detained. See FORESTS, CHASES, PARKS, and WARRENS.

Rabbit-Skins form the raw material of more than one branch of industry. A silver-grey variety of the common rabbit is much valued in China on account of its fur, which there brings high prices. In Europe, again, the skins of both wild and tamed varieties of rabbits are extensively employed in the fur trade—not much, however, under the name of R.-S., but almost entirely as imitations of other and more costly furs. Thus white R.-S. do duty as ermine skins, and to imitate other furs the skins are suitably dressed, dyed, and prepared, the industry alone giving employment in Great Britain to no fewer than 2000 persons. In France certain long-haired varieties of rabbit—the Angora and the Cashmere—are greatly prized on account of the length of their fine silky hair, which ranges from 1 to 1½ inches. It is spun into a fine thread, which is woven into a kind of shawl much prized in the American market. The great proportion of R.-S., however, is used in the manufacture of fine felt hats, in which the French greatly excel. It is estimated that in France 60,000,000 R.-S. are collected annually, the hair of the greater part being used in the felt-hat trade, the remainder for imitation furs. As a fur material R.-S. are unsatisfactory, owing to the hair falling quickly away from the skin. A large number of R.-S. are now imported from the Australian colonies, which are so overrun by the animal that rewards are in some quarters offered for their extermination.

Bab'lais, François, the youngest son of Thomas R., an apothecary or innkeeper at Chinon, in Touraine, was born in that town about the year 1495. His earliest education was received at the village of Seully, whence he was despatched in despair at his laziness either to the convent of Baumette, or the university at Angers. Here he formed a friendship with Du Bellay, who afterwards became a cardinal. Under what impulse is not known, but R. chose the Church as his career in life, and entered among the Cordeliers of Fontenay-le-Comte, in Poitou, a mendicant order of friars. His residence lasted fifteen years, and was productive of two results. He gained an absolute knowledge of the scurrilities of monastic life, and he developed an enthusiasm for learning which rendered him one of the most scholarly men of his age. Many stories, utterly beyond verification, are told of mad pranks indulged by him at this time in contempt of priestly superstitions, but they must be accepted as after thoughts suggested by incidents in his writings. But his devotion to the masterpieces of antiquity brought him within the discipline of his superiors. Along with a companion, Pierre Lamy, he was indicted for the study of Greek, which was regarded as synonymous with the heresy of the Reformation. His books were confiscated, and serious punishment would have been awarded him had not influential friends intervened, and obtained from Clement VII. an indulgence by which he passed into the less exacting order of St. Benedict (1523), at the Abbey of Maillezais. Here he remained but a short time, finding the attractions of freedom and the world too strong for him. He was not, however, ostracised from the society of ecclesiastics, as he was received into the house of the Bishop of Maillezais, and there prosecuted, for an indefinite period, amidst the congenial companionship of scholars, a great variety of studies. It is told by Colletet that the range of his studies included philosophy, theology, mathematics, medicine, jurisprudence, music, arithmetic, geometry, astronomy, natural history, painting, and poetry. For some years traces of him are lost, though between 1524 and 1530 he probably attended at the Universities of Paris and Bourges. In 1530 he reappears as a student of medicine at Montpellier, where he ultimately (1537) qualified himself as a physician. Tradition has preserved a number of anecdotes concerning the life he led here, most of them indicating his devotion to horse-play, wine, and the grosser pleasures. Justice is also done to his extraordinary knowledge of languages, which probably included, besides the classics, Arabic, Hebrew, English, German, Italian, and Spanish. In 1532 he was at Lyon, labouring partly at medicine, but more especially at literary hack-work. The publishing establishment of Sebastian Gryphe secured his name for a number of works on medical, legal, and archaeological subjects as well as for some popular almanacks. It is to this period that must be referred the composition of two parts of *Gargantua et Pantagruel*, though the entire book was not published as we now have it until after his

death. It partakes of the character of romance, satire, and extravagance. The principal heroes are moulded on colossal lines, and are based, many critics suppose, upon contemporaries. For example, in *Gargantua* they recognise the king of Navarre, and in *Pantagruel* Antoine de Bourbon. Such identification is far-fetched, and explains nothing as to the general movement of the story, which is arbitrary and capricious, a medley of satirical descriptions, of grotesque and serious philosophy, of wild and impossible adventure. In its details the regulating purpose is hard to find. Taken as a whole, however, it is meant to touch the society of the epoch at all points, an aim which his familiarity with every aspect of life rendered completely successful. From cloister to the throne no class escaped him. Each is assailed with the merciless strength of well-directed laughter. R. had a matchless exuberance of animal spirits, and on that very account *Gargantua* sometimes descends into inexcusable depths of coarseness. Yet at his worst he is robust and human rather than prurient and nasty. The book gave a strong impulse, though on the Pagan and sceptical side, to the emancipation of the human spirit from mediævalism. It takes rank as the earliest product of French prose bearing that subtle influence in the mechanical structure of sentence and in the fertility of vocabulary due to classical study. In 1534 R. joined Du Bellay as he passed southwards to Rome and acted as physician on his suite. From Italy he wrote a number of letters, published in 1651, and when there obtained reinstatement to the order of St. Benedict with authority to practise medicine. In that capacity he obtained a high reputation in Narbonne, Castres, and Lyon. He retired to the Abbey Saint Maur les Fossés in 1538, but his connection with it was not rigidly maintained, as he had free movement outside its walls. The death of François I. made R. a fugitive along with Cardinal Du Bellay, but in 1551, partly through the exercise of that tact and diplomacy for which he was famous, he obtained the curacy of Meudon. It is still matter of contention where and when he died, but the majority of voices pronounce for Paris, and the year 1553. See *F. R.* by Délécluze (1841); *R. sa Vie et ses Ouvrages* by Lacroix (1859); *R. et ses Ouvrages* by Jean Fleury (1877). But every episode of his life has had a monograph or a treatise devoted to it, until a vast expository literature has grown round his name.

Bab'ener, Gottlieb Wilhelm, a German satirist, was born at Wachau, near Leipsic, September 17, 1714. After studying at the College of Meissen, in 1734 he entered the University of Leipsic, where he devoted himself to the study of law. His special knowledge of financial matters led to his appointment in 1741 as inspector of customs for the Leipsic district, and to his being summoned to Dresden (1753), and nominated (1764) counsellor of customs to the king. He died at Leipsic, March 22, 1771. From 1741 to 1744 R. made many contributions to the *Belustigungen des Verstandes und Witzes*, and in 1744, together with Gartner, Cramer, A. Schlegel, Schmid von Lübeck, Ebert, and Zachariae, established the *Bremer Beiträge*. R.'s contributions to these two journals make the first two vols. of his *Sammlung Satirischer Schriften* (Leips. 1751), to which he added a third vol. (*Satirische Briefe*) in 1752, and a fourth in 1755, and which went through ten editions prior to 1772. His *Freundschaftlichen Briefe* were edited with a life of the author by Weisse (Leips. 1772), who also issued a complete edition of P.'s works (6 vols. Leips. 1777; latest ed. by Ortlepp, 4 vols. Stuttg. 1840). R. had great influence in his own time, and was an important factor in the literary development of Germany. To some extent he took Lucian as his model, but in genius he came far short of his great original.

Bab'ies. See HYDROPHOBIA.

Rac'ahout, a farinaceous food said to be derived from the farina of the acorns of the Barbary oak, *Quercus ballota*, with some flavouring material. An imitation but superior article is composed of cocoa, potato starch, sugar, and vanilla, and is used like cocoa.

Racalmu'to, a town of Sicily, province of Girgenti, on an affluent of the Platani, 15 miles N.E. of Girgenti. It is of Saracenic origin, and was long under the Chiaramonte family, whose castle is 2½ miles distant. Hitherto a notorious haunt of brigands, it is rapidly improving, and is developing a trade in fruits, sulphur, gypsum, and saltpetre. Pop. (1874) 12,250.

Racconi'gi, a town in the province of Cuneo, in N. Italy, 23½ miles S. of Turin by rail. It is well built, and has a park, 1½ miles long by ¾ of a mile wide, laid out by Le Nôtre in 1755, and a château which was the favourite residence of Carlo Alberto. Pop. (1874) 9912.

Race (Old Eng. *raer*, 'rapid course,' 'stream'), a name sometimes given to the current produced by the meeting of two tides, as the R. of Portland, the 'R. of Alderney.' The term R. (*cf.* Old Fr. *rase*, 'a mill-stream') is also applied to the stream which turns a mill, the part below the wheel being called the *tail-R.*, while the *head-R.* is the watercourse above it. —In *waving*, R. denotes the ledge in the batten or lay by which the shuttle conveying the weft passes through the decussation or 'shed' of the warp threads.

Racehorse, a breed of horses noted for the delicacy of their form, and for the muscularity and suppleness of their limbs. The body is long and slender, the neck being especially long and prominent. It is generally admitted that the Arab breed has greatly contributed to the formation of the R. variety. See HORSE-RACING.

Raceme (Lat. *racemus*, a 'bunch' or 'cluster of berries') is an inflorescence (q. v.) in which the flowers are borne on pedicels along a single undivided axis or rachis, —as, for example, in the hyacinth and currant.

Racemic Acid. See TARTARIC ACID.

Rachel, Elizabeth Rachel Felix, the greatest of modern French tragédiennes, was the daughter of a Jewish pedlar, and was born in the Canton of Aarau, Switzerland, March 24, 1821. In early childhood she sang with her sister Sarah in the streets of Lyon, and subsequently in Paris. In the French metropolis the two children attracted the notice of a wealthy patron, who placed them both in the conservatory of sacred music. R. made her first appearance at the Gymnase, April 24, 1837, and next year obtained an engagement at the Français. Her success was complete. Jules Janin recognised her genius, and the Parisian public received her with enthusiasm. The classical drama of France was almost revived for her. Among her most powerful impersonations were Camille in *Les Horaces*, Roxane in *Bajazet*, Athalie, Joan of Arc, Hermione in *Andromaque*, and notably Phèdre. She triumphed in London in 1841, in St. Petersburg in 1853, and in the United States in 1855. In the latter year her health gave way, and after seeking recovery in vain in the Havannah and Egypt, she died of consumption near Cannes, 3d January 1858. An English memoir of R. was published in the year of her death. In person she was slender and lissome, pale in countenance, with features capable of marvellous transformation. Her action was graceful and nervous, and the effect of her elocution was thrilling and electric. She had little tenderness, but in scenes of rage and passion her power was overwhelming. G. H. Lewes, in his book *On Actors and the Art of Acting* (1875), describes her as 'the panther of the stage.'

Rachis (Gr. 'the spine') is the axis of inflorescence (q. v.). The term is also applied to the common petiole of compound leaves, and to the stalk or stalks of the frond in ferns.

Racine, Jean, was born at Ferté-Milon, December 21, 1639, and in his fourth year lost both father and mother. He then passed to the care of his maternal grandfather, in whose house he had long the freedom of neglect until he was sent to the College of Beauvais. Here he remained until his sixteenth year, and obtained a competent knowledge of Latin. On the death of his guardian he was introduced to a school in connection with the community of Port-Royal, and under Claude Lancelot, the sacristan, gained a scholarly acquaintanceship with Greek. But his enthusiasm for the splendours of Pagan literature was considered dangerous to his spiritual life, and it is recorded of his teacher that he delivered to the flames a copy of *Theagenes and Charicleia*, which he captured in the hands of his pupil. Being discovered in the act of perpetrating secular rhymes of his own, he was forthwith set to turn into French verse the Latin text of the Breviary hymns. R. next (1658) studied at the Collège d'Harcourt with the view of adopting either law or the church as a profession. On the marriage of the king in 1660, he published *La Nymphe de la Seine*, for which he was rewarded by Colbert sending him 600 livres, and by Chapelain pronouncing the

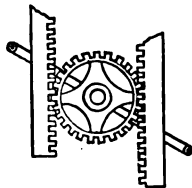
verses 'bien-tournés.' The circumstance gave a bias to his whole life. He cultivated the society of wits and worldlings and lost taste for professional pursuits, whilst at the same time he gave himself freely up to pleasure. But in 1661 he went to an uncle's at Languedoc, where he applied himself to theology with the view of succeeding his relative as a canon of St. Geneviève at Uzès. Twenty-three letters of his correspondence with La Fontaine and others survive from this period, which reveal his intense enthusiasm for secular study and his yawning weariness with theology. By 1663 he had returned to Paris, and had made the acquaintanceship of Molière and Boileau, attracted anew the attention of the court by his ode *La Renommée aux Muses*, and with his *La Thébaine* commenced the life of dramatist in serious earnest. R. throughout his dramatic career wrought under the conditions of time, place, and action prescribed by the greater models which he imitated, though he relaxed the rules to the extent of making both time and place indefinite. His characters were not studies from life, having the variety and range of humanity with its innumerable moods. They were beings impelled by one dominant passion, which it was his invariable aim to follow out to a climax. In that respect he followed the law of Corneille; but instead of giving heroic proportions to his men and women, he kept them, though finely idealised, to the earth, limiting their development to the qualities of tenderness or nobility with which he endowed them. In 1665 appeared *Alexandre*, in which there are marks of rawness, but two years later *Andromaque* revealed, in full strength, the depth and moral grandeur of his studies in character, the pathetic reaches of which he was capable, and the transports of passion purified by ethical and intellectual virtues which it was in his power to portray. Here, too, he showed for the first time his flawless taste in phraseology, his high capacity for marshalling the objects of the drama, and in proportioning their language and actions whilst conducting them from point to point of a well-arranged plot. In 1668 appeared *Les Plaideurs*, an inferior comedy, *Britannicus* (1668), *Bérénice* (1670), *Bajazet* (1672), *Mithridate* (1673), all of these works showing how extensive were his resources, both historical and reflective. *Iphigénie* (1674) and *Phèdre* (1675) brought his labours to a close for a number of years. Disgusted by the attacks of a literary cabal, headed by the Duchess of Bouillon, and influenced by his friends the Port-Royalists, he resolved to adopt the life of a monk. He took a wife instead (1677), became king's historiographer, having already (1673) become a member of the French Academy, educated his own children, and grew wholly reconciled to that religious life from which he had formerly lapsed. In 1689 he wrote *Esther* for the nuns of St. Cyr, and in 1691 *Athalie* followed; and after his abandonment of the theatre he did not scruple to write malicious epigrams against contemporary dramatists. His relation to the 'Grand Monarque' was that almost of a personal friend, until his 'disgrace,' the causes of which are lost in mystery. He died April 21, 1699, and was buried in the cemetery of Port-Royal, from which, in 1711, his body was removed to the church of St. Étienne du Mont. See *Mémoires*, by his son Louis Racine (born 1692, died 1762); Aime Martin's *Commentaires*; Sainte-Beuve's *Causeries du Lundi*; Villemain's *Cours de Littérature*; Saint-Marc Girardin's *Cours de Littérature Dramatique*. All the later editions of R.'s works have been based upon that of Aimé Martin (6 vols. 1820-21). The best of these are Mesnard's (8 vols. Par. 1865-73) and Saint-Marc-Girardin (Par. 1870 *et seqq.*).

Racine, a town of Wisconsin, U. S., 23 miles S. of Milwaukee, on the Chicago and Milwaukee railroad. It stands on Lake Michigan at the mouth of the Root River, and has an excellent harbour, 24 churches, 4 newspapers, and large manufacturers of machinery, &c. R. College in 1875 had 18 instructors and 180 students. Pop. (1876) 9880.

Rack (from Old Eng. *racan*, 'to stretch out'), an engine of torture consisting of an oblong frame of wood with four beams, to which a sufferer was bound. By the application of machinery, his limbs could be subjected to such a strain that dislocation might ensue. The R. is at least as old as the Roman Empire. During the Middle Ages it was employed in every part of Europe. The Inquisition, in particular, has an evil fame in connection with its employment for extracting a confession or recantation of heresy; but the Tudor kings were as remorseless as the followers of Torquemada. This barbarous mode of obtain-

ing evidence has long been abandoned even in the most despotic countries.

Back, a straight bar with teeth on its edge arranged so as to gear with those of a wheel, pinion, sector, or with a worm. A *segment R.* has its pitch-line curved. The cut shows a double R. motion adopted in double-barrelled air-pumps; by turning the handle the spur-wheel is made to impart reciprocating rectilinear motion to the R. on each side.



Back'ets (Fr. *Raquette*), a ball game played after the manner of Fives (q. v.), only a stringed battledore is used for striking the ball instead of the open hand.

Back Bent is in England the full annual value of land.

Racoon, or **Raccoon** (*Procyon lotor*), a species of *Carnivorous* quadrupeds belonging to the *Versida* or bear family. It occurs in N. America, and derives its specific name of *lotor* or 'washer' from the prevalent belief that it dips its food in water before eating it. The R. is of greyish colour; the top of the head is dark brown, and the tail short, bushy, and marked with blackish rings. The fur, which is woolly, is highly valued. The animal subsists on miscellaneous food, but exhibits a preference for vegetable food. It eats shell-fish and crabs readily, and is dangerous to poultry-yards. The average size is that of a small fox. R. hunting is a favourite pastime in America, the animal exhibiting much dexterity in escaping from its pursuers, and attacking the dogs fiercely when brought to bay. The young number two or three, and are born in May. The Agoura or Crab-Eating R. is the *P. cancrivorous* of naturalists. It inhabits tropical and S. America.

Double Rack Motion.

Rad'cliffe, a manufacturing town of Lancashire, on the Irwell, 2½ miles S.S.W. of Bury by rail, has five churches—the ancient parish church of St. Bartholomew, St. Thomas (1864), St. John, St. Paul (1875), and St. Andrew (1877). A market-hall was presented to the town in 1852 by the Earl of Wilton, and a co-operative hall, with store-rooms, library, and assembly room, has been erected in 1878 at a cost of £12,000. There is one weekly newspaper, and cotton-spinning, gingham and fustian weaving, bleaching, dyeing, and paper-making, form with coal-mining the principal industries. Pop. (1851) 5002; (1871) 11,446.

Rad'cliffe, Anne, an English novelist, was born in London, July 9, 1764. Her maiden name was Ward, and at the age of twenty-two she married Mr. William Radcliffe, who became editor and proprietor of the *English Chronicle*. Her first novel, *The Castles of Athlin and Dunbayne* (1789), was only remarkable for the wild improbability of its plot; the *Sicilian Romance* (1790) was nowise better; but the *Romance of the Forest* (1791), a tale founded on a French *cause célèbre*, evinced a power of description and a facility of invention the like of which had not been seen for many a day. Mrs. R.'s next tale was her best, *The Mysteries of Udolpho* (1794). Montoni, the bandit chief in that work, is one of the weirdest characters of fiction, and everything is in keeping with him, terrific and melodramatic. Mrs. R.'s popularity with our grandfathers can scarcely be conceived by us; but we must remember that, with some help from Horace Walpole and Clara Reeve, she practically revived the romance. Had her faults not been a hundred times exaggerated by imitators from Monk Lewis downwards, we should sneer less at her wax ghosts, lofty-souled desperadoes, castles full of interminable dungeons, and other puerile horrors. In 1795 this authoress published a *Journey through Holland*, and two years later appeared her last novel, *The Italian*, full of racks, confessions, inquisitions, and lightning. Her posthumous romance, *Gaston de Blondenville*, was edited by Talfourd in 1826; and in 1834 her poems, many of them taken from her novels, were collected. Mrs. R. died in London, February 7, 1823. Fifty years ago her books were the standard amusement of old and young; now we wonder even at the words of Dunlop:—'Life has few better things than sitting at the chimney corner in a winter evening and reading such absurdities.'

Rad'cliffe, John, M.D., was born at Wakefield, Yorkshire, 1650. He graduated at University College, Oxford, in 1671, and after a course of study in medicine began to practise in Oxford. In

1682 he took the degree of M.D., and two years after he removed to London, where he quickly obtained an extensive practice. In 1686 he was appointed principal physician to the Princess Anne, and in 1713 he was elected M.P. for the town of Buckingham. Many stories are told of his witty sayings and eccentric doings. In the last illness of Queen Anne he was sent for; but, knowing the case to be desperate, he excused himself from attendance on the ground of indisposition. Her Majesty died the day after this refusal was given. A motion of censure on R. was passed in the House of Commons, and the severe criticism of the public on his conduct deeply affected his mind. He died November 1, 1714. He never published anything, but left his fortune to found the well-known R. Library at Oxford (1737-49), which is now used as a reading-room to the Bodleian. This library, now absorbed in the Bodleian, was especially rich in books on the physical sciences, architecture, and some sections of archaeology. Garth, alluding to R.'s lack of acquaintance with literature, remarked that for him to found a library was as if a eunuch should establish a seraglio. See *Libraries and Founders of Libraries*, by Edwards (Lond. 1864).

Radegun'da, Saint, daughter of Berthar, a prince of Thuringia, was born in 521, and in her eighth year carried prisoner to Soissons by the Frankish king Hlothar. Placed for education at Athies in the Vermandois, she became devoted to Christianity. In 538 she was forced to become one of the wives of Hlothar. The king's putting to death her brother, who had been taken captive along with herself, decided R. to leave her husband and become a nun, first (544) at Orleans, then at Tours, and finally at Poitiers, where she founded the Abbey of the Holy Cross about 550, and gathered around her 200 nuns, whom she employed in reading and transcribing MSS. She died 13th August, 587.

Radetz'ky, Johann Joseph Wenzel, Count, a distinguished Austrian general, was born at Trzebnitz in Bohemia, 2d November, 1766, became a cadet of Hungarian cavalry in 1784, and first served in the Turkish campaign of 1788-89. His conduct in the wars against France in the Netherlands and the Rhine (1792-95) gained him the rank of major in 1796, and he fought brilliantly against Napoleon at Aspern and Wagram in 1809, and at Kulu and Leipzig in 1813. In 1831 he became commander-in-chief of the Austrian army in Italy, and received the baton of field-marshal in 1836. The bitter hatred with which the Italians regarded Austrian dominion breaking forth suddenly in the rebellion of 1848, R. was at first obliged to retire from Milan before the superior forces of the insurgents, but was reinforced at Verona, and immediately inflicted upon the Italians the severe defeats of Montanara and Curtatone. Defeated at Goito by Carlo Alberto, he took advantage of the enemy's delay by rapidly raising his force to 82,000 men, and after driving the king from Custoza, was again victorious under the walls of Milan, 4th August 1848. After a six months' armistice, the war began again, and R., in spite of his old age, at once advanced into Piedmont and finally routed the Italians at Novara, 23d March 1849. This victory he immediately followed up by the bombardment and recapture of Venice. As governor-general he maintained a stern, jealous guardianship over Lombardy and Venice till his death at Milan, 3d January 1858. See *Der Oesterr. Feldmarschall Graf R. Von einem Oesterr. Veteranen* (Stuttg. 1858), and Prince Trubetzkoi's *Campaigns of Marshal R.* (Leip. 1861).

Rádhanpur, the capital of a native State of the same name in Gujerat, India, in political connection with the Government of Bombay, 85 miles N.W. of Ahmedabad, and 270 S.E. of Hyderabad in Scinde. Pop. (1872) 13,910.—The State of R. lies between Kattywar and Rajputana. Area, 833 sq. miles; pop. (1872) 91,579; revenue, £50,000; army, 248 horse and 362 foot. The soil is flat and fertile, and produces excellent wheat and cotton; other products are catile, saltpetre, and unbleached cotton cloth. The tribute of £1700 was remitted in 1825, and an equal amount is now paid to the State in compensation for the loss of its salt-works. The chief is a Nawaub of Persian descent, whose family dates back 250 years.

Radial Ar'tery, the almost direct continuation of the *Brachial artery*, or main artery of the arm. It commences just below the bend of the elbow, and passes along the radial side of the forearm to the wrist, where it is felt as the pulse. The

ulnar artery is larger than the radial, and is given off from the brachial artery close by the origin of the radial vessel. It also lies deeper in the forearm.

Ra'diant En'ergy. The recognition of Energy (q. v.) as a something which has as true an existence in the physical universe as matter, has resulted during the last thirty years in a rapid development in all branches of science. Energy cannot be regarded as a property merely of matter; indeed, the most plausible theory of the ultimate nature of matter, the vortex theory of Sir W. Thomson, suggests that matter, *as we know it*, is a form of energy. Laying aside such hypotheses, however, the physicist recognises matter and energy as distinct, but yet so related that we know of the existence of either only by means of the other. We perceive an object solely by reason of certain transformations of energy which are inseparable from it. Energy is the active agent which works through matter; matter is in itself passive, and is that by which we recognise the workings of energy. It is now an accepted truth in physics that when energy passes from any one system of bodies to any other it must pass through a material medium—that, in other words, action at a distance is unphilosophical, because of necessity making other and less admissible assumptions than are required for action through a medium. Light is understood to depend physically upon a certain undulatory motion executed in the ether. What is commonly called radiant heat differs from light only in the greater length of its wave-lengths, and to the same category belong the actinic rays, whose wave-lengths, though too short to affect our eyes, produce such miracles in photography. All these forms of energy are conveniently grouped under the name R. E. They are of the same nature and are subject to the same laws. They move in straight lines with the same velocity, they are reflected and refracted in precisely the same way, and they can all be polarised. It is thus evident that radiant heat resembles light more than that which we ordinarily understand as heat. Indeed, we have no reason to regard it as heat. All we can say is, that when a body receives this kind of radiation, certain effects are observed which are usually regarded as effects of heat, implying at most, however, a transformation of R. E. into heat. The laws of radiation and the consequences of Prevost's theory of exchanges are considered under HEAT and SPECTRUM ANALYSIS.

Radia'ta ('rayed animals'), one of Cuvier's four great divisions of the animal world. As now used, the term widely differs from its former meaning. Cuvier regarded the Radiate animals as the lowest, and as including the three modern sub-kingdoms known as *Protozoa*, *Cœlenterata*, and *Echinozoa* or *Annuloida*. Cuvier's division was therefore a very heterogeneous assemblage of animal forms, which the progress of research has separated into distinct divisions, and into certain plain types of animal structure. The most typical members of Cuvier's Radiate group were the *Echinodermata* (star-fishes, sea-urchins, &c.). The term R. is not much employed in modern zoology, but when used is synonymous with *Echinozoa*. The symmetry of the bodies of these animals, as well as of *Cœlenterates*, exhibits a *radial* disposition of parts; i. e., the ideal elements of the body are arranged radially around a central point, most frequently represented by the mouth.

Rad'ical (Lat. *radix*, 'a root'), a term which first came into use about 1830 to designate the advanced Liberal party in English politics. It is a contracted form of 'R. reformer.' There are several subdivisions of radicalism, notably the 'philosophical radicalism' of such men as Bentham and the two Mills, and radicalism of the 'Manchester school,' represented by Cobden, Bright, and their followers. The word 'radical' is now used in several European countries (e. g., France) to designate politicians of the Extreme Left.

Ra'diolites, a peculiar fossil genus of *Lamellibranchiate* Molluscs belonging to the family *Hippuritida*, and occurring in the Cretaceous rocks exclusively. The shell is inversely conical in shape, and its valves are dissimilar.

Radiom'eter, a very delicate instrument, invented by William Crookes for showing certain remarkable phenomena of apparent repulsion and attraction discovered by him. In a very perfect vacuum four light vanes are suspended horizontally and radially, like the vanes of an anemometer, so as to be capable of free rotation round a vertical axis. Each disc or vane

has its one side white and its other side black, so that when the system is rotating, all the discs are moving in the direction of similarly coloured sides. When in the dark, the system is motionless; but when it is brought into the light, the vanes begin to rotate in a definite direction. Any source of light and heat brought near it acts so as to repel the blackened surface of the disc which is facing it. The true agent is radiant heat, which raises the temperature of the blackened surface higher than that of the white surface. The effect of heat upon the molecules of a gas is to make them go faster; and hence the molecules still present (for an absolute vacuum is not possible) rebound off the blackened surface with greater velocity than off the other, and the recoil forces the vanes round. The true explanation was arrived at independently by several physicists; and Stokes has done much to elucidate many curious and at first sight contradictory phenomena in connection with it.

Rad'ish (*Raphanus*) is a genus of cruciferous plants numbering six well-marked species, of which the esculent in common cultivation is the most important. The genus is distinguished from its congeners by its elongated pod being either one-celled and many-seeded; or transversely jointed, the joints being one- or two-celled, and the cells one-seeded. The origin of the garden R. (*R. sativus*) is, like that of so many of our cultivated vegetables, a doubtful question; but we know that it was grown at an early period in Egypt, and that for ages it has been cultivated in India and China. Into Britain it was introduced upwards of three centuries ago. The original stock has given rise to numerous varieties, which are divided into long-rooted or spindle-shaped, and round or turnip-rooted. They are also called spring, summer, autumn, or winter radishes, according to the season in which the respective sorts are found best adapted for use. The R. is generally used as a salad vegetable, but the roots are sometimes used boiled, and a few years ago a great sensation was created by the introduction of a Japanese form of the species which grew into a bush producing pods nearly a yard long. In this case the young pods were the part eaten, and the plant obtained the name of the rat-tail R. (*R. caudatus*). A common agrarian weed of this genus is named *R. Raphanistrum* or jointed Charlock. The name is derived from the Lat. *radix*, implying a plant valued for its roots.

Ra'dius, in geometry, is a straight line drawn from the centre of a circle to the circumference. In astronomy, the line which at any instant connects the planet with the centre of force is called the *R.-vector*, or sometimes simply the R., and from this use of the word it has been extended to the variable line, which, with its one extremity fixed at the origin or pole, sweeps out a curve. See CO-ORDINATES, and POLE.

Ra'dius, one of the two bones existing in the forearm of man and other Vertebrate animals, and lying, when the arm is in the supine position, to the thumb-side of the limb. By the movements of the radius on the ulna and humerus, the forearm can be readily turned or rotated. The exact representative of the R. in fishes has not yet been determined. In birds the R. is the smaller of the two bones of the forearm, but in most other Vertebrates it is the more constantly developed. In the horse, for example, the R. is large, whilst the ulna is rudimentary. In the frog and camel, again, it attains a large development, the ulna, its companion bone, being fused with it.

Rad'norahire, a border county of S. Wales, is bounded N. by Montgomery, E. by Salop and Hereford, S. by Brecknock, and W. by Cardigan. Area, 276,552 statute acres; pop. (1871) 25,430. The surface, of Silurian formation, is everywhere intersected by hills, which attain in Radnor Forest an elevation of 2163 feet, and send down numerous tributaries to the Wye, the southern boundary of the county. In 1876 there were 23,874 acres under corn crops, 8199 under green crops, 16,539 in clover, sainfoin, and grasses, 103,343 in permanent pasture, exclusive of heath and mountain land, and 8523 woods. R. had (1876) 8212 horses, 30,937 cattle, 282,988 sheep, and 6734 pigs. Oats, hay, wheat, barley, and turnips form the principal crops, and are grown chiefly in the south-eastern district. R., which is an English-speaking and purely agricultural county, returns one member to Parliament. Presteigne, with a pop. (1871) of 1910, is the county town, other places being New Radnor (pop. 517), Knighton, and Rhayader, which conjointly return one member to Parliament.

Rad'om, a government of S. Poland, surrounded by Kielce, Piotrkov, Warsaw, Siedlce, Lublin, and Galicia. Area, 4769 sq. miles; pop. (1872) 541,993. P. is drained by the Vistula and its affluent the Pilica. In the S. the Lysa Gora and Lysica rise to 2066 feet. In 1872 the corn reaped in R. amounted to 1,471,670 qrs., potatoes raised to 6,857,374 bushels. 4242 workmen were employed in manufactures, producing iron, spirits, beer, sugar, leather, porcelain, &c., to the value of £748,216. — **R.**, the capital, on the Meczna, has considerable trade and manufactures. Pop. (1870) 10,944.

Rad'owitz, Joseph Maria von, a Prussian general and statesman, born at Blankenburg, Brunswick, 6th February 1797. He was of a noble Catholic family, originally Hungarian. Educated in Paris and at Cassel, he became in 1813 an officer in the Westphalian artillery, and was wounded at the battle of Leipzig. After the peace he became a teacher of mathematics and military science in the Cadet Institute at Cassel, but in 1823 went over to the Prussian service, in which he became chief of the Artillery Staff. Meanwhile he had (1828) married the Countess Maria von Voss, and had formed a close and lasting friendship with the Crown Prince, afterwards Friedrich Wilhelm IV. He now began to assume a place in the front rank of anti-revolutionary politicians, and went hand in hand with the Ultramontane party, though towards the close of his life his position in this respect was a good deal modified. After the Revolution of 1848 he was actively concerned in the unsuccessful attempt to reconstitute the German confederation through the alliance of the three kings. In the autumn of 1850 he was for about six weeks Minister for Foreign Affairs. He died at Berlin, 27th September 1850. R. was an author as well as a statesman, and wrote on politics, mathematics, and military science. See Frensdorff, *Joseph von R. Eine Charakterschilderung* (Leips. 1850).

Rae'burn, Sir Henry, son of a manufacturer, was born at Stockbridge, Edinburgh, March 4, 1756. At the age of six he was an orphan, and at fifteen he left school and became apprentice to a jeweller. His caricature drawings drew attention in the shop of his master, and ere long he was doing some business as a miniature painter. Martin, the portrait painter, lent him pictures to copy; his master absolved him from his apprenticeship, and he devoted himself entirely to painting. Sketching in the fields one day, he put on canvas the figure of a young lady who had sauntered across the scene. Not long afterwards, he was pleased to receive a visit from the same young lady, who gave an order for her likeness. Ultimately she became his wife, and brought him a handsome fortune. Thus provided with means, he visited London, where he was warmly received by Reynolds, in whose studio he worked for about two months, and after studying for two years in Italy he settled in Edinburgh (1787), where he worked enthusiastically to the end of his life, making a yearly income of many thousand pounds. He was elected an R.A. in 1815, and was knighted by George IV. in 1822. He died 8th July 1823. There can be no doubt that R.'s style is modelled on that of Reynolds. Adopting Reynolds' great principle of making breadth—the effect produced by massing and keeping the lights and shadows as far as possible apart—the leading element in a picture, he carried out the principle in a manner and with a feeling peculiarly his own, rejecting thick impasto, and adopting a low tone and a sharp touch while working the colours with little unctuous admixture. Wilkie, when in Madrid studying the Spanish works, in noticing those of Velasquez, repeatedly alludes to his simple and powerful mode of treatment as always reminding him of R.'s works. In likenesses of men, his veracity has proved an immense boon to subsequent generations; for he lived in the time of Edinburgh's glory, and was intimate with its greatest men. His works are admirably supplemented by Cockburn's *Memorials of His Times*. His portraits of Lord Braxfield, Lord Newton, Cockburn, Francis Horner, Mackenzie, Robison, Robertson, Sir Walter Scott, are all very well known and highly prized. An interesting exhibition of his paintings was held at Edinburgh in 1876. See *Portraits of Sir Henry R.*, in autotype, with Memoir of the painter, by Dr. John Brown (Edin. Elliot, 1873).

Raff, Joachim, a modern German composer, born at Lachen, Switzerland, May 27, 1822. He was devoted to literature and science in his youth, but about 1843 began to publish a number of fantasias, caprices, rondos, &c., for the pianoforte, and their success induced him to renounce school teaching for

musical composition. Soon afterwards he produced the opera of *König Alfred* at Weimar without much success. He belongs to the Wagner school, and has glorified his master in his book *Die Wagnerfrage*. His pianoforte compositions number over 200, and he has also written songs and concerted pieces. His fame, however, rests principally on his symphonies, particularly those entitled *Leonore* and *Im Walde*, which are rich in fine effects of instrumentation and orchestral colour.

Raffles, Sir Thomas Stamford, a traveller and naturalist, was the son of a captain in the W. India trade, and was born at sea, off Jamaica, 5th July 1781. While a clerk in the East India Company he was sent as assistant-secretary to the new government of Pulo-Penang in 1805, and having acquired a knowledge of Malay, was appointed official interpreter. In 1807 he became principal secretary and registrar of the court of judicature, but was forced by illness to retire to Malacca in the following year. Acting partly on his advice, Lord Minto captured Java from the Dutch in 1811. Appointed lieutenant-governor, R. ably conducted the administration for five years, abolishing slavery and conciliating the native princes. In 1816, on account of ill-health, he returned to England, where he received the honour of knighthood and published his well-known *History of Java* (2 vols. 4to, 1817). After Java was restored to the Dutch, he was made lieutenant-governor of Fort Marlborough settlement, Bencoolen, on the Sumatra coast (1817), where, except during several months while engaged in forming the new settlement at Singapore, he remained till 1824, when illness again drove him back to England. While on the voyage the vessel took fire, but the passengers and crew escaped in the boats. Sir Stamford thus lost a valuable scientific collection and most of his other effects. Before leaving he had published *Malayan Miscellanies* (2 vols. Bencoolen, 1820-22), and endowed a college at Singapore for the study of Malay and Chinese, and on his arrival in England he founded and became first president of the Zoological Society. He died in London, 4th July 1826. See a *Memoir* by his widow (1830).—**Thomas R., D.D., LL.D.**, cousin of the preceding, born in London in 1758, was long an able preacher in Liverpool, and published several very popular hymns. He died 18th August 1863, and his biography, written by his son, Thomas Stamford R., appeared in 1864.

Rafflesia is the type genus of the curious parasitical plants constituting the small natural order *Rafflesiaceae*, natives of tropical Asia and S. America. The name was given by Robert Brown in honour of Sir Stamford Raffles, who, during his governorship in the East, discovered (1818) in the interior of Sumatra the wonderful *R. Arnoldi* as a parasite upon the roots of *Cissus angustifolia*. This plant bears no leaves, but consists of a single gigantic flower, measuring a yard across, and estimated to weigh 15 lbs., while its cup-shaped perianth is calculated to contain six quarts of fluid. The flower is of a mottled flesh colour, and after remaining expanded a few days begins to putrify, emitting a carrion-like odour attractive to insects, and thereby probably conducive to fertilisation. Three other species of R. are known to botanists, of which *R. Patma* is employed in Japan as an astringent and styptic. The principal S. American genus of this order is *Pilostyles*, natives of Brazil and Chili.

Rafn, Karl Christian, a celebrated Danish philologist, was born 16th January 1795, at Braheborg in Fyen. After studying law at Copenhagen University (1814-16), he became sub-librarian there (1821-23), and a professor in 1826. From his early youth R. had been a student of Icelandic, and in 1821 he began to publish in a Danish translation a collection of old Scandinavian mythic and romantic sagas (*Nordiske Kjempehistorier*, 3 vols. Copenh. 1821-26; 2d ed. 1829-30). In 1825 he founded the Early Scandinavian Text Society, as secretary of which he edited a large number of important works, among the chief of which are his editions of the *Kråkumál* (Copenh. 1826); *Fornaldar-Sögur Norðurlanda* (3 vols. 1829-30); and *Färeyinga-Saga* (1832). For the great collection of the *Fornmanna-Sögur* (12 vols. 1829 *et seq.*) R. edited a large part of the text, and wrote the parallel Danish translation of the three first and the eleventh volumes. In his elaborate *Antiquitates Americanae* (1837) he clearly proved that America had been discovered by Scandinavians in the 10th c., and that between the 11th and the 14th centuries they had settlements in the lands now called Rhode Island and Massachusetts. In conjunction with Finn Magnussen, R. wrote *Grönlands Historie*

Mindermarker (3 vols. 1838-45), and part of *Antiquités Russes* (2 vols. 1850-52). He died at Copenhagen, 20th October 1864.

Raft (Dan. *raft*, 'a spar or pole') is the name given to an assemblage of pieces of timber fastened together to act as a float. When the R. is composed of timber sawn into marketable shape, and joined simply for convenience of transport down a river to the shipping port, it is called a *lumber R.* Rafts in some places are employed to carry freight; and in many cases of emergency at sea, poles and spars require to be lashed together for the purpose of saving life. In some large ships, precautions are taken against disaster in the provision of life-rafts of ingenious construction, based principally on the American tubular system. The American life-R. originally consisted of a collapsible material, such as indiarubber, which had to be inflated before launching; but now metal tubes have been adopted, two or three being connected by girders, between which air- and watertight tanks for holding provisions are fitted. These tanks have screw taps at top and bottom, so that it is immaterial which side of the life-R. falls uppermost. Christie's and Roper's cellular life-rafts of metal and wood are recent important English additions to the means of saving life at sea. They are carried stretched across the deck, parallel to the captain's bridge, and they may be launched from either side of the ship.

Rafters, in building, are inclined timbers of a Roof (q. v.), to which is secured the lathing for the support of the slates or other covering. The feet of the R. rest on the wall-plate, and the heads abut at an angle against each other or against a ridge-plate running along the top of the roof.

Ragged Schools are supplementary of Industrial Schools (q. v.), from which they differ only in being founded and maintained by voluntary contributions. Such schools are intended to provide education for vagrant children, and to supply means whereby they may be prevented from lapsing into crime. The first ragged school was perhaps that of John Pounds, the poor cobbler of Portsmouth, who, from about 1819, continued to teach destitute children till his death in 1839. The Ragged Sunday School of London was founded in 1838, and later converted into a free day-school; the Field Lane School was established in 1843. The first schools at which food was supplied to the children were those opened by Sheriff Watson in Aberdeen in 1841, and by Dr. Robertson in Edinburgh (the Vennel) in 1845. Dr. Guthrie's *Plea for R. S.* gave an impetus to the movement, which led to the establishment of such schools throughout the country. A grant of £2. 10s. per head was allowed by the Privy Council in 1856, but withdrawn in 1859, and since then R. S. have received no aid from the State. The Education Acts (1870 and 1872) introducing the principle of compulsory education have caused many ragged day-schools (especially in England) to be changed to public schools. The question of further undertaking the burden still resting on the voluntary R. S. is at present being forced on the attention of school boards. In the United States the only similar institutions are orphan asylums. Of these, the chief, Girard College in Philadelphia, founded in 1848, contained as many as 550 orphans in 1875.

Raggee (*Eleusine Corocana*), a dark and very small-grained species of millet, which forms the staple of the food of the poorer classes in the central plateau of S. India. It is grown as a 'dry-crop,' i. e., on unirrigated land. Its chief merit is its great productiveness, for it is neither very palatable nor very wholesome. In Mysore, however, it is universally preferred to rice as an article of diet.

Raglan, Fitzroy James Henry Somerset, Lord, a younger son of the fifth Duke of Beaufort and of a daughter of Admiral Boscawen, was born 30th September 1788, and educated at Westminster, which he left in his sixteenth year to join the 4th Light Dragoons. In 1807, after proceeding to Constantinople with the British ambassador, he joined the staff of Sir Arthur Wellesley as aide-de-camp, and went to Copenhagen with him. During the Peninsular War he distinguished himself at all the remarkable battles, and became military secretary to the commander-in-chief. At the restoration of the Bourbons in 1814 he acted as secretary to the embassy at Paris for some months, and married Emily Wellesley, niece of the Duke of Wellington, whose military secretary and aide-de-camp he again became on the renewal of the war. At Waterloo his right arm was shot off, but he made good the deficiency to a certain extent by learning

to write without it. In 1816 he resumed his diplomatic position at Paris, and remained till 1819, when he became secretary to the Master-General of the Ordnance; in 1822 he accompanied the Duke of Wellington to the Congress of Verona; in 1825 he went with him to St. Petersburg as secretary of embassy, and in 1827, on the Duke being appointed commander-in-chief at the Horse Guards, he was made military secretary, and so remained until 1852. He then became Master-General of the Ordnance, Privy Councillor, and peer. R. was appointed to the command of the English troops operating in the Crimea when he was sixty-six years of age. His long administration of business in military offices during peace was, in the opinion of Kinglake, far from being a good preparation for the command of an army in the field, because the genius of war abhors uniformity and tramples upon forms and regulations. At Alma, Balaklava, Inkermann, and Sebastopol, R.'s courageous simplicity of mind was strongly revealed, but the disastrous repulse of his troops (June 18, 1855), together with grievous mismanagement in the commissariat, which entailed great losses among his men, prostrated him. He died June 28, 1855, of dysentery. His French colleague Saint-Arnauld talked of him as possessed 'd'une valeur antique,' but he did not possess the talent for swift initiative which is necessary in a position of the highest command. See Kinglake's *Invasion of the Crimea* (1863-77).

Ragman Roll, the name given to a record (preserved in the Tower of London) of the Scottish barons, landholders, clergy, and burgesses who did homage to Edward I. during his triumphal progress through Scotland in 1296 when John Baliol was de-throned. The original instruments of homage have almost entirely perished, but the R. R. enables us to understand how thoroughly the English king attained his purpose. The record is of great historical value. It is the only genuine statistical document of the time, and the names of the persons throw a flood of light on the ethnological conditions of the country. One point, for example, is made out quite clearly, viz., that at the close of the 13th c. the Gaelic element was still preponderant in Strathclyde—Fergus, Niel, Duncan, Donald, Dougal, Gilmore, and Malcolm being names of frequent occurrence, while 'Macs' positively swarm. One might almost venture to affirm that 'English' was not yet the vernacular of districts like Ayrshire and Galloway. The work was published by the Bannatyne Club in 1834.

Ragout (Fr. *ragoûter*, 'to revive the appetite'), the French term for a stew of meat with vegetables and culinary herbs. It is essentially the same as the Irish stew.

Rags are the remains of textile substances after they have served the purposes for which they were originally fabricated. They are variously utilised, according to the nature and condition of the fibres of which they are made. Linen, cotton, hempen, and other R. of vegetable origin are principally employed as a raw material of the paper manufacture, the cellulose of which they are composed being perfectly fitted for that use. Linen R. are also reduced to the state of surgical lint, although that substance is now principally prepared from a specially woven loose linen texture. R. for papermaking are sorted into numerous qualities, the finest being white linen, and the lowest qualities are printed calicoes and heavy cottons such as mole-skins, corduroys, &c. Woollen and worsted R. are used up in the Shoddy Manufacture (q. v.), and the fine fragments or dust of woollen and worsted cloth are dyed various colours and used for making flock papers for wall decorations.

Ragstone, a dark-grey siliceous sandstone which breaks with a rough or ragged fracture. It is much used in Kent as a building material.

Raguly (Fr. *ragulé*, 'fretted by rubbing'), in heraldry, an epithet applied to a notched or serrated line.

Ragu'sa (Slav. *Dubrovnik*, Turk. *Paprovnik*), a seaport of Austria, in Dalmatia, on a peninsula at the base and on the slopes of Mount Sergio, 103 miles S.E. of Spalato. With its old walls and towers, the town presents a medieval appearance, but it has also modern fortifications, with Fort Imperial on Mount Sergio and Fort St. Marco on the La Croma. It is well built, though many of the streets are steep, and most of them are narrow. The harbour immediately S. of R. only admits ships of 200 tons, but that of Gravosa, the real port N. of the peninsula and one mile distant, admits the largest vessels. Most of

the buildings, including the metropolitan church, were rebuilt after the great earthquake of 1667, but many splendid remains point to the former magnificence of the city, and two noble buildings have survived the overthrow—the Palace, a Renaissance structure, begun 1388, finished 1435; and the Dogana ('custom-house'), a Romanesque work, finished 1520. The trade of R. is chiefly in oil, soap, brandy, corn, rice, sugar, tobacco, and leather. It carries on also a large transit trade with Turkey by means of caravans, the annual imports of which are estimated at £98,000 and exports at £76,500. In 1871, 14,819 persons, forming 365 caravans with 9064 horses, visited the town. Pop. (1870) 8678. R. was founded in the middle of the 7th c. by the inhabitants of Old R. (the ancient *Epidaurus*) fleeing from the incursions of the Slavonians. It formed itself into an aristocratic republic under a count, afterwards styled a rector, and was until the 10th c. under the protection of the Slavonian princes of Narenta. Its inhabitants acquired great maritime power, and inflicted defeats on the Saracens. From 1260 till 1368 it had Venetian rectors, though it did not lose its independence. In the war between Genoa and Venice (1378-80) R. sided with the former, and sent a fleet to the battle of Chioggia. In 1414 it purchased peace from the conquering Ottomans by paying a tribute of 500 ducats, which in 1471 was raised to 8000 ducats. From this time the city paid a yearly tribute to the Porte, which gave it its powerful protection, without interfering with its internal affairs; consequently Ragusan traders enjoyed the peculiar good fortune of being safe from the ravages of the Barbary pirates. In 1806 Napoleon took possession of R., and in 1808 incorporated it with the province of Dalmatia, after an independent existence of more than 1000 years. In 1814 it fell to Austria.

Ragu'sa, a town in the S.E. of Sicily, on the right bank of the stream R. or Mauli, 31 miles W.S.W. of Syracuse. It consists of the two parts, R. Superiore and R. Inferiore, each with its own municipal government. In R. Superiore are several old churches which survived the earthquake of 1693, the finest of which, that of Santa Maria della Scala, has been spoilt by injudicious restoration. Many ruins in different parts, and the tombs in an ancient cemetery a mile to the W., point to the former grandeur of the city. R. manufactures linens, silks, and woollens, and has a considerable production of bricks and tiles. Pop. (1874) of R. Inferiore, 6826; of R. Superiore, 21,546. R. is probably the ancient *Hybla Heræa*.

Ragwort is the common name in England for the large and coarse species of the genus *Senecio* (q. v.), with yellow rayed flowers and lacinated leaves—more particularly to the widespread European species called *S. Jacobæa*. It is a troublesome perennial weed in pastures, &c., crowding out the desirable herbage, and is itself refused by stock. 'Grubbing' is the most effectual remedy. *S. aquatica*, often met with in rough, damp, undrained pasture-ground, is the Marsh R. In Germany the name R. (*ragwurz*) is assigned to plants of the Orchis tribe, in conformity with its aphrodisiac application, as explained in the old herbals.

Rahel. See VARNHAGEN VON ENSE.

Rah'way, a city of New Jersey, U.S., 20 miles S.W. of New York, stands on a river of the same name, navigable for boats of from 4 to 8 feet draught. It has seventeen churches, two weekly newspapers, a printing-press manufactory, and thirty carriage factories. Pop. (1870) 6258.

Raigúrh, a hill fort in the district of Tannah, Bombay Presidency, British India, 65 miles S.E. of Bombay, and 52 N.W. of Sattara. It is situated among the N. Ghauts, and has been called, from its natural strength, the Gibraltar of India. In 1648 it fell into the hands of Sivaji (q. v.), the founder of the Mahratta power, who fixed his capital here. It surrendered to the British in 1818.

Raikes, Robert, the founder of Sunday-schools, was born at Gloucester in 1735. He was long editor and publisher of the *Gloucester Journal*, and during a life of philanthropy became intimately acquainted with the destitute and demoralised state of the children in and about his native town, then a great centre of the pin manufacture. In 1781 he engaged four teachers in dame-schools to give Sunday instruction in reading and the Church catechism, and in a short time the scheme met with a large share of success. A letter by R. in the *Gentleman's Magazine* for June

1784 led to the formation of numerous schools on the same model, and of a society under high patronage for the establishment of similar schools throughout the kingdom. This society expended £4000 to teachers in fourteen years. R. died April 5, 1811, and not long after his death the Sunday-school scheme was vastly extended by the teaching being made gratuitous. See Cornell's *Life of R. R.* (New York, 1864).

Rail, a term applied to various *Grallatorial* or Wading Birds. The *Rallus aquaticus* is the water-R.; the *R. Virginianus* the Virginian R.; the landrail being the familiar corncrake (*Crex pratensis*). The rails form the type of a family (*Rallidae*). The genus *Rallus* itself is distinguished by a markedly curved bill, with a long groove in which the nostrils are situated. The second and third quills are the longest, and the hind toe is short and slender. The water-R. attains a length of 12 inches. It is of a brown colour above, mottled with black. The throat, sides, breast, and under parts are grey, tinted with white and brown. The bird inhabits ponds and lakes. It is lithe and active, and is difficult to capture on account of the ease with which it makes its way through reeds and aquatic vegetation. The Virginian R. migrates to S. America in winter. It is of smaller size than the English water-R., and is of a black colour, striated with brown above and orange-brown below. Other American species of rails are the Great Red-Breasted R. (*R. elegans*), the Salt-water Marsh Hen (*R. crepitans*), and the Manque Hen (*R. longirostris*).



Landrail.

Rails (Ger. *riegel*, Lat. *regula*), in architecture, the horizontal parts of a frame and panel, as opposed to the vertical pieces or *styles*.

Railways and Railway System. The earliest attempts at railway construction in this country were made in the coal-districts of Northumberland and Durham. They were originally limited to tramways of flagstone flanked by parallel rows of planking. So long ago as 1630 something of the kind was used by a Mr. Beaumont, manager of collieries near Newcastle-on-Tyne, and in the beginning of the 18th c. the practice was extensively adopted. Improvements were gradually but slowly made; slips of iron were added to increase the durability of the rails, and subsequently flanges to prevent the waggons from running off. The first considerable iron railway was laid down at Colebrookdale, in Shropshire, in 1770. The upper rails were made of cast-iron 5 feet long, 4 inches wide, and 1½ inches thick, with raised rims to keep the carriage wheels on the track, and with holes through which they were spiked to the lower wooden rails. The iron railways, or tramways, as they were called, which followed this, were constructed on a like principle, although the rails were broader and thicker. Upright flanges were used in the railway on the Duke of Norfolk's collieries near Sheffield in 1776. Jessop introduced smooth rails at Loughborough in 1789, flanges being placed on the carriage wheels. Wrought-iron rails were introduced in 1808, and improved machinery for rolling them followed. The real foundation of the railway system was, however, the introduction of steam. In 1759 Dr. Robison had suggested to Watt the construction of a steam-carriage, and the latter patented an invention of the kind in 1784, a working model of which was made by Murdoch, his assistant. Cugnot, a native of Lorraine, made a model locomotive for dragging cannon in 1763, and a full-sized engine in 1769, which, loaded with twelve persons, travelled at the rate of 2½ miles an hour. Oliver Evans, an American, invented a road steam-carriage in 1772. A self-acting locomotive was patented by Richard Trevithick in 1802, and exhibited in a field near Euston Square. A second engine, by the same maker, was used to draw waggons at Merthyr Tydvil in 1804, but only worked well with light loads on level surfaces or moderate grades, the extent of its power being to draw 10 tons of iron at the rate of about 5 miles an hour. For a number of years an imaginary obstacle de-

layed railway progress, the opinion being prevalent that the adhesion between the wheels of a loaded engine and the rails was not sufficient for the purpose of traction, but that the wheels would slip round upon the rails without making progress. Cogged wheels were therefore used, and numerous patents were taken out for racks, chains, &c. Blenkinsopp's engines from Middleton Collieries to Leeds ran on a racked or tooth-rail laid on one side of the road, dragging thirty coal waggons at the rate of $3\frac{1}{2}$ miles an hour. The fictitious difficulty was not finally dissipated until 1812, when smooth wheels were proved by Mr. Blackkett at Wylam to be quite efficient in ordinary cases if an adequate proportion of weight were made to press upon them. The subsequent rapid progress of the locomotive was, according to Robert Stephenson, 'not due to one man, but to the efforts of a nation of mechanical engineers.' The greater share of the honour is, however, undoubtedly due to the father of this modest speaker and to himself. George Stephenson's first 'Travelling Engine,' constructed in 1813 at Killingworth Colliery, where he was engine-wright, drew 30 tons weight at 4 miles an hour. An engine made by him two years later contained the germ of all that has since been effected, and is the type of the present locomotive engine. A locomotive on the Killingworth model was made for the Duke of Portland for use on a tramroad from Kilmarnock to Troon in 1817, but frequent breakages of the cast-iron rails caused its discontinuance. The Hetton Railway, from Hetton Colliery, Durham, to the coast, was constructed under Stephenson's direction in 1819, and was opened on 18th November 1822, on which day five of Stephenson's locomotives each travelled at the rate of 4 miles an hour dragging seventeen waggons weighing about 64 tons.

The turning point in the history of railway enterprise was the construction of the Stockton and Darlington line. Previous to this about twenty Acts had been passed for the construction of railways, commencing with the Wandsworth and Croydon line, projected in 1801 and completed in 1805, but the Stockton and Darlington was the first railway which carried passengers, and on which the locomotive had an extended trial. The scheme was set on foot by Edward Pease and a number of other members of the Society of Friends, on which account the railway obtained the designation of 'The Quakers' Line.' An Act for the purpose received the royal assent on 19th April 1821. Stephenson resurveyed the ground afterwards, and although the original proposal was to use horses, he impressed Pease with a high opinion of his locomotive. A second Act was obtained in 1823. An engine factory was established by Stephenson, Pease, and others at Newcastle in 1823, where many of the most celebrated engineers of Europe, America, and India have since been educated. The line was opened 27th September 1825, the locomotives dragging 90 tons, including 600 passengers, at a rate of 12 miles an hour. Among the oldest advocates of a national system of railways were R. L. Edgworth, who described in *Nicholson's Journal of the Arts* in 1802 a project he had formed many years before for laying iron rails on the main roads of England; Dr. James Anderson, who made a similar recommendation in 1800; and Thomas Gray of Leeds, who sketched a most able and comprehensive plan in his *Observations on a General Iron Railway* (1820). It is much to the credit of the *Scotsman* that it was the first newspaper in the kingdom to give railways hearty support, a series of remarkable and far-seeing papers appearing in its columns in 1824 from the pen of the editor, Mr. Charles MacLaren, full of confident anticipation. They were extensively circulated in Britain, America, and the Continent, and did much to press forward the movement. The second railway in Great Britain to carry passengers and use locomotives was that from Monkland to Kirkintilloch, Scotland, opened in September 1826. A year or two later came the Ballochney and the Canterbury and Whitstable Railways. But the line which finally broke the neck of the opposition, and ensured the triumph of the innovation, was the Liverpool and Manchester Railway. The marvellous increase in business between these two great towns had for years quite outstripped the tardy efforts of the canal companies, and in 1821 a tramroad was projected between them. William James, of West Bromwich, a surveyor, suggested the formation of a railway in 1822, but his plan was not taken up. A scheme devised by Joseph Sandars in 1824 was more successful. Stephenson surveyed the ground in that year, meeting with

the greatest difficulties from the canal proprietors and land-owners, who organised a determined opposition. In all England, only one engineer, James Walker, was prepared to support Stephenson's evidence before the House of Commons as to the speed of the locomotive. A writer in the *Quarterly Review*, while supporting the scheme, hoped Parliament would limit speed to 8 or 9 miles an hour, that being, in his opinion, as high as could be ventured on with safety. The Bill was defeated in 1825, but passed in 1826. For traction a multitude of schemes were suggested—water-power, hydrogen, carbonic acid gas, &c. Gray urged the use of a greased road, and Vignolles and Ericsson a central friction rail. Stephenson advocated smooth rails and locomotive engines. Two consulting engineers were selected to report to the Directors, and they recommended fixed engines at stages of $1\frac{1}{2}$ miles each to work the trains forward. The bewildered Directors inclined to their own engineer, and offered a prize of £500 for the best locomotive engine, three of the leading conditions being that it was to consume its own smoke, to draw 20 tons weight at 10 miles an hour, and that its price should not exceed £550. Robert Stephenson's engine *Rocket* more than fulfilled all the conditions, and on the trial day not only gained the prize over three other competitors, but decided the Directors in favour of the locomotive. The line, notwithstanding great obstacles, was successfully constructed—a road over Chat Moss, a bog of 12 square miles, being a triumph of engineering—and the railway was opened for traffic on September 15, 1830. Its undoubted success completely proved the practicability of railways, and the public spirit and enterprise of the country were henceforth abundantly forthcoming for the extension of the system. Railways were laid down between all the manufacturing centres of the N., and were projected from the metropolis in all directions. Land-owners, who were at first intensely hostile, came to see the effect of a railway was not to diminish but to increase the value of their property. In ten years 2500 miles of railway, almost all with double lines, had been laid down at a cost of £60,000,000. Space forbids any account of the gigantic growth of the system, and the enormous advantages which have accrued from it are so transparent that it is unnecessary to dilate upon them. Railways acted like swift and navigable rivers, stimulated production all over the country by creating markets for produce, vastly economised time, labour, and money, offered a rapid and commodious means of travel to any portion of the kingdom to all sections of the community, assisted the diffusion of knowledge, created large towns, and strengthened alike national ties and international interests. Over-competition and reckless speculation was often indulged in; many private individuals, particularly during the Railway Mania of 1844-46, were ruined, yet, after all, the monetary value of railways to the nation far exceeds even the wasteful amount which has been spent upon them. (For present statistics of British railways, see end.) England's example was speedily followed by most European countries, many lines being constructed largely by British capital and British engineers. The first railway in France, from Paris to St. Germain, was finished in 1835. In the course of thirty years the entire mileage amounted to 8500, and one half more has since been completed. America, however, with true Anglo-Saxon enterprise, took the field before the nations of the Continent. A railway, part of the Baltimore and Ohio line, was opened for passengers on 31st December 1829, locomotive power having previously been employed on a line from the Delaware and Hudson Canal to Honesdale. The railway mileage in the United States was 2818 in 1840, 30,635 in 1860, while in 1876 it reached the astonishing total of 77,457, or three times the circumference of the globe. In 1871 alone 7660 miles were opened. In 1848 the first grants of land to a railway (the Mobile and Ohio) were made by Congress, and this step led to most beneficial results. The increase of wealth and population west of the Rocky Mountains, owing to the discovery of gold in California and other causes, induced Congress to authorise the Pacific Railroad in 1862. The railway crosses nine separate mountain ranges, and attains an altitude at the eastern rim of the Great Salt Lake basin of 7458 feet. The railway system has been developed with great energy in Canada, Australia, the British colonies, and in India. In 1869 the Indian Government, which had previously guaranteed interest to shareholders and reserved power to control proceedings, decided on carrying out all extensions by direct state agency.

the building after the point of building; structure house is chiefly built at for

	1876	1877	1878
...	41	5	7
...	10	11	12
...	13	17	20
...	22	50	54
...	56	59	148
...	150	242	242
...	242	504	7
...	2,848	...	...
...	20,042	88,540	181
...	19,247	77,457	46
...	52	2,030	248
...	...	6,412	599
...	...	1,847	6,337
...	156	8,076	2,476
...	156	6,938	129
...	...	2,688	2,050
...	...	618	155
...	...	575	190
...	...	170	562
...	...	445	784

In 1877 about 5000 miles of railroad were in formation throughout the British Empire. A railway through the entire Dominion of Canada, from the Atlantic to the Pacific, is at present being constructed, which will, when completed, establish an actual as well as political union between all the provinces of that vast colony. The expense is estimated at £32,000,000, and the British Government has contributed to this a guaranteed loan of £2,500,000. Among the mighty projects of the future may be mentioned a railway from Russia through Siberia with a branch to Tashkend, though it is probable that the financial strain of the late war will postpone its construction indefinitely. Through communication from England to India may be considered only a question of time. According to Mr. Simon M'Bain's volume on *To India by Rail* (1876), 2209 miles of such a line are at present in existence, leaving 3660 miles to be constructed, at an estimated cost of £32,000,000. A Committee of the House of Commons considered in 1872, but did not give its support to, a proposal for a railway via the Euphrates valley.

Railway Legislation and Management.—The policy of Governments differs widely on the subject of railway management. In most Continental countries everything connected with railroads is organised on a systematic and uniform plan, and in some countries, such as Belgium and Germany, the state is a great railway proprietor. In France and elsewhere the Government determines the localities for which railway communication is to be provided, lays out the line, regulates the number of trains, fixes tariffs, and controls to the most minute details the general administration of the system. In England and America, on the other hand, everything is left to experience, and no fixed principle or plan exists. Government solely authorises the construction of a line and defines the powers of the company which is to work it. The tendency everywhere has been towards amalgamation and monopoly, the large companies gradually swallowing the smaller ones. Almost the whole railway system of France is in the hands of six companies, viz., the Paris, Lyon, and Mediterranean, the Paris and Orleans, and the Northern, Western, Southern, and Eastern. In this country half the total mileage is owned by the London and North-Western, the North-Eastern, the Great Northern, the Great Western, the Midland, the Great Eastern, the Lancashire and Yorkshire, the North British and the Caledonian Companies. The pur-

chase of British railways by the state has been lately urged by an influential party. The Government had power by an Act passed in 1844 to purchase all lines after they had been in existence twenty-five years after that date, but a Committee of Parliament reported in 1872 that the terms of the Act were at that time impracticable. There are many obstacles in the way of purchase. The enormous expense would probably be much increased by speculative movements, and would more than double the National Debt, the temptation to political favour would be great, a dangerous power would be at the command of the party in office, while the right of the state to make every subject a compulsory partner in so great an undertaking may be questioned. On the other hand, much expense might be saved, particularly in preparatory charges, the construction of useless lines might be avoided, and a system of more uniform or at least cheaper rates to all places in the kingdom might be adopted. At present railways in the United Kingdom are started by private individuals, who form a company. The 'Standing Orders' of Parliament afford opportunity to petitioners in favour of and against the proposed scheme to state their case before that tribunal. The examiners of private bills see that the standing orders have been complied with previous to submission of the Act to Parliament. After the second reading of the bill in the House of Commons, which is tantamount to an approval of it in principle, it is referred to a Select Committee, which hears both sides, and reports on the evidence. If the bill passes the Commons, it goes through a similar ordeal in the Lords. Acts of Parliament sometimes cost enormous sums. That for the Great Western cost £88,000, and that for the Brighton line even more. Railway shares are first in the form of scrip, deposits being paid by those to whom they are allotted, to meet the preliminary and parliamentary expenses. The balance is paid on the passing of the Act by calls, and the company is authorised to borrow one-third of its stock by debentures. *Debenture stock* has a perpetual guaranteed dividend. *Preference stock*, of which there are many varieties, is so called from its being preferred to ordinary stock in the payment of dividends. The liability of shareholders is limited to the amount of their shares. The shareholders elect the Directors from among their own numbers, and meet personally or by proxy, usually every half year, when the Directors' report is read, and the current dividend declared. The secretary and other officers are elected by the Directors.

The *Construction* of railways is executed by contracts, usually let out to public or private competition. The surveyors of early railways followed as closely as possible the natural declivities of the ground, and afterwards the practice was more largely introduced of moderating these declivities by embankments, arches across valleys, cuttings or tunnelling through hills, &c. *Tunnels* and *Viaducts* being very expensive, are never used when it is possible to dig *cuttings* and build *embankments*. The material, earth, &c., taken from cuttings generally goes to make embankments, and the engineer has to arrange his plans to make the two operations fit as well as possible. The railway and earthworks require careful draining, and it is much better that this should be done thoroughly at first. As regards *gradients*, the tendency has been to increase. On the oldest lines grades of 30 or 40 feet to the mile were considered heavy, but these have since been much exceeded. In England grades of 100 feet are not uncommon, there are several of 150 feet and even more, one of the greatest (196 feet) being near Sheffield. In Switzerland, where the grades are very severe, as on the slope of the Righi, central cogged rails are used. It is now asserted that grades of 370 feet are workable by locomotives. *Curves*, when adopted in railway lines, are with few exceptions over $\frac{1}{4}$ ths of a mile in radius, though many are under half a mile. The Government formerly, in both France and England, fixed a minimum radius for railway curves. They should be avoided at portions of a line where great speed is desirable. Mechanical contrivances affecting the wheels or rails are used where the curves are narrow in radius in order to prevent the train running off the line. After the level road has been constructed over bogs, hills, or ravines, a thousand minute details require the engineer's attention. Each rail with its fastenings must be completed and the whole road carefully ballasted up to the proper level. The material in which the railway sleepers are imbedded consists usually of broken stone or coal, gravel, cinders, or similar substances, and is technically called *ballast*. The ballast promotes drainage by its porosity,

resists the sinking of the sleepers, and gives elasticity to the line. It is usually about 2 feet in thickness, one foot being below and one foot around and above the sleepers. The best material for sleepers is oak, which is, however, expensive. Larch and timber from the Baltic are most generally used in this country, and hemlock and chestnut trees in the United States. The trees, about 10 inches in diameter, are split through the middle, and the sleepers thus formed, which must be straight and uniform in size, are laid down about 3 feet apart from one another. In their natural state they last six or seven years, but the process of creosoting renders them much more durable. In India, where wood is expensive, rectangular blocks of cast iron have been used as sleepers.

Rails.—For many years the iron used for rails was inferior, but has lately much improved in quality, and since the year 1837 steel rails have been largely introduced. Steel rails cost about one-half more than iron rails, but last enormously longer. In Great Britain and Europe the usual form of rail is the double-headed, which when worn on one edge is reversible. It requires a cast-iron chair on every sleeper in which it is fixed. In America the base of the rail is about 4 inches wide, and chairs are dispensed with. Rails are about 24 feet long in this country, and in America 30 feet is usual. 85 to 100 lbs. per yard was formerly considered the best weight for rails, but now a weight of 35 lbs. for light rails and 60 for heavy rails is thought sufficient. The joints of the rails are secured by fish-plates and fastened by screw bolts. Switches or points and crossing by turntables and traversing platforms are used for the passage of a train from one set of rails to another.

All railway lines are divided into districts, to which gangs of platelayers are attached. Their duty is to inspect the rails, points, and signals in their portion of the road every twelve hours, and to keep them in perfect repair. For the purpose of signals, again, a railway is divided into blocks, each commanded by a signal cabin, in any one of which there must be only one train at a time on each line of rails. One signal box frequently commands several separate lines of rails, and the duties of the signalman then require his most unceasing vigilance.

Gauge.—In the first railways constructed George Stephenson adopted a gauge of 4 feet 8½ inches, that being the gauge of the common vehicles of the country at the time. Brunel and other engineers subsequently recommended a much wider gauge, but in 1846 the gauge was fixed by Parliament at Stephenson's dimensions for all railways in the United Kingdom except the Great Western. The latter railway afterwards adopted 4 feet 8½ inches also, and the practice thus became universal. The early lines on the United States used the British gauge, but in the S. and W. from 5 feet to 6 feet was afterwards common. Experience has not been in favour of broad gauges, and on a memorable occasion the Ohio and Mississippi Railway changed their gauge from 6 feet to 4 feet 9 inches, by moving a line of rails along their entire route on a single Sunday night. Lines on narrower gauges have lately been sanctioned in Russia and adopted in Canada, some parts of Sweden, and Switzerland. The Indian Government decided on 5 feet 6 inches in 1851, but adopted 3 feet 3 inches in 1873 for the sake of economy in the construction of the Punjab, Scinde, and other large railways. With a narrow gauge expense is diminished, and the ratio of dead to useful weight in a train is lessened.

The cost of railway construction in Great Britain has been much greater than in America, the aggregate expenses connected with the formation of all the lines in the two countries being about equal, although the mileage of railways in the United States is five times that of this country. This is accounted for partly by the enormous preliminary expenses which have been paid by British railway companies. To construct the railways of the United Kingdom up to the end of the year 1875 (see D. Kinnear Clark's contribution to *British Manufacturing Industries*), cost £630,223,494, or £37,833 per mile, only about two-thirds of which was actually expended in works, the remainder being paid chiefly in law expenses and compensation to land-owners. The sums paid as 'land damage' used to be most exorbitant, and even now it is probably double the real value of the land, so general is the prejudice in favour of private as opposed to public interests. Unfavourable physical features have also increased the expense of English lines. But the cheapness of American railways is more apparent than real. They

are built at the lowest possible estimates, and light rails, narrow banks, and wooden or trestle bridges are extensively used. The result is that the subsequent expense in maintenance and repairs is much greater in America than in Great Britain. In England one ton of bituminous coal suffices for about 75 miles of journey, against 45 in America.

Tunnels, Viaducts, Bridges, &c.—(1) **Tunnels.**—One of George Stephenson's most splendid efforts was the Kilsby Tunnel, on the London and Birmingham line, which is 2398 yards long, and cost £300,000. The Thames Tunnel, now used, though not originally constructed for a railway, is also a wonderful work, and the Underground Railway in London, which cost on an average £700,000, is also a splendid achievement. The Watford Tunnel, 1 mile long, cost £140,000. The Woodhead Tunnel (3 miles 60 feet) is the longest tunnel in Great Britain. Tunnels have, however, been constructed on a much grander scale elsewhere. The Mont Cenis Tunnel, about 8 miles in length, uniting the railways of France with those of Italy, was constructed in 1857-70, and cost £3,000,000. The St. Gothard Tunnel, now being carried through, and which will probably be completed in 1879, is on a larger scale still. It is designed to connect the Swiss railways with those of Northern Italy. But a gigantic scheme has in the last few years been mooted, before which even these great efforts pale, viz., the projected Channel Tunnel, from St. Margaret's Bay, South Foreland, to a point between Calais and Sangatte, a length of 22 miles, requiring, with approaches, 31 miles of railway. A rival proposal has been made to lay a pair of huge tubes from Dover to Cape Grisnez. Either scheme would practically annex our railway system to the whole of the railways of the Continent. (2) **Bridges.**—The High Level Bridge at Newcastle, one of the most picturesque and imposing of railway structures, was designed by Stephenson and opened in 1845. The Britannia Bridge over the Menai Straits, opened 5th March 1850, is 1841 feet long, and cost £600,000. In S. Devonshire there are 5 miles of bridges and viaducts designed by Brunel on a gigantic scale. Some of the railway approaches to London are constructed for several miles on arched viaducts of brick. The Tay Railway Bridge, opened 31st May 1878, is at present the longest railway bridge in the world (10,612 feet, in 85 spans, 11 being of 245 feet each). It was designed by T. Bouch, and cost £350,000. The Victoria Bridge, which crosses the St. Lawrence near Montreal, is 7000 feet long, but the Royal Albert Bridge, designed by Mr. Legge to cross the same river, will be 15,500 feet long. The E. River Bridge between Brooklyn and New York, and the St. Louis Bridge, are two of the first works of the kind in the United States. Elevated rack railways, such as that from the Battery to 30th Street, New York, are features in the streets of some American cities. The combined road and railway bridge over the Rhine at Cologne cost £600,000. Hollandsch Diep, near Maerdijk, Holland, is a remarkable work 7 furlongs long. It cost £460,000. The Sommerung Railway, connecting Vienna and Trieste, abounds in extraordinary works, steep gradients, vast tunnels and viaducts.

Rolling Stock.—Locomotives.—In recent years locomotives have increased in size. Six-wheeled engines are used in this country, and eight and even ten wheels in America and some parts of Germany. The weight of a modern engine ranges from 6 to 50 tons, including the tender, and the load from 50 to 500 tons. The usual weight is 20 to 25 tons. A first-class engine to travel fifty miles an hour will weigh 30 tons, and cost £3000. **Carriages.**—Passenger-carriages are of three kinds, first, second, and third class on all British railways except the Midland, where only two classes are used. On most lines all classes of passenger carriages have recently been made more comfortable. The long train-like carriage is an American invention. The new carriages of the Midland line cost from £500 to £600 each. They rest on 6-wheeled bogies, and each has four first-class and four third-class compartments and a luggage box. Recently sleeping accommodation has been provided for on the long-journey trains in this country by the use of Pullman cars.

Speed.—The average speed of express trains in England is over 40 mile an hour, and at some places exceeds a mile a minute. The journey from London to Exeter by the Great Western Railway, 193 miles, is accomplished in 4½ hours, and from London to Edinburgh by the Great Northern and North British Railways in 9 hours. The latter, not taking stoppages into account, gives an average continuous speed along the whole route of 44 miles

an hour, it being greatly more at various portions. Continental and American railways are slower. The fastest train in France, from Calais to Paris, travels at 37 miles an hour. From Paris to Marseilles (537 miles) takes 15½ hours, the average per hour being 34 miles. The highest speed in Belgium and Holland is about 33 miles. In Germany and Switzerland few lines much exceed 20 miles. From Berlin to St. Petersburg (1028 miles) is traversed in 46 hours, the average being 22½ miles. In America 30 miles is considered fast.

Passengers and Fares.—The total number of passengers who travelled by railway in the United Kingdom during the year ending 31st December 1876, excluding 394,427 season-ticket holders, was as follows:—

1st Class,	44,859,066
2d Class,	66,478,195
3d Class,	426,950,034

538,287,295

The following statement of the proportion of the total passengers carried in the three classes in 1855 and 1876 shows an increasing tendency on the part of the public to travel third-class:—

	1855	1876
1st Class,	13.4	8.3
2d Class,	30.4	12.4
3d Class,	56.2	79.3

Fares, average 2½d. per mile for first class, 1½d. second, and 1d. or 1¼d. third. When return tickets are granted, the average charge for the double journey is about a fare and a half. Special excursion trains frequently run at much lower rates. In the booking-office attached to the stations the tickets are arranged in long upright tubes in reversed numerical order. Only one ticket for a particular place and class can be drawn out at a time, and the last remaining ticket in the tube always shows the number sold. A large Clearing-House, on the banker's principle, is established near Euston Station, London, where all the accounts for the through traffic is settled. The money received at all stations for joint tickets is paid into the Clearing-House, and the proper proportions are thence every month handed to the various companies according to a mileage scale. The regulations as to luggage, &c., are looser in England than on the Continent, on account of the high pressure demanded. A general improvement is, however, observable in railway station accommodation, and the practice of having hotels attached to the termini has been found a great convenience. The traffic managers, locomotive superintendents, and station-masters are responsible for the organisation and smooth working of all passenger and goods trains. The difficulties of the traffic manager may be estimated by considering that Bradshaw's Guide gives the time of running of passenger-trains only, and that he is in addition responsible for all the mineral and goods trains, which must not disturb the ordinary traffic.

Accidents.—In the year 1876 the following casualties occurred on railway lines in the United Kingdom:—

	Killed.	Injured.
<i>Passengers</i> —		
1. From causes beyond their own control	38	1279
2. From misconduct or want of caution	101	604
<i>Railway Servants</i> —		
1. From causes beyond their own control	43	384
2. From misconduct or want of caution	630	2216
3. Persons passing over level crossings, trespassers and suicides	433	241
Total	1245	4724

Taking a series of years, the causes of railway accidents have been classified by Mr. J. Bramwell as follows:—

Collisions of various kinds	58.7 per cent.
Trains going on wrong lines	12.0 "
Leaving the rails	9.2 "
Defects in rolling-stock	9.2 "
On inclines	4.6 "
Entering stations at too high speed	1.8 "
Miscellaneous	4.5 "
	100.0 per cent.

During the year 1876, the total number of safe journeys accomplished bore the proportion of 4,500,000 to one fatal accident, or excluding the fatal accidents arising from the passengers' own fault, the proportion of 14,000,000 to 1. Probably the most perfect arrangements will never wholly prevent accidents.

Statistics.—The following additional statistics of the railways of the United Kingdom, as at 31st Dec. 1876, are interesting:—

	Authorised Capital of Railways.	Gross Receipts during year.	Working Expenses during year.
England & Wales	£611,412,535	£52,476,319	£28,466,366
Scotland	92,725,357	6,965,091	3,597,973
Ireland	37,664,635	2,774,365	1,471,150
United Kingdom	£741,802,527	£62,215,775	£33,535,590

£549,095,705 of the authorised capital was by shares and £192,706,822 by loans. The paid-up stock and share capital was £490,916,875. The passenger traffic and mails gave 42.05 per cent. of the gross receipts or £26,163,551, and the goods traffic 54.25 per cent. or £33,754,317. The value of the passenger and goods receipts was about £3551 per mile, and 5s. 6½d. per train mile. The total capital received by railway companies in the United Kingdom including loans and debenture stock has been at the rate of £39,012 per mile of railway constructed up to the end of 1876. Railway dividends paid in 1876 varied from 1 to 13 per cent., the great bulk lying between 3 and 8. The total mileage open on 31st December 1876 was

England and Wales	11,989
Scotland	2,726
Ireland	2,157

Total—United Kingdom 16,872.

The Great Western Railway has the greatest mileage (2059 miles), the London and North-Western carried the greatest number of passengers in 1876 or 46,746,332, and the North-Eastern Railway the heaviest weight of goods or 34,343,695 tons.

References.—The third volume of Smiles' *Lives of the Engineers* (1862) contains a good history of the early English railways. See also a *Book about Travelling, Past and Present*, by T. A. Croall (London and Edinburgh, 1877); Wood *On Railroads*; Simm's *Public Works of Great Britain*; Pambour, *The Locomotive Engine*; Clark *On Railway Machinery*; *Reports of Commissioners on Guages*; and the annual Reports of the Railway Commissioners. Bradshaw's *General and Steam Navigation Guide*, published monthly, is a most admirable and comprehensive collection of time-tables. Poor's *Railway Manual* is a standard authority on American railways.

Laws Affecting R.—By 24 and 25 Vict. c. 97 any malicious injury to a railway or malicious obstruction of the line is a felony, subjecting the offender to penal servitude, possibly for life.

Liabilities.—Every railway is required to forward goods and passengers without unreasonable delay. The company must provide reasonable accommodation in their trains, but they are not bound to accommodate an extraordinary number of passengers. It is liable for neglect or default in the carriage of goods to a limited amount. Extra value may be declared and paid for.

Raimon'di, Marc Antonio, the most famous of the early Italian engravers, was born at Bologna about 1488. Originally apprenticed to a goldsmith, he studied design and engraving in *niello* under Francia, and his first copperplate is a reproduction in 1505 of the 'Pyramid and Thisbe' of the famous Bolognese. Vasari says that R. adopted the profession of an engraver after seeing some of Dürer's woodcut prints. When he went to Venice in 1506, he copied with the minutest accuracy the entire series of Dürer's 'Passion of our Lord' and 'Life of the Virgin.' To one of these he affixed the monogram of Dürer, and the prints sold as originals. Dürer was so enraged, according to Vasari, that he hastened to Venice and procured from the senate an order restricting the future use of his monogram or mark. In 1510 R. removed to Rome, where among his earliest works were Raphael's 'Lucretia' and 'Judgment of Paris.' So pleased was the great master with the execution of these that he permanently secured R.'s services. For the next ten years R. devoted himself exclusively to engraving Raphael's pictures, aided by a body of pupils, among the best of whom were Marco da Ravenna and Agostino Veneziano. In this way R. founded what is called the Roman school of engraving. After Raphael's death he was mainly engaged on the designs of Giulio Romano; and as the engraver of that artist's indecent illustrations of Aretino's sonnets he was

imprisoned by Clement VII. Released on the intercession of Cardinal de Medici, he acquired the favour of the Pope by engraving Bandiell's 'Martyrdom of San Lorenzo;' but the sack of Rome in 1527 reduced him to poverty. He then retired to Bologna, where he appears to have resided till his death, the date of which is uncertain, some authorities assigning it to 1539, others to 1546. One of the earliest, he is also one of the greatest of all engravers. His treatment of Raphael's designs has never been equalled for precision and delicacy of touch, subtlety, and range of tint, and faithful preservation of the painter's feeling. From the first his works, of which there are over 600, were in great request, and hence the plates soon got worn, and only early impressions are worthy of his name. At Mr. Johnson's sale in London, in 1860, a 'Judgment of Paris' brought £320. Fine collections of R. are in the print-room of the British Museum and in the Louvre.

Rain is the result of the condensation of the water-vapour ever present in the air into drops, which descend by their own weight to the surface of the earth. Even when there is not a cloud in the sky there is always a considerable quantity of moisture in our atmosphere, and this moisture is a most important element in the modifications of climate. The quantity which the air can retain depends upon the temperature—the higher the temperature the greater the quantity; and when the maximum quantity for any temperature is present, the air is said to be saturated. Saturation must always precede precipitation. The air, however, is not always saturated. As a rule, the moisture present could be held in suspension by the same mass of air at a lower temperature; and the temperature, for which the air would be saturated in the given circumstances, is called the dew-point. The determination of this critical temperature by the ordinary methods of Hygrometry (q. v.) gives the necessary datum for finding the absolute humidity of the air, *i. e.*, the quantity of water-vapour in unit mass of air. The ratio of the actual quantity present to the maximum quantity which the air at its present temperature could hold is called the relative humidity, or simply the humidity. It is the humidity which indicates the dryness or wetness of the air. If it is nearly unity, the air is nearly saturated, and is therefore wet; and the smaller the fraction which expresses the humidity, the drier is the air. Any cause which lowers the temperature of the air below the dew-point is sufficient to cause deposition of moisture, which appears as dew, mist, R., snow, or hail, according to the circumstances under which the cooling has taken place. On a clear still night after a hot summer day, the conditions are most favourable for the deposition of dew. The surface of the earth radiates rapidly the heat which it had absorbed during the day, and soon cools below the temperature of saturation of the contiguous air, which, reduced also in temperature, is no longer able to retain the moisture it formerly held, but deposits it as dew on the cool surface. Here there is generally no cloud formed, since the condensation takes place not in the body of the air, but only along the thin stratum in immediate contact with the colder earth. Sometimes, however, and especially if the air is nearly saturated, a broader stratum is reduced in temperature, and there results the well-known evening haze, which gives to the setting sun or rising moon a characteristic ruddiness. This haze differs only in degree from the thick fogs which frequently envelop our islands. A slight diminution in temperature of a mass of nearly saturated air is sufficient to cause the vapour present to condense into minute drops, which make up what we understand usually by a cloud. Mist or fog is simply a cloud formed close to the surface of the earth. The most usual causes which effect this condensation are the cooling of the air by its own expansion, the intermingling of two masses of air at different temperatures, and the impact of the moisture-laden air against a cold surface. When a stream of heated air ascends, it loses heat in two ways—by radiation and by expansion—and thus it gradually cools until it can no longer hold the water-vapour present as vapour. Condensation takes place, and clouds are formed in the high strata of the air—clouds which by their own weight are always descending. Should these in their descent pass into a sufficiently dry mass of air, they will gradually evaporate again and disappear. They are not R.-clouds. R.-clouds are usually the result of the indraught of a warm saturated current of air into a colder region, or of a cold current into a warmer saturated region. If the lowering of the temperature is not

sufficient to bring it below the saturation point, no condensation can take place and no rain will fall. A current of air which flows from a more humid to a less humid region must necessarily feel *wet*, even though it be unaccompanied by precipitation, and a wind from a less humid to a more humid region is *dry*. The trade-winds are therefore dry, while the heavy rains in the intermediate region of calms are the result of the rapid cooling of the ascending masses of air which have been saturated with moisture through the action of the sun's tropical heat. Clouds are thus formed, and these, cooling continually by radiation from their upper surface, descend gradually towards the earth. The drops, at first small, grow in size, the larger ones growing at the expense of the smaller, until their weight, ultimately overcoming the viscosity of the air, precipitates them as R. During evaporation heat is absorbed, while during condensation it is evolved. Hence a cloud when forming is at a considerably high temperature—a fact which may be readily observed as a sudden mist is settling down. The cause of R., then, is a more or less sudden alteration in temperature. This change is generally accompanied by wind, and hence wind and R. are usually, and in some regions invariably, the accompaniments of each other. Forests have a great influence on the rainfall of a country. They seem to attract the R., and thus are their own preservers, since R. in turn encourages vegetation. As a country is cleared of its wood, its climate becomes drier, a phenomenon which has been extremely well marked in Queensland and other parts of Australia. The relation of rainfall to seasons is most marked in the tropics. Winter is the dry season, summer the wet; and as a rule the air is more humid in summer than in winter all over the globe. Everywhere, however, even in the tropics, the configuration of the land has a great influence upon the rainfall. The direction in which to look for the explanation of this is indicated by the consideration that the grand source from which the atmosphere draws its vapour is the ocean. If the prevalent winds set from the ocean towards the land, the likelihood is that that region will be wetter than if the prevalent winds set from inland. The moisture-laden air, again, after crossing a considerable tract of country, gradually loses its vapour, especially if the country be mountainous. Mountains and mountain-ranges powerfully influence the climate of the contiguous country, robbing the air of its moisture as the current speeds past. Thus, during the S.W. monsoon of India, there is no rain on the E. coast, but there is a copious precipitation on the W. coast. The W. of Europe, exposed to the Atlantic, has generally a wetter climate than the E. There are also certain parts of the earth where R. never falls. The best known of these are the Sahara in Africa, the Desert of Gobi in Asia, the basins of the Columbia and Colorado in N. America, and the coast of Peru in S. America. In the last case, the Andes acts as a complete barrier to the clouds which are borne from the Atlantic, and which pour forth their stores of water upon the eastern slopes, feeding the tributaries of the Orinoco and Amazon. The greatest rainfall on the globe occurs at the Khasi Hills (q. v.) in Assam, where 600 inches fall in a year.

Rain-Bird (*Saurorthera vetula*), a species of *Scansorial* birds allied to the cuckoos, inhabiting S. America and the W. Indies. It is also known by the name 'Tom Fool,' on account of the carelessness and prying curiosity with which it will approach any new or unusual object. The wings are weak. Its colour is a brownish grey above and a yellowish brown below, the tail being varied with white and black. This bird belongs to a small group of the *Cuculida*, named the 'Ground Cuckoos.'

Rain'bow, the well-known luminous arch which is frequently seen stretching across the heavens after or during a shower of rain. The circumstances under which such a phenomenon may occur, however, are very various; but in all certain conditions are necessary. The observer must be situated between the sun and a cloud from which the sun's rays are reflected. These rays are not reflected directly as from a polished surface, but are thrown back after refraction and reflection through and in the minute spheres of water which make up the cloud. Not all these drops can so act, but only such as fulfil the necessary optical conditions for a ray incident at the external surface to suffer internal reflection, and be transmitted after a second refraction to the observer's eye. All such drops must lie upon a circle symmetrically placed with reference to the right line joining the observer

and sun. If white light were homogeneous, the bow would be simply a thin bright line. But since white light is heterogeneous, and each constituent has a definite wave-length with corresponding refractive properties and a corresponding tint, the complete solar R. is composed of numerous concentric lines of various colours blending insensibly into each other from red through the intermediate tints to green, and so on to violet. A R., indeed, consists of a series of spectra (see SPECTRUM ANALYSIS), arranged side by side so as to form a circular band 2° broad. The size and height of this arc depend upon the position of the sun. The lower the sun the higher the R. The radius of the circle of which the bow forms a part is about 41°. The violet is innermost, the red outermost, and within the violet supernumerary arcs are sometimes seen. These are caused by interference. Frequently a secondary R. is observed, having a radius of about 52° and a breadth of 3° 30'. In it the red is on the inside. It is produced by the final emergence of the ray from the drop after two internal reflections. The increased loss of light makes the secondary R. always much less brilliant than the primary. Rainbows of the third order have been seen, but they are of rare occurrence. The most usual circumstances, other than the ordinary rain-shower, under which rainbows appear, are in cascades and fountains, in the foam of the sea, or even by the action of the dewdrops. Such phenomena as lunar rainbows are also known. Here the source of light is the moon, and consequently the tints are not so brilliant as in the solar R. A secondary lunar R. is an extremely rare phenomenon.

Rain-Gauge is an apparatus for measuring the rainfall at any locality. The simplest and most trustworthy form consists of a vessel or receiver which communicates with the air above by means of a funnel. The quantity of rain collected is then measured either by being poured into a graduated vessel, or by having a graduated scale in the receiver itself. Much attention must be paid to the setting of the R.-G. in a suitable place.

Rainy Lake, on the boundary between Canada and Minnesota, lies 160 miles W. of Lake Superior, at an elevation of 1035 feet, and is 35 miles long by 5 of average breadth. It is fed by the river Nameken and other streams, and drains, by the Rainy Lake River 100 miles long, into the Lake of the Woods.

Baipur, the chief town of the district of the same name, Central Provinces, British India, 180 miles E. of Nagpur. Pop. (1872) 19,116. It is an old town, with a massive fort and many tanks, gardens, and temples. It has now a large trade. In 1875-76 the exports, chiefly oil-seeds and lac, were valued at £89,000; the imports, piece-goods, rice, metal-ware, &c., at £106,000. The main street is 2 miles long, well laid out, and the houses are ornamented with wood carving.—The *district* of R. is almost coextensive with the plateau of Chutteesgurh. Area, 11,885 sq. miles; pop. (1872) 1,093,405. The tableland is very fertile, but the surplus produce is, as yet, remote from a market. It is proposed to continue the railway from Nagpur, or to open a new line from Calcutta. The crops are rice, wheat, gram, kodo, and cotton.

Raised Sea-Beaches. See BEACHES, RAISED.

Raisins (Fr. *raisin*, 'grape;' Prov. *razim*, Span. *racimo*, Ital. *racemo*, from Lat. *racemus*) are the dried ripe grapes of certain varieties of the vine. These varieties are principally the Muscatel, Valentia, and Sultana grapes, cultivated in the countries bordering the Mediterranean Sea and the Greek Archipelago. Currants are a small variety of R. made from the currant or Corinthian grape grown in Greece and the Ionian Islands. Sultana R., cultivated in Turkey, are free from seeds or 'stones,' and consequently more valuable than the other kinds. To prepare R. the grapes are allowed to be dead ripe, after which they are plucked, scalded in a caustic saline ley, and dried by exposure to the sun for about a fortnight. R. are nutritious, cooling, and somewhat laxative, but a little indigestible. In addition to their extensive use as a dessert fruit and in puddings, &c., they are extensively employed in the preparation of British wines. The imports into the United Kingdom for the year 1876 amounted to 583,860 cwts., the duty on which was £204,351. These imports came from Spain, Asiatic Turkey, Italy, Greece, and other countries.

Rajah (*rājā*), the Hindu term for king or prince, which preserves the original Sanskrit form corresponding to Lat. *rex* and French *roi*. It is assumed by all sorts of petty chiefs, and is frequently conferred by the British Government, as an honorific title, upon meritorious individuals. In early times there was no higher rank; but now Oriental vanity is pleased with the invention of Maharajah ('great prince') and Adhi Rajah ('first prince'). The former of these is borne by most of the great Hindu feudatory chiefs, and is also conferred on British subjects. The chief of Oodeypoor (q. v.), the acknowledged leader of the Rajputs, bears the title of Rana, probably a corruption of R. Other common corruptions of the word are Roy (Rai), which was applied by the Mohammedans to Hindu civil officers of rank, and Row (Rao), which was originally a Mahratta title. Both these two have now become common personal names. The feminine of R. is Ranee; cf. Lat. *rex*, *regina*; Ger. *könig*, *konigin*.

Rajahmundry (*Rāja-mahēndravaram*), the chief town of the Godavery district, in the Madras Presidency, British India, just above the bifurcation of the delta of the Godavery river, 30 miles from the sea and 65 N.E. of Masulipatam. Pop. (1871) 19,738. The southern suburb is well laid out. The Government offices to the N. occupy the site of an old fort. Near the river are an ancient Hindu pagoda and a Mohammedan mosque bearing date 1324 A.D. There is a church, a provincial school teaching up to the university standard, and a Protestant mission with 400 converts. A permanent museum was built in the centre of a public garden in 1865. In the 12th c. R. was the capital of an independent Rajput dynasty, and it used to give its name to the British district. See *The Godavery District* by H. Morris (Lond. 1878).

Rajmehal ('royal estate'), a ruined town in the district of the Sonthal Pergunnahs, Bengal, British India, situated on high land a short distance from the right or S. bank of the Ganges, 137 miles by rail N. of Calcutta. It was chosen by the Moguls in 1592 as the seat of government in Bengal, and remained a place of great importance until the beginning of the present century, when the Ganges deserted its former course. The river now flows 4 miles away, and the palaces, mosques, and tombs of the Mohammedans have relapsed into jungle. In trade, also, it has been to a great extent supplanted by Saheb-gunge. In 1876-77, however, piece-goods to the value of £184,000 were received at the railway station for distribution in the country round.

Rajpeepia, the first native state in the Rewa Kanta Agency, India, in political connection with the government of Bombay. Area, 1514 sq. miles; pop. (1872) 120,036; revenue, £80,000, of which £6500 is paid as tribute to the Gaekwar, under British guarantee. Hills cover three-fourths of the area, producing teak and other timber. The lands to the N. along the Nerbudda river yield abundant crops of cotton, oil-seeds, tobacco, and sugarcane. The climate is unhealthy, and more than half the inhabitants belong to the wild tribe of Bheels. Nandod, the capital, has a pop. (1872) of 9768. The ruling family are Rajputs, and date back for 400 years.

Rajpūt ('the son of a Raja,' or prince), the general designation of the races in the N. and W. of India, who claim to be descended from the ancient dynasties of the sun and moon, forming the two great tribes of Suryavansi (Solar) and Chandravansi (Lunar), from whom the 36 royal clans are supposed to originate. There are, in addition, an innumerable number of minor clans of inferior rank. The Rajputs are generally regarded as the legitimate representatives of the Kshattriya or warrior caste of the primitive Hindu system; and as a rule they disdain employments which are not of a semi-military character. Many of them are landholders; and the poorer members are largely employed throughout the Peninsula as sepoy, policemen, door-porters, and private guards. The home of the race is the central tract of Rajputana, where their chiefs still exercise sovereignty; but they are also numerous N. in the Punjab, W. in Gujerat, and E. as far as Behar. The petty hill chieftains in all parts of India, even when evidently of aboriginal descent, claim to belong to this caste. According to the general census of 1868-72, the total number of Kshattriyas and Rajputs in British India amounts to more than five and a half millions, most numerous in Behar, the N.W. Provinces, Oude, and the Punjab. In addition, about 700,000 more of this caste in the Punjab are now Mohammedans in religion.

Rājputānā ('the land of the Rajputs,' or 'king's children'), an extensive tract in W. India, containing an aggregate of eighteen native states, subdivided under seven political agencies, but all subordinate to the Governor-General's Agent for R., whose official headquarters are at Mount Abu. Total area, about 128,126 sq. miles; pop. estimated at 9,000,000, of whom the great majority belong to wild tribes, such as Bheels and Mhairs. This tract is bounded N. by the Punjab, E. by the Native States of Central India, S. by the Native States of Bombay, and W. by the Bombay province of Scinde. There are no natural boundaries, but in the centre are the original strongholds of the ancient R. dynasties, and the limits are those imposed by successive conquerors of Mogul or Mahratta origin. Towards the E. lies the Thur, the great sandy desert of India; and the soil is nowhere fertile, being much broken by rocky ridges. After the Afghan Emperor, Shere Shah, had defeated the Rajput princes in a hard-fought battle, he is said to have remarked that he had hazarded the empire of India for a handful of *jowar*, a coarse millet which is the staple crop in this barren country. The rivers are insignificant, and there are no irrigation works proper, except the enormous tanks, or rather artificial lakes, constructed by former sovereigns. The Aravulli Mountains, running from N.E. to S.W., form a sort of watershed, dividing the country into two portions; the highest peak of Mount Abu is 5800 feet above the sea. In the N.E. is the salt lake of Sambhur, now leased to the British Government. The most valuable commercial products are opium (to which the Rajputs are themselves immoderately addicted) and building stone of various excellent kinds, there are also found copper, cobalt, &c. During the year 1874-75 the imports from the Punjab only into R. were valued at £1,146,000, chiefly piece-goods and sugar, in about equal proportions, metals, rice and other grains, and raw cotton; the exports from R. into the Punjab were valued at £524,000, chiefly salt, piece-goods, wheat and inferior grains, fruits, and raw cotton. In 1876-77 piece-goods were imported from Calcutta to the value of £121,000. Since the opening of the R. State Railway, running from Delhi to the Sambhur Salt Lake near Jeypore city, the main trade route is towards the N. A branch has since been opened to Agra, and the main line has been continued to Ajmere. By the end of 1875, the total number of miles open was 344; the capital expended, £2,155,216; and the net earnings of the year, £63,482. It is now contemplated to make two branches S., joining directly with the Bombay system at Ahmedabad and Indore; total length, 433 miles, at an estimated cost of £2,664,000, or a little more than £6000 per mile. These are all narrow-gauge lines, but they will revolutionise the present commercial apathy of R. The British force stationed in R. consists of 42 Europeans and 4391 native soldiers.

Of the eighteen states into which R. is divided, three are Jat, and one, Tonk, is Mohammedan, while the rest are all governed by Rajput princes of ancient lineage. The acknowledged chief is the Rana of Oodeypur (q.v.) or Mewar, who traces his descent back for eighteen centuries. Other important states are Jeypore, Jodhpore, Kotah, Bikanir, Ulwar, and Jeysulmir, which are described under their several headings. The administration in all cases is of a feudal character, the barons claiming the same descent as their prince, and consequently a semi-independence. This strongly-developed feudal spirit has proved both the strength and weakness of R. It enabled the princes to offer an heroic resistance, such as the annals of the world will hardly parallel, to the Mohammedan invaders; but subsequently it divided the great states into little fragments, rendering them an easy prey to the Mahrattas of the last century; and it forms now the main obstacle to the establishment of order. British connection with R. dates from 1803, when the Marquis of Wellesley, in pursuance of his policy of universal British supremacy for the sake of India, enforced treaties on some of the states, by which they were protected from marauders in consideration of paying tribute. This policy was extended by Lord Hastings in 1817.

The great blot on the Rajput character, besides opium intoxication and laziness, is female infanticide. In 1818 it was ascertained that among the offspring of 8000 married Jhareja Rajputs not more than 60 females were living. The cause of this crime is to be found in the necessity that exists for marrying into another clan, and for spending enormous sums on the wedding. The parents hope that the female children born to them may die; and very moderate ill-treatment is sufficient to secure their

wish. Continuous efforts have been made by the British officials to check this barbarous usage, and no doubt with some success. No trustworthy statistics are available for R.; but the condition of things may be inferred from the fact that the general census of 1868-72 shows that throughout British India the percentage of females to the total population, which in some places falls as low as 42 (in England the average is 52), varies directly with the presence of a Rajput element. Even so late as 1872, in one village in the N.W. Provinces, only 8 girls were found to 80 boys. A special Act of the Legislature was passed in 1870 to enforce appropriate regulations in such cases. Tod's *Annals of Rajasthan*, Malcolm's *Memoir of Central India* (2 vols. Lond. 1823), *Annual Bluebooks on the Moral and Material Progress of India* (Lond.), *Annual Reports of the Governor-General's Agent for R.* (Printed at the Foreign Office Press, Calcutta), an article in the *Edinburgh Review* for July, 1876, and Rousselet, *India and its Native Princes* (Lond. 2d ed. 1877).

Rake, a well-known horticultural and agricultural implement, which in its simplest form consists of a shaft or handle, to which a cross-bar is attached, studded at regular intervals with wooden or iron teeth of uniform length. The garden R. is a small implement with short teeth, used for smoothing tilled grounds and walks, collecting weeds, and like purposes. The field R. is of two kinds—the hand R., such as is used in haymaking, and the harvest R. The latter is frequently a heavy implement, dragged by a horse, with its teeth or tines so detached from each other that they follow irregularities and depressions of the ground.

Baking Moulding, in architecture, a moulding which is neither vertical nor horizontal, but runs at an angle.

Rakoczymarsch, a heroic composition, the *Marseillaise* of the Magyars. Its origin is unknown, but it was popular in the early part of the 17th c., and owes its name probably to Franz Rakoczy II. of Transylvania. During the Hungarian struggle for independence, its performance was on several occasions suppressed by the Austrian Government. It fired the enthusiasm of the revolutionary forces in 1848, and its music was set to patriotic poems.

Raleigh, the capital of North Carolina, U.S., on the Raleigh and Gaston and North Carolina and Chatham railroads. It has a fine granite Capitol, a State penitentiary, institutions for the insane, deaf, dumb, and blind, 8 churches, 2 daily and 8 weekly newspapers, and 3 banks. It has two foundries and a manufactory of steam-engines, and is an extensive cotton mart, handling about 40,000 bales annually. From the fineness of its native oaks, it is known as the 'City of Oaks.' Pop. (1870) 7790.

Raleigh, Sir Walter, born in 1552 at the manor-house of Hayes, on the E. coast of Devon, entered Oriel College, Oxford, in 1566, and three years later quitted it without a degree, to serve his 'prenticeship in arms among the Huguenots. He shared in the retreat of Moncontour, and after staying six years in France and seeing a few months' service in the Netherlands, sailed in 1578 with his half-brother, Sir Humphrey Gilbert, in search of the 'Unknown Goal.' A smart brush with the Spaniards drove them back, and in 1580 R. led 100 men to assist in putting down the revolt in the 'common-weal or rather common-woe' of Ireland. He was one of the slayers of 600 surrendered Spaniards at the Smerwick fort, received 12,000 acres of the confiscated Desmond estates; then, having quarrelled with the deputy, Lord Grey, returned to England in the winter of 1581. He entered on court life under Leicester's patronage, 'got the Queen's ear at a trice, being taken by her for a kind of oracle,' and, charged with a special mission to the Prince of Orange, attended Anjou on his entry into Antwerp (1582). Receiving in 1584 a grant of any lands not actually held by Christian princes, he sent three several expeditions to explore and colonise the coast to the N. of Florida, and on the region there discovered the Virgin Queen bestowed the name Virginia, whilst knighting R. (1585). After spending some £40,000 upon his colony, R. abandoned it in 1590, though not till he had introduced two of its products into Europe, potatoes and 'an herbe called by the natives *ypponow*, by the Spaniards *tobacco*.' Meanwhile he sat in Parliament from 1585, received the post of Warden of the Stannaries, and in 1587 was appointed Captain of the Queen's Guard. At the coming of the Armada (1588) he was employed on the coast defences, so could not join the fleet

till July 23, nor can we more than guess how valiantly he quitted himself in the busy week that followed. Then Leicester died, and R., jealous of Essex, withdrew to Ireland, there met with 'Colin Clout,' and brought him back with him to 'Gloriana.' Next for seducing Bessy Throgmorton, a maid of honour, Elizabeth committed R. to the Tower (1592); whilst he lay there, a ship of his captured a splendid Spanish prize, and on release he married the cause of his disgrace. He must, however, retire to his seat at Sherborne, to dream of El Dorado, that wondrous land beyond the Orinoco which he should never find. But if his search for it in 1595 proved vain, he showed at least the way to win the natives' love, penetrated Guiana as far as the Falls of Caroli, and sacked San José, a town of Trinidad. At the taking of Cadiz (1596) R. headed the English fleet, and his was all the glory of that grand success; his also were the laurels of the 'Island Voyage' in 1597, when, without waiting for Essex to arrive, he carried Fayal in the Azores by storm, widening thereby the jealousy that only ended with his rival's death (1601). In 1600 R. was made Governor of Jersey; in 1603 there arose a king 'which knew him not, nay, hated him for Essex' sake. And within half a year he, Spain's great enemy, was sentenced to death at Winchester for conspiracy with Spain. As Kingsley well observes, 'but one thing comes brightly out of the infinite confusion and mystery of this dark Cobham Plot, and that is R.'s innocence.' James durst not, however, kill him yet; a self-inflicted wound soon healed, and so for thirteen years the Tower became his cage, where he composed the great unfinished *History of the World* (1614), brewed cordials in a hen-house, and gave sage counsels to Prince Henry. At length in 1616 he was let go, unpardoned and *non ens* in law, and in April of the following year sailed for the last time Westward Ho! with a 'scum of men,' a commission thwarting him at every turn, and the Spaniards forewarned of his design. He sailed in quest of a Guiana gold-mine, whether real, or fancied, or trumped up as a pretext for release, is still unknown. Sickness and storm assailed the expedition from the first; R. himself lay fever-stricken; the storming of San Thomé cost his firstborn's life; and Keymis, oldest and truest of his captains, was goaded to suicide by the father's taunts. But loyal to his word, though with 'broken brains,' R. returned to Plymouth, there to be met by his kinsman Sir 'Judas' Stukeley, who, after tempting him to an abortive flight to France, that so his enemies might have a surer handle, arrested and lodged him in the Tower. On 29th October 1618 R. died bravely and cheerfully on Whitehall scaffold, a base king's sacrifice to Spanish pride, nominally under the sentence of fifteen years before. There died with him the Elizabethan hero age, though he was not the greatest of its heroes. 'Water' had been his nickname with the Queen; 'unstable as water' ran maybe in her mind. For R. had all the making of a great soldier, statesman, or navigator, but hardly of the three combined. Yet to combine them was always his ambition; what wonder if it o'erlept itself and fell? His possible achievements may be inferred from what he really did. His *History of the World*, 'writ by the captive eagle with his own wing's quill,' belongs in style as well as date to the age of pure English undefiled; Cromwell commended it to his son, and Hampden was at the cost of transcribing 3000 of its sheets. His *Truth of the Fight about the Isles of the Azores* (1591) is known to many now through Tennyson's *Revenge* (1878); how closely the poet has followed the historian comparison will show. And of his poems, the *Lie* at least discovers no mean member of the Mermaid Club. In Parliament, in an age of petty restrictions, he advocated freedom of tillage, freedom of church-going, and repeal of monopolies; his valour in the field and on the sea 'tossed him,' as even Naunton owns, 'from nothing up to greatness.' But it is chiefly as the planter of England's earliest colony, as the first to recognise that Spain must be foiled with her own weapons, that this Ulysses of over-many wiles deserves our praise, and, as the victim of the author of the *Counterblast*, our pity. R.'s *Complete Works* were published at Oxford (8 vols. 1829); his *Discovery of Guiana* has been separately edited for the Hakluyt Society by Sir R. Schomburgk (1848). The best Lives of him are by Tytler (1853), Edwardes (1868), and Mrs. Creighton (1877). See also vol. i. of Kingsley's *Miscellanies* (1859), and S. R. Gardiner's *History of England, 1603-16* (1863).

Râles, sometimes called Ronchi or Rattles, are thoracic sounds of a morbid type evolved during the acts of respiration.

Râma, a favourite hero of Hindu mythology, identified with three incarnations of Vishnu as Parasuram, Ramchandra, and Balarama. His adventures and those of his wife Sita are described in the *Ramayana* and the *Vishnu Purana*; his most popular exploit is the conquest of Lanka or Ceylon, and the destruction of the demon giant Ravana.

Ram'adan, or **Ramazan**, the ninth month of the Mohammedan year, which previously to the time of Mohammed was dedicated by the Arabs to excessive drinking, was by Mohammed set apart for fasting, because in it 'the Koran was sent down from heaven.' The fast is extremely strict during the day, so that Mohammedans must abstain entirely from eating, drinking, and intercourse with women. But during the night they may refresh themselves with eating and drinking, and enjoy the company of their wives. From the fast of R. none are excused except travellers and those whose health would suffer by observing it; and this exemption has to be compensated by fasting an equal number of days as soon as the impediment is removed.

Râmânûja, the founder of a sect of Vishnuvite Hindus who are numerous at the present day in S. India. He was born near Madras in the middle of the 12th c., and is known to have lived at the holy places of Conjeveram and Srirangam. His teaching was founded upon the supremacy of Vishnu over the other members of the Hindu Trinity, as the cause and creator of all things. In N. India the similar sect takes its name from Ramananda, said to have flourished at Benares in the 14th c. To Kabir, a pupil of Ramananda, may be traced the monotheism of the Sikhs. See Monier Williams' *Hinduism* (1877).

Râmâyana ('the goings of Rama'), one of the two great epic poems of Sanskrit literature, relating the adventures of Rama, one of the incarnations of the god Vishnu. It is affirmed to be undoubtedly the work of one hand, traditionally that of Valmiki; and it thus preserves a general unity, which renders it superior as a work of art to the rival epic of the *Mahabharata*. On critical investigation, the text which is preserved reveals two distinct recensions. It contains 24,000 verses, arranged in seven books. The date of its composition is assigned to the 3d c. B.C.

Rambouillet, Catherine, Marquise de, the founder of the famous literary society which took her name, and met in the Hôtel de R., in the vicinity of the present Palais-Royal. Born at Rome in 1588, the daughter of the Marchese di Pisani was married at the age of twelve to Charles d'Angennes, who on the death of his father became Marquis de R. in 1611. Beautiful and accomplished, she turned with disgust from the licentious court of Henri IV., and devoted her leisure to classical studies, gradually gathering around her an illustrious circle, which was greatly extended on the death of the king. The Hôtel de R. she luxuriantly refitted in a style opposed to the fashion, but in such pure taste that Marie de Medici ordered the architect of the Luxembourg to follow its designs. When only thirty-five years of age, Madame de R. was attacked by a peculiar malady of which the physicians could neither determine the nature nor relieve the suffering. Not too ill, however, to receive company, she generally reclined on a bed placed in an elegant alcove of the great *chambre bleue*. Here she could be screened off, admitting only her more intimate friends to the space around the bed known as the *ruelle*. The *levées* of the Marquise attracted the choicest wits of Paris and the most distinguished members of the French aristocracy, and the Hôtel de R. for about fifty years remained the fashionable rendezvous of all that was worthy and brilliant in the society of France. The list of visitors includes Malherbe, Racan, Corneille, Scarron, Saint-Evremond, Larocheffoucauld, Richelieu, and Boileau; while a charming coterie, famed equally for beauty and culture, was formed by Mademoiselle de Scudery, Madame de Sévigné, Mademoiselle de la Vergne, Madame Lafayette, the Marquise de Sablé, and the Duchess de Longueville. The fame of the Hôtel de R. led to the formation of many minor societies, and for a time *bas-blousism* was the rage. Literary ladies were *alcovists*, and the clubs became mere corollaries of the *ruelles*. Even Madame de R.'s infirmities were imitated, and fashionable belles gave audience in coquettish *déshabille*. Against these follies and pedantries Molière aimed his *Précieuses Ridicules*. The Hôtel de R. declined greatly on the ascendancy of Louis Quatorze, and the Marquise died at Paris, 2d December 1665. The precursor of the Academy, the Hôtel de R. diffused a taste for literature, and

aided the development of the language, while it raised the moral tone of society and imparted new life to the art of conversation. See Somaize, *Dictionnaire des Précieuses* (1661), Roederer, *Mémoires pour servir à l'Histoire de la Société polie en France pendant le XVIIe Siècle* (1835), Livet, *Précieux et Précieuses* (1859).

Rameau, Jean Philippe, the most celebrated French musician of the 18th c., was born at Dijon, September 25, 1683. After a professional visit to Milan in 1701, he spent several years in wandering about the south of France as first violinist to a theatrical company, and giving performances on the organ. In 1717 he went to Paris, and was organist in succession in several churches. He published a *Traité d'Harmonie* in 1722 (there is an undated English translation by Griffith Jones), and his *Nouveau Système de Musique Théorique* in 1726. He wrote many pieces for the church and the theatre, and was ultimately appointed manager of the opera, where he produced numerous operas and ballets. The former include *Hippolyte and Aricie* (1732), *Castor and Pollux* (1737), *Dardanus* (1743), *Pygmalion* (1748), *Zoroastre* (1749), *Acante and Céphise* (1751), and *Les Paladins* (1760). He published his *Dissertation sur le Principe de l'Harmonie* at Paris in 1750. R. died at Paris, 12th September 1764. His character as a theorist stands deservedly high, and his compositions, though now obsolete, were considered at the time both scientific and brilliant. See Fétis, *Biographie universelle des Musiciens* (new ed. 1878).

Ram'esses was the name of thirteen of the kings of ancient Egypt. See EGYPT and PHARAOH.

Rameswaram (from *Rama* and *iswar* = 'god'), the chief town on the E. shore of the island of the same name which forms part of the district of Madura, Madras, British India: pop. (1871), together with the adjacent town of Paumbaum (q. v.), 9407. Close by is a fresh-water tank 3 miles in circumference, on the bank of which is the celebrated pagoda, one of the finest buildings in India, annually frequented by 30,000 pilgrims. This is approached through a gateway 100 feet high, of handsomely carved granite, which opens into a cloister 600 feet square. The town itself is well built, and is the residence of many wealthy priests and traders. The island of R., which is about 20 miles long and of varying width, forms the first link in the chain connecting the mainland of India with Ceylon, by means of Adam's Bridge. For the proposed ship-canal across it, see PALK STRAITS. Its sanctity in Hindu eyes is connected with Rama's invasion of Ceylon; but local tradition, confirmed by geological evidence, asserts that it was only separated from the mainland by a hurricane in the 15th c.

Ramillies, a village of Brabant, Belgium, 13½ miles N. of Namur by rail, where Marlborough at the head of the allies defeated the French under Villeroi and the Elector of Bavaria, May 23, 1706. In an hour's engagement the French lost baggage, artillery, and 20,000 men, and with them the whole of the Spanish Netherlands—Antwerp, Brussels, and other towns surrendering to the conqueror without a blow.

Ram'ler, Karl Wilhelm, a German lyrical poet, born at Kolberg, 15th February 1725, studied at Halle, was from 1748 to 1790 a teacher in the Cadets' School at Berlin, and from 1790 to 1796 director of the theatre. He died 11th April 1798. Of the poems of R. all that are now interesting are his imitations of antique metres, as his *Oden aus dem Horas* (Berl. 1769), which served as models to Voss and others. See his *Poetische Werke* by Gökkingk (2 vols. Berl. 1800-1), and Heinsius, *Versuch einer Biographischen Skizze R.'s* (Berl. 1798).

Ramm'elsberg, a mountain in the Upper Harz, S. of the town of Goslar (q. v.), 2041 feet above the sea. Its mines have since 968 yielded gold, silver, lead, copper, zinc, vitriol, sulphur, and alum.

Ramm'ohun Roy, Rajah, the founder of the Brahmo Somaj (q. v.), or reformed Theistic sect of Hindus, and one of the most original men whom India has produced in later times. He was born in Burdwan district in Bengal in 1774, and early learned the classic languages of the East, and studied the Shastras, the Koran, and the Bible. In 1820 he published *The Precepts of Jesus, the Guide to Peace and Happiness*, and in 1830 organised a society for prayer-meetings, based upon adoration of the One and Universal God of Goodness. He adhered closer to the Vedas than his followers have done. Shortly afterwards he came

to England, partly on a mission from the Mogul Emperor of Delhi. He published English translations of the principal books of the Vedas and other Indian works. He died at Stapleton Park, near Bristol, 27th September 1833. See Mary Carpenter's *Rajah R. R.'s Last Days* (Lond. 1866).

Rámnuggur ('town of Rama'), a town in the district of Benares, N.W. Provinces, British India, on the right bank of the Ganges, and 4 miles S. of Benares. Pop. (1872) 8916. It is celebrated for the fort or residence of the Rajah of Benares, built of stone, which is one of the handsomest specimens of modern Hindu architecture.

Ram'pant (Old Fr. 'climbing'), in heraldry, an epithet applied to a lion standing erect on his hind legs, with the tail and one of the fore legs elevated, and the head in profile, as the red lion in the royal arms of Scotland.

Ramphorhyn'chus, a curious genus of extinct reptiles, the fossil remains of which occur in Mesozoic rocks. There were no teeth in the front portion of the jaws, which apparently existed in the form of a horny beak. R. was one of the flying reptiles allied to the *Pterodactyl* (q. v.).

Ram'pion, or **Ramps**, is a name applied to *Campanula Rapunculus* formerly much cultivated in gardens for its roots and its leaves, both being used in a raw state as a salad mixture, and the latter boiled as spinach. The root has a flavour of walnuts. The plant is a biennial, and has a wide distribution in Europe, extending to W. Siberia and N. Africa. In Britain it is a native of gravelly ground in S. England.

Ramps, in fortification, obliquely sloping passages 10 or 12 feet broad, cut in the interior *talus* or slope of a rampart, for the ascent or descent of troops and cannon.

Rámpúr (= city of the god Rama), the capital of a native state in India, in political connection with the government of the N.W. Provinces, on the left bank of the Kosila, a tributary of the Ganges, and 18 miles E. of Moradabad. Pop. 68,000. It is a straggling town, with two forts and several handsome palaces. There is a special manufacture of a kind of damask. The state of R. lies W. from Bareilly, in the centre of the N.W. Provinces. Area, 945 sq. miles; pop. 507,013; revenue, £146,000. Army, 28 guns, 500 horse, and 1000 foot. The exports are rice, sugar, and hides; the imports are elephants, horses, English cloth, spices, and salt. The ruling family, whose title is Nawaub, came from Afghanistan towards the end of the 17th c., and the name of Rohilcund is said to be derived from their original home. For loyal services during the Mutiny of 1857, the late Nawaub received an increase of territory, yielding £13,000 per annum.

Rámpúr, the capital of the native state of Bussahir, Punjab, British India, situated amid the Himalayas, on the left bank of the Sutlej, 50 miles N.E. of Beelaspur. The architecture is of a Thibetan character, but there are many temples frequented by Hindu pilgrims. The river, which runs through a gorge, is here crossed by a swing bridge of ropes. R. is celebrated as an emporium of trans-Himalayan trade, and has given its name to the *chuddurs* or shawls made from the wool of the mountain sheep, which are themselves used as the beasts of burden. Borax is also an important article of trade.

Rámpúr Beauléah, the chief town of the district of Rajshahye, Bengal, British India, on the left or N. bank of the Ganges, 125 miles N. of Calcutta. Pop. (1872) 22,291. In the early part of last century it was the site of a commercial factory, and the administrative headquarters were moved here in 1825. There is an important English school, which is growing into a college, and is well supported by the landowners. A large trade is conducted on the Ganges. In 1876-77 the registered exports were valued at £251,000 of raw silk; the imports at £199,000, including £100,000 of refined sugar.

Ram'say, Allan, was born at Leadhills, Lanarkshire, October 15, 1686. His father, Robert R., manager of Lord Hopetoun's lead mines, died when Allan was little more than an infant; and Mrs. R. soon after married a landowner in the neighbourhood named Crighton. Allan got the benefit of the parish school, learned as much Latin as enabled him 'to read Horace faintly in the original,' and in 1700 was apprenticed to a wig-maker in Edinburgh. At Edinburgh he soon became known for a thoroughly sociable fellow; and as small clubs held in taverns were patronised then by all classes, he connected himself with

more than one of these. His most regular attendance was given to the Easy Club, of which he became poet laureate, and which was usually favoured with the first reading of his poems. The members of this society were known by assumed names; R. was first Isaac Bickerstaff, and afterwards Gawin Douglas. He seems to have continued in the wigmaking business until thirty, although long before that he had conjoined with it the dignity of authorship. He was never ashamed of his early profession, and turned away sneers by remarking that he 'thatched the out and inside of many a shrewd and witty pate.' In 1712 he married Christian Ross, a lawyer's daughter. At the *Mercury*, opposite Niddry's Wynd, he was now established as bookseller and publisher, and it was the custom of parents to send their children to his shop for 'his last piece,' which he would hand over the counter in the shape of a penny broadsheet. In this manner appeared 'Edinburgh's Salutation to my Lord Marquess of Caernarvon' (1720) and others such. His first considerable attempt at publication was the production of King James's *Christ's Kirk on the Green*, with an additional canto by himself. The rich, broad humour here displayed caused the book to be sold rapidly, and after two years he brought out a second edition, with still another canto, as successful as the former. His poems now amounted to so considerable a number that he collected them (1721) into a quarto volume, the subscriptions for which brought him four hundred guineas. It is a curious sign of the times that he dedicated to 'The Most Beautiful the British Ladies,' a book stained in many places with the grossest indelicacy. He produced in 1722 his vigorous *Fables and Tales*, and in 1723 *The Monk and the Miller's Wife*, a Chaucerian tale, which Woodhouselee declares 'would be of itself his passport to immortality.' In 1724 appeared his poem on *Health*, and the first volume of the *Tea-Table Miscellany*, a *Collection of Songs, Scottish and English*. October of the same year welcomed his *Evergreen, being a Collection of Scots Poems wrote by the Ingenious before 1600*. This is compiled chiefly from the Bannatyne MS. which had been lent to R. But his conscience as an antiquarian editor was too easy; he freely cut and patched wherever it seemed good to him, his single aim being to catch the public taste. Of two poems of his own introduced into the *Evergreen*—'The Vision' and 'The Eagle and the Robin,'—the former is his greatest effort of imagination. It is a political allegory referring to the Pretender, and rivals the best work of Dunbar. R.'s purest, truest poem, *The Gentle Shepherd*, appeared in 1725. Its germ had been printed in 1718 in a separate pastoral, entitled *Patie and Roger*, followed in 1721 by the song *Patie and Peggy*, and in 1723 by the sequel *Jenny and Meggie*. These pieces were of such merit as to induce R.'s friends to ask him to undertake a pastoral poem descriptive of life in the S. of Scotland. Dr. Pennecuik, a brother poet, furnished him with the framework of the drama. The scenery is now generally supposed to be that around Newhall House, twelve miles from Edinburgh. *The Gentle Shepherd* is a Scotch eclogue *sui generis*. It does not ape the classical; no line of it is out of harmony with the spirit of Scottish peasant life; yet its beauties are those of Theocritus. It had reached ten editions in 1750, and has since then gone through at least forty more. The remaining three volumes of the *Tea-Table Miscellany* appeared successively in 1725, 1727, and 1740. A second collection of R.'s poems was made in 1728, and a book entitled *Thirty Fables* followed in 1730. His last work was a collection of *Scots Proverbs* (1736). In 1726 he had removed his business to the Luckenbooths, where he changed his sign of Mercury for the heads of Drummond and Ben Jonson. Here he established the first circulating library in the kingdom. It appears to have succeeded well, for Wodrow notes that in 1728 the magistrates attempted to suppress it on account of its influence on the youth of the city. These magistrates also fell foul of a theatrical speculation of R.'s, and, refusing him a licence for plays, rendered useless a theatre he had built at great expense in Carrubber's Close. This was the single piece of ill-luck in the life of the poet, who, like his contemporary Pope, was always able to coin his verses into gold. In his sixtieth year he retired from active business, and built himself a quaint villa, 'like a goose-pie,' on the Castle Hill, where it still remains, commanding a view that is scarcely to be surpassed anywhere. This Scottish Horace passed through old age, though burdened by disease, with Horatian equanimity, and died on the 7th of January 1758. His statue was erected in Princes Street, Edin-

burgh, in 1865. A neat and careful edition of *The Gentle Shepherd*, with memoir, was published by Ross (Edin. 1875). Chalmers' edition of R.'s complete works (1800) has been superseded by that of Gardner (2 vols. Paisley, 1877), who supplies a full biography.—**Allan R.**, son of the preceding, was born at Edinburgh, October 1713. He pursued the profession of artist, a profession his father had at one time contemplated, lived on friendly terms with Dr. Johnson and Sir Joshua Reynolds, acquired considerable political and literary influence, and rose to such eminence in art as to be appointed portrait painter to George III. About half-a-dozen short political tracts were published by him anonymously. R. died at Dover, August 10, 1784.

Ramsay, Edward Bannerman Burnett, was born at Aberdeen, 31st January 1793. His father, Alexander, second son of Sir Thomas Burnett, Bart., of Leys, was Sheriff of Kincardineshire, where the family estates lay. Edward, when very young, was taken in hand by his uncle Sir Alexander R., who sent him to school in Yorkshire, at Harsley, near his own house. Harsley was the most retired village in the county. In its church the Bible lay in chains of Edward VI.'s period; no turnpike road passed through it; and all the letters of the villagers were written by Sir Alexander's gardener. In the second series of the *Reminiscences* will be found an account of the quaint surroundings and time-honoured usages amid which R.'s youth was passed. Sir Alexander died in 1806, leaving the estates to Edward's father, who obtained a baronetcy from Fox. In 1815 Edward graduated at St. John's College, Cambridge, and next year he obtained the curacy of Rodden, Somersetshire. This charge he soon conjoined with that of Buckland Dinham. An account of his work among the Methodists of Buckland was written by Dr. Guthrie in the *Sunday Magazine* for January 1865. In 1823 he removed to Edinburgh, where he became first incumbent of St. George's Episcopal Chapel, next, incumbent of St. Paul's Church, Carrubber's Close (1826), in 1827 assistant minister of St. John's, and in 1846 Dean of the Diocese of Edinburgh. He was offered the Bishopric of New Brunswick, that of Glasgow, and the position of Coadjutor-Bishop of Edinburgh; but declined the preferment. His *Advent Sermons* appeared in 1850, *Diversities of Christian Character* in 1853, *Christian Life and Manual of Catechising* in 1859, *On the Canon Law of the Episcopal Church* in 1861, and *Christian Responsibility* in 1864. These represent the literary work he did as a Churchman. He published in 1827 a *Memoir of Sir J. E. Smith*, in 1850 a *Memoir of Chalmers*, in 1862 *Genius and Works of Handel*, in 1866 *Preachers and Preaching*, in 1868 *Pulpit Table-Talk*, and in 1869 *The Art of Reading and Preaching Distinctly*. In 1857 appeared the work which has carried the best of Scotch humour over the world, *Reminiscences of Scottish Life and Character*. It had first taken the form of a little book of fifty pages, entitled *Some Changes in Social Life and Habits*. This kindly humourist, who occupied a unique and delightful position in Edinburgh society, died 27th December 1872. In 1873 appeared *Memorials of Dean R.*, by Rogers; the 1874 edition of the *Reminiscences* (22 editions have appeared) contains an appreciative biography of the author by his old friend Cosmo Innes.

Ramsay, William, youngest son of Sir W. Ramsay of Bamff, was born in 1806, and educated at the universities of Edinburgh and Glasgow. He graduated B.A. at Trinity College, Cambridge, in 1831, and two years before this had begun to act as Professor of Mathematics in Glasgow. In 1831 he resigned the chair of Mathematics for that of Humanity. He contributed largely to Dr. Smith's *Classical Dictionaries*, and published *Selections from Ovid and Tibullus* (new ed. 1859), *Manual of Roman Antiquities* (4th ed. 1859), a fine annotated edition of *Cicero pro Cluentio*, since adopted by the Clarendon Press (1869), and *Manual of Latin Prosody* (1859). R. died 12th February, 1865. R. was a ripe scholar, and poured forth his learning with a certain diffuse eloquence that enraptured students. Tradition in Glasgow College still retains many of his humorous sayings and doings. He was succeeded in the chair of Humanity by his nephew, George R., who still (1878) holds it.

Ramsden, Jesse, an inventor and maker of scientific instruments, was born near Halifax, Yorkshire, in 1735, received a good education, and began the pursuit in which he became

famous, after being for several years a cloth-dresser. He married the daughter of Dolland (q. v.), and thus acquired an interest in the letters-patent for achromatic telescopes. For the chief observatories throughout Europe he constructed instruments which excited general wonder by their accuracy and the perfection of their object-glasses. He reduced the possible error of the sextant from 5' to 30" of a degree, and invented a dividing machine, which ensured greater certainty and rapidity. One of his many skilful productions was the theodolite used by General Roy. He died at Brighton, November 5, 1800, leaving great part of a moderate fortune to be divided among his workmen.

Ramsey, a seaport in the Isle of Man, 12 miles N.N.E. of Douglas, has a courthouse, grammar-school, and small harbour, with a lighthouse and breakwater. There is weekly steam communication with Liverpool and Whitehaven. Pop. (1871) 3934.

Ramsgate (from *Rium*, the British name for Thanet, and *gate*, 'a road or passage,' referring to the break in the chalk cliffs which here occurs), a seaport and watering-place of Kent, on the Margate branch of the South-Eastern Railway, 4 miles S. of Margate, and 75 miles S.E. of London. It is now a well-built and handsome town, commanding a fine view over the Downs, Pegwell Bay, and, in clear weather, the French coast. Its commercial importance began early in the 18th c. Its present harbour, 40 acres in extent, protected on the E. by a breakwater 3000 feet long, and on the W. by another half that length, serves as a harbour of refuge for the Downs. In 1877 452 vessels, with an aggregate tonnage of 46,252, entered and cleared. Pop. (1871) 14,640, which is very largely increased in the season, from the middle of summer to the end of autumn. In 1877 was opened the Granville Marina, a large sea-garden on the beach, including a dining-hall, promenade, concert-hall, theatre, and bazaar, and an hotel on the cliff above, surmounted by a tower 175 feet high. R. has some ropeworks, and a shipbuilding industry.

Ramshorns, in fortification, a sort of low, semicircular work invented by Belidor, sometimes erected in the ditch of a fortification to serve instead of Tenailles (q. v.).

Ramskin, or **Sifton Oake**, a cake in which the dough is baked up with skim-milk or grated Parmesan cheese. It is rolled out thin, glazed with white of egg, and after firing, is eaten hot.

Ram-Til, an Indian name for the Black Til (*Gnissotia oleifera*), a small herb belonging to the *Compositæ*. The plant is commonly cultivated in Mysore and the Deccan for the sweet-tasted oil obtained from the seed. Besides the home consumption, it forms an article of export to Europe.

Ramus, or **La Ramée**, **Pierre**, born in 1515 at Cuth, in Vermandois, came to Paris a peasant boy of twelve, and there for nine years was by day a servitor, a student only at night. After taking his master's degree (1536) he opened a course of lectures, the boldness and novelty of whose opinions caused their suppression, and would have brought their author to the galleys but for two powerful patrons, the Cardinals de Bourbon and Lorraine. Through them he was appointed president of the Collège de Presles (1545) and Professor of Eloquence and Philosophy in the Collège Royal (1551), still, however, incurring the frequent censures of the University. At length his adoption of the Reformed faith (1561), by redoubling the animosity of foes and breaking existing friendships, forced R. to fly from Paris, whether he returned only to fall in the massacre of St. Bartholomew, August 26, 1572. The paradox of R.'s M.A. thesis, 'That all in Aristotle is false,' forms the text of all his later teaching, wherein he combated the philosophy of the Middle Ages with no small success. Strangely enough it was itself founded on antiquity. 'I find,' he said, 'to my great wonderment that neither Cicero nor Virgil took any account in their writings of the laws of the *Organum*. This wonderment increased when, passing on to Plato, I read neither subtle rules nor methodical arguments. Socrates was content with sensible discussion; he would have us examine and bring reason rather than authority to the task. Why, then, he proceeds to ask, 'can we not Socratise a little?' And before that question the mists of Scholasticism lifted, clearing more and more as R. proceeded to publish his destructive *Aristotelia Animadversiones* (1543); *Rhetorica Distinctiones* (1549); *Pro Philosophica Disciplina* (1551), and *Dialectique* (1555), by which he opened up a path for the constructive genius of Bacon and Descartes. He was also one of the first to

recognise the Copernican system, and in his *Grammaire Française* (1562) advanced a 'neographic' method two centuries before the lexicographers, distinguishing *j* from *i* and *v* from *u*. See Waddington, *R., sa Vie, ses Écrits et ses Opinions* (Par. 1855), and Desmazes, *Pierre R., Professeur au Collège de France, sa Vie, ses Écrits, sa Mort* (Par. 1864).

Rana and **Ranidæ**. See FROG.

Rancé, **Armand-Jean le Bouthillier de**, born at Paris, January 9, 1626, received the tonsure in his tenth year, and in 1639 dedicated to his god-father, Cardinal Richelieu, a commentary on Anacreon. With such tastes and such a sponsor, little wonder that he led a gay, profligate life even after his assumption of the priesthood in 1651. The legend of his conversion is horrible, if apocryphal,—how, climbing one night through his mistress's window, he was confronted by her head lying John-Baptist-like in a charger, she having died in his absence, and the coffin proving too short to receive her. Certain at least it is that in 1663 R. suddenly resigned an enormous plurality of benefices, turned Trappist, and, himself a reformed man, proceeded to reform others by elaborating the present austere rule of his order (see TRAPPISTS). He died in the odour of sanctity at Soligny-la-Trappe, October 27, 1700, leaving behind him *Relations de la Vie de quelques Religieux de l'Abbaye de la Trappe* (4 vols. 1696), *Lettres de Piété* (2 vols. 1701-2), and other prolix but devout treatises. A collection of his letters was published by B. Gonod (Cler. 1846), and his *Life* has been written by De Tillemont (1712), D'Exauvillez (1842, new ed. 1868), Chateaubriand (1844), and Dubois (1866).

Rancho (Span. 'a messroom') is a word denoting in Mexico and California a rude hut used by herdsmen on the plains, and is opposed to *hacienda*, a farm. From it is derived the name *rancheros*, for the half-breed herdsmen of Mexico, a race of daring riders and huntsmen, among whom are recruited the strength of the Mexican army—its guerilla cavalry. *Ranche*, a corruption of R., is now applied in California to any large farm, but especially to those devoted to stock-raising.

Rancid'ity is the strong, penetrating, disagreeable odour acquired by oils and fats after some exposure to the air. See OILS.

Randazzo, a town of Sicily, province of Catania, in the Val Demone, 2536 feet above the sea, on the river Alcantara, 32 miles N.W. of Acireale, and 11 miles N. by W. of the crater of Etna. Its finest churches are S. Maria (Norman of the 13th c.), and S. Niccolo, of alternate courses of black and white stone. Pop. (1874), 7900.

Randers ('the town on the foreland'), a town of Denmark, in N. Jutland, on the Guden, 8 miles W. of its entrance into the Randersfjord, and 19 N.N.W. of Aarhus by rail. It is compactly built, and has one church, St. Mortens (14th c., restored 1870), a synagogue (1858), a hospital (1868), a 'Lærd Skole,' and four other schools. In 1874 there were in R. thirteen brandy distilleries, Brewing, cotton-weaving, and the manufacture of machinery, gloves, chicory, and tobacco are carried on, and there is considerable trade in agricultural products. Before the Reformation R. had six churches and four monasteries. Pop. (1870) 11,354.

Randolph, **Earl of Moray**, nephew of Robert the Bruce, first emerges in history on the eve of the battle of Bannockburn (1314), where he routed, with an inferior number of men, Clifford at the head of 800 horse, as he approached Stirling Castle from the east. In 1315, when the order of succession to the throne was adjusted, R. upon certain contingencies was appointed to be guardian of the kingdom. On the 20th September 1319, he fought a battle near Borough Bridge, in Yorkshire, known as the Chapter of Milton, owing to the number of English ecclesiastics who contended with the Scotch spearmen. And again in 1322 he assailed the English, and drove them S. to York. R. travelled to the Papal court at Avignon in 1324, where, says Burton, the rough Scots soldiers overreached the Pope in diplomatic subtlety, and wrung from him the promise that he would henceforth address Robert the Bruce by the title of king. In 1327 he conducted another raid into England, and on the death of King Robert became, under the Act for the settlement of the crown, the Regent. He died July 1332, and, writes Burton, left behind him 'a traditional reputation for even-handed justice and wonderful sagacity.' See Burton's *History of Scotland*, vol. ii.

Ran'dolph, John, of Roanoke, an American politician, born 2d June 1773, at Cawson, Virginia, was of an old and wealthy family, and is said to have been seventh in descent from the famous Pocahontas. He studied at Princeton, and at William and Mary College, but without much application, and afterwards read law at Philadelphia. In 1799 he was elected to Congress, though the celebrated orator, Patrick Henry, opposed his election. With one or two short interruptions he sat in Congress thirty years. He was an ardent republican and follower of Jefferson, yet opposed the war with England in 1812 and the Missouri compromise in 1820. His sarcastic eloquence always excited attention, but gained him few friends, and in 1826 he fought a duel with Henry Clay. In 1822 and again in 1824 he visited England, and in 1830 he was appointed Minister to Russia, but spent most of his time in London, and returned in 1831. His nervous eccentricities, which extended even to dress, attracted much attention in England. He died at Philadelphia, 24th June 1833, leaving a will by which he emancipated his slaves, and provided for their maintenance. This will afterwards gave rise to much litigation. See *Biography of J. R.*, by Sawyer (New York, 1844), *Life of J. R.*, by Garland (New York, 1850), and Powhatan Bouldin's *Home Reminiscences of J. R.* (Richm. 1878), a work which has all the charm of picturesque detail.

Ran'dolph, Thomas, an English poet, was born at Newnham, Northamptonshire, in 1605. Educated at Westminster School along with Mayne, he proceeded to Trinity College Cambridge, where he took the degree of M.A., and obtained a fellowship. Ben Jonson made a bosom friend of him. He wrote several lively dramas entitled *Aristippus*, *The Muse's Looking-Glass* (1630), *The Conceited Pedlar*, *The Jealous Lovers* (1632), *Amyntas* (1638), and *Hey for Honesty*. Several of the songs scattered through these works—as much masques as set plays—are spirited and graceful. R. led a life of dissipation, and died 17th March 1635. His *Dramatic Works* were edited by W. C. Hazlitt in 1875.

Raneegunge (Raniganj, 'Queen's market'), a town in the district of Burdwan, Bengal, British India, on the left bank of the Dahmudah River, 120 miles N.W. of Calcutta by rail. Pop. (1872) 19,578. It is celebrated as the spot where coal and iron have been first profitably worked in India. The R. coalfield has an area of 500 sq. miles; the seams are numerous, and those that are now worked vary in thickness from $4\frac{1}{2}$ to 35 feet. Coal was worked here as early as 1777. In 1872 there were 44 collieries, with a total output of 322,443 tons, most of which was sent to Calcutta or used on the railway. The largest concerns are at Chowkidanga, R. itself, Searsol, and Jemery. Iron ore is found abundantly in clay beds and magnetic deposits. A large European company, established in 1875, has achieved some success in setting up blast furnaces on the European model. In 1876-77 the registered exports of coal to Calcutta were 254,000 tons, valued at £356,000. The imports by rail included £135,000 of salt, and £113,000 of piece-goods.

Range, in gunnery, is the distance from the gun at which the projectile strikes the earth. This distance depends upon the angle of projection, the initial velocity of the projectile, and the resistance offered by the air to its flight. Were there no resistance, the trajectory would be a parabola, and the maximum R. for a given initial velocity would be obtained when the angle of projection was 45°. The resistance of the air, however, completely alters the form of the trajectory; and for high initial velocities, the angle of projection for maximum R. is about 32°. Elongated projectiles travel much further than round shot; and as great a R. as 6½ miles has been covered by a 250-lb. projectile fired from a Whitworth gun at an angle of 33°.

Bangoon ('the city of victory'), the capital of British Burmah, and the chief town of the district of the same name, lies on the left bank of one of the twelve mouths of the Irrawaddy, known as the R. River, about 25 miles above the sea, and 62 miles S. of the ancient capital of Pegu. Pop. (1876) 108,000. It was originally built in 1753 by Alompra, the founder of the Burmese monarchy. In 1824 it was occupied by the British during the First Burmese War, and again in 1852 it was captured by storm in the Second War, the result of which was the annexation of the province of Pegu. It contains few important buildings beyond the administrative and commercial offices. It is,

however, celebrated for the great Shoay-dagon pagoda, situated on an eminence 800 feet square, which formed a strong citadel during the last siege, and which has lately been strongly fortified. The superstructure of this building cannot be very ancient; but in massiveness and ornamentation it is unsurpassed, as also for sanctity, as it contains relics of the great Buddha Gautama and his three immediate predecessors. It was regilded in 1870 at a cost of £60,000, and a new Htee or top, presented by the King of Burmah, costing £65,000, was placed on it. Other conspicuous buildings are the barracks for European troops, and the central jail, in which are usually confined some state prisoners from India. The municipality was organised in 1874, being half composed of non-official members. In the first year, the municipal income was £43,000, and a large amount was expended on sanitation, &c. R. is in weekly communication with Calcutta by the British Indian line of steamers, and is by far the most important port in the province. In 1874-75, including coasting trade, the total exports were valued at £3,826,000, chiefly rice and timber; the imports at £3,959,000, comprising betel nuts, salt, piece-goods, cotton twist, crockery, raw silk, wines, and liqueurs; 838 vessels entered the port, with a total tonnage of 565,000. The exports of rice, which showed a great decrease on the previous year, were 389,900 tons, valued at £1,769,000, more than half of the total from all Burmah. In the same year there passed through the custom-house goods valued at £600,000, going up the river to Independent Burmah, on which a duty of only 1 per cent. is levied. The manufactures are chiefly confined to mills worked by steam for the husking of rice. R. is already the third city in commercial importance in the Indian Empire, and lying as it does at the mouth of the Irrawaddy, navigable for at least 1200 miles, it will undoubtedly become in time a great city. It has been laid out with this view, and the spacious site between the R. and Pegu Rivers, with the Poosondong River flowing through it, will hold a vast population.—The district of R., which lies E. of the Irrawaddy River, has an area of 9800 sq. miles; pop. (1872) 431,069. Almost the entire cultivated area, 1100 sq. miles, is under rice. A railway has recently been constructed up the river to Prome, a distance of 150 miles. See General Fytche's *Burma, Past and Present* (Lond. 1878).

Rank, the relative position in which officers and men stand in the army and navy. *Army R.* is the position held by an officer in the army by brevet or through his status in his regiment, and his seniority in that R. is determined by the date of his commission. If the commissions of two officers bear the same date, their relative seniority remains as it stood before their promotion in the R. below. *Brevet R.* is a superior R. in the army to that attained by an officer in his regiment, and is given for long service, or as a reward for gallant conduct. In his regiment an officer ranks according to his regimental title, but stands among other officers in the army according to his brevet R. Officers in the Grenadier, Coldstream, and Scots Guards hold higher R. in the army than the nominal R. in their regiments. *Local R.* is a higher R. assigned, within particular limits, to officers serving abroad, in order that they may take proper position among officers of other troops, or that they may be enabled to perform more important duties. *Honorary R.* is such R. as is given (usually a step in advance) to officers retiring on full pay, but it is not accompanied by increased pay. *Substantive or permanent R.* is R. where the pay of the officer corresponds to it, and up to the post of captain is the only R. which obtains in the army. Among non-commissioned officers and men the positions of regimental corporal-major, regimental sergeant-major, quartermaster corporal-major, regimental quartermaster-sergeant, sergeant, corporal, bombardier, second corporal, and private, are ranks; all other positions being appointments. In the navy there is only one kind of R. for all officers. For the relative R. of army and navy officers, see RELATIVE RANK. See also PROMOTION.

Rank and File. All soldiers bearing arms, from corporals downwards, are designated as the R. and F. of the army. A line of soldiers standing side by side is called a *rank*; a line where the men stand behind one another is called a *file*. The term R. and F. is thus meant to include the entire mass of a body of troops.

Bank'e, Leopold von, born at Wiehe in Thüringen, December 21, 1795, was educated at Donndorf and Schulpforta,

next studied at Leipzig, and in 1818 became head-master of the gymnasium at Frankfurt-am-Oder. Two works both published in 1824, *Geschichte der Romanischen und Germanischen Völker von 1494-1534* and *Zur Kritik neuerer Geschichtschreiber*, at once proclaimed their author's ability, and gained him a chair of History at Berlin. Here R. soon signalised himself as an author, lecturer, and founder of an historical school. In 1827, shortly after the appearance of his *Fürsten und Völker von Südeuropa im 16. und 17. Jahrhundert* (4th ed. 1857), he undertook, at the cost of the Prussian Government, a journey to consult the Austrian and Italian archives. Those of Venice proved especially valuable, and on them he drew largely for the materials of his *Serbische Revolution* (1829; Eng. trans. 1853), *Die Verschwörung gegen Venedig im Jahre 1688* (1831), and *Vorlesungen zur Geschichte der Italienischen Poesie* (1837). Important as these works are, they were eclipsed by *Die Römischen Päpste, ihre Kirche, und ihr Staat* (3 vols. 1834-37; 5th ed. 1866-67; Eng. trans. by Kelly, 3 vols. 1843, and E. Foster, 1847), and *Die Deutsche Geschichte im Zeitalter der Reformation* (6 vols. 1839-47; 4th ed. 1867; Eng. trans. by Sarah Austin, 3 vols. 1845-47). Appointed historiographer of the Prussian kingdom in 1841, R. now produced *Neun Bücher Preussischer Geschichte* (3 vols. 1847-48; Eng. trans. by Sir A. Duff Gordon, 1849), which, with its freedom from national bias and vainglory, was coldly received. In France, however, his *Französische Geschichte, vornnehmlich im 16. und 17. Jahrhundert* (5 vols. 1852-61; 2d ed. 1857-62) is a standard authority, whilst his *Englische Geschichte, vornnehmlich im 17. Jahrhundert* (6 vols. 1859-67; 4th ed. 1877; Eng. trans. Oxf. Clar. Press, 1875) is allowed by common consent to clear up much that Hallam and Macaulay left obscure. Amongst R.'s minor, though only relatively minor works, may be reckoned his *Geschichte Wallensteins* (1869), *Die Deutschen Mächte und der Fürstenbund* (2 vols. 1871-72), *Genesis des Preussischen Staates* (1873), *Ursprung und Beginn der Revolutionskriege 1791 bis 1792* (1875), *Friedrich der Grosse, Friedrich Wilhelm IV., zwei Biographien* (1877), and *Denkwürdigkeiten des Staatskanzlers Fürsten von Hardenberg* (4 vols. 1877). Since 1867 he has been bringing out a complete edition of his works, of which 39 volumes have at present appeared. No historian has grasped European politics so widely and so firmly as R. In the internal working of foreign constitutions he is necessarily sometimes at fault, confounding, for instance, an impeachment with a bill of attainder; but such occasional slips are far outweighed by his masterly survey, based on contemporary documents, of England's connection with the Continent under the Stuart dynasty. His style is characterised by its intense seriousness, history being to him neither romance nor epic, and by an objectivity rarely met with amongst his countrymen.—His brother, **Karl Ferdinand R.**, born at Wiehe, May 26, 1802, was successively director of the gymnasiums of Quedlinburg (1831), Göttingen (1837), and Berlin (1842), and died in the last-named city, March 29, 1876. He was author of a *Chrestomathie aus Lateinischen Dichtern* (5th ed. 1873), *Lives of Aristophanes* (2d ed. 1845) and *Sophocles* (1876), *Rückerinnerungen an Schulpforta* (1874), &c.

Ranking and Sale is a complete and comprehensive process of Scotch law, by which the *heritable*, or real, property of an insolvent person is judicially sold, and the price divided amongst his creditors according to their several rights and preferences.

Rankness is a certain condition assumed by plants arising from excessive richness of soil, or too free an application of manure. Grasses become coarse and unpalatable; shrubs and fruit trees produce luxuriant shoots with a minimum of fruit-bearing wood, and it becomes necessary to check this unprofitable overgrowth by pruning. In all cases the tendency of R. is to diminish the fruit yield of the plant, and to produce an abundance of roots and suckers. Some plants, however, have naturally such a surpluse of luxuriance that for practical service it has to be modified—thus the pear is frequently grafted upon the stock of the quince to accomplish this. See PRUNING.

Rannoch, Loch, a Scottish lake in the N.W. of Perthshire, and to the N.E. of the wild, wide moor of the same name. It is 11 miles long and nowhere more than 2 broad, receives the Gauer water from Loch Lydoch, and the Erich from the loch of that name, and sends forth the Tummel to join the Tay 3 miles above Pitlochry. It is girt by mountains, partly covered with birch woods, and its waters abound with trout and char.

Ran'ula is the term applied to an encysted tumour, very analogous to a ganglion, found in the floor of the mouth and raising up the tongue. R. resembles the body of a frog, hence its name. It may be caused by the obstruction of one of the large salivary ducts by a calculus, by the expansion of one of the processes of a salivary gland, or by the formation of a cyst in the cellular tissue. R. may be cured by making a free incision into it, pressing all the fluid out, and keeping the wound open till the cavity has filled up; or a portion of the cyst may be snipped out with the scissors, or a seton may be passed through it.

Ranuncula'ceæ is a natural order of thalamifloral dicotyledons—forming the opening order in works arranged according to the system of De Candolle—and consists of about 500 species of annual or perennial herbs, or rarely shrubs, found abundantly in temperate and cold regions of the world. It is founded upon the common crowfoot or buttercup, but embraces plants of very different structure within its limits. Its essential characters are indefinite stamens, anthers attached by their base and opening by slits, and albuminous seeds. The properties are acrid and poisonous—sometimes vehemently so, as in aconite and hellebore. Some of its constituents are beautiful with gay flowers, as the peony, ranunculus, larkspur, and columbine, while many are mere weeds. In larkspur and aconite the general resemblance to the regular portion of the order is much obscured, from the striking variation and irregularity in the calyx and corolla.

Ranunc'ulus (from Lat. *rana*, 'a frog') is the type genus of *Ranunculaceæ*, consisting of about 160 species of herbs found in all temperate regions. The



Ranunculus Lingua.

yellow or white flowers are usually panicled; the sepals 3 to 5, caducous, imbricate in bud; the petals usually 5, glandular at the base; the stamens many; the carpels numerous, with a short style, and an ascending single ovule; the fruit a head or spike of apiculate or beaked achenes. The three species commonly known as buttercups (*R. acris*, *R. repens*, and *R. bulbosus*) are familiar representatives of the genus, and the goldilocks of woods and copses (*R. auricomus*), the lesser spearwort of wet places (*R. Flammula*), and the spring-flowering pilewort or lesser celandine (*R. Ficaria*) of damp, shady situations, are all common plants. The greater spearwort (*R. Lingua*) with handsome deep-yellow flowers as big as a crown-piece, is more local, whilst the celery-leaved R. (*R. sceleratus*) is common in watery places, but has inconspicuous flowers; it is very acrid. *R. arvensis*, with achenes beset with hooked prickles, is a noxious cornfield weed. A section of the genus called *Batrachium* embraces a very variable and puzzling series of aquatics, common in ditches, ponds, and streams. They usually bear white flowers, and produce two kinds of leaves, those upon the surface being more or less circular, whilst the submerged are cut into numerous capillary or linear segments. Among cultivated species *R. Asiaticus* affords the endless varieties of the R. grown by florists—varying both in doubleness and colour; and *R. aconitifolius* is the 'white bachelor's buttons' of gardens, a double variety of *R. acris* forming the yellow. None of the species have any noteworthy economic properties or uses.

Rans des Vaches, the name given to the simple melodies played by the herdsmen of the Swiss Alps on the Kuh-horn (q. v.) when driving the cattle to and from their pasture grounds. They have been collected and published along with other popular Swiss melodies in the *Sammlung von Schweizer Kuhreigen und Volkslieder* (Bern, 1818), and in the *Allgemeine Schweizer Liederbuch* (1851).

Rapall'o (formerly called Tigulia), a seaport of N. Italy, in the province of Genoa, 19½ miles E. by S. of that city by rail. In the vicinity is the pilgrimage church of the Madonna di Mont-

allegro. R. has an active coral fishery, and considerable trade in olive-oil, besides manufactures of soap and wax. Pop. (1874) 5352.

Rape (from Lat. *rapio*, 'I seize') is the crime of having carnal intercourse with a woman by force, and against her will. Penal servitude for life, or minor punishment, may be awarded to the offender, according to circumstances. The injured woman is an admissible witness to prove the crime; but the value of her evidence is a question for the jury, depending on such questions as—Is she of good character? Did she immediately tell of her injury to some one, and cause search to be made for the offender? It is an essential feature of the crime that it be against the will of the sufferer, so that if she be cheated into consent the crime is not committed; but the guilt is not extenuated by showing that the woman yielded to threat of murder, or of even minor violence. All aiding or abetting in this crime are equally guilty with the chief perpetrator. See ABDUCTION.

Rape or Cole Seed, is the *Brassica Napus* of Linnæus, one of the factors of the puzzling series that Dr. Boswell combines under the significant name of *B. polymorpha*. It is either annual (*B. præcox* of some writers) or biennial, and is distinguished from its allies *B. Rapa* and *B. campestris* (the source of the turnip group) by its fusiform root, its leaves all being glabrous and glaucous, and its corymb lengthening before the fall of the deciduous petals. The plant has a wide distribution through Europe and temperate and sub-tropical Asia, appearing also in a quasi-spontaneous condition in Britain; but it is impossible to distinguish in what countries it is truly wild, and where it is merely an escape from or remnant of cultivation. The two principal reasons for which it is grown are for the feeding of sheep upon the stalks and leaves, and for the extraction of oil from its seeds. For these purposes it is largely cultivated in Europe, and for a long period has been grown in the eastern and southern counties of England. The plant delights in a rich alluvial soil, and is one of the few suitable for newly reclaimed bog and fen land. Great crops have been produced in the fens of Lincolnshire and the alluvial flats of Essex. R. speedily, however, exhausts the soil, and some leases prohibit its cultivation, except to be eaten green by sheep. The collection of the seed is somewhat precarious, as the lower pods are ready to burst before those at the top are full. If the season is wet at harvest, much of the seed is lost, and without great attention some loss is sustained in the most favourable seasons. The plant should be cut when the dew is on it, and removed as little as possible; indeed, if the weather permits, it is advisable to thresh out the seed on a cloth in the field. The seed is subsequently spread out on the floor of a granary that it may not heat, and is turned frequently over until it is ready to go to the crushers, who express the oil. The residue after pressure forms R.-cake, sometimes used as a cattle food, but generally ground up and used as a manure.

Raph'ael, Sanzio da Urbino, among painters 'the divine,' and the 'Phœbean singer' of the Renaissance, was born at Urbino, 28th March 1483. Descended of a family which had produced several artists and ecclesiastics, his father, Giovanni Sanzio or de Santi, himself an artist standing high in the second rank of the Umbrian school, instructed the young R. in the rudiments of art. On his father's death in 1494 R. entered the school of Pietro Perugino at Perugia, where he remained till about his twentieth year. Of the works painted by him before 1495 nothing is known with certainty, and he now acquired Perugino's manner so perfectly that the works of this period are only distinguished from that master's by their great freedom, elaboration, and delicacy. R. spent the summer of 1502 in Siena, where, to assist Pinturicchio in adorning the cathedral library, he made some designs, two of which are still preserved, one at Florence, the other at Perugia. Not later than 1503 were painted the exquisite little 'Madonna between S. Jerome and S. Francis,' now in the Berlin Museum, the beautiful 'Staffa Madonna,' which remained in the Staffa Palace, Perugia, till it was sold for £14,000 to the Czar in 1871, and the allegorical 'Knight's Dream,' now in the National Gallery, besides several other easel pictures. The 'Sposalizio,' or 'Espousal of the Virgin' (1504), is the most celebrated example of R.'s first or Peruginian style. It preserves the simplicity and tenderness, with not a little of the constraint, of the Umbrian school, while the figures are invested with a new dignity, and the features are lit with a subtler, sweeter intelligence. R. proceeded in October 1504 to Florence, then

the glorious centre of the Cinquecento revival, and the art treasure-house of N. Italy. In the City of the Lilies, a knowledge of the grander methods and heroic aspirations of Florentine art burst upon the disciple of quietism, and severed the bonds of Umbrian conventionality. R. now studied the nature-breathing frescoes of Masaccio in the Brancacci Chapel, and drank inspiration from the precious antiques garnered by Lorenzo de Medici in the gardens of San Marco. The cartoons of Leonardo and Michael Angelo filled his mind with nobler ideas of form and composition, while to the devout Fra Bartolommeo, himself educated by the influence of Leonardo, he owed more, perhaps, than to any other teacher. Among the most interesting works of this period are the Uffizi portrait of himself, in which he shows a pale, eloquent face, with brown hair and eyes; the charming 'Three Graces,' his first classical theme; 'La Belle Jardinière' (said by Clement to be so called because the model was a fair flower-girl), in whom are so exquisitely blended divine beauty and human feeling; and the majestic 'Entombment of Christ,' the chief ornament of the Borghese Palace. These works indicate a rapid transition from the still, statuesque expression and stately mysticism of the Umbrian style to the dramatic movement, vivid realism, and glowing colour which found their consummate utterance in the *Stanze* and *Galatea*. In the complete second or Florentine style the Madonna is no longer a pallid, nun-like abstraction, but a noble type of human beauty, who seems 'to look on Jesus as her beloved child rather than as her divine Lord.' Without losing his earlier purity and elevation, R. has now gained in vitality and force of treatment something of the intense power of Angelo, and in varied choice of theme and plenitude of resource not a little of Leonardo's versatility. At the age of twenty-five, and when Leonardo was fifty and Angelo thirty-three, R. went by invitation to the court of Pope Julius II., where he was commissioned to fresco the Vatican hall of judicial assembly called 'La Segnatura,' one of the four halls of *Le Stanze* which had already been decorated by Perugino, Francesca, and others. On the walls of this room he painted with his own hand (1508-11) a pictorial epic in four magnificent allegories—Theology, Philosophy, Jurisprudence, and Poetry. These mark the highest reach of the master's art in solemn grandeur of conception, calm realisation of the loftiest ideal by perfect harmony in grouping, colouring, and draping, and above all in the bold and successful translation of 'the golden treasure of the Christian spirit into the silver vessel of antiquity.' Delighted with the transformation of *La Segnatura*, the Pope ordered that the frescoes in the other rooms of *Le Stanze* should make way for fresh creations of the new favourite. But R. subsequently preserved an entire vault by Perugino, and several small works of Sodorina. Meantime the Sistine frescoes of Angelo were publicly unveiled (1512), and of these R. made a careful study. The Madonnas of the Roman period are stronger and grander than those painted at Florence, and this is ascribed by Lanzi and Mengs mainly to an earnest study of the newly-discovered antiques. The second hall of the Vatican was decorated (1512-14) with 'The Miraculous Expulsion of Heliodorus from the Temple,' 'The Miracle of Bolsena,' 'Attila Repulsed from Rome,' and 'The Deliverance of St. Peter.' These works indicate perhaps his nearest approach as a colourist to the Venetian school, while they show an increase of freedom and flexibility, of dramatic power, and of skill in handling large masses of light and shade, and at the same time a tendency to that coarseness of execution which becomes more visible in the later frescoes. The frescoes in the third of the *Stanze*, including 'The Fire in the Borgo,' 'The Oath of Leo III.,' 'The Coronation of Karl the Great,' and 'The Victory of Leo IV. over the Saracens at Ostia,' were painted partly by his pupils (1514-17) and from his designs. They are dedicated to the glory of the Papal power. Those in the Sala di Constantino, representing scenes from the life of Constantine the Great, were executed from his drawings (1519-24), under the direction of Giulio Romano. The frescoes of the Loggia (galleries) in the Vatican were designed by R. (1514-16), and comprise the series of exquisitely simple compositions, upwards of fifty in number, known as 'R.'s Bible.' For Leo X., R. designed (1515-16) the famous cartoons for the ten tapestries, worked at Arras, and still preserved in the Vatican. The seven cartoons, now after many vicissitudes safe in South Kensington Museum, have been frequently engraved, and are preferred by some judges to any other of R.'s works. The subjects are drawn from the Acts of the Apostles, and the splendid series

is called by Quatremère de Quincy 'the climax not only of the productions of R., but of all those of modern genius in painting.' R. had already executed the 'Sibyls' for Santa Maria della Pace, which for serenity and grace far outvie the sublime 'Sibyls' of Angelo, and the incomparable 'Triumph of Galatea' in the Chigi Palace. In rapid succession followed the 'Birth of Venus,' 'Madonna della Sedia,' 'Christ Bearing the Cross' ('Lo Spasimo'), 'The Visitation,' 'The Archangel Michael,' 'The Large Holy Family of the Louvre,' the portraits of Leo X. and Joanna of Arragon, 'The Violin-Player,' 'The Sistine Madonna' (Dresden), and 'The Transfiguration.' Symonds calls the Sistine Madonna the 'sublimest lyric of the art of Catholicity.' According to Passavant, together with the 'Transfiguration,' it has 'excited the most constant admiration and the warmest veneration throughout all Christendom.' These were the last works of the master, who, having caught malarial fever, died on Good Friday, April 6, 1520. Short as was his career, the vast mass of his work is not less striking than its variety. His easel-pictures crowd the galleries and palaces of Europe, and yet he produced innumerable designs never used for painting, was himself a sculptor, engraver, and sonneteer, and still found time, from 1514, to superintend the building of St. Peter's, and to form an elaborate plan for the excavation of Rome. Gifted with an industry equal to his fertility, in the wide range of his labour there is everywhere visible a perfect serene equipoise between the faculty of the artist and the artistic purpose. 'There is nothing overmuch in any portion of his work, no sense of effort, no straining of a situation, not even that element of terror needful to the true sublime.' Viewing the world through a pure atmosphere of joy and beauty, R. threw a tinge of loveliness even over tragedy and death, while he shrank from a realistic treatment of what was stern or shocking. His dictum that 'we must not represent things as they be, but as they should be,' has been spurned by modern pre-Raphaelites, and Ruskin says that on the walls of the Segnatura the artist 'wrote the *Meme Tekel U'pharsin* of the art of Christianity.' But this Hellenic tendency to glorify flesh and feeling, to scout ugliness and obscenity, and to dower youth with beauty and old age with dignity, is that which makes R. peculiarly the singer of the Renaissance. Lanzi likens the rivalry of R. and Angelo to that between Zeuxis and Parrhasius in its stimulating both to their highest efforts. R. in his later years lived like a prince, owned a palace in Rome and a villa beyond the walls, and was surrounded by a retinue of disciples. He left property to the value of sixteen thousand ducats, and bequeathed his painting materials to his favourite pupils, Giulio Romano and Gianfrancesco Penni. See the biographies of R. by Vasari, Quatremère de Quincy, Von Wolzogen, Charles Blanc, Charles Clement, C. P. Landor, and especially that by Passavant (Paul Lacroix's ed. Par. 1860); the art-histories of Lanzi, Kugler, Layard, Jameson, Crowe and Cavalcaselle, Rosini, and Symonds; also Gruyer's voluminous works on the Madonnas, and Herr Ruland's exhaustive catalogue of the works (Lond. 1877).

Rapha'nia, or **Er'gotism**. See ERGOT.

Raph'ides (Gr. *raphis*, 'a needle'), are acicular crystals of calcium oxalate found disposed in bundles in the cells of plants. They abound in some genera, such as the Cacti, and many of the Lily family, and in the medicinal 'Turkey rhubarb' their presence imparts the peculiar grittiness, 100 grains of the root containing 30 or 40 grains of the crystals. In the duck-weeds their presence or absence furnishes a specific character. R. vary in size, from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch in length. In some plants, as geranium and pelargonium, in which they are abundant, they have a radiating arrangement.



Rapier Hilt.

Rap'idan. See RAPPANNOCK.

Ra'pier (Ger. *rappier*, 'a foil,' Fr. *rapière*), a sword having a straight, thin, narrow blade, generally four-sided, designedly for thrusting only. From Italy the R. was carried into France and Spain, and in the 16th c. it was introduced into England. It was customary for all gentlemen to wear one.

Gallants rivalled each other in the length of their rapiers, till Elizabeth proclaimed that no blade should exceed a yard in length. Toledo, Seville, and Solingen were the most celebrated seats of the manufacture of R. blades. The R. has a cup-guard, frequently richly ornate, a straight handle, and curved or straight *quillons*. The R. was formerly the universal weapon used in duelling and fencing.

Rapin, de Thoyras, Paul, a French historian, was born 25th March 1661, at Castres in Languedoc, studied at the Protestant Academy of Saumur, became an advocate in 1679, preferred a military life, but was kept from it by his father's advice, and in consequence devoted himself to music, mathematics, and ancient literature. In 1686 he crossed to England, from whence he passed to Holland to join a company of cadets at Utrecht, recrossing in 1689 in the train of William of Orange, whom he served in Ireland, receiving a severe wound at the siege of Limerick. By 1693 he had become a captain, and was appointed travelling tutor to the son of the Earl of Portland. In 1699 he married, and in 1707 retired to Wesel, where he devoted himself with untiring zeal to the production of his *Histoire d'Angleterre*, published at the Hague (8 vols. 1724; Eng. trans. by Tindal, 15 vols. 1725-31; 2d ed. 1733). It traverses the ground from the Roman invasion to the death of Charles I., and has a fine enthusiasm for political liberty, besides being lucid and orderly in its narrative and rich in matter. R. had previously written a curious *Dissertation sur les Whigs et les Tories*. He died at Wesel, 16th May 1725.

Rapp, Jean, Comte, born at Kolmar, April 27, 1773, was destined by his father for the Church, but (1788) entered the army, and having distinguished himself under the eye of General Desaix at the battle of Szeiskam, was appointed his aide-de-camp. After the battle of Marengo he acted in the same capacity to Napoleon, who made him a general of division (1805) on witnessing his conduct at Austerlitz. His behaviour in Prussia and Poland gained him the surname of 'the intrepid.' For his services at the battle of Lobau (August 1809) he was made a Count of the Empire. He played a brilliant and glorious part in the Russian expedition, in which he was wounded for the twenty-second time, and specially signalised himself by his heroic defence of Danzig against the Russians. Forced to capitulate, he was sent to Russia as a prisoner, and only released on the return of the Bourbons in 1814. During 'the Hundred Days' he joined Napoleon and got command of the army of the Rhine, and was created a peer of France. Until 1817 he lived in Switzerland, but being pardoned his allegiance to his old master, he entered Louis's service as king's chamberlain, and died at Paris, 8th November 1821. His *Mémoires* (from family papers) were published in 1823. In 1853 a bronze statue was erected to his memory in his native town. See De Courcelles, *Histoire des Généraux Français*.

Rappahann'ock, a river of Virginia, U.S., rises in the Blue Ridge of the Alleghanies, and after a S.E. course of 250 miles, generally parallel to that of the Potomac, reaches Chesapeake Bay through a broad estuary 70 miles long. The largest affluent is the Rapidan, which joins it 10 miles above Fredericksburg. At the rapids here a fine dam has been made, giving great water-power. Below this point it is a noble tidal stream with important shipping, and for 35 miles above it has been made navigable by artificial means.

Rappee, a moist coarse variety of snuff, which is said to derive its name from the French *rape*, 'a grater,' the instrument originally employed in its preparation.

Rapto'res, an order of birds, sometimes known by the name *Accipitres* (q. v.), and which includes the familiar 'birds of prey,' such as the eagles, hawks, falcons, vultures, owls, &c. They are *monogamous*, and the females are, as a rule, larger than the males. The order has been arbitrarily divided into the *Diurnal* and *Nocturnal* R.

Ras (Heb. *rosh*), an Arabic word meaning 'headland,' and of frequent occurrence in the names of capes on the coasts of Arabia and N. Africa. Its resemblance to the Gaelic *ross*, which has the same signification, is probably accidental.

Rash'es, or **Exanthemata**. See EXANTHEMATA.

Rash'i, one of the ablest and most famous of the Rabbis, was born at Troyes in France in 1040. His family name was Ishak,

and from the initials of his full title, Rabbi Shelomo Ishak, was formed the name R. His father was a learned Talmudist, and in the Talmud 'R. was nourished, lived, and moved.' Marrying according to its prescriptions at the age of eighteen, he yet left his home to pursue his studies in the great rabbinical schools of Mainz, Worms, and Speier, undergoing the severest privations, and never seeing his wife except at festival times. In 1064, already a renowned master in the Talmud, he settled permanently at Troyes, where he became the Rabbi of the community, receiving of course no pay for this, and presenting to his contemporaries, till his death in 1105, the perfect example of a Rabbi, of which all Jewish posterity, too, has regarded him as the stainless ideal, expressing its admiration in extravagant legends. His great work was a commentary on a great part of the Talmud, which Grätz considers a model. It is simple, luminous, acute, independent, and many-sided. The language, which is the Talmudic idiom, is at once laconic and perspicuous; indeed, R. is an artist as well as a commentator. With justice, he and his contemporary, Isaac al Alfaszi, are regarded as the men who first gave elevation and depth to Talmudic study. Nor is he less original and intelligent in his exposition of most of the books of Scripture. He would know nothing of a mystical explanation or method, and his commentary has been with the Jews the most popular of all such works. See Grätz, *Geschichte der Juden*.

Rask, Rasmus Christian, a great Danish philologist, was born 22d November 1787 at Brændekilde, near Odense in Fyen. In 1807 he left Odense School for Copenhagen University, where in 1818 he became a titular, and in 1825 an extraordinary professor of the history of literature, in 1829 was appointed librarian, and in 1831 extraordinary professor of Oriental languages. After accompanying Nyerup to Sweden and Norway (1812), he went to Iceland (1813-15), and in 1816 began a linguistic tour, at the expense of the Danish Government, through Sweden, Finland, Russia, Persia, and India, from which he returned to Copenhagen in 1823, bringing two collections, the one of Zend and Pehlevi MSS. for the University library, the other of Pali and Singhaleze MSS. on palm-leaves for the Royal library. R. died of consumption, 14th November 1832. His chief works are *Veiledning til det Islandske* (Copen. 1811), *Biörn Haldorsons islandsk Lexicon* (ib. 1814), *Angelsaxisk Sproglaere* (ib. 1817), *Det islandske Sprogs Oprindelse, Anvisning til Isländskan, Snorra Edda, and Edda Sæmundar* (ib. 1818), *Synishorn* (ib. 1819), *Singalesisk Skrifflære* (Colombo, 1821). After his return from India he published Spanish (1824), Frisian (1825), Danish (1826), and Italian (1827) Grammars; a *Grammar of the Danish Language for Englishmen* (1830); *Locmani Fabulæ* (1831); and in 1832 Grammars of old Norse, Lappish, and English, and *Nonnulla de pleno systemate Sibilantium in linguis montanis*. After R.'s death his brother brought out his *Samlade Afsendinger*, with a life by N. M. Petersen (3 vols. 1834-38). A prodigious memory, joined to great acuteness and accuracy of mind, constantly employed in the severest study, enabled R. to rise to a place in the first rank of the philologists of his century. At his death he was acquainted with 55 different languages. He was the first to reduce philology to a system, and the classification of languages which he already attempted in 1819 is essentially that accepted at the present day.

Raskol'niki (Russ. 'separatists,' from *raskól*, 'schism'—*ras*, 'asunder,' and *kólot*, 'to split'), the Nonconformists of Russia, the descendants of the conservative dissenters who parted from the official 'Orthodox' Church in the 17th c. On the introduction of printing, the patriarch Nikon thought it necessary (1654) to choose the best texts of the Liturgy, Psalter, and other religious books, but large sections of the people, believing these 'Nikonian novelties' to be heretical, refused to give up their old Icons and missals, or correct the irregularities of their ceremonial. Persecution (1666) only confirmed their zeal. Thousands fled to neighbouring countries, or to retreats in the northern forests. Peter the Great was to them no other than Antichrist, for had he not eaten and drunk with heretics, and worn their dress, and 'numbered the people;' introduced passports bearing 'the seal of Antichrist,' disfigured 'the image of God' by shaving, and 'destroyed the years of our Lord' by transferring New Year's Day from September to January? After quelling all armed opposition, Peter had recourse to clemency, and issued ukazes (1714) tolerating the R., provided they paid a double poll-tax.

Catherine II. abolished their disabilities (1762), and thenceforth the R. have been generally tolerated, on the condition of paying a certain tax to the parish clergy of the established Church, and to the police. The two main sections of the R. are the *Stára-abridtsi*, or 'Old Ritualists,' and the *Bespopostsi*, or 'People without Priests' (*bez popóv*), and include (according to Mackenzie Wallace) 7,000,000 people. The latest official census (1871) admits only 1,093,452 R. The Old Ritualists, believing that priests could only be consecrated by bishops, were thus till 1844, when Ambrose, the deposed Metropolitan of Servia, was permitted by Austria to found a bishopric at Bělava Krynizza, in Gallicia, forced to accept priests who had seceded from the 'Orthodox' Church. The Priestless People included the Pomórsi ('dwellers near the coast') and the Theodosians (followers of a sectary Theodosi), and at first believed in celibacy; but a numerous 'orphan' class having arisen among them, they instituted a form of marriage, which the civil power did not recognise till October 1874. The other nonconformists are either *Philippins* (q. v.) *Stránniki* ('Wanderers'), or *Beguny* ('Fugitives')—who call themselves *Christóviye Lyúdi* ('Christ's People')—or belong to minor denominations (*tsétki*) differing on minor tenets. The dissenters of Russia are about 10,000,000 in all, or one-eighth of the population of the empire, and include in their ranks the third and wealthiest part of the merchant class, the majority of the Don Cossacks, and all the Cossacks of the Ural. See Niiski, *Semánaya zhizn v russkoni Raskóli* (St. Peters. 1869); *Select Sermons* by Philaret, late Metropolitan of Moscow (Lond. 1870); *Subbótin, Istoria Békroinitskoi Ierarkhii* (Moscow 1874); Mackenzie Wallace's *Russia* (vol. ii. Lond. 1877).

Raso'res. See GALLINACEOUS BIRDS.

Rasp, a species of file having distinct abrading prominences formed by indentations of a pointed punch, instead of with a chisel, as is the case with a file. The R. is almost exclusively used for operating on wood, bone, and the softer metals.

Raspail, François-Vincent, chemist and politician, was born at Carpentras, January 29, 1794, where he received his education from a priest. He was sent to Avignon to complete his education, and in 1811-12 he delivered lectures on theology and philosophy, but declined to enter the Church. In 1816 he went to Paris, took various scholastic engagements, studied law and natural science, and between 1827 and 1830 made many important contributions to organic chemistry in the *Annales des Sciences Naturelles* and the *Bulletin des Sciences*. Into the Revolution of 1830 R. threw himself with great impetuosity on the democratic side, and received a severe wound. He was then offered the administratorship of the Museum of Natural History, but declined it. In 1831, for a violent letter in *La Tribune*, he received fifteen months' imprisonment, and, with the exception of brief intervals, he continued in custody until 1836, because of his outspoken hatred of royalty. But his scientific studies were prosecuted with unabated fervour. In 1843 he began to develop his theory of disease, and to advocate the antiseptic virtues of camphor. He even prosecuted a lucrative practice, until he was stopped on the ground of illegality. He was one of the leaders of the Revolution of 1848, and exercised a great influence by his writings in *L'Ami du Peuple* and his speeches in the clubs. In 1849, however, for advocating the abolition of the Presidency in offensive language, he was imprisoned for five years, during which time he was twice elected to the Assembly. In 1854 he retired to Belgium, and continued his devotion to science until 1869, when he was elected to the Corps Législatif, where he associated himself with Communism in its most extreme enunciation. After the fall of the Empire he became the idol of democratic Lyon, which returned him regularly as its member. The aged demagogue died at Paris, January 10, 1878, leaving a reputation for consistency and earnestness which, however, bore no fruit to his party on account of the impracticability of his views.

Rasp'berry (*Rubus Idaeus*) is the only species of the extensive genus *Rubus* (q. v.) that has been brought into general cultivation for its fruit. It is a shrub with a perennial rootstock, throwing up suckers which grow into biennial stems (technically *cane*), more or less clothed with slender straight prickles. The leaves are pinnately three to five foliate; the flowers drooping, with white petals; the fruit (which consists of many aggregated drupes) red or yellow and hoary, falling off from the spongy conical receptacle when fully ripe. The R. is common in woods, &c., through Britain, ascending to 2000 feet in the Scotch High-

lands, and has a wide distribution through Europe and Northern and W. Asia. 'It was known to the ancients, and Linnæus retained the classic name of *Ida* with which it was associated by Dioscorides.' The mode of cultivation is by suckers, which are usually planted in rows from N. to S. at 4 feet apart every way. Growth from seed is only resorted to when new varieties are wanted. The fruit of the R. ranks in the dessert with the gooseberry and strawberry, but its principal uses are for jams, tarts, sauces, sweetmeats, and ices, and it is employed on a large scale in preparing spirituous liquors and cooling syrups. It is reckoned next in efficiency to the strawberry in removing the tartar of the teeth, and has been recommended to gouty and rheumatic subjects. In Scotland both the R. plant and fruit are generally called 'rasps,' and locally the name 'hindberry' is used. The origin of the name R. is doubtful. *R. occidentalis*—the black R. or 'thimbleberry' of N. America—yields a well-flavoured and large fruit, ripening early; and the value of that of *R. odoratus* would doubtless be enhanced by cultivation. *R. parvifolius* is the native R. of Australia.

Rasp berry Vinegar is a pleasant acidulous fruity beverage, prepared by bruising up raspberries in an equal proportion of good malt or wine vinegar, allowing the mixture to stand for three days, and then pressing and straining out the juice. To each pint of juice so obtained add 1 lb. of refined cane-sugar, then boil, skim, and bottle immediately the R. V. is cool. It is sometimes fortified with a little brandy.

Rasse (*Viverra malaccensis*), a species of Carnivorous quadrupeds, inhabiting India and other parts of E. Asia, and allied to the Civet (q. v.). It is about 3 feet in length, is of a general greyish-brown hue, variegated with longitudinal rows of black spots. The tail is long and marked by black rings. Like the civet, the R. secretes an odoriferous substance, which is in high repute amongst the Javanese, by whom it is named 'Dedes.'

Ras'tadt, or **Ras'tatt**, a town of the Grand-Duchy of Baden, situated on the river Murg, 3 miles from its junction with the Rhine, and 15 miles S.W. of Karlsruhe. In 1840 it was strongly fortified by the German Confederation, but since the annexation of Strassburg in 1871 its fortifications have been razed. Near it is a palace, formerly the residence of the Markgrafs of Baden-Baden, built in imitation of Versailles. It has manufactures of tobacco, metal-wares, and papier-maché. Pop. (1875) 12,205. R. has been the seat of two congresses. At the first, in 1714, Marshal Villars, on the part of France, and Prince Eugene on that of Austria, signed the peace which concluded the War of the Spanish Succession. The second in 1799 separated without any result having been arrived at, and the three French plenipotentiaries on leaving the town were attacked by Austrian dragoons, who murdered two of them, and seized the papers of the legation.

Rat (*Mus*), the name applied to various species of *Rodents* of the genus *Mus*, which also includes the mice. The two typical species of R. are the common or brown R. (*Mus domesticus*), and the black R. (*Mus rattus*). In England the latter has been well nigh exterminated by the brown R. The black R. is smaller than the brown R., and the upper jaw is more prominent. The brown R. is also termed the 'Norway R.,' and the black R. the 'English R.' The tail of the brown R. is shorter relatively to the size of its body than that of the black R. Its average size is about 8 or 9 inches. Both species breed several times in the year, and may produce from ten to fourteen or fifteen young at a birth. The skin of the R. is largely utilised for the manufacture of glove-leather.

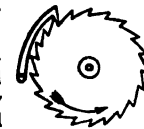
The water R. is the Water Vole (*Arvicola amphibius*) of naturalists (see **VOLE**). The Musk R. is described in the article of that name. The Coypu R. or Racoonda (*Myopotamus coypu*) inhabits Central America. It is allied to the beavers, is aquatic in its habits, and attains a length of about 2 feet 6 inches. The Beaver R. (*Hydromys chrysoaster*) is allied to the Musk R. It inhabits Van Diemen's Land, and resembles in its habits the Water Vole. The name 'R.' is applied to Rodentia far removed from the R. family (*Muride*). Thus the Mole R. (*Spalax*), Coast R. or Land Mole (*Bathyergus*), and the Pouched R. (*Sacophorus*), are R.-like only in appearance, and have no near affinities with the true rats.

Ratafia, in France, the generic name for liqueurs compounded of alcohol, sugar, and the odoriferous and flavouring

principles of plants; also a spirituous liquor consisting of brandy flavoured with apple or apricot kernels.

Ratch'et is a stop or detent which drops into the spaces between the teeth of a wheel, called a R.-wheel, rising as the wheel moves forward, but preventing it from moving backwards.

Ra'tel (*Mellivora R.*), a species of Carnivorous animal allied to the Weasel (q. v.), and known also as the 'honey weasel' and 'honey badger.' It inhabits S. Africa, a nearly allied species being found in India, is about 3 feet long, generally of black colour, the back being grey. The tail is short. The R. is very fond of honey, and is said to rob the nests of the wild bees. It is readily domesticated.



Ratchet wheel.

Rates mean taxes leviable by statutory authority on owners or occupiers of real property for local purposes. The usual mode of enforcing payment is by the authorised agent or collector applying to a justice of the peace for a distress warrant against the recusant.

Rathenau, or **Rathenow**, a town in the province of Brandenburg, Prussia, on the right bank of the Havel (here crossed by a stone bridge), 50 miles N.W. of Berlin. It is surrounded by walls pierced by six gates. It has considerable weaving, spinning, and tanning industries, as well as brickworks and manufacturing of optical instruments. Pop. (1875) 9951.

Rathkeale (Irish Gael. *Rath-Gaela*, 'Gaela's fort'), a market-town of Ireland, in the county of Limerick, on the Deel, an affluent of the Shannon, 19½ miles S.W. of Limerick by rail. In R. and its neighbourhood are many descendants of German Protestants, known as 'Palatines,' settled here about the beginning of the 18th c. Pop. (1871) 2517.

Rathlin, **Island of**, an island belonging to the barony of Cary, County Antrim, Ireland. It is 6½ miles long by 1½ broad, and is 6½ miles N. of the coast at Ballycastle, its post-town. R. is supposed to be the island mentioned by Ptolemy as *Rikina*, and by Pliny as *Ricinia*. Its Irish name is *Rachra*, whence the form *Rackrann* and *Rachrin*, sometimes found. A religious house is said to have been founded here by St. Columba in the 6th c., and there are still remains of a fortress said to have been built by Robert the Bruce, who at one time took refuge here. In 1558 a Scottish colony, which was then inhabiting the island, was expelled from it with much slaughter by Lord Deputy Sussex. Most of the surface of R. is rocky pasture. The geological formation is basaltic, and takes a columnar form on the E. side similar to that of the Giant's Causeway and Fingal's Cave. Kelp-burning used to be largely carried on here, but since kelp has gone out of demand the population has fallen off from 413 (1841) to 1039 (1871).

Ratibor, a town of Prussian Silesia, on the left bank of the Oder (here crossed by a bridge 320 feet long), 11½ miles from the Austrian frontier, and 85 S.W. of Breslau by rail. It was almost entirely rebuilt after the fire of 1858, and has five churches, a gymnasium, and several charitable institutions. It is the seat of the Upper Silesian Court of Appeal, and was from 1288 till 1532 the capital of the principality of the same name. R. has manufactures of damasks and woollens, and produces brandy, tobacco, and glass. It has also an important transit trade in corn and wood. Pop. (1875) 17,269.

Ratification, in Scotch law, is the ceremonial sometimes gone through by the maker of a deed legally to establish the fact of its having been made without intimidation. *R. by a wife* is made by her declaring in presence of a judge, her husband being absent, that she has not been induced by him, by force or fear, to execute the deed.

Ra'ting in the Navy. 1. *Rating of Men*.—The rating according to his qualifications of each sailor in the ship's books. Persons who have never previously been to sea are rated as ordinary seamen of the second class, and practised sailors as ordinary or able seamen, according to their experience. 2. *Rating of Ships*.—All large ships in the Royal Navy are registered under one of six rates, according to the number of men or the complement of guns which they carry. The following table (then under revision) shows the different rates of ships as on 1st January 1878:—

- 1st Rate. All ships carrying 110 guns, or 1000 men and upwards.
 2d Rate. One of Her Majesty's yachts, and all ships carrying between 81 and 109 guns, or between 800 and 799 men inclusive.
 3d Rate. Her Majesty's other yachts, all flag-ships and guard-ships, and all ships carrying between 60 and 80 guns, or between 600 and 799 men inclusive.
 4th Rate. All frigate-built ships carrying between 410 and 599 men inclusive.
 5th Rate. All ships carrying between 300 and 400 men.
 6th Rate. All other ships carrying a captain.

The other vessels in the navy are divided into (1) sloops, (2) gun-vessels, and (3) all other ships and smaller vessels commanded by lieutenants.

Ra'tio. See PROPORTION.

Ra'tion in army and navy, the allotment of food, fuel, &c. granted to each soldier and sailor for his daily maintenance. In the British army the peace ration includes $\frac{3}{4}$ lb. of meat, 1 lb. of bread, 37 lbs. of coals for every 12 men, $2\frac{1}{2}$ gills of oil for every 18 men, and such groceries and vegetables as the soldier chooses to buy. The war ration is 1 lb. fresh or salt meat, 24 oz. of bread or 1 lb. biscuit, 2 oz. rice, 2 oz. sugar, 1 oz. coffee or $\frac{1}{2}$ oz. tea, $\frac{1}{2}$ oz. salt, 1 gill spirits, and fresh or preserved vegetables. A stoppage of 1d. per day is made when the war ration is supplied. When a soldier's wife accompanies her husband abroad, he receives half a R. for her, and from $\frac{1}{2}$ to $\frac{3}{4}$ of a R. for each accompanying child, according to its age. In India a soldier's ration is 1 lb. meat, 1 lb. bread, 4 oz. rice, $2\frac{1}{2}$ oz. sugar, $\frac{7}{8}$ oz. tea or coffee, $\frac{3}{8}$ oz. salt, 1 lb. vegetables, and 3 lbs. firewood. The R. of forage for army horses is 10 lbs. oats, 12 lbs. hay, and 8 lbs. straw, which the men receive free, and for which the officers pay 8 $\frac{1}{2}$ d. per day. The rations supplied in the navy are 1 lb. meat, $1\frac{1}{2}$ lb. ship biscuit or $1\frac{1}{2}$ lb. soft bread, $\frac{1}{2}$ pint spirits, 2 oz. sugar, 1 oz. chocolate, $\frac{1}{4}$ oz. tea, $\frac{1}{2}$ lb. vegetables, and various extras. According to scientific investigation, the nutriment for able-bodied men doing heavy work should have three carboniferous for every nitrogenous element. Soldiers in Continental armies are not generally so well fed as British troops. In the Franco-German war pea-sausage was largely supplied to the German army, and was found portable and nutritious, while it made good soup.

Ra'tionalism has been defined as 'a certain cast of thought or bias of reasoning, which leads men on all occasions to subordinate dogmatic theology to the dictates of reason and of conscience; in history, to attribute all kinds of phenomena to natural rather than miraculous causes; in theology, to esteem succeeding systems the expressions of the wants and aspirations of that religious sentiment which is planted in all men; and in ethics, to regard as duties only those which conscience reveals to be such.' The rise of this spirit in Europe is marked by the decline of the belief in magic and witchcraft which began in the 14th c. Since the Reformation on Protestantism as a basis, various modifications of R. have been built—by the Arminians, the Socinians, the Deists of the 17th c., and the more thorough-going Rationalists of the 18th c. in England, France, and Germany. In the 16th c. Christianity was regarded as a system entirely beyond the range of human reason, a system which it was impious to question or examine. It was bristling all over with miracles, which excited no scepticism and no surprise. On the other hand, the central conception of R. is that conscience has supreme authority as the religious faculty, and that religion is no exception to the general law of progress and uninterrupted development, Christianity being a conception which is to become more and more spiritualised as the human mind passes into new phases. The best-known characteristic of R., however, because it is the first direction it invariably takes, is the attempt to explain away the miracles of Scripture. See Farrar's *Critical History of Free Thought* (Bampton Lectures, 1863); Hurst's *History of R.* (New York and Lond. 1866); Lecky's *History of R. in Europe* (4th ed. Lond. 1870); and Hodge's *Syst. Theology* (Edinb. 1873).

Ra'tios, Prime and Ultimate, the name employed by Newton to denote the fundamental principles of limits as established geometrically in the opening sections of his *Principia*. The ultimate ratio of two small variable quantities is the limit to which their prime or real ratio continually approaches as they are diminished indefinitely. Thus the ultimate ratio of an arc and its sine is unity, since as both are made smaller and smaller, the

ratio approaches nearer and nearer to unity, and may be made to differ from it by less than any assignable quantity. See LIMIT.

Ra'tisbon. See REGENSBURG.

Battans', or **Battan Canes**, are the long flexible stems of various species belonging to the genus *Calamus* (q. v.) or allied genera. The species are chiefly found in India and the Eastern Archipelago, where they grow in the forests, climbing over trees and bushes to a greater extent than any known plants. The stems vary very much in length, but 100, 300, and 500 feet are of ordinary occurrence, and Rumphius states that one kind attains the extraordinary length of 1200 feet. In the countries where these palms abound the inhabitants make use of them for a great variety of purposes; chairs, mats, door-blinds, hats, baskets, and other useful articles of plaited work being manufactured from strips of the stems, but the most important services they are utilised for is as mooring-cables for the coasting vessels, and as ropes where immense strength is necessary. From *C. montanus*—a native of the Himalaya up to 6000 feet—the light but strong suspension-bridges spanning the large rivers of Sikkim are constructed; it also supplies material for the strongest ropes for dragging logs of wood from the forests. The R. used in lieu of ropes on timber rafts in Burma are referred on good authority to *C. latifolius*, a common species in the moist valleys of that country, where its stem, 200 feet long, terminating in an elegant crown of leaves, may be seen surmounting the gigantic trees over which it climbs. *C. Rotang*, *C. rudentum*, *C. verus*, *C. viminalis*, and probably several other species, furnish the canes or R. imported in large quantity into Europe for the bottoms of chairs, couches, sides of carriages, window-screens, and other purposes. The Malacca cane of Sumatra is generally ascribed to *C. Scipionum*, which Loureiro erroneously described as from Cochinchina. The flesh surrounding the seeds in *Calamus* is a delicate article of food, and the young shoots of some species, while still tender, are roasted or boiled, chopped small, and being fried with pepper and gravy, are said to furnish a very palatable dish. See CANE and DRAGON'S BLOOD.

Batt'any, or **Rhat'any** (*Krameria triandra*), is a pretty little shrub, a native of Chili, Peru, and Bolivia, at elevations from 3000 to 8000 feet. A preparation of the root is used as an astringent medicine; it also acts as a tonic and as a styptic; and the dried powdered root forms an ingredient of many dentifrices. An extract is said to be extensively employed to give astringency and colour to artificial port wine. Some other species of this anomalous genus have similar astringent properties, particularly *R. Ixine* from Central America and the W. Indies.

Bat-Tailed Maggot, the name given to the *Eristalis tenax*, one of the flies in its larval condition. It inhabits the mud of ponds and ditches. The abdomen ends in a long breathing tube opening by two terminal 'spiracles,' and bearing hair-like appendages. There are seven pairs of 'prolegs.' The chrysalis buries itself in the earth.

Rattaz'zi, Urba'no, an Italian statesman, born at Alessandria, Piedmont, June 29, 1810, was educated at a Government school, practised as an advocate at the Turin bar, and in 1838 removed to the Court of Appeal then recently established at Casale. When Carlo Alberto proclaimed his constitution in 1845, R. was returned to the Lower Chamber of Sardinia as the ultra-Liberal representative of the College of Alessandria. After the battle of Custoza he acted as a member of the ten days' Ministry, and subsequently he filled the office of Minister of the Interior, a post he was deprived of on the change consequent on the battle of Novara and the abdication of Carlo Alberto. Thereafter he and a few friends formed what was termed the left centre, while Cavour led the right centre. By degrees the republicanism of R. was modified, and in 1854 he found himself able to accept the Minister of Justice's portfolio in the Cavour Ministry. As Minister of Justice he put forth all his powers against the Clerical party; but subjected to continual opposition, which fatigued rather than conquered him, he retired at the general election in 1857. In the following year a large majority elected him president of the Chamber, and after the peace of Villafranca he replaced Cavour, took an active part in the arrangements for the annexation of Tuscany, Bologna, Modena, and Parma, and pushed the organisation of the new Italian kingdom. In 1860 Cavour regained the power, and R. retired. He died June 5, 1873.

Rattlesnake (*Crotalus*), a genus of snakes belonging to the section *Viperina*, in which there are no teeth in the upper jaw save the poison-fangs and their rudimentary successors. It forms the type of a distinct family, that of the *Crotalidae*, in which there is a large pit or depression between the nostril and the eye. In the genus *Crotalus* itself the head has posterior scales, and the scales of the lips are large. The R. inhabits N. America. The best known species are the *C. horridus*, named popularly the banded R. or Caravel, the *C.* or *Uropsophus durissus*, and the small or Military R. (*Crotalus miltaris*). The chief characteristic of these reptiles is the possession of a number of horny joints or rings on the tail, which make a rattling noise when the snake moves. The number of the 'rattles' is said to increase with the age of the animal. The exact use of this curious apparatus is still undetermined, and its analogy is by no means clearly made out. Professor Shaler, United States, thinks that the R. imitates through its movements the note of the Cicada, an American insect, and that birds swooping down to seize the supposed prey, are in turn seized by the serpent. The R. is a highly poisonous reptile, its bite proving fatal within a short period. Its average length is from 6 to 8 feet. The colour of the *C. horridus* is brown, with a black streak in the side of the neck. The *U. durissus* is of paler brown colour, and the small R. is brownish olive, and attains a length of 2 or 3 feet.

Rauch, Christian, a German sculptor, born 2d January 1777 at Arolsen in Waldeck. After studying under Ruhr at Kassel, he came to Berlin (1797) as valet of King Friedrich Wilhelm II. The king dying in the autumn of that year, R. entered the service of his successor, Friedrich Wilhelm III. and Queen Luise. In 1804 they sent him to Rome, where he enjoyed the society of Wilhelm von Humboldt, Canova, and Thorvaldsen. Among the earliest works of R. are the bas-reliefs 'Hippolytus and Phædr,' 'Mars and Venus wounded by Diomedes,' a colossal bust of the King of Prussia, a life-size bust of Queen Luise, and several busts for the Walhalla (Regensburg). In 1811 R. returned to Berlin to execute the celebrated monument of Queen Luise, which was finished in 1814. His activity grew with his fame. His other chief works were his statues of Bülow and Scharnhorst at Berlin (1815-22), numerous busts (before 1824 he had completed as many as 70, 20 of these being of colossal size), the bronze statues of Blücher at Breslau and Berlin (1826), of Francke at Halle (1826), of King Max of Bavaria at Munich (1829), and of Durer at Nürnberg (1838), the six colossal 'Victories' in the Walhalla (1836), and the equestrian monument of Friedrich the Great at Berlin (uncovered May 1851), which is considered his masterpiece. Equally great in noble ideal representation and in truth to nature, R. is recognised as one of the first of modern sculptors. He died 3d December 1857.

Rauher, Friedrich Ludwig Georg von, born at Wörlitz, near Dessau, May 14, 1781, proceeded from the Joachimsthal Gymnasium at Berlin to the universities of Halle and Göttingen, and after holding various legal offices was called to the chair of history in the university of Breslau (1811). His tour, made at the cost of the King of Prussia, in Germany, Switzerland, and Italy (1815-17), bore splendid fruit in a *Geschichte der Hohenstaufen und ihrer Zeit* (6 vols. 1823-25; 4th ed. 1871), where R. sought to confirm the reviving consciousness of German nationality. He became professor of political economy and history at Berlin (1819), was led by his historical researches to Paris (1830), and imperilled his favour with the court by withdrawing from the Superior College of Censors (1831). A liberal speech on Friedrich the Great's saying, 'Each of my subjects shall be happy according to his liking,' cost R. his membership of the Berlin Academy (1847), but procured his election to the Frankfurt Parliament, whence he was sent on an embassy to Paris. In 1853 he was created a member of the Upper House, but retired thenceforth from politics, though continuing to lecture down to his ninetieth birthday. He died June 14, 1873, at Berlin, which owes to him several of its people's libraries. R. was author of *Vorlesungen über die alte Geschichte* (2 vols. 1821; 3d ed. 1861), *Geschichte Europas seit dem Ende des 15. Jahrhunderts* (8 vols. 1832-50), *Beiträge zur neuern Geschichte aus dem Britischen Museum und Reichsarchive* (5 vols. 1836-39), *Handbuch zur Geschichte der Literatur* (4 vols. 1864-66), and various works of

travel, *Herbstkreise nach Venedig* (1816), *Briefe aus Paris und Frankreich* (1831), *England*, 1835 (2 vols. 1836; 2d ed. 3 vols. 1842), *Italien* (1840), *Die Vereinigten Staaten von Nordamerika* (2 vols. 1845), &c. See his *Lebenserinnerungen und Briefwechsel* (2 vols. Leips. 1861).—**Karl Georg von R.**, brother of the preceding, was born at Wörlitz, April 9, 1783, and studied at Göttingen, Halle, Freiburg, and in the Pestalozzian Institute at Iferten. He became professor of mineralogy at Breslau (1811), served on Blücher's staff through the War of Liberation (1813-14), accepted a call to Halle (1819), and to Erlangen (1827), where he died, June 2, 1865. Of his many admirable works on geology, geography, and education, may be mentioned *Geognostische Fragmente* (1811), *ABC-Buch der Krystallkunde* (1821), *Lehrbuch der Allgemeinen Geographie* (3d ed. 1848), *Beschreibung der Erdoberfläche* (6th ed. 1866), and *Geschichte der Pädagogik* (4 vols. 1842, et seq.; 4th ed. 1872-74). See his *Selbstbiographie* (Stuttg. 1866), and Scheurl, *Zum Gedächtniss K. von R.'s* (Erl. 1865).—His son, **Rudolph von R.** (born at Breslau, April 14, 1815; died at Erlangen, August 30, 1876), as professor at Erlangen of the German language and literature, published some valuable contributions to German philology, *Einwirkung des Christenthums auf die althochdeutsche Sprache* (1845), *Geschichte der Germanischen Philologie* (1870), *Erläuterungen zu den Ergebnissen der Berliner Orthographischen Konferenz* (1876), &c.

Raupach, Ernst Benjamin Salomo, a prolific German dramatist, was born at Straupitz in Silesia, May 21, 1784. In 1801 he entered the University of Halle, where he underwent a course of study in theology, after which he acted for ten years as a teacher in Russia, and was appointed professor of philosophy (1816) and of German literature (1817) at St. Petersburg. In 1822 he left Russia, and after travelling in Italy, settled in Berlin, where he died, March 18, 1852. R.'s dramatic works were arranged by himself in the two divisions, *Dramatische Werke ernster Gattung* (18 vols. Hamb. 1830-44), and *Dramatische Werke komischer Gattung* (3 vols. Hamb. 1828-34). Of these the chief are *Die Fürsten Chawansky* (1818), *Die Gefesselten* (1821), *Der Liebe Zauberkreis* (1824), *Die Freunde* (1825), *Isidor und Olga* (1826), *Rafaele* (1828), *Die Tochter der Luft* (1829). His *Lustspiele* appeared in 1828, and subsequently *Kritik und Anti-kritik*, *Die Schleichhändler*, *Der Zeitgeist*, *Das Sonett*, and the farces *Denk' an Cäsar* and *Schelle im Monde*. A collection of tales issued in 1820 and another in 1833 were less successful. He published a cycle of sixteen dramas on the history of the Hohenstaufen emperors (Hamb. 2 vols. 1837-38). The later works of R. were contained in the *Jahrbuch deutscher Bühnenspiele* of Gubitz, and were *Jacobine von Holland* (1852), *Der Kegelspieler*, *Mulier taceat in Ecclesia* (1853), and *Saat und Frucht* (1834). The plays of R. have merits which are theatrical rather than dramatic. See Pauline Raupach's *R., eine biographische Skizze* (Berl. 1854).

Ravallac, François, assassin of Henri IV., was born in Angoulême, 1578; became successively a clerk, valet-de-chambre, solicitor, and schoolmaster. While imprisoned for debt, he contracted a habit of seeing visions, which induced him, on his release, to adopt the religious life recommended to him by the Jesuits. He is remembered only for his infamous murder of Henri, May 14, 1610. In the Rue de la Ferronnerie a block occurring, R. stepped up, put his foot on the wheel of the royal carriage, and plunged a knife into the king's heart. R. escaped at the time, but was shortly captured, knife in hand, taken in charge by the Duc d'Epemon, and, after condemnation by the Parliament, torn asunder by wild horses (May 27, 1610). His crime was attributed to the Spanish Court and to Marie de Médicis. Kitchin remarks that 'it is best to believe that he had no direct accomplices, and that he instinctively did the work of the party of which he thereby became, in a sense, the representative.' He declared to the end he had no partners in the enterprise. See Kitchin's *History of France* (vol. ii.); Henri Martin, *Histoire de France*.

Ravana, in Hindu mythology the demon-king of Lanka or Ceylon, is depicted as a giant with ten faces, who carried away Sita, the wife of Rama, and whose destruction by her avenging husband with the aid of the monkey Hanuman forms the subject of the great Hindu epic, the *Ramayana* (q. v.). As the monkeys represent the negroid aboriginal tribes in the centre of the peninsula, so R. is supposed to stand for a Dravidian monarch.

Ravelin (Fr. *ravelin*, Ital. *riellino*, from Lat. *re*, and *vallum*, 'fortification'), a triangular outwork, constructed to cover the curtain and shoulders of the bastions. It is open at the rear, and has two faces forming a salient angle, two demigorges formed by the counterscarp, and is surrounded by a ditch which separates it from the covert way. Within it a smaller work of a similar kind is sometimes erected, termed a *redoubt*, the salient angle of which is defended by a *bonnet*, the sides of which are parallel to those of the R. The ditch before the redoubt of the R. is defended chiefly by *tenailles*, and *lunettes* are works erected at its sides. See FORTIFICATION.

Ra'ven (*Corvus corax*), a species of *Corvidæ* or Crows, very widely distributed over the surface of the globe. Its colour is a bluish black, and the female is larger than the male R. A large specimen may measure about 2 feet in length. The bill is very strong, the upper mandible overlapping the lower. The R. does not exhibit the usual gregarious habits of crows. It is bold and wary, and has been known to attack even comparatively large animals, such as rabbits and hares, and even lambs. The R. has the faculty of imitation highly developed, and may learn to utter short words. It may attain a venerable age, instances having been known of a R. having lived for sixty or seventy years. It has from time immemorial been regarded as a bird of evil omen, a result probably due to its sombre appearance and croaking notes.

Bavenna's, one of the oldest cities of Italy, capital of the province of R., 43 miles S.E. of Bologna, lies in a swampy valley, between the rivers Lamone and Ronco, and is connected with the Adriatic by the Naviglio Canal. It has an art-gallery, a library containing 50,000 volumes and many valuable MSS., an archaeological museum, and fifteen churches. The most notable buildings are the cathedral of St. Orso, dating from the beginning of the 5th, and restored in the 18th c.; the adjoining *Baptistry*, a splendid specimen of Byzantine architecture; the church of *San Francesco* (founded 450); the *Tomb of Dante*, who died in R.; the church of *San Vitale* (consecrated 547), an imitation of the church of St. Sophia at Constantinople; the church of *San Apollinare Nuovo*, a basilica erected about 500 by Theodoric the Great; and, a little way outside the town, the church of *San Apollinare in Classe* (consecrated 549, restored 1779), the finest extant basilica. Near R. is the famous pine-forest, *La Pineta*, celebrated by Dante, Boccaccio, Dryden, and Byron. R. has manufactures of silk, linen, paper, and glass. Pop. including suburbs (1874) 18,414.

History.—R. was founded either by the Etruscans or by a Greek colony from Thessaly, but was of no importance until Augustus constructed the harbour (*Clasius*), and made it the headquarters of the Adriatic fleet. The deposits brought down by the river Po have not only filled up the harbour, but extended the coast-line so greatly that R. is now upwards of 5 miles from the sea. In 402 the seat of the Western empire was removed thither by Honorius. It was taken in 493 by Theodoric, and was till 552 the seat of the Ostro-Gothic kings. For the next two centuries it was the residence of the Byzantine exarchs. In 755 Pippin (q. v.) of France handed it over to the Pope. Between 1275 and 1509 it was governed by independent dukes and by the Venetians, and from 1509 to 1860 it was, with one short interruption, in the hands of the Pope. In 1512 the French, under Gaston de Foix, who was killed in the battle, defeated the Spaniards and Papal troops under the walls of R. See Spreti, *Dell Origine e della Magnificenza della Città di R.* (2 vols. Rav. 1793-96); Quast, *Die Alichristl. Bauwerke zu R. vom 5 bis 6 Jahrh.* (Berl. 1842); Hubsch, *Die Alichristl. Kirchen, &c.* (Karls. 1863); John Henry Parker's *Mosaic Pictures in Rome and R.* (1866); Pasolini's *Delle Antiche Relazioni fra Venezia e R.* (Flor. 1874); and *The Goths at R.*, in the *British Quarterly Review* for October 1872.

Bavensburg, a town of Würtemberg, in the fertile Schusenthal, 11 miles N. of Friedrichshafen on the Bodensee by rail. It has one Protestant and two Catholic churches, a medieval rathhaus, a lyceum (1809), a realschule, and a wealthy hospital. There are cotton, woollen, hemp, and flax manufactures; paper, oil, and grain mills. Pop. (1875) 10,034.

Ra'venscroft, Thomas, an English composer, was born in London about 1590. As a boy he was a chorister in St. Paul's Cathedral under Edward Pierce. He published his *Melismata*, musical phantasies fitting the court, citie, and country humours, to

3, 4, and 5 voyces, in 1611, and a *Brief Discourse* in defence of the old musical notation in 1614. His arrangement of *The Whole Book of Psalmes, with the Hymnes Evangelical and Songs Spirituall, composed into 4 parts by sundry authors* (1621-23), was the finest collection of psalm tunes which had appeared, and contained many beautiful melodies of his own composition. He died in London in 1635. A selection of his works was published by the Roxburghe Club in 1823.

Rávi, one of the five rivers of the Punjab, identified with the Hydrastes of the Greeks, and still called Trastee in certain parts of its course. It rises among the Himalayas, and flows S.W. past the city of Lahore, till its junction with the Chneaub: total length, about 450 miles. At Madhapore, where it debouches on the plains, a large canal system takes off to irrigate the sandy desert of the Bari Doab, which lies between the R. and Bias rivers. The total cost has been £2,000,000 sterling, and the net profit is £50,000 per annum. The main canal is 212 miles long, and there are 692 miles of distributaries. The number of acres irrigated in 1872-73 was 228,000; the rate for water varies from 12s. to 3s. per acre.

Ravignan, Gustave François Xavier Delacroix de, born at Bayonne, December 2, 1795, quitted the bar for the seminary of Saint-Sulpice in 1822, and passed thence into the Society of Jesus. After some years' employment in the work of education, he grew into fame through the discourses, grave, elegant, and closely reasoned, which he delivered at Amiens and in the churches of St. Thomas Aquinas and Notre Dame at Paris. He died February 26, 1858, and his *Conférences* and *Entretiens Spirituels* were published in the following year. R.'s defence of his order, *De l'Existence de l'Institut des Jésuites* (1844; 7th and enlarged ed. 1855), created a deep sensation at the time of its appearance. See his *Life* by Father de Pontevey, S.J. (Eng. trans. Dubl. 1869).

Ra'wicz, or **Ra'witch**, a town of Prussia, province of Posen, near the borders of Silesia, 37 miles N.N.W. of Breslau by rail. It has a fine rathhaus, and a 'realschule' of the first rank. Leather, oil, and tobacco are manufactured; and weaving, spinning, and brewing are carried on. There is also a considerable trade in corn. Pop. (1875) 11,155.

Rawlinson, Sir Henry, K.C.B., an Oriental scholar and Indian diplomatist, was born at Chadlington in Oxfordshire in 1810, and entered the Bombay army in 1826. In 1833 he was selected to assist in disciplining the Persian army, and while in that country was led to study the cuneiform inscriptions, of the interpretation of which he is one of the joint discoverers. He first deciphered the rock inscriptions of Behistun (q. v.) in 1838. During the Afghan expedition of 1839-42 he served as political or diplomatic officer with the force that occupied Kandahar; and he is now the sole survivor of this branch of the service who was connected with the fatal war. He was made agent at Bagdad in 1844, and lieutenant-colonel in Turkey in 1850; in 1856 was knighted, and appointed a director of the East India Company and elected a member of Parliament in 1858; and in 1859 he was sent as minister to the court of the Shah. Since 1868 he has been a member of the Council of India. From 1859-60 he again sat in Parliament, and from 1871 to 1875 he was president of the Royal Geographical Society. R. has received many honours both at home and abroad, and has been president of the Society of Biblical Archæology since its foundation in 1873. He acquired wide celebrity by his translation of the Persian text of Darius, first published in the *Transactions* of the Royal Asiatic Society in 1846, and has since contributed to the same journal many valuable memoirs on this and other Eastern subjects. With E. Norris and George Smith, he edited 5 vols. folio of cuneiform inscriptions, 1861-70, and furnished much of the material for his brother's edition of Herodotus. In 1874 he published *England and Russia in the East*, in which he advised the occupation of Herat by the British, as a check to the advances of Russia in Central Asia.—**Rev. George R.**, brother of the preceding, born 1815, is Camden Professor of Ancient History in the University of Oxford, and Canon of Canterbury. He is best known by his translation of Herodotus in conjunction with Sir G. Wilkinson (4 vols., 1858-60), and by his elaborate *Five Great Monarchies of the Ancient Eastern World* (4 vols. 1862-67; 3d ed. 1876); *Manual of Ancient History* (1869); *Sixth Great Oriental Monarchy, or the Geography, History, and Antiquities of Parthia* (1873); *The Seventh Great Oriental Monarchy*, treating

of the Sassanians (1876). He has also written the commentaries on the book of Kings, &c., for the *Speaker's Commentary*, and contributed an essay on the Pentateuch to Thomson's *Essays and Reviews*.

Ráwul Pindi, the chief town of the district and division of the same name, in the Punjab, British India, on the Grand Trunk Road, 160 miles N.W. of Lahore. Pop. (1868) 19,228, with an additional 6581 in the cantonments, which lie S. of the town. There are stationed here one regiment of hussars and two of European infantry, as well as artillery and native troops. R. has a considerable trade in country produce; and since 1860 the largest horse-fair in N.W. India has been held here, under Government patronage.—The *district* of R., which lies among the spurs of the Himalayas between the rivers Indus and Jhilum, has an area of 6216 sq. miles; pop. (1868) 711,256. It contains the ruins of Taxila city, visited by Alexander; Attock, where the Indus has been always crossed, and the sanitarium of Murri. The crops are wheat, millet, and barley. The camels, mules, donkeys, and horses of the district are celebrated.

Ray, the name given to several species of fishes belonging to the order *Elasmobranchii* (q. v.). In the family *Raidæ*, to which both skates and rays belong, the body is flat and very broad. The breadth of the body, however, is due, not so much to its own actual breadth, but to the fact that the large *pectoral* or *breast fins* are united with the body itself, and thus serve to increase its area. The tail is markedly slender. Its upper lobe is prolonged over the lower, thus causing it to appear *heterocercal*. The body is sparsely covered with *placoid scales*, and some species have large spines on the tail. Of the rays, the common R. or skate (*Raia batia*) is a well-known genus. The Thornback R. (*R. clavata*) is common round the British coasts, and derives its name from the large size of the spines on the back and tail. The tail of the sting R. (*Trygon pastinaca*) is covered with a large spine, the sides of which are toothed or serrated. The eagle R. (*Myliobatis aquila*) has also a prominent tail-spine. Its tail is exceedingly slender, and from this latter circumstance it has received the name of 'whip R.' The Homelyn R. (*R. miraletus*) has large dark spots on the sides; and the Bordered R. (*R. marginata*) a dark border on its side-fins, and three rows of tail-spines. Most famous of the R., however, is the Horned R. (*Cephaloptera*) of the Mediterranean Sea. Specimens of this latter fish, weighing over a ton, and measuring 20 feet in length and 8 in breadth, have been obtained. The Electric R. is the *Torpedo* (q. v.) of naturalists.

Ray, or Wray, John, born at Black Notley, Essex, November 29, 1628, passed from Braintree Free School to Catherine Hall, Cambridge, but migrated to Trinity, where he became a fellow (1649), Greek lecturer (1650), mathematical tutor (1652), and junior dean (1658). He accepted episcopal ordination at the Restoration, but was ejected by the 'Black Bartholomew Act' (1662), and thenceforward mainly devoted himself to natural science, having already published a *Catalogus Plantarum circa Cantabrigiam nascentium* (1660). With his friend Francis Willoughby, of Middleton Hall, Warwickshire, he travelled over Great Britain and on the Continent (1663), in 1667 was elected a Fellow of the Royal Society, and after some years' residence in Warwickshire settled in his native village (1679), where he died, January 17, 1705. One of the earliest natural systems of classification in botany was that proposed by R. in his *Methodus Plantarum* (1682; 2d ed. 1703). He distinguished flowering and flowerless plants, dividing the former into Dicotyledons and Monocotyledons. His orders were thus correctly based upon affinities, and R., whilst far outstripping his contemporaries, may be regarded as the forerunner of Jussieu, Decandolle, Brown, Endlicher, &c. Amongst R.'s numerous writings were his *Catalogus Plantarum Angliæ* (1670), *Historia Plantarum* (3 vols. 1686-1704), and *Synopsis methodica Animalium Quadrupedum et Serpentina Generis* (1693). He also edited and enlarged Willoughby's *Ornithologia* (1676) and *Historia Piscium* (1686), and published a *Collection of Unusual or Local English Words* (1674; edited by Professor Skeat for the English Dialect Society, 1874), and a *Collection of English and other Proverbs* (1678), besides various religious treatises. His *Life and Select Remains*, by Dr. Derham, appeared in 1760; and the R. Society, founded in 1844, has devoted two volumes of its *Transactions* to his *Memorials* (1844) and *Correspondence* (1848), edited by Dr. E. Lankester.

Raymond, the name of seven counts of Toulouse. **R. I.**, in 852, succeeded his brother Fredelon, who had been granted the lands of Toulouse by Charles the Bald, and added to them the county of Querci. He died in 864 or 865.—**R. II.** succeeded his father, Eudes, in 918. Next year he drove back the invading Saracens under Abd-er-Rhaman IV., and in 923 defeated the Normans. He died in 923, and was succeeded by his son, **R. III.**, who is also known as **R. Pons**. This prince defeated the Hungarians in 924, driving them beyond the Alps. He died in 950.—**R. IV.**, known as **R. de Saint-Gilles**, succeeded his brother, Guillaume IV., who was without male heirs, in 1088, uniting to the hereditary dominions of Toulouse the earldoms of Rouergue, Nîmes, and Narbonne, which he had acquired in 1066 by a marriage with the daughter of his uncle Bertrand, Comte de Provence, which procured him ten years later the excommunication of Pope Gregory VII. He married in 1080 Mathilde, daughter of Roger, Count of Sicily, and in 1094, Elvire, daughter of Alfonso, King of Leon and Castile, becoming by his alliances one of the most powerful princes in the S. of Europe. In 1096 he left his dominions for Palestine at the head of the third army of the Crusaders, and in 1100 went to Constantinople, leaving it next year at the head of 100,000 Christians; but this undisciplined army was soon routed on the plains of Cappadocia, and R. was obliged to return to Constantinople. Returning to Syria in 1102, he was seized at Tarsus by Tancred, his mortal enemy, and only recovered his freedom at the prayer of several princes, who put him at the head of an expedition against Tripoli in 1103. Here he died in 1105.—**R. V.**, grandson of the preceding, was born in 1134, and began to reign in 1148. The claims of Henry II. of England to the suzerainty of Toulouse through Eleanor his wife, daughter of Guillaume IV., were opposed by Louis VII. of France, but were satisfied by a partial submission of R. in 1193. He died in 1194, and was succeeded by his son, **R. VI.**, who was born in 1156. Under his mild rule the doctrines of the Albigenses spread widely, and his court was rendered brilliant by troubadours whom his generosity attracted. R. was obliged to promise to extirpate the 'heretics,' but being unwilling to persecute the greater number of his subjects, he was excommunicated by the papal legate, Pierre Castelnau, and this sentence was soon after ratified by the Pope. Alarmed at the threatened invasion of his territories by the neighbouring barons, R. yielded, but the assassination of the legate in 1208 laid him under the suspicion of having caused his death, and he was once more excommunicated, while an interdict was laid on his territory, and a crusade preached against him, and inculcated on all true Catholics. In 1209 an army of 100,000, under Simon de Montfort, invaded Toulouse. His submission and visit to Rome in 1210 having proved unsuccessful, R. took up arms, and at first was successful; but on September 12, 1213, he was defeated with a loss of 15,000 men, his noble ally Peter of Arragon being among the slain. R. now retired to England; but, after the Council of Lateran had ratified all the actions of Montfort, he returned to Toulouse, flung himself into his capital in 1217, and defended it for ten months, until the death of Montfort obliged the Crusaders to raise the siege. R. now recovered most of his former territory, but died suddenly in the August of 1222.—**R. VII.**, son of the preceding and last sovereign of his house, was born at Beaucaire in 1197. Amauri, the son of Montfort, having handed over his claims upon Toulouse to Louis VIII., the latter marched against R. A new crusade was preached against him, and in June 1226 Louis appeared before Avignon, which fell after three months' resistance. His death in November 1226 alone saved R., when his enemy had advanced within 12 miles of Toulouse. Notwithstanding some partial successes, he found himself obliged to submit to a rigorous and humiliating peace, April 1229, in which he bound himself to punish heretics without mercy, to pay immense fines to the Church, to raze the walls of Toulouse and thirty other towns; lastly, to give his only daughter in marriage to one of the brothers of Louis IX., and go against the Saracens in Palestine. The hatred of the people, as shown by the driving the inquisitors from Toulouse and Narbonne in 1236, was attributed to his schemes, and he was once more excommunicated, and subjected to many indignities. He died September 27, 1249, when on the point of setting out for Palestine, having the mortification to see his dominions pass under the sway of the house of Capet. See Catel, *Histoire des*

Comtes de Toulouse; and Moline de Saint-Yon, *Histoire des Comtes de Toulouse* (4 vols. Par. 1862).

Raynouard, François Juste Marie, born at Brignoles, in the modern department of Var, September 8, 1761, was educated at Aix, and after a short legal practice at Draguignan, became a deputy in the Legislative Assembly (1791). He suffered imprisonment during the Reign of Terror, carried off the Institute's prize of poetry (1803), and achieved an immense success with a national tragedy, *Les Templiers* (1805), though, like his other dramas, *Caton d'Utique* (1794) and *Les États de Blois* (1814), it lacks action, and reproduces the tone but nothing of the genius of Corneille. His poems, too, *Socrate dans le Temple d'Aglaure* (1803), *Camœns* (1819), &c., are poor and prosaic, all their author's power being avowedly reserved for the closing line, 'the crack of the whip,' as he was pleased to style it. A native of Provence, it is as an investigator of his country's speech and literature that R. is best remembered. To the works already mentioned under PROVENÇAL LANGUAGE may be added *Éléments de la Grammaire Romane* (1816), *Des Troubadours et des Cours d'Amour* (1817), and *Influence de la Langue Romane* (1835). R. was secretary to the French Academy (1817-25), of which he had been elected member in 1807, and died at Paris, October 27, 1836.

Razor (Fr. *rasoir*, from *raser*, 'to shave' or 'scrape'), an instrument with a fine cutting edge for shaving. First-class razors are made of the best cast steel, perfectly hardened and tempered. The edge of a R. is composed of a microscopic and regular series of saw-like teeth, so that the operation of shaving resolves itself into one of mowing. Sheffield is the great seat of the R. manufacture in Great Britain, and several qualities of razors are there made. A black-handled Sheffield R. of good and well-tempered steel may be purchased for one shilling; while others of cast iron are sold at the rate of sixpence per dozen for export to S. and W. Africa and the islands of the Pacific for native use. Sharks' teeth and oyster or mussel shells are used for shaving in New Caledonia and other South Sea Islands. Captain Cook, the intrepid navigator, once resigned himself for six hours into the hands of a native royal barber, the operation being performed with a sharpened oyster-shell.

A *R.-strop* is usually a leather-covered flat strip of wood. One side is smeared with R.-paste, compounded of oxide of iron, emery powder, or putty powder and hog's lard or other unctuous matter; while the other side, on which the keenness of edge is finally imparted, has either the soft leather plain or blackened with plumbago and lard.

Razor-Bill (*Alca torda*), a species of Auk (q. v.) or *Alcida* common in the Arctic Seas, and found frequently on the northern coasts of Britain. It is allied to the Great Auk (*Alca impennis*), now so rarely found. The R.-B. is caught in large numbers on the Labrador coast. It attains a length of 17 inches, and is an expert swimmer and diver. The eggs number two at most, and are deposited on the bare surfaces of rocks. Both eggs and flesh are esteemed for food.



Razor-Bill.

Razor-Shell and Razor-Fish. See SOLEN.

Ré, Ile de (Lat. *Rex Insula*), an island, 18 miles long by 4 broad, on the coast of the department of Charente-Inférieure, France. It is separated from the mainland by the Pertuis de Breton, from the Ile d'Oléron by the Pertuis d'Antioch, and its four fortifications serve as a protection to the harbour of La Rochelle. The population (in 1872, 16,618) is chiefly occupied in fishing, in the cultivation of the vine, in the distillation of brandy, and in the manufacture of sea salt. Oyster-beds, capable of producing 300,000,000 oysters annually, have recently been established in the neighbourhood. The capital of the island is St. Martin (pop. (1872) 2740), fortified by Vauban, and containing an arsenal. Other towns are La Flotte and Ars. The coast is rocky, but has several good harbours and two lighthouses.

Reaction (from Lat. *re*, and *ago*, 'I act'), in politics or religion a backward tendency from reform or progress. It often arises, among those who have been but half converted to a cause, from disappointment at the smallness of apparent results, but it is the almost invariable consequence of injudicious or ill-timed change. It was a reactionary feeling which the Jesuits in the 17th c. availed themselves of to check the further spread of Protestantism, and it was this which reconciled the French to the imperialism of the first Napoleon.

Reaction is the term employed in medicine and surgery to designate the process of recovery from a state of collapse. The immediate symptoms of collapse are followed by R., and in this stage the prognosis mainly depends upon the rapidity of the recovery, and on the character of the pulse when R. is established. See SHOCK.

Reade, Charles, son of Mr. John Reade of Ipsden, the most popular squire of Oxfordshire, was born in 1814. Educated by private tutors, he entered Magdalen College, Oxford, as demy, or scholar, and in 1835 he graduated third class in classics. He then obtained a fellowship from his college, and afterwards held the Vinerian Fellowship. He also obtained the degree of D.C.L., and was called to the bar, Lincoln's Inn, 1843. The first of his books were *Christie Johnstone*, a tenderly-wrought picture of Scottish life, and *Peg Woffington*, a piece of historical realism which at once raised him high in the ranks of novelists. These appeared in 1853, and were followed by a still greater success—*It is Never too Late to Mend* (1856); *The Course of True Love*, and *White Lies* (1857); *Cream*, containing *Jack of All Trades* and *Autobiography of a Thief* (1858); *Love me Little, Love me Long* (1859); *The Eighth Commandment* (1860); *Cloister and Hearth* (1861); *Hard Cash* (1863); *Griffith Gaunt* (1866); *Foul Play* (1868); *Put Yourself in His Place* (1870); *A Terrible Temptation* (1871); *A Simpleton* (1873); *The Wandering Heir* (1875); *A Hero and Martyr* (1876); *A Woman-Hater* (1877). No novelist of the day excels R. in discriminative appreciation of character, or sense of dramatic fitness. His style, terse and epigrammatic, is to be compared for effect to that of no contemporary except Victor Hugo, whom R. rivals in egotism and eccentricity, even more than in genius. Almost all his novels are written with a serious purpose—e.g., *Hard Cash* exposes the system of private lunatic asylums, and *Never too Late to Mend* that of convict prisons. R. has worked along with Tom Taylor on several plays, the most noted of which are *The King's Rival* (1854) and *Masks and Faces* (1854). His other dramas are *Gold* (1850); *Two Loves and a Life* (1854); *Wandering Heir* (1875); *The Scuttled Ship* (1877).

Reading (Celt. *rhyd*, 'a ford'), the county town of Berkshire, stands on the Kennet, just above its junction with the Thames, 35½ miles W. of London by rail. It has three parish churches—St. Lawrence, a good Perpendicular structure (restored 1868), St. Mary's (1551; restored and enlarged 1864), and St. Giles's (restored 1872), whilst the finest of its seven district churches are the cruciform Gray Friars (rebuilt 1863), Christ Church (1862), All Saints' (1864-74), and St. John's, with a spire of 172 feet, rebuilt in 1874. Among the public edifices are the Assize Courts (1861); the new Municipal Buildings (1876), with a tower of 100 feet, containing a carillon; the Royal Berkshire Hospital (recently enlarged); and the Grammar School (founded in 1486; rebuilt 1870-71), which (1878) has 8 masters and about 150 boys. Plans were approved in April 1878 for a new town-hall, to comprise a free library, reading-rooms, museum, and schools of science and art. New drainage-works were completed in 1874, and waterworks in 1878. The ruined abbey, with its fine Norman gateway (restored 1861), is surrounded by beautiful public gardens; and there are also recreation grounds of about 22 acres, 13 of which were presented to the town in 1876 by Mr. Alderman Palmer, now (1878) M.P. for R. Two world-famous establishments at R. are the biscuit factory of Huntley & Palmer, employing 2500 workpeople and using 1000 sacks of flour weekly, and Sutton's seed emporium, which covers 5 acres, and in 1877 sent out grass-seed enough for 28,000 acres. There are also extensive ironworks, breweries, flour-mills, &c. R. sends two members to Parliament, and has three weekly newspapers, of which the *Mercury* was established in 1723. Pop. (1871) 32,324. Occupied by the Danes in 871, R. rose into importance under Henry I., owing to his foundation (1121) of a stately Benedictine abbey. Four parliaments met

at R. in the reigns of Henry VI. and Edward IV.; and in the Great Rebellion it was held alternately for King and Parliament, being taken by Essex after an eight days' siege (1643). See the Histories of R. by Coates (Lond. 1802) and Man (1816).

Reading, a city of Pennsylvania, U.S., on the E. bank of Schuylkill river, 128 miles W. of New York. The streets are well laid out and kept scrupulously clean, and excellent water is abundant. There are some very costly churches, excellent schools, two handsome opera-houses, a number of fine hotels, a court-house and public offices, and three daily and several weekly newspapers. R. has blast-furnaces, rolling-mills, foundries, wool, cotton, nail, and other manufactures, flour and saw mills, and large coal trade. A great railway riot took place here in June 1877. Pop. (1870) 33,930.

Real (Lat. *realis*, from *res*, 'a thing'), a term used in English law. Property in England is legally divided into *R.* and *personal*. *R.* property comprehends lands and houses and such other things as are permanent and immovable. Things *personal* include things movable and all other things which lack the two requisites of a *R.* estate—permanency and immobility. There is also a subordinate division of personal estate, or chattels, into chattels *R.* and chattels *personal*. The former are interests issuing out of or annexed to *R.* estates, such as the right of presenting to a church. The latter are such articles as household furniture, money, jewels, &c. Actions and suits in English law are also divided into *R.* and *personal* according to their object. The similar but not identical term of Scotch law is *Heritable and Moveable* (q. v.). In England, a mortgage is personal property and goes to the personal representative; while in Scotland a security affecting heritable, that is *R.* property, is heritable and descends to the heir.

Real (Span. 'royal'), a current Spanish coin, valued at 100 to the pound sterling, or equivalent to nearly 2½d. It is divided into 100 centimes, and is equal to ¼th of a piastre. The *R.* was first coined in Spain in 1497, and was introduced into Mexico, Peru, and other old Spanish possessions. In these New World republics the name still survives, though it is no longer retained as an official coin. In Portugal it is also used as money of account, being equivalent to 40 reis.

Realgar is a native ruby-red sulphide of arsenic occurring in Hungary, Transylvania, the Harz, and other localities, in prismatic crystals, massive or disseminated. *R.*, prepared artificially, is used as a pigment, and in making coloured fires.

Realism. See NOMINALISM.

Real Presence of Christ in the Sacrament of the Eucharist is held by the different denominations of Christians in various senses. According to the Roman Catholic doctrine of Transubstantiation (q. v.), Christ is present by the bread and wine being actually changed into his body and blood. Lutherans, in their doctrine of Consubstantiation (q. v.), hold the doctrine of the *R. P.* as firmly as the Roman Catholics, only the body and blood of Christ are with, in, and under the bread and wine. Calvin, while denying the *R. P.* in the sense in which it was maintained by Romanists and Lutherans, yet affirmed that the body and blood of Christ were *dynamically* present in the Lord's Supper (q. v.). From the glorified body of Christ in heaven there radiates an influence of which believers, in the Lord's Supper, are the recipients. The Calvinistic doctrine on this point, which was at first carried as near to Lutheranism as possible in order to avoid a schism, was afterwards modified to meet Zwinglianism, which can hardly be charged with affirming the *R. P.* in any sense; but even in the Westminster Confession a certain kind of *R. P.* is affirmed:—'The body and blood of Christ . . . (are) as really, but spiritually, present to the faith of believers in that ordinance, as the elements themselves are to their outward senses.' In the famous Bennett case, heard in the Privy Council (1871), the Archbishop of York, in delivering judgment, said that the Church of England holds and teaches 'a presence of Christ in the ordinance to the soul of the worthy recipient, but as to the mode of the presence she affirms nothing, except that the Body of Christ 'is given, taken, and eaten in the Supper only after a heavenly and spiritual manner,' and that 'the mean whereby the Body of Christ is received and eaten is faith.' See Hodge's *Syst. Theology* (Edin. 1873), Blunt's *Dict. of Doct. and Hist. Theology* (Lond. 1872).

Real Schools (Ger. *realschulen*), in Germany, are secondary schools giving a general *practical* training, and are thus distinguished from *Gymnasias* (q. v.), which lay the foundation of a general *philosophical and liberal* education. A. H. Francke (q. v.), at the Halle Orphanage, made the first attempt to place 'Realia' on a level with classical studies. His method was carried out by Semler in his 'Mathematical and Mechanical Real School' at Halle, between 1706 and 1740, and Semler's assistant Hecker founded at Berlin in 1747 the 'Economic-Mathematical Real School,' which was favoured by Friedrich the Great, and named by him the 'Royal Real School.' The ascendancy of Philanthropinism, with its worship of bare utility, checked the movement for a time, but in 1822 Spilleke's reconstruction of the Real School at Berlin laid a firm basis for the modern system. The subjects of instruction in *R. S.* are mathematics, the natural sciences, and modern languages. The controversy excited by the demand to enforce at least Latin on the *R. S.*, which led to the foundation of 'Real-Gymnasias,' aiming at a union of both methods, was settled in 1859, by the enforcement of Latin in *R. S.* of the first order in Prussia and Saxony. Another agitation is now going on for the opening up to boys trained at *R. S.* the special studies and professions hitherto requiring gymnasial culture. *R. S.* of the second order want the two highest classes belonging to *R. S.* of the first order, while the 'Higher Burgher Schools' are simply lesser *R. S.*, with a three years' course (from the age of 12 to 15). In 1877 there were in Prussia 84 *R. S.* of the first order (14 in Brandenburg). Austria, during the school year 1876-77, had 60 'Real-Gymnasias,' and such other institutions, with 970 teachers and 12,230 pupils. In Lombardy and Piedmont, *scuole reali* were founded in 1851, divided into two grades, which in 1859 were reconstituted as *scuole tecnici* and *istituti tecnici*. Switzerland, in 1873, had 41 *R. S.*, with 3800 pupils. In 1864 an imperial decree classed all the gymnasias of Russia as 'Classical' or 'Real-Gymnasias.' A statute of the 27th May 1872 replaced the latter with *R. S.*, from which the ancient classics are entirely excluded. In 1876 they numbered 44, with 8308 pupils. See Loth, *Die Realschul-Frage* (Leips. 1870), Kreissig, *Ueber Realismus und Realschulwesen*, Gallenkamp, *Die Reform der Höheren Lehranstalten* (Berl. 1874), and (against *R. S.*), Laas, *Gymnasium und Realschule* (Berl. 1875).

Beam, a quantity of paper containing 20 quires of 24 sheets each; that is, 480 sheets in all. A *R. perfect*, for printers' use, contains 21½ quires, or 516 sheets.

Reaping (from Old Eng. *ripan*, 'to pluck,' connected with *reafian*, 'to seize'; cf. Lat. *rapere*) is that part of harvesting operations which is concerned with the cutting down of cereal crops and grasses. In addition to simple cutting down, *R.* embraces the collateral operations of binding and stooking the grain, and generally of preparing crops for carrying from the field. Although from very remote times innumerable attempts have been made to devise and apply machinery to the operations of harvesting, down till quite recent years the implements employed in *R.* were of the most simple and primitive type, and indeed to a large extent these obtain still. That strenuous efforts should have been made to introduce improved appliances is not to be wondered at, seeing that while economy of labour is of great consequence, the security of the crops with promptitude at the proper time and under favourable conditions of weather are matters of the highest importance. The possibility of using machinery in *R.*, however, depended to a large extent on the perfection to which other agricultural operations were brought; and it was only when advanced systems of farming came to be practised that *R.*-machines were found to be practically available. The implement used from the most remote antiquity for cutting down crops was the sickle or *R.*-hook, a simple apparatus consisting of a hook-shaped knife of steel fastened in a handle, which the reaper seizes with one hand and thrusts into the ripe grain immediately above the ground, while the other hand holds the stalks against its edge till they are cut. In modern times three forms of sickle are in use, the ordinary smooth-edged, the saw-edged, and the heavy or bagging sickle. It is evident that the work of *R.* with the sickle must necessarily be slow, while the manual labour in the stooping position necessary is severe. Still a large quantity of grain is annually cut down with this little implement, large bands of reapers yearly migrating from Ireland to the harvest in the grain-growing districts of England and Scotland. A modi-

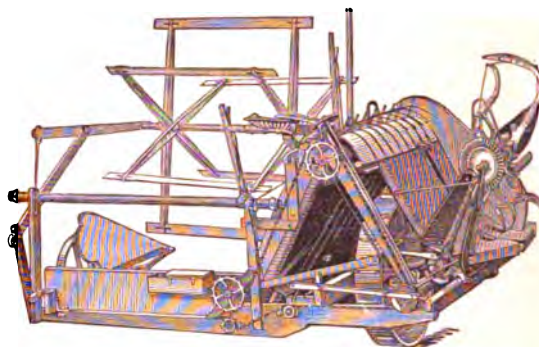
fied form of bagging-hook, or rather half hook, half scythe, both in form and action, is the Hainault scythe, which consists of a heavy knife attached to a long handle or shaft, by which the reaper is enabled to stand upright and cut down the corn by striking the knife-edge forcibly against it, the shorn grain being then collected into a sheaf by means of a hook. The various forms of scythe are in labour-saving qualities a great improvement on the sickles, and for many years on large farms the scythe supplanted the R.-hook till, in its turn, it was also thrown aside for the R. machine. In R. with the scythe the grain cut down is caught by a cradle or hoop attached to the handle and heel of the blade, carried forward, and thrown up against the line of standing corn. Three persons at least are required in R. with the scythe—the scytheman, a female lifter who gathers the corn into sheaves and makes a band for banding them, and a bandster who follows, tying up the sheaves and stooking them.

The number of R. machines which have been proposed at various periods is beyond all computation; but some indication of the activity of invention may be gathered from the fact that down to the year 1866 not less than 1000 patents were sought in Great Britain alone for R. machines or for various details connected with them. It would be a mere waste of space to attempt to give any account of the various systems put forward, not one of which was successful, even experimentally, till the Rev. Patrick Bell, in the year 1826, invented his apparatus. The essential mowing principle in Bell's reaper was the cutting of the straw by means of shears, and in all subsequent machines that principle has been adopted, although its mechanical details have been much improved. The original model machine made by Mr. Bell himself is now preserved in the Museum of Science and Art, Edinburgh, and from that model it will be seen that the inventor's first idea was simply fitting a series of reciprocating scissors or cutters on a broad frame. Subsequently the cutters were so modified that the upper blades, thirteen in number, were immovably fixed to the cross bar, under which played twelve movable blades, the whole so geared that when the machine was put in motion they formed a continuous series of open jaws, opening on the one side when closing on the other, so that the cutting was effected against both sides of the upper blades alternately. An endless web of cloth having a transverse motion, and mounted angularly behind the cutters, caught the cut grain and delivered it at the off side. The first modifications of Bell's machine which received much attention were Hussey's and M'Cormack's reapers, both of American origin, and indeed since the machines were first introduced, American inventors and manufacturers have done very much for their development and improvement. In consequence of that activity, reapers of American manufacture are in extensive use in Great Britain, the European Continent, and, indeed, throughout the world.

The general features of all R. machines as now made are the same, individual manufacturers modifying only the method of mounting delivering gear and other details. The usual construction consists of a drawing wheel fixed to one side of the machine, to which is attached a spur wheel working into a series of small toothed wheels, which increase the slow speed of the periphery of the wheel to the fast motion necessary for driving the cutting knives. The knives differ somewhat in shape, but generally consist of a series of triangular pieces of steel riveted to a bar of iron, in some instances serrated on the edges. The knife bar is attached to a crank by means of a connecting-rod, and this crank, which makes about 700 revolutions in a minute, receives its accelerated motion through a train of wheels in direct communication with the large driving-wheel. The knife bar moves backwards and forwards on guides fixed at the back of a number of pointed fingers, which enter the corn crop and guide the straw to the edges of the cutting knife. A platform is fixed at the back of the cutter-bar which receives the corn as it falls from the knives. In most cases a revolving rake with four inclined arms is attached to such machines, and set in motion by the main driving wheel. Two of the arms act as gatherers for bringing the corn well on to the knife, and the others as rakes for delivering the cut corn at the back of the machine.

The most recent notable addition to the R. machine consists of an apparatus for binding the sheaves, several forms of which have been suggested. That, however, devised by Mr. W. A. Wood of New York has been practically the most successful, and there can be no doubt that the binding apparatus will soon be looked on as an essential feature in any reaper. In Mr.

Wood's reaper and binder there is an endless apron which receives the grain as it is cut and deposits it in a trough on the



Wood's Self-Binding Harvester.

outer side of the machine. In this trough by an ingenious and effective mechanical arrangement the loose straw is caught and compressed between two iron arms, wire from a reel is passed round the compressed sheaf, the wire is fastened by twisting, cut away, and the bound sheaf is then tossed out of the trough by one of the arms with which it was compressed.

Reason (Lat. *ratio*, from *reor*, 'I think') is a word used to signify (1) all the intellectual powers, taken together; (2) those intellectual powers which differentiate man from the brute, (3) the faculty of reasoning, (4) the premisses or premisses of an argument, (5) a cause—as when we say that electrical disturbance of the atmosphere is the reason of thunder. The distinction between men and brutes as rational or irrational is now being abandoned. Coleridge refines upon it by saying that in the lower creatures 'there may be understanding, but there is nothing of R.,' his R. being that of Kant, which deals with the supersensible world of ideas, while his *understanding* deals with the sensible world and conceptions. This pure R. holds the same relation to understanding that perception holds to sensation. By the understanding we inquire into grounds, causes, conditions of phenomena; but by the R. we inquire into the *ultimate* grounds, causes, or conditions of these phenomena. See DEDUCTION, INDUCTION, SYLLOGISM, &c.

Reaumur, René Antoine Ferchault de, a French physicist and zoologist, was born February 28, 1683, at La-Rochelle. He went to Paris in 1703, soon attracted attention by three geometrical memoirs, and became in 1703 a member of the Academy of Sciences. He had a special genius for inventing practical methods, and turned his attention to a number of different projects, such as the manufacture of steel, the tinning of iron, the manufacture of porcelain, &c. He is best known as the inventor of the spirit-of-wine thermometer, and of the thermometer scale which is still popular in Germany (see THERMOMETER). He died at his estate of Bermondière in Maine, October 17, 1757. His most important work is the *Mémoires pour servir à l'Histoire des Insectes* (6 vols. 1734-42).

Rebate, or **Rabbet**, in carpentry, a rectangular groove cut longitudinally along the edge of a piece of wood to receive the edge of another piece or pieces. The recess in a door frame into which the door shuts is a familiar example of a R.

Rebec, or **Rebeck**, an old three-stringed instrument like a fiddle, which was in this country the precursor of the viol.

'While the merry bells ring round,
And the jocund rebecks sound.'—Milton's *L'Allegro*.

Rebellion (in law). The difficulty which law has to contend with regarding R. is this, that when part of the subjects of a state take arms against the authorities in power, whether the fact is to be regarded as R. depends on the force of the insurgents, or on the issue of the struggle. If the contending powers are each strong enough to carry on a protracted war, policy and humanity will lead each to award belligerent rights to the other; to award quarter to those who surrender, and to spare the lives of captives. Yet, the war being finished,

the victors may regard the vanquished as rebels. Thus, in the recent conflict in the United States, the North awarded belligerent rights to the South, yet the Northern doctrine, though it has been mercifully applied, continues to be that the Southern states were rebels. Wheaton in his *Elements of International Law* suggests the following principles:—(1) The courts of a state must treat rebels as criminals. (2) The fact that the state has treated rebel prisoners as prisoners of war, and has claimed as regards neutrals the privileges of a state of war, does not affect the first rule. (3) A foreigner holding a rebel commission takes his chance of being treated as a rebel, or as a belligerent. (4) A foreigner carrying on naval war under a rebel commission, takes his chance of being treated as a pirate, or as a belligerent, by his own nation, and by all others. (5) That though the parent state have awarded belligerent rights to insurgents, yet that their doing so concerns internal state policy only, and that the mode of action may be changed at any time. Of course the rebels will not award any rights to their opponents, or to those assisting them, or to neutrals, which opponents and neutrals do not award to them; and if the rebels succeed, then they have just such privileges of success as the parent state would have had had it succeeded.

Rebus, a species of pictorial hieroglyphics, said to be named after the squibs on passing events ('de rebus quæ geruntur') composed by the clergy of Picardy for the yearly carnival. In the Middle Ages many knights and ecclesiastics employed as cognisances rebuses punning on their names; thus the Lyharts bore a stag couchant, the Derings a deer and ring, and so on. At present the R. serves chiefly for padding in our lighter magazines, and the following may stand as a good representative of its kind: On the letters S T a gorgeous cockatoo sits perched, whilst beneath is a wretched moulting bird, the solution being: On ST (honesty) is the best Poll I see (policy).

Récamiér, Jeanne Françoise Julie Adelaïde Bernard, one of France's most distinguished society queens, was born at Lyon, December 4th, 1777. Her father, a banker at Lyon, in 1784 removed to Paris, where he filled an important position in the Post-Office, and where his wife succeeded in drawing around her a large and fashionable circle of friends. Among these the dazzling beauty of Mademoiselle Bernard raised general admiration, and while yet a child she received, through her parents, several offers of marriage. Left entirely to her own choice, in her fifteenth year she married M. Récamiér, a rich banker, nearly four times her age. Under the fatherly protection of this husband, she quickly assumed the leading position in society which her beauty and her manners were so calculated to obtain; and wisely making friends of her feminine rivals, such as Madame de Stael, whom she entirely eclipsed in the affections of all except the blind, she threw her net of fascination over men so skilfully that few escaped. Of the number of scholars and men of the world who remained through life her firm friends, nearly all commenced their intimacy with her as lovers. But she never allowed their devotion to compromise either themselves or herself. The Duc de Laval's quotation wittily describes her influence on these admirers—

'Ils ne mouraient pas tous, mais tous étaient frappés.'

Prudent in everything except politics, Madame R. seemed formed for an object, not so much of intense passion, as of general esteem. Her capability of loving was perhaps small, but her capability of pleasing was infinite. Sainte-Beuve declares that if coquetry was hers, it was the coquetry of an angel. Adrien and Matthieu de Montmorency, Bernadotte (afterwards king of Sweden), General Moreau, Benjamin Constant, and J. J. Ampère were her most faithful adorers. But the only suitor whom she favoured in her youth was Prince August of Prussia, nephew of Friedrich the Great, and a royal prisoner in France. Madame de Stael introduced him to her friend, who agreed to marry him, and asked her husband for a divorce. Her husband had by this time lost nearly all his wealth. The assent he gave to her request touched her with commiseration for his misfortune; and she never fulfilled her strange engagement with the brave, handsome prince. In 1811 she was exiled from Paris by Napoleon; and she did not return till the Restoration. The only man besides the Prince on whom she seems to have bestowed real affection was Chateaubriand. Him, too, Madame de Stael introduced to her, but on her deathbed. When Madame R. had retired in comparative

poverty to the Abbaye-aux-Bois, she carried her society with her. Chateaubriand transferred all the attentions he had bestowed on De Stael to her beautiful friend; and for the last twenty years of her life she lavished her undivided solicitude on this hypochondriac. It was a strange ending for both. Chateaubriand became a widower in 1846, and wished to marry her. She, too, was widowed, but she preferred to remain his friend. He died July 4, 1848, and Madame R. died May 11, 1849. Gerard painted a portrait of her in her girlhood; Canova (whom she met at Rome in 1813) executed a bust of her; and Achille Devena made an exquisite sketch of her on the day of her death. See *Souvenirs et Correspondance tirés des Papiers de Mme. R.* (2 vols. Par. 1859); and *Mme. R., les Amis de sa Jeunesse et sa Correspondance intime* (Levy, Par. 1873), understood to be edited by Mme. R.'s niece.

Receipt' is a legal acknowledgment of money received in discharge of a debt or obligation. In English law a R. is not necessarily a written document; it may be constituted by the evidence of witnesses who can swear to the payment of the money. In Scotland such evidence is not admissible, if the debt itself is created by writing. When the written R. is for more than £2, a penny R.-stamp is necessary to the validity of the discharge.

Receiving Stolen Goods, knowing them to be stolen, makes the offender Accessory (q. v.) to the theft. The crime may be a misdemeanour or a felony, rendering the criminal liable to imprisonment or to penal servitude of not fewer than three, or more than fourteen years. The police in London have in certain cases power to enter premises in search of stolen goods. Anyone who prints or publishes an advertisement for the return of stolen goods, *without questions being asked*, or to that effect, is liable to be fined £50. But no action can be begun without the consent of the Attorney- or Solicitor-General. The corresponding term of Scotch law is *Reset of Theft* (q. v.).

Recent, in geology, is a general term applied to deposits later than the glacial age, and is therefore equivalent to what is ordinarily known as the Human Period. See **PLEISTOCENE**, which includes all formations later than the Pliocene (q. v.).

Receptacle, or **Torus**, in botany, is the extremity of the peduncle (above the calyx), upon which the corolla, stamens, and ovary are inserted. It is sometimes little more than a mere point or minute hemisphere, but is often also more or less elongated, thickened, or otherwise enlarged. R. is also applied, in a capitate Inflorescence (q. v.), to the short, flat, convex, or conical axis on which the flowers are seated.

Receptaculites, a curious fossil organism of doubtful nature. It is referred by most authorities to the *Spongiata* or Sponges, but some maintain its affinities with the Foraminifera, or the corals. The fossil remains of R. occur in Lower and Upper Silurian strata. They are of cylindrical, ovoid, and discoid shape. The bodies are hollow, and have an aperture on their upper surface. Below, a thickened portion seems to indicate the original *nucleus* or beginning of the organism, the walls of which exhibit an outer and inner layer, with a spicula layer between. The inner layer is pierced by numerous apertures.

Reception of a novice is a ceremony, consisting of laying aside the ordinary dress, being invested by a bishop or priest with the novice's habit, which has first been blessed, and of having the hair cut off. This ceremony takes place after the individual has passed a few months as a Postulant (one desirous of being taken into an order), but is not to be confounded with the final R. into the order, which takes place at the end of the Novitiate, or period of probation, and which is called 'profession.' See **NOVICE**.

Reciprocal. In algebra, two quantities are said to be reciprocals of each other when their product is unity. Thus, the R. of a is $\frac{1}{a}$, and of $\frac{1}{10}$. In modern geometry, the theory of R. polars leads directly from a given proposition to another which is known as its R. See **POLE** and **POLARS**.

Recitative' is musical declamation. Something of the kind was common in the Greek theatre. Modern R. grew probably from the *aria-parlante* in which poems were recited, and was

introduced into opera at the beginning of the 17th c. by Jacopo Peri. For a long time the harpsichord, subsequently the violoncello, was used to accompany R., but in modern music the whole string band usually plays soft four-part chords throughout. *Recitativo Secco* is simple R. when unaccompanied or only supported by plain chords. *Recitativo Obligato* has pronounced an elaborate accompaniment. When the R. approaches the *aria* in melody, it is called *recitativo Arioso*.

Reclaim', in Scotch law, means to appeal from the judgment of the Lord Ordinary to the Inner House. The initiatory act of the appeal is termed a *reclaiming note*. See COURT OF SESSION.

Recluse'. See EREMITES, ASCETICISM, ANCHORITES.

Recognisance is an obligation with one or more sureties entered into before a court of record, or magistrate, to do, or to refrain from doing, some specific act. In default, the R. is forfeited to the crown, and the principal and his sureties may be sued for the sums to which they are respectively bound. Justices of the peace may enforce R. at their own instance, or they may grant it at the instance of another.

Recoil' (from Fr. *reculer*, 'to fall back'), in gunnery, is the backward motion of a cannon at the instant of firing, caused by the reaction of the projective force of the explosion. The momentum with which the projectile leaves the cannon is equal to the momentum with which the cannon recoils. The much greater mass of the cannon, and the resistances to its motion which arise from friction and its weight, render its velocity much smaller than the velocity with which the projectile travels. The peculiar action of the Moncrieff gun-carriage depends upon the R., which forces the gun backwards and *downwards*, so that it may be reloaded with greater security for the gunners.

Recoll'ets (Fr., from Lat. *recollectus*, 'gathered together') is a name which seems to have been given to reformed bodies of various monastic orders in the 16th c., and especially to the Reformed Franciscans, who received this name in France, that of *Reformati* in Italy, and that of *Discalceati* ('bare-footed') in Spain, and were established as a separate association by Pope Clement VII. in 1532.

Reconnaissance, an examination of a place with a view of facilitating military or naval operations. Reconnaissances are of two kinds, (1) Offensive, and (2) Topographical or defensive. (1.) Offensive reconnaissances may be carried on either secretly or openly. In the former case the reconnoitering party usually consists of a small mounted body of men, commanded by an officer, who advance as near to the enemy's position as possible. Open offensive reconnaissances are conducted by a general officer at the head of a considerable mass of troops, and are sometimes called 'armed reconnaissances' or 'reconnaissances in force.' They are experimental movements made in order that the strength of the enemy at a particular place may be ascertained, or for strategical purposes. When it is desired to discover if a town or village is occupied by the enemy, it is usual to send a body of horsemen at full gallop through the principal street. (2.) Topographical or defensive reconnaissances are undertaken by staff officers for the purpose of obtaining information relative to the country. The qualifications required are of a high order. A reconnoitering officer should be able to judge distances correctly, to make a good rapid sketch, carefully noting the hills, woods, roads, the direction and depth of streams, bridges, canals, towns, villages, isolated buildings, and all the main features of the country, and to write a clear and accurate description, detailing its resources and capacities for maintenance of horses and troops, and the comparative healthiness and suitableness for occupation and defence of the various positions. A knowledge of the language of the country is very desirable. Reconnaissances should be made by naval and military officers before the disembarkation of troops as to the anchorage, depth of water, nature of the beach, and other salient points. Classes of instruction in reconnoitering have been established at the various military stations in connection with the Intelligence Department of the War Office. Mr. Archibald Forbes, the distinguished war correspondent of the *Daily News*, has suggested that instead of the men being drawn from various services, a special reconnaissance corps should be formed in the British army.

Rec'ord, in law, denotes the written averments and pleas of parties in a litigation, forming the basis of the future argument and decision of the cause. The higher courts of England file the records of a suit, hence they are called courts of R. They alone have authority to fine or imprison for *Contempt of Court* (q. v.) under CONTEMPT. Trial by R. means that one of the parties to a suit or action pleads in his favour the R. of a former case. Should the other party deny the plea, then the R. relied on must be produced.

Recorde, Robert, M.D., a physician and mathematician, was born at Tenby, Pembrokeshire, about the beginning of the 16th c. He studied at Oxford, and was elected a Fellow of All Souls' College in 1531. In 1545 he took his doctor's degree at Cambridge, and shortly after went to London, where he died in the debtors' prison in 1558. His chief works are *The Urinal of Physike* (1548), *The Ground of Artes; teaching the Worke and Practice of Arithmetike* (1549), *The Pathway to Knowledge, containing the First Principles of Geometrie* (1551), *The Castle of Knowledge* (1551), in which he compares the Ptolemaic and Copernican systems, to the benefit of the latter, and *The Whetstone of Witte, which is the Second Part of Arithmetike, containing the Extraction of Roots* (1557), a mathematical treatise which establishes his reputation as the foremost mathematician, after Vieta, of his time.

Recor'der, an old instrument of the flageolet kind.

Recor'der is in England a legal officer associated with the magistrates of a city or town corporate. He must be a barrister of not fewer than five years' standing. The duties of the R. are to try prisoners who have been committed for trial by Justices of the Peace. See QUARTER SESSIONS, COURT OF.

Rec'ords, Public. A record is defined by Lord Coke as 'an authentic and uncontrollable testimony in writing, contained in rolls of parchment, and preserved in courts of record.' By Act 1 and 2 Vict. c. 94, under the title Public Records are embraced all rolls, records, writs, books, proceedings, bills, warrants, accounts, papers, and documents whatsoever of a public nature belonging to Her Majesty. And by a comprehensive definition given by the Record Commission of 1836 the P. R. are said to constitute four great classes—(1) independent documents, such as *Domesday Book* or the *Valor Ecclesiasticus* of Henry VIII.; (2) a series of enrolments, as the *Close, Patent, and Charter Rolls*; (3) records which contain entries of judicial proceedings; (4) separate documents, such as letters, inquisitions, commissions, &c.

The R. were for the most part written on parchment, and till the time of George II. in the Latin language, except during the period of the Commonwealth, when English was substituted. The Parliament R. were mostly written in Norman-French. The custom of recording documents on rolls of parchment dates from a period subsequent to the Conquest.

Custody and Preservation of P. R.—In early times the R. of the courts, being part of the king's treasures, were preserved in his palace, but when the courts of law became stationary, the R., instead of being carried by the king from place to place, were deposited in their respective courts. The quantity of these R. increasing rapidly, further accommodation had to be obtained. Thus we find mention of the New Temple, the wardrobe of the Tower of London, the four Treasuries, afterwards consolidated into the Chapter House, and the Rolls Chapel, as repositories. The Tower, Rolls Chapel, and Chapter House, continued for many years the chief though not the only repositories, more accommodation being required. In the time of Edward I. a keeper of the rolls in the Tower was appointed, and frequent orders were issued by his immediate successors for the better care and preservation of the P. R. There were legislative enactments for the same object in the reigns of Queen Elizabeth, Charles II., and William III. But the most minute and full inquiry into the state of the P. R. was that made by the Committee of the House of Commons in 1800, and their report is the most exhaustive and comprehensive that has yet appeared. Upon that report the Commons presented an address to Geo. III. 'to give directions for the better preservation, arrangement, and more convenient use of the P. R. of the kingdom,' and that they, the Commons, would cheerfully provide whatever extraordinary expenses might be incurred. During

the next thirty years several other commissions were appointed. In the year 1836 a Select Committee was appointed to inquire into the affairs of the Record Commission, and as a result of their report the P. R. Act 1 and 2 Vict. c. 94 was passed, which placed the records in the custody of the Master of the Rolls, and eventually led to the establishment of the present Record Office.

The Record Office.—This office, built in 1856, stands on the Rolls estate between Chancery Lane and Fetter Lane. It now contains the R. formerly kept in the Tower, Chapter House, Rolls Chapel, and other places. In number, antiquity, and great historical value, these R. form a collection unsurpassed by that of any other country, and they are now so well arranged that any difficulty regarding their inspection has been removed. Chief among the documents is the *Domesday Book* (q. v.) of William the Conqueror. The *Court of Chancery R.* form an unbroken series from the time of King John, and the *Exchequer Rolls* date from the days of Henry II.; the *Close Rolls*, so called from being closed or sealed up, commencing with King John, and continuing to the present time, are documents of great importance to the historian, antiquarian, and for purposes of legal reference; the *Patent Rolls*, so called from being unsealed, also from the time of King John, illustrate almost every subject connected with the history and government of the country; the *Parliamentary Rolls*, from Edward I. to Henry VIII., give the transactions that took place during each Parliament; the *Great Roll of the Exchequer*, or *Pipe Roll*, contains the yearly accounts of the Crown revenues, the rent of lands, &c.; the collection of *Fines* are R. of the transfer of lands, &c., from Henry II. to 1833, when this kind of conveyance was abolished; the *State Papers* contain the Privy Council, Secretaries of State, foreign and other correspondence, and papers on domestic and ecclesiastical affairs. These, together with the *Charter*, *Coronation*, *Memoranda* and *Originalia Rolls*, the *Rotuli Hundredorum*, *Extenta Manerii*, *Testa de Nevill*, and the *Valor Ecclesiasticus*, a survey by Henry VIII. of the abbeys, monasteries, bishoprics, &c., in the kingdom, are some of the most important documents in the English national archives.

Scotland.—Prior to the return of David II. from captivity, the P. R. of Scotland are very fragmentary and incomplete. The earlier R. seem to have been wholly carried away by Edward I. None of these are now known to exist in Scotland. At the Reformation many valuable documents, preserved by the monks in the religious houses, were destroyed. In 1650, when Edinburgh Castle surrendered to Cromwell, the P. R. were removed to Stirling; but in the following year Stirling Castle, with 'all the R. of Scotland,' fell into the hands of the English, and by order of Cromwell were transported to the Tower of London. The legal documents were returned sometime between 1653 and 1657. The remaining R. which were of a historical and public character were ordered to be returned after the Restoration, but the vessel in which they were being conveyed to Scotland was wrecked, and though some of the documents were recovered, a great many valuable R. perished. Prior to 1787 the R. of Scotland were kept in a room under the Parliament-House, known as the Laigh Parliament House. On the completion of the General Register House in 1787, all the R. were removed thither. They are in the custody of the Lord Clerk Registrar.

The R. of Scotland include the Parliamentary and Privy Council Acts, the R. of the various courts of justice, Great Seal, Privy Seal and Signet R., the *Retours of Services*, dating from 1547, and the important and useful Registers of Sasines, of Inhibitions, and of Adjudications.

Ireland.—Ireland possesses no continuous series of R. Many valuable documents were destroyed during the wars which occurred in the island; others perished through the decay of age, the negligence of officials, and by fire; and many were carried off by successive governors on the expiry of their term of office; some of these are now found in the P. R. Office in England; others in the British Museum, Bodleian Library, &c. In 1810 a Commission was appointed for the care and preservation of the R. Its labours terminated in 1830. In 1867 the P. R. (Ireland) Act was passed, and a P. R. Office has been erected in Dublin.

Publication of the R.—In 1855 the Master of the Rolls received authority to prepare and print calendars and indexes to the R., state papers, and other documents in his charge, and already a large number of volumes of calendars, divided into

different series, have been published, and others are in preparation. In 1857 a plan for the publication of the ancient chronicles and memorials of the United Kingdom in a uniform series was submitted by the Master of the Rolls to Her Majesty's Treasury and adopted, and since that time about 70 vols. have been published, embracing the period from the earliest time of British history to the end of Henry VII. The publication of this series still continues. Among the more important of the early record publications may be mentioned *Domesday Book*, first published in 1783, and again in facsimile by photozincography in 1863; *Calendarium Inquisitionum post mortem* (4 vols.); *Statutes of the Realm* (11 vols.); the *Valor Ecclesiasticus* (6 vols.); *Rymer's Fadera* (1st ed. 20 vols.); *Proceedings and Ordinances of the Privy Council of England* (7 vols.). Issued under the direction of the Lord Clerk Register of Scotland may be mentioned the *Acts of the Parliaments of Scotland* (12 vols.); *Registorum Magui Sigilli regum Scotorum*; and the *Retours* (5 vols.); and recently *Historical Documents, Scotland* (2 vols. 1870); *National MSS. of Scotland* (1867-72); *Lord High Treasurer's Accounts* (vol. i. 1877); *Register of the Privy Council of Scotland* (2 vols. 1877-78); *Exchequer Rolls of Scotland* (vol. i. 1878). Others are in preparation.

See *Record Reports*, 1800 and 1836; *Annual Reports of the Deputy Keepers*; Cooper, *Account of the P. R.* (2 vols. 1832); Thomas, *Handbook to the P. R.* (1853); and Ewald, *Our P. R.* (1873).

It may be interesting and useful to glance briefly at some of the more valuable collections of foreign nations.

France.—The French archives accompanied the kings from place to place down to 1194, when their loss at the battle of Fréteval led to the establishment of the Trésor des Chartes in the Sainte-Chapelle of Paris. Louis XIV.'s ministers first classified the more important documents, and Louvois founded the Dépôt de la Guerre in 1668, Torcy the archives of state papers relating to foreign affairs in 1710, while in 1716 the R. of the royal household were deposited in the Louvre. Napoleon laid almost every royal collection of Europe under contribution for the aggrandisement of the Dépôt des Archives, but his spoils were mostly restored on the fall of the empire to their respective governments. The present Archives Nationales, in the Hôtel Soubise, were organised by Camus in 1790, and in 1858 comprised 300,000 charters, deeds, and other documents, divided into the four sections of history, the secretariate, the legislature, and the judicature. The Bibliothèque de la Ville possesses a considerable series of historical and political R., bequeathed by Thouret; and the departments also have each their special archives, in which are preserved many valuable documents of suppressed institutions and the former provinces. See H. Bordier, *Les Archives de France* (1855); *Musée des Archives Nationales* (1872); and *Collection des Inventaires sommaires des Archives départementales communales et hospitalières* (1862 et seq.).

Spain.—The Royal Library at Madrid includes among its 100,000 volumes the secret correspondence of Gondomar, ambassador to the court of James I., and also autograph letters from English lords, ladies, and gentry who were in receipt of Spanish pay. These have furnished Mr. S. R. Gardiner with much of the fresh materials for his *History of England from 1603 to 1616* and *Prince Charles and the Spanish Match*. Of even greater value, as shedding light on the marriage and divorce of Catharine of Aragon and on the struggle in the Netherlands are the Simancas Archives, a portion of which are now preserved in Paris, and which have in turn been utilised by Prescott, Froude, and Motley. Three volumes of a *Calendar of Letters, Despatches, and State Papers relating to the Negotiations between England and Spain, preserved in the Archives of Simancas and elsewhere*, have been edited for the Record Office—the two first, covering the period 1485-1525, by G. A. Bergenroth (1862-68); the third, in two parts, comprising the years 1525-29, by Don Pascual de Gayangos (1873-77).

Italy.—The Archivio Centrale di Frari at Venice comprises some 14,000,000 documents, the earliest dating from 883. They form 8,664,709 stitched quires, are divided in 1890 departments, and fill 298 rooms. Of this unrivalled collection Ranke, in the introduction to his *History of England*, says: 'A rich harvest of independent reports has been supplied me by the archives of the ancient Republic of Venice. The *Relations*, which the ambassadors of that republic were wont to draw up on their return home, invaluable though they are in reference to persons and the state of affairs in general, are not, however, sufficient to

supply a detailed and consecutive account of events. But the Venetian archives possess also a long series of continuous reports, which place us, as it were, in the very midst of the courts, the capitals, and the daily course of public business. For the 16th c. they are only preserved in a very fragmentary state as regards England; for the 17th they lie before us, with gaps no doubt here and there, yet in matchless completeness.' Six volumes of a *Calendar of State Papers in the Archives of Venice and other Libraries of Northern Italy*, extending over the period 1202-1556, have been edited for the Record Office by Mr. Rawdon Brown (1864-77). The late Sir T. D. Hardy, in his *Report upon the Documents in the Archives and Public Libraries of Venice* (1865), confines himself to the three collections of the Frari, the Marcian Library, and the Correr Museum, and calls especial attention to documents in the first relating to Catharine's divorce and to Cardinal Pole. The archives of the Vatican, first mentioned under Damasus I., are arranged somewhat chaotically in eleven rooms, and comprise a vast number of important documents, especially of the middle ages—registers of the papal acts, letters of the Popes from Innocent III. to Sixtus V. in 2016 volumes, and correspondence with nuncios and foreign nations. They offer an immense field for future research, having been only partially explored by Ranke, Raumer, Reumont, and in 1876 by Mr. Stevenson. Also at Rome, in the Church of S. Maria in Campo Marzo, are established the new Government Archives, which include the charters and documents of ex-papal authorities, suppressed monasteries, &c. The Archivio di Stato at Pisa possesses 15,994 parchment charters (one granted by Friedrich Barbarossa in 1162, another by Richard Cœur-de-Lion in 1192); the Central Archives of Tuscany—140,000 documents, arranged by Bonaini—are stored in the Biblioteca Nazionale at Florence; at Milan, the Palazzo del Censo ed Archivio contains part of the Government archives, chiefly relating to the history of the city; and the University of Bologna has a large number of ancient documents on papyrus, the *Codex Diplomaticus Bononiensis* amongst the number. At Naples the monastery of S. Severino has been since 1818 the depository of the archives of the kingdom, which include some 40,000 parchment MSS. (the oldest in Greek) dating from 703. The documents of the Angevin period number 380,000, and fill 378 volumes; and lastly, the Monte Casino Archives, rich in materials for the history of Naples, Apulia, and Calabria, occupy three apartments, and comprise 40,000 deeds and records of various kinds, charters, papal bulls, &c., dating from the 8th c. downwards.

Germany.—The archives of the towns rarely extend beyond the 12th, or of the great princely houses beyond the 13th c. The former German Empire stored its R. in four different localities—Frankfurt, Wetzlar, Regensburg, and Vienna, but only those of the last-named city have been partially utilised by Don Gayangos for the Simancas Calendar. At Königsberg are preserved the archives of the Teutonic Order, those of the Hanseatic League at Lübeck, of the Suabian towns at Ulm, and of the Rhenish towns at Speier. See Seizinger, *Grundzüge der Bibliothekswissenschaft* (Dres. 1863).

Switzerland.—The public library of Berne has 3200 MSS., many of which relate to the affairs of Switzerland generally and the Canton of Berne in particular; while the 1200 MSS. contained in the cantonal library at Aarau are of great value for both French and Swiss history.

Holland.—The historical documents in the Royal Library of the Hague are very numerous, and furnish rich materials for the history of France as well as of the Low Countries. Motley calls especial attention to a series of pamphlets known as the 'Duncan Collection,' the source from which he drew that great variety of details which gives colour and interest to his narrative.

Belgium.—The Archives Générales du Royaume form the second of the collections of Brussels, uniting the character of a library of MSS. and of a state-paper office. The documents numbered, in 1838, 130,394, extending from the 12th to the 19th c., and classified in 57 divisions. They are of high historical importance, and have been well arranged by M. Gachard. See his *Notice sur le Dépôt des Archives du Royaume de Belgique* (Bruss. 1831).

The *P. R. Office* of Norway is in the Storting edifice, Christiania. It contains a large collection of documents, consisting chiefly of State papers from the 16th to the 19th c. The *Diplomatic Collection*, which is arranged in a separate compart-

ment, comprises about 8000 documents and letters, 2000 of which are inscribed on parchment. This supplied materials for the important work, *Diplomatarium Norvegicum: Oldbreve til Kundskab om Norges indre og ydre Forholde, Sprog, Slægter, Sæder, Lovgivning og Rettergang i Middelalderen*, collected by Lange, Unger, and Huitfeldt, and published (1849 *et seq.*) at the public expense. The most valuable of the papers belonging to the period 1520-37 were originally at Munich, but on the application of the Norwegian government were restored to Norway in 1829. See Raine, *Historical Papers from Northern Registers* (Lond. 1873).

United States.—Sir Archibald Alison, in stating the half-truth that Americans will have to write their own history from foreign archives, is wrong in ascribing this to the 'utter disregard' in America 'of historical records and monuments.' Large collections of important documents are gradual and natural growths, and any neglect of political records of which the early colonists were guilty has been amply atoned by the zeal of their descendants. The various states have passed laws similar to that of Massachusetts (1826) enacting that 'all books and MSS. belonging to the Commonwealth, and now in any department of the State House, be collected, arranged, and deposited' in a State Library, and that a sum be annually appropriated for the purchase of 'books, MSS., and charts,' specially relating to the Commonwealth or the United States. These State libraries, maintained at the public charge, are intended primarily for the use of the legislatures and public officials, but are virtually accessible to all persons. As illustrative of their character, it may be stated that the library of Massachusetts contains the records of the General State Court from 1629 to 1777, which reflects the entire legislative and much of the religious history of the period; while that of New York has an important series of charters, commissions, letters-patent, &c., extending from Charles II.'s grant to the Duke of York, 1664, down to the period of the Independence. The first library of Congress, founded at Washington in 1800, was totally destroyed by the British army, 24th August, 1814. The valuable collection of Mr. Jefferson bearing on the history and political affairs of America was purchased in 1815, and forms the nucleus of the present Congress Library. A collected series of the *Annals of Congress* has been published, since 1859, in an edition of 2000 copies. Of all current Congressional papers 500 copies are reserved to be bound, at the end of each session, into sets for the public libraries, historical societies, and colleges of the union.

Destruction of R.—By the law of the United Kingdom any one fraudulently taking away any record or legal writing relating to matter, civil or criminal, pending in court, is liable to penal servitude, under 24 and 25 Vict. c. 96. By the same Act, fraudulently to cancel or destroy a will may render the offender liable to penal servitude for life.

Recoveries and Fines. See FINE.

Recruiting (from Fr. *recruter*). The United Kingdom is divided for R. purposes into districts, under the charge of officers assisted by non-commissioned officers. The acceptance of a shilling or of any current coin of the realm from a R.-sergeant, with the knowledge that it is enlisting money, constitutes enlistment; but a recruit has within from 24 to 96 hours after his verbal agreement with the sergeant to appear before a magistrate, who attests his desire to enter the army, and swears him into the service. If the recruit then desires to cancel his engagement, he may do so on paying a fine of 20s. smart money, for the trouble he has caused, half of which goes to the enlisting sergeant. Recruits enlisted at the headquarters of an infantry regiment are enlisted for the subdistrict brigade to which the regiment belongs, and cannot be transferred to any other brigade without their own consent. If they are enlisted in a subdistrict they may be passed into the subdistrict brigade, or a brigade of any other R. subdistrict, or any other corps for which R. is open. Recruits may also enlist for general service, in which case they may be posted to any regiment of that arm of the service in which they enlist. Certain limits of ages, height, and chest measurement are fixed from time to time for recruits in the infantry, cavalry, and other branches of the service. Recruits may be enlisted for long or short service, the duration of these at present being 12 and 8 years respectively in the cavalry, artillery, and engineers, and 12 and 6 years in the infantry. Short-service soldiers have to serve the difference between the period of long and short service in the

army reserve. The number of recruits annually required under present arrangements in the British army in time of peace is from 30,000 to 40,000 men.

Rec'tifying is a process which consists simply in submitting any substance to a second distillation either to increase its strength or to free it from deleterious impurities. The complex forms of distillatory apparatus now in use in the distillation of alcohol, in many cases entirely obviate the necessity for any R. operation.

Rec'tor, in the Church of England, is a parish priest who, unlike a vicar, enjoys the whole of his ecclesiastical dues. The title is also borne by certain heads of colleges, schools, and hospitals, by the superior of a Jesuit seminary, and by a cleric appointed by the Pope to attend to the patrimony of the Church in different states.

Rec'tum, the terminal part at once of the *large intestine* and of the whole alimentary tract. In some animals (*e.g.*, certain Fishes, Reptiles, Amphibians, and Birds) the R. ends in a *cloaca* or chamber common to the alimentary, urinary, and generative systems. Even in the lowest mammalia (*e.g.*, *Ornithorhynchus*) (*q. v.*) the R. opens into a *cloaca*; but in all other quadrupeds it terminates in a distinct *anus* or *vent*. In *man* the R. attains a length of from 6 to 8 inches. It extends from the left *sacro-iliac symphysis* (or juncture of the sacrum (*q. v.*) with the ilium on the left side), and passes obliquely from left to right along the curve of the sacrum, inclining slightly backwards at its termination in the anus. Contrary to the etymology of the word, the R. is not straight in its course. It does not present a sacculated appearance like the *colon*, and dilates somewhat just above the anus.

Diseases of the R.—The rectum may be the seat of various affections requiring medicinal treatment or surgical interference. Those of most common occurrence are Hæmorrhoids or Piles (*q. v.*), Prolapsus Ani (*q. v.*), and Fistula (*q. v.*) in Ano; but there are other diseases of very frequent occurrence, the more important of which are the following:—

(1.) **Fissure, or Ulcer of the Anus**, is a little crack on the edge of the bowel, hardly implicating the whole thickness of the skin, and situated in the great majority of cases towards the coccyx. It is the seat of great pain, especially when the bowels act, and the obstacle to the healing of the ulcer is in the connection of the ulcerated skin with the sphincter ani. It is more common in women than men. The treatment consists in cleanliness, attention to the state of the bowels, and the application of some such stimulant as stick-caustic. The most satisfactory mode, however, consists in exposing the whole extent of the ulcer with a speculum, and then making an incision through its whole length and depth with a straight probe-pointed bistoury. If this fails, the division of the entire sphincter may be necessary.

(2.) **Pruritus Ani, or Itching of the Anus**, is often a troublesome affection, and in some cases may almost oblige the sufferer to renounce society. It is usually symptomatic of some digestive disorder, and may be cured by careful attention to the state of the bowels and the regulation of the diet. The local treatment consists of astringent and sedative lotions with scrupulous cleanliness.

(3.) **Polypus of the R.** is most common during childhood. Two forms are described, the vascular and the fibrous, but the difference is rather of degree than of kind. These polypi are often attached by long stalks to the bowel, so that when they float up into the gut they are imperceptible and cause no symptoms; but when they are carried down they are grasped by the sphincter, and this gives rise to pain and bleeding. The polypus may be detected by making the bowels act by an enema, when it will probably be seen as a small, red projection at the anus, or it may be felt and drawn down by passing the finger round the bowel. The removal of polypus is best effected by tying the base and cutting it off close to the ligature.

(4.) **Mucous Tubercles and Condylomata** are chiefly syphilitic affections, though they may proceed from the irritations of gonorrhœal and possibly other discharges. Mucous tubercles are small, perfectly flat, sessile elevations covered with a velvety or warty and moist epidermis. Condylomata are large, pedunculated projections covered with a foul warty surface, and exhaling a fetid moisture. They are frequently very vascular, and may bleed to an alarming extent when removed.

(5.) **Stricture of the R.** may be simple or cancerous, but

both are accompanied by the same symptoms of mechanical obstruction in proportion to their extent. The more prominent symptoms are constipation followed by diarrhœa, distension of the abdomen, and indigestion, loss of appetite, health, and complexion, depending upon the setting up of inflammation and catarrhal discharge in the mucous lining of the bowel from retention of the fœces. *Simple stricture* depends on the deposit of fibroid material in some portion of the bowel which may be due to chronic inflammation, or the healing of ulcers, more especially those of a strumous nature, which may result in the formation of firm bands of cicatrix, narrowing the calibre of the intestine. In *cancerous stricture*, the morbid deposit is infiltrated into the walls of the bowel and the neighbouring tissue, producing a hard, irregular, nodular mass, extending for some distance from the seat of obstruction. There are in addition the general symptoms of the cancerous cachexia.

Treatment.—When the stricture is *simple*, and when the cause on which it depended has passed away, dilation may be successfully accomplished either gradually, by means of bougies, or rapidly by incision; but the latter mode should be practised only in cases in which the method of gradual dilation fails, or is too painful owing to the density of the cicatricial tissues, and even in such cases dilation by the bougie must be afterwards practised. The operation may be performed by means of an ordinary hernia knife, but the bistouri-caché is a safer instrument. *Malignant or cancerous* stricture can be treated by palliative measures only, as every form of mechanical treatment merely aggravates the disease. Relief may be afforded, for a time, by opening the bowel above the seat of stricture, but this is admissible only in urgent cases. Cancer of the rectum may be either epithelial or scirrhou, and it may remain for a long time without spreading to the neighbouring viscera.

Malformations of the R. may consist in imperforate anus, in which case there is no anal opening; or in imperforate R., in which case the anal opening does not lead into the bowel. In many cases the obstruction is formed by a mere membrane, but usually the lower end of the gut is at no great distance, and the malformation may be remedied by operation.

Redan' (Fr., in the 17th c. *reden*, or *redent*, 'a toothed-work'), or **Fisché** (Fr. 'arrow'), in fortification, the simplest form of field-work, consisting of two faces forming a salient angle towards the enemy, and thus resembling the *tooth* of a saw.

Red Admiral Butterfly (*Vanessa Atalanta*), a well-known species of Butterflies, of a glossy black colour above, the front wings being marked with a band of red which passes across the wings to their hinder margin. The hinder wings have a red border, and the under parts are yellowish. The R. A. B. occurs in England, Scotland, on the Continent, and in N. America. It is found in Britain late in autumn, but disappears in October. The larvæ feed on nettles, and are dark green in colour, the sides being marked with a yellowish band.

Redbreast (*Erythacus rubecola*), a species of *Insectorial* birds belonging to the sub-order *Dentirostres*. The R. is one of the most familiar birds in Britain, and is recognised by the colour of the breast of the male, the hue in the female being less marked. The bill is short and tapering, and slightly notched at the top. The R. remains in Britain throughout the year. It is common on the Continent, and also occurs in N. Africa. In winter especially the R. becomes bold and familiar, and ventures within dwellings for the purpose of obtaining food. It is pugnacious in disposition; its song is sweet, but neither strong nor varied in its register. The nest is built of soft moss, feathers, and hair, and the eggs, numbering five or six, are white, spotted with brown. The R. is fond of worms, insects, and berries.

Red Colours. Red pigments, or painters' colours, are numerous, and are derived from various sources, some being obtained from the mineral kingdom in a native condition, and others formed by artificial means. The most important and valuable red pigment is vermilion, a sulphide of mercury, which occurs native as Cinnabar (*q. v.*), but for painters' use it is principally elaborated by artificial means. Binoxide of mercury is another valuable red colour, giving a very rich, strong, scarlet shade. Antimony vermilion is a comparatively new pigment, possessing some of the qualities of true vermilion. It consists of an oxy-sulphide of antimony, and is artificially prepared. Chrome red is a third red colour, having a vermilion-like hue.

It is a basic chromate of lead, and is sometimes called Austrian vermilion. Minium, or red-lead, is an oxide of lead in very extensive use. Among other red pigments may be enumerated Venetian and Persian red (the peroxide of iron), the red ochres, suboxide of copper, red oxide of tin, and purple of Cassius. There are also numerous red lakes, of which the chief are carmine and madder lake. Red dyes are more numerous and important than any other range of colours. They include cochineal and its allies, in the animal kingdom; the lichen dyes, madder, and allied substances; the red woods, and an endless variety of the artificial derivatives of aniline, phenol, and other products of gas-tar. Nearly all the substances mentioned will be found noticed under their own proper heads.

Red Crag. See PLIOCENE.

Red Coral (*Corallium rubrum*), a well-known species of *Sclerobasic Corals*, found in the Mediterranean Sea, and valued on account of the red hue and for the lustre it is capable of showing after being highly polished. As in all other sclerobasic corals, the R. C. has the living parts external to the coral, the latter forming a hard central axis. In the living bark the *coral-polytes* are found imbedded. Each polyte has the eight fringed tentacles characteristic of the order *Alcyonaria*, or that including the familiar 'Dead-Man's-Finger' polyte (*Alcyonaria digitata*) of the British coasts. The R. C. is of slow growth, and strict laws have been framed for the regulation of the fishery. The animal nature of the R. C. was discovered by Jean André de Peyssonnel, a French naturalist, whose discovery was rejected by the French Academy of Sciences, but afterwards fully confirmed by independent research.

Red Deer. See STAG.

Redditch, a town of Worcestershire, 13 miles S.W. of Birmingham by rail, has two modern churches, St. Stephen's and St. George's (1876). It is a great seat of the needle trade, and also manufactures pins, fish-hooks, and fishing-tackle. Pop. (1871) 6737.

Reddle, or **Red Chalk**, a soft clay iron ore, imported from Hessa, Thuringia, Silesia, and other parts of Germany as a material for making crayons. It is a light brownish red mineral; and coarser varieties are obtained from the Mendip Hills in Somersetshire, from Wastewater in Cumberland, and also from several places in Devonshire. The R. of Rotherham, Yorkshire, is the best material known for polishing spectacle glasses.

Redemp'tion, in theology, means the salvation of sinners by Christ. Literally it means the liberation of a slave or a captive by the payment of a ransom. In the New Testament, Christ is represented as giving his own life as a ransom for sinners. The triple yoke from which men need to be liberated is the power of sin, the law, and the guilt of sins committed. It is specially from the last that St. Paul speaks of the R. of Christ delivering men. His theory is briefly as follows: (1) Christ dies. (2) The believer unites himself to Christ by faith so essentially that Christ's death becomes actually his own death ('if one died for all, then all died'—not 'were dead' (2 Cor. v. 14, 15), the 'old man is crucified' with Christ (Rom. vi. 6). (3) But he that is dead is freed from sin (Rom. vi. 7), so that he who thus dies with Christ is justified by his faith; he may truly be reckoned as one dead in respect of his past sins, provided that he is henceforth 'alive unto God' (Rom. vi. 11; cf. Gal. ii. 20). The various theories regarding the R. of Christ which have been evolved in theology are connected with the various views regarding the nature of the Atonement (q. v.). See Hodge's *Syst. Theology* (Edin. 1873); Reuss's *Histoire de la Theol. Chrétienne* (3d ed. Strasb. 1864).

Redemp'tionists were an order of monks founded 1198 by two Frenchmen, Jean de Matha and Felix de Valois, the principal object of which was to procure the redemption of Christians who were captives among the infidels. To this purpose a third part of their revenues was devoted. The society was consecrated to the Trinity, and hence received the other name of Trinitarians.

Redemp'torists. See LIGUORI.

Red-Eye, or **Budd** (*Leuciscus erythrophthalmus*), a Teleostean freshwater fish belonging to the *Cyprinidæ* or Carp family.

It resembles the roach, and has a short but deep body, of a general red colour, the iris of the eye being of a bright red hue. A large R. will attain a weight of over 2 lbs.

Redgrave, Richard, B.A., the son of a manufacturer, was born at Pimlico, 30th April 1804, and received his earliest art instruction as a designer in his father's factory. He became a student at the Royal Academy in 1826, and his first success as a painter was a picture exhibited at the British Institution, 'Gulliver on the Farmer's Table,' bought for the purpose of engraving. He acquired a high reputation for his genre painting, happy specimens of which are 'The Wedding Morning' (1844) and 'Country Cousins' (1848); and was subsequently even more successful in landscape subjects, such as 'The Woodland Mirror' (1852) and 'Old English Homestead' (1854). During the latter years of the Government School of Design he was headmaster, and subsequently Inspector-General of Art-Schools, an office which he resigned in 1875, after about thirty years' service, receiving a pension of £750 a year. Subsequently, together with Mr. Cole he formed the Museum of Ornamental Art at Marlborough House, now the Museum of Art at South Kensington. Since 1858 he has been surveyor of Crown pictures, and has prepared a catalogue of such works. He is also favourably known as the author of *An Elementary Manual of Colours* (1863) and *A Century of Painters of the English School* (1866), the latter in conjunction with his brother, **Samuel R.**, who died 20th March 1876, and whose valuable *Descriptive Catalogue of the Historical Collection of Water-Colour Paintings in the South Kensington Museum*, with a preface on the history of this branch of art, appeared in 1877.

Red Gum, or **Strof'ulus**, is a disease of infancy, characterised by an eruption of small pimples, usually situated close together on the most exposed parts, as the face, arms, and hands. When the pimples are red it is called *S. confertus*; when large and white, *S. candidus*; and when intermixed with red spots, *S. intertinctus*. The eruption is generally accompanied by slight itching, and occasionally by considerable pain from irritation and cracking of the skin. R. G. usually occurs in infants during their first dentition, and is almost always an acute disease, seldom lasting longer than a month. The eruption is generally due to disorder of the bowels or irritation about the gums, and in most cases it will subside in a few days by attention to the state of the gums and of the digestion.

Red Hand, in heraldry, a sinister hand, erect, open, and couped. It is the arms of Ulster and the distinguishing badge of baronets.

Red-Hot Shot, cast-iron projectiles heated to redness, and used in warfare for incendiary purposes. A miniature in a 15th c. MS. in the Ambras collection at Vienna testifies to their employment at that time. The most memorable instance of their successful use was at the siege of Gibraltar in 1779-83.

Re'ding, Aloys von, a Swiss patriot, was born in the canton of Schwyz in 1755. He at first entered the Spanish service, and left it with the rank of colonel in 1788, when he became captain of the militia of his native canton. In this capacity he drove back the invading French at Morgarten, May 2, 1798, and, after the establishment of the Helvetic republic, strenuously advocated the restoration of the old federal constitution. The dissatisfaction of his countrymen with the Helvetic constitution obliged R. to convene a diet at Schwyz, which occupied itself with framing a new constitution. All his attempts to gain the consent of Napoleon, however, proved unsuccessful, and his reforms only led to the disarmament of the Swiss by the French troops. R. was arrested by order of General Ney, and confined for some months in the fortress of Arburg. In 1803 he was chosen *landamman* of Schwyz, and in 1809 he bore the same title at the diet of Friburg. In 1813 he conducted the negotiations for the neutrality of Switzerland, but showed his hatred to the French by opening the passage of the Rhine and communication through the Swiss territory to the allied forces. R. died in the town of Schwyz, February 5, 1818. He was a man of pure patriotism, but he lacked the decision of character necessary for a great political rôle.

Red Lead. See LEAD.

Red Liquor is the name under which one of the most important mordants used in calico printing is known. It is an ace-

tate of alumina, and owes its name to the fact that the dye colours it produces with madder, alizarine, and logwood are red and pink. The R. L. is prepared by treating a concentrated solution of sulphate of alumina (alum cake) with acetate of lead, whereby a sulphate of lead is formed and precipitated, leaving the acetate of alumina in solution.

Redoubt, or **Redout** (Fr. *redoute*, Ital. *ridotto*), in fortification, a small enclosed work of various form—polygonal, square, triangular, or even circular. A square R. is usually without bastions, or any means of flank defence. A triangular R., if without bastions at the corners, has, instead of them, complete bastions in the middle of its sides. As redoubts cannot defend their own ditches, and are easily approached at their salient angles, they are used mainly as temporary field-works. A R. of masonry enclosed within another work, as a last retreat for the garrison, is sometimes called a *Reduit*.

Redowak, a Bohemian dance in triple time, somewhat resembling a polka.

Red'pole. See LINNET.

Red' River, so called from the colour of its sedimentary matter, the last important affluent of the Mississippi, rises in the great Stake Plain in the Pan-Handle of Texas, on the E. border of New Mexico, flows E. between Texas and Indian territory, for the first 100 miles through a very steep cañon, from 5 to 20 miles wide, and 200 to 1000 feet high, S.E. through Louisiana, and joins the Mississippi 341 miles from its mouth, after a tortuous course of 1550 miles, 1246 of which are navigable in high water. Eighteen of its affluents are navigable, the chief being the Washita, Negro, Big and Little Wichita, &c.

Red River of the North, rising in Elbow Lake, Western Minnesota, U.S., 1680 feet above the sea, flows S. and then W. as far as Breckenridge, 953 feet above the sea, the head of the steam navigation. Thence flowing N., it separates Minnesota and Dakota, and at an elevation of 792 feet crosses into the British possessions, where it traverses Manitoba, and falls into Lake Winnipeg, after a course of 750 miles, and a total fall of 1072 feet. The chief affluents are the Cheyenne, Pembina, and Assiniboine.

Red' River, or **Sel'kirk Settlement**, a colony of British America, called also Pembina and Assiniboia, which was founded by the Earl of Selkirk in 1811, along the course of the Red River of the North. It has been (since 1871) included in the province of Manitoba (q. v.) as a part of the Dominion of Canada.

Red'-Root is the popular name for several American plants, but is more particularly applied to *Ceanothus Americanus*, a small shrub belonging to the natural order *Rhamnaceae*, with downy leaves and stems, and numerous small white flowers. The plant is used for dyeing purposes, and also as an astringent. An infusion of the dried leaves occasionally serves as a substitute for tea, hence the other name of the plant, 'New Jersey tea.' Other species of the genus furnish ornamental hardy and half-hardy shrubs for the garden, and several Californian species are recommended for hedges, in consequence of being evergreen, and their branches becoming densely intricate.

Red'ruth, a town of Cornwall, situated on the brow of a hill 414 feet high, on the highroad from Penzance to Truro, and 10 miles W.S.W. of the latter by rail. It consists mainly of one long street, has a church dedicated to St. Uny (rebuilt 1768), and publishes a weekly newspaper. The tin-mines of the district employed 2395 men in 1871, the copper-mines 635, and there are also iron foundries. Pop. (1871) 10,685.

Red Sea, or **Arabian Gulf**, the N.W. arm of the Indian Ocean, connected with the Arabian Sea by the Straits of Babel-Mandeb, and divided from the Mediterranean by the Isthmus of Suez. It separates Arabia from Africa, and has a general N.W. direction from the straits in the S. at 12° 39' N. lat. and 44° E. long., to the N. end of the Gulf of Suez 39° N. lat. and 33° E. long. Its length is 1380 miles, and its breadth varies from 18 miles at the entrance to 220 at 16° N. lat., after which it maintains an average of 100 miles until the division at Ra's Mohammed into the two arms separated by the Peninsula of

Sinai, the Gulf of Akabah (Bahr-el'-Akabah), and the Gulf of Suez (Bahr-es-Suweis). The latter, the R. S. of the Hebrews, has a length of 180 miles and an average breadth of 20 miles, while the former is 100 miles long and 15 miles in average breadth. The bed of the R. S. consists of a long valley, both sides of which are made up of coral reefs that form two chains of islands and rocks stretching along the shore and dividing the sea into 3 parallel channels, of which the middle one is the broadest and deepest. The average depth of the R. S. in the middle is from 420 to 640 feet; the greatest depth hitherto ascertained is 1124 feet, 115 miles N.W. of Jeddah. The abundance of these reefs, and the sudden and violent winds which are frequent, render navigation very difficult. From May to October, the prevailing wind is the N.W. monsoon; for the rest of the year, the S.E.; but in the N. part, from Suez to Jeddah, N. winds blow throughout the greater part of the year. It was formerly believed that there was a difference in the levels of the R. S. and the Mediterranean, variously stated at from 30 feet to 3 feet 3 inches, but it is now known that the levels are really the same. The R. S. receives no rivers except torrents at irregular intervals, and its pure pellucid water has an intensely blue colour which appears greenish over the coral reefs. Its temperature is very high, in the middle between 14° and 24° N. lat.; in the winter months it is seldom lower than 79° F., in March and April 84° F., in May occasionally as high as 90° F., while 106° F. has been experienced in September. The chief islands from N. to S. are Jubal, St. John's, Kamaran, and Perim, besides the groups of Farsan (q. v.) and Dhalac (q. v.). The principal ports on the African side are Suez, Cosseir, Suakin, and Massowah, and on the Arabian side, Yembo, Jeddah, Loheieh, and Mocha.

The origin of the name R. S., which is a translation of the Latin *Rubrum Mare* and the Greek *Erythra Thalassa*, is uncertain. The Hebrews called it *Yam Sapph* ('weedy sea'), and the Arabs still give it the name of *Bahr Souf*, which has the same meaning. The R. S. is first mentioned in the Hebrew Scriptures as having been passed by the Israelites under the guidance of Moses, and Solomon is said also to have had ships at Elath and Ezion Geber on the Gulf of Akabah. Under the successors of Alexander it became the chief means of commercial communication between Europe and India. It was navigated by the Arabs in the 9th c., and between the 12th and 15th centuries the Venetians carried on a great commerce on its waters, until the discovery of the passage round the Cape of Good Hope opened up another route. Since the establishment of the Overland Route to India, and still more since the opening of the Suez Canal, it has recovered its importance as one of the principal channels for the commerce of the world, and the chief means of communication between the E. and W.

Red'shank. See SANDPIPER.

Red'shid, or **Résch'id Pasha**, a Turkish statesman and reformer, was born of a wealthy family at Constantinople in 1802. He first became familiarised with political affairs as secretary to Ali Pasha, governor of the Morea, and afterwards as a protégé of Pertew Pasha, Minister of Foreign Affairs, by whom he was sent to assist in the negotiations with Russia at Adrianople in 1829. He also had an important hand in the treaty of Kutahia in 1833. He spent two years (1834-36) in diplomatic residence alternately at Paris and London, where his urbane manners secured for him the friendship of the leading western statesmen. Recalled to high office in Turkey, he initiated a liberal policy, and put in practice the lessons he had learned in constitutional Europe. But intrigues such as have stopped so many efforts at improvement in Turkey procured his dismissal, and he was again engaged in diplomacy, till on the death of the Sultan Mahmud he became the chief minister of Abdul Medjid. After the battle of Nezib he concluded the Quadruple Alliance which secured the Porte from the ambitious designs of Mehemet Ali. In 1839 he proclaimed the Hattisherif of Gulhane, a new charter of civil and religious government, which he endeavoured with indifferent success under his various administrations to carry out. R. was ambassador at London in 1841, Grand Vizier 1846-52, and he was also in power during the war with Russia. He died January 7, 1858. R. was one of the most able, liberal, and unprejudiced of Ottoman statesmen. He was an admirer of English institutions, and his foreign policy was always partial to this nation. He

negotiated two commercial treaties with England and France which were of great service to his country.

Red-Snow is 'the common name of *Protococcus nivalis*, which in an incredibly short space of time produces large patches of brilliant scarlet on the surface of snow in the Arctic regions or amongst the Alps.' Although Aristotle appears to refer to R.-S. in *Hist. Anim.* v. cap. 19, it was not until Saussure called attention to his discovery of it on St. Bernard, in 1760 (*De Saussure, Voy.* ii. p. 646), that the phenomenon and its origin attracted notice in the world of science. The report and specimens brought home by Captain (afterwards Sir James) Ross from his Arctic expedition in 1819 increased the general interest in the subject; and the chemist, the botanist, and the zoologist in turn examined the extraordinary substance; the most prominent investigators being Peschier, Wollaston, R. Brown, F. Bauer, Baron Wrangel, Agardh, R. K. Greville, Carmichael, Hooker, Kunze, Unger, Martius, Shuttleworth, Agassiz, Meyen. Whilst some considered the organism to belong to the animal kingdom, others pronounced it to be a fungus, and others, again, a lichen. Agardh placed it amongst the *Alge* in his *Systema Algarum*, and Sir W. J. Hooker described it in the 'Appendix to Parry's second Voyage' as *Palmella nivalis*.

Red'start (*Ruticilla phanicura*), an *Insectorial* bird belonging to the *Dentirostral* group, and allied to the Robins (*Erythacinae*). The tail, from the jerking movements of which the name is derived, is of a red colour. The common R. is tolerably plentiful in Britain in summer. The head, back, and wings are grey; the forehead is white; there is a black patch at the base of the bill; the throat and neck are black; and the wings brown. The under parts are pale brown. The eggs number five or six, and are of a greenish blue. The R. feeds chiefly on insects. An American bird, *Satophaga muticilla*, belonging to the family *Muscicapidae*, or that of the Flycatchers (q. v.), also receives this name.

Reduction, in arithmetic, is the changing of quantities from one denomination to another. Thus multiplying by 12 reduces shillings to pence and feet to inches; dividing by 20 reduces shillings to pounds sterling, and hundredweights to quarters avoirdupois.

Reduction, in Scotch law, means the proofs of law by which the legal effect of a deed is annulled. The requisite action can only be at the instance of one having an interest in the matter.

Reduction, in metallurgy, is one of the chemical processes by which metals are freed from the impurities contained in the various ores. Sulphur, arsenic, or other volatile substance, is simply removed by *roasting* the ore in a reverberatory furnace, but when oxygen is present R. is carried out. This process consists in heating intensely the ore in contact with a reagent, such as carbon, which takes up the oxygen and *reduces* the ore to a metallic state.

Redwing (*Turdus iliacus*), a species of thrush (*Turdinae*) found in Britain in winter, and inhabiting northern regions in summer. It attains the size of the common thrush. Its colour is a warm brown on the upper plumage, and a greyish-white below. The R. derives its name from the presence of a large spot of red on each side of the body; this patch being brought to view when the wings are spread in flight. The eggs number four or five, and are of a bluish tint spotted with black.



Redwing.

Red Woods comprehend a class of woods very extensively used in dyeing and calico-printing. There are two classes of R. W.; one, in which the tinctorial substance is readily soluble in water, comprehends Brazil-wood, Pernambuco-wood, Nicaragua-wood, and Sappan-wood. &c., all great trees of the leguminous genus, *Cæsalpinia*. The second class, embracing woods

which do not yield up their dye to water, and cannot in consequence be used as extracts, includes Sandal-wood, *Pterocarpus santalinus*, barwood and camwood, species of *Baphia*, also all leguminous trees. These woods are more resinous in their nature than the *Cæsalpinia*, and yield more enduring colours.

Ree, Lough, a lake in Ireland, formed by an expansion of the Shannon. It is 17 miles long, and separates Roscommon (Connaught) on the W. from Longford and Westmeath (Leinster) on the E.

Reed is the name given to an appurtenance of the Loom (q. v.). It consists of a series of parallel flat wires (formerly slips of cane or reed were used) called 'dents,' held at proper distances apart by two parallel wooden rods placed at their extremities. It is set in the swinging frame called the lathe, and the warp threads are separated by being passed through the spaces between the 'dents.'

Reed (Old Eng. *hreed*, Ger. *riet*; the root is doubtful) is the popular name for the largest of the British grasses, known botanically as *Phragmites communis*. It is a common plant by the sides of rivers, lakes, pools, &c., luxuriating in alluvial and tenacious clayey soils, and by its extensively creeping root-stalks soon forms dense marginal barriers. The plant grows to the height of 6 to 10 feet, and when its very large, soft, dull-purple, nodding panicle is in perfection, the masses of the R. produce a striking scenic effect in the landscape. It has a wide distribution, occurring in the four continents and in Australia. From the coarseness of the herbage, cattle in general refuse it, although they eat it if cut into chaff prior to flowering, and mixed with other food; and it contains a considerable proportion of nutritious matter. In some parts the hay is found very convenient for littering cattle, and the dried stems are used largely for thatching purposes. In the allied genus *Arundo* is included the largest of the European *Gramineæ*, namely, the evergreen *A. Donax*, supposed to be the R. of the New Testament. Its canes or stems are sufficiently tall and strong to form fishing-rods, and were formerly used as arrow-shafts (see *Liad*, xi. &c.). They also furnish material for musical-instrument makers. This plant has been introduced into gardens for ornamental effect, for intercepting the view of unsightly objects, and for giving early shelter. From the split stems of the tall R. named *A. Karika* the Durma mats are made.

Reed in music is a thin strip of wood or metal used in certain instruments, such as the oboe, fagotto, and clarinet, the pulsations of which cause a number of rapid vibrations of air. One R. is free, the other lying over or within an aperture, and actuated by forcibly directing through this aperture a current of air. The rapidity of vibration and pitch depends on the length and weight of the R. and its relative thickness at the two ends. If thick at the free end and thin at the fixed, the tone is grave; or if the reverse, acute. There are two kinds of reeds, the beating and the free. The former, used in the clarinet, is larger than the aperture which its pulsations alternately close and open. The latter, used in the harmonium, is slightly smaller than the aperture, and its pulsations moving within the current alternately allow and interrupt the passage of air. The tone of reeds is intensified by the addition of a pipe or tube. The manufacture of R. organs is carried on in America to a great extent.

Reed, Edward James, C.B., M.P., naval constructor, was born at Sheerness, September 20, 1820, and educated at the School of Mathematics and Naval Construction, Portsmouth. He gained practical experience in shipbuilding in Sheerness Dockyard, after which he edited the *Mechanic's Magazine*, and became secretary to the Institute of Naval Architects. In 1859 he drew attention to the room for economy of time and cost in the building of ironclads, and he was appointed Chief Constructor of the Navy in 1863. His views regarding turret ships not meeting with acceptance, he resigned this appointment in July 1870. He was returned to Parliament for Pembroke as a Liberal in February 1874, and has since been consulted by the Admiralty on plans of naval architecture, while he has shown himself a keen critic and experienced authority on naval affairs in the House of Commons. In 1877 he proposed without success the appointment of a Secretary of State for the Navy. Mr. R.'s services as a designer have been largely made use of by

the British and many foreign Governments, from whom he has received numerous orders of distinction. Among the ships in the Royal Navy constructed by him are the *Monarch* and the *Neptune*, the latter of which was purchased by the Admiralty from the government of Brazil for £600,000. He has written largely on naval and other subjects, *Our Ironclad Ships* (1869); *Our Naval Coast Defences* (1871); *Letters from Russia* (1875), &c.

Reed-Mace. See TYPHA.

Reef (from Old Eng. *reafian*, 'to seize'; 'what may be seized or pulled'), that portion of a sail comprehended between the head of the sail and any of the R. bands, four of which are usually in the topsail and two in the foresail and mainsail. By manipulation of the reefs the surface of the sails may be lessened on the increase of the wind. When all the reefs of the topsails are taken in, the vessel is said to be close-reefed. Sails are reefed by men on the yard, a dangerous operation in rough weather, which may be avoided by furling the sails by ropes from the deck under Cunningham's patent.—**R.**, a ridge of rocks rising as high as the surface of the sea (probably from the Icel. *hrifa*, 'a rake').

Reel (named from the circling motion), a lively Scotch dance in common or jig time performed by two or more couples. The Danish *krøl* is somewhat similar.

Reel-Winding Machines. Numerous attempts have been made to introduce automatic machinery for filling the spools or reels of sewing-thread, &c., an operation now chiefly done by girls. The machines proposed have generally been very complex in structure, costly, and liable to derangement; but one recently invented by Mr. Bash of Glasgow appears to be at once simple and efficient. It can be constructed by multiplication of parts to fill any desired number of reels at once, and it can be easily arranged to suit different sizes of thread, reel, &c. The apparatus fills the reel, nicks the side, cuts the thread, secures the loose end in the nick, and throws out the finished reel or thread automatically, leaving only to the attendant the duty of supplying the empty reel. It is being extensively adopted in the great thread factories.

Re-entering Angles (Fr. *Angles Reentrants*), or **Angles of the Flank**, in fortification, are the angles between the flanks of the bastion and the adjoining curtains, so named from their pointing towards the interior of the fortification.

Rees, Abraham, born at Llanbrynmair, Montgomeryshire, in 1743, was educated for the Presbyterian ministry at Caermarthen and Coward's Academy, Hoxton. He was appointed mathematical tutor in that institution (1762), three years later was ordained to the pastorate of a Southwark congregation, and in 1786 accepted the chair of natural science in a newly-founded college at Hackney, which he held till 1795. He was a member of the Royal Society and a D.D. of Edinburgh at the time of his death, June 9, 1825. R.'s success as editor of the second edition of *Chambers's Cyclopædia* (4 vols. 1776-85), which he entirely recast, emboldened him to publish his own far larger *New Cyclopædia* (45 vols. Lond. 1802-20), and he was also for some years Dr Kippis' coadjutor in the *Monthly Review*, and author of *Practical Sermons* (1809), various social and political treatises, &c.

Reeve (Old Eng. *gerfa*; see GRAF), the former title of the bailiff of a franchise or manor, who levied his lord's dues, acted as his deputy at the *folk-mot*, and could discharge certain of his judicial functions. Except in the Lowland Scotch *grive*, 'a farm overseer,' it now only exists in such compounds as *sheriff* (Old Eng. *scyr-gerfa*), *port-reeve*, and *borough-reeve*.

Reeve, a term applied to the female Ruffs (q. v.) which are captured along with the male birds, and sent in large numbers from the Lincolnshire fens and marshes to the London market.

Reeve, Clara, an English novelist, born at Ipswich in 1738, was the daughter of a clergyman, with whom she read through Rapin's *History of England*, the Greek and Roman histories, and Plutarch's *Lives*, while a mere child. In 1762 she displayed her learning by translating from the Latin Barclay's fine old romance of *Argenis*, under the title of *The Phenix*. Five years afterwards appeared *The Champion of Virtue*, which in the second edition changed its name to *The Old English Baron*. The authoress in the preface informs us that the romance is 'the literary offspring of the *Castle of Otranto*.' It uses much

of the supernatural machinery Walpole and Mrs. Radcliffe were so fond of, but is much more verbose and feeble. Her other books, quite forgotten, are:—*The Two Mentors* (1783); *The Progress of Romance* (1785); *The Exile* (1788); *The School for Widows* (1791); *Plans of Education* (1792); *Memoirs of Sir Roger de Clarendon* (1793); *Destination* (1799), and *Edwin, King of Northumberland* (1802). Miss R. died at Ipswich 3d December 1803. See Sir Walter Scott's *Biographical Memoirs* (Edin. 1852).

Reeves, Sims, the greatest English tenor of modern days, was born at Woolwich in 1821. While still in his teens he became organist and instructor of the choir in the church of North Cray, Kent. His teachers in singing included T. Cooke and Hobbs. He first came out as a baritone at Newcastle in 1839. After a course of study at Paris he proceeded to Milan, where he received lessons from Mazzucati, and appeared at the Scala in the part of Edgardo (tenor) in *Lucia di Lammermoor*. On 6th December 1847 he began an engagement at Drury Lane, during which he sang in *Lucia* and in Balle's *Maid of Honour*. He appeared at Her Majesty's Theatre in 1848, and at Covent Garden in 1849. In the spring of 1851 he confirmed the reputation he had gained in Italy and in England by an appearance in Italian opera in Paris. He was the leading tenor in the English Opera Company at Covent Garden in 1860, when he took the original part of *Robin Hood* in Macfarren's work of that name. His most brilliant successes, however, have been gained in oratorios and the concert-room, and for many years no great musical festival was considered complete without his presence. In his best days his voice possessed a splendid quality and strength, and the brilliancy of his execution and artistic beauty of his style distinguished him as much as his vocal power. He rendered the most florid composition and the homeliest ballad alike with perfect grace and feeling.

Reference, in law. See ARBITRATION.

Referendaries, in the early European monarchies, were officers charged with the procuring, execution, and despatch of charters and diplomas. In France the Grand Referendary performed analogous functions to the Chancellor or Keeper of the Seals.

Refining, as applied to metals, indicates the separation of a commercially pure metal from its regulus, or any impure compound. The operation varies according to the nature of the metal and compound dealt with, and for details see under the various metals, especially IRON, GOLD, and SILVER. See also ASSAYING.

Reflection is the change of direction which a ray of light, radiant heat, sound, or other form of radiant energy, experiences when it strikes upon the surface of separation of two media, and is thrown back into the same medium from which it approached. When the reflecting surface is plain, the direction of the reflected ray makes with the normal to the surface the same angle which the incident ray makes with the same normal; or, as it is usually expressed, the angles of reflection and incidence are equal. When the surfaces are curved the same law holds (see OPTICS). In all cases of R., the energy of the ray is diminished, so that R. must always be accompanied by absorption. Not only so, but absorption probably precedes R. Most bodies are visible by light reflected from their surfaces; but ere this has taken place the light has undergone the modification which gives it the colour peculiar to the bodies viewed. When light impinges upon the surface of a denser medium, part is reflected, part absorbed, and part usually refracted (see REFRACTION). But for a certain angle depending upon the refractive index of the refracting medium no refraction takes place. This angle is called the angle of total R., since all the light which is not absorbed is wholly reflected. For the phenomena of reflected sound, see ECHO. See also UNDU-LATORY THEORY and TELESCOPE.

Reform, in English, is now commonly restricted to signify any change in the regulations of Parliamentary representation treated under HISTORY OF ENGLAND. Properly, however, the word has a much wider meaning, and is appropriately applied to any re-arrangement, legislative, religious, or even literary, which either brings back an older order of things which has been fallen away from, as did the reforms of Livius Drusus and the Gracchi in Roman history, or reconstructs the present

order in an entirely new form, as did the Solonic R. in Greece. Taking the word in its widest sense, we may say that it is the distinguishing feature of the English constitution to have grown by the more gradual and continuous process of R., and in but a small degree to have been hurried forward by the intermittent and volcanic action of revolution.

Reformation, The, is the name applied by Protestants (q. v.) to the Disruption of the Roman Catholic Church which took place in the 16th c. This revolution is sometimes regarded by Protestants as an isolated event brought about by the genius of Luther; as an effort to purify a Church which was rotten to the core, root and branches, and entirely opposed to any reform; and the effects of which were the spread of learning, the diffusion of pure doctrine and morals, and the gain of political and religious liberty. The fact is, however, that the R. was only one phase of that regeneration of Europe which began in the 15th c. and has been called the Renaissance (q. v.); and the work of Luther was not to bring about a R. of which there had been no signs before, but to apply the match to a train which had been in preparation for a century or more within the Church herself. One who desires to form a correct impression of what the R. was in its nature and effects has to remember that of the host of pamphlets called forth by every discussion in the prodigious intellectual activity of the time, almost all those on the Roman Catholic side were destroyed at the triumph of Protestantism, as indeed it was often with difficulty that they could be got printed; and that the R. cannot be fairly judged from the narrative of one side alone. The causes of the R. can only be properly understood by considering the previous condition of Europe and the change which at the time passed over the general mental condition of the people.

In the 15th c. the spirit of humanity began to awake, after a ten-centuries sleep of sluggishness, stupidity, and superstition. And as humanity was then represented by Europe, so the leading nation of Europe was Italy. In that country a long period of independence and comparative prosperity in trade and commerce had produced a greater accumulation of wealth than in any other country, and a consequent superiority in learning, arts, and general culture. Accordingly, it was in this country that the harbingers of the great intellectual revival appeared—Dante (q. v.), Petrarch (q. v.), and Boccaccio (q. v.).

The grand characteristic of the Renaissance was the twofold discovery by man of the world and of himself. The special sphere of the R. was that part of the Renaissance connected with the discovery of Man in his spiritual relations; or which exhibited in the domain of religious thought what the Renaissance elsewhere did in the spheres of Discovery, Science, Art, and Scholarship. In the restricted sense of the Protestant movement, the R. falls to be considered in a threefold aspect: political, intellectual, and moral.

Political.—There can be no doubt that the success of the R. as a disruption of the Church depended on its political relations. Throughout the greater part of the Middle Ages the Christian countries of Europe were virtually governed by the Popes as the superiors of all the secular clergy, and the countless orders of monks and friars. The power wielded through this ecclesiastical organisation was enormous, and at first was beneficial for civilisation, by fusing the people to some extent into a single community, and by counteracting the other influences which all tended to division and isolation, thus saving Europe from anarchy and lawlessness. But however beneficial the supremacy of the Popes may have been for a time, the mind of Europe began to rebel against it. The growth of nationalism and the conception of monarchy in its modern form were both hostile to it. Laymen generally, from the highest to the lowest, began to kick against the universal clerical control which was exercised over them. The Pope assumed the post of arbiter in national quarrels, and claimed the right to crown and dethrone kings at his pleasure. As regards the people generally, the clergy alone not only baptized, married, and granted or refused Christian burial, but had virtually the disposal of a dead man's property, as his will had to be proved in an ecclesiastical court. But that which was always made the worst complaint against the Papacy was that so much money was drained out of the different countries to go to Rome. This was made a handle of by all the Reformers—Wiclif, Huss, Luther, &c. And it was the weakest handle they had, for it was an appeal to the most sordid and selfish elements of human nature.

This circumstance alone would cast some suspicion on the motives of those who were so eager for a reform which relieved them of the taxes required for the support of the Church. Even the clergy joined the laymen in calling abuses the dues which the Church received, while yielding to the exactions of princes; abuses of this kind having been as much due to lay patrons as to the Pope.

This reaction against the Papacy, the climax of which was the essential political feature of the R., dates from the 12th c. In England from before 1164, when the Constitutions of Clarendon were passed under Henry II., there had been a disposition to resent ecclesiastical interference in the affairs of the kingdom. When the Popes at Avignon became the creatures of the French king, their influence in England still further waned; and under Edward III. (1327-77) 'Parliament vindicated the right of the state to prohibit the admission or execution of Papal bulls and briefs within the realm by the statute of Præmunire, and denied the Papal claim to dispose of benefices by that of Provisors.'

In France the contest began under Philippe le Bel, in the dispute which arose between that monarch and Boniface VIII. (1295) regarding the exportation of money from France to Rome, the right of Philippe to impose taxes on the clergy, and the rights of the laity generally in relation to the clergy. The pretensions of the Pope to supremacy over Philippe in secular matters were met with a determined resistance by the whole French nation. A similar effect was produced in Germany when John XXII. attempted to maintain his supremacy over the empire, and to deprive Ludwig of Bavaria of his crown in order to confer it on the King of France (1324). The result was that in 1338 the electoral princes solemnly declared that the King of the Romans received his appointment solely from the electoral college. Now, sovereigns in their contests with the Popes, or rival princes in their contests with each other, were always glad to make use of any spiritual opposition to the Papal power; as, e.g., Charles VIII. of France made use of Savonarola. So the Hussites derived an adventitious political importance from the enmity existing between Bohemia and Austria; and the support which Luther received from some of the German princes turned on the hereditary enmity between Austria and France, produced by the marriage of Maximilian I. to the heiress of Burgundy (1477). Maximilian, in writing on one occasion to the Elector of Saxony regarding Luther, said 'there might come a time when he would be needed.' At the time when Luther was beginning to make himself heard, the Elector of Saxony had a quarrel of his own with Albrecht, Archbishop of Mainz, and the Pope, because a bastard son of his had been refused admission to an ecclesiastical benefice. The way that the quarrel of Henry VIII. with the Pope regarding the divorce of his wife furthered the R. in England is well known. Such were the general, and some of the particular, political causes which led up to the R. Add to the former that a new power on the side of freedom had arisen among the people by the enfranchisement of city corporations. Burgesses had risen in social status, and having been freed from the yoke of feudalism at home, would be little inclined to brook foreign control of the same kind. Besides, the general spirit of independence was greatly fostered by the diffusion of popular literature by means of the printing-press (invented 1438). Works descriptive of the rights of the people, of the intellectual and civil thralldom in which their fathers had been kept, and of the means of redress, were freely circulated, and read with avidity. This agitation for civil liberty Luther turned against the existing religious institutions. His writings bore such titles as *Christian Freedom, Bondage of Babylon*, &c.; and his constant watchword was 'Liberty.'

Intellectual.—From about the middle of the 11th c. the scholastic philosophy and theology had been completely dominant in the Church. A new era began when the long-neglected study of the classic authors was resumed at the end of the 14th c. The intelligent and critical study of Latin, Greek, and Hebrew exposed the ignorance of the Schoolmen, and the 'Humanists,' as the classical scholars were called, turned to ridicule the barbarous style, hair-splitting subtleties, and trivial polemics of the theologians, as well as the generally profitless and meaningless methods of the whole education of the time, which had all a clerical tone. Even the science of the time was settled by texts of Scripture; e.g., it was held on this ground, that the earth was flat and the centre of the universe. Thus the discovery at this time of America (1492) and the roundness of the earth dealt a great

blow to the influence of the Church, by proving that her teaching was false in this particular. Copernicus explained his view of the solar system in 1507. An instrument which did a great part of the work in educating and enlightening the people which is generally ascribed to Luther or to the R. was the printing-press (1438). By means of it books gained a circulation which they could never have had in MS. By the end of the 15th c. it was at work in most of the large towns in Italy and France, and between 1455 and 1536, 22,932,000 volumes were printed by the Popes and by Roman Catholic princes and sovereigns, the patrons of learning, arts, and sciences. Not only were the classics and copies of the Scriptures in the original—Hebrew and Greek—provided for scholars, but copies of the Scriptures in the vernacular for the people. Before the R. upwards of twenty versions had been made into the different modern European languages—Italian, French, Spanish, Belgic, German, and English. Again, universities were founded everywhere (ten in Germany alone between 1403 and 1506), in which professors lectured in the vernacular instead of the old learned language of Latin.

The effect of all these enlightening influences was to produce, in reference to the Papacy and the creed of the Church, a leavening of that spirit which in modern times has received the name of Rationalism (q. v.). It was manifested at that time 'in the irrepressible aspirations of the human mind to establish the right of every individual to judge for himself in matters most deeply affecting his welfare and peace of mind—that is, to follow the decisions of his reason and the dictates of his moral sense, and thereby to emancipate himself from the yoke of ecclesiastical systems and the thralldom of theological creeds.' This spirit was one of the influences at work in the minds of the Reformers of the 16th c.; but it was not the only one, and it was not the strongest one. They had found deliverance from the Pope and the dogmas of the medieval Church by the help of the Scriptures, and these were now invested with a quite new authority. An infallible Book was substituted for an infallible Church, and dogmatic tests of orthodoxy were enforced as rigidly as in the Mother Church—a practice entirely at variance with the true Protestant principle of liberty. The immediate effect of the R. on learning was on the whole detrimental. The Reformers not only discouraged classical and scientific studies, and denounced them as a snare of the devil, but even Biblical criticism was denounced. The facts are very significant that, whilst at Venice alone, before 1559, sixteen editions of the Hebrew Bible had been printed, there was not an edition published in Protestant Germany till the close of the century; and while at Paris alone, before 1551, ten editions of the Greek New Testament had been printed, there was not one produced in Protestant Germany for forty years after the R. The general condition of the universities became deplorable. They soon became noted for nothing but the pride, laziness, and unbridled licentiousness of the professors, and the debauchery, gambling, blasphemy, and indecent language of the students. So flagrant did this become that parents feared to send their sons to attend them. The number of students at the University of Erfurt, *e.g.*, fell from 311 in 1520 to 14 in 1527.

Moral.—The struggle between purity and corruption in the Church was no new thing in the 16th c. The desire to escape from various forms of degeneracy gave rise to almost all the countless orders of monks and friars which were founded in the Middle Ages. But these societies, each in its turn, fell into the very abuses which their founders desired to avoid; and as we approach the time of the R. a tendency becomes apparent to form for this reason sects outside of, or even hostile to, the Church—*e.g.*, the Cathari (q. v.), Waldenses (q. v.), Albigenses (q. v.), &c.—all distinguished by a common renunciation of the authority of the priesthood. By the beginning of the 16th c. the whole of Christendom was crying out for a reform of the Church. The sees being mostly filled by simony, many of the bishops were utterly unfit for their office, the duties of which they neglected for various reasons. The chief of the prelates indeed were also secular princes, who sunk their spiritual functions in their secular character. The clergy, thus left very much to themselves, became illiterate and immoral, while practising on the people similar exactions to those practised on themselves by their superiors. Grievous complaints of these abuses had been carried to Rome from before the beginning of the 15th c. A vigorous but unsuccessful attempt was made, at the instance of

the Faculty of Theology at Paris, in the Councils of Pisa, Constance, and Basel (1409–1443), to obtain a reformation in the morals of the clergy and the administration of the Church. Efforts in the same direction had been made by various Popes—Nicholas V. (1447–55), Sixtus IV. (1471–84), Innocent VIII. (1484–92), Julius II. (1503–13), and Leo X. (1513–22). By the last-named pontiff various enactments were made for priests, bishops, and cardinals, regarding their learning, mode of life, and discharge of duty. It must be admitted that until the R. these efforts had very little effect; and so far from any attempt having been made to check the abuse which both Luther and Zwingli almost simultaneously made the *casus belli* of their opposition to the Church—namely, that of Indulgences (q. v.)—it was carried on at the instance, and in order to fill the coffers, of the Pope.

In connection with this aspect of the subject it is remarkable, although it was not altogether unnatural, that the immediate effect of the R. was to produce a kind of libertinism among Protestants. It is startling to read the accounts given by the Reformers themselves of the corruption of morals among the people. Luther declared that men were more covetous, hard-hearted, corrupt, licentious, and wicked than of old under the Papacy. So great was the corruption in Wittenberg that he wished to leave it for ever, and to see his little daughter die before him. But the despondency that often seized the great Reformer need not affect the judgments of those who live more than three centuries later in time, and who can read in the pages of history the vast and various benefits which the R. ultimately conferred on Europe and the world. A change which brought men face to face with God, which connected the liberty of private judgment with responsibilities of eternal moment, which obliterated all the inequalities of life and character in the universal need of a personal salvation, and compelled all Christians, high and low, rich and poor, lay and cleric, to recognise the necessity of following in the footsteps of Christ, was an enormous change for the better. The conceptions of life and duty were immeasurably enlarged and infinitely intensified. A fresh vigour, a new vitality, was given to men's nature; the individual rose in dignity and worth; and in spite of the narrowing influences of mere creed-worship, a moral energy was aroused that has gone on increasing from age to age, and the ultimate effects of which it is impossible even yet to foresee. The Church of Rome itself has shared in the good effects of the R., which has set up a common standard of moral life for Christendom that no religious communion can ever again afford to neglect or despise. The details of the history of the R. in the various countries of Europe will be found under LUTHER, ZWINGLIUS, FAREL, CALVIN, WICLIF, HENRY VIII., CRANMER, PATRICK HAMILTON, GEORGE WISHART, JOHN KNOX, &c. See Symonds' *Renaissance in Italy* (Lond. 1875 *seq.*); Häusser's *Geschichte des Zeitalters der R.* (Eng. trans. 1873); D'Aubigné's *Hist. de la R.*; Döllinger's *Die R.* (Regensb. 1848); Gieseler's *Lehrbuch der Kirchengeschichte* (Eng. trans. 1855); Mosheim's *Institutiones Hist. Eccl.* (Eng. trans.); Fisher's *R.* (Lond. 1873). For England specially, Foxe's *Book of Martyrs* (1563); Burnet's *History of the R., &c.* (Lond. 1679); Strype's *Works* (Oxf. 1821–40); Lingard's *History of England* (1819 *seq.*); for Scotland, the Wodrow and Spottiswoode Society's publications; M'Crie's *Works*, &c.

Reformatory Schools are institutions founded for the purpose of reclaiming children who have already begun a career of vice or crime. They are intended not only to inculcate moral principles, but to provide a practical knowledge of industrial pursuits. They are identical in character with certified industrial schools, and differ from ragged schools in so far as they are maintained by the State, and only receive children or youths under judicial sentence. The history of R. S. on the Continent begins with the Reformation, when workhouses were founded in Amsterdam, Leyden, Hamburg, Lubeck, and other cities, for the purpose of checking vagrancy. Every workhouse had a special department, in which refractory children were placed for discipline. Parents could send obstinate or froward children either gratuitously or for a small charge, which entitled them to certain privileges. The benevolent movement thus begun led soon to the establishment of houses of correction, industrial schools, orphanages, and kindred institutions, all differing somewhat from the R. S. and from each other, but all agreeing sub-

stantially in purpose. The originator of the modern R. S. system in Germany was J. D. Falk, the philanthropist, and founder of 'The Friend in Need' Society, which, by the establishment of the Lutherhof at Weimar in 1818, provided homes for 300 children, to whom elementary instruction was given in religion and industries. About the same time similar institutions at Overdyk and Düsseldorf were founded by Counts Adalbert and Werner von der Rieke, and these are still in existence, with an average roll of 300 children. The R. S. at Beuggen, Baden, founded in 1816, was the first of the kind in the S. of Germany. That in Berlin was opened in 1825, and has been greatly enlarged recently. It was followed by the organisation of such schools at Memel, Frankfurt, Posen, Stettin, and Königsberg. The foundation by the State of houses of correction has, however, caused a number of these institutions to disappear. In Switzerland there were in 1877 as many as 44 farm and R. S., with 1543 pupils. Perhaps the most celebrated of all Continental R. S. was the Rauhes Haus, formed in Hamburg by J. H. Wichern in 1833. With this school was connected a small farm near Hamburg, and here the 'family plan' was developed, a little village soon springing up with its church, schoolhouse, workshops, and gardens. The fundamental idea of the Rauhes Haus was that it should be at once a training school and an institution for preparing missionaries. The heads of families, teachers, overseers, formed a religious brotherhood, the members of which, after an apprenticeship in the simple community, went out into the world as ministers to the poor. From its foundation till 1867 the Rauhes Haus had received and educated 800 children, the average yearly attendance being 120. Its influence has been very great, the family plan having been adopted in various parts of Russia, Switzerland, France, Belgium, Sweden, England, and the United States. The first R. S. in England was founded near London by the Philanthropic Society in 1788. Two others, one in Warwickshire (1818), the peculiarity of which was out-door labour, and another established (1830) by Captain Brenton, who held that no person under sixteen years of age should be sent to prison, were allowed to collapse for want of funds. In 1834 the Victoria Asylum for girls was opened at Chiswick, and in 1838 a separate prison was added to that at Parkhurst for persons under sixteen, in which the discipline was reformatory. The institution founded at St. George's-in-the-Fields by the Philanthropic Society having fallen off somewhat, it was removed in 1850 to Redhill, in Surrey, where on the family plan it is now the largest of English reformatories. Since then, important schools have been founded at Harewicke Court, Kingswood, Stoke Farm, and Saltley. In 1854 the R. S. Act was passed, authorising magistrates to commit to R. S. youths under sixteen (in Scotland under fourteen) for not less than two, or more than five years. The English law divides schools into two kinds—R. S. proper, intended for correction, and industrial schools, intended for prevention, admission to either kinds being determined by differences of age and previous criminality. In 1866 the laws relating to these were consolidated and amended. In 1873 Great Britain had 45 reformatories for boys and 20 for girls, the former with 4424 inmates, and the latter with 1151. In the United States there were in 1877 as many as 66 reform institutions, some under State, others under municipal control. The oldest and largest is that on Randall's Island, New York, which was founded in 1825, and has an average of 800 inmates. See INDUSTRIAL SCHOOLS and RAGGED SCHOOLS; also the *Proceedings of the International Prison Congress*, held in London in 1872, and *Reports on Certified Industrial and R. S.* (20 vols. 1856-77).

Reformed' Church'es, in its widest sense, is the title applied to all the religious communities which separated from the Roman Catholic Church in the 16th c.—Lutheran, Zwinglian, and Calvinistic; but Lutheran writers use it to denote all which did so except their own. In this latter sense the R. C. would mean those of England, Scotland, Holland, Switzerland, France, Ireland, and N. America. The Reformed Church of Germany is Zwingli-Lutheran rather than Calvinistic, and holds by the Heidelberg Confession.

Refraction is the change of direction which a ray of light, heat, &c., undergoes in passing from one medium to another. When a ray passing from a vacuum into any medium is refracted, the sine of the angle which the refracted ray makes with the normal to the surface of separation at the point of refraction

bears to corresponding sine for the incident ray a constant ratio, which is called the refractive index for the medium. (See OPTICS, UNDULATORY THEORY, TELESCOPE.) This refractive index, however, is different for different rays of light, so that R. of ordinary white light is necessarily accompanied by separation into different coloured rays. See SPECTRUM ANALYSIS.

In certain media the refracted ray is split into two distinct pencils. This phenomenon of *Double R.* was first observed with Iceland spar by Erasmus Bartholinus, whose experiments were published at Copenhagen in 1669. The two rays are called the ordinary and extraordinary rays, because the one follows the ordinary laws of R. while the other does not. It is a property possessed by all crystallised minerals except those belonging to the cubical system. In most cases, however, the separation of the two rays is too small to be directly observed, but its existence is proved by certain phenomena which result from the mutual action of the two pencils. (See POLARISATION.) Huygens was the first to discuss theoretically the nature of double R.; and in the hands of Fresnel the theory became almost complete. In following out this theory to its consequences, Sir W. R. Hamilton came upon two remarkable cases of double R. which had hitherto escaped notice. He found that, in certain circumstances, a ray of light emerging from or passing into a doubly refracting crystal was split up into a *cone* of rays. The two cases are distinguished as external and internal conical R. This prediction from theory was tested experimentally by Lloyd, and fully corroborated even to its details, thus affording one of the most powerful arguments in favour of the undulatory theory. See Lloyd's *Wave Theory of Light*.

Befrain' (Fr. *refrain*), the burden of a song—the portion repeated after each verse.

Refrigerants are medicines which diminish the heat of the body when unduly increased, produce a sensation of coolness, and quench thirst. They do not in reality diminish the temperature of the body, as may be ascertained by the test of the thermometer, but they cause a sensation of coolness and a refreshing feeling over the whole body. When applied externally, in the form of cooling or evaporating lotions to inflamed parts, the temperature of the part to which they are applied is actually lowered. R. are used in medicine in the treatment of febrile and inflammatory affections, their action on the stomach occasioning, sympathetically, a temporary reduction in the force of the circulation, and thereby allaying morbid sensations of heat, thirst, and nausea. The following are the R. in most common use for internal administration: *Acetic acid* or *vinegar*, half an ounce to an ounce, diluted with 20 fluid ounces of water, forms a cooling drink, and may be taken *ad libitum*, unless where contra-indicated. In the proportion of one to three of cold or tepid water it may be applied by means of a sponge to the surface of the body, as an external refrigerant, in the treatment of most febrile and inflammatory diseases. *Citric acid* may be administered in the form of effervescing powders along with bicarbonate of soda or bicarbonate of potash, in the proportion of nine parts of the acid and eleven parts of the soda, or thirteen parts of the potash carbonates. Lemon-juice is also much employed in the preparation of effervescing draughts, with the alkaline carbonates, in the proportion of three and a half drachms of lemon-juice to twenty grains of the bicarbonate of potash. *Nitrate of potash* is administered in febrile affections in the form of *nitre whey*, prepared by boiling two drachms of nitre in one pint of new milk, and straining. It may then be taken in doses of from 2 to 4 ounces. Water at various degrees of temperature, snow, ice, and freezing mixtures, prepared with salt and pounded ice, are used as R. both in medicine and surgery, but more especially in surgery. Applied to the spine, they are useful in the treatment of the nervous diseases of women. See article HYDROPATHY.

Refrigerating Machines' See ICE.

Refrigeration of the Earth. That the earth is a cooling body is now an accepted truth in cosmic science. The fact upon which it is based is, that as we descend into the earth the temperature increases regularly by about 1° F. for every 60 feet. Consequently there must be a flow of heat outwards towards the crust through every isothermal surface throughout the mass, with a simultaneous radiation of heat from the surface into space, and this must continue as long as the earth is hotter

than space. Knowing the rate of increase of temperature with depth, and the thermal conductivity of the rocks near the surface of the earth, Sir William Thomson has calculated the quantity of heat which the earth radiates per annum, and with the aid of Fourier's analysis has worked backwards to a time when the conditions under which Fourier's equations applied no longer exist. In other words, the earth was not then a solid, but a molten mass quite unfitted for the existence of life as we know it. Here then is a superior limit to geological time, and this limit Thomson has fixed at 200,000,000 years. Thermal conductivity generally increases with temperature, so that the earth would probably cool much faster in past time than now. This consideration, according to Professor Tait, is sufficient to reduce the limit to 20,000,000 of years, and even then life would not be possible, since water could not exist as liquid till at least 10,000,000 years subsequent. See EARTH.

Refrigerator, an apparatus for the preservation of perishable articles of food by exposing them to a low temperature; an ice-safe. A R. for domestic use consists of a chamber having double walls, the exterior of wood and interior of metal generally, with a lining of some non-conducting substance between. Inside, shelves are fitted up for holding the provisions to be preserved, and in an upper compartment a quantity of ice is packed which considerably reduces the temperature of the currents of air circulating through the chamber. To keep wines or other bottled liquids cool, the cold water draining from the ice is caused to trickle over the bottles placed below. Allegretti's R. has an inside metallic chamber for meat or vegetables, which is surrounded at the sides and part of the top with an ice-chamber, and below is a cold-air passage; an outer double-walled case encloses the whole.

The name R. is also applied to an apparatus employed for speedily reducing the temperature of liquids; it is used in breweries for cooling worts, and is also applicable for dairy purposes. In old forms of the brewer's R. the worts are run through a length of metal tubing which is surrounded by cold water. Many disadvantages attend this method of cooling, and it is generally being supplanted. In improved forms of R., such as Lawrence's of London, the liquid to be cooled flows over the outside of a series of metal pipes or deeply corrugated sheets, through or between which cold water passes.

Refugee (Fr. *refugé*), one who, in times of religious persecution or of political commotion, flies to a foreign country for liberty or safety. The name was first given to those Protestants who fled from Holland to escape the persecution of Alva in 1567, but is now applied especially to the French Huguenots who found an asylum in England, Holland, and other countries on the revocation of the Edict of Nantes by Louis XIV. in 1685. They belonged chiefly to the industrious *bourgeois* class, and carrying with them their capital and the knowledge of their crafts, were everywhere warmly received. Most of those who settled in England anglicised their names, so that their posterity cannot now be distinguished, but several who belonged to the higher classes obtained high honours in their adopted country, and have had descendants who have been elevated to the peerage. The French Revolution drove many refugees to England, which enjoys the glory of being the peculiar home for refugees of every class and country. See Erman and Reclam, *Mémoires pour servir à l'Histoire des Réfugiés Français* (9 vols. Berl. 1782-1800), Weiss, *Histoire des Réfugiés Protestants* (Paris, 1833), and Smiles, *Huguenots in England and Ireland* (Lond. 1867).

Regal, or **Bigole**, a small portable organ formerly much in use, fitted usually with one, but sometimes with a double row of pipes. Its principal function was to support treble voices.

Regalbu'to, a town of Sicily, province of Catania, situated on a hill commanding a view of Mount Etna, near the right bank of the river Salso, 17 miles E. of Leonforte by the highroad to Catania. It has a fine cathedral. Pop. (1874) 9429.

Regale'cus, a genus of *Teleostean* fishes, belonging to the family *Trachypterida*, and including the curious Tape-fish (q. v.) (*Regalecus Bamskii*), so named from its long thin shape. The body is much compressed in this genus; the ventral fins are long and attenuated, and the dorsal fin is spiny.

Regalia (Lat. 'royal things'), the ensigns of royalty, more especially those used at a coronation. The old R. of England,

before the Reformation intrusted to the monks of Westminster Abbey, having been destroyed in the Civil War, new ensigns were made for the coronation of Charles II. These, now exhibited in the jewel-room in the Tower of London, include the royal crown and sceptre (with the cross), the verge or rod (with the dove), the 'staff of Edward the Confessor' (made for Charles II.), the two sharp 'swords of justice,' and *Curtana*, the blunt 'sword of mercy,' the anointing-spoon and ampulla for the coronation oil, the armillæ, the 'spurs of chivalry,' and certain vestments. With these are exhibited the lesser insignia of a queen-consort, the golden crown of the Prince of Wales, and Queen Victoria's state-crown of silver and diamonds.

The R. of Scotland, including the crown (dating from Robert the Bruce), adorned with alternate crosses and *fleurs-de-lis*, the sceptre (from James V.), and the 'sword of state' (presented to James IV. by Pope Julius II. in 1507), were, during the Civil War, taken from the crown-room of Edinburgh Castle by the Earl Marischal to his castle of Dunnottar, at the siege of which by the Parliamentary army they were secretly conveyed to the manse of Kinneff. From the Restoration to the Union the R. of Scotland were again kept in the crown-room, where from the Union till 1818 they were hidden away in a chest, though popularly believed to have been secretly transferred to the Tower of London. On the 4th February 1818, by permission of the Prince Regent, they were taken from their concealment, and they are now intrusted to the officers of state for Scotland, and exhibited in the crown-room, along with certain other insignia bequeathed to George IV. by Cardinal York, and lodged in Edinburgh Castle (1830) by William IV.

Regality, a territorial jurisdiction which formerly existed in Scotland. It was conferred by the crown, and those receiving the right were called *Lords of R.* Their civil jurisdiction was equal to that of the sheriff, but their criminal jurisdiction was much greater, being, except in case of treason, equal to that now exercised by the *Justiciary Court* (q. v.). The jurisdiction was abolished by 20 Geo. II. c. 50. The analogous jurisdiction in England was called a *Palatinate*. See COUNTIES.

Regatta (Ital.), a name given by the Venetians to a grand fête in which a chief incident was a contest of the gondoliers. It is now applied generally to all rowing or sailing matches, but more especially to yachting races. See YACHT AND YACHTING.

Regelation, the name given by Faraday to the property possessed by ice at 0° C., of gradually joining itself to another fragment at the same temperature with which it is placed in contact. Faraday explained the phenomenon by supposing that the film of liquid between the two pieces of ice assumed the solid state because of the proximity of particles in this state. This, however, is hardly an explanation, since it is based upon an assumption by no means self-evident. Forbes based his explanation upon an even more doubtful assumption, viz., that ice was essentially colder than water, so that there was always a transfer of heat from the water to the ice. The effect of this was to make the ice semi-fluid at the surface; and, therefore, when two pieces were placed in contact, the film of water between them parted with its heat to the ice on both sides until it cooled sufficiently to freeze, while the heat it gave off was not sufficient to melt the ice. The explanation proposed by Professor J. Thomson is founded upon the truth, theoretically discovered by himself, that the freezing point of water is lowered by pressure. Hence if two slabs of ice are present together, the ice will melt at the points of greatest pressure. Now ice contracts when it liquifies and at the same time absorbs heat. The pressure will be at once relieved, and the cold produced will re-freeze the water. The points of greatest pressure will thus be continually shifting until the union is complete. Faraday and Forbes both objected to this explanation, upon the ground that R. took place between two pieces of ice which were suspended side by side so as to just touch and no more. Here, they maintained, there was no pressure; but J. Thomson showed that the capillary action of the film of water between them was sufficient to produce the requisite pressure—an explanation supported by the fact that R. cannot take place between dry slabs of ice (i.e., at a temperature lower than the freezing point) without external pressure being applied. See GLACIERS.

Regenera'tion (Lat. 'new birth'), among the Jews, denoted the change of status which a heathen proselyte underwent on joining the Jewish community; he was said to be 'born again.' In Christian theology it is the name given to the change from a carnal to a Christian life (*cf.* John iii. 3). The term R. in this sense only occurs once in the New Testament (Tit. iii. 5); in Matt. xix. 28 it has a different meaning (see PALINGENESIA). But the idea is one of the most fundamental in the Pauline theology. "What the apostle indicates by it is a change so complete that the new state is in every respect the opposite of the old, and that, as regards spiritual matters, nothing passes from the old to the new (*cf.* 2 Cor. v. 17). The same idea occurs in the epistle under various figures. (1) Various passages represent it as a spiritual creation, which is attributed sometimes to Christ and sometimes to God, forming a parallel to the physical creation or the natural birth of man (*cf.* 1 Cor. viii. 6, Gal. vi. 15, Eph. ii. 10, iv. 24, Col. iii. 10, &c.). (2) Others, as a renewal; the Christian becomes a new man, or a series of bad qualities are laid aside like a garment, and a series of good ones put on like another (Rom. vi. 6, xii. 2, Eph. ii. 15, iv. 22-24, Col. iii. 9, 10, &c.). (3) And a third class, as a metamorphosis; the Christian must so closely resemble Christ as to be changed into his image (Rom. viii. 29, xii. 2, xiii. 14, Gal. iii. 27, Col. iii. 10, &c.).

In the doctrine of the Church of Rome, R. is synonymous with Justification (q. v.), which includes (1) the removal of the guilt of sin; (2) purification from inherent moral corruption; (3) the 'infusion of new habits of grace;' and (4) adoption; and the instrumental cause of which is the sacrament of baptism. In that of the Reformed Churches (q. v.) it is 'an act of the almighty power of God,' which, without effecting any 'change in the essence or acts of the soul,' communicates a new principle of life. It is the Effectual Calling of the Westminster Confession and Catechism, and includes Conversion. In the Church of England, besides those who hold the Reformed and those who hold the Romish doctrine of R., there are some who make a distinction between Conversion and R., holding the latter to be a grace which accompanies baptism; while others regard it merely as an external change of status accompanying baptism. See Reuss, *Hist. de la Theol. Chrétienne* (Strasb. 3d ed. 1864), Hodge, *Syst. Theology* (Edin. 1873).

Regensburg, or **Batisbon** (Lat. *Reginum* or *Ratisbona*), the chief town of the province of Oberpalz and R., Bavaria, stands on the S. bank of the Danube, opposite the influx of the Regen, 65 miles N.E. of Munich by rail. It is situated in a wide and fertile valley, 1000 feet above the sea-level. A stone bridge of fifteen arches (finished 1146) connects it with its suburb *Stadt am Hof*. It presents a very mediæval appearance with its ancient fortifications, narrow and crooked streets, and high-gabled houses. Among its most notable buildings are the Gothic cathedral of St. Peter (1275-1634), 306 feet long by 125 broad and 132 high, with a magnificently sculptured double portal, fine stained glass windows, remarkable monuments and elegant open towers, completed 1860-70; the Church of St. James of Scotland, dating from the 12th c., and of pure Byzantine architecture; the fine old Rathhaus, partly of the 14th c., formerly the place of meeting of the German Diet; and the palace of the Prince of Thurn and Taxis. About 6 miles E. of R. is the magnificent Walhalla, or German Temple of Fame, founded by King Ludwig in 1830, and completed, from designs by Klenze, in 1842 at a cost of £67,000. A Doric edifice of grey marble, resembling the Parthenon, and surrounded by 52 fluted columns, it stands on a hill 323 feet high overlooking the Danube. It contains the 'Victories' of Rauch (q. v.), and 101 busts of famous Germans. R. is the seat of a bishop, and possesses in all 13 Catholic and 3 Protestant churches. It has several breweries and distilleries, and considerable manufactures of beetroot sugar, faience, candles, soap, and gold, silver, steel and brass ware. In 1853 it was made a free port, and has now considerable shipbuilding industry and extensive river trade in corn, wood, and especially salt. R. is one of the oldest towns in Germany. It was the *Castra Regina* of the Romans, and was a commercial station of importance in the 2d c. Its bishopric was founded in 740. Friedrich Barbarossa made it a free town, and from the 11th to the 15th c. it was the most populous and prosperous city of Germany. In the Thirty Years' War it was taken and retaken several times by the contending parties.

From 1663 to 1806, with only two interruptions (1713-14 and 1740-44), it was the seat of the Imperial Diet. It suffered severely in the five-days' battle fought in its neighbourhood in 1809. After several political vicissitudes in the Napoleonic times it was ultimately made over to Bavaria in 1810. Pop. (1875) 31,487.

Regent is the name given in England and France to one who without being king exercises kingly authority during the minority of the proper sovereign, during his absence from the country, or when he is incapacitated from any cause for the discharge of his royal duties. Other names have been used to designate the office. John, the brother of King Richard, acted as R. under the title of *summus rector totius regni*, while that monarch was fighting in the Holy Land; Somerset was R. under the title of 'Protector' during the minority of Edward VI., but the regency of the Prince of Wales (afterwards George IV.) during his father's insanity has made the name R. familiar to Englishmen.

Regents, in the mediæval universities. Newly made M.A.'s had to teach their subject (*regere scholas*) for two years, during which period they were styled 'necessary R.' Afterwards they might teach or not as they pleased, and were therefore called *regentes ad placitum*. Gradually, however, the regents' functions were superseded by those of the Professors' (q. v.).

Beggell'o, a town of Italy, in the province of Florence, 16 miles E.S.E. of that city. Pop. (1874) 11,000.

Beggio (*Rhegium Julii*), called R. di Calabria to distinguish it from R. nell'Emilia, is the capital of the S. Italian province of R. di Calabria, and is situated on the Faro di Messina, 297 miles S.S.W. of Taranto by rail. Behind is the imposing wooded range of Aspromonte, the highest point of which, Montalto (6907 feet), is 4 miles distant. The town has environs of the most beautiful and varied scenery, and has a noble view of the Sicilian coast, with Mount Etna in the distance, and Messina 4½ miles off. As the old town was almost entirely destroyed by the earthquake of February 1783, the streets present a modern appearance. The finest is the Corso Borbonico, 3050 feet in length, which intersects the town from N. to S., and is adorned with many fine buildings. R. is an archiepiscopal residence, and has a fine cathedral rising in the midst of olive and orange groves. It has several educational institutions and an hospital. It manufactures linens, silks, essences, and scented waters. Pop. (1874) 20,855. R. was originally a colony from Chalcis in Eubœa, and was founded B.C. 723. It rose rapidly, and attained to great power under Anaxilas and his two sons (494-461 B.C.). It was destroyed by Dionysius the Elder (387 B.C.), partly rebuilt by Dionysius the Younger, and joined to Rome after the Social War. In 410 A.D. it marked the limit of the progress of Alaric, and in 549 it was taken by Totila. Destroyed in 918 by the Saracens, and in 1005 by the Pisans, it was taken by Robert Guiscard in 1060. In 1552 and 1597 it suffered severely from the Turks, and in its vicinity Garibaldi was taken prisoner by the Italian general Pallavicini, 29th August 1862.

Beggio (*Regium Lepidi*), distinguished from the preceding as R. nell'Emilia, is situated on the right bank of the river Crostoli, 96½ miles S.E. of Milan by rail. It has broad, well-built streets, flanked with arcades. The finest squares are the Piazza Maggiore and Piazza Minore, the former containing the cathedral of the 15th c., and the Municipio, near which is the house (still shown) in which Ariosto was born, and the latter, the church of S. Prospero, erected in 1504. Other buildings are the Teatro Nuovo, one of the finest in Italy; the church of the Madonna della Ghiara, with fine frescoes, built 1597; that of the Madonna della Concezione, a handsome modern structure; the Museo, containing the natural history collections of the famous Spallanzani (q. v.); and the Biblioteca Municipale, with 36,000 volumes, and MSS. of the 11th c. R. has manufactures of silk and hemp. Pop. (1874) 19,131.

Regiam Majesta'tem is the title given to a collection of ancient laws, bearing to have been compiled by the order of David I., king of Scotland. There has been a controversy about the authenticity of the work, it being held by some authorities to be a compilation from the old laws of England, made by order of Edward I., with the view of assimilating the laws of Scotland to those of England.

Regill'us, Lake, a small lake in Latium at the foot of the Tusculan hills, where the Romans under Aulus Postumius defeated C. Mamilius and the Latins in 496 B.C. Gell plausibly suggests that it occupied the site of a now drained volcanic crater at Cornufelle at the foot of the hill on which Frascati stands. The battle is the subject of one of Macaulay's *Lays of Ancient Rome*.

Regiment (Fr. from Lat. *regimentum*, 'rule' or 'government'), a body of soldiers consisting of one or more battalions of infantry or of several squadrons of cavalry, commanded by a colonel. It is the third subdivision of an army corps, several regiments going to a brigade, and several brigades to a division. In the British Army there are 3 regiments of Life and Horse Guards, 7 of Dragoon Guards, 3 of Dragoons, 13 of Hussars, 5 of Lancers, 3 of Foot Guards, 109 of Infantry, the Rifle Brigade, the Royal R. of Artillery, the Corps of Royal Engineers, and several Colonial and West India Regiments. The Scots Guards and the Coldstream Guards have two battalions each, and the Grenadier Guards have three battalions. All the line regiments from the 1st to the 25th have two battalions, and the others one, except the 60th (the King's Royal Rifles) and the Rifle Brigade, which have each four. The single battalion regiments are grouped in pairs under the Army Localisation Scheme, so as to form district brigades. Each battalion of infantry is commanded by a lieutenant-colonel, and is usually divided into 12 companies. Its peace complement varies from 600 to 800 men. A R. of cavalry, consisting of 8 troops, numbers in time of peace about 500 men. The army is placed upon a war footing, not by adding to the number of regiments, but by increasing the number of men in each. On the mobilisation of the 1st Army Corps in 1878, the war strength of each battalion of infantry was fixed at 31 officers, 50 sergeants, &c., 16 buglers, and 1000 men, or 1097 of all ranks, and of each R. of cavalry at 653 men of all ranks, with 480 troop horses, and 44 draught horses. The Royal R. of Artillery is composed of 31 brigades, 16 of which are horse brigades, and it numbered in 1877-78, 34,668 of all ranks. The Corps of Royal Engineers consists of 40 companies and 3 troops. In 1878 there were 135 infantry militia battalions, and 35 regiments of artillery militia. Most regiments are called after the county or district in which the men were originally enlisted. The regimental system can only exist in the case of standing armies. The Roman legions at first consisted of 4200 infantry (30 companies) and 300 cavalry. Each company was commanded by a first and second centurion assisted by two ensigns. In the days of Marius the number was 6000 men divided into 10 cohorts. In modern days regiments date from the fall of feudalism, and were first formed in France. Companies such as the 'Compagnies d'ordonnance' established by Charles VII. were ultimately grouped into regiments, which were made of nearly uniform strength, the battalion forming the tactical and the R. the administrative unit. The 1st Royal Scots, which was originally the Scottish Guard of the Kings of France, is said to have the oldest history of any R. in the world. The next oldest regiments in the British army are those of Life, Horse, and Foot Guards, the 2d Queen's and the 3d Buffs, which were the only troops maintained after the disbanding of the army of the Commonwealth. Charles II. added a few regiments to these, James II. raised 8 of cavalry and 12 of infantry, William III. 3 of cavalry and 11 of infantry, and Queen Anne 1 of cavalry and 11 of infantry. Under the First and Second Georges the army was increased by 40 regiments, and a further number were added during the American and Peninsular Wars. An additional battalion was added to each of the first 25 regiments of foot in 1857-59, and the 100th R. was raised in Canada in 1858. Finally 3 regiments of cavalry (the 19th, 20th, and 21st Hussars) and 9 of infantry (101st to 109th) were formed from the European regiments in the service of the old East India Company. In the French and German armies 3 battalions, and in the Austrian army 6 (3 field, 2 reserve, and one dépôt) battalions go to every infantry R.

Regimental Schools are attached to each R., battalion, corps, or garrison in the British army, for the instruction of the non-commissioned officers and men and their children. The commanding officer may require married soldiers under pain of forfeiture of certain privileges to send their children to these schools, where a good sound education is given by the regimental schoolmasters. Soldiers, orphans of soldiers, and children of soldiers

servicing abroad, are instructed free of charge, 1d. per head per month being charged for other children, or 5s. each for the children of officers. An infant and industrial school under a schoolmistress is also attached to every corps. In some large garrisons, schools solely for the children of officers have been established.

Regiomonta'nus, properly Johann Müll'er or Moli'tor, was born at Königsberg in Franconia, June 6, 1436. He early showed a strong mathematical bias, and after studying at Leipzig, went to Vienna in 1451. In 1461, he accompanied Cardinal Bessarion to Italy, to learn the Greek language with the view of getting a thorough knowledge of writings of the Alexandrian school. Returning in 1464, he next spent seven years at the court of King Matthias Corvinus of Hungary, after which he removed to Nürnberg, where, aided by Bernard Walter, a wealthy citizen, he established an observatory and printing press. In 1475 he was called to Rome by Pope Sixtus V. to superintend a proposed reformation of the calendar. At the same time he was appointed Archbishop of Ratisbon; but he did not long enjoy this honour, dying on July 6 of the succeeding year. As a mathematician and astronomer R. was the greatest of his age. In his *Tabula Directionum Projectionumque* (1475) he tabulated the first tangents published in Europe. Prior to this he had issued his *Ephemerides ab Anno 1475 usque ad Annum 1506*, and his *Kalendarium Novum* for the three years 1475, 1494, and 1513. The latter was probably the earliest European almanac. His observations at Nürnberg, which were supplemented by those of Walter, and published in 1544 under the title *Observationes 30 Annorum a J. Regiomontano et B. Walthero*, were used by Lacaille in the construction of his solar tables. They gave ample evidence of the inaccuracies of the Alphonsine tables; but the contemplated correction of these by R. was never undertaken on account of his premature death. His other works, chiefly tables, were for the most part published after his death. See Montuclia's *Histoire des Mathématiques*, and Gassendi's *Life of Müller*; also Ziegler's *R., ein Vorläufer des Columbus* (1874).

Register, (1.) The compass in whole or part of a voice or instrument. The human voice is usually said to have a lower and upper register, the chest notes forming the former, and the head or falsetto notes the latter. Such notes as do not strictly come under either of these categories are sometimes spoken of as in the middle register. (2.) A stop or range of pipes on the organ.

Register, Lord Clerk, is an officer of the law and of the state in Scotland. He has custody of the national records, and is Keeper of the Signet (see SIGNET). The tenure of the office is for life.

Registration of Births, Deaths, and Marriages. 31 and 32 Vict. c. 122 repeals former statutes and provides for the establishment of a general register office in London, and for the appointment of a Registrar-General of Births, Deaths, and Marriages in England (see BIRTHS, REGISTRY OF). In case of death, some one present during the last moments, or some inmate of the tenement in which the death has happened, must, within five days after the event, give notice to the registrar of the district, and the informant must within eight days, to the best of his or her belief, instruct the registrar on the following points—the day of death, the name and surname, sex, age, rank or trade, of the deceased, and cause of death. The person giving the information must write in the register his or her name, with such other note as circumstances require for identification. Unless this be done, the entry in the register cannot be taken as evidence. No fee can be lawfully taken from the person giving the information. The Act affixes penalties to undertakers or others performing funerals without the registrar's certificate of death; and to the registering of any false statement regarding births, deaths, and marriages, the false informer being held guilty of perjury. In Scotland, the Registration Acts are in some respects more stringent than the English, consequently they secure more trustworthy statistics, especially as regards births. Births in Scotland must be registered within twenty-one days, deaths within eight days, and marriages within three days. See MARRIAGE.

Registration of Deeds. There is no general registry of deeds in England. As a limited protection to purchasers and

mortgagers, statutes have been passed requiring abstracts of deeds and judgments affecting lands in Middlesex and Yorkshire to be registered, under penalty of being otherwise void against subsequent purchasers. But these statutes do not embrace copyhold property, nor leases exceeding a term of twenty-one years. Some deeds must be enrolled (see ENROLMENT) in Chancery; but this registry being partial, does not generally assist those who seek a full knowledge of encumbrances on property. 1 and 2 Vict. c. 110 provides that no judgment of the superior courts shall affect lands, unless a memorandum of it shall be registered, under the name of the person whose estate is affected by it, with the senior Master of the Common Pleas division. Without renewal of entry, these registered judgments are only valid for five years. Real estate is not affected by a judgment or decree unless delivered in execution, and the execution is registered. In Scotland there is an admirable system of R. of D. affecting *heritable, i.e., real, estate*. The registration may be in virtue of a clause in the deed, or under the Act of 1698. The custom of inserting the requisite clause had its origin in ecclesiastical influence inducing parties to deeds to place their effects under the authority of the Church courts. There is a head register office in Edinburgh, and there are also burgh registers. By inspecting the latter as to burgage property, and the former as to all other property, every burden affecting heritage in Scotland can be ascertained. As regards England, see MORTGAGE.

Registration of Title to Land. See LAND, TRANSFER OF, BY REGISTRATION OF TITLE.

Regium Donum (Lat. 'royal gift'), an annual parliamentary grant formerly given in augmentation of the stipends of Presbyterian ministers in Ireland. From 1672 to 1682 Charles II. paid annually £600 of 'secret service money' to Irish Presbyterian ministers, and on the 19th June 1690 William III. authorised the payment of £1200 to six such ministers. Anne renewed the grant, placing its disposal in the hands of the Lord-Lieutenant, but for some time before her death it was discontinued. The R. D. was in 1718 restored and augmented by £800 from the civil list of England, the latter sum being distributed by the Rev. Dr. Calamy of London and other trustees to those Presbyterians who were unwilling to sign the *Westminster Confession*. But the orthodox refusing to be thus overawed, the supplement was immediately withdrawn till the accession of George II., when it was renewed and its arrears paid up. In 1784 an addition of £1000 was granted—the Seceders also receiving £500—and again of £5000 in 1792, from which date the R. D. was extended equally to all the Presbyterian ministers of Ireland. An arrangement by Lord Castlereagh (1803) that the congregations should be divided into three classes, receiving £100, £75, and £50 each, respectively, raised the R. D. from £6329, 16s. 10d. to £14,970, 18s. 10d. Irish currency, besides the sums paid to the Southern Association and the Secession Synod. Six years after the R. D. was extended to the Seceders, who, however, were to receive not more than £70, £50, or £40 each. From 1838 an equal grant of £75 was paid to each minister of both bodies, and in 1840 it was regulated that no bounty should be paid unless £35 a year were raised by local effort. Under the Irish Church Act of 1871 the R. D. was finally withdrawn, and nearly all its recipients commuted their life interest, thus forming a general fund of over £580,000, which yields in interests and dividends about £29,000 a year. The Sustentation Fund then founded produces £26,000, and the sum raised from pew-rents amounts to more than £44,000. Thus the members of the Irish Assembly have altogether (1878) an income of about £100,000 a year.

Regius Professor, a title borne by five Cambridge and eight Oxford professors, all of whose chairs were founded by Henry VIII., with the exception at Oxford of that of Modern History (1724), of Pastoral Theology (1842), and of Ecclesiastical History (1842); and in Scotland by all professors appointed by the crown.

Regnault, Henri Victor, a French physicist and chemist, was born at Aix-la-Chapelle, July 21, 1810. After serving in a drapery business in Paris, he entered the École Polytechnique in 1830, and two years later began active duties in the department of mines. Subsequently he became professor at Lyon, and in 1840 was appointed to the chemistry chair in the École Polytechnique, which he gave up the next year for a similar chair in the Collège de France. He now turned his attention to experi-

mental physics, and made valuable researches into the properties of solids, liquids, and gases, determining their specific heats, compressibility, &c. In 1854 he became director of the porcelain manufacture at Sèvres, a branch of industry which engaged much of his subsequent time. On returning to his laboratory after the siege of Paris in 1871, he found that the results of over 600 observations of the thermal phenomena accompanying expansion of gases had been destroyed. He died after a long and painful illness, January 19, 1878. As an experimentalist he was among the foremost of his time, and the facts embodied in his numerous memoirs before the Academy of Sciences and in the *Annales de Chimie* and other scientific journals, are invaluable alike to the chemist and physicist. His chief work is *Cours Élémentaire de Chimie* (4 vols. 1847-49).

Regnier, Mathurin, the creator of classical satire in French literature, was born at Chartres, December 21, 1573. He was the nephew of the poet Philippe Desportes, under whose auspices he first cultivated poetry. In 1593, he accompanied Cardinal Joyeuse to Rome, returning after a stay of eight years, disappointed in his hopes of advancement—a result which was perhaps due to the irregularities of his life. He visited Rome once more in the train of Béthune, ambassador of Henri IV., and seems to have availed himself of his opportunities to make a careful study of Italian poetry. In 1609 he became canon of the church of Notre Dame in Chartres, and from this period he was able, without anxiety, to cultivate his poetical tastes, and to abandon himself 'à la bonne loi naturelle.' He enjoyed the friendship of some of the most distinguished men of his time, and was known among his friends as 'le bon R.' He died at Rouen, October 22, 1613. The works of R. comprise satires, epistles, elegies, epigrams, sonnets, and miscellaneous poems. On his satires, sixteen in number, his fame confessedly rests. They were highly estimated by Boileau, but many have found in this old Juvenal of France a power which he himself does not exhibit. They are unlike all other French poetry of the age of Henri IV., being vehement in tone, and somewhat rugged, reminding us of his English contemporaries, Hall and Donne. R. is an artist rather than a moralist, and concerns himself more with the painting than the lesson to be taught. His style is his best creation, and he has been aptly termed by Sainte-Beuve the Montaigne of French poetry. Editions of his works are numerous. The chief are those of Paris (1608), Leyden (1652), Amsterdam (1729), Paris (1780, 1808, 1819), the best are those by M. Viollet le Duc (Paris, 1822, reproduced 1853), and Barthélemy (Paris, 1862), and Lacour (1867). See Sainte-Beuve, *Tableau de la Poésie Française au Seizième Siècle*.

Reguardant, a heraldic epithet applied to an animal with its head turned backwards.

Regular Canons. Canons were a new class of priests that arose in the 8th c., intermediate between the regular and the secular clergy, that is, they adopted in part the mode of life of monks, but without taking vows, while they also performed ministerial functions in certain churches. In the 11th c. when various disorders had arisen among them, Pope Nicholas II. attempted to re-form them on the old constitution, while other associations were formed with a constitution more of the nature of a monkish rule. Hence arose at this time the distinction between R. C. and Secular Canons. See REGULAR CLERGY.

Regular Clergy was the name given to all those—monks, friars, &c.—who devoted themselves to a religious life under a monastic 'rule' (Lat. *regula*: see MONACHISM), as distinguished from the secular priests, who acted as ministers of religion to the people.

Regulations, Military and Na'vy, are in general all regulations issued by the War Office and Admiralty for the use of officers in the army and navy to ensure uniformity in matters of discipline, drill, finance, &c. They include the Mutiny Act, the Articles of War, the Queen's Regulations, the periodical warrants and orders, and the monthly circulars issued by the War Office and Admiralty to the two services.

Regulus ('little king') a name given by the alchemists to an intermediate product in the smelting or reduction of metallic ores, and which is still retained to indicate certain stages in the reduction of copper and of some other metals. The term does not indicate any precise compound or proportions.

Reg'ulus, a star of the first magnitude in the constellation Leo (q. v.), situated at the point of the well-marked 'sickle.'

Reg'ulus. See GOLDEN-CRESTED WREN.

Reg'ulus, Marcus Atil'ius, a celebrated Roman general, was consul with L. Julius Libo in 267 B.C. Having subdued the Salentini and taken Brundisium, he obtained a triumph, and was raised to the consulship a second time with L. Manlius Vulso Longus in 256 B.C., the ninth year of the first Punic War, which the Romans were now eager to end. Accordingly, the consuls were despatched to Africa with 330 ships. At Heraclea they met a more numerous Carthaginian fleet, under Hamilcar and Hanno, which they defeated. Landing in Africa, they took Clypea, and making it their headquarters, laid waste the Carthaginian territory. On the approach of winter the Roman senate imprudently withdrew one-half of their troops, leaving R. in command of the rest. Acting with true Roman vigour, he routed a large Carthaginian army with many elephants and cavalry under Hasdrubal, Bostar, and Hamilcar, killing 15,000 men, and capturing 5000 with 18 elephants. This victory enabled him to advance within 20 miles of the capital, so that the Carthaginians, harassed at the same time by a Numidian revolt, sued for peace. But the terms offered by R., now insolent with success, were so intolerable that they determined to hold out; and putting their forces under the command of Xanthippus, an able Macedonian general, who at this time arrived at Carthage with a force of Greek mercenaries, they totally defeated R., killing 30,000 men, and capturing the general himself. Only 2000 Romans escaped to Clypea (B.C. 255). After five years' captivity R. was sent to Rome with an embassy to treat for an exchange of prisoners, having sworn to return if the embassy was unsuccessful. On his subsequent conduct no embellishments of legend and poetry has been spared. He is said, as a Carthaginian slave, to have refused at first to set foot within his proud native city, or speak in the assembly of the venerable fathers. And when at last he did consent to advise them, it was strenuously to insist that neither peace nor an exchange of prisoners should be granted, 'donec labantes consilio patres firmaret auctor numquam alias dato.' Then heedless alike of the counsels of his friends and the tears of his wife and children, he returned to his African prison 'egregius exul.' There he is said to have been put to death by being placed in a chest full of iron nails, with his eyelids cut off, plunged first into a dark dungeon, and then exposed to the scorching rays of a burning sun. The story of his tortures is most likely one of those calumnious exaggerations so usual with the Roman writers in speaking of their enemies.

Rêl, the nominal unit of account in Portugal and Brazil, but no longer existing as a coin. A thousand réis = a Milrei (q. v.).

Reich'enbach, a town of Saxony, 11½ miles S.E. of Zwickau by rail. It has two churches and a realschule, and is the chief seat of an extensive woollen manufacture. Pop. (1875) 14,620.

Reich'enbach, a town of Prussian Silesia, on the Peilbach, at the base of the Eulengebirge, 39 miles S.E. of Liegnitz by rail. It has old fortifications, a castle, eleven churches, and a synagogue, and is the centre of a rich manufacturing district, embracing the great manufacturing villages of Langenbielau and Peterswaldau. The town itself has six cotton factories, and carries on linen and woollen manufacture, yarn bleaching, dyeing, and printing. Pop. (1875) 7267. R. was the scene of a victory of Friedrich the Great over Laudon in 1762.

Reich'enbach, Karl, Baron von, a German naturalist and manufacturer, was born at Stuttgart, February 12, 1788. Educated at Tübingen University, R. for several years entertained the chimerical project of founding a new German state in the South Sea Isles. He thus incurred the suspicion of the police of Napoleon I., and for several months was confined in the fortress of Hohenasperg. On his release he devoted himself to the study of physical science, and its applications to industrial art. After visiting the chief factories of France and Germany, he established a blast furnace at Villengen, and large kilns at Haussach for charcoal-making. From 1821 onward, with the aid of Count Hugo zu Salm, he established at Blansko in Moravia several factories, which he managed with such skill and economy as to gain wealth enough to purchase large estates, among them the Château de Reisenberg. He died at Leipzig, January 19, 1869. Many of R.'s discoveries are most important. He inves-

tigated chiefly the compound products of the distillation of organic substances, and thus discovered several new compounds of carbon and hydrogen, such as creosote (1833) and paraffin. His works are *Das Kresot und seine Gebrauche* (Vienna, 1832). *Geologische Mittheilungen aus Mähren* (Vienna, 1834); *Physikalisch-physiologische Untersuchungen über die Dynamide des Magnetismus und der Electricität und ihre Beziehungen mit der Lebenskraft* (Brunswick, 1847-49), in which work and those that follow the author seeks to establish the existence of a new substance 'Od' (q. v.); *Odisch-magnetische Briefe* (Stuttg. 1852-56); *Der Sensitiv-Mensch und sein Verhalten zum Od* (Stuttg. 1854); *Höhlerglaube und Afterswissenschaft*, in reply to Carl Vogt. (*ibid.* 1856).

Reich'enberg, the second town of Bohemia, and one of the most important manufacturing towns of Austria, is situated on the Neisse, 55 miles N.N.E. of Prague by rail. It has a castle and rathhaus of the 16th c. Woollens and cottons form the staple manufactures, but dyeing is also carried on, while small-arms, hats, gloves, musical instruments, and gold and silver wares are produced. The total annual produce of the town amounts to £400,000. Pop. (1870) 22,394. In the Austro-Prussian war of 1866 R. was the head-quarters of Prince Friedrich Karl.

Reich'enhall, a town in Upper Bohemia, on the left bank of the Saale or Saalach, 2 miles from the Austrian frontier, and 13 S.W. of Salzburg by rail. It is beautifully surrounded on three sides by an amphitheatre of mountains, the Untersberg, Lattenberg, Müllnerhorn, and Hoch-Staufen, and has been almost entirely rebuilt since the fire of 1834. It is a favourite watering-place, visited annually by 5000 persons, and owes its importance to its being the central point of the four great Bavarian saltworks, which are connected by conduits of an aggregate length of 45 miles, by means of which the surplus brine is carried from the Berchtesgaden mines to R., and thence to Traunstein and Rosenheim. The *Salinengebäude* are situated in the market-place, with the offices on the right, and four *Sudhäuser* ('boiling-houses') on the left. The sources of the salt springs, one of which, the *Edelquelle*, is impregnated to the amount of 24 per cent., are 14 in number, 50 feet deep, and are reached by a descent of 72 steps. The principal resorts of the visitors are the *Haupt-Brunnhaus* ('pump-house'), the *Curhaus Achselmannstein*, the *Gradirhaus*, and the *Gradirpark*, the latter with a salt-water fountain 40 feet in height. Pop. (1870) 3312.

Reich'stadt, Napoleon François Charles Joseph, Duc de, called Napoleon II. by the Bonapartists, was the son of Napoleon I. and Maria Louisa of Austria, and was born at Paris, March 20, 1811. Transported with joy at his birth, the father himself announced it to the congratulating throng with the words '*C'est un roi de Rome.*' Napoleon abdicated in his favour in 1814, but Louis XVIII. was called to the throne, and Maria Louisa with her child then retired to Schönbrunn, near Vienna. On the conclusion of the Treaty of Vienna, she removed to Parma, but her son still remained at the Austrian court with his grandfather Franz I., who educated him like a prince of the imperial family, and in 1818 made him Duc de R., with the rank of a prince of Austria, since by the Treaty of Vienna he was excluded from the inheritance of the Duchy of Parma. He was thought of as a candidate for the French throne in the Revolution of July 1830, but the project came to nothing. In fact, he had never been very vigorous either in body or mind, and when, after passing through all lower grades of military office, he had risen to be commander of a battalion, the speedy progress of laryngeal phthisis compelled his retirement to Schönbrunn, where he died, July 22, 1832. His last words were a piteous cry to his mother, — 'Ich gehe unter, meine mutter, meine mutter!' See the works of Montbel (Par. 1833), Lecomte (1842), Guy (1856), and Saint-Felix (1856).

Reid, Captain Mayne, an English novelist, was born in Ulster in 1818. He proceeded to New Orleans in 1838, and after several years of adventurous travel in Mexico and the States, settled in Philadelphia. In 1845 he obtained a commission in the United States army. He served in the Mexican campaign, was present at the siege of Vera Cruz, and was wounded at Chapultepec. He raised an American detachment of volunteers in 1849 to assist the Hungarians in their memorable struggle with Austria,

and was on his way to the East when the insurrection collapsed. Shortly afterwards, taking up his residence in London, he assumed authorship as a profession. He has written many novels, in all of which there runs a dash of wild adventure. They include *The Rifle Rangers* (1849); *The Scalp Hunters* (1850); *The White Chief* (1855); *The Maroon* (1860); *The Headless Horseman* (1865); *The Child Wife* (1868); *The Death Shot* (1873), and the *Flag of Distress* (1876). His books for boys are immensely popular, and while gratifying the juvenile taste for excitement are also designed to popularise the study of geography and natural history. Captain R. started the short-lived monthly magazine *Onward* in 1869. A collected edition of his works in 15 vols. appeared in New York in 1868. A series has been published in England under the name of the *M. R. Library*, and his tales have been translated into most Continental languages.

Reid, Thomas, was born in the parish of Strachan, Kincardineshire, April 26, 1710. He entered Marischal College, Aberdeen, at the age of twelve, and there, as in after life, fulfilled the prediction of his schoolmaster, that he 'would turn out to be a man of good and well-wearing parts.' He took the degree of M.A. in 1726, studied thereafter for the Church, spent some time in London, Oxford, and Cambridge, and in 1732 was presented to the parish of New Machar, where he spent fifteen years. Here he devoted himself to intense study, in particular examining the facts of external perception. His first publication, an *Essay on Quantity*, was contributed to the Transactions of the Royal Society of London in 1745. In 1752 he obtained the chair of philosophy in King's College, Aberdeen. His course of instruction embraced mathematics and physics, as well as mental and Moral Philosophy. In 1764 appeared his *Inquiry into the Human Mind on the Principles of Common Sense*. This was the result of study directed towards a refutation of Hume's sceptical teaching in the *Essay on Human Nature*. Immediately on its appearance the author was called to Glasgow College to fill the chair of Moral Philosophy vacant by the resignation of Adam Smith. For twenty years he faithfully discharged the duties of this chair; but the only work he published in connection with it was a brief account of Aristotle's *Logic*, appended to Lord Kames's *Sketches of the History of Man*. In 1785 he published his *Essays on the Intellectual Powers of Man*, containing a theory of external perception, and of a common sense as the basis of knowledge and belief in general. The *Essays on the Active Powers*, which followed in 1788, traversed the field of ethics, and gave an analysis of the mechanical, animal, and rational principles of action, with a discussion of free-will. R.'s last literary work was a historical account of Glasgow University for the *Statistical Account of Scotland* (1794). Mathematics formed the study of his old age. He died at Glasgow, October 7, 1796. Hume's Philosophy of Scepticism was no sooner given to the world, than Kant in Germany and R. in Scotland set themselves to expose it. But while Kant soared into the region of intuitions and pure reason, R. contented himself principally with an examination of external perception, striving to overthrow Berkeley's idealism, from which Hume's scepticism sprang. Using the inductive method, he professed to discover the genuine or common reason of man, substituting this for the paraphernalia of ideas which he imagined had taken the place of truth in Berkeley's theory. His philosophy is a plea for perceived reality. He begins in experience, and asserts from experiment that we have in hearing, sight, &c., not only *sensations*, but also *perception* of external bodies causing these sensations. This is the testimony of man's common sense. Thus he seeks to establish a real material and moral world entirely independent of ourselves. But his induction is far from thorough; many of his first principles are reducible to simpler forms. No two words could have been more unfortunately chosen than those he uses most—*Common Sense* and *Instinct*. The ordinary meaning of these terms is almost the reverse of that which he would take from them. Few entirely unacquainted with his system would suppose that by these names he denominates the highest and most abstract powers of the mind. But whatever the results of R.'s philosophy, he founded a method which in the Scotch and French schools has contributed much to the development of mental science, especially of psychology. For accounts of the 'Common Sense School' of philosophy, consult Cousin's *Philosophie Ecossaise*, and M'Cosh's *Scottish Philosophy*. See the

great, but unfortunately incomplete, edition of R. by Sir William Hamilton (1846).

Reigate (from *Ridgegate*, the passage, that is, through the ridge of the North Downs), a market-town of England, in Surrey, 23 miles S.W. of London by rail, has a fine parish church (restored 1858) in Third Pointed style, containing the tomb of Lord Howard of Effingham, besides three district churches, a town-hall, public hall (1861), and grammar-school (founded in 1675). Under the scanty remains of a castle of the Earls of Warrenne is an excavation, known as the Barons' Cave. The parish includes the Redhill Reformatory (1849), with 248 boys in 1871, and the Earlswood Lunatic Asylum, with 510 patients. R. has no important industries, but carries on a considerable trade in agricultural produce. It publishes a weekly newspaper, and sent one member to Parliament up to 1867, when it was disfranchised for corrupt practices. Pop. (1851) 4927; (1871) 15,916.

Reign of Terror, the name applied to the period of the French Revolution between the fall of the Girondins (q. v.) in May 1793 and the revolution of Thermidor, July 1794. A triumvirate consisting of Robespierre, Couthon, and St. Just held the whole power in their hands, uniting in their persons the influence of the Jacobin Club, the power of the Convention, or rather of the dominant *Montagne*, and the authority of the *Comité de Salut Public*. They declared 'terror the order of the day,' and the guillotine was kept incessantly busy. The *Revolutionary Tribunal*, originally appointed at the suggestion of Danton in March 1793 under the name *Tribunal Extraordinaire*, having a Judge-President, a permanent jury, and for its Attorney-General or Public Prosecutor the bloodthirsty Fouquier-Tinville, condemned, without even the form of a trial, all who were brought before it, as aristocrats, *ci-devants*, reactionists, or federationists. On the 13th of July 1793, Marat was murdered by Charlotte Corday. The republican calendar was introduced on the 5th of October. On the 16th Marie Antoinette was guillotined, and on the 31st of the same month twenty-one of the leading Girondins met the same fate. Philippe Egalité, Duc d'Orleans, was executed on the 6th, and Madame Roland on the 8th of November. In the same month the Christian religion was declared a blasphemous superstition, and a Feast of Reason was held in Notre Dame, the Goddess of Reason being represented by a famous courtesan. In the beginning of 1794 the secondary Terrorists themselves began to fall before the relentless triumvirate. On the 24th of March, Hébert and Anacharsis Clootz, on the 5th of April Danton and Camille Desmoulins, were guillotined. In the same month fell the Princess Elizabeth, sister of Louis XVI., the chemist Lavoisier, and the philosopher Condorcet. On the 8th of June Robespierre restored a form of religion, and a great fête of the *Être Suprême* was arranged by David the painter, Robespierre himself being the principal actor. But his fall was at hand. On the 8th Thermidor (26th July) 1794 he spoke for the last time in the Convention, and on the 10th Thermidor he was guillotined along with Couthon, St. Just, and Henriot. Power fell into the hands of Tallien, Barras, and the *Thermidorians*, by whom the Directory was soon formed, and the R. of T. was over. In the provinces it had been no less sanguinary than in Paris. Couthon and Collot d'Herbois perpetrated shocking barbarities at Lyon; and at Nantes, Carrier, by means of wholesale massacres and his famous *Noyades*, or drownings in the Loire, is said to have put 32,000 persons to death. The number of those who fell by the guillotine in Paris is estimated at about 4000. In June and July 1794 no fewer than 1507 persons were executed.

Rei Interventus, a term of Roman law denoting the doing, or refraining from doing, some act, on the faith of a bargain or promise (see OFFER AND PROMISE); in consequence of which act the law holds that neither party can draw back. To give R. I. this effect, it must flow from the contract or promise, and must be known to the party against whom it is pleaded.

Reimarus, Hermann Samuel, a German philosopher, born at Hamburg, December 22, 1694, studied theology and philosophy at Jena, and was a *privat doctent* at Wittemberg from 1716 to 1723, with the exception of a two years' tour in Holland and England. He was appointed rector at Wismar in 1723, and in 1728 was called to the chair of Hebrew in the Hamburg

Gymnasium, which he held till his death, March 1, 1765. Besides a scholarly edition of Dion Cassius (1750), R. published *Die vornehmsten Wahrheiten der natürlichen Religion* (1754), *Vernunftlehre* (1756), *Betrachtungen über die Kunsttriebe der Thiere* (1762), works that ran through many editions in their day, but are now less remembered than his assault on supernatural religion, first given to the world by Lessing (q. v.), under the title *Wolfenbüttelsche Fragmenten eines Ungenannten* (1777-78). See J. G. Büsch, *Memoria Reimari* (Hamb. 1769).

Rein'deer (*Tarandus rangifer*), a species of Deer (q. v.) inhabiting the northern and Arctic regions of the world, and distinguished from other species of deer by the circumstance that both sexes possess horns. The R. appears to be represented by two varieties: the R. proper being found in the N. of Europe and Asia, whilst the Caribou represents the American variety. There are no grounds for referring these animals to different species, the minor difference of size being insufficient to constitute a specific distinction. The R. of Europe varies greatly in size. A large R. equals a stag; while the full-grown Caribou attains a height of about 3 feet 6 inches at the shoulder. The colour varies according to the season. The summer tint is a sooty brown, the under parts being grey. These hues grow lighter in winter, the grey tints becoming white. The R. constitutes the wealth of the Laplander. It feeds on the lichens which it disinters from the snow in winter. It is a hardy creature, and does not appear in some cases to be over well cared for. The average weight a R. will carry with ease is about 200 lbs., and its pace averages 9 or 10 miles an hour. The senses of the R. are acute. In a wild state the animal migrates, leaving the forests in summer for the open hill-country. It is singularly liable to the attack of flies and other insects which deposit their eggs in its hide, and cause painful sores through the development of the larvæ in the skin. The Caribou is hunted in America for the sake of its flesh, and especially for the layer of fat, known as *depoillé*, and which is obtained from the back and croup of the male animal. The valued *Pemmican* (q. v.) is made from its flesh. The Caribou is found in herds of large size, and the skin is highly valued for making 'hunting-blankets.'

Rein'deer Moss, or *Cladonia rangiferina*, is perhaps, economically regarded, the most important of all the northern lichens. It frequently overspreads large tracts of sterile country in northern and arctic Europe and America, constituting sometimes the sole terrestrial vegetation. As such it is the main support in Lapland and Esquimo-land of the reindeer—one of the chief articles of food of the inhabitants. In some parts of Norway this lichen is also regularly used as a winter fodder for cattle. About the end of September it is scraped into heaps by means of large iron rakes, and the position of these heaps is marked by poles sufficiently tall to be visible above the winter snows. In the same country it is commonly used as a stuffing material in the construction of the usual log houses, and is also used for stuffing pillows by the Lapps. Occasionally, too, it forms at least an ingredient in the food of man (*Lindsay*). *Cladonia* is a large genus of the Lecidinea division of the lichens, and is characterised by its coloured globose or button-shaped fruit growing at the tips of vertical hollow shrub-like or cup-shaped processes, arising from a foliaceous or crust-like thallus.

Reinette (Fr. 'little queen'), sometimes, but improperly, **Rennett**, is a name given to a group of apples in the same manner that the names 'pippin,' 'nonpareil,' and 'russet,' are applied to other groups. R. do not appear to have any one particular and special character to distinguish them. In England they are not so much grown as in France, Germany, &c.; yet still in most choice selections we find some kinds of R. among both the early and late dessert fruit. At a congress of German pomologists (see POME) held in 1876, out of fifty varieties of apple selected by them as best adapted for general cultivation in that country, the large proportion of fifteen are classified under R., including *Champagne R.*, a good kitchen sort; *Carmelite R.*, one of the best for table and kitchen; *Normandy R.*, a good hardy variety, with rich aromatic flavour; and *Canadian R.*, a fine dessert fruit, and excellent for cooking.

Reinforces, in artillery, an additional thickness of metal applied about the breech of a gun to strengthen it; also the part strengthened. In smooth-bore ordnance the portion between

the base ring and the ring near the trunnions is made up of the first and second reinforces, the former being nearest the breech where the metal is thickest.

Rein'kens, Hubert Joseph, the first of the 'Old Catholic' bishops, was born at Burtscheid, near Aachen, 1st March 1821. After working for three years in a spinning-mill, he entered the university of Bonn (1844), was ordained priest (1848), and held the chair of ecclesiastical history at Breslau (1857-74). A pamphlet published on the occasion of the jubilee of his university (1861) had brought him into conflict with his superiors, and shortly after the promulgation of the Infallibility Dogma (1870) he appeared as a leader of the *soi-disant* 'Old Catholics' (q. v.). His deposition from the professorship by Bishop Förster (1871) remained unrecognised by the Prussian government, but was followed up by excommunication. Thrust out from one Church; R. proceeded with the formation of another, of which he was consecrated bishop, August 11, 1873. As such he has been recognised by Prussia, Baden, and Hessen, though not by Bavaria, and as such he has addressed a pastoral to the 'Old Catholic Church' in Germany (1875). He is author of *De Clemente Presbytero Alexandrino* (1851), *Hilarius von Poitiers* (1864), *Martin von Tours* (1866), *Aristoteles über Kunst besonders über Tragödie* (1870), *Ueber Päpstliche Unfehlbarkeit* (1871), *Louise Hensel und ihre Lieder* (1877), &c. See *The New Reformation, a Narrative of the Old Catholic Movement* (Lond. 1875).

Reis Effen'di, the title of the chief of the Turkish diplomatic bureau. His functions are those of Minister of Foreign Affairs, and Chancellor of the Empire, in the latter of which capacities he acts as a sort of Minister of the Interior under the direction of the Grand Vizier.

Rejoin'der, in English law, means the defendant's answer in an action to the plaintiff's *Replication*.

Relap'sing Fever, Fam'ine Fever, Military Fever, or Typhus Recurrens, as it is sometimes called, is a contagious specific fever, depending upon the absorption of a poison into the blood. It is called *famine fever*, as it prevails especially in times of scarcity and famine. Dr. Murchison describes the symptoms as follows:—'A very abrupt invasion, marked by rigors or chilliness; quick, full, and often bounding pulse; white moist tongue, rarely becoming dry and brownish; tenderness at the epigastrium; vomiting, and often jaundice; enlarged liver and spleen; constipation; skin very hot and dry; no characteristic eruption; high-coloured urine; severe headache, and pains in the back and limbs; restlessness and occasionally acute delirium; an abrupt cessation of all these symptoms, with free perspiration, about the fifth or seventh day; after a complete apyretic interval (during which the patient may get up and walk about), an abrupt relapse on or about the fourteenth day from the first commencement, running a similar course to the first attack, and terminating on or about the third day of the relapse; sometimes a second or even a third relapse; mortality small, but occasionally a death from sudden syncope, or from suppression of urine and coma; after death, no specific lesion, but usually enlargement of liver and spleen.'

It has been conjectured that the 'sweating sickness' of the 15th c. was a variety of R. F.; but the first reliable record of it is in the autumn of 1739, when it was epidemic in Dublin; and it prevailed in Ireland, more or less, until the great epidemic of 1817-19, which commenced in Ireland and spread to Britain. Previous to the outbreak, there had been great destitution in Ireland, through the failure of crops. It was estimated that an eighth part of the population was affected, and the total number of deaths was estimated at 44,000. England and Scotland also suffered, but not to the same extent. Since then it has re-appeared in 1826, 1842-43, 1847, 1851, 1853, 1865 (on the Continent), 1869, and 1870.

R. F. is contagious, and the cutaneous excretion contains the poison, which, being thrown off by the skin, infects the air, the clothes, and perhaps the walls of the room. Dr. Obermeir of Berlin has discovered that in persons suffering from R. F. there are fine filaments, supposed to be bacteria, in the blood, that have undulatory movements and spiral contractions. They are only found in the paroxysms of the fever, and are absent during the intermissions.

Relative Keys, in music, keys whose first, third, and fifth degrees form a common chord made up of notes of the key to which they are related. Taking a major key, the keys nearly related to it are its dominant or fifth above, its subdominant or fifth below, its relative minor key (see MUSIC) which bears the same signature and the dominant and subdominant of that minor key. The R. K. of C Major are thus G Major, F Major, A minor, E Minor, and D Minor.

Relative Rank. Officers in the British navy rank with officers in the army according to the following table:—

Rank in Navy.	Rank with	Rank in Army.
1. Admirals of the Fleet	rank with	Field-Marschals
2. Admirals	"	Generals
3. Vice-Admirals	"	Lieutenant-Generals
4. Rear-Admirals	"	Major-Generals
5. Captains of the Fleet	"	Brigadier-Generals
6. Commodores	"	Colonels
7. Captains of 3 years' standing	"	Lieutenant-Colonels
8. Captains of less than 3 years' standing	rank next to	"
9. Commanders	rank next to	Majors
10. Lieutenants of 8 years' standing	rank with	Captain
11. " of less than 8 years' standing	"	Lieutenants
12. Sub-Lieutenants	"	Sub-Lieutenants.
13. Midshipmen	"	"

Non-combatant officers have R. R. similar to that enjoyed by certain combatant officers. Thus a quartermaster in the army has in virtue of his position the R. R. of lieutenant, and a paymaster the R. R. of captain.

Release, in the law of England, is a discharge of an interest in land, or of a legal right.

Rel'evancy, in the law of Scotland, means that a plea is well founded as regards law, if it can be proved as matter of fact.

Relics (Lat. *reliquia*, 'remains') are the bones, clothes, or other articles belonging to those who were revered in their lifetime, which are preserved as memorials of them after their death. It was a common practice among the Greeks to pay divine honours to great public benefactors and heroes after their death; and their bones were believed to afford protection to a city or country. With this view their R. were sometimes transported from a distant place of interment, as when the bones of Theseus were brought from the island of Scyrus to Athens.

The heathen converts to Christianity very naturally transferred to Martyrs (q. v.) the honours they had been accustomed to pay to their heroes. Altars and shrines were built over their graves. Their R. were carried to every country in Christendom, and chapels or oratories built to contain them; the most precious of all being the wood of the cross of Christ, which was discovered by the Empress Helena on her visit to Jerusalem (about 325). Numerous miracles were wrought by these R., such as the cure of all kinds of diseases. They were especially efficacious for protection against demons. The Christian Fathers found a notable precedent for these miracles in the case of Elisha (2 Kings xiii. 20, 21). St. Augustine (*De Civ. Dei*) affirmed that in his own diocese of Hippo seventy miracles had been wrought by the body of St. Stephen, and in a neighbouring region, where it had been before, a far greater number, including five cases of the dead being raised to life again. In the 5th c. the reverence paid to saints came more and more to consist in the superstitious worship of R. Men of peculiar sanctity claimed the power of discovering the graves of the martyrs by prayer and fasting. The place was often revealed by a vision, and angels did not disdain to transport the R. through the air. As the tomb of a martyr had in early times been regarded as the best place for celebrating the Eucharist, it became common to place R. beneath the altar in churches; and a decree of the second Council of Nice (787) forbade the consecration of a church without R. At a later period, during the Middle Ages, the worship of saints almost swallowed up the worship of God. Great numbers of old saints were discovered and new ones made. Loads of R., often articles of a ridiculous description, were brought from the East by pilgrims. The Greeks and Syrians, from whom they were procured, soon became adepts at manufacturing them for sale to Europeans. In Europe the monks and inferior clergy carried them about through the provinces and sold them, or allowed the people to see, handle, and kiss them, on paying for the privilege.

The worship of R. was one of the abuses discarded by the Protestants at the Reformation. In the Church of Rome there are various opinions as to the kind or degree of worship that

ought to be paid to R., but the veneration with which they are regarded generally was defended by Bellarmin (*De Eccl. Triumphant*) by the following arguments:—1. Scripture examples: (1) The Israelites carried the bones of Joseph with them from Egypt (Ex. xiii. 19); (2) the honour paid to the remains of Moses, who was buried by God himself (Deut. xxxv. 6); (3) the case of Elisha (2 Kings xiii. 20, 21); (4) the prophecy of Isaiah (xi. 10 *Vulg.*), that the sepulchre of the Messiah would be glorious; (5) the cure of a woman by touching Christ's garment (Mark v. 25-33); and (6) of the sick by articles which had touched Paul (Acts xix. 11, 12). 2. The decisions of councils. 3. The testimony of the Fathers. 4. Miracles wrought by R. 5. Miraculous discoveries of R. 6. The translation of R. from one place to another. See Gieseler's *Lehrbuch der Kirchengeschichte* (Eng. trans. Edin. 1855); Mabillon's *Acta Sanctorum*; Muratori, *Antiq. Itali. Medii Ævi*.

Relief, Parish. See POOR-LAWS, and PAROCHIAL BOARD.

Religion, as a name, is used in ordinary language in at least three different senses:—(1) as the object of belief; (2) as the power of belief; and (3) as the manifestation of belief. Subjectively it expresses a state of mind, but of what that state of mind consists there have been as many explanations as there have been writers on the subject. Some Christians will not admit that there is any 'true R. but the Christian; all others are merely superstitions. But granting that they are false religions, there must be some point of agreement between them and the true R., otherwise they could not be compared. The question is, what is the essence of R., or the mental faculty which lies at the root of all its forms, true or false? The answer to this question, or the definition of R. given by some of the greatest thinkers may here be given. Plato—a likeness to God according to our ability; Schleiermacher—the feeling of absolute dependence; Feuerbach—covetousness, or wishing manifesting itself in prayer, sacrifice, and faith; Bretschneider—faith in the reality of God, with a state of mind and mode of life in accordance with that faith; Fischer—recognition of the mutual relation between God and the world; Theile—the recognition of a superhuman causality in the human soul and life; Jacobi—faith founded on feeling in the reality of the ideal; Kant—the observance of the moral law as a divine institution; Fichte—faith in the moral order of the universe; Hegel—morality become conscious of the free universality of its concrete essence; Schelling—the union of the finite with the infinite, or God's coming to self-consciousness in the world; Comte—the worship of humanity; Parker—voluntary obedience to the law of God; M. Müller—a mental faculty which, independent of, nay, in spite of, sense and reason, enables man to apprehend the infinite under different names and under varying disguises.

This religious faculty, whatever its exact nature may be, is at any rate analogous to our other intellectual faculties, and hence assumes different phases of development as mankind advances from a state of barbarism through all the stages of civilisation. It changes continually as man's knowledge of nature increases, for it originated in the natural tendency of the human mind to explain the surrounding phenomena of nature; and hence at different stages, or among people amid different surroundings and differently educated, it assumes the forms of Fetichism (q. v.), Dualism (q. v.), Polytheism (q. v.), Monotheism (q. v.), Pantheism (q. v.).

Again, R. may be regarded as developed in different creeds, each with so many adherents. Viewed in this light, its history will be found under the heads of HINDUISM, BUDDHISM, JEWS, CHRISTIANITY, MOHAMMEDANISM, &c. The following table (taken from a manual on Buddhism published by the 'Society for the Propagation of Christian Knowledge') gives the relative numbers of the adherents of the different religions, and the percentage of the population of the globe:—

Buddhists,	500,000,000	about 40 per cent.
Christians—Roman Catholics,	152,000,000	" 12 "
" Greek Church,	75,000,000	" 6 "
" Other Christians,	100,000,000	" 8 "
Hindus,	160,000,000	" 13 "
Mohammedans,	155,000,000	" 12½ "
Jews,	7,000,000	" 1 "
Sikhs,	2,200,000	" "
Parsees,	150,000	" "
Other religions,	100,000,000	" 8 "
Total,	1,250,350,000	

See Nitzsch, in *Studien und Kritiken* (1828); De Wette, *Ueber Religion und Theologie*; Theod. Parker's *Discourse of R.*; Tiele's *Hist. of R.* (Eng. trans. Lond. 1878); M. Müller's *Lectures on the Origin and Growth of R.* (1878).

Offences against R.—The laws in the United Kingdom against apostasy, heresy, reviling the Church ordinances, and against the Jesuits and religious societies, are now obsolete.

Religious Tract Society, London, was founded, 1799, for 'the circulation of small religious books and tracts in foreign countries, as well as through the British dominions.' The nature of the religion taught in these publications is Evangelical Calvinism. Although the R. T. S. is nominally a tract society, by its constitution it also includes books among its publications. Again, its books have not been confined to strictly religious subjects, on the principle that almost all secular subjects may be treated in a religious manner. The circulation of the society's publications, which extends over the whole known world, is effected by means of depots, of grants to foreign societies and to missionaries, of libraries granted gratis or at reduced rates to parishes, schools, hospitals, &c., and of colportage, and through the book-selling trade. The funds of the society are divided into missionary and trade funds; the former, raised from subscriptions, donations, collections, and other free contributions, being all devoted to the grants of the society; the latter supporting all the expenses of publication and distribution. According to the seventy-ninth annual Report of the R. T. S., dated March 31, 1878, the number of publications issued in seventy-nine years was about 14,432; the total circulation in the same time, about 1,783,000,000; the total annual circulation about 63,000,000; and the number of languages and dialects in which publications have been issued 124. The Religious Tract and Book Society of Scotland claims to be the oldest of the kind in Great Britain. In 1875 the sale of its books amounted to 200,000, while its monthly and weekly periodicals had a circulation of about 1,810,000.

Reliquary is a relic-holder, the use of which arose in the early times of Christianity, when Relics (q. v.) began to be carried about the person as amulets. They were mostly small caskets, ornamented with the emblems of Christ or Biblical illustrations; sometimes they were cross-shaped. The constantly increasing veneration for relics led to the manufacture of reliquaries of the most varied forms and sizes, for which the most costly materials were employed, and in the decoration of which the highest efforts of the art of the different periods were displayed. See Lübke's *Echl. Art in Germany* (Eng. trans. 4th ed.; Edinb. T. C. Jack, 1877).

Relocation, Tacit, a term of Scotch law, denoting a renewal of a lease, legally inferred from neither landlord nor tenant having given notice of intention to end it at the period stipulated for. Unless notice be given forty days before Whit-sunday, there is T.R., the renewal being presumed to be for one year. See, in English law, HOLDING OVER, LANDLORD AND TENANT, NOTICE TO QUIT.

Remainder is an interest in an estate, to come into effect on the determination of another interest, or on the occurrence of some event. A R. is either *vested* or *contingent*. The former depends on an event which must happen; the latter on an event which may, or may not, happen. An interest to emerge on the death of some one is a vested R. An interest to emerge on the birth of some one is a contingent R. The analogous term of Scotch law is Fee and Liferent (q. v.).

Rembrandt van Ryn, or Harmenszoon, the head of the Dutch school of painting, was born in Leyden, 15th July 1607. The story of his life is shrouded in a mystery which harmonises significantly with the chiaroscuro of his art, and both life and art are the outcome of a critical period in the history of a great people. All biographies prior to the first half of the 19th c. are vitiated by the fables of Houbracken and Weyerman, but many of the old errors have been dispelled by modern research. R.'s father, Harmen Gerritszoon, or Van R., was a well-to-do miller, and his mother, Neeltje, the daughter of a Leyden baker. As now appears, R. was born in his father's town house, but his birthplace was long supposed to have been a windmill on the Rhine above Leyden, and the fallacy mainly arose from the title of one of his etchings, 'The Mill of R.,' though the title was only given in the 18th c. After

spending nearly three years in Swanenburg's studio in Leyden, he passed to Amsterdam, where he studied under Lastman for six months. In 1622 or 1623 he returned to Leyden, only to remove finally to the great city by the Zuyder Zee seven years later, in the bright dawn of his fame. Here the silvery tone and equal light of his earlier style rapidly gave way both in painting and etching to a novel, startling method, mysterious and sombre, in chiaroscuro strongly pronounced yet subtly toned, with vivid high-lights flashing forth from backgrounds of profoundest shadow. Besides many fine portraits, the more notable of his early works are 'The School of Anatomy,' 'The Elevation of the Cross,' 'The Descent from the Cross,' 'The Entombment' and 'Resurrection,' and above all, 'The Night Watch.' The period in which these were produced was the happiest in R.'s life. In 1634 he married Saskia, daughter of the juriconsult Ulenburgh, who brought him wealth, and whose fair face formed a constant theme for his pencil. Generous and hospitable, he formed a wide circle of friends, and stored his house with costly *bric-à-brac* and rare works of art. Everything went well till the death of Saskia in 1642. This blow was followed by a reaction against his art, and by a series of troubles, domestic and pecuniary. R. married again (probably twice), but the name even of the second wife is not certainly known. It is certain from documents still existing that in 1656 he was publicly declared bankrupt, and various causes are assigned for the disaster. But little is known of his declining years, except that he maintained his household in comfort and independence. He died 8th October 1668. Like nearly all the artists of Holland who preceded or immediately followed him, R. takes hardly any cognisance of the stirring political and religious events which give historical importance to his time. Even his portraits are not those of warriors or patriots but of peaceful burghers—the advocate, the burgomaster, the printseller, the writing-master. His landscapes show broad populous plains under cloudy sky or lurid sunset, weird windmills rising by the ponderous sea-dyke, or the sleepy hamlet in the polders girt with dark groves and silvery water-ways. In dealing with classical and Scriptural subjects, he rejected the Italian style, and going direct to nature, has incurred the wrath of critics like Pels, Fuseli, and Ronchaud by his choice of boors and *bourgeois* as types of beauty. The chief of his later large works are 'The Woman taken in Adultery,' 'The Peace of the Land,' 'The Bather,' 'The Preaching of John the Baptist,' 'The Adoration of the Magi,' 'Moses Breaking the Tables of the Law,' 'Jacob Wrestling with the Angels,' and 'The Syndics of the Guild of Clothmakers.' Quinet wonders how his magic colouring could have been produced under 'the leaden sky' of the Low Countries, and Vosmaer answers with a proud defence of his native land. But colour is always subordinate to chiaroscuro, the exquisitely subtle interplay of tints and shadows, delightful in harmony and delicate balancing. Each work is a masterpiece of soft, vapoury shading, a perfect tissue woven of golden light and thickest gloom, shone across by phantasmagoric gleams of intensest brilliancy. R. has been called 'the prince of etchers,' and among his great etchings are 'Ecce Homo,' 'The Death of the Virgin,' and 'Christ Healing the Sick,' also called the 'Hundred Guelder Piece.' A copy of the 'Hundred Guelder Piece' was bought in 1867 by Mr. Dutuit for £1180. The literature relating to the life and works of R., 'La Pléiade Rembrantesque,' approaches the magnitude of a library. We can only refer to Smith's *Catalogue Raisonné* (vol. vii.); Blanc's *Œuvre Complet de R.* (1853-64); Hamerton's *Etching and Etchers* (1868); Vosmaer's *R., ses Précurseurs, &c.* (1863), and *R., sa Vie et ses Œuvres* (2d ed. 1877); Seymour Haden's preface to the catalogue of R.'s etchings exhibited at the Burlington Fine Arts Club (1877); and the forthcoming *Life* by Rev. C. H. Middleton.

Remigius, St., the apostle of Gaul, was born in 437, at Cerny in Laonnais, and raised in his twenty-second year to the archbishopric of Rheims. His labours were sealed by the baptism of Hlodwig in 496, and ere his death in 533 he saw almost the whole of his vast diocese converted to Christianity.—Another **St. R.**, Archbishop of Lyon from 852, opposed Hincmar (q. v.) in the strife engendered by the monk Goltschalk, and prevailed on the Synod of Valence (855) to recognise as orthodox the teaching of a twofold predestination. He died October 28, 875.

Remiremont, a town of the German empire, province of Lothringen, on the left bank of the Moselle, 16 miles by rail

S. E. of Epinal. It manufactures lace, linen, muslin, woollen fabrics, leather, and wrought iron. There is active trade, too, in corn, hemp, cattle, and cheese. R. is a very pleasant little town, with broad streets and fine walks. The parish church contains a very ancient crypt. The town owes its origin to a monastery founded at the beginning of the 7th c. Pop. (1875) 5668.

Remis'sio Inju'riæ, a term of Scotch law equivalent to *Condonation* (q. v.).

Remitt'ent Fever is one of the three varieties of malarious fevers, the other two being ague and malarious yellow fever. R. F. is supposed to depend upon the absorption of some organic poison into the blood, and is endemic in low-lying tropical districts. In its milder forms it is almost identical with severe intermittent fever; but in more severe cases it may merge into yellow fever. The different localities in which it has prevailed have caused it to be designated by various names, such as Walcheren fever, Bengal fever, bilious remittent of the W. Indies, jungle or hill fever of the E. Indies, African fever, Mediterranean fever, &c.

The symptoms of R. F. closely resemble those of intermittent fever, except in point of severity, but it is distinguished from it by the fact that in the interval there is no entire cessation of the fever, but simply an abatement or diminution. The disease generally continues from twelve or fourteen days, and the period of remission varies from six to twelve or fourteen hours. The fever is generally ushered in with gastric symptoms, uneasiness, depression, languor, nausea, and frequently very severe headache. The cold stage varies in intensity and duration, but in general there are shiverings and cold clammy perspiration, followed by a severe hot stage, with burning skin, more especially about the neck and forehead, intense headache, sleeplessness, nausea and vomiting, and frequently delirium. This stage, the duration of which is somewhat indefinite, ranging from six to twenty-four hours, is succeeded by a stage of sweating or subsidence, and may be followed by another attack similar to the first but more severe, the attacks and varying remissions constituting the fever. The liver, and more especially the spleen, are frequently much enlarged and tender on pressure. Jaundice is occasionally present, and hence the term bilious remittent. In very severe cases the tongue is brown and dry, sometimes quite hard, bilious vomiting is incessant, the neck is burning hot, delirium is present, there is intense thirst, and, almost invariably, obstinate constipation.

In the treatment of R. F. the first object to be attained is the relief of the bowels. This is sometimes extremely difficult, as nothing will remain for any length of time on the stomach. An enema will not answer the purpose, and it may be necessary to administer two or three drops of croton oil on the tongue. When the stomach can retain the medicine, a full dose of the compound powder of Jalap should be given, or the compound colocynth pill, with two or three grains of calomel, and one quarter of a grain of the resin of podophyllin. When the bowels have been freely moved, quinine should be given in full and oft-repeated doses from five to twenty grains every three hours during the remissions. The quinine may be continued so long as the bowels remain free, and entire chinchonism is produced. Sponging the body with cold water, or with vinegar and water, often affords great relief, and accelerates the sweating stage. No relief is experienced until the patient breaks out in a copious perspiration, and this invariably affords relief. A severe attack of R. F. is very dangerous as regards life, and it is frequently necessary for Europeans to seek a change of climate before recovery takes place, and if this be not done there is usually a lengthened period of convalescence. In tropical, malarious districts the natives suffer almost as severely from R. F. as Europeans do. The only known specific in R. F. is quinine, following the exhibition of active cathartics.

Remonstrants. See ARMINIUS.

Re'mora, or Suck'ing Fish (*Echeneis Remora*), a Teleostean fish, reaching a length of from 8 to 12 inches, and having on the top of its head a curious sucker, by means of which it can attach itself firmly to any object. It occurs in the Mediterranean Sea, and also in the Atlantic Ocean, and has been occasionally found on the coasts of Britain. The colour is a dark brown, the hue of the back being darker than that of the under parts. The R. is employed by the Chinese and by other nations in the capture

of turtles. The fish, secured by a ring—passed through the tail-fin—and line, is allowed to swim in search of turtles, which are met with sleeping on the surface of the water. The R. attaches itself by means of its sucker to the turtle, and is then drawn in by the line along with its prey. An allied species is the *E. scutata*, in which the sucker is very large. There is a single dorsal fin, and the ventrals are placed on the throat below the pectoral fins.

Remo'val of Goods by the tenant of a house is a violation of the landlord's right of *Lien* (q. v.), in Scotch law, *Hypothec* (q. v.). If rent be due at the date of removal, the landlord may follow the goods and seize them in payment within thirty days from the date of removal. But if the rent be not due when the goods are taken away, the landlord cannot do this.

Remo'val of the Poor. No pauper can be legally removed from any parish or workhouse till twenty-one days after notice of his being chargeable has been sent to the parish to which the order of removal is directed, with a copy of the examination and order, unless the order be submitted to, when the pauper may be moved directly. No removal can be made pending an appeal. Notice of appeal must be given fourteen days before first day of Sessions. The parish losing the appeal pays costs. Under 28 and 29 Vict. c. 79 no pauper can be removed from a parish after he has resided in it for one year, and residence in any part of a union has the same effect as residence in a parish.

Remo'ving of Ten'ants is a term of Scotch law, denoting the giving up possession of a subject by a tenant on expiry of his lease. Notwithstanding expiry, the tenant may continue in possession, on a tacit understanding, from year to year. To authorise judicial removing, the tenant, when the lease does not provide otherwise, must be warned by the landlord to remove. The notice must be given forty days before the term of Whitsunday (15th May), on which the removal is to take place. In English law, see NOTICE TO QUIT.

Rem'scheid, a town of Rhenish Prussia, in the fine valley of the Lennep, 18 miles E.S.E. of Düsseldorf by rail. It has important manufactures of excellent woollen cloths, cutlery, iron wares, &c. As early as 1580 it had iron-foundries, producing hand-wrought bars. Pop. (1875) 26,120.

Rémusat, Charles François Marie, Comte de, born at Paris, March 14, 1797, after studying at the Lycée Napoléon, was admitted advocate, and in 1820 published a brochure, *De la Procédure par Juries en Matière Criminelle*, which achieved a marked success. Turning from legal studies, he attached himself for ten years to the press, writing for the *Tablettes Universelles*, *Globe*, and *Courrier Français*, and signing with his brother journalists the protest against the 'July Ordinances' (1830). Under the Citizen King's régime R. sat in the French Chamber as *Doctrinaire* member for Toulouse, served as under-secretary of state in the Ministry of the Interior (1836), and himself held the portfolio of that department from March to October 1840. The fall of Thiers brought him over to the Opposition, but for the next seven years he chiefly occupied himself in writing the brilliant philosophical treatises, *Essais de Philosophie* (2 vols. 1842), *Abélard* (2 vols. 1845), and *De la Philosophie Allemande* (1845), works which procured his election to the Académie des Sciences Morales et Politiques and the Académie Française (1846). After the 'February Revolution' (1848) politics again engrossed him; the department of Haute-Garonne elected him to the Constituent and Legislative Assemblies; and it was only after the *coup-d'état* and a seven months' banishment from France that he returned to private life and to his books (1852). England engrossed R.'s interest about this time, and his *St. Anselme de Cantorbéry* (1854) was followed by *Angleterre au XVIIIe. Siècle* (1856; 2d ed. 1865), *Bacon, sa Vie, son Temps, sa Philosophie* (1858), *Channing, sa Vie et ses Œuvres* (1861), *Philosophie Religieuse, ou De la Théologie Naturelle en France et en Angleterre au XVIIIe. Siècle* (2 vols. 1865), and *Histoire de la Philosophie en Angleterre depuis Bacon jusqu'à Locke* (1874). The events of 1870-71 caused him at length to resume the career of politics, and as Minister of Foreign Affairs he stood by Thiers down to the fall of the Conservative Republic in 1873. He died at Paris 6th June 1875. From Royer-Colliard R. received the title 'Prince of Amateurs,' a *mot* whose seeming praise conceals a sting. Indeed, as politician, historian, and philosopher he enjoyed a reputation in his day which time will hardly justify; his writings, if we except perhaps the *Bacon*

and *Channing*, being rather remarkable for keenness and vivacity than depth or originality of thought. An additional instance of his *esprit universitaire* is furnished by *Abhard, Drame Philosophique* (1877) and *La Saint Barthélemy, Drame Historique* (1878), composed by R. during the years 1836-38, and now given to the world by his son, M. Paul de R. Overburdened with erudition, and utterly unsuited for the stage, these plays have yet an interest of their own as subtle psychological analyses and vivid delineations of two eventful epochs. See an article by P. Davergier de Hauranne in the *Revue des Deux Mondes* for November 1875.

Rémusat, Jean-Pierre-Abel, born at Paris, September 5, 1788, the son of a surgeon, was himself destined for the profession of medicine, but under De Sacy's influence conceived the notion of devoting all his energies to a study of Chinese. Without a dictionary, he compiled one for himself, and by 1811 produced an *Essai sur la Langue et la Littérature Chinoises*; whilst his natural bent asserted itself even in his M.D. thesis, *De Signis Morborum qua e lingua sumuntur, præsertim apud Sinenses* (1813). In 1814 a Chinese professorship was specially created for R. in the Collège de France; he became editor of the *Journal des Savants* (1818), keeper of Oriental MSS. in the Bibliothèque Royale (1824), and President of the Société Asiatique (1829), which he had helped to found in 1822. He died of cholera at Paris, June 4, 1832. Amongst his numerous writings, where we discern no mere ingenious word-hunter, but one who sought to discover in speech the thoughts, manners, and history of the speaker, the principal are *Recherches sur les Langues Tartares* (1820), *Éléments de la Grammaire Chinoise* (1822), *Observations sur l'Histoire des Mongols Orientaux* (1832), and *Histoire du Bouddhisme* (1836). See Silvestre de Sacy's *Éloge d'Abel R.*

Remy. See REMIGIUS.

Renaissance (Fr. from Lat. *renascor*, 'to be reborn') is a term used to denote that glorious epoch of Italian history immediately succeeding the Middle Ages. It is commonly made to include entirely the 15th and 16th centuries; but within exacter limits it may be said to have begun with Petrarch, and ended with Leo X. The existence of the ecclesiastical state had made national unity in Italy an impossibility. Patriotism, and even the narrower jealousy of city towards city, had grown weary of the never-ended struggle for emancipation; the freedom now to be aimed at, it was felt, was the freedom of the individual. During the Middle Ages the glamour of early Christianity had become a mist, through which great men could not distinguish each other, and amid which the only voice distinctly heard was that of Papal authority. There was something noble in the faith which thus bound society together; but the childlike faith became more and more childish, and at length was seen to be simply illusion. The emaciated Christ, the sorrowful Virgin, and the entranced saints of the Middle Ages contrasted too forcibly with the popes and nuns and priests of the republican times. The Church set the example of worldliness. Its servants were the first to revile and wag the head under the cross. Religion was dead: a new influence was to give second birth to the spirit of man. This R. had two distinct causes. There was the perception of the incompleteness of the Church's scheme of human life, with a consequent indifference to its authority. This contributed the element of freedom and individualism. But while this spiritual revolution was going on, the wind wafted precious fragments of classical literature to Italian shores from the conflagration of the Eastern Empire. To this literature the popular energies were directed. Had it been absent, the R. might have been a Reformation; but Calvary was deserted for Olympus, Galilee for Corinth.

Petrarch in his study, poring over almost undecipherable Greek manuscripts, like one striving to recall a dream, typifies the new-born Italy. In the article **PETRARCH** we have shown what the father of modern learning did for his age and all ages. Innumerable men of distinction followed his example. Pope Nicholas V., when a simple monk, crippled himself with debts incurred in the buying and copying of classical MSS. At his death he left a collection of 5000 volumes. Niccolò Niccoli, the Florentine, spent his entire fortune on books, and when he was himself bankrupt still continued to buy with gold provided by

Medicean munificence. Guarino and Poggio may be picked out from book-hunters for special mention. The latter in Southern Germany discovered six orations of Cicero, the first complete Quintilian, and made important additions to Silvius Italicus, Manilius, Lucretius, Valerius Flaccus, Asconius Pedianus, Columella, Celsus, Statius, and Aulus Gellius. Along with Lionardo Aretino he also unearthed the last twelve comedies of Plautus, and Cicero's *De Oratore*, *Verrine Orations*, and *Brutus*. Such was the work of salvage done by hundreds of rich and enthusiastic men at a time when to have neglected these literary treasures would have been to lose them for ever. The Greek scholarship of Petrarch and Boccaccio, meagre though it was, produced the richest fruits. Schools of Greek literature and philosophy—Plato's especially—sprang up everywhere. Florence, Rome, Padua, Verona, Ferrara, Venice, Perugia, Pavia, had all professors of Greek. Aldo Manucius of Venice, the great printer and editor, ventured his whole fortune in the cause of learning. And so successful was this movement, that towards the end of the 16th c. large numbers of Italian youths were accustomed to speak Greek fluently. The effect of this classical mania was not entirely good. For 200 years the highest aim of the best men was a pure Latin style; literature became the art of quotation. Petrarch had placed his hopes of fame on his Latin poems, which are universally neglected for his Italian; Poggio bewailed Dante's choice of the vernacular for his *Divine Comedy*. Yet we have to thank generations of men, content to be editors when they might have been authors, for the preservation of the old world. Their labours hindered but did not impair the development of the Italian language; they realised the dream of Dante, and gave him Virgil for a companion on the road to fame. These humanists, however, in one respect, left Italy even worse than they found it, for they abolished morals. Their Paganism was complete. Intoxicated with the sense of power, mental and physical, they devoted themselves to the enjoyment of each passing moment as an end in itself. Cosmo de' Medici sang, 'You follow infinite objects; I follow finite.' Lorenzo de' Medici wrote, 'We must enjoy: there is no certainty of to-morrow.' Leo X. summed up his theology by crying, 'Let us enjoy the Papacy, now that God has given it us.' Humanistic morals at their best might be exhibited in the words of Pope Julian II.—'If we are not ourselves pious, why should we prevent other people from becoming so?' It was this want of principle that ultimately extinguished the humanists as a class. They laboured unweariedly in the cause of antiquity, but quarrelled among themselves; and when they had delivered up their honey, they stung each other to death.

Amid this carnival riot of the reason and the senses, a few stand almost immaculate. Such are the universal geniuses—Michael Angelo, the half-divine Hercules of art; Leonardo da Vinci, the exquisite dreamer; Alberti—athlete, lawyer, scholar, painter, sculptor, poet—a great-hearted, devout Christian. These in their wonderful lives justified the spirit of the R.; they stand like statues on its pinnacles.

In *Architecture*, the term R. is used to denote a style that originated in Italy in the 15th c. and spread over Europe in various forms. Its development in Italy is traced under **ITALIAN ARCHITECTURE** (q. v.). It was introduced into France by the Italian architect Fra Giocondo under Louis XII. (1461-83), whose Italian campaigns had familiarised Frenchmen with the style. From his reign and that of François I. date many of the finest specimens of the R. style, such as the Châteaux of Chambord and Chenonceau on the Loire, and the Church of St. Eustache in Paris (1532). While the Italian architects returned more or less completely to the Roman forms, the French clung at first to Gothic forms, and merely introduced classical details of ornamentation—pilasters, capitals, mouldings, cornices, &c. The style reached its perfection in France under Henri II, in the S.W. façade of the Louvre, parts of the Château of Fontainebleau, and other buildings. From the time of Henri IV. to that of Louis XIV. it became degraded, its form being nondescript, neither Gothic nor Classic, and its ornamentation both excessive and meaningless. Under Louis XIV., again, it somewhat revived, the Gothic form being entirely abandoned, and a more consistent, if often heavy and unimpressive style, being introduced. The great palace of Versailles, built by Hardouin Mansard, and the E. front of the Louvre, designed by Perrault, are the most notable buildings of this period. The R. style did not penetrate

into Germany until the middle of the 16th c. Among the most notable of its early examples are the Belvedere in the Hradschin of Prag, the Palace of Heidelberg (1556), and the Rathhaus of Nürnberg (1616). In Spain it was early adopted, and the town-halls of Saragossa and Seville, with many other buildings, are fine specimens of the style, which was afterwards considerably affected by Moorish influences. The earliest instances of R. architecture in England date from the latter half of the 16th c. By the engrafting of the Continental R. upon the Tudor and Old English styles, the ELIZABETHAN ARCHITECTURE (q. v.) was produced, and this was followed by the JACOBÆAN, of which the principal master was Inigo Jones, the architect of the banqueting-house of Whitehall, London, and Heriot's Hospital, Edinburgh. The Great Fire of London in 1666 made room for a great number of buildings in the purer R. style, most of which were erected by Sir Christopher Wren, the chief being St. Paul's Cathedral. Classicism predominated throughout the 18th c., in the beginning of which English architecture was greatly influenced by the ponderous style of Louis XIV. To this period belong such buildings as Blenheim House and Castle Howard, erected by Vanbrugh.

The beginning of the present c. was marked by a revival of the purely classical style. The R. architects had as far as possible adapted classical methods and details to modern requirements. Modern requirements were now made to adapt themselves as best they could to pure classical forms. Of this movement the Madeleine in Paris is perhaps the most remarkable result. Other examples are St. Pancras Church, London, St. George's Hall, Liverpool, the High School, Edinburgh, the Museum, Berlin, the Glyptothek, Munich, and the Walhalla near Donaustauf on the Danube. This movement soon gave way to a revival of the earlier R. style, and even of the Gothic, in such remarkable examples as the Houses of Parliament, London, and the Votive Church, Vienna.

The other fine arts of the R. have already been described in the articles PAINTING and ITALY. The roots of modern art strike deeper into the Middle Ages than do those of modern learning. The Church furnished the painters with subjects of which imagination was long in growing weary; when classical art was revealed, it did not conquer the ecclesiastical, but only blended with it. Thus the painter who depicted Mary fainting on Calvary turned to wed Ariadne to Bacchus with his brush. The quickening sense of bodily perfection led artists to the intensest study of anatomy. Here, indeed, they found the Greeks had been before them, but they laid hold of the beautiful everywhere. On their canvas the lean saints grow lusty and strong, the Virgin rivals Venus, and Christ, as Pulci observed, becomes 'a crucified Jupiter.'

See Tiraboschi's *Storia della Letteratura Italiana* (13 vols. 1772-83), Roscoe's books on the Medici, Reumont's *Lorenzo de Medici* (1874; Eng. trans. 1877), Pater's *Studies in the R.* (1873), Symonds' *R.* (3 vols. 1877), Burckhardt's *Cultur der R.* (1869); Eng. trans. 1878), and Paul Lacroix's *Science and Literature in the Middle Ages and at the Period of the R.* (Lond. 1878). Consult also article MEDICI.

Renaix, a town of Belgium, province of E. Flanders 22 miles S.S.W. of Ghent by rail. It has important cotton and linen manufactures, besides brewing, distilling, tanning, bleaching, salt and dye works. Pop. (1874) 13,643.

Renan, Joseph Ernest, an illustrious critic, theologian, and philologist, was born 27th February 1823, at Tréguier (Côtes-du-Nord). Destined by his parents for the Church, he was sent at the age of sixteen to a seminary at Paris directed by the Abbé Dupanloup. After three years there he was placed under the Sulpicians, first at Issy for philosophy, then at St. Sulpice. He had now attained rare distinction in all subjects taught at the seminaries, especially in the study of Hebrew, but his attitude towards Christianity had shifted so much that in 1845 he left St. Sulpice. For a while he was *répétiteur* in a school, preparing himself for a university chair, but his independent spirit soon led him to prefer a less fettered position. His memoir *Sur les Langues Sémitiques*, which obtained the Volney prize in 1847, and that *Sur l'Étude du Grec dans l'Occident au Moyen Âge*, crowned in the following year, show the variety and exactness of his knowledge even then. He studied deeply theology, philosophy, philology, and history, out all with a view to explain the origin of Christianity from a

thoroughly naturalistic standpoint. In 1848 he published various essays, inspired by the boldest German philosophy, very aggressive in tone, and showing a much less just appreciation of Christianity than he afterwards attained. Among the more miscellaneous articles, that on the origin of language is specially noticeable. His *Histoire Générale des Langues Sémitiques*, expanded from the memoir mentioned above, appeared in 1854-56. The work, while deeply indebted to preceding inquiries, abounds in exact information and original views, and shows how lucid and elegant a hand at once firm and delicate can make the most erudite disquisitions. During this same period he contributed in 1851 and 1852 to the *Journal des Débats* and *Acue des Deux Mondes* articles in which subtlety and originality of ideas, deep and extensive learning, and beauty of style are equally striking. These essays he collected and published in two volumes with the titles *Études d'Histoire Religieuse* (1856) and *Essais de Morale et de Critique* (1859). On his return from a scientific journey in Italy in 1850, in which he gathered materials for an essay upon *Averroës et la Italie Averroïsme* (1852), he had become employé in the MS. department of the Imperial Library at Paris. In 1856 he was made a member of the Academy of Inscriptions, and soon after of the Commission of the Literary History of France. In 1857 his treatise on the origin of language was republished, and in 1859 appeared his translation of Job, with an introduction upon the age and character of the poem. The translation is perfect, combining throughout the severest faithfulness to the original with naturalness, fluency, and purity of form. The introduction, marked by clearness of thought, charm of exposition, and solidity of learning, is one of the most valuable aids we have to the understanding of the book. In the next year a similar work upon the Canticles followed, and R. was sent by the Emperor to Phœnicia and Syria on a tour of investigation, the results of which were afterwards published in his work *la Mission de Phénicie* (1864-67). On his return he was elected professor of Hebrew at the Collège de France, but fanaticism, irritated by the free tone of his opening lecture in 1862, finally secured his removal from his chair. In the controversy R. wrote a clever brochure, the *Lettre à mes Collègues*, in which he maintained his right, as Hebrew professor, to handle freely any theological questions. In 1863 appeared Part I. of his purposed great work on the *Origines du Christianisme*, the famous *Vie de Jésus*, a work of strange and various power, but rather an idyll than a history, the biography of an emotional visionary such as Shelley, rather than of the founder of anything great and permanent. He judges, as Scherer has said, a moral work in the spirit of a mere artist, and virtually denies Christ's integrity and purity. His portrait of Christ is 'unintelligible, inconsistent, and inadequate,' and though it may be admitted that in this work he sets forth the great problem of the origin of Christianity in a singularly 'direct, perspicuous, and intelligible form,' none the less is it plain that his own Christ and early Christians are psychological impossibilities. The vigour, lucidity, chasteness, and picturesqueness of his diction, 'a blending of Victor Hugo and Lamennais,' cannot be too highly praised. In 1866 followed the *Histoire des Apôtres*, equal to the *Vie de Jésus* in pathos, in sweetness, and strength of diction, in consummate skill of grouping and painting, and in its fervour 'strong and strange,' 'an ardent adoration of something indefinite, dreamy, and ideal,' but with less verve, less thoroughly radical, 'conciliatory and even exquisitely courteous towards orthodoxy,' and deeply offending Liberal France by its admiration of Cæsaristic centralisation. In 1869 appeared Part III., *Vie du St. Paul*, and in 1873 Part IV., *L'Antichrist*. In the Franco-Prussian War R. came forward as a political writer against Prussian 'arrogance and ingratitude,' in an essay in the *Revue des Deux Mondes*, and a correspondence with Strauss. In 1876 appeared the *Dialogues et Fragments Philosophiques*, which sketch a whole philosophy or rather theology, and show in unabated vigour his three distinguishing qualities, 'exquisite charm of treatment, the most aristocratic scepticism as to traditional beliefs, and a constant effort to respond to the claims of the religious mind without contradicting science.' In 1878 was published Part VI. of the *Origines du Christianisme*. The 5th vol., entitled *La Seconde Génération Chrétienne, Les Évangiles*, is perhaps the ablest of the set, 'painting in marvellous colours the two centres in which the Gospels originated, showing consummate art in discriminating the characters of the four, and discussing with extreme delicacy the arranging and combinations which they underwent.' In 1878

appeared his *Mélanges d'Histoire et Voyages*, an interesting collection of articles published in reviews between 1847-75, and also his political satire *Caliban*, a continuation of the *Tempest*, in which Caliban triumphs, Prospero becomes his minister, and Ariel in despair dissolves into the elements. In June 1878 R. was elected a member of the French Academy. Other works of R. are his *Histoire Littéraire de la France au XIV^e Siècle*, in conjunction with Victor Leclerc, *Questions Contemporaines, La Part de la Famille et de l'Etat dans l'Éducation, La Monarchie Constitutionnelle en France*.

Reidsburg (in the 12th c. *Reinoldesburg*), a fortified town of Prussia, in the province of Schleswig-Holstein, on the Eider and the Schleswig-Holstein Canal, 67½ miles N.N.W. of Altona (Hamburg) by rail. It consists of three parts, the *Allstadt*, *Kronwerk*, and *Neuwerk*; has two churches, an arsenal, and a 'Realgymnasium,' and manufactures brandy and tobacco. Pop. (1875) 11,406.

René, or Rena'tus I., of Anjou, Comte de Provence and Guise, Duc de Bar, titular Duc de Lorraine, and titular King of Naples, was born at Angers, 16th January 1409. He was a great-grandson of King Jean the Good of France and a grandson of Louis I. of Anjou, who, being the heir of Queen Joanna, had been crowned King of Naples by Pope Clement VII. (1384), but was supplanted by Charles of Hungary and Margaret his consort. Married at thirteen to Isabelle of Lorraine, he seized that duchy on the death of Charles, his father-in-law (1431), yet was overpowered and made prisoner by a nephew of the latter, Antoine of Vaudemont. Called to the throne of Naples by the testament of Queen Joanna II., he at first sent his wife thither to lead the struggle against Alfonso of Aragon. In 1437 R. was freed from imprisonment through pawning the duchy of Bar to Philip of Burgundy. The year following he appeared in Naples, where he maintained himself till 1442. By the marriage (1444) of his daughter Iolanthe with Frédéric, the son of Antoine of Vaudemont, Lorraine became a possession of Frédéric in 1444, and in 1470 of his son R. II. R. I., after having repelled the attacks of Charles the Bold on Lorraine and Provence, bequeathed the latter, on the death (1470) of his only son Jean, to King Louis XI., and died at Aix in Provence, 10th July 1480. R. was a lover of pastoral poetry, and himself a poet. His *Œuvres Complètes* were published by Quatrebarbes (4 vols. Par. 1845-46). His daughter is the subject of a drama by the Danish poet Hertz, translated into English by Theodore Martin. See La Salle, *Vie de R. I.* (Aix, 1820), Villeneuve de Bargemont, *Histoire de R. d'Anjou* (3 vols. Par. 1825), and A. L. de la Marche, *Le Roi R.* (Par. 1875).

Renfrew, a royal and parliamentary burgh on the banks of the Clyde, 6 miles W.N.W. of Glasgow, and 3 miles N.E. of Paisley by rail. The burgh was first chartered by Robert III. in 1396, and the R. Grammar School was founded by a charter of James VI. in 1614. The office of High Steward of Scotland was conferred by David I. on Walter, Laird of R., from whom the Stuart family is descended. A new townhall, opened in 1873 at a cost of £12,000, was destroyed by fire, 6th March 1878. The chief industries of R. are shipbuilding, engineering, and iron-founding. In conjunction with Kilmarnock, Dumbarton, Port Glasgow, and Rutherglen, it returns a member to Parliament. Pop. (1871) 5004. See *A Historical Sketch of the Burgh of R.* (Paisley, 1872).

Renfrewshire, a county of Scotland, bounded on the S. by Ayrshire, on the E. and N.E. by Lanarkshire, on the N. by the river Clyde, and on the W. by the Firth of Clyde. Pop. (1871) 216,947. Its greatest length is 31 miles and its greatest breadth 13 miles, the total area being 254sq. miles or 162,428 acres; of which in 1876, 18,187 acres were under corn crops, 7360 under green crops, 18,556 in clover, sanfoin, and grasses in rotation, and 48,582 in permanent pasture, the preponderance of the last being due to the amount of dairy-farming carried on for the supply of the great towns of Glasgow, Greenock, and Paisley. In 1876 there were in R. 3128 horses, 25,090 cattle, 32,909 sheep, and 1917 pigs. The valued rental for 1877-78 was £609,755 exclusive of railways and public works, valued at £79,252. Along the banks of the Clyde and for some way inland R. is low-lying, undulating, and fertile, but further inland its surface is broken and unequal, though it does not rise more than 1240 feet above the sea level. Its only notable rivers are the Black Cart, the White

Cart, and the Gryffe, from which it took its ancient name of *Strathgryffe*. Coal, ironstone, shale, limestone, and sandstone are extensively worked, the chief coal mines being at Quarrieton near Johnstone, at Hurler and Househill near Paisley, and at Renfrew, Pollockshaws, &c. R. stands next to Lanark among the Scotch counties in the extent and importance of its manufactures, principally of silk and cotton goods, woollens, shawls, muslins, &c. Paisley (q. v.) is the centre of the manufacturing industries, but weaving is carried on in almost every village. Greenock and Port Glasgow are large and flourishing seaports, the other ports on the coast being Renfrew, Erskine, Gourrock, Innerkip, and Wemyss Bay. R. is divided into Upper and Lower Wards, each of which has a sheriff-substitute, stationed at Paisley and Greenock respectively. In 1404 the barony of R. was conferred by Robert III., the second of the Stuarts, on his son and heir James, and since then the eldest son of the reigning monarch has always borne the title of Baron of R.

Benn'ell, James, F.R.S., an English geographer, was born at Chudleigh, Devonshire, 3d November 1742. He entered the navy at the age of fifteen, but after nine years of seafaring passed as an officer of engineers into the service of the E. India Company. For his conduct in Clive's campaign he was rewarded with the rank of major, and during this period he prepared his first publication, *A Chart of the Bank and Current of Cape Agullas*, a work which at once attracted the attention of men of science, and secured him the congenial appointment of surveyor-general of Bengal. On his return to England he received a pension of £600, and was elected a F.R.S. He aided Mungo Park in preparing for his first great African expedition, and from this time maintained a correspondence with many of the most learned men of Europe. The best known of his many works are *Elucidations of African Geography* (1793-98), *The Geographical System of Herodotus Examined and Explained* (1800), *Observations on the Topography of the Plain of Troy* (1814), and the posthumous *Investigation of the Atlantic Currents* (1832). He died in London, 29th March 1830, and was buried in Westminster Abbey. Highly gifted with shrewdness and perseverance, R. pushed his way to fame in spite of a defective education and without the aid of friends or fortune.

Bennes', a river-port of France, capital of the department Ille-et-Vilaine, stands at the confluence of the Vilaine and Ille, and on the Ille-et-Rance Canal, 155 miles W. of Brest by rail. It consists of an upper and a lower town, the former dating from the fire of 1720, which destroyed 3284 houses. Among the chief buildings are the cathedral of St. Peter, the churches of St. Germain and Nôtre Dame, the Palais de Justice (1618), with paintings by Juvenet and Coypel, the Lycée, or Palais de l'Université, with picture and sculpture galleries, the theatre, and the Hôtel de Ville, containing a public library of 45,000 vols. The banks of the Vilaine are lined with quays, and there is a fine Jardin des Plantes, besides the splendid promenades of Mont Thabor with a statue of Duguesclin, Le Mail, &c. R. is the seat of an archbishop, and possesses an arsenal and school of artillery. The leading industries are shipbuilding and the manufacture of sail-cloth, linen, leather, tobacco, starch, and soap, and there is a considerable trade in salt butter, honey, and wax. Pop. (1876) 57,177. The chief town of the Celtic *Redones* (hence its modern name), R. was formerly the capital of Brittany, with which it passed by marriage to François I.

Bennet. See REINETTE.

Benn'ie, John, F.R.S., a celebrated civil engineer, was born at Phantassie, East Lothian, June 7, 1761. He was educated at East Linton and Dunbar, and after working some time as a millwright, proceeded to Edinburgh, where he attended the lectures of Robison and Black. Recommended by the former, he entered the employment of Boulton and Watt, at Soho, near Birmingham, in 1780, and in 1789 he was appointed by this firm to superintend the construction of the Albion Mill. His reputation was now thoroughly established, and in 1794 he was recognised as the foremost engineer in the country. He especially excelled in the construction of bridges, of which the finest are Waterloo and Southwark Bridges. At various other places, Leeds, Boston, Musselburgh, Kelso, &c., are similar structures, which in elegance and solidity are unsurpassed. As an engineer of dockyards, harbours, canals, and railways, he also stood pre-eminent; and London, Hull,

Plymouth, Portsmouth, Liverpool, Dublin, Greenock, Leith, &c., furnish evidences of his talents in this respect. Perhaps the most remarkable of his naval works is the Plymouth Breakwater. R. died at London, October 16, 1821, and was buried in St. Paul's Cathedral.—**George R., F.R.S.**, eldest son of the preceding, was born in the parish of Christ Church, Surrey, January 3, 1791. Four years he studied at Edinburgh University, returning to London in 1811, where he became assistant to his father, after whose death he formed a partnership with his brother John (afterwards Sir John), and later with his two sons. He constructed many of the great naval works at Sebastopol, Cronstadt, Odessa, in Belgium, and at the various British ports; and executed besides several railways at home and on the Continent. He died in London, March 30, 1866.—**Sir John R.**, the brother of the latter, was born August 30, 1794. He was knighted at the opening of the new London Bridge (1831), a work executed by him, though designed by his father. He retired from his brother's firm in 1845, and subsequently won great celebrity as a civil engineer. He was recognised as one of the highest authorities on all questions connected with naval engineering, and was the author of a work on harbours. He died September 3, 1874. See *Autobiography of Sir J. R.* (1875).

Rent (Fr. *rente*, from *rendre*, 'to give back') is that portion of the product of soil which remains over and above the portions covering the expenses of cultivation. This may be taken as a fairly comprehensive definition of R.; but no definition has ever been agreed upon by any two economists. Feudal traditions envelop the relations of landlord and tenant so much, that we find difficulty in perceiving this, that R. is the result of a contract entered into voluntarily by both parties concerned. To hire a field is an act every way similar in principle to the hiring of a house or a ship. The true position of a landlord is not that of a patron, but that of a party to a contract, his peculiar qualification being that he is a capitalist.

It is from its productive agency that profits accrue to the proprietor of land; but land is not the only productive natural agent. The water of rivers turns this mill, the wind turns that. Yet, while all other natural agents are looked upon as practically inexhaustible, it is otherwise with land. No capital, no industry can be said to be expended on the sea or the wind; capital and industry are lavished upon land. Why, then, are capital and industry thus expended on the soil? In answer to demand. The productive soil has no value, except as producing that which satisfies some demand. There are rich tracts of cornland in the heart of Africa wholly valueless; nobody is in the least benefited by their fertility. Suppose a colony to establish itself in a tract of such land. The members of that colony will begin cultivation immediately; they will work on till food sufficient for the wants of all is secured. No further labour than this would they bestow upon the soil, because the fruits of such labour would remain unconsumed and useless. What each man received from the soil would exactly compensate his labour. But if a sudden increase of demand for corn arose, say in a neighbouring colony, the owners of the soil would probably do one of two things—they would work harder and sell their surplus produce, or they would allow others to cultivate the land, themselves stipulating for a certain proportion of the grain produced. Properly, we should call the first of these cases one of profit; the second, one of R. All that the proprietors might produce above what was necessary for their own maintenance might go for profit; all that the tenants might produce above what was necessary for their maintenance might go for R. Thus, cultivation must go on wherever there is a man, but appropriation of the soil only follows on demand in excess of that of him who appropriates. Whence it follows, that if a soil is capable of producing more than suffices for the maintenance of the labour expended upon it, it is capable of yielding R. Appropriation follows demand; R. follows appropriation.

Two important theories of R., differing widely from the account given above—which agrees with the most commonly accepted doctrines—are those of Bastiat with his followers, and Ricardo with his.

Bastiat's theory is that R. is only compensation received by the landlord for labour and capital expended at one time or other on the land. This theory was raised as a shield against the attacks of the socialists, who maintain that landed property is a

privilege, and should therefore be abolished. Bastiat replies that landed property is no privilege; that R. is no privilege, but a right similar to that connected with any other species of property; it bears no relation to natural agents, but applies exclusively to *services rendered*. Without going into details of this plausible theory, we may point to the example of a kelp shore or a gravel pit, upon which no capital or human labour was ever expended, to illustrate its fallacy.

Ricardo's theory is that R. is determined by the difference in the product of land of different qualities, the worst land in cultivation yielding no R. at all. An example may illustrate this doctrine. When colonisation takes place in any country abounding in fertile, unappropriated land, no R. is paid—no person would pay for what might be got for nothing. But when tillage has reached that particular stage at which demand can no longer be supplied by the best lands, either the increase of population must cease, or people must consent to pay such an additional price for corn as shall enable cultivators to bestow attention on inferior soils. Suppose that land of the first quality yielded 100 quarters per acre, and that of the second only 80. A farmer would generally be as willing to cultivate the first soil, giving 20 quarters by way of R., as to cultivate the second soil, subject to no claim for R. In either case, he himself would receive 80 quarters from the land. This increase of R. is not, as generally supposed, occasioned by improved agriculture, or by anything like a greater natural fertility in the soil. It results from the stress of population, which makes it necessary to resort to soils of a decreasing fertility. R. varies in inverse proportion to the amount of produce obtained by means of capital and labour employed in cultivation; it increases when the profits of agriculture diminish, and diminishes as these increase. Profits are at their maximum in new countries where good land is unappropriated; rents are at their maximum in old countries where even the worst soils are appropriated.

To detail objections to this doctrine would require great space. Suffice it to say that Ricardo's theory of R., like his theory of value, avoids a direct appeal to Demand. Ricardo in both cases makes cost of production a cause, whereas cost of production and value and R. are alike limited by the single determinant Demand.

Law Regarding R.—For legal modes of enforcing payment of R. after it becomes due, see, in English law, DISTRESS, EJECTMENT. On the same subject in Scotch law see POUNDING, EJECTION AND INTRUSION, and in both cases the articles referred to in these. By 33 and 34 Vict. c. 35 rents and tithes, and payments in place of these, are, after 1st August 1870, held to accrue from day to day, and are apportionable accordingly; an accrued part not becoming due until the whole would have been so. See LANDLORD AND TENANT. A tenant must continue to pay rent though the premises in respect of which it becomes due are burnt, and the landlord refuses to rebuild them. See REPAIRS.

Ren'ton, a small town on the Leven, in Dumbartonshire, 3 miles N. of Dumbarton, was founded by the Smolletts of Bonhill in 1782. Tobias Smollett, the novelist, was born in its neighbourhood, and a monument has been erected to his memory in the town. R. has considerable calico-printing, bleaching, and dyeing industries. Pop. (1871) 3087.



Renuncia'tion. In English law the term is only applied to denote the refusal of an executor to accept office. The R. should be made by a letter to the Court of Probate. In Scotland, R. by an heir means his declining, which he is entitled to do, to accept an inheritance, the acceptance involving liability for debt attached to the subject. See ANNUS DELIBERANDI. R. of lease or other right is equivalent to *surrender*.

Ren'wick, James, a preacher and martyr of the Covenant, was born of humble parentage at Minnihive, Dumfriesshire, 15th February 1662. He attended Edinburgh University, but was refused a degree on declining to take the oath of allegiance, and afterwards witnessing the execution of Cargill in 1681, he threw in his lot with the Covenanters. At the request of the 'Society Men' he went to Holland, and was ordained at Groningen, immediately afterwards returning to Scotland, when he preached his first public sermon on Darnead Moss in 1683. His life now became one of incessant danger, as he rapidly passed from place to place throughout the S.W. of Scotland, preaching, counselling, corresponding, and issuing manifestoes. On the proclamation of


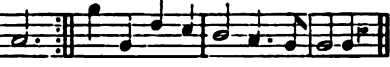
James II. in 1685, R. and 200 men went to Sanquhar, and published a declaration disowning him as a Papist, and throwing off allegiance. In 1687 a sum of £100 was offered for the capture of R. dead or alive, and in less than five months fifteen furious searches were made for him by dragoon parties. After many wonderful escapes he was at last taken in Edinburgh, where, in spite of his youth and nobility of character, he was speedily condemned, and executed 17th February 1688, his last words being drowned by the beating of drums. See *Life of R.* by Alexander Shields, a contemporary; also *A Choice Collection of very valuable Prefaces, Lectures, and Sermons, preached upon the Mountains and Muirs of Scotland, in the Hottest Time of the Persecution*, by Mr. James Renwick (Glasg. 1777).

Rep (probably a corruption of *rib*), a woollen fabric so woven as to present a ribbed appearance transversely. It is used for ladies' dresses. Any stuff exhibiting this feature is said to be *repped*.

Repairs (in law). If a tenant agree to make repairs, and the premises are burnt, wholly or partially, he is bound to replace them, unless there is a contrary stipulation. He is not, however, bound to replace damage done by natural casualty. See **ACT OF GOD**. In England, the burden of making R. is by common law laid on the tenant; in Scotland it falls on the landlord, unless they have become necessary through the tenant's fault. In English Church law, see **DILAPIDATION**.

Repeat, in music, a sign that a portion of a composition is to be played or sung twice. The part to be repeated is indicated by dots, sometimes two  and sometimes four 

being used. The words *Da Capo* (*D.C.*) signify that the repeat is to be from the beginning, and if the entire passage is not to be again performed, the word *fine* points out where the repetition is to end. The words *Da Segno* (*D.S.*) are used instead of *Da Capo* when the repeat is to run from another point than the beginning, such point being marked ♯ . An alteration is sometimes made the second time, thus:—

1st time, or prima volta.  2nd time or seconda volta. 

When a few bars are to be repeated they are marked *bis*.

Repetition, in Scotch law, means repayment of money erroneously paid. See **CONDUCTIO INDEBETI**.

Replevy and Sale. In English law, a replevy is an action to test the legality of a Distress (q. v.) and to recover the goods distrained. As the action may involve a tenant in an expensive and protracted lawsuit, it ought to be very cautiously attempted. To replevy, the tenant whose goods have been distrained, must, within five days after notice of distress has been given to him, enter into a bond, with two sureties, for double the value of the goods, to try without delay the right of distraining, and to return the distress should the case go against him. The judge will then direct a precept to a bailiff to restore the goods to the tenant.

Replica'tion, in English law, is the pleading of the plaintiff in answer to the plea of the defendant.

Reporting, Parliamen'tary. Prior to the practice of P. R. the discussions of the House of Commons were scarcely more known to the public than those of the Cabinet Council, and it was only after a long and arduous struggle that the Legislature allowed an unchallenged record of its debates to appear in the press. The work which gives the most methodical and complete record of the proceedings of ancient English Parliaments is Cobbett's *Parliamentary History of England*, which forms a historical introduction to Hansard. When we consider that the first volume of this series embraces the period of time from 1066 to 1625, while Hansard's *Debates* for a single session comprise several volumes of the same size, we can understand the revolution worked as regards the publicity of parliamentary proceedings by the institution of regular reporting. The *Parliamentary History* was compiled from numerous disjointed authorities, such as the Records, the Rolls of Parliament, English histories, a former

Parliamentary or Constitutional History, first published in 1751, the *Journals* of the two Houses, containing the votes and proceedings of the House of Lords from the reign of Henry VIII., and those of the House of Commons from the reign of Edward VI., and Sir Symonds D'Ewes's *Journal of Queen Elizabeth's Parliaments*. The *Proceedings and Debates of the House of Commons* in 1620 and 1621, collected by a member of that House, published at Oxford in 2 vols., were incorporated in Cobbett's work. Rushworth, assistant-clerk in the Long Parliament in 1640, made notes of the principal speeches he heard, and embodied them in his *Historical Collections*. A series of *Debates of the House of Commons from 1667 to 1694*, collected by the Honourable A. Grey, M.P. for Derby, is an important historical contribution in 10 volumes. In most of these works much of the material consists of papers laid before Parliament of mere momentary utility, and having a very remote connection with the valuable proceedings of Parliament. A member sometimes transmitted accounts of proceedings privately to his constituents. The famous Andrew Marvell supplied Hull for example with daily information of this kind from 1660 to 1678. It was not till the end of the 17th c. that meagre Parliamentary reports furtively found their way into the public journals, being sent thither by some adventurous members. In 1698 the attention of the House of Lords was called to the innovation, which they declared to be a breach of privilege. The House of Commons expressed itself similarly in 1728, and adopted a resolution to punish offenders in future with the utmost severity. This determination was not however actively carried into practice, and in 1735 two publications, the *Gentleman's Magazine* and the *London Magazine*, began to give more elaborate accounts of the debates than had ever been attempted. The names of the speakers were suppressed, with the exception of the first and last letters, a transparent device, but sufficient to postpone the wrath of Parliament for some time. According to Sir John Hawkins, the *modus operandi* of Edward Cave, the proprietor of the *Gentleman's Magazine*, was to obtain admission along with his assistants to a concealed station in the House, where they took down notes of the several speeches, and the general tendency and substance of the arguments. This crude matter was adjusted and embellished by William Guthrie, the historian, who seems sometimes to have attended himself, and who possessed a most retentive memory in addition to his other abilities. The reports did not appear till the end of the year, and thus six months sometimes intervened before the account of a debate was published, proceedings in January not appearing in print till July. On April 13, 1738, the House of Commons again characterised the publication of debates as a 'high indignity and notorious breach of privilege;' though, by the irony of circumstances, a most full account of the debate upon this motion, which was unanimously adopted, will be found in the *Parliamentary History*. The magazines therefore resorted to the expedient of describing the debates as if they had occurred in a fictitious assembly. Thus the *Gentleman's Magazine* headed its account as the 'Debates in the Senate of Lilliput,' and the *London Magazine* gave the proceedings as the 'Journal of a Political Club,' a key to the names of the speakers, &c., being duly supplied in both works at the end of the year. On the 19th November 1740, Dr. Johnson succeeded Guthrie as the writer for the *Gentleman's Magazine*, and he continued to do the work till 23d February 1743. Boswell informs us that Johnson had sometimes 'nothing more communicated to him than the names of the several speakers and the part which they took in the debate,' so that when we consider the imagination of the Doctor, and the grandiloquent style of his reports, we cannot accept the latter as very literal. But it is certain that Cave was at considerable pains to secure accuracy, and that speeches were frequently furnished to the members themselves to correct. Johnson was succeeded by Dr. Hawkesworth, author of the *Advertiser*. Cave and Thomas Astley, the printers of the *London Magazine*, were ordered into the custody of Usher of the Black Rod in 1747, charged with reporting the trial of Lord Lovat before his peers in 1745. But though they were reprimanded and had to pay fees, implore pardon, and promise amendment, Cave after a short while resumed his reports of the Lords' debates. In 1764 the House of Lords fined the proprietors of the *London Evening Post* £100 for mentioning the name of one of its members, and in several succeeding sessions printers of newspapers were fined for similar offences. Four

printers, including Woodfall of the *Public Advertiser*, were reprimanded by the House of Commons in 1766. Meanwhile public feeling became aroused, and so strongly did it declare itself in favour of the reporting of debates, that newspapers continued the system with increasing energy, while Parliament winked at the daily breach of its privileges. Among the most determined advocates of the rights of the press at this juncture were Horne Tooke and John Wilkes, and it was on the occasion of the latter's notorious struggle with Parliament that the final storm burst in which a complete victory was won by journalism. After a fierce night's debate on 12th March 1771, in which twenty-three separate divisions were taken on the subject, eight printers were summoned before the bar of the House of Commons, none of whom obeyed. The city magistrates were in sympathy with the public, and discharged three of the offending printers who were brought before them. For this contempt of Parliament the Lord Mayor and Alderman Oliver were committed to the Tower, and the clerk of the City was compelled to tear out the leaves of the register containing the judgments of the magistrates. On the other hand, the City authorities sent to prison the officers who had arrested Wheble, one of the printers. The popular excitement was intense, but after a time the House gave up the struggle, and thenceforward made no attempt to punish the practice. Reporting the debates still remained theoretically a breach of the privileges of Parliament, but the right of the public to be present through their agents was clearly established. The House has therefore since this time taken no notice of the breach except when a report has been manifestly unfaithful, as in the case of a paper in 1801. The printers of the *Times* and the *Daily News* were summoned before the bar of the House of Commons so late as 1875, but it was with regard to an entirely different question, viz., the publication of matter relating to evidence given in a select committee of the House.

Among the ablest of early Parliamentary reporters was 'Memory' Woodfall, of the *Morning Chronicle*, who is said to have been able to write out accurately a column speech without a single note. His successor, John Perry, was the first to establish a regular relay of reporters who took up the work at short intervals. Thus a reporter found time to write out his notes in full while his colleagues continued the note-taking, and a full report of the debate was in writing almost immediately after its termination. The practice became after a time universal among other papers, and it is still in use. During the last century, reporters had no means of entering the gallery beyond those within the reach of the general public, and on important occasions had to push their way through the crowd. On the occasion of a great debate, shortly before the death of Pitt, they struck, so to speak, on account of the bad accommodation, and the Minister's brilliant periods were unreported. The result was the appropriation of the uppermost bench of the gallery, with a separate door, to their exclusive use, and a reporters' room was subsequently added. Soon afterwards the Lords followed the Commons' example. For a long time note-books were forbidden to be shown at the bar of the Upper House, and Mr. Windyer was the first reporter who defied the rules in this respect. When the new Houses of Parliament were built, separate rooms were given to reporters, exclusive of the reporters' galleries facing the woolsack in the House of Peers, and behind the chair in the House of Commons.

After the close of the great war in 1815, public opinion became concentrated more on domestic than on foreign affairs, and the consequence was an increased demand for parliamentary intelligence. The reports became still more voluminous at the time of the Reform agitation, and in Barrow's *Mirror of Parliament*, for which members corrected their speeches, very full accounts were given. In England the public appetite for debates seems somewhat to have slackened of late years, though it is as great in Scotland as ever. Parliament, however, with the great addition of public business, has become more loquacious. Thus in 1841, 231 members took part in the debates, while the number in 1876 had increased to 385. The practice of reporting has had a marked effect on parliamentary eloquence. Before its institution an orator on a momentous occasion addressed an audience of men more or less labouring under feelings of temporary excitement. He was then tempted to declaim in a heightened or exaggerated vein, or to try like a parliamentary Orpheus or Piper of Hamelin to charm members to follow him into the lobby by the single sweet-

ness of his eloquence. But under present circumstances he is compelled to think less of a momentary than a permanent triumph. He addresses the calm, reflective judgment of the country, and speaks with the knowledge that his arguments will go forth to the world accompanied by full commentaries and searching criticisms in the columns of the public press.

Of 74 reporters regularly engaged in the House of Commons in the year 1877, 15 were employed on the staff of the *Times*, 9 on the *Standard*, 8 each on the *Daily News*, *Morning Advertiser*, and *Morning Post*, 6 on the *Daily Telegraph*, and 5 on the London evening papers, while the remainder represented the various news agencies that supply the provincial papers. These gentlemen were also available for duty during the brief sittings of the House of Lords, but when important debates were proceeding in both Houses, extra reporters were engaged. The parliamentary intelligence of the *Times* and *Standard* in particular enjoys a deserved reputation. The reporting staff of each paper is under the direction of a leader, who is the medium of communication between them and the office, and who in most cases writes the summary. The reporters take turns in the gallery, varying in length according to the importance of the debate or speaker, and transcribe their notes in dingy rooms behind the gallery and under the ladies' gallery, or else in one of the committee-rooms in the House of Commons. They have a good, well-fitted writing room in the House of Lords. Most newspapers have communication by telegraph with the Houses of Parliament—indeed one paper (the *Daily News*) has recently introduced a telephone—but the wires are not used for the transmission of the reports, which are sent by messengers and cabs to the offices. Wonderful as the results obtained are, we cannot look upon the present system of newspaper reporting as perfect. Public journals are, after all, commercial speculations, and their proprietors must suit, like all other business-men, their own interests and the tastes of their clients. They will not perform work at a loss, nor print what few care to read. Much therefore remains unreported, important discussions on supply and committees on bills are often scarcely noticed, while the despatch of newspapers to the provinces by the early morning trains forbids justice being done to the speeches after midnight. Probably, if the chief provincial newspapers were admitted to the gallery, there would be greater efforts even in this respect, while the reports would certainly be improved. As regards accuracy, Mr. Gladstone recently observed that he was better reported in the provinces than in the House of Commons. This is probably accounted for by the fact that in public meetings the reporters are placed close to and in front of the speaker, whereas in the House of Commons the gallery is some 20 feet above the level of the floor, and the members often speak with their backs to the representatives of the press. That the reports are as excellent as they are is a marvel, considering the difficulties of the task. The duties of a Parliamentary reporter demand abilities of a high order, readiness, invention, endurance, intelligence, and memory, besides a special and severe training. He must not only be a complete master of shorthand, so as to write a verbatim report, but must be able to seize the salient points of a disjointed speech, to condense a wandering harangue into a practical form, and to state elegantly what has often been expressed most awkwardly. There are few professions of so restricted a nature which have been adorned by so many men who have subsequently attained eminence. Lord Campbell and Charles Dickens, the latter of whom when engaged on the *Morning Chronicle* was one of the fastest writers on record, have not been the only occupants of the reporters' gallery who have made their names illustrious.

Until the year 1875 it was within the power of any member of the House of Commons to obtain the withdrawal of reporters on his calling the attention of speakers to the presence of strangers. On the 27th of April in that year Mr. Biggar took this step. On the motion of Mr. Disraeli the suspension of the rule during that sitting was adopted, and the incident led to its alteration. It is now necessary to obtain a vote of the House on the question of the withdrawal of strangers. A division on the subject was baulked in 1876 by a count-out, and the first actual division took place on 12th April 1878, when, on Mr. King-Harman's motion, strangers were excluded for three hours during a discussion on the assassination of Lord Leitrim. A summary of the proceedings while the reporters were absent was furnished by members to the press.

The annual publication of *Hansard's Parliamentary Debates*,

begun in 1803, has been conducted with such tact that they have improved every year. They are compiled from the daily papers and local reports, corrected by the members themselves, and though not authoritative, their accuracy has rarely been disputed. The question has, however, lately arisen in the House whether the matter should be left to private enterprise, or whether official verbatim reports ought not to be provided by a staff of reporters employed by Government. In proposing a motion to the latter effect on April 10, 1877, Mr. Hanbury Tracy estimated that six reporters and six writers in front of the speaker would meet the want at an annual cost of about £15,000. The motion was lost by 152 votes to 128. A Select Committee of the House of Commons sat in July 1878 to consider the question of P. R., both with regard to the desirableness of an official report, and the necessity of other newspapers than those published in London being represented in the gallery.

In the United States official reports are published, every senator being allowed two copies of the *Congressional Record* for his own use, and twelve for distribution. Such reports have also been adopted in Victoria, Queensland, New Zealand, and other British colonies. In most foreign countries the official are the only reports, newspapers being unrepresented at the debates. In France, where the Assembly meets early in the day, the official reports, which are of three kinds—one *in extenso*, a summary, and a very short report—are corrected by the deputies within five hours. The official reports are sold to the daily press, and a similar system is followed in Austria and Germany, and was adopted by the late Turkish Parliament.

References.—Andrew's *History of British Journalism* (1859), Knight Hunt's *Fourth Estate* (1859), Grant's *Newspaper Press* (1871), Wade's *British History*, Pitman's *Reporter's Companion*, the debate in Hansard on Hanbury Tracey's motion, April 10, 1877, &c.

Reports, Law. These comprise the decisions on legal issues preserved in the archives of the various divisions, and communicated to the public in numerous volumes. They contain a narrative of each case, a summary of the proceeding, the argument on both sides, the judgment, and the reasons for it. The R. are extant in a regular series from the reign of Edward II. inclusive. From his reign to that of Henry VIII. they were taken by the protonotaries, or chief scribes of the court, at the expense of the crown. From the reign of Henry VIII. to 1865 they were taken by private persons; a system which led to great inaccuracy. In 1865 an improved system was instituted, under the superintendence of the Council of Law Reporting, since incorporated. The statutes are hardly less voluminous. A revised edition of those now in force is in course of publication. See ACT OF PARLIAMENT.

Reponusé (Fr.) is an art term applied to ornamental metal work, produced by hammering or beating up the sheet of metal from behind until a design is roughly formed, then working on the front, and finishing the work by the process of chasing. Metal objects were worked in R. by the ancients, and all through the middle ages; and in the 16th c. this artistic process received its highest development in the hands of Benvenuto Cellini and other artists, who produced vases and figures in gold and silver, and pieces of armour in steel and iron. Of late years a revival of the higher flights of R.-work has taken place in England and France, and some works of art of extraordinary beauty have been executed.

Representa'tion, in politics, the method necessarily adopted in all states of any extent for obtaining a formal expression of the popular will. It is not employed exclusively in democratic constitutions. Many ecclesiastical assemblies have been representative, and even in absolute monarchies R. is sometimes brought into more or less limited play. It is best seen, however, in democratic forms of government. An ideal, or 'pure' democracy, as it is called, is that in which every citizen has a direct and independent voice in the national councils. This is only possible in very limited communities. When the political unit is of such size that it is impossible for all the citizens to attend frequently or at all in one place, the necessity for R. arises. A stated number of citizens, or those inhabiting some particular place, choose one or more *representatives*, to whom they delegate their political rights and powers. 'Experience shows,' says Mr. E. A. Freeman, 'that the purely democratic system which does such great things for a wandering

band, a single city, or a small district, becomes out of place when it is applied to all the inhabitants of a large country. . . . The representative assembly is as much the natural form of free government for the greater society as the primary assembly is for the smaller.'

R. was little, if at all, developed among the ancients. It must not be thought that wherever there is *election* there is R. The elective officials of Greece and Rome were in no sense representative, their functions being purely executive. In Greece R. was in most cases rendered unnecessary by the small extent of the political units. In Rome, when her empire began to extend over Italy, the need of R. was severely felt, but it was never introduced. The earliest instance of a complete system of R. is to be found in the parliament of the Sicilies, under the Swabian dynasty, in the 13th c. The growth of the representative system in England is traced in the article PARLIAMENT (q. v.). In Scotland, representative burgesses formed part of Robert Bruce's national assembly at Cambuskenneth in 1326, but it was not till 1587 that R. was permanently introduced, and even then to a very limited extent. Down to a very late period in British history, the purposes of the representative system were in many instances defeated by 'pocket boroughs,' 'rotten boroughs,' and aristocratic pressure and influences, but these abuses have been largely done away with by the Reform Bills of 1831 and 1867. R. now plays a more or less important part in the government of every European country except Russia, as well as in that of the United States and in almost all the British colonies.

The theory of R. generally received at present is that the representative should not give pledges to his constituents as to his action on any particular question—that he should not be merely their mouthpiece, but that, once elected, he should act on his own responsibility, with due regard, of course, to their interests and wishes. Mr. Mill, however, admits that it is almost impossible to prevent pledges being demanded and given. Another point on which speculative politicians have expended much ingenuity is how to secure the *Proportional R.*, as it is called, of minorities as well as majorities. This is so far secured by the system of *three-cornered voting* (i.e., where there are three vacancies giving each voter only two votes), or by that of *cumulative voting* (i.e., allowing voters who have more than one vote to give them all to one candidate). Both of these systems are in use in England, either in parliamentary, municipal, or school-board elections, but they are at best very rough means for their end. See Mill's *Representative Government* (1861), Hare's *Treatise on the Election of Representatives* (1859), Professor Fawcett's *Mr. Harl's Reform Bill Simplified* (1860).

Reprieve (from Fr. *repandre*) is, in law, a suspension of a criminal sentence. It may be before or after judgment. If the judge doubts the justice of a verdict, or the validity of the indictment, he may stay sentence to give time for consulting the Crown; and after sentence the Crown may grant R., which generally proceeds on the recommendation of the jury, usually substituting a minor punishment to that which has been awarded. Insanity, or pregnancy, if proved, is always held to be valid ground for R.

Reprisal (Fr. *repraille*; Low Lat. *reprensalia*, 'things seized back,' from *repandre*) is the retaking of goods captured by an enemy, or of an equivalent. A ship retaken is a *reprise*. It becomes the property of the recaptors if more than twenty-four hours have passed since the original seizure; otherwise it must be wholly returned to the owners.

Reprisal, Letters of, the same as *Letters of Marque*. See LETTER.

Reprobation is the name given to a doctrine alleged to be involved in the Calvinistic doctrine of Election, but repudiated by Calvinists in the sense sought to be given to it. The word R. does not occur in the *Confession of Faith*, but the following language seems sufficiently explicit: 'By the decree of God, for the manifestation of his glory, some men and angels are predestinated unto everlasting life, and others foreordained to everlasting death' (chap. iii. sec. 3). Yet in sec. 7 of the same chapter it is further stated that it hath pleased God 'for the glory of his sovereign power over his creatures, to pass by, and to ordain them (the non-elect) to dishonour and wrath for their sin, to the praise of his glorious justice.' The phrase 'for

their sin' is held to introduce the moral element that clears the doctrine of the character ascribed to it by its adversaries.

Reproduction, the act of producing new organisms or beings in the animal and plant worlds. This process may be regarded as initiating the process of *Development* (q. v.), or that through which the germ or egg becomes transformed into the likeness of the being which gave it birth. The function of R. in plants is effected by means of the *essential organs* of the flower—these organs being the *stamens* and *pistil*. The *envelopes* of the flower (*calyx* and *corolla*) help by their colour, odour, &c., to attract insects to the plants; the insects carrying the *pollen* from the stamens of one flower to those of another flower of the same species, and thus effecting the *fertilisation* of the *ovules*. When the pollen of the stamens is applied to the *stigma* of the Pistil (q. v.), a *pollen-tube* is produced by the growth and elongation of the inner coat or *intine* of the pollen-grain. This pollen-tube passes down through the style of the pistil, and brings the matter of the pollen-grain in contact with the ovules, the result of this contact being the fertilisation or impregnation of the ovules. After fertilisation the ovules become 'seeds,' and are then capable, when placed in suitable circumstances, of growing up each into a new plant. The ordinary course of R. in plants is closely paralleled by the true *sexual* R. of animals. Here we find, as in plants, the elements of sex operating to secure the fertilisation of the egg or germ. The male organ (*spermarium*) of the animal supplies the *spermatic fluid* for the fertilisation of the product of the female generative organs—the *ovum* or *egg*. The stamens of the plant are thus comparable to the *spermarium* of the animal; while the pistil of the plant is the analogue of the *ovary* or *ovarium* of the female animal. In all groups of animals save the *Protozoa* (q. v.), *true* or *sexual* R. occurs, and some authorities maintain that even in the *Protozoa* this process is truly represented. The *nucleus* of these lowest forms is thus believed to represent an ovary; whilst the *nucleolus* is thought to represent the male organ of higher animals. In all animals the essential act of sexual R. is thus seen to consist in the contact of the male and female generative products. This contact is effected in very varied ways. In many lower animals, and even in higher forms (e.g., Fishes and Amphibians) there is no coition or copulative act. The male simply sheds the seminal fluid over the eggs of the female, and in some cases the male fluid may simply be discharged into the surrounding water, and fertilisation of the eggs may be largely a matter of chance. Where *Hermaphroditism* (q. v.) occurs, the act of fertilisation is rendered one of simple performance, but some hermaphrodite forms (e.g., Leeches and Snails) require to be impregnated by their hermaphrodite neighbours to ensure fertilisation. In such a case the male generative organs of the one form fertilise the female organs of the other; the female organs of the first being in turn fertilised by the male organs of the latter. In all Vertebrate animals, the sexes are situated in distinct individuals; hermaphroditism being only found in cases of monstrosities. Many Invertebrates (e.g., Insects, Spiders, Crustaceans—excepting the *Cirripedia*—Cuttlefishes, &c.) exemplify as complete a separation of the sexes; while among hermaphrodite or monœcious forms may be cited the Snails, certain Lamelli-branchiates, many Brachiopods, Sea-Squirts, Polyzoa, Earth-worms, Leeches, &c. In certain fishes (e.g., Dogfishes, Skates, and Rays) the embryos or young are enclosed in curious *egg-capsules* formed of a horny material resembling seaweed in its texture. These capsules are frequently cast up on our coasts, and are popularly known as 'Mermaid's Purses.' Some Molluscs (e.g., the Cuttlefishes and Whelks) also enclose their eggs in protective sacs termed *maternal capsules*. In Mammalia, the act of R. necessarily becomes more complicated than in other groups, conformably with the more elaborate process of development through which these animals pass. The chief subject of interest, in connection with the R. of the highest group of animals, has already been noticed in the article PLACENTA (q. v.).

In the animal world certain *asexual* processes of R. also occur. Into these the elements of sex do not enter. They are known under the terms *fission* and *gemination*. By *fission* is meant the simple division of the body of an animal into two or more parts, each of which becomes in due time a perfect animal. In such a case the ordinary processes of *nutrition* and *growth* serve to reproduce the new forms which have been outlined, as

it were, by the division of the parent-body. Such a process is well exemplified in many *Protozoa*, such as *Amœba*, *Infusoria*, &c. The case of the *Hydra*, a freshwater Polype, which, as Tremblay showed in 1744, may be divided artificially into numerous parts, and perfectly reproduce its like, is paralleled by that of the sea-anemones or *Actinia*, which possess equally great separative powers. In some worms (e.g., *Nais*) the body may be seen to divide spontaneously into two or more parts, a new head having been previously formed on the detached portion. Corals also exhibit the process of fission. It is obvious that the asexual process of R. by fission can only occur in animals of low organisation, whose tissues are equally vital throughout, and which can therefore bear, without any permanent injury, an amount of mutilation which would destroy animals of higher structure. The second form of asexual R. is that known as *gemination* or *budding*, and is described under the latter heading.

Reptiles (Lat. *reptilia*, from *reps*, 'I creep'), a class or group of Vertebrate animals, nearly allied to Birds. In modern systems of classification the *Reptilia* are included with birds (*Aves*) in the *Sauropsida* (q. v.). The distinctive characters of the Reptilia are as follows:—The *exoskeleton* never consists of feathers, but of bony plates or horny scales. In some cases, scales and plates may co-exist. The *endoskeleton* is always osseous. The breathing-organs are lungs. Gills or *branchia* are never present in R.—hence a first distinction between R. and such animals as the frogs, newts, &c. The latter have gills in early life, and some *Amphibians* may have gills co-existent with lungs in adult life. But no reptile is provided with gills at any period of its existence. The *heart* of R. is three-chambered, save in crocodiles, in which there is an additional chamber. The skull is articulated to the spine by a single process or *condyle*, as in birds; mammals and amphibians having two condyles. The lower jaw of R. is a *compound* bone. Each half consists of a number of pieces which are ossified together in the adult. The lower jaw further articulates with the skull by a *quadrate bone*, the *os quadratum*, represented in mammalia by the *malleus*, or one of the small bones of the internal ear. The blood of R. is cold, and the red blood corpuscles are nucleated, as in birds; but the lungs of R. are closed sacs (as in mammalia), and do not, as in birds, open into *air-sacs*. In some R. (as in Snakes and the Blind Worms), all four limbs may be wanting. Some snakes (e.g., Boas) exhibit rudiments of the under pair of limbs, while some lizards may be provided with but one pair. But in the great majority of R. the limbs are well developed, and in certain extinct R. (e.g., *Pterodactyles*, q. v.), the fore limbs were modified for flight. It may thus be seen that R. differ from birds chiefly in the fact that they are cold-blooded, that they want feathers, have closed lungs, and have not the anterior *extremities* modified for flight.

The *exoskeleton* of R. consists, as has already been remarked, of scales and bony plates. In *Crocodylia* both structures exist, but scales alone form the characteristic covering of other R. In the *Chelonina* (Tortoises and Turtles) the skeleton itself is greatly modified, and along with the exoskeleton of scales forms the well-known bony case in which the bodies of these animals are contained. The scales are developed from the *dermis* or true skin, and are covered by *epidermal cells*. It is this epidermal covering which is shed or cast in the moulting process of many serpents. The *spine* of R. may (as in Serpents) be extremely long. In *Crocodylia* the skeleton is very complete, and includes most of the structures and parts regarded as typical of the vertebrate axis. The peculiarities of the reptilian skull have been already referred to. The *centra* or bodies of the Vertebrae in R. may be hollow at either end (*amphicœlous*), *procelous* (hollow in front and convex behind), or *opisthocœlous* (the reverse of 'procelous'). The *sacrum* of R. is provided with *sacral ribs*, the *ilia* of the pelvis articulating with these ribs. The 'hand' of R. consists of more than three digits, and the toes are never fewer than three. The metatarsal bones are not united by ossification, nor are they connected with the lowermost tarsal bones; while in birds the *astragalus* of the ankle is united to the lower end of the *tibia* or shin-bone, and the ankle-joint of the bird thus ceases to exist in the middle of the *tarsus* or ankle. The disposition of the quadrate bone of R. differs in the various orders. In some genus (e.g., *Chelonina*) the quadrate bone is finally ossified to the skull. But in serpents the quadrate is a mobile bone, and through its mobility permits

the great extension of the jaws, and thus aids in the enlargement of the mouth. In all reptilia save the snakes the various regions of the spine and trunk can be clearly defined. The *digestive system* of R. is of a complete character. It includes an oesophagus, a simple stomach, and a large and small intestine. The intestine terminates in a *cloaca*, a common chamber also receiving the efferent ducts of the urinary and generative organs. The walls of the stomach of *Crocodylia* are highly muscular and probably serve to triturate the food. The liver is well developed, and there is a gall bladder. The heart is *three-chambered*, and consists of two auricles and a ventricle in all R., save the *Crocodylia*, in which the single ventricle becomes divided by a complete *septum* or partition into two cavities, thus converting the crocodilian heart into a four-chambered organ. The *circulation* in all R. (inclusive of the *Crocodylia*) is, however, impure or mixed in its character. The pure blood from the lungs passes into the left auricle and thence into the ventricle; the impure blood from the veins passes into the right auricle and thence into the ventricle. It follows that a mixture of arterial and venous blood takes place in the ventricle, this latter cavity by its contraction sending the mixed blood partly to the lungs for purification, and partly to the system for nutritive purposes. In birds, as in mammalia, the venous and arterial blood-currents are never mixed, but are kept distinct throughout the entire extent of the circulation. The same imperfect circulation obtains in the *Crocodylia*, the blood currents in which, however, not being mixed in the ventricle, but in the great blood-vessels (*right and left aorta*) in the neighbourhood of the heart. Between these vessels a communication (the *Foramen Panizza*) exists, and the impure blood from the right ventricle thus mixes into the pure blood which is being driven from the left ventricle to nourish the body. The *breathing organs* of R. consist of lungs, but the *bronchi* do not divide equally into pairs as in mammals. A *larynx* or organ of voice is developed. The lungs of snakes are long and rudimentary, and exhibit little or no cellular structure in their posterior moiety. Only one lung is well developed, the left frequently existing in a rudimentary condition. The most perfect lungs found in R. are those of Crocodilians and Chelonians. The *brain* of R. is well developed and fills the cranial cavity. The *cerebellum* in *Crocodylia* has a 'distinct Vermis with transverse fissures.' The *optic lobes* of R. are placed together on the upper surface of the mid-brain, and the *olfactory lobes* are usually long. The *sympathetic system* of serpents is not well developed. The *senses* of R. are well developed as a rule. The *eyes* are rudimentary in some lizards (e.g., blindworms) and in some serpents. In serpents the outer skin is continued to form the outer covering of the eye and is rendered transparent—hence the 'stony gaze' of the serpents, whose eyelids are in reality united. Many lizards, crocodiles, and chelonians have a 'third eyelid' or *nictitating membrane*. The crocodiles alone have an outer ear of small size, the *internal ear* being fairly developed in all R. The kidneys of R. open by their *ureters* into the *cloaca*. Distinct male and female generative organs are developed, but true copulatory organs are found only in the Chelonians and Crocodilians. The R. are *oviparous* animals—i.e., produce eggs from which the young are afterwards hatched. Some (e.g., vipers and some lizards) are *ovoviviparous* and retain the eggs within their bodies until the young are hatched.

Classification of Reptilia.—The R. are usually classified so as to form four orders of living R. and five orders of extinct forms. Former methods of arrangement divided this class into the *Saurian R.* (or those in which scales were developed as the body-covering), and *Loricata R.*, this latter group being represented by the *Crocodylia*, in which bony plates form part of the exoskeleton. The four orders of living R. are the (1) *Chelonia* (tortoises and turtles); (2) *Ophidia* (snakes); (3) *Lacertilia* (lizards); (4) *Crocodylia* (crocodiles). The extinct orders of R. include the orders (5) *Ichthyopterygia* (*Ichthyosaurus*); (6) *Saurypterygia* (*Plesiosaurus*); (7) *Dicynodontia* (*Dicynodon*) or *Anomodontia*; (8) *Pterosauria* (*Pterodactyls*); (9) *Deinosauria* (*Iguanodon*).

Republican, a name which has at different times been given to political parties of different shades in the United States of America. It was in the Convention of 1787 that parties first developed themselves. The 'Federalists,' among whom were Washington, Hamilton, the elder Adams, and Madison,

favoured a strong central government, not acting through the States, but directly upon the people. The 'Anti-Federalists' opposed any great central power, and maintained the rights of individual States. Jefferson was the head of this party, and, objecting to the name of 'Democrats,' with which it had been saddled, tried to introduce the name 'R.' In this he failed, and the title was gradually appropriated by the Federalist party. During the French wars, the Federalists sided with England, while the Democrats, under the presidency of Madison, who had by that time gone over to their party, declared war against England in 1812. In 1832 the two parties appear under the names of 'National Republicans' and 'Democratic Republicans,' but the former party soon after assumed the name of Whigs. About this time slavery became the burning question of national politics, and on it the parties were clearly divided. The Democrats denied the right of the central government to prohibit slavery in new States and territories, while the Whigs, who afterwards merged into the present R. party, affirmed and wished to exercise this right. Thus the Democrats became identified with the slavery party, the Republicans with the anti-slavery party. The former has always had its stronghold in the South, the latter in New England and the North. In 1861 the election of Abraham Lincoln, a R., to the Presidency, determined the secession of the Southern States. During the war, the R. party was for maintaining the Union at all hazards, while the Democrats of the North were for acquiescing in the Southern secession. After the war, the R. 'platform' became that of gradual 'reconstruction,' and of securing the complete political equality of the blacks and whites, the Democrats confining themselves to a defence of State rights, and to the promotion of a general amnesty for the rebellion. In 1868, the presidential election resulted in the return of the R. candidate, General Grant, who was re-elected in 1872. Again in 1876 a R., Mr. Rutherford B. Hayes, was elected to the Presidency. The present policy of the party may be defined as the support of a 'hard-money' currency, and of civil service reform.

Republics (Lat. *res publica*, 'common weal'), communities where the sovereignty is vested in the people, may be either democratic or aristocratic, i.e., all who enjoy civil may also enjoy political rights, or these may be restricted to a privileged order (see DEMOCRACY and OLIGARCHY). The purest and most ancient form of democracy was that in which all the citizens met in common assembly to enact their laws, a system practicable only in very small states, and which accordingly has been superseded in all the modern R. of the world by that of Representation (q. v.). Oligarchical Sparta, democratic Athens, and Rome, where the patrician privileges were gradually extended to the plebeians, constitute the great R. of antiquity; Venice, Genoa, and the Hanseatic Towns, of the Middle Ages. That of the United Netherlands (1609–1806) has passed away; so, too, the English Commonwealth (1649–60), and the still shorter-lived republic of Spain (1873). At the present day, with the exception of the tiny states Andorra and San Marino, France and Switzerland are the only European R., the former since 1870 (its two earlier R. of 1792 and 1848 having given place to the First and Second Empires), whilst the latter, whose independence was recognised in 1648, adopted (1847) a form of Federal Government (q. v.) resembling that of the United States. The Western hemisphere contains no fewer than eighteen R.—Argentina, Bolivia, Chili, Colombia, Costa Rica, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Paraguay, Peru, San Domingo, the United States, Uruguay, and Venezuela. The empire of Brazil and the colonial possessions of European powers alone are governed on other than republican and democratic principles. See Freeman's *History of Federal Government* (1861), and *Comparative Politics* (1873); May's *Democracy in Europe* (1877); and Wolsey's *Political Science, or the State Theoretically and Practically Considered* (2 vols. 1878).

Repulsion is the action which two bodies exert upon one another when they tend to increase their mutual distance. Convenient though the idea may be of a repulsive force as far as the mathematical statement of dynamical truth is concerned, there is little doubt that in nature true R. as defined above has no existence. Force itself has no real existence, far less repulsive force. It is simply a convenient name for the rate at which the energy of a system is changing from one form to another. And when we speak of a system, we understand not only the portions

which are evident to us as matter, but also the medium which separate these, so that all radiation which takes place through this medium is as much a transformation of energy as a change of velocity or configuration in these more evident portions. The apparent R. between the earth and a balloon, as the latter ascends, is due to the fact that the balloon is lighter bulk for bulk than the air, *i. e.*, is attracted less by the earth. Similarly may many other apparent repulsions be explained; and there is every reason to believe that, as our knowledge of molecular physics advances, all R. shall be referred to attraction, and attraction to displacements in and through material media. Le Sage's theory of gravitation, and Maxwell's theory of electrical action, are steps in this direction.

Repute' is a technical term in Scotch law. See HABIT AND REPUTE. In English law it denotes an abatement. Thus, in speaking of the clear yearly value of an estate, after deducting rent charges or annuities, we say that it is so much a year, besides *reprises*.

Repute Ownership is a term of bankruptcy law, denoting the apparent ownership by the bankrupt, at the date of his bankruptcy, of goods belonging to another. The false credit given by R. O. has led to the general rule of law being that all goods so placed shall belong to the trustee for the creditors. An exception may occur when the nature of the goods is such as not to affect credit, or such as ought to have caused inquiry as to their ownership. Were an insolvent merchant to have a horse or plate belonging to another at the date of his bankruptcy, it is probable that the general rule would not hold good.

Reque'na, a town of Spain, province of Valencia, near the river Magro, in the midst of a beautiful, populous, and fertile plain, 53 miles W. of Valencia. Its inhabitants manufacture cottons, woollens, and silks. Pop. 10,500.

Re'quiem, a solemn mass for the dead celebrated in the Roman Catholic Church. The term is derived from the words 'requiem eternam dona eis' used in the service. The requiems of Mozart, Cherubini, &c., contain some of the most beautiful of sacred music.

Re'redos (Fr. 'behind the back') is most frequently used as an ecclesiastical term to denote the wall behind the altar. It usually takes the form of a highly ornamented screen.

Re'scripts, the official answers of a pope or emperor to questions in jurisprudence. If addressed to a corporate body, a rescript was termed a Pragmatic Sanction (q. v.).

Rescues (Fr., from Lat. *re*, and *excutere*, 'to shake off') and **Escapes'** (from Fr. *échapper*, Ital. *scappare*, 'to skip away'). Rescue is the forcibly freeing another from arrest or imprisonment. It generally makes the rescuer an accomplice in the crime. To rescue, or attempt to do so, any one committed for murder, or on the way to execution, is a crime punishable with penal servitude for life. An escape of a person arrested upon criminal process is punishable by fine or imprisonment.

Resec'tion (Lat. 'a cutting'), or **Excision** ('a cutting out') of **Joints**, is an operation in which the diseased bones of a joint are cut out in place of amputation of the whole limb. It is an operation of quite modern date, and one which could scarcely have been practised before the invention of anæsthesia. R. is performed chiefly on account of disease of the articular surfaces, or of the tissue of the bone excised, or on account of the growth of tumours from the bone, or as primary or secondary operations after injury. In the operation appropriate incisions are made, according to the nature of the parts to be removed; the soft parts are turned aside without injuring the main vessels and nerves, the joint is dissevered from its connections, and the whole of the morbid tissues are removed. The operation must be so performed as to make provision for the subsequent stability or mobility of the limb, as may be required. When the elbow-joint is the part to be removed, it is necessary that the mobility of the joint should be maintained, but in the case of the knee-joint an ankylosed joint is preferable. Within recent years Ollier and Langenbeck have pointed out the advantages of preserving the periosteum in subperiosteal excision, and in some cases this mode is of decided

advantage. R. was first performed in 1762, but it was not till 1850 that it was accepted as a justifiable mode of operation, chiefly through the influence of Professor Fergusson. The object of the operation is, by removal of the dead parts, to leave a more or less useful limb, although shortened. R. constitutes one of the triumphs of modern surgery. The operation may be performed on the shoulder-joint, the scapula, the clavicle, the elbow, the wrist, the hip, the knee, the ankle, the os calcis, the astragalus, and various parts of the foot.

Reseda'cææ is a small natural order (6 genera, 20 species) of thalamifloral dicotyledons, consisting of annual or perennial herbs or rarely shrubs, occurring through Europe, in W. Asia, and in N. and S. Africa, but not in the New World. The flowers are irregular, small, and greenish; stamens indefinite; ovary one-celled, of two to six carpels, at length open at the top; seeds exalbuminous; leaves alternate. Most of the species are mere weeds, and excepting that *Reseda odorata* (Mignonette, q. v.) is among the most fragrant of plants, and *R. luteola* yields a yellow dye (see WELD), any properties they may possess are unappreciated.

Reserva'tion, Men'tal is the act of withholding from a statement some word or clause necessary to convey the real meaning of the speaker. An equivocal statement, while it conveys one meaning to the hearer, may, without alteration, be construed in another sense by the speaker. But that a statement involving a mental reservation be reconciled with the speaker's meaning, it is necessary that it be amplified. The moral legality of mental reservation has always been a moot point in theological casuistry. Pascal dealt largely with it in his attacks on the Jesuits. See Murray's *Theological Essays*, iv. 774.

Reserve'. This word is used in military language in two senses. Thus it is applied to a R. of troops held in readiness on the field of battle out of sight of the enemy for the support or reinforcement of the forces in action. Upon the proper use of reserves the fate of a battle has often turned. According to Jomini, they should be of the best quality of troops, but this opinion is now open to doubt, as the modern use of arms of precision make well-armed troops of any description powerful reserves. The *R. ammunition* of a British army is carried in carts, three going to a regiment of infantry and one to a regiment of cavalry. It is kept in the rear, and used to replenish the supply carried by the men when that is exhausted. When an army marches over rough and mountainous ground, the *R. ammunition* should be conveyed in pack-carriages.

In the second sense, reserves are bodies of men following ordinary civilian occupations, who may be called on to strengthen the regular standing army of a nation on an emergency. In all European states service is more or less compulsory, and the reserves thus practically come to be the active manhood of the country. These are usually divided into reserves of the active and reserves of the territorial forces. In Great Britain the R. consists of the auxiliary forces (the Militia, q. v., Yeomanry, q. v., and Volunteers, q. v.), the *Army R.*, and the *Militia R.* The *Army R.* was a force brought into organisation by Lord Cardwell's scheme of 1870. The first class of the *Army R.* consists of all short-service men who have not completed the term of service for which they enlisted, although they have been permitted to retire on serving a certain number of years with their regiments. A soldier who enters for short service must serve at least three (usually six) years with the colours, and the difference between that period and the term of twelve years in the R. Soldiers also who have served twelve years, provided their ages do not exceed thirty-four, may enter the R. They receive 4d. per day and an annual allowance of £1, besides 2s. or 2s. 6d. a day during their annual training of twelve days, and on occasion of 'imminent national danger, or great national emergency' may be called on to join the regular army. The first class of the *Army R.* came practically into existence for the first time in 1876. Its numbers in 1878 were 12,000 men and an ultimate limit of about 60,000 men may, under present circumstances, be looked for in the course of five or six years. A second class of the *Army R.* (about 15,000 in number) consists of pensioners, who are only liable for service in the United Kingdom. The *Militia R.* is a body of men consisting of not more than one-fourth of the total militia force who are liable for service in the army in the same manner as the first class *Army*

R. They receive £1 annual retaining fee, and are called out for fifty-six days training every year. In 1878 the number of the Militia R. who had gone through two annual trainings in addition to the required preliminary drill was estimated at 30,000 men, of whom 26,000 were looked upon as available.

Grave doubts, frequently expressed, as to whether the army and militia forces were a real or paper force, were set at rest by the complete success attending their being called out for the first time in 1878. In the course of two or three weeks 35,000 able-bodied soldiers out of about 38,000 men on the lists were incorporated in the regular army. The manner in which many of them at the call of duty gave up home ties and permanent and comfortable situations is a matter of justifiable national pride.

When the R. forces are undergoing their annual training they are under command of the officers of the regular forces of the district. The commander-in-chief's orders are conveyed to them through the Inspector-General of R. Forces. For the Navy see NAVAL RESERVE.

Reserve, in life assurance, is the sum set apart by a life assurance office to meet its liabilities. By the Life Assurance Act of 1870, an office must value its risks at least once in five years, when the R. required for each policy on its books is ascertained. The R. is the difference between the value of the reversions and the value of the future premiums, less the value of a portion of the premiums set apart for profits, expenses of management, &c. The table by which most life assurance companies now value their liabilities is based upon the Institute of Actuaries' experience of healthy male lives—the H. M. Table—and the rate of interest adopted is usually 4 or 3½ per cent.

Reserved List of naval officers is a class under which old and deserving officers are promoted to a higher grade, and placed upon half-pay, with only a very remote liability to be called upon for active service. It is regulated by Her Majesty's Orders in Council of June 25, 1851, December 29, 1853, August 1, 1860, and July 9, 1864. According to the Navy Estimates for 1877-78, 180 officers were upon this list, and their pay amounted to £44,133. They included 41 admirals, 15 vice-admirals, and 44 commanders, at from £2, 2s. to £1, 5s. per day, and 80 staff-commanders and navigating lieutenants at from 15s. 6d. to 5s. per day.

Reservoir (Fr.), a pond or basin for the collection and storage of water for the use of the inhabitants of a town, for irrigation, the supply of a canal or mill-dam, or for any other purpose. There are few districts so favoured by nature that it becomes unnecessary to store up the rainfall to meet one or other of the above wants. The construction of reservoirs dates from a remote period, for the system of impounding water for purposes of irrigation was practised in Egypt, Assyria, and India. Herodotus states that the great lake of Moeris was artificially formed to receive the overflow waters of the Nile; Nebuchadnezzar constructed an immense R. (140 miles in circumference) at Sippara; and in India and Ceylon there are numerous ancient tanks, formed by throwing a *bund* or embankment across a ravine or valley. Many thousands of these tanks are still in use in the Madras Presidency, and many others are ruinous from neglect; some of the latter are of immense size—one, the Ponriary tank, having an area of 80 square miles. The construction of a R. calls for the greatest engineering skill. The best position for a *storage* R. is in an elevated gorge or valley, across which an embankment may be thrown, as in the case of the Indian tanks already alluded to. In determining the capacity of the R., the average annual rainfall and the annual service demand must be taken into consideration, as well as the probable loss by absorption and evaporation. As a rule, in England the capacity should be sufficient for 120 to 180 days' supply. An extensive drainage area should rise above the R., which itself should be sufficiently elevated to ensure the water, at its lowest level, being delivered at the highest point of the service pipes. In fixing the site, the impermeability of the rock forming the sides and bottom must be ascertained, otherwise leakage of the water might endanger the stability of the embankment. When the bottom is permeable, borings ought to be made to determine at what depth an impervious rock lies, and on it the puddle wall should rest. A R. should always be deep, so as to prevent the growth of vegetation. Before constructing the embankment, the suitability

of a site for it should be tested by trial shafts and other means. The foundation should be solid, and free of faults or fissures communicating with permeable strata beneath. All soft, loose, or porous materials should be excavated. The embankment may be formed of earth, and through its length, in the centre or nearer the water-side, an impenetrable wall of well-puddled clay should run. The slopes of the embankment are usually 3 to 1 on the inside and 2½ or 2 to 1 on the outside. The water-side is commonly 'pitched' with stone, and the reverse sown with rye-grass or clover seeds. The outlet from the R. is by a culvert under the embankment, or better by a tunnel driven round the end of the embankment through solid ground. When the latter plan is adopted, a valve-shaft is constructed in a line with the puddle trench from the surface of the ground to the tunnel, which at this point is stopped with water-tight masonry in which two valved outlet pipes are placed. A waste-weir or waste-pit to carry away overflow occasioned by flood waters flowing into the R. is essential to its safety.

The water is usually conveyed from the storage R. to a *distributing* or *service* R., a large tank roofed over, and from it the supply is distributed for public use. It serves to check waste, for while the supply is constant, the consumption is variable, being less during night than day. The capacity of the distributing R. should be great, and its position high enough to command the highest dwelling to be supplied. When dwellings rise higher than it, these are supplied by a branch-pipe connected with the main from the storage R. *Compensation* reservoirs are constructed for the supply of streams, &c., in dry seasons, in order to compensate mill-owners and others for the water diverted from the watercourses on which the mills are situated.

Reahd, the capital of the province of Ghilan, Persia, and one of the chief entrepôts for the Caspian, situated about 2 miles inland from the shallow Bay of Enzeli, amid groves and orchards, 150 miles N.W. of Teheran. It has a royal palace, and extensive caravanserais and bazaars, and carries on through its port of Enzeli a considerable trade with Russia, exchanging silks for iron wares. The road to the port is in the most wretched state at all seasons. Pop. 23,500.

Residuary Legatee. The person is so called in law to whom a testator bequeaths the remainder of his personal estate, after payment of debts and special legacies. If these exhaust the personal estate, the R. L. gets nothing.

Resignation, a Scotch law term denoting the form by which a vassal returns the fee (see FEE and LIFEFEUD) into the hands of the superior.

Resina (probably the *Retina* of Pliny), a town of S. Italy, province of Naples, at the foot of Mount Vesuvius, 6 miles S.E. of the city of Naples. It stands upon the site of the ancient Herculaneum (q. v.), the entrance to the excavations of which is a quarter of a mile distant from the royal palace of La Favorita in the immediate vicinity. R. is the starting-point for the ascent of Vesuvius, and furnishes travellers with guides, horses, and asses. From the slopes of the mountain the well-known wine *Lacryma Christi* is produced, and there is also considerable silk-spinning. Pop. (1874) 12,175.

Resins (from Lat. *resina*, connected with the Greek *rhēō*, 'I flow') constitute a class of vegetable secretions which are in their nature closely allied to the essential oils, being, according to the views of Liebig, oxidised forms of these bodies; and through the oleo-R. the one series passes gradually into the other. R. are solid bodies, more or less transparent, mostly breaking with a glassy fracture, entirely insoluble in water, but soluble in ether and the volatile oils, partially soluble in alcohol and the fixed oils, dissolving under the influence of heat. Dissolved in alcohol, R. form spirit varnishes, while with oil they form ordinary varnishes such as copal varnish. They are all highly inflammable, and burn with a yellow smoky flame. Chemically, they are complex bodies, being in all cases combinations of several distinct resinous principles, though in ultimate composition they resolve themselves into pure hydrocarbons or compounds of carbon, oxygen, and hydrogen. R. from a commercial point of view may be separated into two distinct classes—hard and soft R. The former, the type of which is copal, comprehend the ordinary varnish R., and are distinguished by dissolving with readiness in common turpentine, the resulting compound forming a clear tenacious fluid. The more

valuable kinds are distinguished by their hard, glassy appearance, perfect transparency, and an almost entire absence of colour. The leading R. which come under this class are the dammars, copals, and animes; and under these heads several botanically distinct products are found in commerce. White dammar or piney varnish is obtained in India from *Vateria indica*, and allied R. are obtained in Oriental regions from various other species of *Vateria Vatica*, *Shorea*, and *Hopea*. A fine dammar is yielded by *Dammara orientalis*, and the well-known Kauria gum of New Zealand, the fossilised produce of *Dammara Australis*, is also a dammar resin. Copals or anime R. are obtained from species of *Hymenaea*, chiefly from the Zanzibar coast, but also from the W. coast of Africa, and from Madagascar, and a similar product is yielded by allied trees in Brazil. Another copalline resin is mastic. Thus, frankincense and sandarach are resinous exudations from pine trees, and sometimes classed as concrete turpentine. The Elemi or soft R. form a link between the copals and the oleo-R., being soft and clammy to the touch, often with a strong balsamic odour. They are in most instances to a large extent, sometimes entirely, soluble in spirit. They include Tacamahac of both the W. and the E. Indies; Mexican Elemi from a species of *Elaphrium*; and E. Indian Elemi, the produce of various species of *Canarium*. The elemi R. are used almost exclusively in medicine, and are not available for varnish making. A great variety of resinous substances are produced in various regions which are little or not at all met with in commerce; and of many of the substances extensively employed, very little is known with accuracy and certainty. Details regarding most of the substances alluded to here will be found under their own proper headings.

Medicinally.—Resin forms an important ingredient in ointments, but is not used internally. It is contained in charta epispastica, and unguentum terebenthinæ. The preparations are *emplastrum resina*, used chiefly for strapping wounds and ulcers; and *unguentum resina*, employed as a stimulating dressing for indolent ulcers. *Resina jalape* is given internally in doses of from 2 to 5 grains, and *resina podophylli* in doses of from $\frac{1}{4}$ to $\frac{1}{2}$ grain. See JALAP and PODOPHYLLUM.

Res Judicata, in law denotes a legal point on which judgment has been given by a supreme court as between two parties. The plea of R. J., if sustained, prevents either party from reopening the question already disposed of.

Resolution, in music, is following a discord by the combination which the ear requires in order to leave a satisfactory effect. It is usually effected by the dissonant note descending or ascending a degree, most frequently the former. Sometimes this is done in the next chord, while at other times it is deferred, or even interrupted by an intermediate progression.

Resolution of Forces. See COMPOSITION AND RESOLUTION OF VELOCITIES AND FORCES.

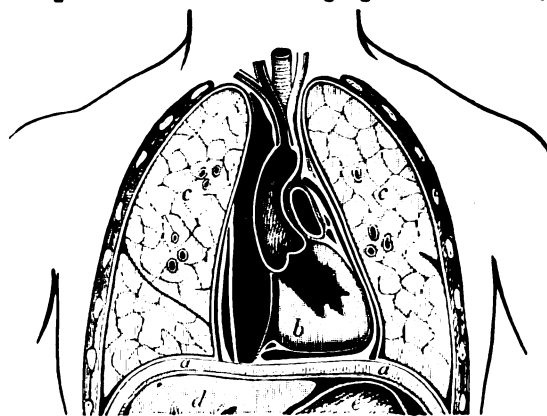
Resorcin is a colourless crystalline compound obtained by fusing galbanum with potassium hydrate, dissolving the fused product in water, neutralising with sulphuric acid, and mixing the clear filtered solution with ether. The R. is taken up by the ether, which is afterwards driven off by distillation. R. acted on by sulphuric acid yields a fine purple red colouring matter, which, with several other dyes derived from R., is used in dyeing and calico-printing. R. is closely allied to orcin, and its composition is represented by the formula $C_6H_4O_2$.

Respectant, or **Respecting**, an epithet applied in heraldry to two animals (not of prey) rampant face to face. Beasts of prey so placed are *rampant combattant*.

Respiration, the function of breathing. This function is one devoted to the purification of the blood by the excretion or elimination of waste matters, and to the absorption of oxygen gas. R. is thus not merely excretory; it is also nutritive, as the absorption of oxygen gas largely contributes to the maintenance of the animal organism. R. is essentially the same in animals and in plants, and consists in the absorption of oxygen for the vital purposes and chemical reactions of the living being. Oxygen gas is absorbed by plants for the purpose of decomposing certain of the substances of the plants. In this action the oxygen deprives such substances of part of their carbon and is ultimately given off in the form of carbon dioxide or carbonic acid (CO_2). This process would appear to be continually performed within living plant-cells. The presence and decomposing action of oxygen would appear to be thus neces-

sary for the life of the protoplasm of the cells. Plants placed amidst pure carbon die of suffocation like animals. Some flowers produce a relatively large quantity of carbonic acid through the absorption of oxygen, and a considerable increase of temperature takes place in such plants, as the result of the union of the oxygen with the carbon of the plant. Thus during the fertilisation of some species of *Aroidæ*, the temperature increases by $10^{\circ} C$.

In animals the respiratory organs vary in form and nature. In the lowest animals the general tissues of the body may serve as unspecialised breathing organs, just as in animals of tolerably high grade (e.g., earthworms), the general surface of the body may constitute the chief respiratory organ. The essential features of any breathing organ is a thin membrane, having the blood on the one side and the atmosphere (or water containing air) on the other. An interchange of products takes place between the blood and atmosphere through the membrane, oxygen passing into the blood and carbonic acid, &c., being excreted. The differences between the various kinds of breathing organs are really referable to variations in this arrangement. In man the breathing-organs consist of two lungs



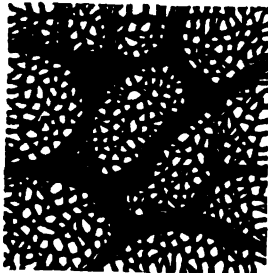
Vertical Transverse Section of Chest, to show arched form of diaphragm, a a: the heart, b: lungs, c c: stomach, e: liver, d.

placed in the chest or thorax,—a cavity completely separated from that of the abdomen by the muscular partition named the diaphragm or midriff. The lungs of man and all quadrupeds are closed sacs, and do not open into air-sacs as is the case in birds. The lungs are two bodies of light spongy texture, and of a pink or light-red colour in infancy, but becoming dark-coloured in the adult, owing to the absorption of foreign carbonaceous matter from without. Each lung is merely the seat of the exchange between the blood and air already mentioned; and each organ may be simply described as a bag of air-cells. The lungs communicate with the outer world by means of the trachea or windpipe. At the upper part of this tube is the larynx or organ of voice; the trachea itself is a fibrous tube strengthened by imperfect rings of cartilage, which contribute towards the flexibility of the structure. The trachea divides at the root of the neck into two main branches or bronchi—one for each lung. Each bronchus on entering its lung divides and subdivides into a large number of branches, and thus constitutes 'a respiratory tree' of considerable extent. Traced to their ultimate terminations, the bronchial tubes are found to end in the air-cells of the lung. These cells are aggregated in groups, called the lobules of the lung. The air-cells vary in diameter from the $\frac{1}{10}$ th to the $\frac{1}{20}$ th of an inch. Their walls are formed of fibrous and elastic tissues, and are lined by squamous or tessellated epithelium. Thus the air received through the trachea or windpipe permeates every part of the lung-structure, and is at last received into the air-cells of which the lungs are essentially composed. External to the air-cells of the lung, and forming a



Two Air-Cells (A) with the ultimate bronchial tube (a) which opens into them (magnified 80 diameters).

dense network thereupon, are the *capillary blood-vessels* of the lung. The capillary network is most dense in the centre of the lung, and a continuous stream



Air-Cells, with capillary blood-vessels injected.

of blood is seen to pass through the lung from the right to the left side of the heart. We thus find in the lung of man the essential conditions of all respiratory organs. The thin walls of the air-cells of the lung exhibit the respiratory membrane, on one side of which the air admitted through the trachea is found; while on the other side the blood (laden with waste matters, and propelled from the right side of the heart) is contained within the capillary blood-vessels.

The *trachea* or 'windpipe' extends from the fifth cervical vertebra to the third dorsal vertebra, and measures from 4 to 4½ inches in length, and ¾ths of an inch in diameter. Its incomplete cartilaginous rings number from sixteen to twenty. The windpipe is lined by *ciliated epithelial cells*, and unstriped muscular fibres also occur. The branches of the windpipe (*bronchi* and *bronchial tubes*) at first resemble the windpipe; but as they gradually become smaller they lose their cartilaginous rings, the walls of the smallest air-tubes being chiefly composed of fibrous tissue, along with a muscular investment. The *right lung* is larger than its neighbour, and is divided into three lobes; the *left lung*, which is longer and narrower than the right, having only two lobes. Each presents when anatomically examined a *base* or lower part resting on the *diaphragm* or 'midriff'; an *apex*, extending into the root of the neck; an *external surface*, smooth and convex; an *internal surface*, concave in form; a *posterior border*, rounded and broad; and an *anterior border*, thin, sharp, and overlapping the *pericardium* or sac in which the heart is contained. The *root of the lung* exists about the middle of the inner surface of each lung. At this point the blood-vessels, nerves, and lymphatics enter the lung, the chief blood-vessels being arranged so that the *pulmonary veins* lie to the front, the pulmonary artery in the middle, and the *bronchi* and blood-vessels of the lung behind. The average weight of the two lungs is 42 oz., the right lung weighing about 2 oz. heavier than the left. Those of the male are heavier than those of the female, and weigh in the proportion of 1 to 37. In the female the relative weight is as 1 to 43. The *pulmonary artery* arising from the right ventricle of the heart carries venous blood into the lungs, and spreads out in the organ to form part of the dense capillary network already mentioned. The capillaries of the lung in due time unite to form the *pulmonary veins*, which convey the purified blood from the lung back to the left side of the heart for redistribution through the body. Besides these vessels which serve to convey blood through the lungs, these organs have blood-vessels (*bronchial arteries and veins*) for their inherent nutrition. The lungs are also supplied with *Lymphatics* (q. v.), and the *nerves* of the lung arise from the *pulmonary plexus* (*anterior* and *posterior*), formed chiefly of branches of the pneumogastric and sympathetic nerves.

The brief study of the mechanism and details of the process of R. may be prefaced by a few observations on the *chemical composition of the atmosphere*. Ordinary atmospheric air consists of two gases—*oxygen* and *nitrogen*, mixed in the proportions of 21 to 79 in 100 parts. The oxygen is the important element, the nitrogen being chiefly useful as a diluent, and bearing no active share in the work of R. These are the essential gases of the atmosphere, but in addition varying quantities of other substances occur therein. Thus in ordinary air traces of carbonic acid (4 or 5 vols. of CO₂ to 10,000 of air) are to be met with; and watery vapour is usually present to the extent of 1.40 per cent. Traces of ammonia and other substances are also found. The quantity of carbonic acid may be vastly increased under certain circumstances, as, for example (according to Dr. Angus Smith), in the dress-circle of a theatre at 11.30 P.M., where it attained a percentage of .0757; or in a Cornish mine, where the quantity was 2.5000 per cent. It may now be asked, what changes happen to the air during R. The chief are as follows:—(1) That the air expired from the lungs is *warmer* than the surrounding atmosphere, and attains a temperature varying from 97° to 99½°.

The expired air literally exhibits the temperature of the blood. (2) The *carbonic acid* is increased. About 4½ per cent. of oxygen is abstracted from every volume of air taken into the lungs, a rather smaller amount of carbonic acid being supplied from the lungs in place of the oxygen. About 1346 cubic inches (636 grains) of carbonic acid is given out of the lungs in one hour; and estimated by weight, the carbon exhaled from the lungs per hour amounts to 173 grains, making about 8 oz. of pure carbon in twenty-four hours. The quantity of carbonic acid emitted in R. from the lungs varies according to the circumstances of the individual. Thus the quantity increases from eight to thirty years of age, and diminishes from forty to old age; the higher the temperature, the less carbonic acid is excreted; in spring more carbonic acid is given off when the air is moist, and more is exhaled than in any other season; more carbonic acid is exhaled during the day (relatively to the oxygen absorbed) than during the night; after food the quantity of carbonic acid exhaled is increased; exercise in moderation increases its amount, and during sleep there is a diminution in the quantity of the gas exhaled. (3) The *oxygen* is diminished in R. The quantity of oxygen absorbed per hour is 1584 cubic inches (= 542 grains). Thus more oxygen is absorbed than is exhaled along with the carbon to form carbonic acid without alteration of volume, the loss of oxygen being due to absorption. (4) *Watery vapour* is added to the atmosphere in R. The quantity of watery vapour given off from the lungs is sufficient to saturate the atmosphere. About 9 or 10 ounces is a fair average estimate of the amount of water exhaled from the lungs in twenty-four hours. (5) That *ammonia* is given off during R. is proved by the researches of Reade and others, but its amount is very small; and (6) *organic matters* are added to the atmosphere; about 3 grains being estimated to be exhaled from the lungs in twenty-four hours.

The *changes which occur to the blood in R.* are equally important. The blood sent to the lungs through the preliminary artery and its branches from the right side of the heart is *venous* or impure, and is therefore dark coloured. After passing through the lungs the *venous blood becomes light coloured*—a change due to the absorption of oxygen gas, which is chemically combined with the *hemoglobin*, or colouring matter of the blood corpuscles. Thus the great result of the passage of the blood through the lungs is a loss of carbonic acid and a gain of oxygen. The blood also becomes 1° to 2° F. warmer after passing through the lungs, and also appears to coagulate or clot more readily and firmly than before. Thus a fair comparison might be made between the lungs and their work in R. and a market-place or exchange. The blood offers to the air certain waste products (*viz.*, carbonic acid, heat, water, ammonia, and organic matters), and obtains from the air oxygen and nitrogen, of which the former is by far the more important. The *essential and intimate part* of the respiratory act is accomplished in virtue of the 'law of diffusion of gases,' the oxygen passing inwards to the blood through the thin capillary-walls and through the walls of the air-cells of the lung; while the carbonic acid and other matters pass outwards from the blood into the air-cells, and are thence exhaled in the act of expiration. They are literally *waste products*, which represent the 'wear and tear' of the living machine, gathered from all parts of the body by the blood, and thus brought to the lungs to be excreted. A certain share of the waste matters falls to be excreted by the *kidneys*, *skin*, and *liver*, which thus bear a very definite relation to the lungs as organs of excretion. The lungs thus excrete most carbonic acid (about 15,000 grains in twenty-four hours), the skin in the same period excretes from ¼th to ⅓th of the quantity exhaled from the lungs; while the kidneys also excrete a small quantity of this gas. In diseases of the lungs the skin and kidneys excrete much larger proportions of carbonic acid; the normal function of the skin being to eliminate water and solid matters (11,500 grains water; solids 250 grains in twenty-four hours); while the kidneys excrete a much larger quantity of water (23,000 grains in twenty-four hours) along with organic matters (680 grains) and mineral and saline matters (420 grains).

The nature of the *respiratory movements* may be readily understood. Two acts (*inspiration* and *expiration*) are involved in this process. The former is by far the more forcible and important. It is essentially a muscular act. The chest or thorax itself is a movable framework or cage, the cavity of which is capable of being enlarged in various directions. All that is required to

effect inspiration (bearing in mind the elasticity of the lungs) is the increase of the capacity of the chest, through the alteration of its floor and sides. By such alteration or measure of capacity the pressure of air in the lungs is diminished, and an additional quantity enters the lungs to equalise the pressure on both surfaces (internal and external) of the chest. The chest is enlarged, firstly, in a vertical direction by the contraction of the *diaphragm* or *midriff*, the great muscle forming the floor of that cavity. The sides of the diaphragm descend to the greatest degree, while its central tendon remains firm, and thus the thorax is pulled downwards, its sides being also pulled outwards below. Secondly, the chest is enlarged from side to side (*laterally*), and from before backwards (in the *antero-posterior* diameter), by the ribs being elevated in front and at the sides. The breastbone is also pushed upwards and forwards. The agents which accomplish these movements of the ribs and breastbone in ordinary breathings are the various *intercostal muscles*, or those extending from one rib to another. But in forced breathing, other muscles (such as the *scalene* muscles, the *serratus magnus*, the *pectoral* muscles, &c.) are also called upon to assist the intercostals. The cavity of the chest being thus enlarged, the lungs are allowed to expand, and air is duly inhaled. The act of *expiration* is effected chiefly by the elasticity of the lungs and chest. Both are forced from their normal position, as it were, in inspiration; and both return in expiration to a position of rest. The movements of breathing vary in the sexes. The breathing of men is termed *abdominal*, since the movements of the abdominal walls are more clearly marked than in women, in whom the chest appears to participate more exclusively in these motions. Hence in females the breathing is said to be *pectoral*. In young children the diaphragm is the chief agent in the movements of breathing.

The *total quantity of air* which passes into and out of the lungs of an adult in twenty-four hours in ordinary tranquil breathing is about 686,000 cubic inches. The average quantity exchanged at each breath in the adult man is about 30 or 35 cubic inches. A hard-working labourer would breathe in twenty-four hours 1,568,390 cubic inches of air. The most violent expiratory act does not empty the lungs of air. Hence the quantity (about 100 cubic inches on an average) which remains in the lungs after the deepest expiration is named *residual air*. The quantity (30 to 35 cubic inches) which passes into and out of the lungs in ordinary breathing is named *tidal air*. The quantity over and above the *tidal air* (varying in different individuals) which may be inhaled by a deep inspiration is called *complemental air*; that expelled by a deep expiration (over and above the *tidal air*) is named *reserve* or *supplemental air*. The chest or thorax is lined by a delicate membrane named the *Pleura* (q. v.). The *work of the muscles engaged in R.* has been calculated by Professor Haughton to amount to 21 foot-tons in twenty-four hours.

The *Hygiene* of the present subject is all-important. Upon the due understanding of what R. is, and upon a knowledge of the processes whereby the effete or vitiated air may be got rid of, and a due supply of fresh air introduced into our dwelling-places, the health of families and communities may be said largely to depend. The breath re-breathed is unquestionably the source of very many serious disorders, not merely personal but also epidemic. The breathing of an atmosphere in which the quantity of organic matter and carbonic acid is increased above the normal standard is fraught with serious, or it may be fatal, effects to man and the higher animals generally. The headaches, drowsiness, and lassitude felt in places of public entertainment and in churches and halls are due simply to imperfect oxygenation of the blood in a vitiated atmosphere; and the imperfect ventilation of our sleeping apartments causes restless nights, and destroys the beneficial effects of sleep. That the animal body may tolerate a vitiated atmosphere in which it has been placed for some time, and thus unconsciously injure itself, is proved by the experiment of introducing a sparrow into a bell-glass in which another sparrow has been confined for two hours. The sparrow thus introduced into the atmosphere vitiated by the first bird, is found to perish instantly, and this although the first bird could have remained under the bell-glass for another hour without endangering its life. The deaths of infants aged from one to fifteen days in the Dublin Lying-in Hospital numbered 2994 (out of 7650 births) in four years, during a certain period; while after the introduction of a new and better system of ventilation, the death-rate sank to 279 deaths during another period of four years with equally

numerous births. More than 2500 deaths (or 1 in 3) were thus caused by imperfect ventilation.

Diseases of Organs of R.—The structures which are mainly affected in disease of the lungs are—(1) the bronchial tubes, (2) the pulmonary air-cells, vesicular structure or parenchyma of the lungs, and (3) the membranes covering the parenchymatous part, forming that portion of the serous sac between the lungs and the walls of the thorax. That portion of the sac immediately investing the lungs is called the *pulmonary pleura*, while that investing the parietes of the thorax is called the *parietal* or *costal pleura*. One or more of these pulmonary structures may be the seat of inflammation (q. v.). When the *bronchial* is inflamed, the disease is called *Bronchitis* (q. v.); when the *substance proper*, or parenchyma, is inflamed, the disease is termed *Pneumonia* (q. v.); and when the *pleura* is inflamed, the affection is described as *Pleuritis* (q. v.). It is seldom that these morbid states are completely isolated, but the disease is usually named according to the more prominent symptoms. When inflammation of the substance of the lung, or pneumonia, is associated with inflammation of the air-tubes, or bronchitis, the disease is termed *broncho-pneumonia*; and when associated with inflammation of the investing pleura, or pleuritis, it is termed *Pleuro-pneumonia* (q. v.). These diseases frequently give rise to secondary diseases which are more persistent than the primary, such as *Hydrothorax* (q. v.), or an effusion of serum into the cavity of the chest; *Pneumothorax* (q. v.), or a collection of air or gas, in the cavity of the pleura, generally co-existing with fluid in the same cavity, and called *hydro-pneumothorax*; *Emphysema* (q. v.), or enlargement of the air-cells by dilatation, attended with obliteration of the blood-vessels distributed over their walls, forming a most serious complication of bronchitis; *Empyema* (q. v.), or an accumulation of pus in the cavity of the chest. *Pulmonary tuberculosis*, or *Phthisis* (q. v.), the growth or exudation of tubercles, which undergo various changes in the lungs, is the local manifestation in the lungs of the constitutional phenomena of tuberculosis. The lungs are also liable to lesions due to the syphilitic poison, affecting the mucous membrane of the bronchial tubes; or gummatous nodules may be developed in the pulmonary substance, or they may be associated with miliary tubercles in the lungs. Syphilis (q. v.) undoubtedly exerts a powerful influence in the development of phthisis. *Gangrene* of the lungs, the disintegration and breaking up into fragments of the filamentous tissue of the lungs, is comparatively rare, and almost invariably fatal. *Hæmoptysis* (q. v.), or the spitting of blood from pulmonary hæmorrhage, may depend upon a variety of causes of more or less serious import, and in some cases it is the result of cardiac disease, and occasionally it is a form of vicarious menstruation. See *Principles and Practice of Pnevnia*, by Sir Thomas Watson (Lond. 1871); *Diseases of the Chest*, by Dr. Waters (Lond. 1873); and *Phthisis*, by Dr. A. Flint (Lond. 1875).

Respiration, Artificial, is required in all cases of suspended animation, as in some cases of childbirth, drowning, the inhalation of chloroform, noxious gases, &c. The operation for producing it may be performed in various ways. In the case of new-born infants, suspended animation is of frequent occurrence; but the stimulus afforded by exposure to the external air, conjoined with certain centric causes arising from deficient aeration of the blood, are generally sufficient to excite the respiratory muscles. Should respiration, however, not immediately follow, A. R. may be excited by blowing on the face, by a smart pat on the nates, or by dashing some drops of cold water on the face. Failing this, the infant should be plunged in a basin of warm water, and, as it is being removed from the bath, cold water should be dashed upon it. The tongue should be drawn forward, the mucus should be rapidly removed from the fauces as far as is possible, and A. R., by the methods hereafter described, should be persevered in so long as the slightest action of the heart continues. In such cases, the umbilical cord should not be tied until it has ceased to pulsate, as there is a possibility of a certain amount of placental respiration.

In cases of threatened asphyxia from chloroform and other anæsthetics, a condition indicated by lividity of the face or by laryngeal stertor, the tongue should be pulled well forward with a pair of forceps sufficiently far to open the larynx freely, that the patient may be enabled to breathe freely. On the first symptom of the failure of the pulse the chloroform must be with-

drawn, the breast should be well slapped with cold towels, and hot effusions applied to the head, and if the galvanic battery is at hand it should be applied.

A. R. may be performed by passing a pipe through the mouth, or a male catheter through the nostril, into the glottis; or by simply putting a pipe into one nostril, and closing the mouth and the other nostril, and blowing through it; or by using in a similar manner a small pair of bellows, the nozzle being inserted into the nostril. The air should be forced into the lung with very great gentleness, and the larynx should be pressed against the spine so that the air may not go down the œsophagus. If the larynx has been crushed by a rope, or by a violent blow, or obstructed mechanically, it may be necessary to perform Tracheotomy (q. v.), so as to impel a current of air directly into the trachea. At the same time the lungs may be filled with pure air by compressing the chest and abdomen, so as to expel the vitiated air, and then allowing them to recover their usual dimensions by the natural elasticity of their parietes. Dr. Marshall Hall has recommended that the patient be turned prone so that the tongue may hang forwards, the larynx thus be opened, and that respiration be then set up by gentle pressure along the back, and turning the patient on his side at regular intervals.

In the case of a person apparently drowned, or in an asphyxiated condition, the best mode of producing A. R. is that recommended by Dr. Marshall Hall and modified by Dr. Sylvester and others, as follows:—The patient is laid on his back on a plane, inclined a little from the feet upwards; the shoulders are gently raised by a firm cushion being placed under them; the tongue is brought forward so as to project a little from the side of the mouth. The operator then grasps the patient's arms just above the elbows, and raises them till they nearly meet above the head. This action imitates inspiration. The patient's arms are then turned down, and firmly pressed for a moment against the sides of the chest. A deep expiration is thus imitated; and these two sets of movements should be perseveringly continued at the rate of about fifteen times in a minute.

The *Report of the Scientific Committee on Suspended Animation*, presented in 1862 to the Royal Medical and Chirurgical Society of London; the *Instructions for the Restoration of the Apparently Dead from Drowning*, issued by the National Lifeboat Institution in 1864, and the *Report of the Scientific Committee on the Uses and Effects of Chloroform*, printed in 1864 in the *Proceedings of the Royal Medical and Chirurgical Society*, recommend the methods described above.

Respirator is the name given to an apparatus worn over the mouth to warm the cold external air before inhaling it into the lungs, or to enable a person to breathe in an atmosphere charged with dust or noxious vapours. Jeffrey's R., patented 1836, and designed for persons having weak lungs, consists essentially of several layers of very fine wire mounted on a light oval curved framework, which covers the mouth closely and is secured by bandages. In the act of respiration the air passes through the interstices of the fine lattice wirework, which is heated with every expiration of the warm breath, and the heat thus imparted to it serves in turn to warm the cold air when inhaled. By this arrangement invalids are enabled to enjoy open-air exercise in cold weather without discomfort, while there is no obstruction to speaking. Several other kinds of respirators have been contrived for the use of operatives exposed to dust of all kinds. For cutlers a R. of magnetic gauze which lays hold of the particles of metal has been designed. Another valuable invention is the smoke R. of Tyndall, which enables firemen to breathe freely for some minutes in a room filled with dense smoke. It consists of a brass cylinder containing a valve chamber and a filter tube. In the former, ball-valves regulate the entrance of the purer air and the discharge of expired air, and in the latter are several superimposed layers of dry cotton wool, fragments of lime, fragments of charcoal, and wool saturated with glycerine, all of which serve to remove the particles of carbon and other impurities from the atmosphere. The R. is shown in the cut attached to a mask.



Tyndall's Smoke Respirator.

When combined with a hood and spiral wire-tubing, it is adapted

for the use of miners entering an atmosphere charged with deadly gases.

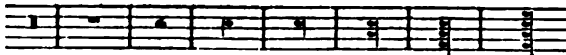
Respondent is the legal designation of the party requiring to answer, in a petition presented against him, to a court of law.

Respondentia is the name of a kind of loan on the security of a ship's cargo. If the goods are lost, the creditor under a R. bond has no claim against the owner of the ship, consequently he usually stipulates for a high premium should the voyage be successful. When the *ship* is pledged in security of a loan, the legal instrument is called a bond of Bottomry (q. v.).

Responsibility for Crime. Certain classes of persons are, on account of age or infirmity, held to be incapable of committing crime. An *infant* (see AGE) under seven cannot be guilty of felony. Above seven, a measure of R. attaches; but there is a presumption in favour of innocence till fourteen, when the individual becomes fully responsible, unless fatuous or lunatic. An act which would otherwise be criminal may be excused or palliated by ignorance as to fact, but not by ignorance regarding law. See IGNORANCE OF THE LAW; CAPACITY, LEGAL; IDIOTS AND LUNATICS, LAW REGARDING.

Responsory, Response', or Respond', a versicle sung by the choir in answer to the priest, as in litanies, or a short anthem interpolated in the reading of a lesson.

Rest (in music), a sign that silence is to be observed for an indicated period. The following rests correspond to the principal notes:—



Breve. Semi-breve. Minim. Crotchet. Quaver. Semi-quaver. Demisemi-quaver. Semidemi-quaver.

Dots affixed to rests produce the same effect as with notes, a single dot adding one-half more, and two dots three-quarters more to the value; thus, ♩· equals three quavers, and ♩·· seven semiquavers. There is no sign for a bar's rest, but a semibreve rest is frequently used to indicate it where a bar contains a semibreve or less, (—) and a breve rest where it contains more than a semi-breve. The number of bars in rest are sometimes written above two lines

crossing the staff obliquely, thus



Rest-Harrow (*Ononis*), a genus of about 60 species of leguminous herbs or small shrubs, often covered with viscid hairs, giving the plants a peculiar, goat-like odour. The leaves consist of three leaflets; the pink or yellow flowers have a broad standard, oblong wings, and an incurved keel; the calyx is five-cleft; the stamens monodelphous; the stigma terminal, and the pod thick. *O. arvensis* is a common British plant of dry pastures and sandy shores, and *O. spinosa* is locally plentiful in stiff clay land. The long and strong matted roots of the former, impeding or arresting the progress of the plough and harrow, has established the popular name of R.-H. The genus is confined to Europe, the adjoining parts of Asia, the basin of the Mediterranean, and the adjacent isles.

Restiaces, a natural order of monocotyledons allied to *Juncaceae* and *Cyperaceae*, is confined to the southern hemisphere, and found chiefly in S. Africa and Australia. The plants are rushy or reed-like, with very rigid wiry stems, simple narrow leaves, and spiked or capitate flowers, with generally separate sexes. The matted roots serve to bind shifting soil, and one of the species at the Cape (*Restia tectorum*) forms a most valuable thatching material, whilst the stems of others are made into brooms, baskets, &c.

Restigouche', a river of British America, separating for the last 50 miles of its course New Brunswick from Quebec. It flows N.E. into the Bay of Chaleur, has a length of 200 miles, and drains an area of 4000 sq. miles. It is navigable for 16 miles by the largest vessels.

Restitution, in law, means the restoring of goods lost or stolen to the owner. See FINDING GOODS, LAW REGARDING.

Restora'tion, in English history the event whereby, according to the Thanksgiving Office of the Church of England down to 1859, on May 29, 1660, 'our then most gracious Sovereign Lord, King Charles the Second, notwithstanding all the power and malice of his enemies, was restored to his own just and undoubted rights; and unto us also was restored the publick and free profession of the true religion and worship, together with our former peace and prosperity, to the great comfort and joy of our hearts.'

Restora'tionists are a sect of American Universalists. About 1818 a Universalist preacher, Hosea Ballow, began to teach that sin is entirely connected with the body, and that the soul is therefore freed from the punishment of sin when it is freed from the body by death. A sect holding this opinion separated from the general body of the Universalists in 1831, and assumed the name of 'Universal Restorationists.'

Resurrec'tion of the Dead, as ordinarily understood, means not merely that when the body dies the soul rises to a new and a higher life, but that the bodies of men rise again. This doctrine was found under different forms in many of the ancient theologies—in that of the Stoics of Greece, the Parsees, and the Hindus. It also appears in the Jewish literature, connected with the ideas of the Jews regarding immortality. Their idea of this was very dim till after the Captivity, but always grew brighter as the hopes of a national restoration waned, and the belief in individual immortality superseded that in Israel's perpetual existence. Now, according to Jewish ideas of the relation between the soul and the body, immortality must necessarily be bodily. At death the spirit returns to God who gave it (Eccl. xii. 7), the *shade* only descends to Sheol, and if the person were to begin a new life the spirit must again be breathed into his shade (*cf.* Ezek. xxxvii.). The belief in a R., then, was prevalent in the 3d c. B.C., although not universally accepted (Dan. xii. 2; Eccl. iii. 21, xii. 7, xiv. 17, xvii. 22-28, &c.), as it was not even in the time of Christ (Mark xii. 18; Acts xxiii. 8). In the Pauline theology two new ideas are added to the old Jewish ones regarding the R.: first, that of a spiritual R. along with Christ, in consequence of the believer's mystical union with him by faith (see JUSTIFICATION and REGENERATION). The second had reference to the nature of the R.-body. Paul explicitly and repeatedly condemns the idea that people would rise again with the same bodies which they had in life (1 Cor. xv. 50; *cf.* Gal. i. 16; Eph. vi. 12). These bodies are to be metamorphosed, their perishable elements changed into imperishable (*v.* 42).

The R. of Christ is generally regarded as the fundamental truth of the gospel, and as the most important as well as the best authenticated fact in the history of the world. Heterodox writers, who reject it as a fact, adopt various theories to account for the belief regarding it which has prevailed among Christians from the first. Some have imagined that the reappearance of Jesus after his death was of the nature of an apparition (*cf.* Luke xxiv. 31, 36, 37, 51; John xx. 19, 26; Acts i. 9). Others suppose that he did not actually die, but merely swooned, and then revived after he was taken down from the cross. But no such theory can be framed which is not negatived by one or other of the evangelical accounts; *e.g.*, the first of the above by Luke (xxiv. 38-43), and the other by the inability of the disciples to recognise him (John xx. 15, xxi. 4-7; Luke xxiv. 16). The strongest and earliest literary proof of the doctrine is in the Epistles of Paul, especially 1 Cor. xv. 3-8. The strongest testimony of all is the traditional—namely, the fact that all the apostles and first disciples believed it—'held it with a conviction so absolute that it inspired them with a zeal and courage to live as missionaries and die as martyrs.' See Hodge's *Syst. Theol.* (Edinb. 1873); Reuss' *Hist. de la Theol. Chrétienne* (3d ed. Strasb. 1864); Greg's *Creed of Christendom* (3d ed. Lond. 1874); *Supernatural Religion*, vol. iii. (Lond. 1877), and replies by Professor Lightfoot in *Contemp. Review*.

Retain'er is in law the fee given by a solicitor to counsel to secure his services for a client. A *general R.*, for which five guineas is the usual fee, entitles the party who gives it to a preference in *specially* retaining the counsel to whom it is given. It is the duty, therefore, of the barrister who has received the general R., should a special one be offered by the other

party, to ascertain before accepting it if the giver of the first fee means to retain him specially. Should it be so, he is bound to the first client.

Retain'ing Wall is the name given to any wall built so as to retain earth, sand, or other yielding substance in forms which they could not naturally preserve. It must therefore be made sufficiently strong and solid to resist effectually the thrust of the material behind it. The necessary thickness depends very much upon the nature of the material which it is purposed to retain in position. A dry earth does not require such a strong R. W. as a moist earth. Hence the retaining walls of the banks of rivers or of walls of docks have a thickness equal to about one-half their height, while in other ordinary circumstances the thickness is just about one-third the height. In docks, too, other considerations, such as the erection of cranes and other machinery, must also be taken into account. To guard against the accumulation of water behind the R. W. small holes called 'weeping holes' are made in it. These are, of course, placed near the base.

Reten'tion, a term of Scotch law, denoting the right which one having movable property which he is bound to deliver to another has of withholding delivery until the debt has been paid. Thus, goods sold become the property of the purchaser, but the seller has a right of R. till the price be paid. See HYPOTHEC; Eng. law, LIEN.

Reten'tion of U'rine, in medicine, denotes the want of power to expel the urine from the bladder, and is to be distinguished from *suppression* of urine, a condition in which the urinary bladder is empty. R. of U. is merely a symptom, and as such may depend on various causes, such as mechanical obstructions and functional conditions.

The principal mechanical obstructions are—(1) Stricture of the Urethra (*q. v.*); (2) Enlargement of the prostate gland, especially in old men; (3) Tumours within the urethra; (4) Tumours pressing upon the urethra; (5) Foreign bodies in the urethra, as calculi, fragments of bougies introduced from without, clots of blood, mucus, &c.; and (6) Contraction of the urethra from external injury on the perinæum. R. of U., depending on such cases, can only be removed by surgical operations. The principal functional conditions are—(1) Spasms of the urethra, and (2) Paralysis of the bladder, and the atony which follows over-distension.

R. of U. from organic stricture is always more or less connected with spasm induced by irritation of the stricture; but in *spasmodic retention*, or *spasm of the urethra*, there is no perceptible change in the tissue of the urethra. The chief causes of spasmodic R. of the U. are gonorrhœa, excessive drinking, the use of cantharides or turpentine, prolonged voluntary R. of U., morbid conditions of the urine, and surgical operations about the penis. The obstruction usually occurs at the point where the membranous part of the urethra is surrounded by its muscles, and it may be overcome by the use of the catheter. Sir H. Thompson says that the Tinct. Ferri Perchloridi, in doses of 15 to 20 minims, administered four or six times, at intervals of a quarter of an hour, will relieve the spasm. In very severe cases, a full dose of Tinct. Opii should be given, and the patient should be kept in a hot bath till he is nearly faint; and, in some instances, it may be advantageous to administer anæsthetics. In R. of U. from paralysis, and from the atony which follows over-distension, the treatment consists in relieving the bladder by means of the catheter, and keeping the bladder constantly empty by retaining the catheter in the bladder.

R. of U., in children, is generally caused by impaction of a stone in the urethra, by abscess pressing on the urethra, by tumour of the bladder or urethra, or by a ligature round the penis. In men, stricture is the most common cause; but it may be from spasm, abscess, prostatitis, stone, &c. In the female sex, it is generally due to nervous causes, hysterical retention, or to pressure, as in parturition. See BLADDER, KIDNEY, and URETHRA, DISEASES OF.

Ret'ford, East, a market-town of England, Nottinghamshire, on the right bank of the Idle, a branch of the Trent, 33 miles N.N.E. of Nottingham by the Great Northern Railway. It has a parish church of St. Swithin, recently restored by Mr. Place; a townhall (1867) in Renaissance style, with a Mansard roof, from which rises a clock-tower 100 feet high; and an old

grammar-school (rebuilt 1858). R. sends supplies of butter, poultry, and eggs to Sheffield and other towns of Yorkshire. It has also paper and corn mills, and a trade in corn, malt, &c. Pop. (1871) 3194. The parliamentary borough, which returns two members, had a pop. in 1871 of 49,257.—**West R.**, on the left bank of the Idle, is a modern extension of the older town, with which it communicates by a handsome bridge of five arches.

Bethel, a town in the French department of Ardennes, on the right bank of the Aisne, 23 miles N.N.E. of Rheims by rail. It has manufactures of shawls, merinos, and other woollen fabrics, leather, &c. Pop. (1872) 7086.

Retina. See EYE.

Retirement in the British army is of two kinds, voluntary and compulsory. Officers may voluntarily retire on half-pay after 25 years' service, or on full pay according to a sum annually voted by Parliament. Compulsory retirement is now regulated by the Army Warrant of 1877. After the abolition of purchase promotion became much longer in attainment, as is shown by the following comparison of the average time taken in 1870 and 1875 for an officer to secure a given rank.

	Average time in 1870.	Average time in 1875.
To secure a Captaincy . . .	9 years	15 years 9 months
Majority . . .	18 years 11 months	29 " 3 "
Lt.-colonelcy . . .	23 " 6 "	33 " 6 "

To meet this evil the Warrant was introduced. By it the establishment of general officers was cut down to 200. Colonels were not to be promoted after the age of 55; lieutenant-colonels were to be removed from their regiments on completing 5 years' service without promotion; majors after 7 years' service as majors, or 27 years in all; and captains after 7 years' service as captains, or 20 years' service in all. Lieutenant-colonels were also to retire on full pay on attaining the age of 60, unless their services were specially retained.

In the Navy, the ages of compulsory R., are as follows:—admirals and vice-admirals 65 years, rear-admirals, 60 years, captains 55 years, commanders 50 years, and lieutenants 45 years.

Retort, a vessel of great importance in a chemical laboratory, intended for distilling substances. It may be made of glass, earthenware, or metal. The glass R. is the most common, and consists of a flask-shaped vessel or *receiver*, the neck of which is drawn out in the form of a longer or shorter tube, and is so fixed in direction that it lies horizontal, or is even depressed. The vapour of the liquid which is being distilled is carried along this tube to the condenser (see DISTILLATION). Retorts are frequently provided with a stopper at the top, so that the substance may be introduced without dirtying the tubular neck.

Retreat (Fr. *retraite*), (1) A military operation, either forced or strategical, by which an army retires before an enemy. It is often a movement of much difficulty and delicacy, particularly when following a defeat. In such a case it is necessary that a strong rearguard, able to offer a powerful, if temporary, resistance to the pursuers, should keep the enemy at bay, and cover the main body, while the latter with its artillery and stores falls back upon a fresh position. (2) The R. is the bugle sound followed by the beating of drums (or sound of trumpets in cavalry) which is given in all garrisons at sunset, marking the time when all trumpet and bugle calls and drums must cease, except at tattoo or as alarms, till the Reveille (q. v.) next morning.

Retrenchment, a line of works formed within a fortress, in which the garrison may continue the defence after the fortress has been entered by the enemy.

Retriever, a variety of the Dog (q. v.), valued by sportsmen for its skill in fetching game, and for its general sagacity in the field and in the water. There appear to be two breeds, one formed by crossing the Newfoundland and setter, the other by crossing the water-spaniel and terrier. The former is the larger and more familiar breed. A typical R. attains a height of from 20 to 22 inches. Its body is stoutly built and its limbs strong, the toes being webbed. The fur is black and curly. The brown R. is not considered so pure as the black. In training the R. great care has to be taken to prevent the dog from injuring the game it secures.

Retrograde, the term applied to the motion of a heavenly body when it takes place in a direction contrary to the order of

the signs of the Zodiac. The sun and moon have no retrograde motion; with the planets, however, it is otherwise. To an observer stationed at any fixed point external to a planet's orbit, the planet will appear first to move from right to left, and then from left to right. An observer stationed on the earth is of course moving; but this simply modifies the phenomenon for the inferior planets, and gives rise to the phenomenon in the case of the superior planets. It is purely a question of relative motion, and since the motion of any planet is sometimes direct, sometimes R., it follows that at intermediate times the planet must beat an apparent standstill. It is then said to be *stationary*. See PLANETS.

Retz, Jean François Paul de Gondi, Cardinal de, was born at Montmirail, Seine-et-Marne, October 1614. His father was general of the galleys, and his uncle was Archbishop of Paris. Destined for the Church, in which an early developed aptitude for diplomacy seemed to promise him promotion, he was educated by Vincent de Paul, who had to wink at a good many of his pupil's follies. Up to the age of eighteen the young divine was known only as a successful gallant, though he was small and ill-formed; but in 1632 he published the *Conjuración de Fiesque*, a book which caused Richelieu to remark, '*Voilà un dangereux esprit*.' At twenty he preached before the court, and making a name at the Sorbonne as a theological debater, he was introduced to the notice of Louis XIII., who on his deathbed appointed him coadjutor to his uncle, the Archbishop of Paris. For seven years he was the implacable adversary of Mazarin, to thwart whom he set at defiance the authority of the crown, and obstinately refusing to resign his ecclesiastical position, became the most energetic and unscrupulous of the Frondeurs (see FRONDE). On Mazarin's fall, he was selected as Minister by the Queen-regent, Anne of Austria, and after much plotting, received the cardinal's hat in 1651. Mazarin, on his return to power in the following year, had him imprisoned on a charge of conspiracy, but he escaped to Spain, and thence to Italy. During this exile he worked hard in the cause of Charles II. On the death of his enemy Mazarin (1661) he returned to Paris, but Louis XIV., having declared that he should never regain the archbishopric, he was forced to resign, gaining instead the abbacy of Saint Denis and several other benefices, with leave to retire to Commercy. He then sold his estates and paid off his heavy debts, of which he had once arrogantly said, when reproached with their number, that Caesar, at his age, had six times as many. During his retirement he composed his inimitable *Mémoires*, in which the society he moved in down to 1655 is faithfully portrayed. Than these, even in French literature, there exist no memoirs more perfect in literary grace, or more valuable for historic truth. De R. died at Paris, August 24, 1679. The *Mémoires* were first published in 1717; the best editions are those of Champollion-Figeac (4 vols. 1859), and Feillet and Gourdalt (8 vols. Par. Hachette & Co. 1874-77). See also Léonce Curnier, *Le Cardinal de R. et son Temps* (2 vols. 1862); Topin, *Le Cardinal de R., son Génie et ses Ecrits* (1872); Grazier, *Les Dernières Années du Cardinal de R.* (1876), and Chantelauze, *Le Cardinal de R. et l'Affaire du Chapeau* (2 vols. 8vo, 1878). The last work is the first instalment of an elaborate biography of the coadjutor for which M. Chantelauze has been collecting materials for sixteen years. The correspondence of De R. with the Abbé Charrier, discovered by M. Chantelauze, occupies the second volume, and is followed by letters of Louis XIV., Mazarin, the Comte de Brienne, Scarron, &c., all relating to the negotiations so indefatigably prosecuted at Rome for the purpose of obtaining a cardinal's hat for the coadjutor.

Retzsch, Moritz, a German designer, miniaturist, and etcher, was born at Dresden, 9th December 1779. He studied at the academy of Dresden, where he became a portrait painter, and was made professor of painting in 1824. His reputation as an artist of bold, fertile fancy rests mainly on his outline illustrations of Goethe's *Faust* (26 plates, 1812; enlarged ed. 1834), and of the works of Schiller, Shakespeare, Bürger, Fouqué, &c. He also produced several beautiful designs in Greek mythology, but perhaps the most striking of his original subjects was the 'Chess-Players'—Satan playing with man, whose soul is the stake. R. died at Hoffösnitz, near Dresden, 11th June 1857. A new edition *de luxe* of *R.'s Outlines* was published by Messrs. Sampson Low & Co. in 1875.

Reuchlin, Johann, one of the greatest of the 'Humanists,' and a pioneer of the Reformation in Germany, was born at Pforzheim in Baden, 28th December 1455. After studying

(from 1470, at Freiburg, he became the travelling companion (1473) of Prince Friedrich, son of the Markgraf Karl of Baden-Durlach, with whom he visited Paris in 1473, there making his first acquaintance with Greek. From 1474 he studied and lectured at Basel, where he took his Master's degree in 1477. After this he studied Greek in Paris, law at Orleans (1478) and Poitiers (1479), and had scarcely settled at Tübingen (1481) as an advocate and teacher of Greek when the Graf Eberhard im Bart appointed him his private secretary. In 1482 he attended Eberhard to Rome, and on his return was introduced to the learned circle at the court of Lorenzo de Medici at Florence. At this time he changed his name R. to the Hellenized form *Rapnio* (*ῥαπνιος*, 'reek'). In 1484 R. was made an assessor in the high court at Stuttgart, and from 1485 he also practised as an advocate of the Dominican Order. During a visit to the court of the Emperor Friedrich III. at Linz (1492-93), he learnt Hebrew from Loans, the Emperor's Jewish physician, and was promoted to the rank of a 'Pfalzgraf.' On the death of Eberhard (1496), R. fled for fear of his son to the Chancellor Johann von Dalberg at Heideiberg, and the year after the Elector Philipp appointed him tutor to his sons, with whom he spent a year in Rome (1498-99). After this he settled at Stuttgart, and from 1502 to 1513 represented Philipp at the Swabian 'Bundesgericht' at Tübingen. In 1509 began the famous controversy with Pfefferkorn, a baptized Jew of Köln, who demanded the burning of all Hebrew books save the Bible, and with the aid of the inquisitor Jacob von Hoogstraaten reviled R. in a treatise which they named *Speculum Manuale* or *Handspiegel* (1510). In *Speculum Oculare* or *Augenspiegel* (1511) R. paid them back in their own coin. The enraged Dominicans impudently summoned him before their heresy tribunal, but Leo X. caused the bishops of Speyer and Worms to acquit R. and condemn the Kölner to pay the costs of the controversy. Yet there was no peace for R. till Franz von Sickingen extorted the costs from the Dominicans themselves. Meanwhile R. had been driven from Stuttgart by the Swabian wars (1519), and was teaching Greek and Hebrew at Ingolstadt. Disputes with Eck drove him back to Stuttgart in 1521. Appointed professor of Greek at Tübingen, he died at Stuttgart, 30th June 1522, before entering on office. Notwithstanding his unquestioning obedience and devotion to Mother Church, which led him even to withdraw his favour from his nephew and pupil Melancthon, R. was a mighty worker for the Reformation, not so much through his excellent school-books and editions of classic authors, or even his bold defiance of Scholasticism, as through his being the founder of Hebrew studies within the Church. His system of Greek pronunciation, caught from living Greeks, and, from the prevalence of the long sound of *Gr. ζ*, nicknamed Iotacism, is still called by his name. Many of his works marked an epoch in the studies to which they belong. Such are his *Latin Dictionary* (Basel, 1477) and *Greek Grammar* (*Microphadia*, Orleans, 1478), *De Verbo Mirifico* (Basel 1494), *Progymnasmata Scenica* (1498), *Rudimenta Linguae Hebraicae* (Forzh. 1506), the first worthy Hebrew grammar by a Christian, and *De Arte Cabbalistica* (1516). See Geiger, *Johann R., sein Leben und seine Werke* (Leips. 1871).

Reumont, Alfred von, born at Aachen, August 15, 1808, studied at Bonn and Heidelberg, and, after filling various diplomatic posts at Florence, Constantinople, and the Papal court, was successively Prussian Minister at Florence, Modena, and Parma from 1851 till 1860, when he retired into private life. He has since resided at Bonn and Rome, and in 1876 received the freedom of the city of Florence. R. is author of valuable works on Italian history, *Beiträge zur Italienischen Geschichte* (6 vols. Berl. 1853-57), *Geschichte der Stadt Rom* (3 vols. Berl. 1867-70), *Lorenzo de Medici il Magnifico* (2 vols. Leip. 1874; Eng. trans. 1876), *Geschichte Toscanas seit dem Untergange des Florentinischen Freistaats* (2 vols. Gotha, 1876-77), &c. See his *Biographische Denksblätter, nach Persönlichen Erinnerungen* (Leip. 1878).

Réunion, Ile de la, or Bourbon, an island in the Indian Ocean, belonging to France, and 90 miles W.S.W. of Mauritius. It is elliptical in form, and about 104 miles in circumference, with an area of 950 sq. miles. It is very mountainous, its principal peaks being the Piton de Nieges, 10,000 feet high; Grand Bernard, 9500 feet; Cimandef, 7300 feet; and the Piton de Fournaise, 7200 feet. The last named, which is situated near the S.E. extremity of the island, is an active volcano, its eruptions averaging two annually for ninety years past.

The country around it is, in consequence, so sterile as to be termed the *Pays Brulé* ('burned land'). The coast districts, however, are clothed with a rich and varied vegetation, and yield heavy crops. The streams are numerous, but are mere torrents running in deep ravines. The climate has of late greatly deteriorated, and is now very deadly to Europeans. Hurricanes are frequent, and cause immense damage both to the crops and to vessels on the coast, which is exposed and almost shelterless. The principal crop cultivated is sugar, of which 35,450 tons were exported in the season 1875-76. Next in importance come coffee and vanilla, the exports of which in 1876 amounted to 833,800 lbs. and 55,850 lbs. respectively. The plantations are cultivated by the labour of Indian coolies, of whom there were 45,000 in the island in 1876. The imports during the same year amounted in value to £720,000. R. is perhaps the only place in the world where the trade is almost exclusively in the hands of the French. Even rice is almost always imported in French ships. In 1876 there arrived 204 vessels of 74,014 tons, and cleared 207 of 77,858 tons. R. was discovered in 1545 by the Portuguese navigator Mascarenhas, who gave it his own name. In 1642 it was taken possession of by the French, who in 1654 re-named it Ile de Bourbon. In the Revolution its name was changed to R., and in 1809 to Ile Bonaparte. In 1814 it was again named Bourbon, and kept that designation until 1848, when the name R. was once more adopted. The pop. in 1876 was 180,295, including coolies, negroes, and a sprinkling of Chinese. The capital, St. Denis, has a pop. of 32,050, and the next largest town is St. Pierre, on the S.W. coast, with 30,615 inhabitants. See Drache's *Insel R., eine Geologisch-Petrologische Studie* (Weim. 1877).

Reus (pron. Re-us), a town of Spain, province of Tarragona, about 6 miles inland from its port of Salon, and 8 W.N.W. of Tarragona by rail. It was founded in 1151, and in 1750 a number of Englishmen established its prosperity by introducing various industries. In recent years its cotton-mills had 5000 looms, while there were also manufactures of ribbons, silk, leather, soap, and machinery. In the province were 69 cotton spinning-mills, with 2000 hands and 53,000 spindles, and 179 weaving-mills, with 5000 hands and 2691 looms. Pop. 28,100.

Reuss, the name of two German principalities which occupy part of the ancient Voigtland, and lie W. of the kingdom of Saxony, separated from each other by the circle of Neustadt. Previous to 1616 they formed one principality, but at that date the territory was divided between the elder and younger lines of the house of R., which traces its descent from Heinrich I. (q. v.). —1. **R.-Greiz** is bounded N. and E. by Saxony and Saxe-Weimar, S. by Bavaria, and W. by Saxe-Coburg and Schwarzburg-Rudolstadt. Area, 320 sq. miles; pop. (1875) 46,085. The surface is mountainous and well wooded, while the soil is poor, except in the fertile river-valleys, the chief of which are those of the Saale and Elster. In the towns, woollens, cottons, and silks are manufactured. The capital is Greiz. Most of the territory is the private property of the present sovereign, who has no civil list. By the present constitution, which dates from 1867, the legislative body consists of twelve members, of whom three are nominated by the sovereign, two by the nobility, three elected by the towns, and four by the rural districts. The public revenue and expenditure in 1876 were each £24,494. There is a public debt of £65,475. —2. **R.-Gera**, formerly **R.-Schleis**, is bounded N. by Prussia, S. by Saxony, and E. and W. by different parts of Altenburg. Area, 322 sq. miles; pop. (1875) 92,375. It is in part hilly, and more than one-fourth is covered with wood. The soil is productive though light, and is well watered by the Elster and its affluents. Cottons and woollens are extensively manufactured, especially in Gera, the capital, besides leather, tobacco, and ironwares. The constitution dates from 1849 (modified 1852 and 1856), and provides for a Diet of nineteen members (four elected by the chief landowners), and a cabinet of three to act under the sovereign. The revenue in 1876 was £36,480, and the debt £100,027. The inhabitants of both states are almost entirely Lutherans.

Reuter, Baron Paul Julius, the great organiser of telegraphic news, was born at Cassel in 1818. He was connected with the electric telegraph system from its beginning, and shortly after the opening of the line between Aix-la-Chapelle and Berlin in

1849 he established the first centre for the collection and distribution of telegraphic news in the latter city. He subsequently became a naturalised British subject, and transferred his chief office to London on the laying of the cable between Calais and Dover in 1851. As the telegraphic system extended he increased his staff of agents, till in recent years he has been able to supply newspapers indiscriminately with full, fresh, reliable information from all parts of the world. In 1865 this vast news agency was transferred to a limited liability company, of which R. is still manager. By his negotiation the right was acquired of laying special submarine cables between England and Germany (1866), and between France and the United States (1869). For his public services R. received the title of Baron from the Duke of Coburg-Gotha in 1871. In the following year he was granted by the Shah of Persia the exclusive right, for seventy years, of constructing railways, working mines and forests, and otherwise developing the resources of that country. Baron R. began vigorously to construct the line from Teheran to Resht, but he has been interdicted on account of the threatening aspect of native jealousy and Russian intrigue.

Reutlingen, formerly an imperial free town in Württemberg, situated on the Echatz, an affluent of the Neckar, 9 miles W.N.W. of Tübingen by rail. It contains many picturesque old houses, but its ancient ramparts and fosses have been converted into streets. The finest church is the Marienkirche (1272-1343, restored 1844). R. has an active manufacture of leather, woollens, cottons, lace, knitted wares, cast-iron, and machinery. Pop. (1875) 15,246.

Revalen'ta, and **Ervalen'ta** are preparations of the flour of the lentil, *Ervum lens* (hence *Ervalenta*, and by transposition R.). Du Barry's much-vaunted panacea, *R. Arabica*, is composed, according to Dr. Hassall, of a mixture of the red or Arabian lentil and barley-flour, to which, in one kind sugar, and in another, salt is added.

Reveillè (Fr. *réveil*, 'awakening'), the morning beat of drums or bugle sound in all garrisons, upon which the troops rise. It is sounded in England at 5.30 in summer and 6.30 in winter. After the R., sentries do not challenge till the retreat is sounded at evening.

Revel, or **Reval** (Esthonian *Tallin*, Lithuanian *Dannu-pis*, or *Revalis*), a fortified seaport of Russia, capital of the government of Esthonia, on the Gulf of Finland, 198 miles W. by S. of St. Petersburg. It consists of an upper portion, called the Domberg ('Cathedral Hill'), a circular mass of rock a mile in circumference, with the cathedral, the governor's residence, the Ritterschafshaus ('Senate Hall'), and an old castle; and a lower, with high narrow houses, and six Lutheran and five Russian churches, of which that of St. Nicholas dates from 1317. In 1875 there entered the port of R. 467 vessels of 234,481 tons, and cleared 460 of 221,645 tons. Founded by Valdemar II. of Denmark in 1219, R. soon increased, and entered the Hansa. In 1547 the Danes sold it to the Teutonic Knights, from whom it passed to Sweden (1561), which held it till Peter the Great annexed the province of Esthonia to Russia. Pop. (1870) 27,325.

Revelation means the communication to man by supernatural means of such knowledge as he could not attain to by ordinary means, or of information which the person receiving it at any rate did not possess. It is not to be confounded with inspiration (q. v.), which means a divine influence rendering a person infallible in communicating truth, whether that truth was previously known or not. Rationalists deny (1) that there is any R. in this sense, and (2) that it is possible or (3) necessary. Deists, on the other hand, maintain (1) that it is possible and (2) necessary, and (3) that there is such a R. in the Word of God. See Hodge's *Syst. Theol.* (Edinb. 1873).

Revelation of St. John, the last book of the New Testament, is ascribed in the canon to St. John the Divine. The received opinion is that this was the apostle, the accredited author of the Fourth Gospel, although a doubt on the subject was raised as early as the 3d c. by Dionysius of Alexandria (*apud* *Eccl. Hist.* Luther, Zwinglius, Ecolampadius, and Bucer express the same doubt more decidedly, and many eminent names since—Lücke, Ewald, Neander, Bleek, De Wette, &c.—have held the same opinion. In favour of the apostolic authorship is urged—(1) that the external evidence is as strong as that

for any other book in the New Testament; and (2) the internal evidence—*i.e.*, the ideas regarding Christ, Antichrist, evil spirits, and the last things—are those of apostolic times. And if it be apostolic, no man but St. John could lay claim to the position and privileges which the writer asserts. A difficulty arises from the differences in doctrine, theology, and language between the Revelation and the Fourth Gospel. Accordingly, some critics give the one to St. John; some, the other; some, neither; those who try to give him both find hard work in getting over the difficulties. As to the time and place, the received opinion is that it was written in Patmos under Domitian (81-96) or Nerva (96-98). There is no external evidence further than tradition; but xi. 1-14 is supposed to indicate that Jerusalem was not yet destroyed (70), while xvii. 10 is quoted as proof that it was written during the reign of the sixth emperor, *i.e.*, Galba (68-69). The object of the writer is 'to set forth the immediate coming of Christ, in order to support his followers under calamities already endured and still impending.' See Davidson's *Introd. to the New Test.* (Lond. 1868); Stewart's *Com. on the Apoc.* (1845); Dusterdieck, *Handbuch über der Offenb. Joh.* (Gött. 1865).

Revelgunge', a town in the district of Sarun, Bengal, British India, at the junction of the Gogra with the Ganges, on the left bank of both rivers, 31 miles N.W. of Patna. The old name was Godna; but in 1788 Mr. Revell, Collector of Customs, founded a bazar which has since become the greatest river mart for oil-seeds in India. It is the station where commodities from the N.W. Provinces and Oude are transhipped. In 1876-77 the exports were valued at £471,000, chiefly oil-seeds; the imports at £563,000, including grain, salt, and piece-goods. A great fair and religious gathering is held here twice a year. Pop. (1872) 13,415.

Revel's, Master of the, or **Lord of Misrule**, at the great English houses was a functionary charged with the conduct of the Christmas revels from Allhallow Eve to Candlemas Day. The post was rendered permanent under Henry VIII. at the English court, its holder having the keeping of the properties used in the royal masques and progresses, and it existed down to the close of the 17th c.

Revenue (Fr. *revenu*, from *revenir*, 'to return'), a return of gain or profit. 'The R. from labour,' says Adam Smith, 'is called wages; that derived from stock . . . is called profit.' The term is now most generally used to express the public income of a nation raised by taxes, duties, &c., and applied to the purposes of Government. The ancient public R. of England chiefly accrued from crown lands, which, however, became in the course of time so reduced in extent by alienation to lords of the manor and other causes, that the R. arising from this source, known as 'ordinary R.' has long been inconsiderable, while the 'extraordinary R.' derived from the taxes imposed by Parliament has constituted the great bulk of the R. of the country. The granting of Supply is vested in the House of Commons, and all alterations in the system of taxation are based upon the annual financial statement made by the Chancellor of the Exchequer in the beginning of April, and known as the Budget. Although the ultimate assent of the House of Lords and the crown is required, the taxes imposed by the lower House are levied immediately after the carrying of their resolutions. The public R. is paid into the Bank of England to the credit of the Comptroller-General of the Exchequer, whilst the function of payment of outgoings is vested in the Treasury. The following is the actual R. of the United Kingdom for the year ending 31st March 1878, and the estimated R. for the year ending 31st March 1879:—

	Actual Revenue 1877-78.	Estimated Revenue 1878-79.
Customs	£19,969,000	£19,750,000
Excise	27,464,000	27,500,000
Stamps	10,956,000	10,930,000
Land-Tax	2,670,000	2,660,000
Property-Tax	5,820,000	5,620,000
Post Office	6,150,000	6,200,000
Telegraph Service	1,310,000	1,315,000
Crown Lands	410,000	410,000
Interest, &c.	949,884	1,075,000
Miscellaneous	4,064,475	4,000,000
	£79,763,299	£79,460,000

The actual expenditure for the year ended 31st March 1878 was—

For the Civil Service	£13,983,267
" Army and Navy	30,054,335
" Debt and Consolidated Fund Charges	27,090,757
" Other Charges	7,776,139
	£78,903,495

The most important source of R. from direct taxation is the income-tax, which is also the most liable to alteration on account of financial exigencies. It has undergone twenty alterations from its establishment in its present form in 1842 until 1878 inclusive, the highest rate levied being 16d. in the pound in 1855, and the lowest 2d. in the pound in 1874 and 1875.

The above statement of R. does not by any means represent the total charge levied upon British taxpayers, but only the amount raised for imperial purposes. An immense R. is raised by local taxation and other sources to provide for expenditure connected with the relief of the poor, the county and borough police, roads and bridges, the draining and lighting of towns. The following is the amount raised in this manner in Great Britain and Ireland in the year ending 31st March 1874, according to the best estimates obtainable:—

	Receipts from Taxes.	From Loans.	Total Local Revenue.
England and Wales	£23,397,029	£8,201,499	£31,598,528
Scotland (partly estimated)	2,372,557	149,494	3,522,051
Ireland	2,995,009	129,493	3,124,502
	£29,265,595	£8,480,486	£37,746,081

In the same year the total amount of taxes received at the Exchequer, and levied locally, amounted to £2, 18s. 11d. per head of the population of the United Kingdom.

Undernoted is given a table showing the R. of the leading states in the world in various recent years:—

Austro-Hungary, 1877	£59,497,730
Belgium, 1877	10,161,830
Brazil, 1872-73	11,213,110
British India, 1876	51,310,063
Canada, 1876	8,615,618
China (average Imperial Revenue estimated at)	25,000,000
Denmark, 1877-78	2,734,189
France, 1877	106,885,620
German Empire (for Imperial purposes) estimated, 1878	27,000,000
Prussia, 1878 (estimated)	32,531,920
Bavaria, 1875	10,002,593
Greece, 1877	1,401,673
Italy, 1877	59,564,396
Japan, 1874	9,750,000
Mexico, 1875	3,741,407
Netherlands, 1876	8,642,556
Portugal, 1876-77	5,346,661
Russia, 1877	81,539,714
Spain, 1878 (estimated)	29,433,000
Sweden, 1878	4,782,773
Switzerland, 1876	1,659,496
Turkey, 1875-76	19,106,352
United States, 1878 (estimated)	\$270,050,000

The Actual R. drawn by a country is no criterion of its wealth or of the tax-bearing strain it is able to bear. Thus France is probably no richer than it was a few years ago, although its enormously increased expenditure on account of the war with Germany and the interest on its augmented debt (which has been hitherto met principally by the imposition of indirect taxes) has caused a corresponding increase in its R. It is believed that the R. of Great Britain is capable of greater expansion than that of any other country.

Reverberatory Furnace is a form of furnace in most extensive use in metallurgical and in many other chemical operations. The construction of a R. F. varies considerably for different purposes, but in principle it consists of a device for throwing heat downward on the material to be operated on. The R. F. consists of a low arched vault, on the bed of which the metal or other substance is laid. The fire-box is at one end of the furnace, partially separated by a fire-bridge, over which and along the vaulted roof the flame freely plays, reverberating the heat downwards. The R. F. gives free access of air to the material, and is thus employed for oxidising impurities in metals and other similar purposes.

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Reverend (Lat. 'venerable') is a title of respect applied to the clergy: the bare R. to ordinary clergymen, Very R. to deans (in Scotland to the Moderator of the General Assembly, and clerical Principals of Universities), Right R. to bishops, and Most R. to archbishops. After the Reformation the Puritans objected to the title being applied to any man, as belonging to God only; and at one time Dissenting ministers repudiated it, but it is now adopted, at least in the principal sects.

Reverse, in numismatics, that side of a coin or medal opposed to the face or *obverse* side, on which is impressed the principal device. The value of a coin is usually indicated on the R.

Reversion is a right to property, to emerge after the ending of an interest in it held by another. If A is to enjoy the profits of an estate during his life, and on his death the estate or the life interest in it, is to go to B, then B's interest is a R.

Revetment, in fortification, is a wall of solid masonry intended to retain the earth of which the works are composed. Revetments usually form the escarp and counterscarp of the ditch. See FORTIFICATION.

Review, an inspection of military or naval forces by a distinguished personage or high officer, which may be accompanied by manoeuvres and evolutions. A review of troops usually consists of a quick march past in columns, sometimes followed by a sham fight.

Revising Barrister, is a legal functionary whose duties are to revise the lists of persons claiming to vote for members of Parliament, and to adjudicate upon these. An appeal from his decision may be made to the Common Pleas division. The appointment is in theory annual, but the same person is invariably reappointed. The R. B. must have been at least three years at the bar. His duties are, in Scotland, embraced in those of the Sheriff-Substitute.

Revival, like Revolution, is one of those vague terms loosely applied to widely different movements. As one may rouse a sluggard whose house is on fire in time for him to quench the flames, or disturb an honest craftsman from his labour by false alarms, so the times of awakening known as 'Revivals' must be judged first by the message they proclaim, still more by their results. Far stronger testimony to the work of Pentecost than the recorded conversion of 3000 souls, or even than St. Peter's great discourse, is the continuance of the work down to this very day, in the steady evangelisation of the entire world. Excitement was never greater than when at the Council of Clermont the Hermit's wild harangue was interrupted by the shout, 'God wills it!' That God did *not* will it was shown by the whitening bones of those who had raised the cry. And so every religious movement, whether set agoing by a Dominic, a Luther, a Xavier, or a Wesley, may be known by its fruits; among the rest, the Revivals of modern times. Christians of almost every creed will grant that there is nothing in the apostolic ministry needing defence; of Revivals their warmest upholders have constantly to speak in an apologetic tone. Thus the narrative of the first important movement of the kind, the New Jersey R., under Mr. Tennent (1730), couples 'much that was objectionable' with 'the characteristics of true conversion'; and in Jonathan Edwards' R. (1735-41) the 'outward reformation in the lives of more than 43,000 persons' is attended by 'manifestations' such as 'convulsions, nervous prostration, and abiding terrors.' Similarly the rise of Wesleyan Methodism in England was characterised by 'persons quaking and trembling as in ague, torn by dreadful torments, which left them weak as infants, falling to the ground as if struck by lightning, and lying in a state of insensibility, or howling and roaring in agony; all this, be it observed, after conversion (*cf.* Luke viii. 35). Wesley himself, says Southey, lost faith in these paroxysms, and by ceasing to encourage them, caused their cessation. Again, in the Cambuslang R. of 1742 men and women 'were smitten by scores, and carried off into the neighbouring houses like wounded soldiers from a field of battle; . . . people of both sexes, from the stoutest man to the tenderest child, shake and tremble, and a few fall down as dead.' In the next hundred years we can only glance at the Truro R. of Walker (1758), that of Venn at Huddersfield (1759), a third and more extensive one under Berdridge's ministry in the Eastern counties (1760), and the singular R. in the Western States (1804), in which were developed the

'falling,' the 'jerking,' and the 'whirling exercise'—extravagances perpetuated by the Shakers, Marshallites, and kindred sects. The American R. of 1858, at New York, Philadelphia, and other cities, was happily distinguished by an absence of all physical manifestations; the ministers, schooled in the annals of former undisciplined enthusiasm, 'uttered simple statements of Gospel truth, and avoided all appeals to the emotions;' and the solid results were 'the reception into the communion of the churches of some 500,000 persons.' Not so with the corresponding movement in the N. of Ireland (1858-61), when a leading revivalist could thus describe a case 'exceeding in beauty and abundance of grace' all that he had yet witnessed in the 600 cases he had seen: 'I was called to see Jane; it had taken four men to hold her, and her shrieks were awful; she had been insensible for hours,' &c. What wonder that mills were closed in consequence of the number of 'stricken' operatives; what compensation for such facts as these the statement that 'a considerable number of Romanists renounced their errors, that Sabbath desecration, cockfighting, brawling, and the like are now nearly unknown in several districts, while the constabulary force was in some places almost a sinecure.' Yet, though the Irish population has steadily dwindled from 6,574,278 in 1851 to 5,402,759 in 1871, there were 4,490,583 Romanists in 1861 and 4,191,933 in 1871, and criminal convictions actually rose from 3350 (1858) to 3798 (1862), the number of lunatics from 11,218 (1858) to 17,193 (1870), and of police—whether their duties are a sinecure or no—from 12,346 (1852) to 14,007 (1870). One good at least the Irish R. did: it served for warning to the American revivalists of 1874, Messrs. Moody (q. v.) and Sankey. Whether 'raciness, pithiness, and humour' were meant to supersede Christ's Sermon on the Mount or St. Paul's at Athens, whether it is wise that 'quite little children' should publicly express themselves as 'deeply exercised by the Spirit,' or how far it is needful that 'Old Formality have his neck broken'—these may be matters of opinion; but that the first outburst of howling was met by the howler's prompt ejection can only be matter for unmixed satisfaction. See *Præcis iön hagiön Apostolön*; Lives of Edwards and Wesley; Dr. G. Salmon's *Evidences of the Work of the Holy Spirit* (Dubl. 1859); and *Narrative of the Awakening* (Lond. 1874).

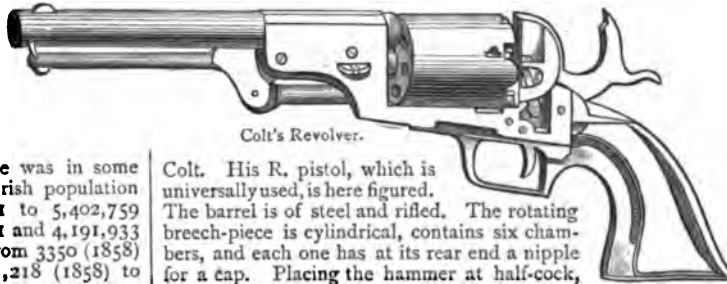
Revoca'tion is a law-term denoting the act of annulling a deed. Many kinds of deeds are irrevocable if delivered. (See DELIVERY OF A DEED.) A will is always revocable; and it may be revoked by implication, as by *marriage*. See also CANCELLING and WILL.

Revolu'tion (Late Lat. *revolutio*, from *revolvere*), in politics, a sudden and violent change of government, mainly brought about by internal causes. A change brought about by external causes is generally of the nature of a *conquest*, while a gradual and pacific internal change is a *reform*. It is only in comparatively modern times that the word has been used in the present sense, but ancient history abounds in revolutions, such as, for instance, the expulsion of the Pisistratids from Athens (B.C. 510), or the overthrow of the Roman Republic by Julius Cæsar (B.C. 47). The first great R. of modern history is the English R., extending through various phases, from about 1642 to 1688, but usually confined, in common parlance, to the convulsion by which James II. was driven from the throne in 1688. The Great R. *par excellence* is the French R. of 1789-94. There have been other revolutions in France in 1830, 1848, 1851, 1870, and 1871. The American War of Independence (1775) is often called a R.; and revolutions have been very frequent in Mexico and the Spanish states of S. America. In Italy the R. of 1859-60 expelled the small potentates, and placed the whole country except the Papal and Venetian territory in the hands of Victor Emmanuel. Among other notable revolutions have been those of Sweden (1772 and 1809), Spain (1820 and 1868), and Hungary (1848). The famous Revolt of the Netherlands, which began in 1566, partook of the nature of a R., and there have been revolutions in Holland in 1795 and 1813. The reaction from a R. often brings about what is called a Counter-R.

Revolutionary Tribunal. See REIGN OF TERROR.

Revolver, a firearm having a revolving breech-piece or barrel so as to discharge several shots in succession without the

need for reloading. The revolving system is not a modern novelty, for it was in use in Germany as early as the end of the 15th c. A 16th c. matchlock, with a rotating breech-piece containing four chambers, is exhibited in the Tower armoury of London, and a revolving arquebus with seven barrels is preserved in the museum at Sigmaringen. The system was revived early in this century and has since been brought to great perfection. Although some weapons have a plurality of bores in the barrel which itself revolves, the plan of having a revolving breech cylinder with a number of chambers which are successively brought opposite a single barrel is more convenient and practicable. The first R. adapted to modern requirements was invented in 1835, and perfected ten years later by the late Colonel



Colt's Revolver.

Colt. His R. pistol, which is universally used, is here figured. The barrel is of steel and rifled. The rotating breech-piece is cylindrical, contains six chambers, and each one has at its rear end a nipple for a cap. Placing the hammer at half-cock, the chambers are loaded from the front of the breech-piece, which is now turned by the hand, and the charges are driven home by a lever ramrod placed in a socket beneath the barrel. The breech-piece rotates on a pin or spindle secured at one end to the lock-frame and at the other to the bracket piece united to the barrel. On the rear face of the breech-piece is cut a ratchet with six teeth, and a pawl connected with the hammer, engaging the teeth in succession, turns the breech-piece. When the hammer is at full-cock, one of the loaded chambers is directly in a line with the barrel, and the rotating cylinder is temporarily held in that position by a small bolt entering a slot (six slots being cut on the periphery of the cylinder) on the under side. The weapon may then be fired by pulling the trigger. The raising again of the hammer with the thumb serves to withdraw the bolt, releases the cylinder, and causes the pawl to turn it one-sixth of a revolution; this movement brings the next chamber opposite the barrel, and immediately the bolt falls into the next slot and locks the cylinder. Colt's revolving mechanism has also been applied to muskets and rifles. Several other revolvers have been introduced, and some of recent Continental manufacture are adapted for self-igniting cartridges, an improvement upon Colt's nipple and cap that is worthy of mention. Adams' R. pistol with a metallic central-fire cartridge has been adopted for the British cavalry and navy. The revolving principle has been successfully adapted to several varieties of battery guns, that invented by Gatling having the widest reputation. See MITRAILLEUSE.

Revolving Furnace. Furnaces to which a motion of rotation is communicated have been introduced with marked success in some chemical manufactures, and a measure of success has also attended the introduction of a rotary furnace in the laborious operation of Puddling (q. v.) in the malleable iron manufacture. The most successful R. F. is that used in the calcination of soda salts in the process termed 'carbonating' (see SODIUM). Among the various forms proposed, that devised and patented by Mr. James Mactear (of Charles Tennant & Co., St Rollox, Glasgow), is the best and most practical. The rotation of the furnace keeps the charge it contains in constant motion, exposes it uniformly to the heat, and saves a great amount of disagreeable manual labour. The soda ash produced is not only made at much less cost, but it is also of finer quality than that made in a reverberatory furnace. The apparatus is applicable to many chemical processes in which reverberatory furnaces are at present used. Of R. F. employed in the iron manufacture, that invented by the American, Danks, for mechanical puddling has met with much attention, and Dr. C. W. Siemens' rotary furnace for making malleable iron direct from the ore is an invention which may yet be productive of great changes in the iron manufacture.

Revulsion is a term used in medicine synonymous with Derivation (q. v.). See also COUNTER-IRRITATION.

Rewá Kantá Agency, a collection of native States in Gujerat, India, in political connection with the government of Bombay: area, 4879 sq. miles: pop. (1872) 487,647, who chiefly belong to the wild tribes of Bheels and Mewassis. There are six larger states, of which the chief is Rajpeepla; and fifty-six smaller chiefships; most are tributary to the Gaekwar of Baroda, and all levy transit dues. In 1842 a Court of Criminal Justice was established, presided over by the Political Agent, and in 1874 a police force was organised.

Rewah or **Baghelcund** ('country of tiger cubs'), the capital of a native state of the same name in Central India, 69 miles S.W. of Allahabad. It was founded about 1620, and is strongly walled, with a fortified palace, but all is now ruinous.—The State of R., which is the first in the Baghelcund Agency, lies between the N.W. and the Central Provinces: area, 13,000 sq. miles; pop. about 2,035,000; revenue, £250,000, of which £150,000 is alienated in feudal and religious grants. The country is mostly a plateau among the Kymur hills, and is rich in minerals and jungle produce. The administration is backward, and there is a debt of £70,000. The present chief, who is a Rajput of the Baghel clan, traces back his family for 1200 years. For his services in the Mutiny of 1857 he was presented with an addition of territory which forms the watershed of Central India, containing the sources of the Nerbudda, the Sone, and the Mahanuddi Rivers. In 1875 the Rajah requested that the administration should be directly undertaken by the British Political Agent, and this step has been adopted.

Rewards, Legal. The law courts of England are empowered by Act of Parliament pecuniarily to reward those who have been active in apprehending persons charged with crime of a certain gravity. Any one taking a reward for helping in the restoration of stolen or embezzled goods or money to the owner is guilty of felony.

Rewards for Distinguished Services, in the British army, are annuities granted to officers of the higher grades who have distinguished themselves in the field, or have done good service to the state. The rewards, usually £100 per annum, cease on a receiver's succession to the colonelcy of a regiment, or in the Indian army when his emoluments otherwise amount to £1000 a year. Annuities of from £10 to £20 are granted to meritorious non-commissioned officers. See PENSIONERS.

Rewári, the chief town in the district of Gurgaon, Punjab, British India, 50 miles S.W. of Delhi. Pop. (1868) 24,503. It is a station on the newly opened Rajputana State Railway. In 1873-74, exclusive of the railway traffic, the imports were valued at £108,000, the exports at £22,000.

Reyk'javik ('the reeky bay,' from the warm springs near), the capital of Iceland (q. v.), and seat of the Althing, lies on the S.W. coast, on the S. shore of the Kollafjord. It consists of about 100 wooden houses, regularly built in a barren, treeless district, usually enveloped in mist. It is a bishop's see, and has a brick cathedral (*Domkirkja*), containing a library (8000 vols.) founded by Rafn; a 'Latin school'; a theological college; a printing press; and a bronze statue of Thorvaldsen (1875). The mean temperature of R. (40° F.) is but 1° F. less than that of St. John, 16° lat. further S. Pop. (1870) 2024, chiefly merchants, peasants, and fishermen. 27 miles E. of R. is *Skalholt*, once a bishop's see; 28 N. is *Reykholt*, the residence of Snorri Sturluson; and 18 N.E. *Thingvellir*, where in former times the Althing met under the open sky. See Burton, *Ultima Thule, or a Summer in Iceland* (2 vols. Lond. 1875).

Reynard the Fox, the great beast-epic of the Middle Ages, that 'World Saturnalia,' as Carlyle terms it, 'where wolves tonsured into monks, and nigh starved by short commons, foxes pilgriming to Rome for absolution, cocks pleading at the judgment-bar, make strange mummery.' Such mummery, in fact, as pleases the infancy of nations, Kafirs and Finns alike, originally mirth-provoking only, afterwards with the nation's growth applied to didactic purposes. The hero of the most ancient version is Isengrim, the wolf, nor till cunning had come to be more admired than strength did Reynard usurp his place. France, Germany, and Holland all claim to be the story's birth-place; that it was ever born, in the sense of being the product of a single mind, may safely be denied. Grimm's theory of its

transmission westward by invading Franks is at first sight neither confirmed nor overthrown by an analysis of names, Reynard (O. H. Ger. *regin-hart*, 'thought-strong') and Isengrim (O. H. Ger. *isan-grim*, 'iron-rough') being as plainly of Teutonic as Chan-tecler and Malpertuis are of Romanic origin. Malpertuis, however, may just as well be a rendering of Uebelloch as Uebelloch of Malpertuis, and the fact that *renard* has wholly superseded *goupil* (Lat. *vulpes*) in French, certainly points to a Teutonic source. The earliest existing version is the *Isengrinus* (ed. by Mone, Stuttg. 1832), a fragment of 688 lines, succeeded by the *Reinardus Vulpes* (ed. by Knorr, Eutin, 1860), an elegiac poem of 6596 lines, both probably the work of Flemish ecclesiastics in the 12th c. On one or other of these was founded the Middle-High-German *Isengrimes Nbt* of the Alsatian minnesinger, Heinrich der Glichesäre (i.e., 'feigner,' or 'one who conceals his name'), and also the Flemish *Reinaert* of Willem van Utenhoven, the former of which has been edited by J. Grimm (Berl. 1834), the latter by Jonckbloet (Gron. 1856), and in its subsequent redacted form by Martin (Paderb. 1874). Willem's poem was the parent of the Dutch prose chap-book (Gouda, 1479), from which Caron made his English translation (1481), and also of the *Reineke Vos* (Lüb. 1498), a free reproduction, in Low German verse, most probably composed by Hermann Barkhusen, a Rostock printer. This *Reineke Vos*, a unique copy of whose first edition exists in the Wolfenbüttel Library, has been repeatedly edited, most recently by Lübben (Olden. 1867) and Schröder (Leips. 1872). It speedily attained a popularity far exceeding that of any of its predecessors, running through countless editions; it was introduced to the High-German world through Beuther's translation (Frankf. 1544), and to the world at large through the Latin rendering of Schopper (Frankf. 1567); and in more recent times it has been popularised in Goethe's hexameters (Berl. 1794; Eng. trans. by T. J. Arnold, 1855), and Kaulbach's illustrations (Mun. 1847). The French *Roman de Renart* consists of two separate portions, the former belonging to the 12th or 13th, the latter to the 14th c. Though far inferior in vigour to its Teutonic analogue, it enjoyed considerable fame, and like it was the source of many quaint old chapbooks, *Le Livre de Maître R. et de Dame Hersant* (Par. n. d.), *Le Docteur en Malice, Maître R.* (Rou. 1550), &c. See the Introductions to the various editions cited above; an essay on *Early German Literature* in Carlyle's *Miscellanies*; A. Rothe, *Les Romans du Renart examinés, analysés, et comparés* (Par. 1845); and W. Jonckbloet, *Étude sur le Renart* (1863).

Reynolds, John, D.D., born at Pinho in Devonshire in 1549, studied at Merton College, Oxford. In 1563 he was made Fellow of Corpus Christi, where he lectured on Aristotle, till 1586, when he was elected reader of the theological lecture founded by Sir Francis Walsingham. In 1593 he became Dean of Lincoln, but resigned this office and refused a bishopric on being chosen President of Corpus Christi. He was the leader of the Puritan party, and was profoundly read in Hebrew and theology. At the Hampton Court conferences of 1603, he suggested and strongly urged that a new translation of the Bible should be made, a work in which he took a prominent part, the weekly meetings of the translators being held at his chambers. He died at Oxford in 1607. Besides sermons, controversial treatises, academical discourses, &c., he wrote an elaborate work against the reception of the Apocrypha into the Old Testament Canon, *Censura Librorum Apocryphorum Veteris Testamenti* (Oppenheim, 2 vols. 1611).

Reynolds, Sir Joshua, the prince of English portrait-painters, was born at Plympton, of an old Devonshire family, 16th July 1723. His father, the rector of Plympton St. Mary, intended that he should enter the medical profession; but an ardent love of art, confirmed by study of the *Jacobs' Perspective* and Richardson's *Treatise on Painting*, upset this plan, and the youth was placed in Hudson's studio in 1741. In 1743 he disagreed with his master, and set up as a portrait-painter in Plymouth Dock, since called Devonport, where his talents attracted the notice of Captain (afterwards Admiral Lord) Keppel, and Lord Mount Edgcombe. Three years later he went to London, and in 1749 he accompanied Captain Keppel to the Mediterranean, and after spending two months in Minorca proceeded by way of Leghorn to Rome. With singular candour he has recorded his mortification at not being at once enraptured by the works of Raphael; and with equal docility he devoted himself to

assiduous and sympathetic study of Italian art, though not, he tells us, as a mere imitator. 'With Dutch painting and Dutch china for the (then) prevailing types of art,' says Ruskin, 'he threw himself at the feet of the great masters of Italy, and arose from their feet to share their throne.' While studying in the Vatican he caught a cold which gave rise to a life-long deafness. Visiting the other art capitals of Italy, he was influenced, at once more directly and durably, by the glories of Venetian colour than by Roman grandeur and dignity. After a short stay at Paris he returned to Plymouth (1752), and settling in London, produced the Rembrandtesque portrait of Marchi, his Italian assistant, which authoritatively announced the advent of a powerful and original genius. A full-length portrait of Admiral Keppel ratified his reputation, and henceforth his career was an uninterrupted and almost unparalleled success. The long list of his sitters comprises the most famous men and the fairest women of the Georgian age. The envious and cynical, unable to deny the great merit of the painter, attempted to decry his artistic department, and their insidious attacks drew from Dr. Johnson, the warm friend of R., a defence of portrait-painting in the *Idler*. R. was animated by a loftier opinion of portraiture than his advocate, and was enabled by an intense and cultivated gift of insight into nature, coupled with great technical dexterity and resource, to express with even finer subtlety than either Titian or Vandyck the various shades of character and mood, the 'stamp of the soul upon the flesh.' It is urged that R. was governed by ideals of dignity, breeding, and sweetness, to which he made all sitters in a general way conform, but in his tendency to generalise, to grasp the broadly permanent, he never fails to catch every essential characteristic. His unerring truth and consequent variety is shown strikingly in his portraits of women and children, where each has its distinctive loveliness, each its peculiar grace. It was impossible for R. to paint any portrait prosaically, and in the treatment of children he discovered a poetic realm of which, in earlier art, we have occasional glimpses and guesses. The rosy brood, innocently wild or comically wise, almost grow in beauty as they are transferred with loving skill from nature into art by the childless painter. Besides those portraits—*e.g.*, Mrs. Billington as St. Cecilia, and Mrs. Siddons as the Tragic Muse—in which he adopted an allegorical setting, R. painted the 'Infant Hercules strangling the Serpents in the Cradle' for the Empress Catherine, designs for the window of New College Chapel, Oxford, and three works for Boydell's Shakespeare. Like Gainsborough, he was more a colourist than a delineator, and his colours are generally in glowing, golden keys. Chiaroscuro he drew from Rembrandt, colour and tone from the Venetians, and somewhat of all three qualities from Correggio. To his tolerant urbanity may be ascribed his uniform excellence. On the foundation of the Royal Academy in 1768, R. was chosen president, and received the honour of knighthood with the office. As president he delivered his celebrated Discourses, which are now published together with his notes on Dutch and Flemish art, his three contributions to the *Idler*, &c. After a painful illness he died, 23d February 1792. In an eloquent *éloge* Burke calls his old friend 'the first Englishman who added the praise of the elegant arts to the other glories of his country.' The number of his pictures is estimated by Tom Taylor at nearly 3000, and of these some 700 have been reproduced by the best engravers, including W. Sharp, R. Earlom, W. Doughty, Raphael Smith, W. S. Reynolds, and Samuel Cousins. See besides the monographs of Cunningham and Cotton, the biographies by Northcote (1813), Farington (1819), and C. R. Leslie completed by Tom Taylor (2 vols. 1865); also Stephen's *English Children as Painted by R.* (1866), Sydney Colvin's *English Art under George III.* in the *Fortnightly Review* of March 1, 1874, Dr. Hamilton's *Catalogue Raisonné* (1875), and the vol. upon R. in the American series of *Artist-Biographies*, edited by M. F. Sweetser (Boston, 1878).

Rhadamanthus. See MINOS.

Rhaetic Beds form the uppermost strata of the Trias formations, and consist of dark shales resting upon white limestone. Formerly they were referred to the Lias, and were included under the name of the *White Lias*. The fossil fishes strongly resemble undoubted Triassic forms; and the reptiles are Jurassic. There are no ammonites or belemnites, but the shell of *Avicula contorta* is very characteristic, whence the old name, *Avicula Contorta Zone*. The present name is derived from the Rhaetian Alps,

where the beds are well developed. They are also well represented in England and Germany.

Rhamnaeae or **Rhamneae**, is a natural order of erect or climbing trees or shrubs, often spiny, with simple leaves usually alternate, and small flowers sometimes unisexual. The order contains 37 genera, embracing about 450 species, and is represented in most countries of the world excepting the arctic zone. The maximum of species occurs through the hottest parts of the United States, the S. of Europe, the N. of Africa, Persia, and India in the northern hemisphere, and the Cape of Good Hope and Australia in the southern. The berries of various species are violent purgatives; they also yield a dye varying in tint from yellow to green. The fruit of *Zizyphus*, on the other hand, is wholesome and pleasant to eat. See BUCKTHORN, FRENCH BERRIES, JUJUBE, LOTUS, RED-ROOT, SANDAL-WOOD.

Rhapsodists (Gr. *rhapsodos*, from *rhapto*, 'I stitch together,' and *odē*, 'a song,') were the wandering minstrels of Greece who sang the Homeric poems. They were of particular importance before these poems were committed to writing. It is said that they were clothed in red while singing the *Iliad*, and in blue when singing the *Odyssey*. See Grote's *History of Greece*, vol. ii.

Rhea's, according to Hesiod, was the daughter of Uranus and Gæa, and wife of Kronos, by whom she bore Hestia, Demeter, Hera, Hades, and Poseidon, all of whom her husband swallowed. Shortly before the birth of Zeus she repaired to her parents, who sent her to the Cretan Lyctus, where Zeus, like Krishna and Mithras, was born in a cave called by Apollodorus the cave of Dictæ, and entrusted to the Idæan Dactyli. The Indian story of Devaki and Kamsa is similar to this. R. corresponded to the Ops of the Romans, the wife of Saturn and mother of Jupiter. Her worship extended E. to the Euphrates, and even to Bactriana, her common designations among the Greeks being 'the great mother,' 'the mother of the gods,' 'the great Idæan mother of the gods,' Cybele, Dindymene, Berecynthia, &c. 'Throughout R. remained a name and a power, worshipped as the great reproductive force of the world, as producing life through death, and thus as honoured by the sacrifice of the reproductive power in her ministers.' See Cox, *Aryan Mythology*.

Rheea's, or **Rameh Fibre**, is the inner bark of the young shoots of *Boehmeria nivea*, a plant of the nettle tribe, indigenous and cultivated in China, Japan, and the Indian Archipelago, also in Assam and various parts of India. It has lately been introduced into Réunion, Guadeloupe, and other French settlements. R. F. is one of the best fibres produced by the vegetable kingdom, being soft, fine, with a beautiful silky gloss, and at the same time exceedingly strong. The exquisite textures known as China-grass cloth are made of it. It was brought to European notice at the beginning of this century, contemporaneously with jute, but the reason why the consumption remains on such a limited scale, whilst that of jute has risen to such importance, is that the rheea is difficult to prepare, and that for growth the plant requires rich soil and continuous moisture. The government of India are at present (1878) offering a prize of 50,000 rupees for the best process of separating the R. F.

Rheims, or **Reims**, one of the oldest and most interesting towns of France, department of Marne, on the Vesle and the canal of the Aisne-à-la-Marne, 107 miles E.N.E. of Paris by rail. It is delightfully situated amid vine-clad hills, and its fortifications have been partly converted into beautiful promenades. There are many interesting buildings, but by far the most famous is the cathedral of Notre-Dame, one of the richest Gothic structures in France. It is built of the chalk-stone of the district, and dates from 1212-41, although its magnificent western façade, and its towers, 292 feet high, were not finished till 1430. The façade, nobly proportioned and royally ornate, may be said to be populous with statues, of which there are upwards of 160, comprising 42 figures of kings from Hlodwig to Charles VI. The building is 466 feet long by 99 broad, while the height of the transept is 144 feet. It has a grand rose window, several rare Italian pictures, fine bas-reliefs (especially on the Cénotaphe of Jovinus), an exquisite font, and a celebrated organ of 53 registers. In 1876 the minister of public works authorised the expenditure on the restoration of the cathedral of £80,000. Other notable buildings are the church of Saint-Rémy, 'the mickle minster of R.' (Freeman), a Romanesque

structure of the 11th c., 'where the ambassadors of England met Pope and Cæsar at its hallowing' (Freeman), the Hôtel de Ville of the 17th c. with its elegant campanile, the archiepiscopal palace, which has a beautiful Gothic chapel, and the Gothic Hôtel-Dieu. The university founded in 1547 was abolished in 1793. R. is a centre of the woollen industry, and the wine trade, manufacturing Champagne to the yearly value of 65,000,000 francs; machinery, cottons, silks, mixed fabric known as *articles de Reims*, soap, &c. Pop. (1876) 81,328. R. was called *Durocororum* in Cæsar's time, and was the capital of the Remi (*Civitas Remorum*), from whom it subsequently took its name. The town and neighbourhood are still rich in Roman remains. At R. the Bishop Nicasius suffered martyrdom in 406, and Hlodwig was baptized by St. Remy in 496. R. was made the seat of an archbishop in the 8th c., and from the 12th c. down to the time of Charles X. the kings of France were crowned here. Napoleon gained a victory over the Russians under Saint-Priest at R., 13th March 1814. During the Franco-Prussian War (1870) it was for some time the headquarters of the Germans. See Justinus (Baron J. Taylor), *R., la Ville des Sacres* (1860), and Marguet and Dauphinet, *Treſor de la Cathédrale de R.* (Par. 1867).

Rhein'gau, the principal district for the production of fine Rhine wines, in the Prussian province of Hessen-Nassau, extends along the right bank of the Rhine, and is protected on the N. by the Rheingaugebirge, an offset of the Taunus. It is 15 miles long and 6 broad, and includes Erbach, Rüdesheim, and Johannisberg. The finest wine is produced in the vineyards of the Schloss Johannisberg, only 40 acres in extent, while Hockheim, on the Main, also yields a superior quality which has given the name of 'Hock' to the wine of the country generally.

Rhein-Hessen. See HESSEN-DARMSTADT.

Rheinpreuss'en, or **Rhein'land**, the most westerly province of Prussia, bounded N. by the Netherlands, E. by Westfalen, Hessen-Nassau, and by Rhein-Hessen, S. by Rheinbayern and Elsass-Lothringen, W. by Luxembourg, Belgium, and the Netherlands. Area, 10,366 sq. miles; pop. (1878) 3,807,120. The N. part of R. is flat; the S., as far as Bonn, hilly, but nowhere reaching 3000 feet. The Rhine flows through R. in a N.N.W. direction for a length of 198 miles (its windings included), receiving from the right the Sieg, Wipper, Ruhr, and Lippe; and from the left the Nahe, Moselle, Ahr, and Erit. 31 per cent. of the surface is forest, and 14 per cent. waste land. The rest is fertile and well cultivated. In 1873 there were in R. 134,256 horses. Vineyards abound on the Moselle, Rhine, and Ahr. R. has rich mines of iron, coal, lead, and zinc. The industries include the manufacture of iron, steel, and brass goods, paper, leather, chemicals, porcelains, cottons, and silks. Of the population of R., 70 per cent. are Catholics, 20 per cent. Protestants. There are also 60,000 Jews and 4000 Mennonites.

Rhesus Monkey (*Macacus rhesus*), a *Catarrhine* or Old World monkey, also known as the Bhunder monkey, inhabiting E. Asia. The fur shows greenish tints, washed with warm chestnut hues. The body is stout and the tail short. The ears are prominent, and the natal callosities (or bare hip-patches) are very conspicuous. The R. M., which is held sacred in India, herds in large troops in the forests, and makes great devastation of the grain crops.

Rhet'oric (Gr. *rhētorikē technē*, 'the rhetorical art,' from *rhētōr*, 'an orator') is the art of prose composition. Aristotle's definition of it as the art of persuading, when applied to written as well as spoken discourses, is still sufficient to embrace the various parts of R. Aristotle's divisions of it were three:—Persuasion (*πίστις*), Expression (*λέξις*), and Arrangement (*τάξις*). The R. of Aristotle is still the standard work on the subject; Cicero, and later, Quintilian, devoted considerable pains to its elucidation, and in modern times Blair and Whately have been as successful as any others in treating it systematically.

Rheum'atism (Gr. *rheuma*, 'a flux,' from *rheō*, 'I flow') is a disease arising from some disordered or abnormal condition of the blood, the most marked characteristic of which is its predisposition for the white fibrous tissue which enters into the composition of sheaths, fascia, fibro-serous membranes and ligaments, and thus, in particular, affecting the joints. The heart and its membranes are often implicated. The late Dr. Prout first pointed out that the blood, in cases of R., contained a superabundance of lactic acid, and he considered this acid to be the actual *materies*

morbi of the disease. Dr. Richardson found that, by the injection of 7 drachms of lactic acid to 2 ounces of water into the peritoneum of a cat, endocardial inflammation, especially of the left side of the heart, and fibrous deposits on the mitral and aortic valves, were produced, but peritoneal inflammation was not induced. In cases of R. the lactic acid is supposed to be formed in the pulmonary circuit of the blood, and from thence carried into the left ventricle, to be propagated by the general circulation to the parts where the disease is manifested. The fibrine appears to preponderate over the saline constituents of the blood during the disease. R. is most commonly divided into *acute* and *chronic*; but there is no distinct line of demarcation between the two, and the latter is frequently a consequence of the former. In acute R. the general and local symptoms are well marked. There is usually a feeling of coldness, want of appetite, thirst, and more or less feverishness, accompanied by acute local symptoms, as redness, heat, swelling, and usually very intense pain in one or more joints. The large joints are often implicated, but the middle-sized ones, as the knee, ankle, wrist, and elbow, are more usually attacked. The disease tends to shift from one joint to another, and does not often remain fixed in the one first affected; and it has been found that, in three cases out of four of acute articular R., with high fever, the heart is affected with endocarditis, or endopericarditis, and the foundation is laid for permanent chronic valvular disease. The implication of the heart is insidious, and being frequently attended with no pain is only discovered on examination with the stethoscope. When R. is thoroughly established the pain is severe, and is intensified by the slightest movement. The pulse is full and quick, there is headache but seldom delirium, the tongue is covered with a creamy thick fur, the tip and edges being red; and the fever is attended with a peculiar acrid, copious, and sour-smelling sweat. The bowels are generally constipated; urine is high coloured and scanty, and deposits, on cooling, a quantity of urates. The temperature ranges from 100° to 104°, gradually ascending for at least a week, but subject to considerable variations, sometimes reaching as high as 108° or 109° in fatal cases. The duration of an attack varies from three to six weeks, but it may extend over several months, and relapses are common. R. is not a very fatal disease, deaths being in the ratio of about 1 in 1000, but it is frequently a serious disease in the after-mischief which it entails by cardiac and other complications. If the effects of R. were taken into account, it is probable that instead of occupying about the thirty-fourth place in diseases, arranged according to their fatality, it would rank tenth or eleventh, for at least two-thirds of cardiac diseases are due either directly or indirectly to R. or its ally, gout. Although the termination is generally in recovery, the joints are frequently left stiff, or they may become chronically enlarged.

The chief exciting cause of acute R. is exposure to cold combined with moisture, sleeping in damp sheets, the wearing of wet clothes, living in a damp house, and more particularly in a newly built house which has not been thoroughly dried. Badly drained houses are prolific causes of R., more especially when the foundation is laid on a sub-soil retentive of moisture, as the moisture constantly passes up and saturates the walls. By the action of the cold and damp, the excreting power of the skin is checked, and certain effete matters which should be eliminated by the process of insensible perspiration are retained, and give rise to blood-poisoning. R. is a great cause of invaliding both in the army and navy, and is most prevalent in climates which are remarkable for damp and variable weather.

Proper drainage of the ground, and strict care that no house has damp foundations, may do much to prevent R. All persons subject to R. in any form should wear flannels in the winter, and clothe lightly in the summer, instead of wearing almost the same underclothing in both the hot and the cold season. The safest plan is always to wear flannel or woollen material next the skin, but of a lighter texture during the summer season.

Treatment.—Bleeding and the administration of mercury and purgatives were formerly the usual modes of treatment, but these are now practically abandoned, and the alkaline treatment, or the administration of salicin, is generally adopted. Two scruples of the bicarbonate of potass and soda may be given every three or four hours in half a bottle of soda water, and should be continued steadily until the febrile disturbance is lessened, the pulse reduced, and the urine rendered alkaline. Flannels soaked in an alkaline lotion consisting of half an ounce of carbonate of soda, and six drachms of Liq. Opii, added to nine ounces of hot

water, should, after being wrung out, be applied to the affected joints, and gutta-percha tissue should be placed over all. Milk diet and farinaceous food should be given at first, and afterwards beef-tea and nutrient and easily assimilated food. Salicin, as recently recommended by Dr. MacLagan, is said to be highly beneficial in the treatment of acute R. When administered in fifteen-grain doses every two hours, it lowers the temperature and diminishes the duration of the disease; indeed, salicin is confidently stated to be a specific in cases of acute R. Salicylic acid, a much cheaper preparation, is said to be equally efficacious, and it may be given in combination with acetate of potass.

Gonorrhœal R., or synovitis, is a painful and often a very intractable disease, supposed by some to be a form of pyæmia or blood-poisoning, the starting-point of which is inflammation of the veins around the urethra or prostate gland. It has been observed that the R. persists as long as the gonorrhœal discharge continues, and even so long as there is any tenderness in the affected portion of the urethra, but subsides when the urethra has become perfectly healthy. R. sometimes occurs, though rarely, after urethritis from other causes. In such cases the knee-joint is generally the principal seat of the disease, but other joints may also be implicated, and there is considerable synovial effusion. The pain is not usually acute, but it is constant and more severe at night.

Rheydt, a town in Rhenish Prussia, on the left bank of the Niers, an affluent of the Maas, 17 miles W.S.W. of Dusseldorf by rail. It manufactures silks, velvets, yarn, hosiery, shawls, linens, leather, soap, glue, paper, and vinegar. Pop. (1875) 15,857.

Rhin Bas and **Rhin Haut**, formerly departments of France, now included in the Germanic territory of Elsass-Lothringen. See ALSACE-LORRAINE.

Rhinanthus is a small genus of *Scrophulariaceæ*, consisting of erect annual herbs, which are supposed to have a parasitic connection with roots of the grasses, &c., amongst which they grow. The flowers are yellow, spotted with purple, and are arranged in one-sided spikes. When the seed is ripe, it rattles inside the compressed membranous-valved capsule, thereby procuring the name of 'yellow-rattle' for the common British species of pastures and grassy wastes. The name R. is derived from the Greek for 'nose' and 'flower,' in allusion to the form of the corolla. The species are confined to the northern hemisphere.

Rhine (anc. *Rhenus*, Ger. *Rhein*, Fr. *Rhin*, Dutch, *Rhyn* or *Rijn*), one of the most famous rivers in Europe, no less as a centre of art and legend than on account of the singular beauty of its scenery and its great material prosperity. It rises in Switzerland, and is formed at Reichenau, in the canton of Grisons, at an elevation of 1922 feet, by the confluence of two streams, the Vorder and Hinter Rhein, the former of which, rising on the N.E. side of St. Gothard, and receiving the small Mittler Rhein, is generally regarded as the principal source of the river. While, however, the latter is only 50 miles long, the Hinter Rhein is 80 from its sources in the glaciers of Vogelberg to the point of confluence. Immediately below the Reichenau, where it takes its general name, the river is navigable for rafts and small craft; but throughout its whole upper course as far as Basel its navigation is difficult, and in many places entirely interrupted by rapids and cataracts, of which the Falls of Schaffhausen, where the water suddenly leaps from a rock 70 feet high, is the most remarkable. At first with a northerly course the R. flows through the romantic valleys of the Grisons, St. Gall, and Voralberg, till it reaches the Lake of Constance (Boden-See), from which it takes a westerly direction, forming the boundary between Switzerland and Baden. At Basel it turns suddenly N., becoming a purely German river, and flowing through the broad, beautiful Rheintal, often called the garden of Germany, between the Schwarzwald and the Vosges. After receiving the Main at Mainz, it swerves to the W. and N.W. as far as Bonn, passes through the loveliest scenery of its course, dominated by many towering castle-crowned rocks, and hemmed in by steep, vine-clad hills, opening in fair valleys, which send down rushing streams. The river here has a rapid current and a most sinuous course, and its navigation is rendered intricate by numerous islands and shifting sandbanks. Its lower course, which zigzags as far as the German frontier, leads from Köln to the

North Sea through low, level, uninteresting country. In the Netherlands it branches off into the Waal, Yssel, Leck, and Vecht, and so reaches the ocean in a number of small streams, which lose much of their volume among the sandbanks of the shore. The entire length of the R. is 960 miles; its breadth at Basel is 189 yards, at Mannheim 429, at Mainz 492, at Koblenz 399, at Bonn 532, at Köln 433, at Düsseldorf 403, and 909 at the Dutch frontier. Its greatest depth between Mainz and Bonn is 76 feet, and its chief affluents are the Aar in Switzerland, the Neckar and Main in the Rheintal, and the Lahn and Moselle in the highlands of its lower course. The delta, comprising an area of 50,000 sq. miles, is intersected by a network of canals, and is protected by extensive embankments. Canals connect the R. with the Rhone and Saône, the Scheldt, Maas, and Danube. It is the channel of a great trade in timber, coal, iron, wine, colonial produce, and manufactured goods. Its banks are now lined with railways, and more than 100 steamers ply on the river, conveying annually as many as a million passengers. In the basin of the R. the winter usually lasts from six to eight weeks, during which time the river is sheeted with ice, and snow accumulates in the adjacent country. In the event of a sudden thaw the river swells to an extraordinary height and inundates the contiguous lowlands. The *Betuwe* ('good meadow land; Lat. *Balavia*), the tract lying between the R. and Leck on the N. and the Waal on the S., is particularly liable to destructive flooding.

The R. was anciently one of the longest and most important natural boundaries of the Roman Empire, and across it the Franks, Burgundians, Suevi, and Vandals forced their way to find new homes in the plains of Gaul and Hispania. It is intimately associated with the great literature of German legend and lyric. Its waters were denized with the weird race of the Nibelungen, and the hero of the Nibelungen Lied slew on its banks the monster of the Drachensfels (q. v.). The Lorelei (q. v.) is perhaps the most beautiful of all Rhenish legends. See, besides the excellent guide-books of Bädiker, Berlepsch, &c., Simrock's *Das Malerische und Romantische Rheinland* (4th ed. 1865), Kohl's *Der Rhein* (2 vols. Leips. 1851), Müller von Königswinter's *Rheinstra* (Frankf. 1846), and *Der Rhein* by Stieler, Wachenhusen, and Hackländer, with 420 drawings on wood by German artists (Eng. trans. Lond. 1877).

Rhine, Confederation of the. See CONFEDERATION OF THE RHINE.

Rhine Wines constitute a class of beverages distinct in character from the wines of all other districts. They are generous full-bodied wines, that improve with age in an unexampled manner. The most characteristic varieties are white, and embrace Liebfraumilch, Johannisberg, Steinberg, Nierstein, Marco-brunner, Rüdesheimer, and Hochheimer, the latter being the Hock of Great Britain, under which name indeed the R. W. are generally drunk in this country. Hock and other R. W. are prepared either as still or sparkling (effervescent) wines. The red wines of the Rhine are not of equal fame, but Asmannshäuser is rising in favour.

Rhinns of Gall'oway. See WIGTOWNSHIRE.

Rhino'ceros (*Rhinoceros*), a genus of *Ungulate* or hoofed quadrupeds, deriving its name from the development on the nasal bones of one or more hard epidermal growths or 'horns,' which, however, are merely bundles of modified hairs. The R. is one of the *Perissodactyla*, or 'odd-toed' Ungulata. There is but one genus, numbering several species, included in a distinct family (*Rhinocerotidae*). The family characters are derived from the large size of these animals, from their thick skin, which is usually thrown into massive folds, from the blunt and rounded muzzle, and from the absence of canine teeth. Incisors are present in both jaws, and the molars number fourteen in each. The skull is pyramidal, and when more than one horn is developed the hinder horn is borne by the frontal bones, and is placed behind the front horn in the middle line of the head. The latter is the larger. The R. formerly had a much wider geographical distribution than at present. It is now confined to Africa and Asia, each continent having distinct species. The most familiar forms are the Indian R. (*R. Indicus* or *unicornis*) and the Javanese R. (*R. Sondaicus*) of Java, Sumatra, and Borneo, both having one horn. The *R. Sumatrensis* of Sumatra has two, as has also the African R., *Rhinoceros* or *Borele* (*R.*

Africanus or *bicornis*). Another African form is the *R. Simus*, or white R. The Asiatic species have the skin-folds more definitely marked than the African forms. The Indian R. attains a height of 5 feet, and is of a deep brownish black. The R. is harmless, but somewhat irritable and uncertain in temper. The Javanese R. is smaller than the preceding. The white R. of Africa is one of the largest species, its front horn being very long. The flesh is valued by the natives, and is said to be highly palatable. A species named the Kobaoba, or long-horned white R. (*R. Osmellii*), is of rarer occurrence than the white R. The front horn exceeds 4 feet in length. Fossil species of R. occur first in the Miocene rocks. One celebrated extinct species is the *R. tichorhinus*, or woolly-haired R., which inhabited England and Europe generally. It occurs first in the *Preglacial* deposits of the Thames valley, and its remains are found in cave-deposits and valley-gravels. Other fossil species are the *R. Etruscus*, *hamitachii*, *incisivius*, *megarhinus*, &c.

Rhinoplastic Operation. This operation is occasionally resorted to when a portion or the whole of a nose has been destroyed by accident or lost by lupus or syphilis; but it does not find much favour with surgeons of the present day, as the new nose being formed only of skin, generally either withers away or remains flat on the face, and in either case the appearance of the patient is not much improved. Another objection is, that the flap being usually taken from the forehead, another scar is added to the previous deformity. The operation is described by Mr. Holmes as follows:—'The common plan, or the Indian operation, is to take a piece of paper, gutta-percha, or leather, and adapt it to the stump of the nose, so as to form as shapely a feature as may be; then lay the pattern on the forehead, and cut a flap of skin accordingly, leaving it attached by as broad a neck as possible to the bridge of the nose. A little tongue is left on the middle of what was the upper border of the flap, and which when it is twisted becomes the lower, in order to form the columella. The edges of the cliff should be refreshed before cutting the flap, and the latter brought down and attached as rapidly as possible in its new position by several points of silver suture. The new nose must be supported in position by a plug, or two plugs, of suitable size and shape, and of some non-absorbing material, and supported on the plug by a pad and bandage loosely applied. When the union of the edges is complete, and the transplanted flap perfectly warm and full, the neck may be divided, the rest of the cleft over the bridge of the nose pared, and the raw surface left by the division of the neck implanted there.'

The R. O. was first performed by Taliacotius, professor of anatomy and surgery at Bologna, where he died in 1553, and is popularly known as the *Taliacotian Operation*. The flap, instead of being taken from the forehead, was transplanted from the patient's arm. The restrained position, however, is a great objection, as an apparatus must be adapted which will keep the arm in comfortable apposition with the face. Dr. Hardie, of Manchester, has transplanted the distal phalanx of one of the fingers into the nose in order to provide a long base for the transplanted flaps. Dr. Wolfe of Glasgow asserts that the skin may be simply cut from the arm, or other part, and inserted into the face where it will adhere and grow.

Rhizanthem (Gr. 'root' and 'flower') was a natural order established by Blume (1828) to include the parasitical plants divided by modern systematists into the Balanophora, the Cisturape, and the Rafflesia families. Lindley made a separate class of this group under the name of *Rhizanthus*, and placed the same in his arrangement between the endogens and the acrogens. He says:—'In their succulent texture, in their colour, often in their putrid odour when decaying, in the sporeiferous seeds, in their parasitical habits, these plants resemble Fungaceæ; while in their flowers and their sexes they accord with Araceæ or similar endogens.' Bentham and Hooker combine them in two orders—*Balanophoraceæ* and *Rafflesiaceæ*, which are respectively included in the cohorts *Santalales* and *Asarales* of the subdivision of apetalous dicotyledons with an inferior ovary. Taking the three families above mentioned—(1) *Balanophoraceæ* are found chiefly in the Himalaya and Andes. Some of the species are astringent, and have been employed as styptics, e.g., the *Cynomorium coccineum*, commonly known as *Fungus militensis*, which grows in Malta and Sardinia. *Balanophora elongata* furnishes a wax much used in Java for making candles, and various N. Indian

species of this genus form large knots on the roots of the oaks and maples upon which they grow; these excrescences are much prized for manufacture into the cups in general use in the Himalaya and Thibet. (2) *Cytinaceæ* are root-parasites met with in S. Africa and the Mediterranean region; they also, from the presence of gallic acid, are serviceable as astringents and styptics, and include the *Hydnora Africana* or 'jackal's kost,' which is eaten, when roasted, by the African savages. For (3) *Rafflesiaceæ*, see article RAFFLESIA. The total number of known species belonging to this curious group is about 60, in 23 genera.

Rhizocrius, a genus of *Crinoids* or Lily Stars, represented by the *R. Lofotensis*, observed by Sars of Christiania in 1867 in the North Sea off the Loffoden Isles. The interest attaching to this form arises from its forming the existing representative of an interesting fossil family (*Apicrinidae*) of 'Pear encrinites,' the group, prior to the discovery of R., having been regarded as extinct. R. is permanently rooted to the sea-bed, and has a flexible jointed stem, destitute of branches save at its root-extremity. The arms are furnished with *pinnules* or branches, and the *calyx* or body-cup is well developed.

Rhizophoraceæ, an order of polypetalous dicotyledons, consisting of tropical trees or shrubs with opposite entire leaves, and axillary flowers either single or in clusters. The stamens are sometimes twice as numerous as the petals. The ovary has two or more cells, and the fruit has few seeds. The order includes some fourteen genera variously found in the continents of Asia, Africa, and America.

Rhizopoda (Gr. *rhiza*, 'a root,' and *podos*, 'a foot'), a class of *Protozoa* (q. v.), distinguished primarily by the fact that the soft protoplasm or living matter of their bodies can be protruded to form processes or *pseudopodia*, adapted for locomotion and prehension. No mouth exists, and a *nucleus* and *nucleolus* are present in the majority of R. The pseudopodia may be blunt, finger-shaped processes as in *Amœba*, or delicate and interlacing as in *Foraminifera* (q. v). Included in the group R. are several orders. Of these latter, the (1) *Monera* include organisms regarded as the lowest R. They are minute in size, and occur in the sea. Their bodies are circular, and capable of protruding pseudopodia, which usually form a radiating series of processes. The *Monera* do not develop any *test* or hard structures, and they reproduce their like chiefly by *fission* (see REPRODUCTION), and usually without encystation. No nucleus exists. *Protomyxa* is a familiar genus. The (2) *Amœbina* form the second order of R., and are represented by the various species of *Amœba*—the 'Proteus-animalcules' of older naturalists. The *Amœbæ* occur in stagnant water, and in infusions of organic matter. They have a nucleus, nucleolus, and contractile vesicles, the latter being small clear spaces, which contract and expand rhythmically. Their pseudopodia are blunt and finger-like, and do not interlace. With one or two exceptions the *Amœbina* have no hard parts. One genus (*Diffugia*) makes itself a covering of sandy particles, named a *carapace*. *Arcella* has a discoid carapace; and *Actinophrys sol*, the 'Sun Animalcule'—another of the *Amœbina*—has merely a tough outer layer (*ectosarc*) of the body, from which numerous stiff radiating filaments proceed. The third and fourth orders of R. are the (3) *Foraminifera*, and (4) *Radiolaria*, both of which are noticed in detail in the articles under these names.

Rhode Island, the smallest State in the American Union, one of the original thirteen. It belongs to the New England group, and is bounded on the S. by the Atlantic, on the W. by Connecticut, and on the N. and E. by Massachusetts. Its area, including the waters of Narragansett Bay, 30 miles long, which divides it into two unequal portions, is 1306 sq. miles, but its land surface is not more than 1054 sq. miles. Pop. (1875) 258,239.—The State takes its name from an island (Dutch *Rode Eylandt*, 'red island') in Narragansett Bay, on which is situated the town of Newport, one of the capitals, the other, Providence, being situated on the mainland, on the Providence River. The other chief towns are Pawtucket, Woonsocket, Warwick, Lincoln, and Bristol. Its direct shore-line is only 45 miles, but owing to its sinuosities, its whole coast-line is about 350 miles. Partly on this account the climate is milder than that of the other New England States. Except in the S.W. where there is much sand, gravel, and salt-marsh, the soil is moderately fertile, but much of it is difficult of culti-

vation owing to the rugged formation of the country. In 1870 289,030 acres were under cultivation, while 213,278 acres were in wood-land or other unimproved farm-land. The aggregate value of crops in 1875 was \$3,316,228, among the items being Indian corn \$281,000, rye \$21,000, oats \$145,000, barley \$25,500, and potatoes \$560,000. Of live stock the total value was \$3,673,485, the items being 14,700 horses, 36,400 cattle, 25,300 sheep, and 16,500 pigs. The geological formation of the western half of R. I. is Eozoic, but the remainder is Carboniferous. About 15,000 tons of anthracite coal are annually mined, and iron, limestone, sandstone, and marble are also worked. R. I. has more manufactures in proportion to its area and population than any other State, though it only ranks tenth among the States in absolute amount of manufactured products. In 1870 it contained 1850 manufactories employing 49,417 hands; the capital invested was \$66,557,322, and the produce of that year was estimated at \$111,418,354. Cotton, woollen, and worsted manufactures employed 315 establishments, and produced nearly \$75,000,000. The other manufactures are principally hardware, jewellery, india-rubber goods, and clothing. In 1876 there were 220 miles of railroad in the State.

R. I. is supposed to be the Vinland discovered by the Scandinavians in the 10th c. The present state was founded by Roger Williams, a distinguished divine of Salem, who was driven from his charge in 1636 by the intolerance of the 'Puritan fathers,' on account of his Anabaptist opinions. After six weeks of extreme hardship, he landed in the early spring of 1635 on the present site of Providence. Two years later he was joined by his friend William Coddington, and the colony began to increase. In 1663 Roger Williams gained for it a very liberal charter from Charles II., under which it was governed, both as colony and State, until 1842. It was noted for the toleration with which religious opinions were treated within its bounds, contrasting in this respect with other New England colonies. It took a prominent part in the War of Independence, and for some time after its close Newport contended with New York and Boston for the commercial supremacy of the new republic. In 1842, after a severe political struggle, the old charter was replaced by a new constitution. R. I. took an active part in the Civil War on the Federal side. See *A Short History of R. I.* by G. W. Greene, LL.D. (Lond. 1877).

Rhodes (Gr. *Rhodos*), a Turkish island in the Mediterranean, 10 miles off the S. W. coast of Asia Minor. Length, 45 miles; breadth, 20 to 25 miles. Pop. 34,000 (24,000 Greeks, 7000 Turks, and 2000 Jews). The surface is mountainous, culminating in Attairo (anc. *Atatyrus*), 4560 feet high. R. is throughout volcanic. The climate is proverbially fine, and the rich soil produces abundant wine, oil, wheat, and southern fruits.—**R.**, or **Kastro**, the capital, on the N. E. point of the island, has a fortified harbour with a narrow entrance. Its streets are dark and narrow. The best parts are the Jews' quarter, with a synagogue, and the suburb Neomaras, inhabited by the European merchants and consuls. R. is the seat of a pasha and of a Greek archbishop, has an arsenal and dock (where two schooners of 100 and 120 tons were built in 1876), and is an important station for the Turkish fleet. It is also a station for the steamships between Constantinople and Asia Minor and Alexandria. The trade of R. is chiefly transit, and carried on by steamers. In 1876 there entered and cleared the port 1988 vessels (66 English) of 288,511 tons. The exports, chiefly sponges (£140,000 in 1876), sesame seed, valonea, onions, wax, wine, storax, oil, fruits, amounted to £824,920; and the imports, mainly cottons, silks, woollens, coffee, sugar, leather, metals, rice, petroleum, soap, saltfish, to £167,400. In 1870 R. was connected by submarine cable with Asia Minor, Candia, and Alexandria. The town has suffered much from earthquakes (1851, 1856, and 1863), and from a great gunpowder explosion in 1856. R. was founded in 408 B. C. In ancient times it had great trade, and was equally famous for shipbuilding and the manufacture of arms and engines of war. The Athenian *Æschines* founded at R. a famous school of oratory, as afterwards did Apollonios Molon, among whose disciples were Cicero and Cæsar. Near the entrance to a harbour now nearly sanded up Chares erected (270 B. C.) the celebrated Colossus (q. v.). It was overthrown by the earthquake of 222 B. C., and is said to have been set up again, yet it lay in ruins in 672 A. D., when the metal (900 camel loads) was sold by the Kalif Moawiya I. to a Jew. Its

naval power was greatest at the time of Alexander the Great, when it was the head of a sort of Greek Hansa, and established for the first time a generally accepted code of law for trade and naval affairs, which was powerfully exerted against piracy. R. successfully resisted Demetrius Poliorcetes in 364 B. C. In the civil wars it joined the party of Cæsar, and after his death suffered much from its resistance to Cassius (42 B. C.). It never recovered its power, though it was long afterwards celebrated as a seat of learning. It was unsuccessfully besieged by Mohammed II. in 1480, when it was defended by the grandmaster Pierre d'Aubusson; but in 1522 it was taken by Suleiman II., after a heroic defence by the knights of St. John under Villiers de l'Isle Adam. On the 1st January 1523 the knights left the island (which they had occupied from 1309). It has ever since been held by Turkey. See Ross, *Reisen nach Kass, Halikarnassos, Rhodus und Cypern* (Halle, 1852); Guerin, *Voyage dans l'île de R.* (Par. 1856); and Berg, *Die Insel Rhodus* (Brunsw. 1861).

Rho'dez, the chief town of the department Aveyron, France, on the steep N. bank of the river Aveyron, 80 miles N. E. of Toulouse, with which it is directly connected by rail. Its cathedral is one of the finest Gothic structures in the S. of France, dating from the 13th and 14th centuries, having a lofty tower and magnificent stained glass windows. R. has several other interesting buildings, and is rich in Roman remains. Its manufactures are woollens, serges, leather, paper, playing-cards, &c., and its trade is chiefly in cattle, horses, and cheese (*fromages du Cantal*). Pop. (1872) 12,111. Anciently *Segodunum*, the chief town of the Celtic *Ruteni*, R. was in the Middle Ages, as *Rutena*, capital of the *Pagus Rutenicus*, and later, that of the principality of Rovergue (*Comitatus Rodensis*). After varying fortune, it passed by marriage to Henri III. in 1526.

Rho'dium (Ro = 104.3), one of the platinum group of metals, forms usually about one half per cent. of the platinum ore, from which it is obtained after a lengthened and complicated process in the form of a double chloride of R. and sodium. By heating in hydrogen the R. is reduced to the metallic state, and after the chloride of sodium has been washed out with water, is left as a grey powder. The metal is hard and malleable, less fusible than platinum, and insoluble even in *aqua regia* except when alloyed with other metals. It forms two oxides, two sulphides, and three chlorides. The trichloride (RoCl₃), itself non-crystallisable, forms beautiful crystallisable double salts with the alkaline chlorides. Most of its salts are a beautiful red colour, whence the name of the metal. It was discovered by Wollaston in 1803.

Rhododen'dron (Gr. 'rose-tree') is a genus of *Ericaceæ*, consisting of shrubs or trees with entire alternate leaves and large showy flowers, usually in compact terminal clusters or umbelliferous corymbs, from large buds with scaly bracts. The corolla is funnel-shaped or campanulate, five to twelve lobed, and sometimes slightly irregular. The stamens are from ten to twenty, commonly declining, as well as the style; the anthers short, opening by pores; the ovary is superior; the capsule cylindrical, dehiscing septicidally; the seeds numerous and scale-like. The genus R. is widely diffused, having its headquarters in the temperate parts of N. America and the mountains of India. In the size attained by the species there is a great contrast, ranging from the Arctic *R. Lapponicum*, a prostrate shrub with branches a few inches long, to Indian trees of a height of 50 to 60 feet and a girth of upwards of 15 feet. The kinds commonly grown in Britain in gardens, shrubberies, and game plantations, are chiefly varieties of *R. ponticum*, a species found wild on the coasts of the Black Sea, from the range of Caucasus through Armenia and Georgia to the western frontier of Persia; or of *R. catawbiense*, an American species; or hybrids between these. *R. arborcum*, known as the Tree R., and common on the outer ranges of the Himalaya from the Indus to Bhutan, is hardy in S. England in sheltered places. The flower-buds and young leaves are believed to be poisonous to cattle; the flowers, however, are eaten in India by the natives, and are made into a pleasant sub-acid jelly by European residents. *R. campanulatum*, also from the Himalaya region, between 9000 and 14,000 feet, is hardy in Britain, and is commonly grown in gardens. The dense buff-coloured coating of the under-surface of the leaves is used as snuff. *R. anthopogon*,

from the same district, is half-hardy. The leaves are used as a stimulant in native medicine. The wood of *R. maximum*, a native of N.E. America, is said to be equalled only by the best boxwood for engraving purposes. The discoveries of Dr. now Sir J. D. Hooker, during his exploration of Sikkim, added greatly to our knowledge of *R.*, and since the publication of his magnificent work devoted to the subject (*The R. of Sikkim Himalaya*, 1849), the genus has been held in high esteem by cultivators, who have raised numberless varieties and hybrids. The beautiful *R. Dalhousia*, which was one of Dr. Hooker's discoveries, is remarkable as being an epiphyte; and *R. nivale* was found by him flourishing at the immense height of 17,000 feet; it is the most alpine of woody plants. *R. ferrugineum* and *R. hirsutum* are two small species, with carmine-coloured flowers, found in the European Alps, and *R. chrysanthum*, with yellow flowers, is a native of Siberia. The leaves of the last named have a great reputation for chronic rheumatism.

Rhom'bus is a Parallelogram (q. v.) whose sides are all equal, but whose angles are not right angles.

Rhone (Lat. *Rhodanus*), next to the Loire the largest river of France, and the swiftest in Europe, rises on the W. side of Mount St. Gothard, at the foot of Maïenwand, at a height of 5468 feet above the sea. It runs through the canton of Valais, and after receiving the Drance, turns to the N.W. and enters the Lake of Geneva, issuing from its S.W. extremity in a clear blue stream, which, however, is soon defiled by the muddy waters of the Arve. It next flows S.W. through a rocky gorge of Mount Jura, and near Fort de l'Écluse, when the water is low, disappears altogether for 300 feet in the so-called *Perte du R.*, a cleft of the rock which has recently been considerably widened. After flowing S. for several miles, it turns sharply to the W., until it is joined by the Saône at Lyon, after which it is navigable and flows S., passing the towns of Vienne, Tournon, Valence, Avignon, and Arles, and receiving on the right the Gier, Ardèche, and Gard, and on the left the Isère, Drôme, and Durance. It empties itself into the Mediterranean. About half a mile above Arles, the R. divides into two arms, which again divide into others, and which are called the Greater and the Lesser R. They enclose the delta known as the Ile de la Camargue. The length of the R. in a direct line is 276 miles, that of the stream 506 miles, and with all its windings 644 miles. Its drainage area is 28,000 sq. miles, 3080 sq. miles of which belong to Switzerland. Its breadth at Valence is 2200 feet, at Arles 5220 feet. The R. carries into the sea 88,000 gallons of water per second. Its navigation is much obstructed by the shifting sandbanks in its bed, which are most abundant near the Bouches du R.; accordingly communication with the main stream is through the L'Étang de Berre and the canals of Martigues and Beaucaire. Passing through some of the most fertile districts in France, the R. has great commercial importance, which has been greatly increased through its being united by canals with the Loire, the Seine, and the Rhine. From the comparative failure for some years past in the cultivation of the vine and madder in the R. valley, causing an annual loss of £3,200,000, public attention has been called to the necessity for providing adequate means for irrigation. A scheme which seems likely to be realised, has (1878) just been proposed for a great canal to branch off from the R. below Vienne, near Condrieu, and thence to follow the left bank of the river above Valence and Montbeliard, to cross at Mornas in large syphons to the right bank, and thence pass through Nîmes, Lunel, Montpellier, Beziers, and Narbonne. The estimated cost of construction is £4,800,000 (of the syphons alone £280,000). With a length of 310 miles, it would irrigate 543,650 acres, and offer to navigation between Condrieu and Mornas a waterway 50 feet wide and 10 feet deep, which might be extended to Marseille and the Mediterranean, and which would ensure to vessels of not more than 300 tons the traffic between Havre, Paris, and Marseille. See Lenthéric's *Villes Mortes du Golfe de Lyon* (Par. 1876).

Rhône, a department of France, second only to that of Seine in smallness and density of population, is bounded N.W. by Saône-et-Loire, E. by Ain, S.E. by Isère, and S. and W. by Loire. Area, 1077 sq. miles; pop. (1876) 705,131. The western part is covered by the northern prolongations of the Cévennes, which also send out spurs to the N.E. and S.E. R. is included in the basin of the River R., which with the Saône forms its E. boundary from 10 miles below Mâcon to Condrieu. It is well watered by their affluents. The climate is healthy, and the soil in

the vicinity of the rivers extremely fertile. Much, however, is poor, and the crops raised are not sufficient by half for the wants of the population. Excellent wines are produced, especially those of Sainte-Foy, Côte-Rôtie, and Condrieu. The mineral wealth is not great, but copper ore and coal, porphyry, granite, and marble are obtained. R. owes its importance to the vast extent and varied nature of its industries, the principal of which is the production of silk fabrics, especially at Lyon (q. v.). Cottons, muslins, calicoes, liqueurs, chemical products, paper, glass, beer, and earthenware are also largely manufactured.

Rhone, Bouches du. See BOUCHES-DU-RHONE.

Rhöngebir'ge, a group of volcanic hills, part of the German Mittelgebirge, to the S.W. of Thüringerwald, between the valleys of the Fulda and Werra. The principal heights are the Milseburg (2813 feet), the Pferskopf (3100), the Wasserkuppe (3074), and the Kreuzberg (3042). Much of the group is well wooded, and the plateau of Vorderrhön, in the N., is in part cultivated.

Rhu'barb (Mid. Lat. *rha*, from its Oriental name, and *barbarum*, 'foreign,' to distinguish the plant of the Volga from the *R. Rhaponticum*,

another kind from the Roman province of Pontus. *Prior*, known botanically as *Rheum*, is a genus of large herbaceous plants belonging to the natural order *Polygonaceæ* (q. v.). All the species are perennials, with large root-stocks, from which the large sheathing leaves and flower-stalks are given off. The inflorescence consists of much-branched panicles, bearing a great number of whitish, greenish, or pinkish flowers. Central Asia is the headquarters of the genus. The R. cultivated for the sake of its leaf-stalk includes several species,

R. Rhaponticum and *R. undulatum*, with their numerous garden varieties, being most commonly grown. Although introduced into England 300 years ago, it is only within the present century that its value for culinary purposes has been recognised. It is now largely used, either made into tarts, or stewed alone, or in the form of jam. From the juice a wine is also made, and the unexpanded flower-heads are recommended for use in the same way as the leaf-stalk, whilst the leaf itself can be dressed in the same manner as spinach. This last was the only use made of R. in the time of Queen Elizabeth.

The source of the fine qualities of the R.-root used in medicine and known as Turkey R. has been enveloped in much mystery owing to the jealous reticence of the Chinese, but with the opening of Central Asia through the exertions of modern scientific travellers, the fact has been established that most of it is the produce of *R. officinale* of Baillon, and of a variety of *R. hybridum*—plants of the high tableland of Western China and Eastern Thibet. Baillon insists on the influence exercised on the quality of the drug by the method of collection, the season when it is made, whether it is taken from the lower stem portion of the plant or from the root, and probably also on the process of drying. A portion of the E. Indian R. of commerce, it has also been recently ascertained, is derived from *R. palmatum* var. *Tanguticum*, a plant of the Mongolian mountains. The Himalayan *R. Emodi* and *R. Webbianum* yield Indian R.—not, however, of much medicinal repute. The name 'Turkey R.' is a misnomer, as the import meant thereby comes from Chinese territory, and the term arose simply from the drug in former times reaching Western Europe *via* Natolia. Since the extension of Russian conquest to the Chinese boundary some has come through Russia, but no supply has been thus received for several years. R. contains Raphides (q. v.) of calcium oxalate, along with tannin, gallic acid, resin, and a peculiar yellow-coloured principle called rhaberberin. *Medicinally*, it is employed as a cathartic, astringent, and tonic, in the form of powder, pill, extract, tincture, wine, and infusion. It should not be administered in a high



Himalayan Rhubarb.

sthenic state of the system, or when depletion is necessary; but it is the best purgative when it is desired simply to unload the bowels in a debilitated subject, as in cases of diarrhoea with intestinal weakness. In the form of syrup, combined with an alkali, it is especially valuable in the summer bowel complaints of children when the stools are greenish and mucous. Powdered R. may be given in doses, as a stomachic, of from 1 to 5 grains, and as a purgative, 10 to 20 grains. The following are the pharmaceutical preparations of R. and their doses:—*Extractum R.*, 3 to 6 grains; *Infusum R.*, 1 to 2 ounces; *Pilula R. Composita*, 5 to 10 grains; *Pulvis R. Compositus*, commonly called *Gregory's Powder*, 30 to 60 grains for adults, 5 to 10 grains for children; *Syrupus R.*, 1 to 4 drachms; *Tinctura R.*, as a stomachic, 1 to 2 drachms; as a purgative, $\frac{1}{2}$ to 1 ounce; *Vinum R.*, 1 to 2 drachms.

Rhumb-Line, in navigation, is a line which cuts the meridians all at the same angle, *i.e.*, which is always directed to the same point of the compass. It is therefore a Loxodromic Line (q. v.).

Rhyl, a watering-place of N. Wales, in Flintshire, 16 miles E. of Conway by rail, has a large and handsome church designed in First Pointed style by the late Sir Gilbert Scott (1861), a Romanesque Catholic church (1864), a townhall (1876) comprising board-offices, meat, fish, and vegetable markets, an aquarium and winter garden (1877), and a promenade pier, 2000 feet long, constructed in 1867 at a cost of £17,000. There are three English and one Welsh weekly newspapers, and steamers ply daily between R. and Liverpool. Pop. (1871) 4229.

Rhyme (properly *rime*, the *hy* being due to the false analogy of *rhythm*; Old Eng. *rim*, 'number'), the consonance of words or syllables of words, although foreshadowed in Leonine Verses (q. v.), was first elaborated in the Western world towards the close of the 4th c. A.D., when accent had gradually superseded quantity in Latin poetry. Its condemnation by Cheke, Sidney, Jonson, and Milton, as Gothic and barbarous, is confuted by the fact that the earliest rhymed Teutonic poem, the Frankish *Evangelij* of Otfried, belongs to the latter half of the 9th c. From Latin hymns R. spread to the Romance literature, attaining its full development among the Troubadours of Provence; and English is poor in rhymes compared with Italian, French, or Spanish, the last named possessing twenty-five where English has only three. Still R. is now a part of the metrical system of our language, having almost entirely superseded the older Alliteration (q. v.), and serves an important function in marking a verse or turn of the metre. To be perfect, a R. must begin on an accented syllable, the vowel-sound of which with the succeeding parts must be identical, while the preceding parts are different. According as the accent falls upon a last or single syllable, a penultimate, or an antepenultimate, the R. is termed single, double, or triple, examples being *care* and *fair*, *clothing* and *loathing*, *family* and *clammy*. Except in burlesque poetry the accent rarely falls further back than on the third syllable; but Hood's *Bridge of Sighs* is one of numberless proofs that Dryden was wrong in declaring only single rhymes to be suitable for a serious theme. See Guest's *History of English Rhythms* (2 vols. Lond. 1838), and Tom Hood's *Rules of R.* (Lond. 1869).

Rhym'er, Thomas the. See RYMOUR.

Rhynchonell'a, a genus of *Brachiopod* shells, familiar both as a living and as an extinct group, the type of the family *Rhynchonellidae*. In this family the shell is usually unattached, but in some cases was fixed by a muscular stalk or *peduncle*. This stalk issued from an aperture existing under the beak of the lower or ventral valve of the shell. The arms are coiled spirally and supported by a small set of shelly loops. There are two living species of R., *R. sulcata* is the most familiar. The genus itself is first found in a fossil state in the Lower Silurian rocks, and has persisted to the present day. In Palaeozoic and Mesozoic rocks, R. shells are abundant. *R. capax* of the Lower Silurian is a well-known fossil form. *Pentamerus* is the only other genus of importance included in this family.

Rhythm (Gr. *rhythmos*, 'a regular motion') is the agreement of sound with measured time in poetry and music, and the agreement of motion with measured time in dancing. It appears to be a necessity of man's nature that efforts of the same kind, in order to be sustained, must be regulated by a law of recurring

proportions. That part of a verse which receives the stress of R. is called the *arsis* (elevation); the rest forms the *thesis* (depression). See *Théorie Nouvelle de la Métrique Arabe, Préface de Considérations sur le Rhythme du Naturel Langage*, by S. Guyard (Par. 1877).

Rhythm (*rhythmos*, 'measure') musical, the proper arrangement and accentuation of the various notes forming a musical composition. Music is rhythmical when the accents recur periodically. A rhythmical period is divided into sections, phrases, and bars, the barring being so arranged as to bring the notes with the strongest accents at the beginning of the bar. The time is duple, triple, or quadruple, according to the number of beats in a bar. In dance music and in marches the rhythmical divisions are strongly marked.

Riazan', a government of Central Russia lying along the Oka, having Wladimir on the N., Tambow on the S. and E., and Tula and Moscow on the W. Area, 16,250 sq. miles; pop. (1870) 1,477,433. It is watered by the Oka, with its tributaries the Pra, Osetr, and Pronja, and by the Don in the S.W. The surface is level and the soil fertile, 56 per cent. being under cultivation, while 22 per cent. is under wood. Rye, wheat, oats, flax, fruit, and vegetables are cultivated; and cotton, soap, tallow, and leather are produced annually to the value of 4,000,000 roubles by upwards of 6000 persons in 220 factories.—**R.**, the capital of the government since 1778, is situated on the Trubesch, a small tributary of the Oka, 115 miles S.W. of Moscow by rail. It is a well-built town, has 26 churches, 2 monasteries, and 40 factories producing linen, cotton, and ironwares. Pop. (1870) 19,990.

Rib, a moulding or projecting band on a ceiling, universal in the Gothic style. Ribs were very common in mediæval architecture both on vaulted and flat ceilings. In the earliest Norman style they are generally mere flat bands crossing the vault at right angles, the groins being plain. Later, they became moulded, sometimes adorned with zigzags and other ornaments, and with carved bosses at the intersections. Early English and all subsequent vaultings have the groins covered with ribs, and bosses or other decorations on the intersections. In the reigns of Queen Elizabeth and James I., ribs were much used on plaster ceilings, often very intricately arranged, and with intersections either plain, or decorated with small pendants.

Ribbon (Fr. *ruban*, Dutch *rijghband*, 'a band or tie'), a narrow fabric of silk, cotton, or other material, principally used as a trimming for ladies' attire. Riband (the former spelling) originally signified a band or border of a garment, and not till the 16th c. was it used in its present sense in England. Then ribbons began to be worn as showy appendages to dress, and during the reign of Charles II. they became quite the rage with gentlemen, who attached them to almost every article of attire. French ribbons were then most esteemed, and in England the manufacture was chiefly confined to London, but after the revocation of the Edict of Nantes in 1685, French Protestant refugees carried it, among other places, to Coventry, which town and St. Etienne in France are now the principal seats of the manufacture. During last century Switzerland and Germany also extensively manufactured figured ribbons, and from these countries have been adopted many of the mechanical improvements of the R. loom, whereby the most complicated designs may be produced. Among the many varieties of plain and figured silk ribbons are love, lutestring, sarsenet, satin, gauze, chiné, ferret, galloon, velvet, taffety, &c. The enormous consumption of these fabrics in the United Kingdom may be judged of from the fact that during 1876 the value of the imports of silk and satin ribbons amounted to £1,718,051, and of other kinds, £75,035. The articles came chiefly from France, comparatively small quantities having been drawn from Belgium, Holland, and other countries. In the same year silk ribbons of British manufacture, valued at £201,654 were exported to British colonies.

Broad silk ribbons constitute distinguishing marks of the various orders of knighthood; that of the Garter is of a deep blue colour, and is worn over the left shoulder; that of St. Andrew a green, worn like the Garter, but never with it; and that of the Bath is scarlet, and is worn by the Knights' Grand Crosses over the right shoulder.

Ribbon-Fish, the name given to several species of *Telostean* fishes, notable for the extreme length, narrowness, and thin-

ness of their bodies. The *Gymnurus Banksii* (or *Pezaleus Banksii*) is one of the most familiar species. These fishes are highly interesting from their appearance when swimming, having tended in some instances to give rise to tales of 'sea-serpents.'

Ribbonism, the name assumed by a system of secret associations which existed in Ireland in greatest activity during the twenty years before 1848, the main end of which was to protect the 'rights' of Irishmen in agrarian questions. During this period the Ribbon lodges overspread Ireland like a network from Belfast to Bantry, while the headquarters of the confederation was Tipperary County, though King's County and Queen's County, Meath, Westmeath, and Monaghan—the 'Gap of the North,' were in turn the temporary centres of its operations. Between the lodges there was the connection of common aims and like modes of operation, but it required an extraordinary crisis and leaders of commanding character to ensure simultaneous action. R. was a league against the Saxon and the Orangeman; but in a greater sense an organisation to protect the artisan and peasant; to intimidate grasping employers, oppressive landlords, and their agents; to evade the excise, and to punish delinquents either within or without the society. Small offences were dealt with by individual lodges, but crimes esteemed capital were subjected to wider investigation, and the instruments of the assassinations were invariably despatched from a distance. The organisations prior to R. were those of the Whiteboys, who appeared about 1760; the Threshers, who are first heard of in 1806, and who regulated tithes and priests' dues, and the prices of articles required by the poor; and about 1814, the Carders, Shanavests, and Caravats, local organisations in the S. and W. R. first began about 1808 or 1810, but it did not assume importance until 1820. Though its origin was due to the existence and example of the Orange lodges, it never regarded the extermination of Protestants as an end. Its main object was to prevent any landlord under any circumstances whatever from depriving a tenant of his land, and, secondly, to prevent any tenant from taking land from which another tenant had been evicted. That R. had any connection with the Catholic Church was a delusion which many persons in England entertained, but which was dissipated by the evidence given before a Committee of the House of Lords in 1839. R. was declared illegal by the Westmeath Act, June 16, 1871. In the mean of crime for 1836, 1837, and 1838, as compared with the mean for 1826, 1827, and 1828, there appears a decrease in cases of murder and manslaughter of 10 per cent., shooting at and stabbing, 46 per cent., and conspiracy to murder, 20 per cent. A less sectarian system of government, and greater efficiency and certainty of punishments in the courts of law, have had great influence in checking R., while experience and time have shown the highly imaginative people of Ireland how many of their wrongs and the supposed remedies for these were alike unreal, imaginary, and sentimental. See Trench's *Realities of Irish Life* (Lond. 1868).

Ribeauville (Ger. *Rappoltswiler*), a town of the German Empire, in the province of Elsass, has manufactures of leather, paper, spirits, dyestuffs, and dress articles. An excellent white wine is largely produced. R. contains the ruins of Notre-Dame-de-Tusenbach, and of the castles of St. Ulric and Rappolstein, the latter having a high tower. Pop. (1875) 5780.

Ribera. See SPAGNOLETTO.

Rib-Wort. See PLANTAGINACEÆ.

Ribs, the name given to the long slender bones springing from the vertebræ of vertebrates, and for the most part attached in front to the breastbone, thus forming, along with the latter bone and spine, the *thorax* or *chest*. The R. may arise from various parts of the spine. In man and mammals at large they correspond in number with the dorsal vertebræ. Man has twelve pairs of ribs. The gorilla has thirteen pairs; but thirteen pairs are occasionally found in man also. Sometimes only eleven pairs occur in man. The first seven pairs of R. are directly joined by their (*costal*) cartilages to the breastbone in front. These are the *true R.* Of the remaining five pairs, the eighth, ninth, and tenth pairs are connected to the sternum mediately through their attachment to the costal cartilages of the lower true R. The eleventh and twelfth pairs spring from the spine, but are not attached to the breastbone, and are hence named *floating* or *free R.* The five last pairs are collectively named *false R.* Each rib is attached by a *head*, which is divided into two facets

or surfaces, which articulate with the bodies of two contiguous vertebræ. The *neck* of the rib is the succeeding flattened part of the bone, the *shaft* being thin and flat, and exhibiting a bend at the *angle* of the rib. The *upper border* of the rib is thick and rounded, the *inferior border* thin and sharp. The *first rib* is the shortest, and exhibits the sharpest curve. The *second rib* is larger than the first, but closely resembles it in its curvature. The *tenth, eleventh, and twelfth R.* have each only a single *facet* at the head, and the twelfth is much shorter than its predecessor. Each rib (save the eleventh and twelfth) is developed by three centres of ossification, the two last having only two such centres.

In some vertebrate animals (*e.g.*, Frogs and Toads) R. are entirely wanting; and a like condition characterises the Lampreys, Hagfishes, and Lancelet as the lowest of the fishes. No division into 'true' and 'false' R. can be made in Serpents, Tortoises, Turtles, and Fishes, these animals having no breastbone. Birds and Seals have more true R. (relatively to the number of false R.) than Man; but the case is reversed in the Whalebone Whales, in which only a single pair of 'true' R. may occur. In some animals (*e.g.*, Manatee) the R. become enormously thick and strong. The R. of lower animals may be given off from regions of the spine other than the dorsal region. Thus in crocodiles *cervical R.*, or neck R., occur. Birds have *sacral R.* (*i.e.*, R. given off from the sacrum), and in the Amphibian *Menobranchius*, R. are found to be developed even from the tail vertebræ. Some animals (*e.g.*, Pythons) have enormous numbers of R.—as many as 320 pairs. In *Amphiuma*, an Amphibian, there are only five or six pairs of R. The two-toed sloth has twenty-four pairs, and only nine pairs occur in *Hyperocean*, a whale. In the Flying Dragon (*q. v.*) certain of the anterior R. are developed to support the flying-membrane, and the Cobra-snake of India expands its 'hood' by the erection of cervical R. Serpents may be said to move on the extremities of the R., which are attached to the broad ventral shields or plates of the under surface of the body. In Tortoises, the R. are broadened and united, and form the basis of the *carapace*. The *costal cartilages* are replaced in Birds by the so-called *sternal R.*

Fracture of the R. is a very common accident, and occurs either as the result of direct violence, or of indirect force from compression of the thorax by a crush, when a good many ribs may give way at or near their angles and sometimes on both sides of the chest. Cases are also on record in which a rib has been fractured by muscular action in coughing. F. of the R. may be (1) uncomplicated, or (2) complicated with injury to the neighbouring soft parts.

The *treatment* consists in avoiding the movements of respiration as much as is compatible with the patient's comfort, and all active exertion should be forbidden. A bandage should be applied round the whole thorax, as low as the end of the sternum, when the patient has emptied the chest as much as possible by expiration, and the bandage should be supported over the shoulders to prevent it from slipping down. Sometimes a belt, fixed with buckles, is applied round the injured part, but the bandage or belt should be worn for at least a month. When the lung is injured, the complication is marked by *emphysema*, and this condition is manifested by a dry crackling sensation, perceptible on the very slightest touch, and so peculiar that, when once recognised, it can never afterwards be mistaken. A fracture of this kind is much more serious than a simple fracture, and the treatment varies according to circumstances.

Ricardo, David, the son of a Jewish stockbroker, whose family had come over from Holland long before, was born in London, 19th April 1772. Educated partly in England, partly in Holland, he entered on the business of the London Stock Exchange at the age of fourteen, and, having offended his father by renouncing the Hebrew faith and marrying on the attainment of his majority, he was forced to rely entirely on his own efforts. Combining to an extraordinary degree the best qualities of a merchant with those of a man of society, he contrived within a few years to retire with a large fortune, and devoted himself to scientific pursuits. He made considerable progress in mathematics, geology, and chemistry; but in 1799 the *Wealth of Nations* fell into his hands and turned him into the ranks of the economists. In 1809 he contributed a famous set of articles on the market price of bullion to the *Morning Chronicle*. These articles were afterwards expanded into the tract entitled *The High Price of Bullion a Proof of the*

Depreciation of Bank Notes. They seem to have largely influenced the Parliamentary Bullion Committee then sitting; and Mr. Bosanquet having written a pamphlet called *Practical Observations on the Bullion Reports*, Ricardo answered that gentleman's strictures in *A Reply to Mr. Bosanquet's Practical Observations* (1811). In 1815 appeared his *Essay on the Influence of a Low Price of Corn on the Profits of Stock*; in 1816, *Proposals for an Economical and Secure Currency, with Observations on the Profits of the Bank of England*; and in 1817, his great work, *Principles of Political Economy and Taxation*. The last of his publications was a pamphlet on *Protection to Agriculture* (1822). He entered Parliament in 1819 as member for Portarlington, and in the House acquired great influence as a clear, though cautious and somewhat reserved debater. His death took place at Gatcomb Park, Gloucestershire, 11th September 1823. The most inoffensive and benevolent of men, R., on account of his economical doctrines, was involved in the fiercest struggles, the result, in some degree, of the ambiguity with which he expressed his views in print. The two distinctive tenets of R., those of Value and Rent, are explained, the former in POLITICAL ECONOMY, the latter in RENT. His works have been edited, with Memoir, by his enthusiastic admirer M'Culloch (1 vol. 1846). See chap. xxviii. of Picciotto's *Anglo-Jewish History* (Lond. 1875).

Ricasoli, Bettino, Baron, an Italian statesman, was born at Florence, 9th March 1809, studied at Pisa and Florence, where he became imbued with a love of Italian independence and unity. Having married early, he devoted his life to farming until 1847, when a *Memoir*, dedicated to the Grand Duke Leopold II., whose attention he drew to many administrative abuses, involved him in politics. In the events of 1848 he had no active share, though he afterwards supported the Grand Duke until he abdicated. After the battle of Novara and the treacherous reinstatement of the Grand Duke by the Austrians, R. went back to his farm, whose wine products in 1855 procured him a medal and the cross of the Legion of Honour. In 1859, on his return to political life, he became the Dictator of Tuscany, in 1861 Prime Minister of Italy, and again in 1866. R. retired in April 1867 with the reputation of being a guileless advocate of liberty, but with a conscience too keen and scrupulous for sustained success in practical politics. See Luigi Passerini's *Genealogia e Storia della Famiglia R.* (Flor. 1861).

Ricci, Matteo, founder of the Jesuit Chinese missions, was born at Macerata, in the Marches of Ancona, 6th October 1552. In 1571 he left off studying law at Rome and became Jesuit, accompanying Valigian, the 'visitor-general' of Oriental missions, to India in 1577, where he finished his theological studies at Goa, and was fixed upon as the man best suited by ability and ardour to introduce Christianity into China. He learned Chinese at Macao, but it was not till 1583 that he was allowed to settle at Tchao-King-Fu. He at once saw that to gain any influence he would have to enter thoroughly into the ways and character of the people, and gain the consideration accorded to a mandarin. With this view he published a *Chinese Map of the World*, and a little *Catechism*, in which he set forth only the great moral principles of Christianity. These works at once gained him the highest esteem. In spite of many persecutions he went on teaching, giving instructions also in mathematics and chemistry, and in 1595 attempted to go to Peking in the dress of a Chinese scholar, but was stopped at Nanking and forced to retire to Nang-Tchang-Fu, where he wrote a treatise on the *Art of Memory*, and a *Dialogue on Friendship*, which so delighted the Chinese that he was allowed to visit Peking, and finally to settle at Nanking with a daily growing reputation. In 1600 he gained an audience of the Emperor, and was allowed to build a church at Peking, where he remained till his death, 11th May 1610, skilfully retaining the favour of the Emperor, the court, and the literati, teaching science, and publishing works both scientific and religious, aiming all the while at propagating Christianity. Chinese history designates him Le-Ma-tsou, sometimes Si-thai. Among his chief Chinese works are a treatise on the *True Doctrine of God*, an *Arithmetic*, a *Translation of the First Six Books of Euclid*, and a treatise on *Practical Geometry*. But his most interesting writings are his memoirs, published by Père Tregault at Augsburg in 1615 (Lyon, 1616) with the title, *De Christiana Expeditione apud Sinas suscepta ab Societate Jesu, ex M. Riccii Commentariis libri V.*, full of precious information on Chinese history and geography.

Sixty-six letters of the illustrious missionary are still in the possession of his family.

Riccio, or Rizzio, David, said to be a native of Turin, appears in Scotch history in 1561 as musician to Queen Mary. Knox describes his position thus—'The Queen used him for secretary in things that appertain to her secret affairs in France or elsewhere.' He was, says Burton, 'virtually her secretary for foreign affairs.' R. gradually became offensive to the Scotch nobles by his personal arrogance. It was said that he was too intimate with her, and that he was engaged in Popish intrigue. Darnley and the Protestant nobles, therefore, agreed by bond that 'a stranger Italian called Davie should be put to death.' On the 9th of March 1566, Darnley introduced into the Palace of Holyrood some of the nobles. Ruthven entered the Queen's chamber, where sat 'Signor Davie' with other attendants. 'It would please your Majesty,' said he, 'to let yonder man Davie come forth of your presence, for he hath been over long there.' Angry dialogue ensued, and a scuffle in which R. was dragged from behind the Queen, thrust into an anteroom, stabbed by every knife that could reach him, and his body conveyed to the porter's lodge. See Burton's *History of Scotland* (vol. iv.).

Rice (called botanically *Oryza*, being the name by which R. was known to the Greeks and Romans) is the type genus of the tribe *Oryzæ* of the *Gramineæ*. The genus is distinguished by its panicles of single-flowered spikelets, each with two small pointed glumes, and two nearly equal paleæ adhering to the grain; six stamens, and two styles. The common R. (*O. sativa*), unlike most of the long-cultivated cereals, is still found in a wild state in some parts of India, and probably also in N. Australia. The plant is well described by Theophrastus (Book iv. c. 5). It has been cultivated in the East from time immemorial, and is now extensively grown in some of the Southern States of N. America, as also in Egypt, Italy, and the S. of Spain. It is also in cultivation in Central Africa, Madagascar, and Peru. An immense number of varieties are recognised, ranging under three categories—hard, soft, and glutinous. These do not, however, differ materially so far as the composition of the grain is concerned. R. is the favourite food-grain of the people of India; but with the exception of Burmah, Bengal, and a few other districts, in which it constitutes the chief and almost only article cultivated, its use is confined to the richer classes. It grows readily on low lands which are annually flooded, or on terraced hill-slopes; heat and moisture being the two essentials for its development. There are three modes of culture:—The first and simplest consists in sowing the seed broadcast in its natural state. In unirrigated lands this method is universally followed. In the second, the seed is steeped and then forced under warm grass to germinate. The seed with the tender shoots is then thrown into the soil, which has previously been flooded to receive it. This method prevails wherever water is abundant. In the third, the crop is raised in a nursery, and when about a month old the young plants are planted out, at stated intervals, in a well-flooded field. This system of transplanting involves a great deal of trouble, and is only followed in heavy swampy ground where the plough cannot work, although by it the yield of R. is greater than by any of the other methods. The R. crop is sown in India in May or June, and reaped in December. When enclosed in the husk, R. is known as *paddy*. By careful milling this husk is removed, and the pearly grain thus cleaned is what is generally sold in the shops, or it is ground into flour. The R.-husk, or *shude*, is harsh and fibrous in texture, and contains much lignose and silica. It is largely used in adulterating many articles of cattle and human food. Mr. Church gives the constituents of cleaned R. as—Water, 14.6; fibrin, &c., 7.5; starch, &c., 76; fat, 0.5; cellulose, 0.9; mineral matter, 0.5 = 100. R. should not be boiled, but steamed, and is most usefully employed as a food when it is consumed along with substances rich in nitrogenous or flesh-forming matters. It cannot be substituted for green vegetables for any length of time without injury to the system. R.-starch is the smallest of all commercial starches. For the process of making the much-advertised patent R.-starch, see *Perrira, Mat. Med.* (4th ed. vol. ii. p. 73). The Chinese vermicelli is composed of a folded filament made of R.-paste. In Japan, a beer called 'saki' is made from R., and the Chinese and the aboriginal tribes of India prepare several kinds of intoxicating liquor from it. Arrack (q. v.) is the spirit distilled from R. and molasses.

In the year 1877-78 the total exports of R. from British India were 18,175,231 cwt., valued at £6,877,361, showing a decrease in quantity but a large increase in value as compared with the two preceding years. Out of the total, 10,488,198 cwt., valued at £3,347,828, were sent to the United Kingdom. British Burmah contributed 11,595,395 cwt., and Bengal 5,884,363 cwt. The Burmese exports come direct to Europe, to be used not only for food, but for making starch, &c.; the produce of Bengal, besides affording the best table R. consumed in England, is also sent in large quantities to Ceylon, the Mauritius, and the Straits Settlements. Besides this, other Eastern countries export more or less considerable quantities to the United Kingdom. Thus in 1876 it received—

From Siam	313,129 Cwts.	£122,589 Value
" Japan	94,580 "	59,204 "
" Other countries	80,459 "	44,222 "

The R. production of the United States in 1860 was 187,167,034 lbs.; in 1870, 73,644,727 lbs., of which 32,304,825 belonged to S. Carolina (35,884,640 lbs. in 1875), 22,277,380 to Georgia, and 15,854,012 to Louisiana (12,007,380 in 1873). The R. exported from the United States in 1876 had a value of \$30,918.

In 1874 Italy had 574,692 statute acres under R., the estimated crop being 26,999,915 bushels; and Austria Proper in 1875 had 1398, an estimated crop of 18,384 cwt.

In 1875 Russia imported 621,373 *oods* of R.; value, 1,687,225 silver roubles.
 In 1875 Sweden imported 8,161,802 *skalpund* of R.
 In 1875 Denmark imported 16,922,125 *puud* of R.
 In 1876 Holland imported 77,035,000 *kilogr.* of R.; value, 23,111,000 gulden.
 In 1876 Switzerland imported 156,707 *centners* of R.
 In 1874 Greece imported 2,660,698 *ogues* of R.; value, 1,816,407 drachmes.
 In 1876 Italy exported 53,397,000 *kilogr.* of R.; value, 18,689,000 lire.

Of other species of *Oryza*, one or more belonging to Central America serve as fodder grasses. The so-called Canada R. is the produce of the allied *Zizania aquatica* of Linnæus, a tall grass found in shallow streams and around pools and lakes from Canada to Florida. The seeds afford a good meal, which is much used by the Indians for bread.

Rice Paper, the popular name for a snowy white, smooth variety of paper, prepared from the pith of a small plant, *Aralia papyrifera*, which grows wild in the northern districts of Formosa. When first brought to England from China, R. P. received its name from the supposition that it was made from rice. The stem of the plant is cut into lengths of 9 or 12 inches, the pith pushed out, then dried and cut spirally into continuous sheets, which are pressed and afterwards formed into squares of various sizes. R. P. is much used by Chinese artists as a surface for painting animal and flower subjects; it is also dyed and formed into artificial flowers. The *Taccada* shrub, *Scavola Taccada*, yields a similar pith, which is the source of *Malay R. P.*

Rich, Edmund, born at Abingdon, in Berkshire, towards the close of the 12th c., was sent at the age of twelve to a school at Oxford, and thence with his brother Robert proceeded to the University of Paris. Summoned home by the last sickness of his saintlike mother, he hired a hall at Oxford, and lectured there for several years, being one of the chief introducers of Aristotle to the English schools, and counting Grosseteste among his pupils. When a boy at school, he had already vowed himself to celibacy, and with quaint devotion plighted troth to an image of the Blessed Virgin in an Oxford church; now one night in a dream his mother bade him study the mystic symbol of the Trinity in place of Euclid's diagrams, and Edmund accordingly took orders, becoming treasurer of Salisbury Cathedral (*circa* 1220). In 1227 he preached the sixth crusade, when miracles attested a holiness that seven years later caused his elevation to the see of Canterbury. As primate he strove to follow in the steps of his great foregoer, Langton, upholding the national party in opposition to Henry's foreign hirelings, lay and ecclesiastical. But though at the Council of Gloucester, in the month succeeding his consecration, he sternly rebuked the king for his murder of the Earl Marshal, Richard of Pembroke, and effected the temporary downfall of Roches and Rivaulx, he found himself thwarted at every turn by these and other favourites, foremost among them the legate Otho le Blanc; and from Rome, where he sought redress in 1238, he returned with a heavy heart. Two years later he left England for France, and, worn out by extreme

asceticism, died at the priory of Soissy, near Provins, November 19, 1240. He was canonised in 1249 as St. Edmund of Pontigny, the place of his burial, whither in September 1874 four hundred English pilgrims repaired to pay their devotions at his shrine. See vol. iii. of Hook's *Lives of the Archbishops of Canterbury* (Lond. 1863).

Richard I. (Cœur de Lion), second Angevin king of England, born at Oxford, 13th September 1157, was the third son of Henry II. and Eleanor of Aquitaine. Receiving the chivalrous training of the period, he became noted for proficiency in arms, for musical and poetical skill, and also for a daring and turbulent spirit. Engaging with his brothers Henry and Geoffrey in a revolt against Henry II., whose ambitious schemes for his sons were only rewarded by ingratitude, R. fled to France in his sixteenth year, and was there knighted by Louis VII. On the death of his brother Henry he became heir-apparent, and refusing to give up Aquitaine to his brother John, as the king wished him to do, he became involved in a contest with John and Geoffrey, and invaded Brittany, of which Geoffrey was ruler. His father having reconciled him with his brothers, he turned his arms successfully against the Comte de Toulouse. Never a very dutiful son, R., when he heard it rumoured that Henry wished the crown to pass to Prince John, did homage to Philippe Auguste for his English lands in France, and along with that king waged war on his father. Henry defended his territories in vain. Ferté-Bernard, Mans, Amboise, Chaumont, and Tours successively fell into the hands of the enemy; and, losing all hope of success, he was humiliated to the acceptance of his son's terms. These were, that R. should marry the Princess Alice, Philippe's sister; that he should receive the homage of all the subjects of England on both sides of the Channel; that Henry should pay twenty thousand marks to Philippe; that Henry's barons should engage, in the event of their master's violating the treaty, to espouse the cause of his son; and that all English vassals who had served with R. should be pardoned. Among those who had so conspired with R., the king was amazed to discover his son John; and the unhappy father, cursing the day he begot such children, died at the Castle of Chinon, muttering, 'Shame, shame, on a conquered king.' R. crossed to England with speed, and was crowned at Westminster, 3d September 1189. But he was rather a knight-errant than a king. 'Born as he was,' says Freeman, 'on English soil, no king ever had less of English feeling; none cared less for the welfare of England; none so systematically made himself a stranger to her.' Scarcely had he ascended the throne than he resolved to raise a crusade—the third. The savings of his father were appropriated for this purpose; honours and offices were sold; and the King of Scotland obtained release from his oath of homage to England on payment of 10,000 marks. The government was left in the hands of the Chancellor, William Longchamp, who was raised to the see of Ely; and on June 29, 1190, the English and French armies, 100,000 strong, met on the plains of Vezela in Burgundy. Philippe conveyed his troops to Sicily by way of Genoa, while Richard proceeded by Marseille. The Crusaders spent the autumn and winter in Sicily; and the French king siding with the King of Sicily in a quarrel with R., the expedition was almost broken up. Eventually a treaty was made, by which R. was freed from his engagement to the Princess Alice, and allowed to arrange a marriage with Berengaria, daughter of the King of Navarre. Leaving Messina on the 10th of April 1191, he encountered severe storms. Some of his ships were wrecked on the coast of Cyprus, and their crews inhospitably treated by the ruler of that island, Isaac Comnenus. R., however, conquered the island in a fortnight, cast Comnenus into prison loaded with silver fetters, and before leaving accomplished his union with Berengaria. The English army reached Acre on the 8th of June 1191. The Christians had held Acre in a state of continual siege for two years, unable to make way against the skilful defence of Saladin; but the arrival of R. inspired them with new vigour, and on July 12, the city whose blockade and defence had cost 300,000 lives threw open its gates. On August 1, Philippe sailed for France, leaving 10,000 of his men under R., who marched to Jaffa, and there defeated Saladin again. But by the time he had reached the Holy City, his army was too much curtailed by war and disease, and with the prize in sight he was forced to turn homewards. He concluded with Saladin a truce of three years, three months, three weeks, three days, and three hours, stipulated that

Acre, Joppa, and other seaports of Palestine should remain in English hands, and obtained protection for all pilgrims to Jerusalem. As he had quarrelled with Philippe, and did not dare to pass through France, R. sailed to the Adriatic, and being shipwrecked near Aquileia, he put on a pilgrim's habit, with the purpose of journeying through Germany. He fell into the hands of an enemy, Leopold, Duke of Austria. The German Emperor bought the prisoner for £60,000, and confined him in a castle in the Tyrol. At the Diet of Worms, 1193, R. did homage for his possessions to the Emperor, and promised a ransom of 100,000 merks. The released king reached England only to find John aiming at the throne. A second coronation (at Winchester, 17th April 1194) 'was held to wipe out the stain of his captivity and his foreign homage.' Soon after he left England for ever. 'For the rest of his reign,' says Freeman, 'his subjects heard of him only as one who was always asking for their money for enterprises in which they had no concern; but, both then and afterwards, it was through royal demands for money that the freedom of England grew and strengthened.' While the brilliant absentee, the 'chivalrous Rufus,' was winning worthless laurels in France, the affairs of England were patriotically carried on by Archbishop Hubert, and his successor in authority, Geoffrey Fitz-Peter the Justiciar. Finally R. died of a wound received at the siege of the castle of Chaluz, April 6, 1199, and was buried at his father's feet in Fontevraud. See *The Chronicles and Memorials of Richard I.* (1864-65), two volumes of the Rolls Series, edited by the Rev. W. Stubbs from MSS. in the libraries of Corpus Christi College and Lambeth; Green's *History of the English People* (vol. i. 1877); Freeman's *History of the Norman Conquest* (vol. v. 1876).—**R. II.**, son of the Black Prince, was born at Bordeaux, 3d April 1366, and in 1377 succeeded his grandfather, Edward IV., with the evil times painted by Langland in *Piers the Plowman* for heritage. Jealousies between Lords and Commons hindered the formation of a regular regency, and the powers of government fell virtually into the hand of R.'s uncle, John of Gaunt (q. v.). The extravagance of the court and an inglorious war with France led to the imposition of the poll-tax, falling alike on poor and rich, and this again to Wat Tyler's insurrection (1381), in whose suppression the boy-king displayed both boldness and address. Scotland was ravaged fruitlessly in 1385, and R.'s attempt in 1388 to assert his independence of control resulted in the execution of his favourites, the Earls of Suffolk and Oxford. Next year, however, he quietly assumed the reins of government, and for nine years handled them wisely and successfully, pacifying Ireland in a single campaign, and at once shielding and repressing the Lollards, but always opposed by his uncle, the Duke of Gloucester (q. v.), who stood at the head of the war or popular party. Through his marriage with Anne of Bohemia, the Wickliffite doctrines were carried to Hus and Jerome of Prague, but Anne died in 1394, and two years later R. wedded Isabella the infant daughter of Charles VI. of France. Gloucester's murder at Calais, and the execution or banishment of most of his adherents, avenged the fall of Suffolk (1397), and from vengeance R. turned to render himself absolute by appointing a permanent committee of twelve peers and six commoners, by forced loans, the outlawry of seventeen counties, and other despotic measures, which roused the enmity of the whole English people. And by the banishment of Henry Bolingbroke (1398) he gave a leader to the national discontent, for during R.'s absence in Ireland Henry landed in Yorkshire, and raising an army of 60,000 men, entered London in triumph. R. returned to find his kingdom lost, and taken prisoner at Flint and brought to the Tower, resigned his crown 29th September 1399. While Bolingbroke ascended the throne as Henry IV. (q. v.), R. was conveyed to Pontefract Castle, where in February 1400 he died either of starvation or by an assassin's hand. He left the character of one whose brilliant qualities, shared by all the Plantagenets, 'were marred,' says Green, 'by fitful inconstancy and a mean spirit of revenge.' See Wallon's *R. II.* (2 vols. Par. 1864), and vol. i. of Green's *History of the English People* (Lond. 1877).—**R. III.**, eighth son of Richard, Duke of York, was born at Fotheringay Castle, 2d October 1452. On his father's fall at Wakefield (1460) he was sent to Utrecht, but returned next year after the Yorkist victories had raised his eldest brother to the throne as Edward IV. (q. v.), and by him was created Duke of Gloucester and Admiral of England. He fought for Edward at Barnet and Tewkesbury, had perhaps a hand in the

death of both Edward, Prince of Wales, and Henry VI. (1471), but must be acquitted of his brother Clarence's murder (1478). High at this time in favour with king and people, he closed a successful campaign in Scotland with the capture of Berwick Castle (1482), and on the death of Edward IV. (9th April 1483) was left Protector of the realm for Edward V. (q. v.). His first step was to break up the Woodville or queen-dowager's party by the arrest of her brother, the Earl of Rivers, and three others (30th April); the next to lodge his nephews in the Tower, which they never left alive. Differences arising in the Council, the Lord Chamberlain Hastings, R.'s partisan till now, changed sides, and on 13th June was seized and beheaded; on the 22d Dr. Shaw in a sermon at Paul's Cross impeached the legitimacy of the late king's children, and, according to More, of Edward IV. himself; the Duke of Buckingham followed suit; and on the 26th R. was enthroned as king, Rivers and his fellow-prisoners having been executed at Pontefract the day before. The popularity which greeted R. on a royal progress was quickly clouded by rumours of the murder of the princes; in October, Buckingham, at the prompting of Morton (q. v.), headed a rising in favour of the Earl of Richmond (see HENRY VII.), and his defeat was mainly due to a great tempest. He followed Hastings to the block, and R. vainly strove by lavish bounty to the Church, pardons to his opponents, and the abolition of benevolences, to stem the growing discontent. On 7th August 1485 Richmond landed at Millford Haven, and marching through Wales, encountered the royal forces on the 22d at Bosworth Field, in Leicestershire, when R., forsaken by Stanley and Northumberland, fought his way right to his rival's presence, and, crown on head, and the shout of 'Treason' on his lips, died like a boar at bay. 'The day,' says Mr. Gairdner, 'has now gone by when it was possible to doubt the evidence at least of R.'s principal crime (the murder of his nephews). At the same time he was a good general in war, liberal to the extent of imprudence, and as a king seems really to have studied his country's welfare.' The bodily deformity which has gained him the nickname 'Crookback,' although 'perceptible, was probably not conspicuous.' See J. Gairdner's *Life and Reign of R. III.* (Lond. 1878).

Richard of Cirencester (*Ricardus Corinensis*) was born in the beginning of the 14th c. at Cirencester, Gloucester, and in 1355 entered the Benedictine monastery of St. Peter, Westminster. His name occurs in documents of that establishment for the years 1387, 1397, and 1399. His proficiency in the study of British and Old English antiquities was so great that he was honoured with the title of historiographer; and Pits says that he visited the principal libraries in England in order to collect materials for his work. His history in four books extends from 447 to 1066. He expresses an intention of continuing it, but there is no proof that he did so. R.'s chronicle gives many charters in favour of Westminster Abbey, and a very full account of the lives and miracles of the saints, especially of Edward the Confessor. He likewise wrote *Tractatus super Symbolum Majus et Minus*, and *Liber de Officiis Ecclesiasticis*. These are in the Peterborough Library, and other writings of his are supposed to exist in the Lambeth Library. It was on this author that Bertram of Copenhagen fathered his forgery *De Situ Britannia* in 1747. See Mayor's *Ricardi de Cirencestria Speculum Historiale de Gestis Regum Anglia*, edited for the Public Records Series (2 vols. 1863-69).

Richards, Alfred Bate, author and journalist, son of the late J. Richards, was born in 1820. He is barrister-at-law, but for the last thirty years has been identified with literature. He is author of the following dramas:—*Cræsus* (1845), *Runnymede* (1846), *Cromwell* (1847, produced at the Queen's Theatre 1873), *Isolda* (1848), and *Vandyke* (1850), and he also wrote the dramatic version of *Norma* in which Miss Wallis appeared in 1875. His poetical works include *The Drama of the Soul* (1848), *Religio Anima* (1866), and *Malta* (1869), and he has published four volumes of *Poems, Essays, and Opinions*, and a novel *So Very Human* (1873). Mr. R. was for two years editor of the *British Army Despatch*, was the first editor of the *Daily Telegraph*, and succeeded Mr. Grant as editor of the *Morning Advertiser* in 1870. He was one of the most prominent and active promoters of the volunteer movement. He convened the meeting at St. Martin's Hall on April 16, 1859, for the purpose of organising volunteer corps, and was colonel of the 3d City of London (Artisan) regiment from its formation till 1869.

Rich'ards, Brinley, an English composer, was born in Carmarthen in 1819. He obtained the King's Scholarship at the Royal Academy of Music in 1835, and again in 1837, and subsequently became a professor in that institution. R. has written a large number of concertos, tarantelles, studies, &c., for the piano-forte, and some hundreds of songs, including 'God Bless the Prince of Wales,' which has become a sort of supplementary national anthem. He is also celebrated as a pianist.

Richardson, Benjamin Ward, M.D., F.R.C.S., a distinguished physician and scientist, was born at Somerly, Leicestershire, October 31, 1828, and graduated at St. Andrews in 1854. He undertook the editorship of the *Journal of Health* in 1855, and in the following year gained the Astley-Cooper prize for a treatise on the coagulation of the blood, and the Fothergillian gold medal for an essay on diseases of the fœtus. He is the originator of several novel and original medical processes, such as the use of ether spray for local pain, and methylene bichloride as a general anæsthetic, and is one of the ablest and most successful experimenters in his profession. He has been a careful student of the effects of modern tastes and fashions upon health, and he is an earnest sanitary reformer. In 1868 he was presented with a testimonial and a thousand guineas by 600 professional friends in recognition of his services to medicine and science. His writings include *Clinical Essays* (1862, &c.), *For and Against Tobacco* (1865), *Alcohol, its Action and Use* (6 lectures, 1869), *Diseases of Modern Life* (1876; 4th ed. 1877), and *Hygeia, a City of Health* (1876). The last-named work made a great impression on the public mind.

Richardson, Charles, LL.D., born in July 1775, abandoned the study of law for that of linguistics, and in 1815 produced his *Illustrations of English Philology*. Intrusted with the lexicographical portion of the *Encyclopædia Metropolitana* (1818), he afterwards published the results of his labours separately as a *New Dictionary of the English Language* (2 vols. 1835-37; new ed. 1863). R. was also author of a treatise *On the Study of Language; an Exposition of Tooke's Diversions of Purley* (1854), and a frequent contributor to the *Gentleman's* and other magazines. He died at Feltham, in Middlesex, October 6, 1865.

Richardson, Samuel, was born in Derbyshire, 1689. Intended for the church by his father, a joiner, he never received more than the simplest village schooling, and in 1706 was bound apprentice at London to John Wilde, a printer in Stationer's Court. Many were the female hearts in Derbyshire the chubby young 'prentice left inconsolable. He writes: 'As a bashful and not forward boy, I was an early favourite with all the young women of taste and reading in the neighbourhood.' For some of these girls he was in the habit of writing love letters, and not a little of the knowledge of woman displayed in *Pamela* went up to London with the youth of sixteen. His London master soon called him 'the pillar of the house;' at the end of seven years he became a trusted foreman, and then he set up business for himself in Salisbury Court, Fleet Street, marrying the old printer's daughter. In Salisbury Court he worked not only with types but with pen, being employed occasionally to furnish indices, prefaces, and—as he calls them—'honest dedications,' for books of the day. He obtained the printing of the House of Commons journals, in twenty-six folio volumes; in 1754 was elected Master of the Stationers' Company, and six years later bought a half interest in the patent of king's printer. As a business man he had proved very successful and very popular. But when more than fifty years of his life had passed, two booksellers chanced to ask R. to write a collection of familiar letters, and in so doing prepared the way for the first English novel. R. was by nature more of a woman than a man, and like all clever women he showed to advantage in the epistolary form of composition. Considering this project of the humble guide to letter-writing, he formed the resolution of combining the epistles into a story, so that he 'might possibly introduce a new species of writing that might turn young people into a course of reading different from the pomp and parade of romance-writing; and, diminishing the improbable and marvellous with which novels generally abound, might tend to promote the cause of religion and virtue.' The story was accordingly written in three months, and appearing in 1741, took Europe by storm. Five editions were published within the year. *Pamela, or Virtue Rewarded*, a tale we should hardly

nowadays include in a course of reading for young people, details the designs of a young rake on his beautiful servant, who combines singular devotion to the person of her master with firm resistance to his wiles. She at length gains virtue's reward by driving to church with this utter scoundrel, who can gain her no other way than by the parson's help; and so she marries him, amid the pious hosannas of all her friends. The novel, which at best inculcates but a prudential morality, was publicly praised from many pulpits, though Dr. Watts was no doubt right in telling the author that ladies could not read it without blushing. The young town wits, moreover, were not slow to make merry over its priggishness; and Fielding wrote his first novel, *Joseph Andrews*, to burlesque it. R. added a sequel to *Famela*, but with no addition to his fame. In the year 1749 he published the first two volumes of *Clarissa Harlowe*, a book ultimately extended to eight volumes. By this, indeed, the wits were hushed into respect; for the history of *Clarissa*, tedious though it be, is yet a minutely truthful analysis of human passions, and towards the close develops an interest only the highest tragic powers could enlist. But its villain, Lovelace, found favour with so many of R.'s fair correspondents, that the author hastened to put before them his ideal of a true Christian gentleman. The *History of Sir Charles Grandison*, extending to seven volumes, appeared in 1753. Sir Charles has become the proverbial prig of literature; but the mental derangement of *Clementina* is in this book so skillfully unfolded, that a cautious critic has gone the length of saying that, for strokes of nature and passion it surpasses the madness of *Orestes* or *Lear*. These three novels are all the works of R. worth more than mention. The world he depicts in them is a narrow world. He studied it over his tea-cup and from the gossip of a hundred female scouts. Dr. Johnson, who placed him far above Fielding, yet declares, 'Were you to read R. for the story, your impatience would be so fretted, you would go hang yourself.' Yet in deserting the elaboration of incidents for the study of character, R. had the merit of adding a new form to literature. If no single page of his rises above mediocrity of sentiment, yet the whole effect of any one book is near akin to that of genius. R.'s first wife died in 1731, leaving five boys and a girl. His second wife bore him five girls and a boy. He himself, having lived a life stained by no vice, and by nothing more criminal than vanity, died on the 4th of July 1761. His inconsiderable writings are *Negotiations of Sir Thomas Roe in his Embassy to the Ottoman Porte* (1740), an annotated edition of *Æsop's Fables, Familiar Letters*, and additions to Defoe's *Tour through Great Britain*. His correspondence, which showed his vanity more than his talent, was edited in six volumes, with *Life*, by Mrs. Barbauld in 1808. His complete works (19 vols.), with memoir by Mangin, appeared in 1811.

Richardson, Sir John, the Arctic explorer and naturalist was born at Dumfries, Scotland, 5th November 1787. In 1801 he passed from Dumfries Grammar-school to Edinburgh University, from which he entered the navy as assistant-surgeon in 1807. Having graduated M.D. at Edinburgh (1816), he accompanied Franklin (q. v.) as surgeon and naturalist to the Arctic Expeditions of 1819-22 and 1825-27, in the latter descending with Kendall the E. branch of the Mackenzie River, and, after tracing the coast of the Arctic Sea eastwards to the Coppermine River, which he descended for 11 miles, travelled overland to join Franklin at the Great Bear Lake. An account of this journey was appended to the *Narrative* published by Franklin (Lond. 1829), and in 1829 R. issued the first part of his *Fauna Boreali-Americana* (Part II. *The Birds*, by Swainson and R., 1831; III. *The Fishes*, by R., 1836; IV. *The Insects*, 1837). R. was appointed physician to the fleet in 1838, inspector of hospitals in 1840, and in 1846 was created a knight. He commanded one of the three expeditions sent in search of Franklin in 1848, returned in November 1849, and published an account of it under the title *Arctic Searching Expedition: A Journal of a Boat-Voyage through Rupert's Land and the Arctic Sea* (2 vols. Lond. 1851). R. also wrote Part I. of *Icones Piscium* (ib. 1842), and contributed to the natural history of the voyages of Captain F. W. Beechey (ib. 1839), Sir James C. Ross (ib. 1845), Captain H. Kellett (ib. 1852), and Sir E. Belcher (1848 and 1855). He retired from the service in 1855, and died at Lancrigg, Grassmere, June 5, 1865. See his *Life* by J. Mellraith (Lond. 1868).

Richelieu, Armand Jean du Plessis, Cardinal, Duc de, third son of François du Plessis, Seigneur de Richelieu in

was born at Paris, September 5, 1585. At first he followed at the colleges of Navarre and Lisieux with a view to entering the army; but his brother Alphonse having resigned to the episcopate, R. got the offer of it from Henri IV., and to take his theological doctorate, was consecrated in the presence of Paul V. at Rome (1607), and in October of the same year, having obtained his degree, entered upon the duties of his office. Occasionally he appeared at court, and became known in Parisian pulpits. In 1614 he was appointed deputy to the States-General for the clergy of Poitou, and having gained the favour of Marie de Médicis, he became attached to the court, entered the Council of State, executed a mission to the Prince de Condé, departed on an embassy to Spain, and acted as War and Foreign Secretary (November 25-30, 1616). Retiring for a time to his diocese, owing to a court intrigue, R. was not able to recover his lost ground until 1620. Two years later he became Cardinal, but not till 1624 was he ushered into the career of office. He was then called to the King's Council, and though desirous of keeping in the background, became the virtual head of it. At once he drew up a marriage-treaty between Henrietta Maria and Charles of England. The English, Dutch, and North German provinces he played off against the Austro-Spanish power, and in 1625 he checked the Spaniards in the United Provinces. In the war of the Valteline he was compelled to operate against the Pope, securing the province to the Grisons. But events turning against him, he gave up his old allies, signed a treaty of peace with the Reformed Churches and the Spaniards, thus reversing, as it seemed, his whole previous policy. From 1626 to 1628 R. set himself to crush domestic resistance, acting apparently with Spain against the Huguenots and the German Protestants. During this period a plot, which had as its object the elevation to the throne of the king's brother and R.'s death, was discovered and crushed. His domestic policy began at the same time to develop. It included the abolition of annual dues, the purchase of hereditary places, and the reduction of privilege and exemption. His plan of government became revealed as an absolute monarchy, with a free people ruled by an all-potent statesman. In 1627, carrying on his attacks on the Huguenots, R. laid siege to their stronghold of La Rochelle, which capitulated October 30, 1628, after a desperate resistance. He allowed the Huguenots, however, to exercise their own worship, but deprived them of their fortresses, their military and political privileges, and their republican right of assembly. Between 1627 and 1633 R. triumphed over his enemies at home, and definitely asserted his influence in European politics. The Spaniards were besieging Casale on the Po. R. disliked a war, but he prevented the siege, reasserted French influence across the Alps, and had a treaty signed with England, April 1629. He then changed the scene to Languedoc, and by the reduction of Montauban quelled the Huguenots. Before the end of the year he had been named, despite of the hatred of the court party, principal Minister of State and Lieutenant-General, representing the king's person in his army at home or abroad. R. became the focus for court-plotting in 1630, the queen-mother having gained temporary influence over the mind of the king. But R. faced him at Versailles, and in one interview regained his position. The queen-mother and the court ladies were exiled by him from the court. The same year he became duke, peer, and governor of Brittany. In 1632 a rising in Languedoc gave him an opportunity of removing the hostile or suspected governors of provinces, and substituting his own friends. He took time in 1635 to found the French Academy, and from that year to his death he conducted France through the Thirty Years' War, his policy being to depress Austria, and the means he used for that end being an alliance with the German Protestants. R. had been appointed Lieutenant-General of the realm, with full powers, when he died at Paris, December 4, 1642. His character has been estimated from many points of view. Corneille satirised him in the remark that 'pride, ambition, self-interest, avarice, clothed with his name, dictated laws to France.' Montesquieu called him 'one of the two worst citizens France has produced.' Yet an examination of his *Testament Politique* reveals a nobly merciful interest in the welfare of France, and a desire to lighten the taxation of her peasantry, and to elevate her industries and commerce. His temperament was certainly cold and repellent. He had a relentless strength of purpose. He was courageous, watchful, cunning, and unscrupulous in the application of means to ends. But his greatness as a

statesman, judged by historical results, and the permanent influence he has exercised on the destiny of France, cannot now be gainsaid. See *Les Mémoires de R.*, published by Petitot (Par. 1823); Sismondi, Martin, and Michelet's Histories of France; Kitchin's *History of France*, vols. ii. and iii. 1877; and Marius Topin's *Louis XIII. et R., avec Lettres inédites* (Par. 1876).

Rich'mond, an interesting town of England, in the county of Surrey, and a favourite summer resort of Londoners, is beautifully situated on the summit and slope of R. Hill, which rises somewhat abruptly from the right bank of the Thames, 10 miles W.S.W. of the metropolis by rail. The famous terrace extending along the brow of the hill commands a broad, magnificent bend of the Thames, the further windings of the river between the soft green of the Twickenham shores and the leafy masses of 'umbrageous Ham,' and a wide radius of rich, varied landscape, reaching in the W. to the grey towers of 'imperial Windsor.' Originally called Scheen or Sheen, R. is a place of considerable antiquity. Henry I. here built the palace of which, under Richard II., Chaucer was clerk and surveyor of the works. Henry VII. rebuilt the palace, and called it R. from his own earldom. Edward III., Henry VII., and Elizabeth died at R., which continued to be a royal residence till the Revolution, when the palace was partly destroyed. The Old Park, formerly the park of the palace, extends along the Thames to Kew Gardens, with which it was united by George III. What is now called R. Park, lying to the S.E., is a beautiful piece of land, enclosed by a brick wall eight miles in circuit. The river is spanned between R. and Twickenham by a handsome stone bridge of five arches, and its banks are studded with delightful villas, while in the vicinity are many lordly mansions, including those of the Duke of Buccleuch and the late Earl Russell. Sir Joshua Reynolds, Gainsborough, Collins, and Thomson resided at R., and the churchyard of the parish church contains the tombs of Thomson and of Kean the actor. The church of St. Matthias, with a spire 190 feet high, was erected from designs by the late Sir G. G. Scott in 1858. The well-known 'Star and Garter' hotel, on the slope below the terrace, was built in 1738, and after being destroyed by fire (1870), was re-erected (1872-74) at a cost of £24,000. The new palatial building has a hall 80 feet long by 61 in breadth. R. is mainly dependent on the resident gentry and the crowd of summer visitors; but there are breweries, malt-houses, market-gardens, and nurseries, and an active trade in coal, &c., by rail and river. A reservoir holding 750,000 gallons was opened in 1876. Pop. (1871) 15,113.

Rich'mond, a market-town in the N. Riding of Yorkshire, on the left bank of the Swale, 15½ miles by rail S.W. of Darlington, has brass and iron foundries, tanneries, and corn and paper mills. The parish church of St. Mary, a fine building, mainly Gothic, partly Norman, was restored in 1860, and a large and highly decorated Roman Catholic chapel of St. Joseph and St. Francis Xavier was built in 1867. The endowed grammar-school, founded 1567, has (1878) 9 masters and 80 boys, and 6 scholarships. R. publishes one weekly newspaper. The castle of the Duke of R., very picturesquely situated, overlooks the river. Pop. (1871) 4443.

Rich'mond, capital of Virginia, U.S., is situated amid a cluster of picturesque hills, on the N. side of James River, at the Great Falls, the head of the tide-water, 151 miles from the mouth. It is well built, and the surrounding scenery is beautiful. Near the city are immense quantities of fine granite, and within easy reach are the vast coal and iron veins of the state. In 1874 there were in R. 57 tobacco and 36 cigar factories, producing 23,803,189 lbs. of tobacco, and 4,072,200 cigars. There are also very large flour-mills and ironworks. The manufactured products of the city in 1874 amounted to \$17,746,720, of which the tobacco factories produced \$8,327,581, the flour-mills \$2,214,683, the ironworks \$2,946,760, and a great variety of manufactories the rest. The river has been rendered much more navigable by the James River Improvement, the mean high tide at the wharves of the lower part of the city giving a depth of about 18 feet. In the year ending June 30, 1875, there entered 44 vessels of 10,775 tons, and cleared 103 of 29,144 tons; while the exports amounted to \$2,944,642, and the imports (chiefly coffee and salt) to \$433,905. R. has a chamber of commerce,

corn and flour, tobacco and stock exchanges, the State Penitentiary, the State Capitol, a handsome edifice with a fine pillared portico, State Central Lunatic Asylum, a theatre, 51 churches, several fine cemeteries, 93 public free schools, R. College for males, under Baptist control, established 1844 (with 7 professors and 128 students in 1875), R. Female Institute, several higher schools under Roman Catholic management, a medical college, 5 daily newspapers, several religious and secular weeklies, a medical, agricultural, and educational monthly, &c. Two bridges give communication with Manchester, a small town on the S. side of the river. The water supply, drawn by steam-power from the river above the falls, amounts to 350,000,000 gallons daily. R. was made a town in 1742, and in 1779 State capital. In 1781 it was taken and burned by Arnold; in 1811, seventy persons were killed by the burning of the theatre; in 1861 it was made the capital of the Confederate States, and was evacuated after a splendid defence by Lee in 1865, when a large part of it was burnt; in 1870 sixty persons were killed or mortally wounded by the floor of the Capitol court-room giving way; and in the same year the James River inundated a great portion of the city. Pop. (1874) 60,705.

Rich'mond, a flourishing town and an important railway centre of Indiana, U.S., situated on the E. branch of the White-water River, in a rich and well-cultivated district, 68 miles E. of Indianapolis by rail. It has 19 churches, 2 theatres, 3 daily and 5 weekly newspapers, and many benevolent institutions. Earlham College, under the control of the Society of Friends, had (1875) 14 professors and 221 students. The manufactures of R. in 1875 were valued at £545,870. They included woollens, machinery, galvanised ironwork, furniture, and cigars. Pop. (1870) 9445.

Rich'mond and Gordon, Charles Henry Gordon-Lennox, Sixth Duke of K.G., eldest son of the fifth Duke, was born February 27, 1818, and educated at Westminster School and Christ Church College, Oxford. He entered the army on leaving the university, and attained the rank of captain, serving as aide-de-camp to two successive commanders-in-chief, the Duke of Wellington 1842-52, and Viscount Hardinge 1852-54. He sat in the House of Commons as (Conservative) member for West Sussex from 1841 till his succession to the title in October 1860. He was President of the Poor Law Board under Lord Derby's administration in 1859, President of the Board of Trade 1867-68, and has been Lord President of the Council since February 1874. He succeeded the late Earl of Derby in the leadership of the Conservative party of the House of Lords, a position he held till Mr. Disraeli's elevation to the Peerage, and in which his courteous bearing, tact, and business-like qualities won golden opinions for him alike from his political supporters and opponents. He was made Earl of Kinsara and Duke of Gordon in 1876. See GORDON.

Rich'mond, Legh, was born at Liverpool, 29th January 1772, studied at Trinity College, Cambridge, and in 1805 obtained the rectory of Turvey, Bedfordshire, where he died, 8th May 1827. He wrote several religious works, once widely read and much admired. The chief are *The Fathers of the Church*, and a volume of tales entitled *Annals of the Poor* (new ed. with Memoir, 1877). Some of these—e.g., *The Dairyman's Daughter* and *The Young Cottager*—are not yet quite forgotten.

Richt'er, Johann Paul Friedrich—'Jean Paul,' as he taught his readers to call him—was born at Wunsiedel, near Baireuth, in Bavaria, March 21, 1763. His father was an organist and schoolmaster at Wunsiedel, but in 1765 was appointed minister of a church in Joditz, and subsequently removed to the larger parish of Schwarzenbach, on the Saale. His father, 'poor and pious in a high degree,' allowed his son but a small amount of schooling, and at home fed his intellect with pages of the Latin Grammar or the Bible, to be committed to memory. Jean Paul entered the gymnasium at Hof, and there in a celebrated school debate completely routed the orthodox rector with sceptical weapons; but the death of his father plunged the family into debt and misery, amid which only the bravest of young hearts could have continued steady at work and presented cheerfulness. R. did work, digging deep into fathomless German philosophy, delivering orations on 'The Value of the Early Study of Philosophy,' and 'The Importance of the Discovery of New Truths;' reading hard also in every department of literature, and before

leaving school filling ten thick quarto volumes arranged notes and extracts. As for the poverty, he carefully self:—'The poor historical professor would not, for me, have had much money in his youth. Fate does with honey, we do with birds—it darkens the warbler's cage until it is caught the oft-played air he is to sing.' In 1781 he matriculated at Leipzig University, with the view of entering the Church. This view was soon abandoned. At Leipzig he lived in the simplest manner, providing himself with a *testimonium pauper-tatis*, and obtaining free class tickets. In order to economise, he dispensed with collars and cravats, and affronted society by wearing no pigtail. Five years he thus spent, struggling not only for education, but for very life, meanwhile hatching the strangest literary projects. The first work sent to a publisher, *Das Lob der Dummheit*, inspired by the *Encomium* of Erasmus, was rejected; but at the age of nineteen he found a publisher for the *Gronianische Prozesse* (Berl. 1783-85). This satire found a publisher but no public, and its author, surrounded with 'unpaid debts and unsoled boots,' even threatened with the debtor's prison, fled to his mother at Hof. His poverty soon drove him thence, and at Topen he acted for three unhappy years as tutor in the house of Herr von Oerthel. During this servitude to a spoiled boy and an arrogant father, he published his *Auswahl aus des Teufels Papieren* (Gera, 1789) a work which betrayed signs only of his satirical genius. It created no stir, and its author took up school at Schwarzenbach, where he taught for four years, and where his *Levana* was sketched. But his troubles may be said to have ended with the publication of his first novel, a pedagogical romance entitled *Die Unsichtbare Loge* (Berl. 1793). This procured him notice and friends, and encouraged the completion of the well-known *Hesperus* (4 vols. Berl. 1794). *Quantus Fixlein* (Baireuth, 1796), the first book bearing the author's name, 'Jean Paul;' *Biographische Belustigungen unter der Gehirnschale einer Riesin* (Berl. 1796), and *Blumen, Frucht, und Dornenstücke* (4 vols. Berl. 1796-97) followed. R.'s plea for notice had now been made; judgment was awaited. Goethe and Schiller were cold to him, but Herder and Wieland greeted him with admiration and curiosity. Charlotte von Kalbe invited him to Weimar, whither he removed in 1798, and there falling in with Jacobi and other philosophers, he revived his old metaphysical studies, and attacked Fichte in the brilliant *Clavis Fichtiana*. At Weimar were written two minor works, *Der Jubel-senior* (Leip. 1797) and *Das Campaner Thal* (Erfurt, 1798), a treatise on the immortality of the soul. From Weimar he often went as a visitor to the court of Hildburghausen, where he was made a councillor of legation, and where he became engaged to Caroline von Feuchtersleben. This engagement, however, was broken off, and in May 1801 he married the lovely Caroline Mayer, daughter of a privy councillor. The first years of his happy married life were spent at Meiningen and Koburg. In 1803 appeared at Berlin the last volume of *Titan*, the best of his novels, begun at Weimar in 1800, and this was followed by *Fliegeljahre* (4 vols. Tüb. 1804-5). In 1804 R. settled at Baireuth, and there spent the remainder of his life. Prince Dalberg enabled him to enjoy his remaining years in some comfort with a pension of 1000 guilders. His last works were *Des Feldpredigers Schmelzle Reise nach Fläts* (Tüb. 1809), *Levana*, an ingenious treatise on education, as good for the heart as the head (Braunsch. 1807), *Leben Fibels* (Nümb. 1812), and *Der Konig Nikolaus Marggraf* (3 vols. Berl. 1820-23). He commenced an autobiography, which only extends to his thirteenth year, and revised and collected his works in sixty-five volumes, to which five supplementary ones were added (Berl. 1825-38; 3d ed. 34 vols. 1860-63). Almost blind, but labouring to the end, Jean Paul died November 14, 1825.

Not only in the literature of his own country, but in that of all Europe, R. must be designated *der Einzige*, 'the Only One.' In our own literature, Sterne to some extent gives a notion of his erratic, whimsical humour; Swift is scarcely more biting in satire, and certainly not more carefully just; only Lamb draws tears of such refined delight, chased by such tender smiles. Jean Paul is a wit, a humourist, a satirist, a moralist; he is sportively learned, and grotesquely scientific. He envelops his reader in a whirl of the mental elements; he presents scarcely so much complete pictures as kaleidoscopic flashes of colour; he treats the solemnest themes with laughter and finds the profoundest significance in trifles. At times he is absolutely incomprehensible; at times his rioting fancy barely

escapes the charge of buffoonery, yet beneath these masks every page of his betrays a man of the deepest spirituality and the noblest imagination. His style attains the limits of the fantastic, and has been the principal hindrance to his popularity, for readers accustomed to the classic work of Lessing, or Goethe, or Schiller, are apt to turn in disgust from R.'s creaking, many-jointed sentences. He is diffuse and tautological, never knows when to have done, and overloads his style with ornament; like the Persian, hanging jewels on every leaf of his tree. No more comical criticism of Jean Paul has been given than the following title of a sober work—*K. Reinhold's Lexicon for Jean Paul's Works, or Explanation of all the foreign words and unusual modes of speech which occur in his writings, with short notices of the historical persons and facts therein alluded to, and plain German versions of the more difficult passages in the context; a necessary assistance for all who would read those works with profit.* Carlyle has written two essays on R., and translated *Quintus Fixlein* and *Schmelz's Reise*. The last page of *Quintus Fixlein*, as it stands either in the original or in Carlyle's admirable rendering, is perhaps the most beautiful piece of descriptive prose in modern literature. The *Fliegjahre*, *Blumen-Frucht- und Dornenstücke*, *Campaner Thal*, and *Levana* have been also translated into English; the last (Bell, 1876) with memoir and autobiography of the author. One or two of the German lives of R. have appeared in English versions. See *Döring's Leben und Charakteristik J. P. R.* (2 vols. Leips. 1830); *Spazier's Jean Paul Friedrich R., ein biographischer Commentar zu dessen Werken* (5 vols. Leips. 1833); *Wirth, R. als Pädagog* (1863); and *Nerrlich, Jean Paul und seine Zeitgenossen* (Berl. 1876.)

Ricinus. See CASTOR-OIL.

Rick (Old Eng. *hrec*, 'a small heap'), in husbandry, is a piled structure of hay or corn-sheaves, having an oblong plan and a top with sloping sides, which are usually covered with thatching. During the process of heaping, a tarpaulin, called a R.-cloth, is suspended from standards over the R. to protect it from rain.

Rickets, or **Rachitis** (Gr. *rhachis*, 'the spine'), is a constitutional disease, closely allied to struma, manifesting itself chiefly in the bones, but frequently implicating other organs, more especially the great viscera. R. may commence *in utero*, but, generally, it does not begin till the child is beginning to walk, and often not till two or three years or even later. The chief causes of R. are bad feeding, bad air, and want of cleanliness; and hence R. is the most common constitutional disease among the children of the poor. The earliest symptoms of R. are, in the child, restlessness and general ill-health; the child loses all inclination to walk; dentition is retarded and the digestion is disordered. The first local indication is a swelling of the cartilaginous extremities of the long bones, most observable near the wrist or ankle, or where the ribs join with the costal cartilages. This is followed by general softening of the bones, and curvature due partly to pressure in walking or crawling, and partly to the traction of the muscles. The chest-walls are distorted, owing in part to the softness of the thoracic parietes causing them to yield to atmospheric pressure, and to the diaphragm pulling inwards the parts of the ribs to which it is attached. The common 'pigeon-breast' may also co-exist with the rickety deformity. The spine is not peculiarly liable to deformity in R., but the pelvis is often much deformed.

The treatment of R. is both medical and surgical. The diet should be wholesome and sufficient, and great attention should be paid to general hygienic measures. The child should be carefully nursed, and prevented, as far as possible, from crawling or walking. Cod-liver oil, iodide and phosphate of iron, or other ferruginous tonics, combined with general hygienic treatment, usually result in rapid improvement. The application of splints and bandages is useful only in the period of considerable softening; but indirect benefit is sometimes attained in that they prevent the child from walking.

Ricochet Fire, in gunnery, is a method of fire, in which the ball or shell, projected with a smaller velocity and at a greater elevation than in ordinary fire, rebounds along the ground. The elevation is necessary in order that the shot, after clearing

the parapet which covers the line of troops or works aimed at, may descend immediately upon these, dismounting the guns, or raking the troops, as the case may be. R. F. was first employed in 1572 at the siege of Haarlem, and was reduced to method and rule by Vauban in 1688.

Ricord, Philippe, son of a French *émigré*, was born at Baltimore, U.S., December 10, 1800. After studying medicine at Philadelphia, he went in 1820 to Paris, where, at the hospital of Val-de-Grâce and at the Hôtel Dieu, he worked under the guidance of Dupuytren and Lisfranc. In 1826 he obtained his degree. He practised first at Olivet, near Orleans, and afterwards at Crouy-sur-Ourcq; but in 1831 he obtained the post of chief surgeon in the Hôpital du Mjdi at Paris. In 1850 he was elected a member of the Imperial Academy, and in 1869 he became consulting surgeon to the Emperor. His practice is the largest in Paris. His works, chiefly dealing with venereal diseases, in the study and treatment of which he has made himself famous as a specialist, are *Mémoire sur l'Emploi du Speculum* (1833); *Sur l'Inoculation artificielle de la Vérole chez l'Homme* (1833); *Sur la Blennorrhagie de la Femme* (1834); *Monographie du Chancre* (1837); *Traité Pratique des Maladies vénériennes* (1838); *Clinique Iconographique de l'Hôpital des Vénériens* (1841-49); *De la Syphilisation et de la Contagion des Accidents secondaires* (1853); *Lettres sur la Syphilis* (1854-57). R. has also contributed largely to the medical journals of Paris.

Riddles, or roundabout definitions of objects which the hearer is left to name, ranked higher in antiquity than now. The *Eddas* and every Aryan folklore teem with them; Samson propounded them to his wedding guests, and Hiram and the Queen of Sheba to Solomon; while Œdipus, in the myth, wins wife and kingdom by his solution of the enigma of the Sphinx. Even to-day in the Russian government of Pskof a bridegroom only gains admittance to the cottage of his bride by answering any R. she may put to him; and these same R. often show traces of primeval faiths, as this: 'A black cow overthrew the world, a white cow set it up again,' where the black cow stands for night, the white for day. Except in times when men were as gods, who could have ever guessed that by 'Over water, and under water, and never touches water,' was meant a girl crossing a bridge, and bearing on her head a pail of water? But nowadays, when their answer is always known beforehand, these 'sense-R.' (so Mr. Tylor calls them) give more delight than those new-fangled punning conundrums, whose spirit is wholly foreign to the *Demands Joyous* of Wynkyn de Worde or any such like time-honoured collections. See Friedrich's *Geschichte des Räthsels* (Dresd. 1866), and vol. i. of Tylor's *Primitive Culture* (Lond. 1871).

Ridge, the upper horizontal timber in a roof, upon which the upper ends of the rafters rest. Ridges are often ornamented with crestsings or running designs.

Rid'ing (Old Eng. *thriting*, 'a third part'), one of the three divisions of Yorkshire, each of which was subdivided into three or more wapentakes or Hundreds (q. v.), and was under the government of a thrithing-man.

Rid'ing-Master, in the British army. In the cavalry, non-commissioned officers and soldiers are selected and trained at the depôt at Canterbury, to be riding instructors in their corps. A R.-M. has the relative rank of lieutenant; his pay runs from 9s. to 12s. 6d. a day, besides an allowance for expenses, and after 30 years' service (15 of which must have been as R.-M.) he may retire with the honorary rank of captain and 10s. a day. The Artillery are taught riding at the riding establishment at Woolwich.

Rid'ley, Nicholas, descendant of a knightly stock, was born about 1500 at Wiltonswick, Northumberland, and from the grammar-school of Newcastle proceeded to Pembroke College, Cambridge, where he obtained a fellowship, and was ordained in 1524. He also studied theology at Paris and Louvain (1527-29), on his return becoming under-treasurer to the university, senior proctor (1533), and public orator. Foxe attributes R.'s adoption of the Reformed doctrines to the reading of Bertram's book upon the sacrament, and to conference with Cranmer and Peter Martyr. Anyhow, we find him procuring a

decree of the university against the spiritual power of the Pope, acting as Cranmer's domestic chaplain (1537), and shielded by the archbishop from a charge of heretical preaching (1541). To Cranmer's favour he owed the livings of Herne and Soham, the mastership of Pembroke College (1540), a royal chaplaincy, and a Westminster prebend (1545). In 1547 he was raised to the see of Rochester, and thence, on Bonner's deposition three years later, translated to London, where he did the nation good service by stimulating Edward to the foundation of Christ's, St. Thomas's, and other hospitals. He helped to compile the Liturgy and Articles, and in 1552 visited Mary at Hunsdon, to win her from Papistry. His repulse led him warmly to espouse the cause of Lady Jane, the 'Twelfth Day Queen,' and in a sermon preached at Paul's Cross on July 16, 1553, R. declared both Mary and Elizabeth to be illegitimate, 'whereat,' says Burnet, 'the people murmured.' On Mary's proclamation, however, he speedily repaired to her at Framlingham, but met with a cold welcome, lost all his dignities, and was sent to the Tower, 'mounted on a lame, halting horse.' There his heart failed him, and he attended mass, for which a fellow-prisoner, Master Bradford, lashed him so fiercely with his pen, that never afterwards did he pollute himself with 'that filthy dregs of antichristian service.' In March 1554 he was sent down to Oxford, with Latimer (q. v.) and Cranmer, to be tried by a Committee of Convocation, and after a disputation, as fair as those of the succeeding reign, was pronounced an obstinate heretic, a sentence which the fact that England was still unreconciled to Rome rendered irregular. So for eighteen months he lay in Bocardo Jail and at the Mayor of Oxford's house, writing a lamentation over his country's downfall, a farewell letter to his friends, and to the temporal lords a passionate appeal to rescue England from false shepherds. On October 16, 1555, after a second trial, he was led with Latimer to the stake, his marriage, as he had smilingly called it when supping with his friends the night before. That R. surpassed all other prelates of the Reformation in learning is manifested by his *Works* (ed. for the Parker Society by the Rev. H. Christmas, 1841), and in honesty by his adherence to the vow of celibacy taken at ordination. He showed his genial temper in charity to the poor, in kindness to 'my mother Bonner' and Archbishop Heath, his prisoner for a year, and in his love of tennis, archery, and chess. His harshness towards the anabaptists may fairly be imputed to the times; and if he rebelled, he paid the forfeit bravely with his life. See Foxe's *Actes and Monuments*; the histories of Froude and Lingard; R.'s *Life*, by his descendant Gloucester R. (1763); and vol. iii. of Wordsworth's *Ecclesiastical Biography* (2d ed. 1818).

Bien'zi, Nic'olo, commonly called **Oola di Rienzi**, was born in Rome about 1310. His father Lorenzi (abbreviated Rienzi) was a tavern-keeper, and his mother a washerwoman. Though his origin was so humble the boy was of very distinguished appearance, and received a good education, becoming an enthusiastic student of Cicero, Seneca, Cæsar, Valerius Maximus, and, above all, of Livy. He adopted the profession of notary, and in 1342 had attained such a public position as to be included in a deputation to Clement VI. at Avignon. Here he first displayed his extraordinary eloquence in urging the restitution of the Holy See at Rome; and although his efforts were unsuccessful, Clement declared that he could wish to hear him every day. During this visit R. made a friend of Petrarch. Returning to Rome, he exerted himself in leavening the popular mind with revolutionary sentiments, enduring many indignities like Brutus, and according to his own account becoming 'by turns serious or silly, cunning, earnest, or timid, as the occasion required.' The eternal sovereignty of Rome, and her right to appoint her rulers, were the themes upon which R. descanted to the gratified mob. He chose for his text on one occasion the *Lex Regia*, engraved on copper plates which still remain in the church of St. John Lateran. Thither he invited the people; he drew from this enactment—really a proof of the Senate's servility to Vespasian—the boldest arguments for freedom, and succeeded so well as to hold large numbers in readiness for any insurrection he might command. One or two midnight meetings on the Aventine matured the conspiracy; and on the day after Ash Wednesday, 1347, R. affixed to the door of San Giorgio a scroll bearing these words: 'Ere long Rome will return to the

good estate.' The following night he spent in the church of St. Angelo, hearing thirty masses of the Holy Ghost, under whose influence he believed himself to act. At ten in the morning he issued in full armour, but with bare head. Three banners accompanied his procession, one for liberty, one for justice, one for peace. Ascending the Capitol, he caused the laws of the good estate to be read. These enacted that the citizens should be furnished with a special guard for their protection; that the right of nobles to maintain strongholds should be abolished, and that these strongholds should be handed over to the people's delegates; that no civil suit should be protracted beyond fifteen days; that in each harbour of the coast a vessel should be stationed, for the assurance of shipping; that a standing militia of 360 horse and 1300 foot should be levied and supported in the city; that one hundred pounds should be paid to the heirs of every soldier who died in the service of his country; that the revenues of the apostolic chamber should be applied to the maintenance of the public safety, the establishment of granaries, and the relief of orphans and widows.

Such were some of the salutary provisions of this constitution, which was adopted by acclamation. R. was created Tribune, and assumed the title in these words: 'By the grace of Jesus Christ, Nicholas, severe and merciful, deliverer of Rome, defender of Italy, champion of mankind and of liberty and peace and justice, Tribune august.' The revolution seemed complete; the nobles were quelled; peace and commercial prosperity prevailed everywhere; Rome, before a den of robbers, was disciplined like a camp. R. boasted, 'It was hardly to be believed that the Roman people, till now full of dissension and corrupted by every kind of vice, should be so soon reduced to a state of unanimity, to so great a love of justice, virtue, and peace; that hatred, assaults, murder, and rapine should be subdued and put an end to.' Embassies from Florence, Perugia, Venice, and Siena congratulated the Tribune on his successful administration; more than one sovereign did the same. R. now commanded Rome: had he commanded himself, he might, by-and-by, have assumed the purple with safety, and founded a dynasty. But once the promptings of patriotism had given place to the goad of ambition, all prudence was left behind. The tribune's splendour rivalled the magnificence of Cæsar; while the people unthinkingly applauded, until the approach of State bankruptcy turned their applause into curses. On August 1st, R. was knighted in the Lateran Church. After the ceremony he extended his sword to three corners of the earth, exclaiming, 'This is mine!' and he summoned Pope Clement, Karl IV., and Ludwig of Bavaria to appear before him. A fortnight after this, he was crowned in the Church of Sta. Maria Maggiore with seven crowns, which symbolised the seven gifts of the Holy Ghost. The infuriated nobles—Colonnas, Ursinis, Savellis—assembled in arms before the city. R. scattered them. But the Pope's excommunication now overtook him; public confidence did not support his policy, for he had sunk from luxury into vice; the freebooter Minorbino seized one of the palaces of the Colonnas, and declared himself master of the city. R. had no means of opposing this intruder; he had played the desperate game of double or quits too long, and abdicated after a reign of seven months. Taking refuge in the castle of St. Angelo, he escaped in a priest's dress to a Franciscan monastery in the southern Apennines, where he remained two years and a half. But the prophecies of a brother monk induced him to visit Prague and urge Karl IV. to invade Italy. The Emperor sent him as a prisoner to Avignon; whence Innocent VI. on his accession despatched him to restore the Papal authority at Rome. In the summer of 1354 he entered the imperial city as a senator; but, aiming immediately at an absolute tyranny, he was defied by the Colonnas, whose castle of Palestrina he besieged in vain. Four months after his restoration, the mob was yelling at the Capitol, 'Down with the traitor who imposed the taxes.' He addressed the people from a balcony, but was driven back by showers of stones. He was seized in the disguise of a doorkeeper, led to a platform at the foot of the Capitol stairs, and after standing mute and motionless there for an hour, was run through the body, and hacked to pieces, 8th October 1354. Twice had R.'s bravery and eloquence gained him the entire confidence of the Roman people; but the power they bestowed only intoxicated him. Still, he had great virtues; again and again in his career he gave the noblest proofs of patriotic generosity. His madness was of the head, not of the heart. An apology for him will be

found in the appendices to Bulwer-Lytton's novel of *R.* An important collection of his letters, addressed to the Emperor and the Archbishop of Prague after his fall, has been published in German by Papencordt, under the title of *Cola di R. und seine Zeit* (Hamb. 1841). See Italian lives by Fortificca and Re (1624 and 1828), Du Cerceau's *Vie de R.* (Par. 1772, translated into English, 1836).

Ries, Ferdinand, an able composer and pianist, was born at Bonn, 29th November 1784. He studied at Vienna under Beethoven from 1801 to 1804, after which he achieved a great reputation as a pianist in the many countries he visited professionally. During a long residence in England (1813-24) his services as a teacher and performer were in immense demand. He composed the operas *Die Räuberbraut* (1829) and *Listka* (first produced as *The Sorceress* at the Adelphi, London, 1831), six orchestral symphonies, several overtures, a cantata, *Der Sieg des Glaubens*, nine pianoforte concerts, and many excellent pianoforte works, violin quartets, &c. He died at Frankfurt-am-Main, 13th January 1838. See Fétis, *Biogr. univ. des Musiciens* (new ed. 1878).

Riesengebirge ('Giant Mountains,' Czech. *Krkonošy-Hory*), a range of mountains, runs from S.S.W. to N.N.W. between the sources of the Bober and the Queis, separating Bohemia and Prussian Silesia. The length is 23 miles, the breadth about 14. The highest peak is the Schnee Koppe ('Snow Top'), 5275 feet, while the general height of the range is about 4000 feet.

Ris'ì, a town of Sicily, province of Caltanissetta, 16 miles N.W. of Terranova, has large chemical works, and a trade in agricultural produce. Pop. (1874) 11,548.

Ris'ti (the ancient *Reate*), a town of Central Italy, province of Perugia, on the Velino, 43 miles N.W. of Rome. It was one of the principal cities of the ancient Sabines, but the only traces of its antiquity are a few inscriptions preserved in the town-hall. R. has nine churches, among them a cathedral, dating from 1456, and containing a monument by Thorvaldsen. Woollen stuffs, leather, and silk are manufactured, and in the neighbourhood there is a large beetroot-sugar factory, the earliest in that part of Italy. Pop. (1874) 11,478.

Rietsch'el, Ernst, a famous German sculptor, born at Pulsnitz, 15th December 1804, studied at the Art Academy of Dresden, and later under Rauch in Berlin, was appointed in 1832 Art Professor in the former city, and died 21st February 1861. He had a marvellous power of combining ideality with fidelity to Nature. His masterpiece is the 'Luther Monument' at Worms; other notable works are a Pietà (Potsdam), a statue of Lessing (Brunswick), statues of Goethe and Schiller (Weimar), the relieve decorations of the Berlin opera-house, and the Dresden museum. See Oppermann's *Ernst R.* (Leips. 1863).

Rif, The, or Riff, the name of the northern portion of Morocco, from Tangier to the Algerian frontier. It is about 220 miles long and 60 miles wide, with a mountainous surface and a rugged coast. From the last feature it derives its name. The region is well wooded and watered, and large numbers of cattle are reared on the upland pastures. The inhabitants, who are Berbers (q. v.), are of a predatory disposition, and yield little more than a nominal allegiance to the Sultan of Morocco. So late as 1844 they were notorious for piracy. Cattle, leather, bark for tanning, and orchella weed are the principal exports from the R. Spain has a foothold at four places on the coast, viz., Centa (q. v.), Melilla, Peñon de Velez, and the island of Alhucemas.

Rifled Arms, the designation given to ordnance and small-arms in which the interior of the bore is furrowed with grooves having a certain degree of spirality from breech to muzzle.

Military Rifle.—It is only within the last twenty-five years that R. A. have come into general use, although it is said that Augustin Kutter of Nurnberg invented a firearm with spiral grooves as far back as 1528. Practically, however, the year 1853 (when the Enfield rifle was adopted by the British Government) may be said to be the time when R. A. came into use for military purposes. Previous to that date (about 1826), a rifle invented by Captain Delvinge had been issued to a few men in the French army, but speedily abandoned. In 1837 the Minie

rifle was introduced, a four-grooved rifle taking a conical bullet, with a recess at the base provided with a small iron cap, which the force of the explosion drove into the bullet, causing the lead to expand into the grooves.

It is necessary to explain that previous to the introduction of R. A. the barrels of both small-arms and ordnance were made with a smooth cylindrical bore, firing as a rule a spherical ball. With such arms it was impossible to secure accurate shooting at anything but very short ranges, owing (1) to windage in consequence of the ball not fitting the bore tightly; (2) the force of the explosion 'upsetting' or changing the shape of the bullet slightly, and (3) from the ball acquiring a rotatory motion by friction against the barrel, so that when it left the muzzle the direction of its rotation would be upward, or downwards to right or left, according to whether it touched the bottom, top, or left or right side of the barrel.

By rifling the barrel with spiral grooves, and using a conical projectile, these defects are remedied. The explosion of the powder upsets the base of the bullet, preventing windage and giving to the bullet a rotation on its own axis proportioned to the degree of spirality of the rifling, so that, the force of gravity or atmospheric pressure excepted, it keeps that axis in the line in which it leaves the muzzle of the firearm.

The soundness of the principle of R. A. with a conical bullet being demonstrated by the success of the Enfield Rifle—a three-grooved segmental cut barrel of 577 inches bore with a spiral of one in 78, *i.e.*, the grooves take one complete turn in 78 inches (for section, see fig. 1)—inventions in this direction came thick and fast, the general tendency being to reduce the size of the bore and increase the pitch of the rifling. Among the first in the field was Mr. (now Sir Joseph) Whitworth, who was entrusted by the British Government to carry out a series of experiments to determine the best size of bore, form of rifling, and projectile for a military weapon. After protracted trials and the expenditure of large sums of money, Sir Joseph produced a hexagon barrel of 451 bore with a spirality of 1 in 20, which, with a mechanically fitting bullet, gave excellent results up to 1000 yards. (A section of Whitworth barrel is shown at fig. 2.) Before this Mr. Lancaster had, however, introduced an elliptical bore having a spiral (for section, see fig. 3), and a number of his rifles were served out to the Royal Engineers. In 1860 an entirely novel form of rifling (a section of which is shown at fig. 4) was introduced by Mr. Alexander Henry of Edinburgh. This, as well as the other systems already mentioned, was designed for muzzle-loading arms. On the conversion of the Enfield to a breech-loader on the Snider system (see BREECHLOADER), the three-grooved segmental cut of rifling was still retained, and is used in that rifle at the present time.

The Snider-Enfield proved a most serviceable weapon, but in its turn it was supplanted about 1873 by an entirely new breech-loading small-bore rifle—the Martini-Henry—which has been described 'as the most magnificent weapon ever placed in the hands of a soldier.' As the breech-mechanism of the Martini-Henry is described under BREECHLOADERS, and the nature of its charge under CARTRIDGE, it is only necessary here to mention a few facts regarding the barrel. It is formed of steel drilled out of the solid; the length is 32½ inches, the calibre 45 in., and the rifling polygonal, on the patent principle of Mr. Alexander Henry. From the section of this barrel (shown at fig. 4) it will be observed that ribs in the angles create re-entering angles, and that a circle inscribed within the bore is tangential to both the plane sides and the ribs. The pitch of the rifling is one turn in 22 inches. The bullet at the base is exactly the same diameter as the minor diameter of the bore, and it takes the rifling by the 'setting-up' of the back end on the explosion of the powder.

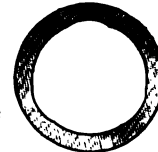


Fig. 1. Section of 'Enfield Rifle' (actual size).

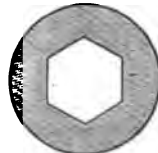


Fig. 2. Section of 'Whitworth' Barrel.

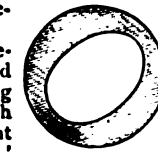


Fig. 3. Section of 'Lancaster' Rifle. Elliptosis exaggerated to show form of bore.

In range, penetration, flat trajectory, and other qualities, the Martini-Henry rifle will bear favourable comparison with any other military breech-loader in existence.

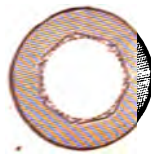


Fig. 4. Section of 'Heavy' Rifle.

Sporting Rifles.—The development of these has long occupied the ingenuity of inventors, and the attention given to perfecting them paved the way for the introduction of the military R. A. The favourite sporting rifle of the present day is the breech-loading 'Express,' having a slow spiral of rifling, burning a heavy charge of powder, and using a very light hollow conical bullet. The latter is propelled with great velocity; the trajectory is very low; in fact, nearly flat to about 180 yards, and the smashing power immense. For a .450 bore rifle (the favourite size for deer-stalking), the spiral of rifling is 1 in 36, charge of powder as much as 5 drachms, while the bullet only weighs 270 grains.

Match or Target Rifles differ from military R. A. in so far as the rifling has generally a slightly quicker degree of spirality; they fire a heavier charge of powder with a heavier bullet, and are provided with fine orthoptic and wind-gauge sights, and shoot with surprising accuracy up to 1200 yards. The usual bore is .450; charge of powder, 90 to 100 grains; bullet, 530 grains; weight of rifle, 10 lbs.; pitch of rifling, generally 1 in 20, or a gathering spiral commencing with almost 0 at breech, and ending with 1 in 18 at muzzle.

Rifled Ordnance became a necessity with the general adoption of R. A. As early as 1744, Benjamin Robins pointed out the advantages to be derived from rifled cannon, and prior to 1848 several experimental guns had been made; but it was only after the rifle came to be fully appreciated that the question of rifled ordnance took practical shape. Lancaster 8-inch oval bore guns were used in the Crimea by the English, but much greater success attended the second appearance of rifled guns in warfare—namely, during the Italian campaign of 1859, when the French employed converted bronze pieces with deadly effect against the Austrians.

In that year British field-artillery were equipped with breech-loading rifled guns, constructed on the coil principle invented by Sir William Armstrong, and during the following



Fig. 5. 'Polygroove' Rifling for British Breech-loading Ordnance.

five years 3500 of different calibres (maximum 7 inches) of this type were manufactured for the British service. These breech-loading arms are rifled on the 'polygroove' system, and the elongated projectiles, slightly larger than the bore, are coated with lead, which on the explosion of the charge is forced into the grooves, causing the projectile to spin on its longer axis. Fig. 5 shows the dimensions of the 'grooves' and 'lands' of the 3-in. (9-pounder) breech-loading gun; this weapon has 38



Fig. 6. 'Woolwich Groove' for British Heavy Muzzle-loading Ordnance.

Heavy muzzle-loading ordnance were also constructed on Armstrong's method, and a new system of rifling, called the 'Shunt' system, was adopted for these pieces, but it has since been abandoned. In 1865, Mr. Fraser of Woolwich proposed an important modification of the Armstrong method of construction, whereby strong guns might be made at less labour and expense; and since 1867, Mr. Fraser's plan has been followed in the manufacture of heavy 'Woolwich' guns, all muzzle-loading. In Germany and France breech-loading is in favour for all heavy rifled ordnance; but at Woolwich it is believed that muzzle-loaders are stronger and simpler than breech-loaders, while they are not inferior in range or accuracy. Within ten years there has been an extraordinary development in the weight of Woolwich rifled guns and their projectiles, consequent on the increase in thickness of ships' armour-plating. The 12-ton gun has been rapidly succeeded by guns weighing 18, 25, 35, 38, and 81 tons. The mode of constructing these guns will be best explained by showing a section

of the 38-ton gun (fig. 7), which only differs from the 35-ton gun in having an additional length of 3 feet in the 'chase.' Setting

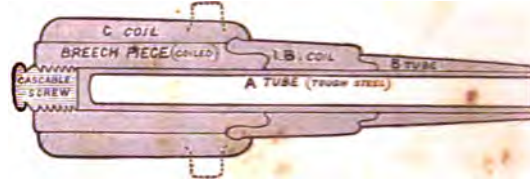


Fig. 7. Section of 38-ton Rifled Muzzle-loading Gun.

aside the numerous thin coils of fine iron and the forged breech-piece used in the Armstrong guns, Mr. Fraser selected wrought iron for the outer portions, and with it formed double or triple coils afterwards welded together. The 'A tube' is first roughly bored from a block of tough steel, the triple coil breech-piece is then shrunk on, the forged cascable is screwed in, next 'I B coil' is shrunk on, followed by 'B tube'; at this stage the boring and rifling are finished, after which 'C coil' with the trunnions welded in one piece is shrunk on; the piece is then vented. The 38-ton gun has a length of 230 inches, a bore 12.5 inches in diameter, and is rifled with 9 grooves of the Woolwich (modified French) pattern (fig. 6), into which studs on the projectile fit. The twist of the rifling is 1 turn in 35 calibres. The 81-ton Woolwich gun is 27 feet long, having a diameter at breech of 6 feet, and at muzzle 25 inches. The calibre is 16 inches (the powder chamber being enlarged to 18 inches), and the rifling consists of 11 Woolwich grooves increasing in twist from 0 at breech to 1 turn in 35 calibres at muzzle. With this twist the initial strain upon the gun is greatly reduced, for the projectile does not begin to rotate till it has moved forward a short distance. The charge of powder (1.4-inch cubes) is 425 lbs., and the elongated studded projectile, including a copper 'gas check' at base to prevent 'scoring' of the bore by the escape of gas, weighs 1700 lbs. The initial velocity is 1600 feet per second, and the striking velocity, at 120 yards, 1585 feet, the stored-up energy being calculated to carry the projectile through 30 inches of iron. The range is estimated at 15,000 yards. This monster gun has recently been beaten in weight by two 100-ton guns constructed for the Italian Government by the Elswick Ordnance Company, Newcastle-on-Tyne. Each of these muzzle-loading guns, at present (1878) the largest yet made, measures 33 feet in length, the calibre is 17.5 inches with an enlarged powder chamber, the charge of powder is 470 lbs., and the projectile weighs 2230 lbs., or a little more than a ton. During experiments at Spezzia with one of these guns a target composed of 23.5 inches of iron and 29 inches of wood was completely ruined. The rifling is on the 'polygroove' system, and the rotation of the projectile is effected by a copper cup gas check attached to the base, which expands on the explosion of the charge and enters the grooves. The efficiency of the gas check for this purpose is so great that it has been determined to apply it and the 'polygroove' rifling to the second 81-ton gun now in course of construction at Woolwich. Sir Joseph Whitworth of Manchester employs compressed steel in the manufacture of rifled ordnance, and Herr Krupp of Essen, Prussia, constructs his breech-loading ordnance of cast steel, rifling on a multigroove plan, and using projectiles coated with lead.

Riflemen. All the infantry regiments in the British army are now armed with the rifle, but the Rifle Brigade (formerly the 95th regiment) and the 60th regiment (King's Royal Rifle) were so armed when the others were armed with the smooth-bore. These 'rifle regiments' have four battalions each, and they retain their dark-green uniform. Mounted R. are soldiers trained to act both as foot and cavalry soldiers, like the dragoons of former days. The last regiment of this kind in the British army was disbanded a few years ago at the Cape, but there can be no doubt of their utility in military operations, and some leading authorities, notably Sir Garnet Wolseley, have strongly advocated their revival. For rifle volunteers see VOLUNTEERS.

Ri'ga (Esth. *Rihga*, Lith. *Ria Linn*, or *Rigka* 'the fortress of the Rugin'), a town of Russia, capital of the government of Livonia,

lies in a waste district on the Diina (here crossed by a floating bridge and by an iron railway bridge 2444 feet long, resting on eight pillars), 6 miles from its mouth, and 309 S.W. of St. Petersburg, with which it is connected by railway. The greater part of R. has exactly the appearance of an old German Hansa town; the three suburbs are modern, with broad, straight streets, and one-storied wooden houses. Interesting buildings are the castle, built 1494-1515 as a residence for the Grand-Master of Livonia, now a barrack, and the seat of the Governor-General of the Baltic provinces; and the 'Schwarzhaupthaus,' belonging to a society founded in the time of the Hansa for the defence of the town. R. has also a citadel with an important arsenal, an exchange, a theatre (1863), a Greek priests' college, and numerous schools. Of sixteen churches in R. seven are Lutheran, including the Gothic Cathedral, with a museum and town library of 18,000 vols., and St. Peter's, with a spire 470 feet high, eight, including a cathedral, Orthodox Greek, and one Roman Catholic. There are also Moravian and Raskolnik chapels, and a synagogue. R. is, next to St. Petersburg, the most important of the Baltic ports of Russia. The chief harbour, named Bolderao, is at the mouth of the river, and defended by the fortress of Dünamünde. In 1876 there entered the port of R. 2755 vessels (530 British) of 794,820 tons, and cleared 2760 of 796,640 tons. The imports during 1876 were valued at £3,170,110 (39½ per cent. from Great Britain), and exports at £4,445,936 (43½ per cent. from Great Britain). The chief imports were raw cotton (£380,229), iron (£322,061), rails (£226,368), herrings, machinery, corkwood, oil, wool, salt, wine, and chemical products; and the chief exports wood (£1,296,259), oats (£796,979), flax (£561,359), rye (£467,675), hemp, barley, oil-cake, hempseed, and buckwheat grits. R., originally named Uxkull (*Ykeskole*), was founded in 1201 by the Livonian bishop, Albert I. of Apeldern, who established here (1202) the Livonian order of Sword Brothers, united to the Teutonic Knights in 1237. R. belonged to the Hanseatic League. It came under Poland in 1581, was taken by Gustaf Adolf in 1621, and unsuccessfully besieged by August II. in 1700-1. After the overthrow of Karl XII., it yielded to Russia, 4th July 1710. R. was blockaded by the English in 1854. Pop. (according to the *Petersburg Calendar* for 1877) 99,892.

Riga, Gulf of, an eastern arm of the Baltic Sea, between the Russian governments of Esthonia, Livonia, and Courland. It is about 100 miles in length from N. to S., and 70 in breadth. At the mouth of the Gulf of R. lie the islands Oesel and Dagö.

Rigadoom' (Fr. *rigodon*), an old merry dance in triple time performed by a man and woman, somewhat in the style of a jig.

Rigging (from Old Eng. *wrgan*, 'to cover,' 'clothe,' or 'rig'), on shipboard, is of two kinds, standing R. and running R., the former comprising the ropes or chains used for the support of the masts, and the latter those employed in extending, taking in, and otherwise manipulating the sails. Standing R. consists of pendants, shrouds, stays, and backstays; running R. of lifts for raising the upper masts, yards, and sails, braces for trimming the yards, halyards for hoisting flags, &c., and clew-lines, sheets, tacks, and guys for the sails. A ship is said to be rigged when it is completely equipped. The men employed on board ships to fit the standing and running R. or to dismantle them are called *riggers*. R-lofts, where rigging is fitted by stretching, splicing, &c., and made ready to be used in ships, are attached to dockyards.

Righi, a mountain mass in Switzerland lying between the lakes of Lucerne, Zug, and Lowerz. The highest point is only 5005 feet above the sea. The N. side is very steep, but the S. consists of easy slopes and broad terraces, planted with fig, chestnut, and almond trees, and pasturing upwards of 4000 head of cattle. The N. peak commands a magnificent panorama, 300 miles in circumference. Since the opening of the R. railway the number of tourists making the ascent has greatly increased, amounting in 1872 to 46,159 persons. See L. Rüttimeyer's *Der Rigi, Berg, Thal und See* (Basel, 1878).

Right, Legal, is the title to the use of any subject, or to the fruits of it. But the distinction between the *corporal* and the *incorporal* in law has been lost in the distinction drawn between *real* and *personal*. See REAL. In Scotch law, see HERITABLE AND MOVABLE.

Rights, Declaration of, a document drawn up after the flight of James II. by a committee of the Commons, presided over by Mr. (afterwards Lord) Somers. 'It recited the misgovernment of James,' says Mr. Green, 'his abdication, and the resolve of the Lords and Commons to assert the ancient rights and liberties of English subjects. It denied the right, of any king to exercise a dispensing power, or to exact money or to maintain an army save by the consent of Parliament. It asserted for the subject a right to petition, to a free choice of representatives in Parliament, and a pure and merciful administration of justice. It declared the right of both Houses to liberty of debate.' Besides this, it confirmed the principle of trial by jury, and established that of frequent Parliaments. On the 13th of February 1689 it was presented to William and Mary in the Banqueting-room at Whitehall, and was accepted by them along with the crown. As it had been drawn up by a revolutionary committee, it was thought right to ratify it by passing it through both Houses of Parliament in due form. In its course through Parliament clauses were added providing that the King or Queen must conform to the Church of England, and must not marry a Papist. In this form it became the BILL OF RIGHTS in 1689. Strangely enough, it left by its silence the whole control of trade to the crown, and it was not till some years afterwards that Parliament tacitly assumed that function. The government of William and Mary in Scotland was established under a *Claim of Right* drawn up on the model of the D. of R.

Rights of Man, Declaration of the, a document drawn up mainly by Dumont, who afterwards interpreted Bentham's philosophy to Europe, and adopted as the groundwork of their constitutional labours by the French National Assembly on the 18th of August 1789, though the king did not give his adhesion to it until the 5th of October. It was in seventeen clauses, which may be thus summarised:—Men are born, and continue free and equal: The end of all political associations is the preservation of these rights—*liberty, property, security, and resistance of oppression*: The nation is the source of all sovereignty: Political liberty is the power of doing anything which does not injure another: The law should prohibit only actions hurtful to society: The law is an expression of the will of the community: No man should be molested on account of his thoughts and opinions, or for their expression and communication: Taxation should be divided equally throughout the community: Every citizen should have a voice in public affairs: The executive should be responsible to the community: The right of property is inviolable and sacred. 'With endless debating,' says Carlyle, 'we get the *R. of M.* written down and promulgated: true paper basis of all paper constitutions. Neglecting, cry the opponents, to declare the Duties of Man! Forgetting, answer we, to ascertain the *Mights* of Man;—one of the fatalest omissions!' Burke, in his *Reflections on the Revolution in France*, refers to the Declaration as 'paltry and blurred sheets of paper about the *R. of M.*' Thomas Paine answered Burke's invective by a pamphlet called the *R. of M.*, which led to his prosecution for libel and outlawry. It is worthy of note that the American Declaration of Independence contained the whole matter of the *R. of M.* in the following remarkable sentence:—'We hold these truths to be self-evident, that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness.'

Rig'or (Gr. *rhigō*, 'I shiver') is a term used in medicine to denote a coldness attended by a shivering more or less perfect, and is a symptom which ushers in many diseases, such as fevers and acute inflammations of internal parts. A R. is, in very many cases, a symptom indicating extreme danger.

Rilievo (Ital.), or **Belief**, signifies the projection of a sculptured design from its ground. See ALTO-RILIEVO.

Rimini, a town of Italy, province of Forli, beautifully situated on the Adriatic at the mouth of the Ansa and Marecchia, 12 miles from San Marino and 69½ S.W. of Bologna by rail. The ancient port is now choked up with sand, but the mouth of the Marecchia forms a small harbour, by means of which R. has some trade by sea, and which shelters a large number of vessels engaged in the fisheries. The town is surrounded with walls, and is well-built with regular streets and squares. The Corso, the main street, passes through the centre of the town, connect-

ing the two principal squares, Piazza Cavour and Piazza Giulio Cesare, the latter the ancient forum. The most interesting ancient structures are the five-arched Ponte d'Augusto over the Marecchia, at the point where the Via Flaminia and the Via Æmilia unite, still in good preservation; the Porta Romana, a triumphal arch of white marble, erected to Augustus (B. C. 27), and the Fontana Publica, which has undergone many changes. Among more modern buildings, the finest is the cathedral church of San Francesco, one of the best existing specimens of Italian Gothic, built in the 14th c. over a temple of Castor and Pollux, and remodelled 1447-50 by Sigismundo Malatesta from designs by Leo Battista Alberti. Other buildings are the Palazzo Comunale and the church of St. Francesco, both with valuable pictures. The library, founded in 1617 by the jurist Gambalunga, has 23,000 vols. and several MSS. R. has manufactures of glass, sailcloth, earthenware, and silk fabrics. It has extensive fisheries, and wine and oil are produced in its vicinity. Pop. (1874) 9747. R., the ancient *Ariminum*, was a town of the Umbrians. It became a Roman colony in B.C. 269. Under the Eastern Empire it was one of the Pentapolis Maritima ('Five maritime cities') governed by the exarchs. Here in 350 a council against Arianism was held. R. subsequently belonged to the Lombards, and was given in 1200 by Otto IV. to the Malatestas, who, from viceregents of the emperors, became hereditary princes. In 1503 they surrendered it to the Venetians, who were obliged to yield it to the Pope. See Tonini, *Storia Riminese* (2 vols. Rim. 1860).

Rinderpest, or **Cattle Plague**, is defined as a specific fever of malignant and contagious type, originally occurring in the Asiatic steppes of Russia, and only seen in Britain and in native cattle as the result of contagion derived from imported and infected cattle. R. begins with a latent or incubatory period of from four to seven or eight days. Its course is well marked. A primary fever is the first general result of the absorption into the blood of the specific poison or *virus*. The temperature rises to 103° and 104°—the normal temperature being about 101°. The first specific symptom is an eruption of the mucous membrane of the mouth, while in the cow the mucous membrane of the vagina is usually affected. About the fourth day from the first rise in temperature serious symptoms supervene, and after the fourth day the head droops, the ears hang, rigors set in, the pulse fails, and the mouth, nose, and eyes discharge a foetid secretion. About the 6th day these symptoms increase in severity, and the heart's action and breathing becomes enfeebled. The temperature falls rapidly, and death results on the seventh day from the first elevation of temperature. R. is clearly induced by a morbid poison, producing an altered state of the blood. Serum obtained from an infected animal at an early stage of the disease will infect a healthy animal; and the virus is also contained in the discharges from the nostrils, mouth, and eyes. Jessen of Dorpat maintains that these secretions retain their poisonous or infective properties for eleven months at least. The poison is said to be communicable at a distance of 500 yards. Many veterinarians consider R. to be analogous to *typhoid* or *enteric fever* in man, from its apparently analogous effects on the mucous membrane. Dr. Murchison combats this opinion, and maintains that Peyer's patches are not specifically affected in R. Cattle-plague was known in England in 1348-49. It was brought from Holland in 1745. In 1865 a noted epidemic occurred. In this latter year, during the week ending December 30th, the R. statistics were as follows:—

	Farms, &c., affected.	Total cattle on affected Farms, &c.	Number of cattle slaughtered healthy.
England	7,433	110,647	10,636
Scotland	2,065	44,527	6,578
Wales	1245	4536	152
Total	9,753	159,710	17,366

In 1872 another outbreak occurred, the disease having been brought to Hull, Deptford, and Leith. R. occurs in the ox, sheep, goat, deer, giraffe, camel, antelopes, &c. It is usually fatal, but where an animal recovers from one attack it is protected against a recurrence of the disease. *Inoculation* induces the disease, and appears like vaccination to render the attack of a mild nature.

Ring (Old Eng. *ring* and *hring*, Icel. *hringr* and *hringr*, from the same root as Dan. *kringle*, 'to run round'), the small hoop or circlet, usually of metal, with or without the addition of precious stones, worn on the fingers for ornament. The habit of wearing rings appears to have originated in the East at a very early period of civilised history, and among all the leading nations of antiquity the practice prevailed to a greater or less extent. The R. is frequently mentioned in Scripture, beginning in the patriarchal days of Jacob, when Tamar obtained the signet of Judah (Gen. xxxviii. 18). Again, when Joseph was advanced in the service of the Egyptian monarch, he received from the hands of Pharaoh his own R. as a token of the delegation of his powers. It thus appears that rings were primarily carried on the finger to be used as signets or seals, and their possession was a token of official place or power. At the same time we learn from Sir J. Gardner Wilkinson that rings were worn in these remote times by Egyptian women as ornaments alone, that the left hand was peculiarly privileged as the R. hand, and of that hand the third finger was more than any other the R. finger. Egyptian rings were mostly of gold, although sometimes silver was used, and among the lower orders they were fashioned of ivory and blue porcelain. Some were plain, some ornamented with scarabei and engraved stones, and in other cases the metal was worked into fantastic forms. Among the Greeks the habit of wearing rings, partly as signets and partly for ornamentation, was almost universal. The intaglios cut in onyx and other stones for ancient Greek and Roman signet-rings have never been approached for beauty, delicacy, and sharpness of outline. Among the Romans the rings first worn were made of iron alone, and it was only as luxurious habits began to prevail that at first the senators, then chief magistrates and equites were permitted to wear gold rings, the right being called the *jus annuli aurei*. Under the empire, the power of granting the privilege of the *jus annuli* was vested in the emperor alone, and by Severus and Aurelian the privilege was granted to all soldiers, while Justinian extended it to all citizens alike. The R. of the emperor was regarded as a state seal, and the use of it was sometimes given to persons to whom he might delegate any of his powers or privileges.

The giving and wearing of rings have from a very remote time been connected with the ceremonies of betrothal and marriage, and many curious customs and observances were mixed up with the practice. What the precise significance of the marriage R. originally was is not known; but as many superstitious beliefs attached themselves to the wearing of rings, and as peculiar virtues were supposed to be connected with their use, doubtless the marriage R. had originally a symbolical significance. Bishops still receive a ring on their investiture, which they wear on the third finger of the right hand as a token of power and authority. Probably the marriage R. originally indicated a similar communication or delegation of authority.

The manufacture of rings is regarded as a distinct branch of the jewellery trade, in which there are several recognised subdivisions. Thus one class of workmen fabricate ladies' ornamental rings, another is devoted to making gentlemen's heavy rings or signets, and a third makes only mourning and wedding rings. Imitation metal and paste rings, and the commoner class of gold rings, are made with dies in stamping presses much in the same way that medals, &c., are struck, the mounting of the stones in the bezel alone being hand work. All the more expensive and artistically valuable rings are, however, made entirely by handicraft, with the ordinary tools, appliances, and processes of the jeweller. See W. Jones's *Finger-Ring Lore, Historical, Legendary, Anecdotal* (Lond. 1877).

Ring bones, the name of an affection of the horse's 'coronet.' It consists in the development of a ridge of bone around the coronet, and is regarded as due to inflammatory action causing hypertrophy. R. is commonly seen in the forefeet of draught horses. The treatment consists in poulticing and in keeping the whole foot cool and moist, the fetlock being afterwards blistered or 'fired.'

Ringdove, a species of Pigeon (q. v.), known scientifically as the *Columba palumbus*, and popularly as the wood pigeon and cushat. It is a common British bird, and is known by its imperfect collar of white-tipped feathers. The head and neck are of a bluish grey, the upper parts of the body the same colour glossed with purple, and the under parts light grey. The eggs

number two, and are pure white. The nest is roughly built in trees. The average length of the R. is 17 inches.

Ring Money is the name by which antiquaries designate the rings and penannular hoops made of precious or base metal, which, there is abundant evidence to show, were used as a circulating medium by various nations in the early stages of their civilisation, and which in some countries to this day constitute the sole currency. The act of weighing money in the form of gold and silver rings is pictorially represented on ancient Egyptian monuments, and a baser medium of exchange in the shape of bronze rings has been recovered from the sites of Persepolis and Carthage, as well as in Egypt. We know, too, on the authority of Cæsar, that the Gauls and Britons used R.



African Ring Money.

M. of gold, copper, and iron; and Pliny mentions as a curious custom that they wore rings on the *middle* finger; a statement which means, according to modern archaeologists, that the smaller pieces of gold R. M. were so carried. Till the 12th c. R. M. was used in Norway, and in Africa it still continues in use, gold rings being circulated in Nubia, while among the Joliba negroes and other tribes of Western Africa, penannular hoops of copper, called 'Manillas,' exported thither in considerable quantities from Birmingham, form the only recognised currency. One of these 'Manillas' is here figured to half scale, and it is worthy of note that the shape differs very slightly from that of gold R. M. found in Scottish *wæms* or underground dwellings.

Ring Ouzel (*Turdus torquatus*), a species of *Insectorial* birds belonging to the thrushes, and found as summer visitants in the western and southern parts of Britain. A broad white band encircling the lower part of the throat has given the bird its popular name. The plumage is chiefly black. The R. is shy and wary. Its nest is placed on or near the ground, and the eggs, numbering five, are blue, spotted with brown.

Ring-worm is a popular term used to designate several distinct forms of skin-disease which occur in a circular or annular form on the body, and more especially on the scalp. *Herpes circinnatus*, known in popular parlance as 'the R.', occurs on the face, trunk, and extremities, and is contagious. The eruption spreads centrifugally, the original ring disappearing and giving place to a larger one, and so on. Sometimes the vesicles are large; but that form of the disease in which they are very minute, the eruption appearing to be of a furfaceous character, is designated R. The secretion, which is contagious, seems to afford a nidus in which the parasite of *tinea tonsurans* grows. This form of R. is curable by local applications, such as sulphate of iron, gallic acid, strong acetic acid, nitrate of silver, or blistering fluid. *Tinea tonsurans* is exceedingly like *herpes circinnatus*, and both are included in the popular term R. Its seat is on the hairy scalp, and it is most common in children from two to twelve years of age. The disease is caused by the growth in the hair of a vegetable parasite—the *trichophyton tonsurans*—which imbeds itself in some unhealthy secretion of the hair follicles. The spores of the plant may be found also in the epithelium of the patch, which is heaped up in opaque white scales, occurring in round patches. The hair breaks off and falls away so completely that the part seems to have been shaved, but on minute examination the hair follicles can be detected, and after the disease is cured the hairs grow again. This form of R. is highly contagious, and in its treatment strict cleanliness must be enforced. The epithelium should be removed by a lotion of borax, and the spores of the fungus destroyed by some germicide. Sir W. Jenner recommends 5 grains of the ammonio-chloride of mercury to the drachm of sulphur ointment, or 2 grains of the perchloride to the drachm of lard, or 30 grains of nitrate of copper to 4 drachms of lard, or 10 drops of creosote to the drachm of lard, the part to be washed directly afterwards with cold water. Lotions of sulphurous acid will effectually destroy the parasites. See HERPES.

Riobamba, a town in the S. American Republic of Ecuador, 84 miles N.E. of Guayaquil, on a plain 9600 feet above the sea-level. Pop. about 16,000. The original town of R. stood at

the foot of Chimborazo, 9 miles from the site of the present town, but was destroyed by an earthquake in 1797.

Rio de Janeiro, or more strictly **Sao Sebastiao do Rio de Janeiro**, commonly shortened to **Rio**, the capital of Brazil, and the most important city of S. America. It is situated just within the tropic of Capricorn, on the western shore of the Bay of Nitheroy, 4 miles from its mouth. This bay forms one of the finest harbours in the world, being easy of access, deep, and landlocked, and measuring 17 miles by 12. It is studded with eighty islands, the largest of which is 6 miles long. The entrance, which is only three-quarters of a mile wide, and is strongly fortified, is between lofty headlands, one of which, the precipitous cone of Pao d'Azucar, was ascended by four men, December 2, 1877. The old town of R. lies next the shore, and its streets are still narrow, roughly paved, and imperfectly drained, though within the last few years great improvements have been carried out. From its centre the houses extend W., N., and S. for 4 miles in each direction, communication between the city and suburbs being maintained by means of tramways. The new town lies to the W. of the old town, from which it is separated by a large open space called the Campo de Santa Anna, on which stand some of the principal public buildings of R. The houses of R. are mostly of granite, faced with white stucco, and roofed with red tiles. Trees have been planted in abundance, especially in the squares, which number fifty-three, and fountains are also numerous, the water being brought in aqueducts from reservoirs formed in the mountains by which R. is environed. Among the principal buildings are the imperial and episcopal palaces, government offices, mint, national museum, and military and naval arsenals. Churches and convents abound, and some of the former are splendid edifices. There are also many important charitable and educational institutions. In 1876 the National Library contained 120,000 vols., and forty-four newspapers and magazines were published in the city. The climate of R. is good, though, owing to the defective sanitary arrangements, yellow fever has occasionally been epidemic. The trade of R., though it has not progressed of late years, is still very extensive, the imports during 1876 amounting in value to £9,466,034, and the exports to £9,669,557. The principal articles of export were coffee, sugar, cotton, hides, tobacco, and diamonds. Pop. (1872) 274,972, of whom 48,939 were slaves. R. was founded by the Portuguese in 1567, and has been the seat of the government of Brazil since 1763.—The province of R. de J. has an area of 18,490 sq. miles, and at the census of 1872 its population was 1,002,548, of whom 319,665 were slaves. It is traversed by a central mountain range of granite formation, and the peaks of that part of the range called the Organ Mountains attain a height of from 6000 to 7000 feet. Offshoots from the main range form many deep and fertile valleys, in which coffee, sugar, cotton, rice, and maize are grown. The north-western portion of the province is a tableland, on which cattle are reared in large numbers. The province is well watered by the navigable river Parahyba and its affluents, and also possesses a number of lakes. Deposits of iron, lead, and kaolin exist, but, with the exception of the last, are not yet worked. The lines of railway open or under construction number twenty-seven, with an aggregate length of 890 miles.

Rio Gran'de, the name given to the great S. American river Paraná (q. v.), in its upper course, prior to its junction with the Parahyba, in 19° 40' S. lat.

Rio Gran'de del Norte. See BRAVO.

Rio Gran'de do Norte, a province in the N.E. corner of Brazil, bounded N. and E. by the Atlantic, and S. and W. by the provinces of Parahyba and Ceará respectively. Its area is 20,130 sq. miles; and its pop. at the census of 1872 was 233,979, of whom 13,020 were slaves. The interior, which is liable to severe droughts, is mountainous, but the coast is flat and sandy. Cotton and sugar are the principal crops, and cattle and horses are reared in large numbers on the upper pastures. Iron, sulphur, salt, and building-stone are abundant. In the financial year 1875-76 the imports amounted to 72,314 reis, the exports to 1,268,644 reis. The chief town is Natal (q. v.).

Rio Gran'de do Sul, or in full **São Pedro do Rio Grande do Sul**, the most southerly province of Brazil, is bounded N. by the province of Santa Catharina and the River Uruguay; W. by the same river; S. by the republic of Uruguay; and E. by

the Atlantic. Area, 110,215 sq. miles; pop. (1872) 430,878, of whom 66,876 were slaves. The province is traversed by a central mountain range, on either side of which the land declines to wide, open prairies. Close to the sea coast are the two large lakes of Dos Patos and Mirim, which are connected by a navigable channel. The former is 180 miles long, with a maximum breadth of 40 miles, and discharges into the sea by the river, only 6 miles in length, from which the province derives its name. Except in the marshy coast districts, the climate is salubrious, and several European colonies have been established. Immense herds of cattle and horses are reared on the prairies, and the principal articles of export are dried beef, hides, horns, and tallow. Maize and beans are grown largely and exported, and wheat, potatoes, and flax are also successfully cultivated. The mineral wealth of the province is very great. Gold, agates, and chalcidies are exported to a considerable amount, and the copper mines of Santo Antonio das Lavras are the richest in Brazil, yielding 60 per cent. of pure metal. Coal, iron, and marble are abundant, and lead, silver, and sulphur are also found. In the financial year 1875-76 the imports amounted to 8,955,926 reis; the exports to 11,129,669 reis. The principal towns are Porto Alegre, at the head of Lake Dos Patos, and the port of R. G. do S., at the mouth of the river of the same name.

Riom, a town of France, department of Puy-de-Dôme, 8 miles N.N.E. of Clermont, has manufactures of silk, linen, and antimony; tanneries and distilleries; and active trade in corn, wine, cattle, hemp, flax, fruits, &c. The chief historic monuments are the Sainte-Chapelle, a fine Gothic building of the 14th c., the church of Sainte-Amable, and that of Notre Dame-du-Marthurst. Pop. (1872) 10,770.

Bio Negro ('black river'), the name of several S. American rivers, of which the two largest are the following:—1. An affluent of the Amazon, rises in the United States of Colombia, and flows successively E., S., and E.S.E., joining the Amazon at Manaus in 59° W. long. The length of its course is estimated at 1000 miles, and its channel, which is full of islands, in some parts is several miles wide. By means of the Cassiquiare (q. v.), unbroken communication is established with the Orinoco, and similar natural canals connect the lower courses of the R. N. and Japura, another large affluent of the Amazon.—2. A river forming throughout most of its length the boundary between the Argentine Republic and Patagonia. It rises in the latter country in the large lake Nahuelhuapi, at the base of the Cordillera, and flows N.E., E., and E.S.E. for fully 700 miles, till it enters the Atlantic in 41° 4' S. lat. Like all the Patagonian rivers, it is very rapid, abounds with shoals, varies greatly in volume, and has a bar near its mouth, nevertheless it is navigable for 500 miles by powerful steamers of light draught; 20 miles from its mouth is the Argentine settlement of Patagones, formerly called El Carmen.

Rionero in Volture, a town in the province of Potenza, Southern Italy, about 7½ miles S. of Melfi. It has considerable trade in grain, maize, and wine, and in maple snuff-boxes, which are here manufactured. Pop. (1874) 11,520.

Ri'ot. See MEETINGS, SEDITIOUS.

Ri'ot Act in the United Kingdom. By this Act, if twelve persons, or more, are assembled to the disturbance of the peace, and continue together for one hour after being commanded by lawful authority to disperse, they are guilty of felony. Silence should be commanded, and this proclamation made:—'Our Sovereign lady the Queen, chargeth and commandeth all persons, being assembled, immediately to disperse, and peacefully to depart to their habitations, or to their lawful business, upon the pains contained in the Act made in the first year of King George I., for preventing tumults and riotous assemblies. God save the Queen!' It is, of course, impossible to define a riot. The essence of rioting is probably an intention to do mischief. A noisy crowd are not necessarily rioters. Justices and constables, whose duty it is to suppress riots, therefore sometimes require to act cautiously.

Ripie'no (Ital. *full*), an occasional, or filling-up part in the orchestra, added when necessary to strengthen the principal or obligato instruments.

Ripley, George, an American author, born at Greenfield, Massachusetts, October 3, 1802, educated at Harvard and

Cambridge Divinity School, was a Unitarian pastor at Boston from 1828 to 1831, afterwards resided for several years in Europe, and became thoroughly acquainted with French and German literature. His chief works are *Discourses on the Philosophy of Religion* (1839); *Letters to Andrew Norton on the Latest Form of Infidelity* (1840); and *Specimens of Foreign Standard Literature* (14 vols. Boston 1838-42). He assisted in conducting the *Dial* (1840-41); contributed to magazines, especially the *Christian Examiner*; promoted the Brook Farm Socialist experiment (1844-46); aided in editing the *Harbinger*, a Fourierite organ (1844-48); became literary editor of the *New York Tribune* (1849); brought out along with Bayard Taylor *A Handbook of Literature and the Fine Arts* (1852); and was joint editor with C. A. Dana, of Appleton's *New American Cyclopaedia* (New York, 16 vols. 1858-63). This was his great life-work. A new edition, made under his care, appeared in 1873-76. In 1874 R. received the degree of LL.D. from Lawrence University.

Rip'on, a city in the West Riding of Yorkshire, on the Ure, 28 miles N. of Leeds by rail. Its cruciform cathedral, commenced by Archbishop Roger (1154-81), continued by Archbishop Gray (1215-55), and partly rebuilt in the 16th c., presents a variety of styles, from Norman to Perpendicular. The W. front, a singularly pure specimen of Early English, is flanked by towers 110 feet high, beyond which rises St. Wilfrid's Tower, and though smaller than many cathedrals (being 266 feet long by 87, or in the transept 132 feet wide), the Minster has many interesting features—five lancets with dog-toothed mouldings, a 15th c. choir-screen with good tabernacle work, and a 7th c. crypt ('St. Wilfrid's Needle'), whose passage formed the old North Country ordeal of chastity. The whole structure was restored by the late Sir G. G. Scott (1861-71) at a cost of £40,000, and a new organ, replacing one by 'Father Schmidt,' was opened, April 24, 1878. Trinity Church (1827), with a spire of 136 feet, was also restored in 1874, other buildings being the Lombardo-Gothic Roman Catholic Church (1862), the town-hall (1831), public rooms (1834), temperance hall (1859), a free grammar school (founded in 1546), and a mistresses' training college. In the market-place is an obelisk of 90 feet, erected by John Aislabic, Chancellor of the Exchequer under George I. The manufacture of woollens, and of spurs (termed *rippons* in the slang of last century) has ceased; but iron and brassfounding, tanning, malting, and the making of varnish and saddletrees are actively carried on. R. returns one member to Parliament, and publishes two newspapers. Pop. (1871) 6143. Created a bishopric in 678, R. was subsequently united with York, and only reinstated as a separate see in 1836. Three miles to the W., in the park of Studley Royal, the Marquis of Ripon's seat, are the exquisite ruins of Fountain's Abbey, established by Benedictines in 1132, with the Early English 'Chapel of the Nine Altars,' a Transition Norman nave and transept, a Perpendicular tower, and a cloister 300 feet in length. The last abbot was hanged at Tyburn for his share in the Pilgrimage of Grace (1537).

Ripple Marks, the familiar undulations left by the receding waves upon the sandy beach, are occasionally met with in rocky strata of old geologic time, and were probably due to the same agency; though in certain circumstances the wind blowing over a sandy district gives rise to a very similar appearance.

Rish'anger, William de, an English chronicler, born in 1250, became a Benedictine monk of St. Alban's, and was appointed historiographer to Henry III. He was alive in 1322. His *Chronicle*, edited by J. O. Halliwell, was printed for the Camden Society in 1840. R. also wrote the *Gesta Edwardi Primi*, some fragmentary annals, and part of the history attributed to Walsingham. All his writings are valuable for the history of Scotland at the period of its conquest by Edward I., Scotland itself not possessing at that time any chroniclers.

Rishis, or **Drish'is** ('seers,' from the root *dris*, 'to see'), the Sanskrit name for the holy men through whose agency the Vedas were revealed to mankind. None of them have individual names. They are supposed to have supernaturally seen as well as heard the divine knowledge, which they communicated by oral repetition, and not in writing. Many sacred spots in India are associated with their apostolic work.

Rissolè (Fr. *rissoler*, 'to roast brown'), a culinary preparation consisting essentially of fish minced and fried with bread-

crumbs and egg. The preparation presents numerous modifications on that basis.

Risto'ri, Adelaide, a celebrated Italian actress, was born in the Venetian territory in 1821. Both her parents were comedians, and she appeared on the stage when quite a child. Her first successes were in comedy and light parts, but under the careful training of Carlotta Marchionni she became a proficient in the highest branches of her art. On her appearance in Paris in 1855 she achieved a splendid success, her genius scarcely palling before the brilliant star of Rachel. On the latter's death she was acknowledged her only legitimate successor, and if she lacked the terrible fire and intensity of her great rival, her talents were more versatile and her range of character was wider. Among them are Myrrha, Rosmunda, Medea, Mary Stuart, Phædra, Camma, Francesco di Rimini, and Lady Macbeth. She appeared in Spain in 1857, in Holland in 1860, in Russia in 1861, and in Constantinople in 1864. She has also paid several visits to this country and the United States. She took her farewell of the English stage at Manchester on November 8, 1873. Madame R. married in 1847 the Marquis del Gillo, who died in 1861.

Ritenu'to (Ital.), in music, the lessening of the speed at which a piece is taken.

Rites are the manifestations by outward signs, such as prostrations, genuflexions, &c., of the feelings of reverence, &c., which are inwardly expressed in divine worship. The use of R. is maintained both on historical and internal grounds. 1. Historical, from their universality. 2. Internal, from their adaptation to the constitution of man, so that they are available (1) for purposes of organisation, the sense of a common brotherhood being thereby kept alive among mankind; and (2) for educational purposes: (a) as a mode of imparting the historical truths of religion, and as a constant witness both to (b) doctrinal, and (c) moral truth. R. are also sometimes used as meaning all the ceremonies belonging to a particular religious office, and sometimes even as synonymous with Liturgy (q. v.). See Blunt's *Dict. of Doct. and Hist. Theology* (Lond. 1872).

Ritornell'o (Ital.), in music, a passage or refrain occurring after each repetition of the leading melody—the instrumental symphony played between the different verses of a song.

Ritschl, Friedrich Wilhelm, the greatest classical philologist of the day, was born at Gross-Vargula, in Thüringen, 6th April 1806, and educated at the gymnasiums of Erfurt and Wittenberg. He studied at Leipsic under Hermann (1825-26), and at Halle under Reisig, becoming a *privat-docent* in the latter university (1829), and extraordinary professor (1832). In 1833 he accepted a call to Breslau as ordinary professor and joint director of the philological seminary, and three years later undertook a scientific journey to Italy, where he collated MSS., amongst others the famous Codex Ambrosianus of Plautus at Milan. In 1839 he removed to Bonn, which university, as professor of classical philology and eloquence and director with Welcker of the philological seminary, he raised to be the metropolis of what in Germany is styled the 'science of antiquity.' He had already published an edition of Thomas Magister (1832), *De Oro et Orione* (1834), and *Die Alexandrinischen Bibliotheken und die Sammlung der Homerischen Gedichte durch Praxistratos* (1838), but it was at Bonn that he produced his 'epoch-making' edition of Plautus' comedies (3 vols. 1848-54; 2d ed. 1871, *et seq.*), preceded by *Parerga Plautina atque Terentiana* (1845). There, too, he summarised his invaluable researches on Latin inscriptions in the *Prisca Latinitatis Monumenta Epigraphica* (6 parts, 1862-64). In 1865 his prosperous career at Bonn was suddenly cut short by the machinations of a colleague, who, representing R. to the Prussian authorities as past his work, forced him to tender his resignation. Nothing daunted, the veteran closed with an offer from the Saxon Government of Hermann's vacant chair, and nobly vindicated his powers by quadrupling the number of the Leipsic students in an incredibly short space of time. He remained in harness to within nine days of his death, which took place on 9th November 1876. Besides the works already mentioned, R. published *Anthologia Latina Corollarium* (1853), *Poesis Saturnina Spicilegium* (1854), *De Varronis Hebdomadam Libris* (1856), 32 collected treatises *Zur Griechischen Literatur* (1866-67), and countless contributions to

philological journals, all marked, says Ihne, 'by perspicuity, a vast range of learning, well-directed research, exhaustive comparison of previous labours, severe logic and sound method, and above all a common sense that never deserted him, and generally led to the discovery of new truths.' The second edition of the comedies of Plautus, left incomplete at R.'s death, is being continued by his pupils.

Rit'son, Joseph, an English antiquary, was born at Stockton in Durham, 2d October 1752, settled in London as a conveyancer, and died 3d September 1803. He was a competent scholar, but an insolent critic, and his opinions in literature were fatally perverted by pride and malignity. Yet some of his works have a permanent value. The chief are *A Collection of English Songs* (3 vols.), *The English Anthology* (3 vols.), *Robin Hood, a Collection of Ballads* (2 vols.), and *A Collection of Scotch Songs* (2 vols.).

Ritter, Heinrich, a German philosopher, was born 21st November 1791 at Zerbst, and studied theology and philosophy (1811-15) at Halle, Göttingen, and Berlin. In 1817 he published *Ueber die Bildung der Philosophen durch die Geschichte der Philosophie*, and settled at Berlin. R. was successively appointed an extraordinary professor at Berlin (1824) and an ordinary professor at Kiel (1835) and Göttingen (1837). His chief work is *Geschichte der Philosophie* (12 vols. Hamb. 1829-53; 2d ed. of vols. i. to iii. 1836-38), coming down as far as Kant. The most important of his other works are *Logik* (1824, 2d ed. 1829), *Ueber die Erkenntnis Gottes in der Welt* (1836), *Ueber das Böse* (1839), *Logik und Metaphysik* (2 vols. Goth. 1856), and *Encyclopädie der Philosophischen Wissenschaften* (3 vols. Göt. 1862-64). His *Kleine Philosophischen Schriften* (3 vols. Kiel, 1839-40) chiefly relates to questions of æsthetics and the philosophy of law. R. is best known in England by the *Historia Philosophia Græca et Romana* (Hamb. 1838; 5th ed. Gotha, 1875), which he wrote in conjunction with Preller (q. v.). He died at Göttingen, 3d February 1869.

Ritt'er, Karl, a celebrated German geographer, was born at Quedlinburg, 7th August 1779, attended the university of Halle, and at Göttingen made a special study of ancient history. In 1820 he was appointed professor of geography in the university and military school of Berlin, and in 1822 a member of the Academy. He is the founder of the so-called science of comparative geography, and the author of many learned works, of which the principal are *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen* (2 vols. 1817; 2d ed. extended 1822-59, to 19 vols.), *Die Stupas, oder die Architektonischen Denkmale an der Indo-Baktrischen Königstrasse und die Kolosse von Bamyam* (1838), and *Einleitung zur allgemein-vergleichenden Geographie* (1852). He died at Quedlinburg, 29th September 1859. Of his valuable and voluminous memoirs published in the Transactions of various societies, his pupil Daniel issued separately *Geschichte der Erdkunde und der Entdeckungen* (1861), *Allgemeine Erdkunde* (1862), and *Europa* (1863). To his memory were founded the K. R. Stiftungen in Berlin (1860) and Leipsic (1861), which have for their object the encouragement of travel and scientific work. See the Biographies of R. by Gage (Lond. 1867) and Kramer (2 vols. Halle, 1864-70).

Rit'ual, in its general sense, means the body of Rites (q. v.) employed at any time in the Church. Specially it means the service-book containing the minor sacramental and other offices which might be performed by the inferior clergy, as distinguished from the Pontifical (q. v.). Originally each bishop had the power to form his own liturgy and R., provided he retained the essential features of the worship of the time. In the 5th c. the Metropolitan Liturgy and R. became the standard for each province; and in the 7th c. these were superseded by national ones. In England the diocesan system prevailed till 1549, when the national Book of Common Prayer (q. v.) was compiled. See Blunt's *Dict. of Doct. and Hist. Theol.* (Lond. 1872).—The name *Ritualism* is popularly given to the remarkable development of ceremonial worship which has taken place in the Church of England during the last thirty years, and which threatens to disrupt that ancient and powerful institution.

Rive-de-Gier, a town of France, department of Loire, on the river Gier, 13 miles N.E. of St. Etienne by rail. A canal, supplied with water from the immense basin of Couson, which

holds 1,500,000 cubic metres, connects R. with Givors on the Rhone. R. is in the centre of a coalfield containing 52 pits, and producing yearly about 659,000 tons of coal. It has 30 glassworks, employing 1200 workmen, and producing over 4,000,000 francs annually, and has also foundries, manufactures of machinery, steel-works, brickworks, and silk-mills. Pop. (1872) 13,946.

River (Fr. *rivière*, from Low Lat. *riparia*, belonging to the *ripa*, or 'bank'). Under the heading RAIN, the natural processes by which the vapour drawn up from the ocean into the air by the action of the sun's heat is condensed into clouds and then discharged upon the earth's surface are described and explained. It remains to complete the natural history of the cycle of operations by which the ocean receives again the waters it had lost; and rivers are the chief channels by which these waters return. Of the rain which falls upon the earth's surface, part drains directly away and helps to swell the volume of some neighbouring river or lake, and part is evaporated; but the greater portion sinks into the porous ground, percolates through the subsoil and underlying formations, and after this filtering process collects in some earth cavity, whence it finds ultimate outlet as a spring. Or, condensing on the cold peaks of a mountain-system, the vapour assumes the form of snow, which, squeezing its way into the lower clefts and valleys, consolidates into glaciers; and from the lower extremities of these issue countless mountain-rills, which pour their muddy waters into R. or lake. The two great sources of rivers are, then, springs and glaciers; for even should a R. appear to have its source in a lake, this lake, if it be not itself fed by minor streams, is nothing more than the expansion of a spring, an expansion which is simply the result of the configuration of the surface. As a general rule, rivers terminate in a sea; and all the really important rivers do. Certain rivers, however, flow into an inland lake, such as Lake Tchad in Africa, the Caspian and Dead Seas in Asia, and the Great Salt Lake in America. These lakes are always salt, and gaining in saltness, for the same reason that the sea is salt. The saline substances present in any mass of water do not evaporate; while any running water carries along with it in solution whatever soluble saline substances it may have come across on the way. For these reasons, a sea or inland lake cannot lose any of its saltness, but is continually receiving from the rivers which flow into it small accessions of salt solutions. There is still a third class of rivers which have no outlet to sea or lake. These are lost in marshes or sandy deserts, being evaporated faster than they are supplied. They are common in the central plains of Asia.

All the rills, streams, and rivulets which ultimately gather into one broad R. form a R. system; and the region of country which is drained of its superfluous waters by such a system is called the R. basin. Basins are usually separated from each other by mountain ranges; and the imaginary line of demarcation between these basins is known as the *watershed*. Not only do rivers serve for draining a country, but they act as important geological agents. As already indicated, they act chemically upon various mineral substances, which are borne down towards the sea in solution. This action, however, is unimportant compared to the purely mechanical action of running water. Fragments of rock, from boulders to the finest mud particles, are carried down the stream until the energy of the current becomes too small to effect the transportation. This continual drawing away of material results in a simultaneous widening and deepening of the channel in which the water flows. The rate at which this erosion takes place depends very much upon the nature of the land-surface; but even when the erosion is very slow, the evidences of its existence are undoubted. Ravines, gorges, cañons, &c., have been formed almost wholly by the streams which now flow through them; but this denudation is not so much due to the direct action of the water as to the wearing and tearing action of the matter it holds in suspension. The detritus, then, which is borne down the stream, is itself the great eroding agent; and as the R. broadens and deepens and slackens in speed, the suspended fragments gradually fall to the bottom, the heavier ones first, and the lighter ones later. Thus a R. in its early courses bounds over abraded rocks and massive boulders; but as it descends to lower regions and gentler declivities, its bed contains less massive fragments, which pass through all gradations from good-sized pebbles to worn gravels. And when at length the stream reaches the ocean, the gravel beds have

passed insensibly into sandbanks, and these into mudbanks. At the mouths of rivers, accordingly, accumulations of sand and mud are continually being deposited. These accumulations are known as deltas, and are well marked in the cases of the Po, Rhine, Nile, Ganges, and Mississippi. Rivers which, like the Thames, are exposed to full tidal action, do not form deltas. In many such cases, a *bar* or shoal is thrown across the mouth of the estuary, which interferes with navigation. The two largest known rivers, the Amazon and Congo, have no deltas, but sweep out into the ocean in an unbroken stream. The rich alluvium which is deposited along the banks of certain rivers is brought down during the periodical inundations, which are especially characteristic of tropical rivers. The inundations of the Nile are world-famed, and far more extensive are the annual floodings of the banks of the Amazon. The Amazon is unquestionably the greatest R. on the globe, having a drainage area of 2,831,500 sq. miles, and a length (exclusive of windings) of 3070 miles. The Mississippi-Missouri is longer (4234 miles), but its basin has an area of only 1,244,000 sq. miles. The Obi, in Siberia, has a length of 2600 miles, but in drainage area it is second only to the Amazon, 1,300,000 sq. miles. The Nile again, though it exceeds the Amazon in length (3500 miles), drains a comparatively contracted area, which, though it has not yet been definitely valued, does not probably exceed one million sq. miles. The Livingstone or Congo-Lualaba drains, according to Petermann, as much as 1,256,000 sq. miles, including the basin of Lake Tanganyika, which Stanley believes to have a periodical outflow to the lake system of the Lualaba. See *Physiography*, by Professor Huxley (Lond. 1878).

Law Regarding Rivers.—The right in flowing water is, by English law, public. The legal presumption is that the owner of each bank of a stream is the owner of one half of the bed over which it flows; but the water belongs to neither. No riparian owner has a right to pollute the water without the consent of all the others. No owner has a right to do any act by which the supply of water is lessened to the lower owners, nor by which the stream is made to overflow the land above. The only way in which a preferable right to the use of running water can be acquired are by licence from the person or persons whose rights are affected, or by twenty years' unchallenged use of the privilege claimed, which gives a title by *Prescription* (q. v.). Each owner has a right to the fish in his share of the river in England; but in Scotland, the salmon and right of salmon-fishing do not necessarily belong to the riparian owner (see SALMON and SALMON-FISHING, LAWS REGARDING). Navigable rivers are *inter regalia*, and are held by the Crown in trust for the community. If the right of navigation interfere with that of fishing, the latter must yield.

River Crab, the name given to a species of the genus *Thelphusa*, included in the *Decapodous* order of the Crustacean class. It is also named the 'Mud Crab,' from its habit of burrowing in the mud of rivers. The *T. depressa*, or Flattened Mud Crab, is the 'Grancio' of the Italians, and is common around Rome, its flesh being regarded as exceedingly delicate. It can be removed from the water for a lengthened period. The R. C. abounds in the Lake of Albano. *T. cunicularis* is a common Indian species. In the family to which the R. C. belong, the carapace or shell is oval in shape, and the stalks of the eyes are short. The body in the genus *Thelphusa* is broad, smooth, flat, and somewhat heart-shaped. The outer pair of feelers are short, and placed near the eyes.

Rivers and Streams, Pollution of. The first sanitary Act in the English statute-book was a Rivers' Pollution Act; for in the year 1388 an Act was passed imposing a penalty of £20 upon persons casting animal filth and refuse into rivers. In 1865 and 1868 respectively, Royal Commissions were appointed to investigate the P. of R. and S., and report thereon; but although the magnitude of the evil, the polluting agencies, and the appropriate remedial measures were clearly pointed out, legislation on the subject was delayed until August 1876, when 'An Act for making further Provision for the Prevention of Pollution of Rivers' was passed. The substances polluting rivers are organic and inorganic. The organic substances are sewage and the effluent drainage waters from cotton and other mills; from print, dye, bleach, alkali, chemical, soap, starch, and other works; tanneries, distilleries, &c. Such *effluents* all hold in suspension and solution matters principally organic and more or

less putrescent. The inorganic substances are chiefly those arising from mining operations and metal manufactures. In the case of lead, zinc, copper, arsenic, tin, and baryta mines, a directly poisonous ingredient is added to the water, some part of which is dissolved, the remainder being held in suspension. In some instances, the affluent waters are extremely acid and corrosive, so much so that they destroy the cement and brickwork of sewers.

The Rivers Pollution Prevention Act, 1876, consists of six parts, as follows:—Part I. *Law as to Solid Matters* prohibits the putting solid matter into streams, such as the solid refuse of any manufactory, manufacturing process or quarry, or any rubbish or cinders, or any other waste or any putrid solid matter. In proving interference with the due flow of any stream, or in proving the pollution of any stream, evidence may be given of repeated acts which together cause such interference or pollution, although each act taken by itself may not be sufficient for that purpose.

Part II. *Law as to Sewage Pollution* prohibits the drainage of sewers into streams. 'Every person who causes to fall, &c., into any stream any solid or liquid sewage matter, shall be deemed to have committed an offence against this Act.' 'Where any sewage matter falls, or flows, or is carried into any stream along a channel used, constructed, or in process of construction at the date of the passing of this Act, for the purpose of conveying such sewage matter, the person causing or knowingly permitting the sewage matter so to fall or flow or to be carried shall not be deemed to have committed an offence against this Act if he shows to the satisfaction of the court having cognisance of the case that he is using the best practicable and available means to render harmless the sewage matter so falling, or flowing, or carried into the stream.' Where the court is satisfied that further time ought to be granted to any sanitary authority for the purpose of enabling such authority to adopt the best practicable and available means for rendering harmless such sewage matter, the court may declare that this section shall not, so far as regards the discharge of sewage matter by such channel, be in operation until the expiration of a period to be limited in the order; and the order may from time to time be renewed by the court, subject to such conditions, if any, as it may see fit.

Part III. *Law as to Manufacturing and Mining Pollutions*, prohibits the drainage from manufactures into streams. 'Every person who causes to fall, or flow, &c., into any stream any poisonous, noxious, or polluting liquid proceeding from any factory or manufacturing process, shall be deemed to have committed an offence against this Act.' When the best practicable and reasonably available means are used to render the polluting liquid harmless, no offence is committed. Under this section there is a very important restriction on proceedings; for proceedings cannot be taken against any person under this part of the Act save by a sanitary authority, nor can any such proceedings be taken even by a sanitary authority without the consent of the court having cognisance of the case; provided always that if the sanitary authority, on the application of any person interested alleging an offence to have been committed, shall refuse to take proceedings, or apply for the consent by this section provided, the person so interested may apply to the court having cognisance of the case, and if that court on inquiry is of opinion that the sanitary authority shall take proceedings, they may direct the sanitary authority accordingly, who shall thereupon commence proceedings. It is also enacted that any person within such district as aforesaid, against whom proceedings are proposed to be taken under this part of this Act, shall, notwithstanding any consent of the Local Government Board, be at liberty to object before the sanitary authority to such proceedings being taken, so far as the same relates to his works or manufacturing processes. The sanitary authority shall thereupon allow such person to be heard by himself, agents, and witnesses, and after inquiry, such authority shall determine, having regard to all the considerations to which the Local Government Board are by this section directed to have regard, whether such proceedings as aforesaid shall or shall not be taken, and where any such sanitary authority has taken proceedings under this Act, it shall not be competent to other sanitary authorities to take proceedings under this Act till the party against whom such proceedings are intended shall have failed in reasonable time to carry out the order of any competent court under this Act.

Part IV. *Administration of Law* authorises sanitary authorities

to afford facilities for factories draining into sewers, and empowers sanitary authorities to enforce the provisions of the Act in relation to any stream being within or passing through or by any part of their district.

Legal Proceedings, Saving Clauses, Definitions.—The county court may by summary order require any person to abstain from the commission of such offence, and when there is default to perform a duty under this Act, may require him to perform such duty, and if either party feel aggrieved he may appeal to the High Court of Justice. 'Stream' includes the sea to such extent, and tidal waters to such point, as may, after local inquiry and on sanitary grounds, be determined by the Local Government Board, by order published in the *London Gazette*. Save, as aforesaid, it includes rivers, streams, canals, lakes, and watercourses, other than watercourses at the passing of the Act mainly used as sewers, and emptying directly into the sea, or tidal waters which have not been determined to be streams within the meaning of this Act by such order as aforesaid.'

Part V. *Application of the Act to Scotland.*—The terms 'Local Government Board' and 'Secretary of State' shall mean one of Her Majesty's Principal Secretaries of State, and 'High Court of Justice' shall mean the Court of Session.

Part VI. makes provisions for the application of this Act to Ireland.

River Terraces occur along the sloping banks of certain rivers, and mark the height at which the river formerly flowed. They are thus somewhat analogous to raised beaches both in their appearance and mode of formation. They are found along the Rhone, Severn, Seine, &c.

Rivet (Fr.), a short metal bolt, consisting of a head, neck, and shank, employed for uniting two overlapping plates of metal or other material. Rivets used in iron shipbuilding and boiler-making, &c., are made from a superior quality of iron by machinery. The head of a 'pan-head' R. is flat, and that of a 'snap-head' hemispherical. When required for use the R. is made red hot, and inserted in the drilled or punched holes prepared for it in the plates; a workman then presses heavily against the head with a hammer, while two 'riveters' beat down or clench the other end, forming a conical point, a 'countersunk' (for a flush surface), or a 'snap,' as may be required. To form the snap-point, the end of the R. is covered with a cup-shaped die, but the other two kinds are formed directly with the hammer. Riveting machines, on the general principle of the punching-machine, have been in use for several years, and for some kinds of work give great satisfaction. Sir William Fairbairn of Manchester first introduced them, and his machines and Tweddell's hydraulic riveters are extensively employed.

Riviera (Ital. 'coast,' from Low Lat. *riparia*), the beautiful strip of shore on the Gulf of Genoa, from Nice to Spezzia, traversed by the famous Route de la Corniche, and by a continuous line of railway, opened in 1814, which is carried through 80 tunnels and many cuttings. To the E. of Genoa it is known as R. di Levante, to the W. as R. di Ponente. The road passes precipitous cliffs, washed by the Mediterranean surf and crowned by ruined castles, skirts extensive plantations of olives and bright green pine-forests, and is bordered by luxuriant growths of figs, vines, citrons, oranges, oleanders, myrtles, aloes, and even palms. Towns are perched like nests among the rocks, and their churches peer forth from a sombre setting of cypresses, while gigantic pinnacles of rock rise abruptly from the rich coast-plains.

Rivoli, a town of N. Italy, province of Torino (Turin), 9 miles W. of Turin by rail. It has a royal residence, and manufactures of silks, woollens, linens, and needles. Pop. (1874) 4886.—**R.**, a village in the Italian province of Verona, between the Lago di Garda and the right bank of the Adige, 12 miles N.W. of Verona by rail, where the Austrians under Würmsner were defeated by the French under Bonaparte, 14th and 15th January 1797. Massena, for his exploits here, was afterwards named Duc de R.

Risah, a town of Asiatic Turkey, on the Black Sea, 35 miles E. of Trebizond. It has extensive linen manufactures. There are nearly 30,000 male inhabitants in the district.

Rizzio. See RICCIO.

Roach (*Leuciscus rutilis*), a species of Teleostean fishes belonging to the Carp family, and common in freshwater lakes and rivers. The R. generally swims in shoals, and is a fish requiring considerable dexterity to capture. It is rather sensitive to changes in temperature and weather. The average weight is about $\frac{3}{4}$ lb. The colour is a greyish green tinted with blue, the abdomen being silvery white. The fins are bright red, the dorsal and tail fins brownish red.

Road, in law. See HIGHWAYS, LAW REGARDING.

Roads and Road-Making. A road is a line of communication between any two points fitted for foot-passengers, cattle, and vehicles. Roads are not only most characteristic essentials of civilisation and commerce, but in themselves they exercise a powerful influence in breaking down barriers of suspicion and jealousy among tribes and peoples, and they directly promote the spread of knowledge, goodwill, and mutual helpfulness among communities separated from each other. The abundance and excellence of roads in any country forms a pretty fair criterion of the civilisation, importance, and wealth of the people owning them, and in that view the following figures possess interesting significance:—

LENGTH OF METALLED ROADS IN 1868-69.

Country.	Length of Roads. Miles.	Area. Sq. miles.	Population.
United Kingdom	160,000	122,519	30,621,431
France	100,048	210,400	38,192,064
Prussia	55,818	139,675	23,970,641
Spain	10,826	198,061	15,673,481

The ordinary highways of the country were, down to the early part of the present century, in a most unsatisfactory condition, so that communication between towns apart was very slow, dangerous to passengers, and painfully difficult to the horses which had to drag the heavy and lumbering vehicles fitted for the roads. A very graphic sketch of the condition of British roads during the 18th c. may be found in Smiles *Lives of Engineers*, vol. i. Mr. Arthur Young writing in 1770 uses some exceedingly strong language regarding the condition of various roads. Writing of the road to Wigan he says:—'Turnpike—I know not in the whole range of language terms sufficiently expressive to describe this infernal road. Let me most seriously caution all travellers who may accidentally propose to travel this terrible country to avoid it as they would the devil, for a thousand to one they break their necks or their limbs by overthrows or breakings down. They will here meet with ruts, which I actually measured 4 feet deep, and floating with mud only from a wet summer; what therefore must it be after a winter? The only mending it receives is tumbling some loose stones, which serve no other purpose than jolting a carriage in a most intolerable manner. These are not merely opinions but facts; for I actually passed three carts, broken down, in those 18 miles of execrable memory.' The condition of public roads even so late as 1809 was little better than that pictured by Mr. Young. The theory of roadmaking was to pile up loose materials in the middle of the way, so that the road was almost barrel like, and thus its sides formed steep and dangerous slopes. Carriages were therefore forced to keep in the middle of the way and thus deep ruts were formed, which gathered the water and forced the loose materials outwards to the sides, quickly converting the convexity to a concavity as seen in the section fig. 1. Towards the end of



Fig. 1.

autumn the repair of a road in such a condition would be undertaken, the loose material again would be pitched into the centre,

more unsorted stones, &c., would be thrown over the surface, and the barrel-like appearance (fig. 2) would once more be pre-



Fig. 2.

sented. Winter's storms and summer's traffic very soon told on its specious and insecure rotundity, and the last end of that road (fig. 3.) would be worse than its first.



Fig. 3.

There is a good deal of dispute as to whom should be assigned the credit of introducing the system of road-making now known as Macadamisation. The method takes its name from Mr. James L. Macadam, who at any rate was undoubtedly the first to put it into extensive practice. In 1816 that gentleman, then in charge of the Bristol roads, put into operation the plan associated with his name, viz.,—to put broken stone upon a road which shall unite by its own angles to form a solid, hard surface. 'It follows,' Mr. Macadam stated before a select Committee of the House of Commons in 1819, 'that when that material is laid upon the road, it must remain in the situation in which it is placed without ever being moved again.' As examples of engineering skill, no roads in the United Kingdom equal the system laid down by Mr. Telford about the beginning of the century in the Highlands of Scotland and in other localities.

Roads as now made are kept as flat on the surface as is consistent with the running of the surface water to the sides. The consolidation of road metal on the surface is also greatly promoted by the use of heavy steam rollers after fresh metalling. Under and side drainage is of the most essential consequence to the quality and durability of a road. The accompanying section, fig. 4, is that of a first class highway with a footpath A, side-



Fig. 4.

channel B, with an opening into a drain C, a roadway D, and a ditch E, on the other side of the road. Regarding the use of surface materials other than 'metal' or broken stones for roads, streets, and footpaths, see PAVEMENT.

Roanne, a town of France, department of Loire, 49 miles N.N.W. of St. Etienne by rail, on the left bank of the navigable Loire, and connected by the Canal-de-Digoin with all the principal water-roads of France. The *Rodumna* of the Segusians, it has remains of baths and a Gallo-Roman cemetery, whilst the church of St. Etienne, dating from the 12th c., a ruined chateau, and the college founded by Henri IV.'s confessor, the Jesuit Cotton, constitute its chief historical monuments. Cotton-mills employ 1200 workpeople, and there are also tanneries, dye-works, faience and hat factories, &c. Pop. (1872) 18,251.

Roanoke, a river of N. America, 260 miles long, formed by the junction of the Dan and Staunton at Clarksville, Virginia, flows through that State and N. Carolina until it reaches the sea at Albemarle Sound. It is tidal up to Halifax Falls, 75 miles

from its mouth, and navigable for steamboats as far as Weldon, 75 miles farther up.

Roaring, the name given to a peculiar affection of the respiratory organs of the horse, characterised by a roughened or grating noise during inspiration. It appears to consist of a spasmodic action of the muscles of the larynx and bronchial tubes, and is attended with atrophy or wasting of the muscles of the larynx. The affection constitutes legal unsoundness in a horse. It increases with time, and appears to be a result of cold, strangles, chest inflammation, &c. A 'R.' horse should be fed and watered several hours before work. In bad cases tracheotomy has been performed, the horse sometimes working for a long period afterwards.

Roasting, a mode of cooking food in front of a fire. As in the process of boiling meat, to retain the nutritive juices inside it, meat to be roasted should first be subjected to a sharp heat for a few minutes in order to coagulate the albuminous matter on the outside and thereby prevent the escape of the internal fluids. The meat ought then to be withdrawn from the fire to such a distance as will allow of the inner portions being slowly and gradually penetrated by the heat. This process of slow R. renders the muscular fibres easy of mastication, coagulates a portion of the albumen and fluids inside, and develops, owing to obscure chemical changes, the well-known savoury flavour and odour of roast-meat.

R., in metallurgy, signifies the protracted heating of metallic ores in order to dissipate volatile matters, and sometimes to effect oxidation.

Rob (Arab. *rob*, 'insipissated juice'; Ital. and Span. *rob*), a term used principally in pharmacy for a conserve prepared by mixing the juice of ripe fruit with honey or sugar.

Robbery, in law, is theft from the person (see LARCENY or THEFT), aggravated in criminality by violence or intimidation in execution. The value of the article taken is immaterial. Forcibly to take a penny is as criminal as forcibly to take a pound. To snatch or filch from the person, though criminal, is not R. The law regarding this crime has been consolidated and amended by 24 and 25 Vict. c. 96. It is declared felony; the punishment ranging from two years' imprisonment to fourteen years' penal servitude, according to circumstance.

Robert I. See BRUCE.

Robert II., the first of the Stewart house to ascend the Scottish throne, was the son of Walter Stewart and Robert Bruce's daughter Marjory. He was born March 2, 1316, and played an important part during the minority and exile of David II., acting as regent, and being present at the battles of Halidon Hill and Neville's Cross. He was fifty-five years old when he ascended the throne, but in that position he felt powerless to restrain his turbulent barons—Douglas, Mar, March, Moray, and the rest—who embroiled him continually with England. In 1381 John of Gaunt, Duke of Lancaster, marched to the border, and imposed on the Scots a three years' truce. At the end of that truce the French sent into Scotland a body of 2000 men under Jean de Vienne, who brought arms and money to tempt the nobles to invade England. The nobles yielded to the temptation, and the allies ravaged the N. of England, but soon disagreed among themselves, and returned home. In 1388 a fresh invasion was begun under the leadership of young Douglas, and this ended in the famous battle of Otterburn (see CHEVY CHASE). In the following year the aged king appointed his second son, the Earl of Fife, to govern in his stead. R. died at Dundonald Castle, Ayrshire, 19th April 1390. He was a monarch who allowed his nobles to manage his kingdom and his mistresses to manage his private affairs.—**R. III.**, eldest son of the preceding, born about 1340, was crowned at Scone, August 14, 1390. His original name was John, and some say it was changed because of its association with Baliol. He inherited his father's indolent disposition, although a better man, and left the power almost entirely in the hands of his designing brother, the Earl of Fife. The Earl was created Duke of Albany in 1398, and the King's son, Earl of Carrick, was then made Duke of Rothesay. These were the first Scottish Dukes. The truce with England, which had remained unbroken during the earlier years of Robert's

reign, was broken in 1400 by Henry IV., who marched with an immense army to Leith, but was forced by want of provisions to return without striking an effective blow. Next year Albany persuaded the King that the profligate Rothesay should be kept under restraint, and imprisoning his nephew in Falkland Castle, he starved him to death. In 1402 the Scots were defeated at Homildon Hill, and in 1405 the King's second son, James, in attempting to escape to France, was captured by the English at Flamborough in Yorkshire. This calamity fairly broke the spirit of the King, who died at Rothesay, April 4, 1406. See Hill Burton's *History of Scotland*.

Robert of Gloucester. See GLOUCESTER, ROBERT OF.

Roberts, David, R.A., the greatest English architectural painter, was born at Stockbridge, Edinburgh, 24th October 1796. He was the son of a working shoemaker, and while a mere child evinced an intense love of pictures, and precocious skill as a copyist with chalk or burnt 'spunks.' During a seven years' apprenticeship to house-painting, he steadily practised drawing and painting, and deepened his devotion to art by fellowship with a host of young aspirants, together with whom he opened three or four annual exhibitions of pictures. After a pleasant and studious year at Perth as a foreman house-decorator, he returned to Edinburgh to begin his career as a scene-painter in 1816, and accompanied a strolling company as far as York. After a varied and arduous experience, enlivened by gleams of success, he was appointed scene-painter in the Edinburgh Theatre Royal in 1820. He exhibited small pictures first at the Edinburgh Exhibition of 1821, and gained much from an intimate acquaintance with Clarkson Stansfield, whom he joined as a *collaborateur* in scene-painting at Drury Lane in 1822. Two years later he exhibited 'Dryburgh Abbey' in the collection of the British Institution, and in 1825 sought on the Continent for newer and higher subjects. His first picture at the Royal Academy was 'Rouen Cathedral' (1826), on seeing which Turner remarked to Sir W. Allan, 'Here is a man we must have our eye upon.' Devoting himself wholly to architectural painting, he produced his fine illustrations of Bulwer's *Pilgrims of the Rhine* in 1832, travelled through Spain in 1832-33, and issued *Picturesque Views in Spain* (1837), and brought his reputation to a height by his memorable journey in the East, the immediate result of which was the splendidly illustrated *Holy Land, Syria, Idumea, Arabia, Egypt, and Nubia* (4 vols. 1842-49). Meantime he had been made an Associate in 1838, and an Academician in 1841, while subsequently he received many honours, the last being the freedom of the City of Edinburgh in 1858. R. died in London, 25th November 1864. His wonderful industry may be judged from the fact that, besides theatrical scenes and prints, he produced nearly 300 finished pictures and some 11,000 sketches in oil and water-colour. A sale of the latter after his death realised £17,000. Admirable specimens of R.'s best style are the 'Ruins of Baalbec' (1841), 'Temple of Karnac' (1845), 'Destruction of Jerusalem' (1849), 'Venice' (1852), 'Interior of St. Peter's' (1854), 'Rome' (1855), 'Temple of the Sun, Baalbec' (1861), 'Mausoleum of Hadrian' (1863). Thackeray, a fast friend of R., says his 'hand is the perfect and accomplished slave of his intellect, and ready, like a genius in an Eastern tale, to execute the most wonderful feats and beautiful works with the most extraordinary rapidity.' His facility in the attainment of broad, powerful effects is equalled by his faultless fidelity in the treatment of subjects ranging from the most gorgeous interior to the airy heights of Lebanon, and from ambitious Gothic piles to the vast Theban ruins. See *Life of R., compiled from his Journals*, by James Ballantyne (Edin. 1866).

Robertson, Frederick William, was born in London, February 3, 1816. He was the son of a Scotch gentleman, Captain Frederick R., of the Royal Artillery, and the first five happy years of his life were spent in Leith Fort. He was educated for some time at the grammar-school of Beverley, in Yorkshire, accompanied his parents to the Continent for a year, during which he secured an accurate acquaintance with the French language, and at the age of sixteen he entered the Edinburgh Academy. At the Academy he won all but the highest honours; and from that institution he passed for a brief session to Edinburgh University. Destined by his father for the bar,

he himself nourished the hope of entering the army. The chivalry of his nature had already been abundantly manifested at school: 'I was rocked and cradled,' he writes, 'to the roar of artillery.' In the end, however, he entered Brazenose College, Oxford (1836), and proceeded to holy orders. In 1840 he was ordained at Winchester by the bishop of the diocese, and obtained the curacy of St. Maurice and St. Mary Calendar in that city. He began work in the spirit of an ascetic, and so weakened mind and body that he had to seek rest on the Continent at the end of a year. At Geneva he married the daughter of an English baronet. Returning to England, he took duty at Cheltenham as curate to the Rev. Archibald Boyd. In this position he remained for five years, but at the end of that time the crisis of his life occurred. He had hitherto called himself an Evangelical, and now he found himself no Evangelical. Like Jouffroy, he found his old beliefs 'slip from him like a garment.' The spiritual fascination exerted by certain of the Tractarians over him faded before the light of reason, and towards the greater portion of his party he began to conceive the bitterest dislike. 'They tell lies in the name of God; others tell them in the name of the devil:—such were the words with which he tore himself from those who shared his early faith. He threw up his curacy at Cheltenham, and led a lonely life for some time in the Tyrol and at Heidelberg. In 1847 he came back to England, and undertook the charge of St. Ebbes, Oxford. Two months after, he removed to Trinity Chapel, Brighton, where he spent the remaining six years of his life. The intensely practical tone of his preaching took hold not more of the aristocratic circles at Brighton than of the working classes. He preached charity as no other English divine has ever preached it. He determined to make Christianity 'bear upon the social state of all parties; upon the questions which agitated society; upon the great movements of the world.' Therefore he worked among his people not only in the pulpit, but on the platform, meeting Chartists and infidels on their own terms, believing ill altogether of nobody and no class; seeking 'to judge the world and to estimate the world's maxims as Christ judged and estimated.' His catholicity prevented his union with any separate school, and prevented him also from founding a school. No man of so sensitive a nature suffered more narrow-minded persecution on account of doctrine; but no man has wrung more admiration from his enemies. His nature was full of Christian chivalry; and throughout all cultivated society in the land a new religious energy, spiritual and not less rational, has been developed by his preaching, by the teaching of his books, and above all by the story of his pure life. He died, a broken-down man, in his thirty-seventh year, August 14, 1853. Four series of his *Sermons* have been published (1855-73). His *Expository Lectures on St. Paul's Epistle to the Corinthians* appeared in 1859; *Lectures and Addresses on Literary and Social Topics* followed in 1858; an *Analysis of Tennyson's 'In Memoriam'* in 1862; and *Notes on Genesis* were edited in 1877. The Rev. Stopford Brooke has written a fine Life of his friend (1865).

Robertson, James Craigie, born in 1813 at Aberdeen, proceeded from the Marischal College to Trinity College, Cambridge, where he graduated (1834). Having taken Anglican orders, he became vicar of Bekesbourne, Kent (1846), was made a canon of Canterbury (1859), and received the chair of ecclesiastical history in King's College, London (1864), which he held till 1875. R. has written *A History of the Christian Church* (1853; new ed. 8 vols. 1873-75), *Sketches of Church History, First Six Centuries* (1855), and *Becket, Archbishop of Canterbury* (1859), a biography whose general accuracy is marred by a pervading tone of hostility. He has also edited Heylyn's *History of the Reformation* for the Ecclesiastical History Society, Bargrave's *Alexander VII. and his Cardinals* for the Camden Society, and for the Record Office *Materials for the History of Thomas Becket* (vols. i.-ii. 1875-76).

Robertson, Joseph, a distinguished Scottish antiquary, born at Aberdeen, 17th May 1810, educated at the grammar-school there and at Marischal College, went to Edinburgh in 1833, and was for some time engaged in miscellaneous literary work. From 1839 to 1843 he edited the *Aberdeen Constitutionnel*, from 1843 to 1849 the *Glasgow Constitutionnel*, and from 1849 to 1853 the *Edinburgh Evening Courant*. In 1853 he was appointed Curator of the Historical Department of the Register House, Edinburgh, an office which he held till his death, 13th

December 1866. R. was a most laborious student, and a most cautious, shrewd, and penetrating critic. His work is among the best of its kind done in any country. In conjunction with Mr. John Stuart he founded the Spalding Club in 1839. The principal works written or edited by him are *The Book of Bon-Accord, or a Guide to the City of Aberdeen* (1839); for the Spalding Club, Gordon of Rothiemay's *History of Scots Affairs from 1637 to 1641*, edited in conjunction with Mr. Grub (3 vols. 1841); *Collections for a History of the Shires of Aberdeen and Banff* (1843); *Illustrations of the Topography and Antiquities of the Shires of Aberdeen and Banff* (3 vols. 1847-62); for the Maitland Club, *Book of the Collegiate Church of St. Mary and St. Anne, Glasgow* (1846), and *Chartulary of the Black Friars of Glasgow* (1846); for the Bannatyne Club, *Catalogues of the Jewels, Dresses, Furniture, Books, and Paintings of Mary Queen of Scots* (1863), with an admirable historical preface; and the *Concilia Scotiæ* (2 vols. 1866), also edited for the Bannatyne Club, and regarded as his most important contribution to archaeological literature.

Robertson, Thomas William, a brilliant modern dramatist, was born at Spalding, in Lincolnshire, 9th January 1829. He was born, as it were, on the stage; in his own phrase, 'was nursed on rose-pink and cradled in properties.' His father and mother both earned some theatrical reputation, and his sister, Madge R. (now Mrs. Kendal), subsequently became one of the brightest ornaments of the famed Haymarket company. R. himself failed as an actor in the provinces, and settled in London as a journalist in 1860. After much literary drudgery, he became dramatic critic to the *Illustrated Times*, and a contributor to the best of the lighter periodicals. Meantime he had written and translated many plays, but it was not till after many delays and disappointments that he achieved his first triumph as a dramatist on the production of *Society* at the Prince of Wales' Theatre in 1865. This success he followed up with *Ours* in 1866, *Caste* in 1867, *Play* in 1868, *School* in 1869, and *M.P.* in 1870. These comedies, aptly called cabinet pictures of society, are all characterised by unwonted freshness and realism, and in scarcely a less degree by arch humour and dramatic effect. The plots, in their simple, flimsy structure the reverse of 'sensational,' are sustained by the strong element of well-balanced *dramatis personæ*, and enlivened by delightful idyllic situations. Recoiling from mock heroics and staginess, R. has been taxed with the opposite evil of commonplace, but the real faults of his art are those of the everyday life he depicts—a shallow cynicism, occasional vulgarity, and a tendency to 'chaff' or 'verbal wit,' but these are atoned for by the presence of genuine poetic feeling. R. died in London, 3d February 1871.

Robertson, William, an illustrious Scottish historian, was born in the manse of Borthwick, county of Mid-Lothian, September 19, 1721. His father removed to Edinburgh as minister of Old Greyfriars' Church, and William commenced university studies at the age of twelve. At the age of twenty he was licensed to preach, and two years afterwards the Earl of Hopetoun presented him to the parish of Gladsmuir, Haddingtonshire. Nothing in R.'s life redounds more to his credit than the fact that in the manse of Gladsmuir, with a stipend of only £100, he supported and educated six orphan sisters and a brother; and only on reaching his thirtieth year, when they were all comfortably established in life, did he himself marry. He early became a noted debater in church courts, and on such questions as that of lay patronage took up so decided a position as ere long to be looked to as leader of the moderate party in the General Assembly. In 1775 his predilection for historical inquiry was manifested in the title of the only sermon he ever published—*The Situation of the World at the Time of Christ's Appearance, and its Connection with the Success of His Religion Considered*. Shortly after this R. distinguished himself as the defender of Home, whose tragedy of *Douglas* caused such scandal in ultra-Calvinistic circles. In 1759 appeared his *History of Scotland during the Reigns of Mary and James VI., till his Accession to the Crown of England*. This work, which occupied two quarto volumes, was sold by the author for £600, and congratulations upon its success reached him from the most distinguished men of the day. R. was now appointed garrison chaplain at Stirling; in 1761 he became a Dean of the Chapel Royal; in 1762 he was raised to the Princi-

palship of Edinburgh University, uniting the duties of that post with those of minister of Old Greyfriars; and two years later he was nominated historiographer of Scotland, with a salary of £200. In 1769 he published *The History of the Reign of the Emperor Charles V., with a View of the Progress of Society from the Subversion of the Roman Empire to the Beginning of the Sixteenth Century* (3 vols. 4to). The copyright of this work brought £3600. Eight years afterwards, his *History of America* (2 vols. 4to) added still to his fame. He laboured for the repeal of some laws against the Catholics then enforced in Scotland; and in the riots consequent on the agitation of the question his house was attacked. His literary labours ended with the publication of *An Historical Disquisition Concerning the Knowledge which the Ancients had of India* (1791). R. died on the 11th of June 1793. As a divine he was more at home in the church courts than in the pulpit; his strong common sense and his administrative ability long preserved the power to his party, in spite of the wishes of a large number of ministers, and almost all the laity. Readers of Carlyle's autobiography or Cockburn's memorials know what a delightful position he held in Edinburgh society during one of its most renowned epochs. His histories it is now the fashion to pronounce shallow and unscholarly; his style is somewhat inflexible, and not free from Scotticisms; and his researches have long since been surpassed or corrected and amplified, as by Prescott in regard to America, and Maxwell in regard to Charles V. Still R. will continue to be read for his philosophical analyses of broad national movements, for his power of grouping and contrasting characters, and for the chastened eloquence of his descriptions. As a rule he is to be credited with candid impartiality; he himself says that in writing he always considered himself as giving evidence before a court of justice. Dugald Stewart wrote his Life in 1801; and to the 1822 edition of his works (12 vols. 8vo) Bishop Gleig has prefixed a memoir of the author.

Robespierre, Maximilien-Marie-Isidore, born at Arras, May 6, 1758, obtained through clerical patronage a bursary in the Collège Louis-le-Grand, and having successfully completed his course, settled like R. *à vie* as advocate in his native town. The bishop, foreseeing in him an excellent business man, 'happily free from genius,' made him judge of the diocese, but unwillingness to sentence a fellow-creature to death induced him to resign the post. Extant pleadings and prize essays, composed by him in the years 1783-85, are full of allusions to the King, 'that dear and sacred head,' of panegyrics on Rousseau, and railings against Voltaire; but his first distinctly political work, on the state of things in the provinces (1788), combats the preponderance given to nobles and clergy in the elections. In 1789 Artois sent him as one of its sixteen representatives up to the States-General. There and in the Constituent Assembly he made his mark, in spite of the inextinguishable laughter that greeted his sea-green visage, screech-owl tones, and grimaces 'like a cat's,' said Mirabeau, 'that has drunk vinegar;' nay, even Mirabeau confessed, 'This man will make his way: he believes all that he says.' Acknowledged high-priest of the Jacobins (q. v.), and appointed Public Accuser in the new courts of judicature, R. devoted one of eighty speeches addressed to the Constituent Assembly (January-October 1791) to urging the abolition of capital punishment; by another he carried a kind of self-denying ordinance, which let him retire awhile to Arras, and find the place illuminated in his honour. Back in Paris in seven weeks' time, he profited by his exclusion from the Legislative Assembly to strengthen his influence in the Jacobin Club, where, safe from contradiction, he could speak of 'a thousand daggers whetted to take his life,' or 'sacrifice that life to justice, liberty, truth, and boundless love for his fellow-men.' He lay invisible through August 9-10, 1792, when the populace rose, the Tuileries were stormed, the Swiss Guards slain; with Marat provided for the including of personal enemies in the September Massacre; yet 'nearly wept' at the thought that one just man was said to have fallen with the rest. With Danton and Marat he headed the Mountain in the National Convention, covered in the first two months of its session before Girondist accusations, but by December plucked up courage to argue on the King's trial that here if anywhere right was might. The first six months of 1793 were spent in the annihilation of the Gironde, and Marat's assassination (July 13) left R. almost absolute dictator, with Hébert and Danton, leaders of the Cordeliers, only in his way. Them, too, as Ultras and Atheists, R. and his

creatures of the Committee of Public Safety, St. Just and Couthon, brought to the scaffold (March 1794); and ever glutting the mob with blood, he next must make Convention decree the existence of a Supreme Being, with the consolatory principle of the soul's immortality, on 8th June celebrating the feast of his new worship, a priest and prophet clad in a sky-blue coat. Two days later came Couthon's 'Decree of the 22d Prairial,' extending the Law of Suspects, and giving fresh vigour to arrests; the increase of terror which followed it was all of R.'s secret direction. At length, on 27th July, shouts of 'Tyranny, Dictatorship, Triumvirate,' burst from the Convention, and the meeting ended with the accusation of R., who, on the failure of Henriot's attempted rising, half killed himself, and the guillotine completing his bungling pistol's work, 'went down to hell,' 28th July 1794. His overthrow by men as vile as he was chiefly due to rivalry between the Committees and Convention, to R.'s own disputes with Barrère and Varenne, and to the ridicule roused by his new religion; but that he fell, and with him the Reign of Terror (q. v.), justifies almost any causes of his fall. His virtues of 'amiability,' neatness, and fondness for pets, but throw into stronger relief his vanity, cowardice, cant, and cold-blooded blood-thirstiness; the title of 'Incorruptible' is the one white hair, and consequent defect, in his otherwise utter blackness. A complete edition of R.'s poems, essays, and speeches was published by Laponneraye (2d ed. 3 vols. 1840-42), and his Life has been written by G. H. Lewes (1839), Tissot (1844), and Hamel (4 vols. 1865 *et seq.*). See also Histories of the Revolution by Carlyle, Thiers, Michelet, &c., and D'Héricault's *La Révolution de Thermidor, R. et le Comité de Salut Public en l'An II.* (Par. 1876).

Robin Goodfellow, or Hobgoblin (Fr. *gobelin*, Ger. *kobold*), a domestic fairy of English folklore, answering to the 'Nisse God-Dreng' of Scandinavia, the 'Knecht Ruprecht' of Germany, and the 'Brownie' of Scottish superstition. The offspring of a 'proper young wench' by Oberon, king of the fairies, he ran away from his mother at six years of age, and received from his father the power of turning himself 'to horse, to hog, to dog, to ape,' with the command to 'love those that honest be, and help them in necessity.' According to Book IV. of Reginald Scot's blackletter *Discoverie of Witchcraft* (Lond. 1584), maids were wont to set out a 'boll of milke' for Robin, 'for grinding of malt and mustard, and sweeping the house at midnight, and he would chafe exceedingly if the maid or goodwife of the house, hauing compassion of his nakednes, laid anie clothes for him besides his messe of white bread and milke, which was his standing fee. For in that case he saith, "What haue we here? Hemton hamten, here will I neuer more tread nor stampen." In the *Midsummer Night's Dream* 'this merry wanderer of the night' appears as a 'shrewd and knavish sprite,' who doth 'jest to Oberon and make him smile,' and bears the appellative of 'Puck.' This *Puck*, or *ponke*, is an old word for 'devil,' the same as the Icelandic *þúki*, Frisian *puk*, and Devonshire *pixy* ('fairy'). See Drayton, *Nymphidia* (282, &c.); Milton, *L'Allégo* (100-114); *The Merry Pranks of R. G.*, in Percy's *Reliques* (vol. iii.); and Mr. Aldis Wright's *Preface to a Midsummer Night's Dream* (Clar. Press. Oxf. 1877).

Robinhood Bay, a creek and village in the N. Riding of Yorkshire, 5 miles S.E. of Whitby. There is here a coastguard station.

Robinia, a genus of *Leguminosa*, as now restricted, consisting of a few N. American trees and shrubs. All the species have pinnate leaves, frequently with spines at their base as stipules; white or rose-coloured pea-like flowers, arranged in racemes springing from the leaf-axils; a short five-toothed calyx; nine united and one free stamens; a slender downy style; and narrow, flat, thin-shelled pods containing several seeds. *R. pseud-acacia* has already been referred to under Locust Tree (q. v.). This species will grow to the height of 90 feet, but the timber is seldom of sufficient size to serve for shipbuilding, for which it has been recommended. It can be kept in a shrub state by planting close and clipping, and then forms a good hedge plant. The roots have the taste and smell of liquorice, but are poisonous. *R. viscosa*, which has its young branches covered with a viscid substance, and bears rose-coloured flowers, is a smaller tree than the above; and *R. hispida* (Rose acacia), with hispid branches and large deep rose-coloured flowers, in loose racemes, seldom

exceeds 6 or 8 feet in height. Both are natives of the Southern United States, and both are ornamental plants, particularly the last named. The genus *R.* was established in memory of Jean Robin, who was the first in Europe to raise *R. pseud-acacia* from seed. Gerard, in 1599, speaks of him as 'the curious and painful herbarist of Paris.'

Robins, Benjamin, an English mathematician, was born at Bath in 1707. Circumstances denied him the benefits of a good education, but by his own exertions he made sufficient advance in mathematics to be enabled to settle in London as a teacher. Here he continued energetically his own self-culture, and made a considerable reputation by the publication of several mathematical works. In 1742 appeared his great work, the *New Principles of Gunnery*, for which he received the gold medal from the Royal Society. He made a valuable series of experiments, which established the whole theory of projectiles upon a solid basis. He invented the ballistic pendulum for determining the velocity of cannon balls, and suggested a method for calculating the explosive force of a charge. He was the first to appreciate the true value of rifling and the advantages to be derived from the use of elongated shot. In 1749 he was made engineer in general to the East India Company, and went to India the succeeding year. He had hardly finished the plans for the defence of Madras when he died of fever, July 29, 1751. His mathematical works were published collectively after his death by Dr. Wilson (1761); and he is believed to have had a great share in the composition of Anson's *Voyage Round the World* (1740-44).

Robinson, Edward, born at Southington, Connecticut, U.S., 10th April 1794, after graduating at Hamilton College in 1816, and acting as tutor there (1817-18), settled at Clinton till 1821, when he removed to Andover, where he published an edition of eleven books of the *Iliad*, and taught Hebrew under Professor Stuart at the Seminary, helping him also with the second edition of his *Hebrew Grammar* (1823-26). His own translation of Wahls' *Clavis Philologica Novi Testamenti* appeared in 1825. During 1826-30 he studied at Halle and Berlin, marrying in 1828 Therese von Jakob. On his return to the United States he was made professor extraordinary at Andover (1830-33), but his health giving way, he removed to Boston, and in 1837 received a professorship in Union Theological Seminary, New York, held by him for the rest of his life. His travels with the Rev. Eli Smith in Palestine in 1838 and 1850 have vastly benefited biblical geography, his greatest work being the *Biblical Researches* (3 vols. 1841, compressed into 2 vols. and a 3d added in 1856). For this book he received the gold medal of the Royal Geographical Society of London in 1842, as well as the degree of D.D. from Halle University, previously conferred upon him by Dartmouth College (1831). Yale College made him LL.D. in 1844. He died 27th January 1864. Besides the works mentioned, R. published *A Dictionary of the Bible for the use of Schools and Young Persons* (1833); *Greek and English Lexicon of the New Testament* (1836; 2d ed. 1847); *Greek Harmony of the Gospels* (1845; 2d ed. 1847); *English Harmony of the Gospels* (1845; 2d ed. 1851), &c. In 1831 he founded the *Biblical Repository*, editing it himself for four years, and in 1843 the *Bibliotheca Sacra*, to which he contributed till 1855. His *Physical Geography of the Holy Land*, edited by his wife in 1864, appeared in 1865. The life of R. has been written by Hitchcock (New York, 1863). — **Thérèse Albertine Louise von Jakob**, wife of the preceding, the daughter of Professor von Jakob, was born at Halle, 26th January 1797. Living with her father in Russia from 1807 to 1816, she learned the Slavic languages, and on her return to Halle began to publish poems. Among her friends were Goethe, the Humboldts, Grimm, Savigny, and Ritter. In 1822 she translated Scott's *Old Mortality* and *Black Dwarf* into German, signing herself 'Ernest Berthold'; in 1824 she published *Psyche, Original Tales*, under the name 'Talvj' (the initials of her name), and in 1825-26 *Volkslieder der Serbeni* (in 2 vols.). After her marriage with Dr. Edward Robinson in 1828, she translated Pickering's essay *On Indian Languages* into German (1834); wrote many essays for her husband's magazine the *Biblical Repository*, among them several on the Slavic languages; and published in Germany, while her husband was in Palestine, her *Characteristics of the Popular Songs of the German Nations*, and

an essay on Ossian (1840). On her return to New York she wrote two small books on American history for use in Germany, several novels which her daughter translated into English, and in 1850 was published her greatest work, *An Historical View of the Language and Literature of the Slavic Nations*. After her husband's death in 1863, she lived at Hamburg, where her son was American consul, and there she died, 13th April 1870. Her *Fifteen Years, a Picture from the Last Century*, was published posthumously.

Robinson, Henry Crabb, F.S.A., born at Bury-St.-Edmund's, Suffolk, May 13, 1775, and after being articled to a lawyer at Colchester and in London, studied at Jena and other German universities (1800-5). Admitted to the 'Weimar circle,' he made the acquaintance of Goethe, Schiller, Wieland, Herder, and Madame de Stael; was *Times* correspondent in Spain during the first two years of the Peninsular War (1808-9); and on returning to London became a regular contributor, being thus brought into contact with many of the leading writers of his day. He was called to the bar (1813), and having acquired a fortune on the Norfolk circuit, retired in 1828 to private life and the society of Wordsworth, Lamb, Coleridge, Landor, and their compeers. A dissenter and a Liberal, he was one of the earliest members of the Athenæum Club, and a founder of University College, London, as also of the Flaxman Gallery. He died in London, February 5, 1867, leaving behind him a delightful Diary, which has been edited by Dr. Sadler (3 vols. Lond. 1869).

Robinson, John, the pastor of the Pilgrim Fathers, was born in 1575, probably in Lincolnshire, entered Cambridge University in 1592, and after holding for some time a benefice near Great Yarmouth, was suspended by the bishop for Puritan leanings in 1602. He drew together an independent congregation at Norwich, and was formally excluded from the Church of England in 1604. In the same year he became pastor of a society of Dissenters at Scrooby, on the borders of Yorkshire and Lincolnshire. Persecution drove R. and many of his flock to Amsterdam, where they were reinforced by other Dissenting exiles. In 1609 the little body settled in Leyden, and there during eleven years their church increased until it had 300 communicants. Through intercourse with Dr. Ames and R. Parker the extreme separatist views of R. were modified, but he continued to condemn the use of the Liturgy and the indiscriminate admission to the sacraments. Entering zealously into the scheme of an American settlement, he promoted the negotiations with the Plymouth company, and dismissed with a farewell sermon the part of his congregation which sailed in the *Spartan* and *Mayflower*, 22d July 1620. He intended to follow with the rest of the congregation, but before arrangements were completed he died, 1st March 1625. His two sons accompanied the second expedition soon after, and his descendants in America are numerous. R. is the author of various controversial works, which show sound classical scholarship and a luminous dialectic faculty. His complete works, with a memoir by Robert Ashton, and an account of his descendants by W. Allen, appeared in London and Boston in 3 vols. 1851.

Robinson, Sir Hercules George Robert, born in 1824, after studying at Sandhurst, received a commission in the 87th Foot, but retired, and held various Civil Service appointments, and was a member of the Irish Poor-Law Board (1846-53). He was next successively appointed President of Montserrat (1854), Lieutenant-Governor of St. Christopher's (1855), and Governor of Hong-Kong (1859), of Ceylon (1865), and of New South Wales (1872), where his six years' term of office has just expired. Having already been knighted in 1859, he was advanced to the rank of G.C.M.G. in 1875 for his services in connection with the annexation of the Fiji Islands.

Robison, John, a Scotch natural philosopher, was born at Boghall, Stirlingshire, in 1739. After graduating in 1756 at Glasgow University, he became mathematical tutor to the son of Admiral Knowles. In 1762 he was intrusted with the charge of Harrison's chronometer on a voyage to Jamaica, and on his return renewed his studies at Glasgow with the view of entering the Church. Under the influence of James Watt and Dr. Black, however, he turned his attention to physical subjects, and in 1766 succeeded the latter (who had been called to Edinburgh)

as lecturer on chemistry. In 1770 he accompanied Admiral Knowles to Russia as his secretary, and remained in that country till 1773, when he was called to the vacant chair of natural philosophy in Edinburgh University. In 1783 he took a leading part in the organisation of the Royal Society of Edinburgh, of which he was for some time secretary, and to the Transactions of which he contributed several papers. He edited Black's *Lectures on Chemistry* (1803) with illustrative notes; and published a first volume on the *Elements of Mechanical Philosophy* (1822). R. died January 28, 1805.

Rob Boy Macgregor Cam'pbell, the Highland Robin Hood, born about 1665, was nicknamed Roy (Gael. 'red') because of his ruddy complexion, and himself assumed the name of Campbell in consequence of Acts of Parliament abolishing his own. His father, Donald Macgregor of Glengyle, held a lieutenant-colonel's commission from James II., but Rob appears to have followed the humble calling of a small grazier, till, acquiring the Craig Royston and Inversnaid estates, near the head of Loch Lomond, and trusted by the Duke of Montrose with considerable loans, he gradually extended his speculations in the cattle line. These turned out ill; Rob absconded with £1000, obtained on false pretences, in his sporan; and in June 1712 an advertisement appeared in the *Edinburgh Evening Courant* offering a reward for his apprehension. Montrose's agents, while seizing Craig Royston, insulted Rob's haughty wife, and he himself, having found a protector in the Duke of Argyle, commenced a predatory warfare with his late patron, and also with all upholders of the Union. In the rebellion of 1715 the Earl of Mar sent him to raise a part of the Macgregor clan at Aberdeen, in which city he lodged with a kinsman, Professor Gregory. His lukewarm zeal at Sheriffmuir did not save him from attainer, nor hinder Cadogan from burning his house at Breadalbane, an act which Rob avenged in the succeeding year by relieving the Montrose factor of over £300. For some years longer he continued to levy 'black mail' on the surrounding country, running thereby a hundred risks, captured more than once, but only to escape, writing Montrose a mock-heroic challenge (1719), and to General Wade, the maker of proleptic roads, an offer of his services to George I. Growing at length more peaceable, he fought a final duel with Alaster Stewart of Invermahyle, receiving then his first and only wound; turned religious, or at least subscribed to Keith's *History of the Affairs of Church and State in Scotland* (1734), and died in his bed at Balquhidder in 1735. He left five sons, the third of whom, James, died an outlaw in Paris, October 1754, while the youngest, Robin, was hanged for abduction at Edinburgh on February 24 of the same year. Concerning Rob Roy himself, his daring, wariness, and generosity to the poor, his strength and ape-like arms, much may be found in Scott's Introduction to his great romance, and something, too, in the *Historical Memoirs of Rob Roy*, by K. Macleay (Edin. 1818).

Rooc'ambole, or **Spanish Shall'ot**, differs very little in general appearance from garlic (*Allium sativum*), excepting by its larger size in all the parts. The cultivated plant, which has received the name of *A. ophioscorodon*, is a form of *A. Scorodoprasum*, a native plant of most parts of Europe, including England and Scotland. R. was formerly grown for the same purposes as garlic, from which it is distinguished by 'the bulbs being smaller, milder in taste, and by the plant producing bulbs on the joints of the stem as well as at the base.'

Roccell'a. See ARCHILL.

Rocheambau, Jean Baptiste Donatien de Vimeur, Comte de, a French marshal, was the son of the governor of Vendôme, and was born there, 1st July 1725. Entering the army in 1742, he took part in the campaigns of Bohemia, Bavaria, and the Rhine. For his services at the siege of Namur he was made a colonel (1747). He also brilliantly distinguished himself at the siege of Maestricht. For his bravery in the expedition to Minorca he received the Cross of St. Louis (1756), and was raised to the rank of brigadier. He took part in the Seven Years' War, became *maréchal-de-camp* and inspector of cavalry in 1761. In 1780 he was sent to America to assist the revolted British colonists with an auxiliary force of 6000 men, and had a great share in the arrangements that forced Lord Cornwallis to capitulate with his whole force at Yorktown, in Virginia, 19th

October 1781. On his return to France he was made governor of Picardy. In 1790 he accepted the command of the army of the North, and in 1791 was made a marshal of France. In 1792 he resigned his command and withdrew to his country estate, narrowly escaped execution by the Terrorists, received the Cross of the Legion of Honour from Napoleon, and died at Thoré, 10th May 1807. See *Mémoires de R.*, by Luce de Lancival (Par. 1809).

Roche'dale, an industrial town of England, Lancashire, situated on both sides and in the pleasant vale of the Roch or Roche, 10 miles N.E. of Manchester by rail. The river is crossed by five bridges, two of which, for passenger traffic, are light iron-work structures. The parish church, dating from the 12th c., stands on an eminence, and is approached by a flight of 122 steps. St. Mary's Chapel-of-ease (1770) was thoroughly remodelled in 1864-66, and among the modern places of worship are St. Alban's, a rich Second Pointed structure (1859), a Methodist Free church in Italian style (1865), a Gothic chapel of the English Presbyterians (1868), All Saints', Hamer, St. Edmund's at Falinge, and St. Peter's (1871); two Wesleyan chapels, two United Methodist Free churches, two Independent chapels, four Baptist chapels, two Catholic chapels, two Unitarian chapels, two Primitive Methodist chapels, a New Connexion chapel, and a 'Friends' Meeting-House. The finest municipal building is the townhall, a Gothic edifice completed in 1867, which is surmounted by a tower and spire, together 240 feet high, and the front of which (220 feet long) faces the river. It contains, besides the municipal chambers, an exchange, borough court, free public library, and a great hall (90 feet by 56). The public baths were opened by the corporation in 1868, and a new post-office was erected in 1875. R. has a grammar-school which dates from 1565, and many benevolent institutions. It is the birthplace and chief centre of the working-men's co-operative movement—the Equitable Pioneers' Co-operative Society, formed in 1844, having (1878) 9700 members, a capital of some £300,000, and yearly sales amounting to £280,000. There are several similar societies in R., and one of these opened the Prince of Wales Theatre in 1867. From an early period R. has been noted for its manufactures. A Flemish colony in Edward III.'s reign introduced the woollen industry, and by the time of Elizabeth R. had attained great prosperity. It is still one of the chief centres of the woollen trade known as *Wannet*, but cotton is now manufactured here even more extensively. In 1871, the latter industry employed 5928 men and 7277 women; the former, for woollen cloth, 1909 men and 2699 women, and for worsted goods, 878 hands. The manufacture of engines and machinery employed 788; of spindles, 133; of silk, 400; of iron, 742 hands; while 990 were engaged as coal-miners, and 444 as stone-quarriers. The R. Canal, 33 miles long, completed at a cost of £600,000, unites with the Calder and Ribble Navigation at Halifax, and the Duke of Bridgewater's canal near Manchester, and thus gives the chief seats of trade in Lancashire and Yorkshire connection with the E. and W. seas. Two newspapers are published weekly at R., where also are held important markets for wool, dye-stuffs, and agricultural produce. Pop. (1871) 44,559; (1878) about 65,000. R. returns one member to Parliament. The parliamentary borough was enlarged by the Act 1867, and the municipal borough was made conterminous with it by the R. Improvement Act (1872). The family of Lord Byron were Barons de R., and held the manor and estates for more than two centuries, but these were sold by the poet in 1823. See Robertson's *Guide to R. Past and Present*.

Roche'fort, Henri, otherwise **Le Comte Victor-Henri de Rochefort-Lugay**, a French journalist and politician of the Red Republican school, was born at Paris on the 30th of January 1830, and was the son of a Legitimist Marquis, who was also a noted comic dramatist. After studying medicine for some time, R. took to literature, and, after working for some years as a *chroniqueur* on minor journals, and a contributor to comic papers, such as the *Charivari*, he became one of the principal members of the staff of *L'Événement* and *Le Figaro*. Between 1856 and 1866, he wrote some eighteen or twenty comedies and vaudevilles, generally in collaboration with other dramatists. In 1868 the bitterness of his satirical articles in the *Figaro* upon the Imperial régime caused several prosecutions to be instituted against that paper. On this account he withdrew

from its staff, and began the publication of a weekly pamphlet under the name of *La Lanterne*. More than 80,000 copies were sold on the day of its first publication (1st June 1868), and its circulation as a whole averaged about 120,000 weekly. It was suppressed by the Government after the eleventh number, and prosecutions were instituted against R., who fled to Brussels, where he continued the publication of *La Lanterne*, and, among other things, fought his fourth *duel de journaliste*. In 1869 he returned to Paris, having been elected to the Chamber of Deputies by the First Circumscription of Paris, after being defeated by M. Jules Favre in the Seventh. He now started a journal called *La Marseillaise*, in which he continued his attacks upon the Empire. It was while attempting to arrange a duel between R. and Prince Pierre Bonaparte that M. Victor Noir, a writer in *La Marseillaise*, was shot dead by the Prince in his own salon. Early in 1870 the journal was seized, and a fresh prosecution instituted against R. by the authority of the Chamber. On the 22d of January he was fined 3000 francs and sentenced to six months' imprisonment. The overthrow of the Empire on the 4th of September released him from the Sainte-Pélagie, and he became a member of the Provisional Government, but resigned on the 1st of November. In December he re-established *La Lanterne*, and in February 1871 changed its name to *Le Mot d'Ordre*. Elected in February to the National Assembly, he refused to sit, and by his writings promoted the cause of the Commune. After its fall he was arrested, and sentenced to fifteen years' transportation. He was taken to New Caledonia in 1873, but in March 1874 he made his escape to Newcastle, New South Wales, whence he returned to Europe by way of America. He settled first at Brussels and then at Geneva, in both of which places he continued the publication of *La Lanterne*. In 1876 he became a regular contributor to the newspapers *Les Droits de l'Homme* and *Le Radical*, published in Paris.

Roche'fort-sur-Mer ('the rock fortress by the sea'), a strongly fortified seaport and arsenal of France, department of Charente-Inférieure, situated on the right bank of the Charente, 7 miles from its mouth, and 18 miles S.S.E. of La Rochelle by rail. In its military port the largest vessels float at all times, but the commercial port does not admit close to the quays vessels of more than 800 tons. Tonnay-Charente, which is 3 miles farther up the river, may be regarded as the proper commercial port of R., for, though vessels coming up the river discharge at R., they almost invariably pass up to Tonnay to load. The arsenal has immense magazines, cannon-foundries, shipbuilding docks, spacious wharves and repairing basins, and a sail factory with a frontage of 1245 feet. The Marine Hospital, built in 1787, has 1285 beds, and contains a library of 12,000 vols. The finest houses of R. surround the great central square Place d'Armes or Place Colbert, which is adorned with rows of elm-trees. The town has a tribunal of commerce, a school of hydrography, a botanic garden, and a maritime museum. The chief industries are shipbuilding, sail-making, distilling, and the manufacture of vinegar and essences. It has also important commerce in wine, brandy, salt, corn, horses, fish, building timber, and colonial wares. In 1873, in R. and Tonnay there entered 152 British vessels of 56,156 tons, and cleared 151 of 56,259 tons. Pop. (1872) 21,564.

Roche'foucauld. See LAROCHEFOUCAULD.

Rochelle' (Low. Lat. *Rupella*, 'little rock'), the capital of the French department Charente-Inférieure, 88 miles W.S.W. of Poitiers by rail, is the finest of all the western harbours of France, with roadsteads sheltered by the Ile de Ré and the Ile d'Oleron. Neither its cathedral, an unfinished Grecian structure (1780), nor any of its seven churches, has much beauty, the finest buildings being the Gothic Hôtel-de-Ville (1486-1607), the Palais-de-Justice (1614), the arsenal, and an imposing Bourse. Besides an outer and inner harbour there are two docks, the larger of which, with an area of 7 acres 2066 sq. yards, was deepened and improved in 1874. Plans are now (1878) under consideration for the construction of new floating and dry docks at a cost of £400,000; and the Marans Canal, opened in 1876, is to be ultimately carried through Vauban's fortifications into the harbour. In 1876 the exports included 46,300 gallons of wine, 91,412 gallons of brandy, and 323,000 cubic feet of pit-props; the imports, 86,346 tons of coal, 9368 tons of iron ore, 3215 tons of salt codfish, 4332 tons of wood, and 3079 tons of pitch; while the customs

amounted to £124,957. There entered 273 vessels of 65,125 tons, and cleared 184 of 55,274 tons. The only important manufacture of R. is one of coal bricks, employing 102 hands in 1875; but the neighbouring salt-marshes, covering 5540 acres, engage 4110 more, and the fisheries, ranking twelfth in France, are carried on by 321 boats and over 4500 men. Pop. (1872) 19,506. Founded in the 10th c., R. came to England as part of the dowry of Eleanor of Poitou (1152), was captured by Louis VIII. (1224), but ceded to Edward III. at the Treaty of Breigny (1360), and finally annexed to France (1372). A Huguenot stronghold, it surrendered to the League after a six months' siege (1573); and in 1628, after an heroic defence of fourteen months, which cost the lives of 15,000 men, Buckingham's expedition bringing no relief, its fall decided the fate of Protestantism in France, and the citizens almost to a man fled abroad, leaving 4000 where sixty years before there had been 72,000 inhabitants.

Rochelle' Salt is a double tartrate of potash and soda ($\text{KNaC}_4\text{H}_4\text{O}_6\cdot 4\text{H}_2\text{O}$), prepared by neutralising cream of tartar with carbonate of soda. It forms beautiful transparent prismatic crystals. It was discovered in 1672 by Seignette, a Rochelle apothecary, whence its name.

Roch'ester (Lat. *Durobriva*, Old Eng. *Hroffe-ceaster*, 'the camp on the rock'), a city of Kent, on a bend of the Medway, 31 miles E.N.E. of London by rail, forms almost one continuous town with Chatham (q. v.) on the E. and Strood, across the river, on the W., being joined to the latter by an iron swing bridge (1856), with a centre span of 170 feet. The cathedral, founded by St. Augustine (604) and rebuilt by Bishop Gundulf (1077-1107), is comparatively small, being 306 feet long by 162 feet wide across the large transept, and has a disappointing exterior, with a 'modern Gothic' central tower (1825); the redeeming features are the pure Norman nave, the crypt (one of the few survivals of Gundulf's work), and the fine Decorated doorway of the chapter-house. Its restoration at a cost of £13,000 was completed by the late Sir Gilbert Scott in 1875. Between the cathedral and the river, surrounded by public gardens, stands the 12th c. castle, the finest specimen of a Norman keep in England, 104 feet high. Other buildings are the churches of St. Margaret (mostly rebuilt 1824-40; restored 1872) and St. Nicholas (1624; restored 1863); the Deanery, adjoining the ruins of St. Andrew's Priory, three of whose gateways still remain; the brick townhall (1687), county court-house (1862), St. Bartholomew's Hospital (1863), Borstal Prison (erected in 1874 for 500 convicts), the grammar-school (1542), Williamson's free mathematical school (1701), and Wait's Hospital (1579), described in *The Seven Poor Travellers* of Dickens, who spent the last eleven years of his life at Gadshill (3 miles from R.), the scene of Falstaff's exploits. R. has no special industries of its own, except oyster and other fisheries, many of the inhabitants being employed in the Government works at Chatham. The shipping and trade returns of the two ports are given together, viz., entered (1877) 4340 vessels of 635,630 tons, and cleared 3446 of 355,697 tons; imports (1876) £1,719,445, exports £176,318, and customs £6583. On December 31, 1877, 978 ships of 41,736 tons were registered as belonging to R. and Chatham, besides 105 fishing-boats. R. publishes one weekly newspaper, and sends two members to Parliament. Pop. (1871) 18,352. The seat of the second oldest English bishopric, co-extensive with the kingdom of W. Kent. R. suffered much in the Middle Ages from siege and conflagration, being destroyed by Æthelred, King of Mercia (676), and by the Danes (839), captured by Rufus from his brother's adherents (1087), and three times burnt during the 12th c. James II. embarked here for France after his abdication, 23d December 1688. See Walcott's *Memorials of R.* (Lond. 1866).

Roch'ester, a city of New York, U.S., 7 miles from and 263 feet above Lake Ontario, on Genesee River. Three falls upon this river of 96, 86, and 83 feet high respectively are within the city, and afford immense water power. All lake vessels can ascend to the lowest fall. The main stem of the New York Central Railway crosses the city at the upper fall. The Genesee Valley, the Northern Central, and the R. and State lines also have their termini here. The Erie Canal, on a fine stone aqueduct of 7 arches, and the Genesee Valley Canal, also cross the city. Ready-made clothing is now the largest manufacture, boots and shoes

rank next; there are also 18 flour-mills, 18 breweries, the Leighton Iron Bridge Works, the Stewart Rubber Company, the largest carriage factory in the U.S., 5 tobacco factories, &c. R. is now becoming a great distributing centre for coal, and has also a vast nursery business. A magnificent system of water-works (including a reservoir of 82,000,000 gallons capacity) was recently constructed at a cost of \$3,250,000. It contains a city hall, court-house, free academy, 60 churches, a university with 10 professors and 160 students, a Baptist Theological Seminary with 8 professors and 77 students, 23 public schools with 200 teachers and 10,000 pupils, a public library, an Athenæum, a law library, 2 hospitals (City and St. Mary's), with provision for 500 patients, industrial school, house of refuge, 4 orphan asylums, and other benevolent institutions; a penitentiary, a lunatic asylum, and Mount Hope Cemetery, one of the oldest of its kind in the U.S. There are 3 daily and 4 weekly papers. Pop. (1876) 82,500.

Rochester, John Wilmot, Earl of, was born at Ditchley, Oxfordshire, April 10, 1647. Educated at Burford School, he entered Waltham College, Oxford, when only twelve years old, and at fourteen was made M.A. along with several other young noblemen, by the Earl of Clarendon. In 1661 he set out to travel in France and Italy; in 1665 he served at sea under Sandwich, distinguishing himself for bravery at Bergen; and in the following year he engaged under Sir Edward Spragge, whose message he once carried to another commander in an open boat, amid a storm of shot. But on his return to London, the dissolute court too eagerly welcomed him as a man of fashion and spirit. Charles II. made him Gentleman of the Bedchamber and Ranger of Woodstock Park. He plunged into systematic debauchery of every kind, was by his own expression intoxicated almost uninterruptedly for five years; turned highwayman, chairman, innkeeper, quack doctor, and beggar by turns, in order to pursue the lowest amours; professed the openest infidelity; and, in short, was more corrupt than even the King himself. Occasionally he retired from the court orgies to the study; but even there too often to compose poems the very names of which no modern pen would transcribe. Some of his lyrics, however, are graceful and pure, while his familiar letters to his wife reveal him in the character of a tender-hearted husband. He was altogether a prodigy of vice. The good qualities of a frank and generous nature which he possessed were only passports to the inner circle of the most profligate court in the world; and he must be judged by his time. He had spent his prodigal life at the age of thirty-one; and on his deathbed seems to have made sincere profession of contrition to Dr. Burnet, who by his desire published the well-known *Passages of the Life and Death of John, Earl of R.* The date of R.'s death is July 26, 1680. In 1680 appeared a collection of his poems, with many said to be spurious. His tragedy of *Valentinian* was published in 1685. Several editions of his works have been put forth, the best of which are St. Evremont's (1709) and that printed by Tonson in 1714.

Roche-sur-Yon or Napoléon-Vendée, a town of France, department of Vendée, on the river Yon, 49 miles S. of Nantes by rail. Its principal streets converge to the spacious and central Place Napoléon, in which stands a bronze statue to Napoleon I., the founder of the town. R. manufactures leather, beer, and hats, and has a considerable hardware trade. Pop. (1872) 8841.

Rochet (Low Lat. *rochatus*, from O. H. Ger. *roc*, 'a coat'), a linen garment resembling an albe, only shorter and with close sleeves, formerly worn by priests and acolytes, but at present restricted to bishops and certain privileged canons. It formed part of the episcopal habit prescribed by the first Prayer-book of Edward VI., and the lawn sleeves attached to the Chumere (q. v.) are a later modification of the ancient vestment.

Rock, in Geology, is the general term applied to all materials which make up the earth's crust, from loose friable sand to the most compact limestone or granite.

Rock is a confection of boiled sugar made up in sticks or rolls, and flavoured and coloured like ordinary sweets, from which, indeed, it only differs in form. A spongy, light texture is given to some kinds of R. by repeated drawing out and folding the material while in a plastic semi-viscous condition.

Such R. is opaque; other kinds of R., simply rolled, are transparent and glassy, but by exposure they gradually assume a granular structure.

Rock, Cock of the (*Rupicola aurantia*), an *Insessorial* bird belonging to the Manakin family (*Piprina*), and found in S. America and Guinea. It derives its name from the resemblance it bears to the domestic cock. It attains the size of a pigeon, and is of a rich orange colour, the wings being black, and those of the tail brown tipped with yellow. The feathers of the head are erect, and form a double row, and the wing coverts and tail coverts are very conspicuous, forming plumes which closely resemble the tail of the cock. The C. of the R. appears to be solitary in its habits, and to be active at twilight and during the night. The eggs are white, and number two.

Rock'all, a rounded rock rising from the Atlantic Ocean, about 300 miles W. of North Uist, in the Outer Hebrides. It is about 20 feet in height, and is frequented by large flocks of sea-birds. A good deal of fishing is carried on in its neighbourhood.

Rock Alum, or **Roche Alum** (Fr. *Alun de Roche*), a reddish variety of native alum, found near Civita Vecchia in Italy. It is also called *Alun de Rome*, or Roman Alum. Fragments of common alum, coloured with Venetian red, pass in commerce as R. A.

Rock Crystal, the name popularly given to transparent, colourless, nearly pure crystals of quartz or silica. It usually occurs in hexagonal prisms, terminated by six-sided pyramids, and is found in the Alps, Pyrenees, Siberia, Brazil, Ceylon, Saxony, the United Kingdom, and elsewhere. R. C. frequently encloses rutile, asbestos, chlorite, different kinds of fluids, &c. It has many useful and ornamental applications, being the 'white stone' of the lapidary, and the material for the 'pebble' lenses of spectacles. In some localities small brilliant crystals are called 'diamonds,' and are greatly esteemed when made up into personal ornaments. The use of R. C. for instruments of precision—as balance-beams and scale-pans, thermometers, standard weights, &c., has been strongly advocated in Germany of late years, and indeed normal weights of this material have been introduced into the imperial mint for the control of gold coins. In its hardness (7), light specific gravity (2.65), and absolute indifference at ordinary temperatures to atmospheric or chemical changes, R. C. is undoubtedly well adapted for such purposes.

Rock'et is a name primarily applied to *ErUCA SATIVA*, a cruciferous plant of the Mediterranean region, with large white flowers veined with purple, and acrid leaves. In S. Europe the R. is used when young as a salad herb. Various other plants belonging to *Cruciferae* have also (probably from family likeness) received the designation of R., with some prefix. Thus, Bastard R. is *Brassica ERUCASTRUM*; Dame's or Garden R. is *Hesperis matronalis* (see DAME'S VIOLET); London R. is *Styrbium Irio* (see HEDGE MUSTARD); Sea R. is *Cakile maritima*; Wall R. is *Dijstaxis tenuifolia*; Winter or Yellow R. is *Barbarea vulgaris* (see CRESS). The name Dyer's R. is applied to *Reseda Luteola*. See WELD.

Rock'et, a pyrotechnic device projected through the air. There are several kinds, as the *sky-R.*, *signal-R.*, *life-saving R.*, and *war-R.*, the principle of construction being the same in all. The sky-R. is formed by filling a stout cartridge cylinder with an inflammable composition such as is used in Pyrotechny (q. v.), and ramming it hard around a 'piercer' or tapering spindle, which leaves a central axial cavity. When the cylinder is nearly filled, a perforated plug of wood or clay is laid in, and over it are placed several pots containing 'decorations,' such as stars, serpents, gold and silver rains, &c. The top is finished off with a conical cap. The conoidal cavity is primed with quick-match, and the finished R. is attached to a stick. On igniting the match rapid combustion takes place in the central cavity, and the liberated gases, meeting with the resistance of the atmosphere, propel the R. upward in a given direction, the stick serving as a guide. When the R. is consumed the terminal 'decorations' explode in mid-air with a pleasing effect. A signal-R. differs little from a sky-R. A life-saving R. is used as a means of carrying a line to a wrecked ship (see

LIFE-SAVING APPARATUS. The use of the R. as an implement of warfare was first rendered practicable by Sir William Congreve in 1803. His R. consists of a sheet-iron case filled with a combustible charge, and the conical head is hollow for the reception of a bursting charge, which is exploded by means of a fuse. The base is closed with a metal disc perforated with five holes, a central one to carry the stick, and four peripheral ones to serve as gas-vents. This R. has been superseded in the British service by Hales' R., which dispenses with a stick. A longitudinal section of the R. and the base disc are here figured.



Hales' War-Rocket.

The metal base has three gas-vents, and each one is partly surrounded by a projecting 'tail-piece' against which the products of combustion play. By this arrangement a rotation of the R. round the axis of its progression is secured, with the additional gains of increased stability and greater accuracy. Four grades of Hales' rockets are used in the British service—namely, 3, 6, 12, and 24 pounders. They are fired from tubes or stands adjusted to a certain elevation and direction.

Rock'fish. See WRASSE.

Rock'ford, a city of Illinois, U.S., on both sides of Rock River, 92 miles by rail W. of Chicago, in an agricultural district of unsurpassed beauty and fertility. It is the seat of R. Female Seminary, and from the rows of trees which adorn it is called the 'Forest City.' There are two furniture factories, one extensive watch manufactory, one woollen and one cotton mill, several flour-mills, five weekly newspapers, and one oatmeal factory. Pop. (1870) 11,049.

Rock'hampton, a town in Queensland, on the river Fitzroy (q. v.), 45 miles from its mouth, and 420 miles N.W. of Brisbane. It is well laid out and built, lighted with gas, and amply supplied with water. Vessels of large size can easily come up to the town, the river being as wide and deep as the Thames, with a tidal rise of 14 feet. Above R., however, the navigation is limited to smaller craft, in consequence of a rocky bar across the river. Being the port of a wide extent of country well adapted for rearing stock, and abounding in mineral resources, R. has a large and growing trade. Its principal exports are wool, tallow, preserved meats, gold, and copper. Pop. (1875) 5600.

Rock'ing Stones, or **Logg'an Stones,** are blocks of stone so exactly balanced that a slight effort is sufficient to displace them so as to set them rocking about from their position of equilibrium, even though their mass may amount to several tons. They are numerous in Cornwall, Derbyshire, Wales, and other places throughout Great Britain and Ireland. They may have resulted from weathering, or perhaps been dropped into position by floating ice during the glacial period.

Rock' Island, a city of Illinois, U.S., on the Mississippi, 180 miles W. of Chicago. It is an important railroad centre, and contains eleven churches, four banks, a public library, and two daily newspapers. It is connected with Davenport, Iowa, by an iron bridge, with passage for trains above and vehicles below. On the island from which the town takes its name stands a national arsenal and armoury. Pop. (1870) 7890.

Rock'land, a seaport of Maine, U.S., on Owl's Head Bay, which forms its harbour, about 60 miles N.E. of Portland. It has eight churches, three banks, and four weekly newspapers. Its numerous limekilns produce 1,000,000 casks annually, and it has also extensive shipping. Pop. (1870) 7074.

Rock'land Lake, in Rockland county, New York, U.S., 36 miles N. of New York, 1 mile W. of Hudson river, and 160 feet above its surface, is a beautiful sheet of water 4 miles in circumference. Every year some 200,000 tons of ice are cut here for the market by about 1000 men.

Rock'ling (*Motella*), a genus of *Teleostean* fishes belonging to the *Gadidae* or Cod family. The body is compressed near the

tail, and has the first dorsal fin short, whilst the second dorsal and anal fins are long. The mouth has *barbules*. There are several species. The *M. tricirrata* has three barbules; the *M. g'auca*, also known as the 'mackerel midge,' attains a length of about 1½ inches.

Rock' Oil. See PETROLEUM.

Rock' River, rising in Fond-du-Lac county, Wisconsin, U.S., traverses Horicon and Koshkonong Lakes, and then flows S. into Illinois, where turning S.W., it reaches the Mississippi 2 miles below Rock Island, after a total fall of 379 feet, and a rather rapid course of 350 miles through a most picturesque and fertile valley. It is navigable only at high water, but affords great water power. Twelve railway lines cross it.

Rock' Rose. See CISTUS.

Rock' Salt (chloride of sodium or common salt) is a widely distributed mineral, being found in cubical crystals and in rock beds or masses in numerous regions throughout the globe. When pure it is colourless and transparent, but most frequently it is tinged red, violet-blue, or green, from the admixture of impurities. R. S. is not confined to any particular geological formation, for it occurs in the New Red Sandstone in the United Kingdom, in Oolitic strata in the Alps, in greensand in Spain, and in Tertiary strata in Galicia. These deposits are believed to have been formed by the evaporation of salt lakes, alternately severed from and joined to the ocean after long lapses of time. The most extensive and productive mines in the world are those of Wieliczka and Bochnia in Galicia. They have been worked for 600 years. The largest British deposits of R. S. are found along the valley of the river Weaver in Cheshire, where two beds attain an aggregate thickness of nearly 200 feet. See SALT.

Rock' Soap, a blackish, soft, greasy mineral, composed of silica, alumina, and water, with smaller proportions of magnesia and sand. It is principally used for artists' crayons, and occurs in igneous rocks in Isle of Skye, Antrim, and other European localities.

Rock'work, in gardening, is an artificial structure of irregular blocks of stone, enclosing earth in which ferns and other plants are grown. R. ought as far as possible to imitate nature, and hence the not uncommon adjuncts of pieces of sculpture, plaster casts, &c., are decidedly out of place. When the base of R. is washed by water, shells and pebbles may be appropriately strewn about.

Rocky Moun'tains, the northern portion of the great backbone which runs through the whole length of the American continents, known as the Andes in S. America, the Mexican Cordilleras in Mexico and Central America, and the R. M. in the United States and British America. The mountains in British America and Oregon are known as the *Cascade Ranges*, from the cascades of the Columbia River. Among them is Mount St. Elias (19,500 feet), the highest of the whole northern system. In the United States the R. M. spread to a breadth of 1000 miles, and cover an area of 980,000 sq. miles, constituting the great arid region where agriculture is impossible without irrigation. They are divided into the *Coast Range* of California; the *Basin Ranges*, including the Sierra Nevada, and extending over south-eastern Oregon, southern Idaho, western Utah, Nevada, and north-eastern California (highest points, Mount Whitney, 14,887 feet, and Mount Shasta, 14,442 feet); the *Plateaus*, stretching from southern Wyoming through western Colorado and eastern Utah into New Mexico and Arizona (highest point, Emmon's Peak, Uintah mountains, 13,694 feet); the *Park Ranges*, in southern Wyoming and central Colorado (highest points, Mount Harvard, 14,375 feet, and Gray's Peak, 14,341 feet); and the *Desert Ranges* in southern California, Arizona, and New Mexico. The rocks are principally metamorphic gneiss, porphyry, granite, mica, and talcose slate. The mineral wealth of the R. M. is very great. Gold and silver are found in large quantities in California and Nevada (q. v.), and have more recently been discovered in Wyoming and Dacotah. There are also considerable quantities of mercury, carboniferous limestone, coal, and petroleum. There are evidences of comparatively recent volcanic activity throughout the whole R. M., and geysers and hot springs

are found in many places. The R. M. form the watershed between the rivers flowing into the Pacific, and those flowing into Hudson's Bay and the Gulf of Mexico. Many rivers, however, in the Plateau and Basin districts flow into the central lakes, usually salt, such as Great Salt Lake and Lake Humboldt. See J. C. Fremont, *Rocky Mountains' Explorer* (Lond. 1861), Raymond's *Mines of the Rocky Mountains* (New York, 1871), and *United States Geographical and Geological Survey of the Rocky Mountain Region*, J. W. Powell in charge (vol. iii., Washington Government Printing Office, 1877).

Boco'co (from Fr. *rocaille*, 'rock-work'), the name applied to a debased style of architecture prevailing in the 18th c., which was to Italian Classicism what Flamboyant had been to Gothic, or the 'Jesuit' style of the 17th c. to that of the Renaissance. Top-heavy columns, interrupted pediments, an endless multiplication of ornamental details, and studied avoidance of simplicity, with the single redeeming feature of occasional picturesqueness, characterised the R. style, which happily was never adopted by the English except in their furniture.

Bocroi, a small fortified town of France, department of Ardennes, within 2½ miles of the Belgian frontier. It is situated in an extensive plain surrounded by the forest of Ardennes. Pop. (1872) 867. Here the Spaniards were defeated by the French under Condé with a loss of 10,000 men, May 19, 1643.

Bod, known also as a pole or perch, is a measure of length, equalling 5½ yards.

Rodentia (Lat. the 'gnawing animals'), an order of Mammalia, also known as *Givres*. They are represented by such quadrupeds as hares, rabbits, rats, mice, porcupines, squirrels, jerboas, beavers, &c. Their characters are derived from the absence of canine teeth, and in having only two incisors in the lower jaw. The upper jaw has also two, and very rarely four incisors. The incisors are chisel-shaped, and form the gnawing organs. Their structure is peculiar; in front they are covered with a layer of hard enamel, while behind they consist of the ordinary ivory. The effect of this arrangement is to cause the softer and hinder part of each tooth to wear faster than the hard anterior portion, with the result of keeping a sharp edge on the tooth by the mere act of attrition. These teeth, further, grow from *permanent pulps*, and increase, like the tusks of the elephant, throughout life. The lower jaw of the R. is peculiarly placed, and is so articulated through the longitudinally set condyles, that its antero-posterior movements are free and extensive, and thus are well adapted for gnawing. The molar teeth number about four on each side of each jaw. They have smooth crowns, with the enamel arranged in transverse folds in ridges. The intestine is long, its cæcum being well developed. The brain is smooth, and well-nigh destitute of convolutions. The eyes are placed laterally, and the orbits and temporal fosse of the skull are continuous. The *placenta* is discoid and deciduate, and the *testes* of R. appear to pass from the abdomen into the scrotum at the breeding season. Despite the fact of the brain being destitute of convolutions, many of the R. possess considerable intelligence; e.g., the rats and beavers.

Roderic, the last king of the West Goths in Spain, was, according to Roderic of Toledo, the son of Theudedefred, Duke of Cordova, while the Arab historians make him a commoner raised for his valour to the command of the cavalry of King Witiza. In 709 a revolution deposed Witiza, and placed R. in his stead; but the determined opposition of Eba and Sisebuth, sons of Witiza, and Oppas their uncle, the Archbishop of Toledo, kindled a civil war which was not wholly quenched before the Arab invasion. On the 28th of April 711, 12,000 Berbers, sent under Tarik by Muza, landed at Algesiras, advanced under the guidance of Count Julian, commandant at Ceuta, and repulsed Theudemir, governor of Andalusia. R. hurried forward with an army of from 50,000 to 100,000 men, against whom Tarik could now bring about 25,000 men. They met (July 24) near Xeres de la Frontera, on the Guadalete, where the battle lasted (it is said) eight days. R. had intrusted the wings to the sons of Witiza, who through Julian made traitorous terms with the enemy, that gave him the victory on July 3, 711. R. fell in the battle. His tragic fate, the effect of treason and the weakness of the West Gothic empire, has won the sympathy of many poets, as of Southey, whose poem of *Don Roderick* shows that he had read to advan-

tage the romance of *Don Rodrigo*, written in the 13th c. See Dahn, *Die Politische Geschichte der Westgothen* (2 vols. 1871).

Rodez. See RHODEZ.

Rod'ney, George Brydges, Baron, a famous English admiral, was born at Walton-upon-Thames, 19th February 1718, and quitted Harrow at the age of twelve to enter the navy, where he rose to the command of the Newfoundland station (1748). He was elected member for Saltash (1752), as rear-admiral destroyed the fortifications of Havre in a three days' bombardment (1759), captured Grenada, Martinique, and Santa Lucia (1761), and was rewarded with a baronetcy (1764). Despatched in 1780 to the relief of Gibraltar, then besieged by the French and Spaniards, he achieved his purpose by a victory over the latter off Cape St. Vincent (16th January), then crossing the Atlantic, fell in with and defeated the French fleet near Martinique (17th April), and took the Dutch islands Eustatia, Demerara, and Essequibo, with ships and booty to the value of £3,000,000. On 12th April 1782 R. encountered De Grasse off Dominica, each fleet consisting of more than thirty ships of the line; and the battle, which lasted twelve hours, resulted in a loss to the French of nine vessels, 9000 killed, and a whole train of artillery. Having thus saved Jamaica, and ended the war at a blow, R. returned home to receive the title of Baron R. He lived thenceforward in retirement, dying in London, 23d May 1792. R.'s brilliant victories were chiefly due to his revival of Blake's tactics of breaking the enemy's line. See his *Life*, by General G. B. Mundy (2 vols. Lond. 1830).

Rodos'to (Gr. *Rhaidestos*), a port of European Turkey, vilayet of Adrianople, on the W. shore of the Sea of Marmora, 77 miles W. by S. of Constantinople. Formerly the seat of a Jewish university, it has several mosques, is girt with rich gardens, and supplies Constantinople with fruit, vegetables, and fish. Pop. 25,000.

Rodrig'ues, or **Rodrig'uez**, a small island belonging to Great Britain, situated in the Indian Ocean, 330 miles E. by N. of Mauritius, of which it is a dependency. It has an area of about 60 square miles, with a mountainous surface, and a remarkably healthy climate. The inhabitants, who numbered 1400 in 1876, are engaged in agriculture, rearing cattle for export to Mauritius, and fishing. The imports and exports in 1876 amounted to £3166 and £8271 respectively.

Roë and **Roëbuck**, the female and male of a species of *Cervida* or Deer (*Cervus capreolus*). The male attains a height of from 2 to 2½ feet at the shoulders. It is of smaller size than the Fallow Deer. The colour is brown, varied with red and grey tints. A white patch occurs at the root of the tail, and the inner surface of the limbs is greyish white. The chin is white, and there is a patch of the same colour on each side of the lip. The R. appears to be monogamous, one male mating with one female. The horns have no snag or branch at the base, and generally have one front antler and two hinder ones. In Scotland the R. is met with in a wild state. The average weight is from 50 to 60 lbs.

Roë, Sir Thomas, was born at Low-Leyton, in Essex, about 1580. After studying at Magdalen College, Oxford, he entered the court of James I., and was knighted in 1604. In 1609 he sailed for 300 miles up the Amazon, and was next sent as envoy to the Great Mogul, Shah Jehan, at whose court in Delhi he resided from 1614 to 1618. He entered the House of Commons as member for Cirencester in 1620, and again in 1640 as member for the University of Oxford. In 1621 he was sent as ambassador to Constantinople, and on his return he presented many Oriental manuscripts, which he had collected, to the Bodleian Library. The Alexandrian MS. of the Greek Bible which he obtained is now in the British Museum. In 1629 R. was successful in negotiating a peace between Poland and Sweden, and it is believed the intervention of Gustavus Adolphus in the Thirty Years' War was due to his advice. In 1641 he was English ambassador at the Diet of Ratisbon, and on his return he was made Chancellor of the Garter and a privy counsellor. He died November 6, 1644. His works are *A True and Faithful Relation of what hath lately happened in Constantinople, concerning the Death of Sultan Osman and the setting up of Mustapha, his uncle* (Lond. 1622); and a *Journal of Voyages to the East Indies, Turkey,*

Egypt, Palestine, and Persia, published first in French (1663), and in English in the same volume with Della Valle's *Travels* (Lond. 1664). In 1730 proposals were made to publish the latter work in 5 vols., but of these only one ever appeared, under the title *The Negotiations of Sir Thomas R. in his Embassy to the Ottoman Porte* (Lond. 1740). The *Journal* has been reprinted by Pinkerton.

Roe'buck, John Arthur, an English politician, was born at Madras in December 1802, his father belonging to a well-known Sheffield family. His boyhood was passed in Canada, whence he came to England in 1824 to study law. R. was called to the bar in 1831, and was returned to Parliament by the city of Bath in 1832. In 1835 he was appointed paid agent in this country by the House of Assembly of Lower Canada. About this time his series of political *Pamphlets for the People* involved him in a duel with Mr. Black, the editor of the *Morning Chronicle*. He lost his seat in Parliament in 1837, but regained it in 1841, to be defeated again in 1847. He distinguished himself as a supporter of free trade, and as a brilliant and daring speaker on many questions, being particularly celebrated for his antagonism to Mr. Disraeli. In 1855 his motion for a committee to inquire into the condition of the army before Sebastopol proved the death-blow of the Aberdeen Ministry, being carried by a majority of 157. R. himself was appointed Chairman of the Committee, which had great influence on the reorganisation of our military system. He defended the Austrian rule in Venetia, and sympathised strongly with the American Confederate party, and with the Danes in the war of 1864. In 1868 he lost his seat at Sheffield owing to his denunciation of trades unions, but was again returned in 1874. Recently (1877-78), he has abandoned the Liberal party on the Eastern question, giving the strongest support to the policy of his old opponent, Lord Beaconsfield. R. is intensely national in his sympathies, and his passionate admiration of his country, though somewhat boastfully expressed, is a sentiment which Englishmen will never despise. He has written a *Plan for the Government of our English Colonies* (1849), and a *History of the Whig Ministry of 1830* (1852).

Roermond, or Remunt (Fr. *Ruremonde*), called formerly **Godsward op de Maas**, a town in the Dutch province of Limburg, at the junction of the Roer and the Maas, 29 miles N.N.W. of Maastricht by rail. It has a fine cathedral of the 13th c., and is the seat of a Catholic bishop. R. manufactures woollens and cottons, paper, and statuary, has important dyeing, and an active transit trade. Pop. (1869) 8816. R. was formerly fortified, and was taken by the Spanish in 1637 and by the French in 1792.

Roe's-stone, a variety of Oolite, resembling pea-stone or Pisolite (q. v.).

Roga'tion Days (Lat. *Feriz Rogationum*), the three days immediately preceding the Feast of the Ascension, were so named because on them litanies were recited by the clergy and people in procession, a custom of which the modern Beating the Bounds (q. v.) is a relic. Their institution is ascribed to Mamer-tius, a bishop of Vienne in the 5th c.

Roger I., Count of Sicily, youngest of the twelve sons of Tancred de Hauteville, was born in Normandy about 1031. After serving under his brother, Robert Guiscard (q. v.) against the Greeks and Saracens of Southern Italy, he crossed over to Sicily (1060), and at the head of 300 followers captured Messina. With forces swollen to 700 by the Christian natives, he overthrew 17,000 Moslems in the open field, and, aided by a Pisan fleet, mastered Palermo (1072). The fall of Syracuse in 1083, and of Girgenti and Enna in the two succeeding years, restored the island to the jurisdiction of Rome, and R. received it as a fief from Urban II., with the title of 'Prince of Sicily, hereditary and perpetual Legate of the Holy See.' He died at Mileto in Calabria, July 11, 1101.—**R. II.**, the sole surviving son of the preceding, was born in 1097, and through the death of his cousin William without issue, added to Sicily the dukedom of Apulia (1127). Three years later he obtained from Pope Anaclete II. the title of king, and thus became the founder of the Norman dynasty of the Two Sicilies. The rise, however, of an anti-pope, Innocent II., backed by the Emperor Lothar, forced R. to withdraw to Sicily (1136), but Lothar's death (1137) and

Anaclete's (1138) made Innocent glad to purchase the recognition of his papal claims by himself confirming R. in all his territories. The latter in 1146 invaded the Eastern Empire, but the loss of sixteen galleys in an unsuccessful attack on Constantinople was barely compensated by the plunder of Athens, Thebes, Corinth and Corfu, and the introduction of the silk manufacture to Sicily was the only lasting result of his expedition. In Africa the Norman arms were more successful, and by 1152 R. had subdued the entire northern coast from Tripoli to Bona. He died at Palermo, February 26, 1154, leaving to his son, William I., a kingdom firmly consolidated by justice and toleration. See Gibbon, *Decline and Fall* (chap. lvi.); Büdinger, *Ueber die Normannen und ihre Staatsgründungen*, in Sybel's *Historische Zeitschrift* (vol. iv. 1860); and A. H. Johnson, *The Normans in Europe* (Lond. 1877).

Roger of Wendover, an English chronicler of the 13th c., was a monk of St. Albans, became precentor of the Abbey, and afterwards prior of Belvoir, from which office he was deposed about 1219. He afterwards returned to St. Albans, where he died, it is thought about 1237. His *Flores Historiarum* is a history of the world from its creation in two books, the first coming down to the birth of Christ, and the second to the nineteenth year of Henry III.'s reign. Although not without value for the whole period of English history, partly because he has gathered his materials from sources that have since perished, by far the most important part is that which treats of his own times. Here he is an original author, and writes in a bold, manly, and impartial style. The work has been edited for the English Historical Society by the Rev. H. O. Coxe (Lond. 1841-44), of whose text there is an English translation by Giles in Bohn's *Antiquarian Library*.

Rogers, John, the first of the 'Marian martyrs,' born at Deritend, a suburb of Birmingham, in 1505, was for several years chaplain to the Merchant Adventurers at Antwerp, and pastor of a Dutch congregation at Wittenberg, Saxony, where he turned Protestant. He became acquainted with Tyndale and Coverdale, and using the former's MSS. he prepared a revised edition of the English Bible, based on Coverdale, which he published under the name of Thomas Matthew. Returning to England, he accepted office in the Church, and in 1553 was cited before the Privy Council to answer for a sermon which he had preached at St. Paul's Cross on the Sunday after Queen Mary's entry into London, denouncing Romanism, and urging the people to hold to the Reformation principles. After a long imprisonment, he was tried for heresy before Gardiner, and condemned to be burnt at the stake at Smithfield, a sentence executed on February 4, 1555. His life has been written by Colonel Joseph L. Chester (Lond. 1861).

Rogers, Samuel, an English poet, was born at Newington Green, near London, July 30, 1763. As a boy he was introduced into his father's banking-house in Clement's Lane, but his literary tastes were early developed, and he used to tell of his once mounting the stairs to the door of Dr. Samuel Johnson, but turning coward with the knocker in his hand. His first efforts were a series of essays entitled *The Scribbler*, contained in the *Gentleman's Magazine* for 1781. In 1786 he paid a publisher £30 to print his *Ode to Superstition*, with some other poems; but of these scarce twenty copies were sold in four years. His *Pleasures of Memory* (1792) introduced him to the literary world as an imitator of Goldsmith, and won him many admirers. Soon after his father died, and left him in possession of great wealth, which he used in gratifying the most refined tastes. His famous house in St. James's Place was the repository of exquisite treasures of art and literature, and his hospitality brought within its walls the most famous men of more than half a century. Of his breakfast parties, given in the cool shady morning-room, which Sydney Smith described as 'a place of darkness and gnashing of teeth,' reminiscences are to be found in the journals and memoirs of very many of his friends. His art collection sold for £50,000 after his death. In 1798 appeared his *Epistles to a Friend*, and other poems; in 1812 *The Voyage of Columbus*; in 1814, *Jacques*, published in the same volume with Byron's *Lara*; in 1819, *Human Life*—his most vigorous poem, and in 1822, *Italy*. Upon two volumes, containing his *Italy*, and poems illustrated by Turner and Stothard, he afterwards expended, and remuneratively, nearly £15,000. At the death of Wordsworth he was

offered the laurel, but declined it. He died in London, December 18, 1855, aged ninety-three. By his own account he was engaged on the *Pleasures of Memory* for nine years, and on *Italy* for sixteen. But in spite of all his labour and all his taste, he has no place among great poets. His purity of diction does not compensate for his feebleness of imagery, and Hazlitt is scarcely too severe in saying that 'his verses are poetry, chiefly because no particle, line, or syllable of them reads like prose.' R. has some claim to remembrance as a cynical wit, but even his acid *mots* are losing the sharpness of their flavour through the lapse of time. See *Recollections of the Table-Talk of S. R., Esq., with a Memoir of his Life* (1859).

Boggewald Mountains, a range in the western portion of Cape Colony, with an average height of 5000 feet. From a distance it resembles an immense wall, and throughout its length of nearly 200 miles there are only one or two available passes.

Bogue Money is, in Scotland, an assessment made annually by the freeholders of each county to pay the expense of apprehending offenders, and of maintaining them in jail, and of prosecuting them.

Bogues and Vagabonds. See BEGGARS, LAWS OF ENGLAND RELATIVE TO.

Bohilcun'd (*Rohilkhand*), a Division of the N.W. Provinces, British India, bordered N. by the sub-Himalayan tract of Kumaon, W. and S. by the Ganges, and E. by Oude. Area, 11,805 sq. miles; pop. (1872) 5,436,314, of whom 21 per cent. are Mohammedans. This tract is crossed by several tributaries of the Ganges, all flowing S.E., of which the chief is the Ram Gunga. The W. portion will be irrigated by the proposed E. Ganges Canal; the N. portion, which forms part of the *Terai* (q. v.), is watered by several old indigenous channels, which now (1878) command 52,000 acres. The country is crossed by the main line of the Oude and R. Railway, and tapped by several branches. The chief towns are Bareilly, Shahjehanpore, and Moradabad. The staple crops are rice, other food grains, sugar-cane and cotton. The native state of Rampur (q. v.), the last home of the Rohillas, is entirely surrounded by the Division. R. takes its name from the Rohillas, an Afghan tribe who settled here under Ali Mohamed Khan in the beginning of the 18th c. In 1774, the Nawaub Vizier of Oude obtained from Warren Hastings the loan of a British army, in consideration of the payment of £400,000, in order to enforce payment of the same sum from the Rohillas, who were alleged to have promised to pay it on account of protection from the Maharrattas. The British force was led by Colonel Champion, and the Rohillas stoutly resisted. Puppet-shows are still shown in the town of Bareilly exhibiting white-faced and red-coated soldiers being cut to pieces by Rohilla cavalry. But the British finally won two battles at Futtehgunge, the Rohillas fled to the hills, and the people of Oude gained the plunder and the territory. A Rohilla chief, however, was guaranteed in possession of Rampur, and R. itself was ceded to the British in 1801. In May 1857, the Sepoys at all the cantonments mutinied, and there were no European troops in the Division. The majority of the Christians, civilian and military, were murdered, though some escaped to Agra and Nyni Tal. The Sepoys marched off to Delhi, but the entire population rose in insurrection, and for many months recognised the authority of Khan Behaudur Khan, the dispossessed descendant of an old Rohilla chief. Here he was joined by the Begum of Oude, Prince Feroz of Delhi, and Nana Sahib. Bareilly was not taken and R. cleared until May 1858. The Nawaub of Rampur was loyal throughout.

Bohlfs, Gerhard, an African traveller, was born at Vegesack, near Bremen, 14th April 1832. He fought as a volunteer in the Schleswig-Holstein struggle of 1849, subsequently studied medicine at Heidelberg, Göttingen, and Würzburg, and after travelling through Austria, Italy, and Switzerland, went to Algeria (1861), where he served in the foreign legion of the French army, and acquired such a command of Arabic that he subsequently ventured to travel through the interior in a Mohammedan guise. He explored various parts of Morocco and the Sudan, crossed the African continent from the Mediterranean to Lagos, in Guinea, accompanied the English expedi-

tion against Abyssinia (1867), and made two notable journeys through the Libyan desert, the second in 1873, in which he was accompanied by Jordan the astronomer, Zittel the mineralogist, Ascherson the botanist, and Remelé the photographer. R.'s chief works are *Reise durch Marokko* (1868; Eng. ed. by Winwood Reade, 1874), *Im Auftrage des Königs von Preussen mit dem Englischen Expeditions-corps in Abessinien and Land und Volk in Abessinien* (1869); *Von Tripoli nach Alexandrien* (1871); *Land und Volk in Afrika* (1870); *Mein erster Aufenthalt in Marokko* (1873); *Quer durch Afrika, Reise vom Mittelmeer nach dem Tschadsee zum Golf von Guinea* (2 parts, 1874-75); *Drei Monate in der Libyschen Wüste* (1875); *Beiträge zur Entdeckung und Erforschung Afrikas Berichte aus den Jahren 1865-70* (1876); and *Die Bedeutung Tripolitaniens an sich und als Ausgangspunkt für Entdeckungsreisen* (1877). In 1878 he started from Tripoli, in company with various savants, on an expedition into the Eastern Sahara, which is expected to occupy five years, and the object of which is to explore a *terra incognita* as extensive as Germany and Austria together, and comprising the oasis groups of Wajanga, Kufarah, &c., long known by report but not yet visited by Europeans.

Bohtuck, the chief town of the district of the same name, in the Punjab, British India, 42 miles N.W. of Delhi. There is a manufacture of turbans interwoven with gold and silver thread, and of fine cotton cloth. Pop. (1868) 14,153.—The district of R. has an area of 1811 sq. miles. Pop. (1868) 536,959. It is partly irrigated by the W. Jumna Canal. The crops are millets, wheat, gram, and barley. The breed of cattle is famous. Jhujur is a considerable town, in a tract which was forfeited after the Mutiny of 1857, when the whole district was for a time lost to the British.

Boïand (Lat. *Rutlandus*, *Hrolandus*; Ital. *Roorlando*, *Rolando*, *Orlando*), the famous hero of the medieval epics, is first mentioned in history by Eginhard, who in his *Vita Caroli Magni* describing the rout of a part of the Frankish army at Roncevaux (778), says simply '*Hruodlandus, Britannici limitis præfectus*, fell in the battle with a great number of others.' Of all the *chansons de geste* relating to R., the Girard de Viane is highest in his praise, but it is the noble poetry of what is named *par excellence* the *Chanson de Roland* or *de Roncevaux*, that has given this barely historic character the first place in the popular imagination among the heroes of the Carolingian time. The Song of R. is one of the oldest, and is certainly one of the most remarkable of the heroic poems of medieval France. The earliest MS. of it is in the Bodleian Library, and consists of 3996 verses, the last of which states that it was composed by one Turold (11th c.). In the Song, R. is a nephew of Charlemagne, a daughter of his sister Bertha by Milon of Angiant, who had wooed the princess unknown to the emperor. At first banished with his mother from the imperial court, R. afterwards gains by his valour and chivalrous spirit the favour of his uncle, and is included among his twelve paladins. Commanding alone, or with other knights, he undertakes great expeditions, even to the remote East, and becomes one of the most dreaded enemies of the infidel. Heathen Spain has been already conquered and forced to sue for peace, when R., leading the rear of Charlemagne's army in the gorges of Roncevals, falls a victim to the treason of his stepfather Ganelon and an army of 20,000 'Saracens.' He and his knights fight with prodigious valour, but in vain. With labour and great pain the wounded R. sounds too late on his ivory horn the signal for Charlemagne to return with the main army, but the giant effort bursts his temples. He still fights bravely, but 'his head pains him full sore.' When he can no longer see, he strikes with his sword Durandal 'ten blows on the brown rock,' that 'God the Father may not be shamed by its remaining among the paynim.' The good steel creaks, but will not break. Soon 'death descends to R.'s heart.' . . . 'Dead is R., God has his soul in heaven: the emperor reaches Roncevals'—to take terrible vengeance on the 'Saracen' king Marsile and on the traitor Ganelon. 'What a picture!' exclaims M. Gerusez, quoting a passage expressing the sympathy of all nature for the death of R. 'Call it, if you will, the infancy of art and language, but have we not here the highest elevation and full maturity of the heroic sentiment?' The tale of R. has been a favourite theme of poets. In France its memory has been kept fresh by the piteous tragi-comedy of Mairêt (1635), the opera of Quinault and Lully (1682), the 'ten-

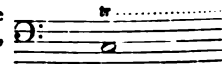
tative lyrique of Mermet (Opéra, 1864), and the brilliant success of the Vicomte de Bornier's *Fille de R.* (Théâtre Français, 1875). It appeared in Germany in the 12th c. as the *Ruolantes Lied*, by Konrad the priest ('Pfaffe Chunrat'), and was extended in the 13th by the Austrian Stricker. Uhland's ballads have lent the old legend a new charm; in Italian we have Sosteno de Zanobi's *Reali di Francia*, Pulci's *Il Morgante Maggiore*, Cieco di Ferrara's *Mambriano*, Boiardo's *Orlando Innamorato*, Folengo's *Orlandino*, Forteguerra's *Ricciardetto*, Ariosto's *Orlando Furioso*; and in English the *Orlando Furioso* is the best tragedy of Robert Greene. See *La Chanson de R. ou de Roncevaux* (Par. 1837; 2d ed. 1869); J. L. Bourdillon, *Le Poème de Roncevaux* (Dijon, 1840); the editions of Genin (Par. 1850), Th. Müller (Gött. 1851 and 1863), Léon Gautier (2 vols. Tours, 1872 and 1875), and Eugen Kolbing (Heilbronn, 1877); *Le Chanson de R.*, translated from the Old French by Adolph d'Avril (Par. 1877); and *Le Chanson de R., Traduction nouvelle, rythmée et assonnée*, by L. Petit de Julleville (Par. 1878).

Roland de la Platière, Jean Marie, was born at Thizy, near Villefranche (Beaujolais), February 13, 1734. At nineteen he left his father's house, and made a peregrination on foot through France. At Rouen a relation of his, Godinot, inspector of manufactures, put him in the way of making a living, and some time afterwards he was nominated inspector of commerce at Amiens. In 1775 he was intrusted by a young friend of his, Sophie Cannel, with a letter to Marie Jeanne Phlipon, daughter of an engraver at Paris. The result of this introduction was the marriage of Mdlle. Phlipon with R., 4th February 1780. He spent four years in Amiens thereafter, and then visited England. On his return from England he was removed in his official capacity to Lyon, and there he composed his *Dictionnaire des Manufactures et des Arts* (4 vols. 1785-90). He and his wife about this time had the principal share in the management of the *Courrier de Lyon*. In February 1791 he went to Paris as commissioner to the Assembly on behalf of the workmen of Lyon, and in December of the same year he fixed himself permanently at Paris. In March 1792 Dumouriez made him Minister of the Interior, and one of his first acts in this position was to subsidise Louvet's journal *La Sentinelle*. When Louis XVI. refused to banish the priests and form a camp of 20,000 men, R. sent him a threatening letter. The king treated the letter with disdain, whereupon R. read it aloud to the Council. The consequence was that Dumouriez had to dismiss him, and he appealed with his letter to the Assembly, which ordered him to print it, and send it to all the eighty-three departments. On August 10, the king's authority having been suspended, R. and the other Girondist ministers resumed their places; but in January 1793 they had again to resign, and on May 31 R. was arrested. He escaped to the neighbourhood of Montmorency, and thence to Rouen. At Rouen the news of his wife's execution caused him to commit suicide, November 15, 1793. Besides the *Dictionnaire* already mentioned, R. wrote *Lettres écrites de Suisse, d'Italie, de Sicile et de Malte* (6 vols. 1776-78), *Mémoire sur l'Éducation des Troupeaux* (1779), *L'Art du Fabricant d'Étoffes en Laine* (1780), *L'Art du Fabricant de Velours de Coton* (1780), *L'Art du Tourbier* (1783), *De l'Influence des Lettres dans les Provinces* (1786), *Recueil d'Idées Patriotiques* (1789), *Le Financier Patriote* (1789), *Compte-rendu à la Convention* (1793).—**Marie Jeanne Phlipon, Mme. R.**, wife of the preceding, was born at Paris, March 17, 1754. Her father, an engraver, furthered her education by all the means in his power, and the girl herself, possessed of beauty of person, gave tokens of a mind no less beautiful. In her simple home on the Quai des Orfèvres she became acquainted with many of the greatest works in theology, philosophy, and the sciences. Augustine's Confessions took hold of her mind so strongly that she became for a time an absolute mystic; and Plutarch's *Lives* imbued her with that patriotic devotion which involved her in so many troubles and won her so much glory. At the age of eleven she entered a convent, and there met Sophie Cannel, the friend who introduced her to Roland de Platière, and with whom for eight years she carried on a correspondence. But while yet very young, Mdlle. Phlipon abandoned the religion she had embraced too impulsively, and during the rest of her life her spirit was that of the Stoics. Her marriage with M. Roland de la Platière took place 4th February 1780. During the following ten years the Rolands led a somewhat unsettled life, now at Paris, now at Amiens, now in England, now at Lyon. When M. Roland

went to Paris, his wife's *salon* quickly became the cabinet of the Girondists. Lovely as she was, it was not her beauty that henceforth influenced these Girondists so powerfully; from her childhood she had accustomed herself to think vigorously and decide firmly; her patriotism was of the purest and intensest kind; her genius for politics far outshone that of her husband; his most important state papers were drawn out by his wife, and indeed she had latterly to deplore that he could neither think nor write except through her. It was Mme. not M. Roland who penned the memorable letter to Louis XVI. which led to the insurrection of the 20th of June. On the fall of her party the Jacobins cast her into prison, and Roland was arrested, his wife rose from a sick-bed to demand his release. She herself was arrested on June 2, and during her confinement rapidly composed the memoirs afterwards published by Bosc under the title of *Appel à l'impartiale Postérité, par la Citoyenne Roland*. According to a note on the manuscript, 300 pages were written in twenty-two days. Throughout her imprisonment she was heroic; on the last day of her life, she thanked her judges for sending her to her friends, and ran towards her cell as if in haste to die; on her way to the guillotine she spent her time in cheering an old prisoner who wept by her side; and ascending the scaffold she turned to the statue of Liberty and exclaimed, 'O Liberty, what crimes are committed in thy name!' Mme. R. was guillotined 9th November 1793. She forms the noblest contrast to the impure Goddess of Reason whom her executioners worshipped. Her life and character, in combining the best qualities of its spirit, justify the aims of the revolution. See an enlarged edition of the *Appel à Postérité* by Champagneux (Par. 1800); *Lettres autographes de Mme. R., adressés à Bancal des Issarts*, with introduction by Sainte-Beuve (Par. 1835); *La Correspondance de Mme. R. avec les Demeiselles Cannel* (2 vols. Par. 1841); *Mémoires et Correspondance de Mme. R.* (2 vols. Par. 1820; 3d ed. 1855; new ed. by Dauban, 1864); Dauban's *Étude sur Mme. R.* (Par. 1864); and his *Lettres, en partie inédites* (2 vols. Par. 1867).

Roll, a schedule of parchment, on which the pleadings and acts of court were entered and filed with the proper officer, after which they became records of the court. In place of this, copies of the pleadings are now in many cases filed. Rolls of Parliament are the MS. registers of the proceedings of the old Parliaments. The Calveshead was anciently a R. in the two Temples, in which every bench, barrister, and student was taxed yearly, for behoof of the cook and other officers, in consideration of a dinner of calves' heads in Easter term.

Roll, the rapid beating of the drum, producing a continuous sound, written in music—



Roll, a cylindrical moulding, very common in Gothic architecture. A scroll or edge-moulding is the R. with an edge or drip. Sometimes in place of the edge a fillet is added; the R. is then termed a roll and fillet or keel moulding.



Roll of Arms, in heraldry, a record of arms blazoned or illuminated on vellum. The earliest R. of A. in England, is 'Glover's R., copied (1586) from a list of 1216-72, giving the arms borne by Henry III., the princes of the blood, and the chief barons and knights of that period.

Roller (*Coracias garrula*), a species of *Insessorial* birds allied to the Crow. The Common R. occurs in Europe, N. Africa, and Asia. It is rarely found in Britain. Its food consists of insects, worms, &c. The head, neck, and under parts have a beautiful green lustre; the back is purplish brown, and the tail green. The average length is from 10 to 12 inches. The R. lays from five to seven eggs of a white colour. Some ornithologists regard the R. as more correctly placed intermediately between the Swallow and Bee-eater. Other species are the Oriental R. (*Eurystomus Orientalis*), found in India, Java, and Polynesia. The *Eurystomus Pacificus* is an allied form, occur-

ring in Australia, where it is called the 'Dollar Bird,' from the presence of a white coin-shaped patch on the inner aspect of each wing.

Roll'er, an agricultural implement used for crushing, pressing, and smoothing the surface of land. Ordinarily it consists of a heavy cylinder of wood, cast iron, or stone, mounted on an axle in a suitable frame, and in improved forms of R. the cylinder is composed of two or more sections separately mounted on the axle, so that each section has an independent motion. The clod-crushing R. consists of a series of wheels or rings all separately mounted on a common axle, the periphery of the wheels being deeply notched. By making the slot of the wheel much wider than the axle on which it is mounted, each wheel has a certain amount of play, so that it adapts itself to the inequalities of the ground. Very heavy rollers worked by steam power are now much employed for condensing macadamised roads.

Rolleston, George, M. D., F. R. S., born at Maltby, Yorkshire, July 30, 1829, was educated at the Grammar School of Gainsborough and Sheffield Collegiate School; and, proceeding to Pembroke College, Oxford, was elected fellow (1851). Having studied medicine at St. Bartholomew's, London, and served as assistant-physician in the British Civil Hospital at Smyrna during the Crimean War (1855-56), he became physician to the Ratcliffe Infirmary, Oxford (1857), Linacre Professor of Anatomy and Physiology (1866), and a fellow of Merton (1872). R. is author of an able treatise on *Forms of Animal Life* (1870), besides a *Report on Smyrna* (1856), the Harveian oration for 1873, &c. He has also contributed a treatise on craniology to W. Greenwell's *British Barrows* (Oxf. Clar. Press, 1877).

Rollin, Charles, a French historian, was born at Paris, January 30, 1661. He studied at the College of Plessis, and for three years pursued a course of divinity at the Sorbonne. At the age of twenty-two he became professor in his own college, in 1687 was appointed professor of rhetoric in the College of France, and in 1694 was chosen rector in the University of Paris. He was in 1699 made coadjutant director of the College of Beauvais, and endeavoured to introduce into that almost deserted establishment the system of education afterwards formulated in his *Traité des Études* (4 vols. 1726-28). In 1715 R. lost his post in the College of Beauvais through the intrigues of the Jesuits, because of his alliance with the Port-Royalists. During his retirement he employed himself upon a careful edition of Quintilian (Par. 1715). In 1720 he was again chosen rector of the university, but only to be removed from his post in two months by a *lettre de cachet*. He then engaged upon his famous work, the *Histoire Ancienne*, the first volume of which appeared in 1730, the thirteenth and last in 1738. As regards accuracy, fulness of matter, and correctness of style, this history was pronounced by Voltaire the best compilation in any language; but it is now superseded entirely in every department of ancient history. R. likewise published several volumes of a *Histoire Romaine* (1738), continued by his pupil Crevier. He died September 14, 1741. His *Opuscules* were printed in 1771 (2 vols.). The best edition of his works is that annotated by Guizot in 30 vols. (1821-27).

Rollin, Ledru. See LEDRU-ROLLIN.

Rolling Mills are used in the manufacture of malleable iron, and consist of a train of cylindrical rolls having grooves diminishing in size towards one end, through which the heated metal is passed in succession to improve its quality, and finally to give it the different forms of merchant iron, as bar, rod, sheet, rail, T, angle iron, &c. This valuable substitute for the previous process of hammering was introduced in 1783 by Henry Cort of Gosport. The rolls are usually placed 'two high' in strong 'cheeks' or standards, and a connection is formed by cog-wheels, motion being imparted from a steam-engine. The rolls may be brought closer together by means of lever screws connected through the standards to the upper rolls. Two sets of rolls are employed, called the *roughing* and the *finishing*. In some cases the motion of the rolls can be reversed to obviate lifting the mass of iron from one side to the other. On the Continent 'three-high' rolls are in general use, with which two sets of 'passes' are obtained without reversing the motion. R. M. are also employed for rolling copper, lead, gold, silver and other metals.

Roll, Master of. See MASTER OF THE ROLLS.

Romagna, part of the states formerly governed by the Pope (see PAPAL STATES), comprising the provinces of Bologna, Ravenna, Ferrara, and Forlì.

Romaine, Rev. William, the son of a French Protestant refugee, born at Hartlepool in 1714, was educated at Houghton grammar school and at Oxford. Ordained a priest in 1738, he became a curate near Epsom, and in 1739 published a sermon preached at Oxford University, in which he held, against Warburton, that the Pentateuch teaches the doctrine of a future state. In 1747 appeared the first volume of his edition of Calasio's *Hebrew Concordance and Lexicon*, a work distinguished chiefly by its unwarrantable alterations of the original. Appointed lecturer at St. Botolph's in 1748, and at St. Dunstan's-in-the-West in 1749, he became two years after assistant morning preacher at St. George's. From this place he was dismissed by the rector, Dr. Trebeck, who was displeased by his great success in preaching, and at his fervid and uncompromising Calvinism. For the latter reason, too, his sermon on the *Lord our Righteousness* was the last he was allowed to preach at Oxford. In 1752 he had been appointed professor of astronomy at Gresham College, a position which he soon resigned; his foolish attacks upon the Newtonian philosophy having clearly shown his unfitness. In 1766 he became rector of St. Andrew, Wardrobe, and St. Anne, Blackfriars, an office which he held till his death in 1795, attracting great crowds of every age and rank by his preaching. Among his many works may be mentioned his *Twelve Sermons on Solomon's Song* (1759); *Twelve Discourses upon the Law and the Gospel* (1760); *Life of Faith* (1763); *Walk of Faith* (1771); *Triumph of Faith* (1795). The Rev. Brownley Cadogan collected and published all his works in 8 vols. (1796).

Roman Catholic Church. In explaining the nature and constitution of the R. C. C., it is essential to observe at the outset that, according to Roman Catholic belief, the Church in communion with the see of Rome is identical with the one and only Christian Church established by our Lord, and destined to continue to the end. Hence we cannot understand the idea which animates the Catholic Church at this day apart from the plan with which Christ, according to Roman Catholic theology, instituted his Church at the beginning.

I. Constitution of the Church.—Christ, then, as Roman Catholics believe, in founding his church founded an external and visible corporation. He was not content with disseminating his doctrine and leaving it to fructify in the minds of men. He did not consider it sufficient to leave the heirs of his doctrine and his spirit separate to the outward eye, unknown even to each other, connected only by such bonds of union as are invisible to men and seen by God. On the contrary, he established a church so visible that it might fitly be compared to a city set upon a hill (Matt. v. 13 seq.) an external body to which recourse might easily be had in cases of dispute between Christians (Matt. xviii. 17), a corporation ruled and governed just as all human corporations are, by officers with definite powers and functions (Acts xx. 28, Eph. iv. 11).

It follows clearly, if the above be granted, that the Church does not consist simply and solely of good and pious Christians. Were it so, the Church would be invisible, for it is impossible to discover by any human means who are and who are not faithful disciples of Christ. Because the Church is a visible corporation, she consists of members bound together by external ties, easily recognised by all.

However, there is yet another point which must be noticed before the picture of the Church as a corporation can be complete. All corporations are visible, all have some external token or mark of membership—but more than this is required. There is a certain unity in a mob, but a real body, such as a regiment, a nation, or the like, has a unity which is wanting in the case of a mob, and this because the former are, and the latter is not, under definite and settled government. Hence, the Church consists of two parts, the one composed of officers or governors, the other of subjects placed under their rule.

Up to this point nothing more has been attributed to the Church than can be predicated of any external body constituted by the will of man. And if our Lord had left the plan and the constitution of his Church to the will of man, there would have

been no reason why Christians should not have met together, formed themselves into a body, and elected their own officers. Of course Roman Catholics believe that it was not so in matter of fact. They hold that Christ himself founded the Church after his own pattern. All authority was given to the Church by Christ himself. As, then, visibility and external union form the first essential point in the Roman Catholic idea of the Church, so now the second essential point to be kept clearly in view is that in the Church all authority descends from above. Its rulers do not owe their authority to the ruled, but derive it from Christ, and their commission is neither given them in the first instance by their subjects, nor held afterwards on their sufferance.

Accordingly Christ, after announcing his intention of establishing a kingdom, begins to constitute this kingdom, so to speak, from above. First of all he attached his apostles to his person, and before any church was formed he told them of the power which he intended to place in their hands (Matt. xv. 18, 19, xviii. 15-18). Moreover, among the twelve apostles he chose one, and put the supreme government in his hands. Early in his public life Christ had changed the name of this disciple from Simon to Cephas, *i.e.*, rock, in token, as Christ himself afterwards explained, that Peter's place in the Church was as essential to the Church as that of the foundation-stone in a house. Christ himself held the keys of the house of David, and he promised to place the keys of the kingdom of heaven in Peter's hands. He thus gave him the absolute right of opening the gates for the admission of some, and of closing them for the exclusion of others. He promised that this sentence of admission or exclusion would carry with it all those gifts in the one case or the forfeiture of them in the other which Christ intended to confer upon men by instituting his Church. The other apostles were to share in Peter's powers of binding and loosing. But three prerogatives were reserved for him alone. He only was to be the foundation of the Church; he alone was to hold the keys of Christ's house; he alone was to be the shepherd of the whole flock. Thus Christ, having constituted the apostles as a college under this supreme head, sent them forth with power to receive all nations into the one body of which they were the appointed rulers.

The Church, according to Christ's design, was meant to continue till the end of all things, and as the Church was of divine constitution, the apostles had no power to alter it in its essential features. It was theirs to complete its organisation according to the instructions received from their Master, and then to provide for the transmission of the powers with which they were invested to their successors. In pursuance of this duty laid upon them, St. Peter established his see at Rome, and made the bishops of that city the heirs of his supreme office as pastors and rulers of the whole Church. This is not the place to examine the historical proofs for St. Peter's Roman episcopacy, or for the transmission of his authority to the bishops of Rome as his successors. Suffice it to say that Roman Catholic theologians are agreed in asserting that no fact rests on an historical basis more solid, and that all antiquity recognised the Roman bishop as the successor of the Prince of the Apostles and as the divinely appointed head of the Church.

The apostolic college, as well as St. Peter, who was its chief, must continue in the Church. Therefore the apostles chose other faithful men, such as St. Timothy and St. Titus, made them their successors, and gave them the power in turn to ordain successors in their own place. As the world had been given to the apostles that they might govern it in Christ's name, so it passed and will ever continue under the rule of bishops, who stand in the apostles' place, and receive their jurisdiction from them. The apostles were placed under St. Peter, and exercised their authority in union with and in submission to him, and the bishops of the Catholic Church hold their office in union with and in submission to the bishop of Rome, St. Peter's successor. If each bishop had independent power the unity of the Church would be at an end. But the Church is one body, and for this reason it has in the see of Rome a centre of unity. They and they only are Catholic bishops who are in communion with the chief see, *i.e.*, the see of Rome. They and they only are members of the Church that are subject to him who received from Christ the keys by which the Church, Christ's house, is opened and shut.

Lastly, the bishop is the centre of unity in each diocese, just as the Pope is in the whole Church. The bishop must be united

with the Pope. The subordinate officers, priests, deacons, and the faithful committed to their charge must be subject to the bishop. The bishop has ordinary jurisdiction over the faithful of his diocese. In other words, he is not a mere vicar or delegate, but he exercises authority which comes to him by the standing constitution of the Church. At the same time, the Pope has ordinary jurisdiction not only over the bishops but over each and all of the faithful. He is like a monarch, who may rule mediately through the governors of provinces who have authority given and circumscribed by the statute law, or immediately if he chooses to call cases at once and directly into his own court. He is indeed far from an absolute monarch. He cannot alter the divine constitution of the Church. He cannot do away with the episcopate. He cannot alter the rules of government which Christ has set. But short of this he has absolute power of rule. To him, says the Council of Florence, in the person of blessed Peter, 'Christ has given supreme power of ruling, feeding, and governing the universal Church.' 'He who gathereth not with him,' St. Jerome says, 'scattereth. He who catcheth the lamb out of his house is profane.'

Such is the constitution of the R. C. C. Christ made St. Peter and his successors the visible heads of his visible Church. From St. Peter's successor, power descends to the legitimate pastor of a lower grade, and to them all members of the Church owe obedience. The 'Church taught,' as it is called, conveys no power to the Church ruling and teaching. At various periods of history, the people, the lower clergy, or imperial sovereigns have exercised more or less influence in the election of bishops. The mode of the Papal election itself has changed repeatedly: but whatever the power conceded to the laity in nominating the rulers of the Church, these rulers have ever received their orders and their mission not from the laity but from the apostles, and through the apostles from Christ.

II. *The Church as the Organ of Truth.*—This account of the Church's organisation leads us by a natural sequence to describe the purpose for which the organisation was called into being. The first purpose of the Church's organisation in the mind of Roman Catholics is the preservation of revealed truth. We say preservation, for Roman Catholic theologians do not dream that the Church can discover new truths in the supernatural order, or is the recipient of fresh revelations. The deposit of faith—*i.e.*, the religion revealed by Christ—was given in all its completeness to the apostles, and is contained partly in the written Word of God, *i.e.*, in Scripture, partly in his unwritten word, *i.e.*, in apostolical tradition. However, when the Church started there was no Scripture of the New Testament; and again, at the present day the New Testament bears unmistakable marks of the occasional way in which it arose. St. Paul, for instance, does not profess to put his entire doctrine in his epistles. He writes, as occasion serves, for the exigencies of the moment. Besides all this, it is possible for individuals to differ as to the number and names of the books which compose the Bible: and, given the list of these books, private persons notoriously differ as to their sense. If Scripture affords too great room for the divergences of private judgment, still more, perhaps, does this hold true of tradition. Who shall say when a father of the Church is giving an opinion of his own, and when conveying a tradition which has descended from the apostles? Who shall determine the diffusion, the marks of antiquity, the intrinsic character which recommend a custom, a tenet, a tradition, as a legacy received from the apostles of Christ? In short, an authority is needed to declare first what it is which is included in Scripture and tradition, and then to determine the sense of Scripture and tradition.

This authority, Roman Catholics tell us, is the Church. The Scriptures regarded as mere *historical records*, as well as other considerations, lead us to the belief that Christ established a Church as the organ of truth, and that he endowed it with his Holy Spirit. He promised that the gates of hell would never prevail against it, and that he himself would guide it into all truth. It is this Church which fixes the list of canonical books, regarded as *inspired books*; it is this Church which hands down, and owing to divine assistance must needs hand down, the full and perfect revelation intrusted to the apostles; it is this Church which with infallible voice condemns each deviation of the truth as it arises; it is this Church which, though it cannot add to the faith, may still draw inference from the truths once revealed, and put either revealed truths or the inferences in that accurate and explicit shape which is required to bring them into sharp anta-

gonism with the errors of the day. Further, the Church may, in the exercise of her office, define and impose upon the belief of Christians truths given indeed to the apostles originally, but which have been forgotten in certain parts of the Church, or which do not stand out so clearly and unmistakably in Scripture tradition as to be recognised there at once, even before the Church points them out. In all these ways the Church secures unity of faith. To her decisions all, ignorant or learned, wise or simple, all of every nation, must bow in absolute submission. What the Church teaches, they must believe or else forfeit the name of Catholic. The unity thus secured is absolute. Catholics may hold what opinions they like on matters which the Church passes over in silence. Scotists and Thomists, Dominicans and Jesuits, may dispute freely in the schools. But once let the Church decide and then dispute ends, faith begins. No Catholic may distinguish between fundamental and non-essential articles of belief. It is essential to believe all the Church teaches. This unity, too, is internal as well as exterior, grounded, as it is, on a firm and undoubting belief that the Church is guided by the Holy Ghost.

The reader will have gathered from the above that the Church's infallibility embraces for its object-matters truths of faith and morals. No Catholic supposes that the Church is infallible in matters merely historical, or in questions of science and literature as such. But the question arises, how, through what organs does the Church speak? It must be premised that according to Catholic belief it is the office of the bishops to teach—it is the duty of the laity to be taught by them. Again, it may be assumed after what has been said above, that the pastors cannot speak infallibly except in union with the Pope, who is the chief pastor. So Roman Catholics have ever held, and it is a necessary inference from their principles. The Pope is the Church's head by divine ordinance—pastors are only legitimate so far as they are recognised by him. It follows then that the pastors of the Church cannot speak with full authority while the head of the Church is silent.

We proceed to observe that there are three ways in which the Church claims to pronounce infallibility in faith and morals. Sometimes the Pope and the Catholic episcopate in the ordinary exercise of their ministry, or again by decrees solemnly promulgated, impose the obligation of belief upon the faithful. This is known as the teaching of the Church dispersed, and is allowed by all Roman Catholic theologians to be infallible. It was the only way in which faith was given or the Church taught during the three first centuries of her existence. Secondly, the Pope may summon all Catholic bishops to council. In this case the decisions, if confirmed by him, are the judgment of the Church gathered together, and are also confessedly infallible.

Catholics, however, are required to acknowledge a third way in which the Church may pronounce without the possibility of mistake. She may speak through her head alone, and the recent Vatican Council has defined as an article of divine faith that the Pope speaking *ex cathedra* is infallible. The Pope is liable to sin like other men; his infallibility is quite different from impeccability. His knowledge is, of course, human and limited. He has no infallibility in mundane matters. Even in regard to the truths of faith he may go astray, if he speak as an individual or write a theological treatise as a private doctor. But when he, exercising his office as supreme teacher, imposes a belief to be accepted by all the faithful with true interior assent, then, and not till then, the assistance of the Holy Ghost secures him from error.

Every one is aware that it is only within the last few years that Papal infallibility became an article of binding faith. But it must be clearly understood that Roman Catholic theologians strenuously deny that this doctrine is new. Now, the Gallican divines maintained that the Pope in his doctrinal decisions was not absolutely infallible till he had secured the assent, tacit or expressed, of the bishops. Still Gallican with all other Roman Catholics allowed (1) that the Pope is the centre of unity, in such sense that those out of his communion are not to be reckoned Catholics; (2) that the Pope has the chief part in defining doctrine, so that all decisions of general councils need to be confirmed by him; (3) that the Catholic Church is indefectible and infallible. Now, Ultramontanists, *i.e.*, the enormous majority who have always asserted Papal infallibility, urged their Gallican opponents with this difficulty, 'If the Pope can fall into heresy and impose this error as a term of communion, what becomes of

the Church's indefectible infallibility?' The bishops in communion with Rome are no longer Catholic, because on the hypothesis they have fallen away from the Catholic faith. The bishops who preserve the true faith are no longer Catholic, because on the hypothesis they are no longer in communion with Rome. In fact, the theory of Papal infallibility is bound inseparably to the Roman Catholic theory of the Church's infallibility. And the Vatican Council, accepted almost immediately by every single bishop throughout the R. C. C., did but draw an obvious inference from primary Roman Catholic principles. Of course, the advocates of Papal infallibility defended it by express testimonies from Scripture and tradition. But this does not concern us here.

III. *The Church as the Channel of Grace.*—We began by describing the organisation of the R. C. C. We went on to say that through its organisation it professes to teach the one true faith with a voice which cannot err, and to which all nations and all men must listen. Yet, when we say that the Church exists to teach revealed truth, we have omitted one half of her mission. It is the office of the Church to make men holy, no less than to unite them in the one true faith. The two offices are closely connected. The Church teaches a doctrine which is holy by the very fact that it is true and revealed by God. The Church cannot err in expounding and applying all the principles of the natural law, that law which has been written on the hearts and consciences of men. She is no less infallible in expounding God's revealed law, *e.g.*, in explaining the supernatural beatitude for which God made man at the first, the means which God took to redeem and to repair man's fallen nature, and the way in which his creatures can regain his favour. Further, she offers to all men the means of holiness. She professes, through the seven sacraments of the new or Christian law, to open fountains of grace adapted to every want of the human heart, to every necessity, to every state and condition. She gives the most powerful helps and incentives to continual prayer, and, above all, she invites men to the one worship which is worthy of Almighty God, the sacrifice of the body and blood of Christ, commonly called the sacrifice of the Mass. In this tremendous sacrifice, according to Roman Catholic belief, Christ continues in an unbloody manner the sacrifice which he offered on Calvary for our redemption. He still offers himself in sacrifice to the eternal Father through the hands of his earthly priests, for the living and the dead, for each need of the Church or of individual souls. The Mass forms the centre of the Church's spiritual life and worship, and in the communion which forms part of the Mass the Church supplies the greatest means of sanctification.

Lastly, as the Church teaches a holy doctrine, and offers to all the means of holiness, so she is distinguished by the holiness of her children. Of course, Roman Catholics do not deny that there is abundant vice among the children of their Church. They know well Christ's prediction that his Church should contain unholy members. Still they do not hesitate to vindicate the Church's claim to a special sanctity, which distinguishes her utterly from all other bodies. Sanctity, they say, is a note or distinguishing mark of the Church no less than unity. In proof they bid us look at the lives of the canonised saints, men whom God has raised up and continues to raise up in every age of the Church, and to whose sanctity he himself sets his seal by the miracles which he works through their hands while they are still on earth, or for those who invoke their intercession after death. Again, Roman Catholics refer the inquirer to the celibate lives of the priesthood, to the multitudes of religious men and women who have given up home and kindred, property, and, hardest of all, their own will, to follow Christ, under the three vows of poverty, chastity, and entire obedience, to the perfect imitation of Jesus Christ in his essential virtues displayed throughout the Church. Much else might be added. We will only allude, in conclusion, to that vast mass of ascetical and mystical literature which witnesses to the intense earnestness and reality with which lives of prayer are cultivated in the R. C. C., and which, considering its spirit and its character, has nothing at all like it outside the Church.

All that has been said on the Roman Catholic idea of the Church may be summed up in a definition given by the Gallican theologian Tournely, and which is substantially the same as that of the famous Ultramontane controversialist, Cardinal Bellarmine—'The Church is a congregation of men, united by the profession of one and the same Christian faith, and by commu-

nicating in the same sacraments, under the government of lawful pastors, and especially of the Roman Pontiff.'

IV. Present Aspect of the Church.—It only remains to sketch very briefly the outward aspect of the Roman Catholic hierarchy at the present hour. At the head stands the Pope, who unites in himself various grades of spiritual authority. He is Bishop of Rome; he is metropolitan or chief bishop of the Roman province; he is Primate of all Italy; Patriarch of the West; and, lastly, Sovereign Pontiff of the universal Church. He is chosen by the cardinals, or rather by such cardinals as are at least deacons, or if not in deacon's orders have obtained power to vote from a preceding pontiff. The election must be made in conclave, with the observance of various solemnities and conditions; and, in order to make the election valid, the votes of two-thirds of the cardinals must fall upon the same candidate. Scrutiny follows scrutiny till the result is obtained. The Pope once elected holds office for life: he may, indeed, like Celestine V., resign of his own free will, but short of this no earthly power can deprive him of his office as head of the Church and vicar of Christ. Around the Pope stands the Sacred College of Cardinals. It consists, when complete, of six cardinal bishops, fifty cardinal priests, and fourteen cardinal deacons. These cardinals are chosen by the Pope, and their dignity is second to his alone. They form a senate round the Pope. It is theirs to assist the Pope in ruling the universal Church, to administer the affairs of the Church on the death of a Pope, and to elect his successor. The cardinals also chiefly compose the Sacred Congregation, which may be roughly described as committees instituted for managing the affairs of the Papal States, or of the Church at large. To the latter class belong the Congregation of the Index, which deals with the prohibition of books; the Congregation of the Council, which settles doubts arising with regard to the decrees of the Council of Trent; the Congregation of Bishops and Regulars, which decides on almost all business which can come before the ecclesiastical court, except those which pertain to faith. The decisions of these congregations possess great authority, and if they are issued after consultation with the Pope, have the force of law.

The cardinals assist the Pope, the legates represent him at a distance. Some of them hold the legatine office as an adjunct of another dignity, and are called *legati nati*. Such was the Archbishop of Canterbury in Catholic times. Others are nuncios, sent by the Pope to temporal princes with power given for a time only. Others, in fine, are legates *a latere*, who are cardinals sent either to provinces or to temporal princes, with the privilege of using the insignia of apostolic dignity, and of superseding, while present themselves, all other legates.

Passing from the Pope, his assessors and his representatives, we come to the patriarchs, bishops who rule over a number of provinces. Constantinople, Alexandria, Antioch, and Jerusalem are still patriarchal sees, although the fact that these countries, once subject to them, are now out of communion with Rome has diminished the importance of the patriarchal dignity. Then follow the primates, who rule over the metropolitans, who rule over provinces, and the bishops who govern single dioceses. These bishops are nominated in various ways settled by canon law, concordats with sovereigns, &c.; but they are always ultimately appointed by the Pope, who nominates them in consistory and issues the mandate for their consecration. Missionary countries are ruled by bishops and priests who have no ordinary jurisdiction, *i.e.*, no power which is attached to their office by the law of the Church in the districts which they govern for the time and at the Pope's will. They are known as vicars or prefects apostolic. In the year 1877 the number of Catholic bishops amounted to 1160.

The orders of Regulars, or religious in the strict sense, are exempt from episcopal jurisdiction. They are subject to their own prelates—abbots, priors, provincials, generals, and the like. These in turn are subject immediately to the Holy See.

A plain and very accurate account of Roman Catholic doctrine will be found in the works of Bishop Hay, especially the *Sincere Christian*, republished by Blackwood, Edinburgh (1871). Those who wish for a deeper and more detailed treatment of the subject, in which the relations of Catholic to Protestant tenets are ably discussed, should consult Möhlers' *Symbolism* (Eng. trans. by Robertson (1847)). Dr. Newman examines the Catholic doctrine in its historical aspect in one of his most striking works—*viz.*, the *Development of Christian Doctrine* (3d ed. 1878). For an

account of the origin of the Church and the theology of the New Testament from a Catholic point of view we may turn to Dollinger's *First Age of the Church* (Eng. trans. by Oxenham, 1867). The works of Mr. Allies on *St. Peter*, published by Burns & Oates, may also be recommended to those who would understand the authority claimed by the Holy See, and the grounds on which it rests.

Roman Catholics, Laws Regarding. See ACT OF TOLERATION. In the United Kingdom, a Roman Catholic priest is not eligible as a member of the House of Commons. The performance of religious service according to the rites of the Church of Rome by any one is legal proof of his coming within the scope of the prohibition. A Roman Catholic may now hold any office in the United Kingdom, except those of sovereign or regent, of Lord Chancellor, or Keeper of the Great Seal, of Lord-Lieutenant of Ireland, or of Lord High Commissioner to the General Assembly of the Church of Scotland.

Romance, or **Romanza**, a little song with a love story, or a melody imitative thereof. The word is derived from the songs of the troubadours having been sung in the R. languages.

Romance Languages, the collective designation of the six great modifications of the *Lingua Romana Rustica*, or provincial Latin of the Empire—Italian, Provençal, French, Spanish, Portuguese and Wallachian. Each of these being treated under its special heading (Wallachian under RUMANIA), it will here be enough to refer to the works of Diez (q. v.) and to the valuable articles contained in *Romania, Recueil trimestriel consacré à l'Etude des Langues et des Littératures Romanes* (Par. 1872-78).

Roman Cement is a term commonly applied to any hydraulic cement prepared from natural cement stones. Parker's R. C., made from the *septaria* of the London clay found at the Isle of Sheppey, was introduced in 1796. Since then similar argillaceous nodules have been found in many other localities in Great Britain, and these constitute the basis of a score of other Roman cements now before the public. See MORTARS.

Roman Empire, The Holy, began on Christmas Day, 800, when Karl the Great was crowned by Leo III. in St. Peter's Basilica at Rome, and ended 1006 years afterwards, when Franz II., Karl's sixty-fourth successor, resigned the imperial dignity, 6th August 1806. The epithet 'Holy' was added by Friedrich Barbarossa, occurring first in his *Privilege of Austria* (1156), and was adopted specially as a protest against Hildebrand's assumptions of exclusive priestly sanctity and absolute priestly jurisdiction, but generally to express the fact that the H. R. E. was simply a temporal aspect of the Holy Catholic Church. For pope and emperor held co-extensive sway, reaching to the earth's utmost limits, and Cæsar's dignity was paramount, in theory at least, over every king, duke, or commonwealth of Christendom. Thus Edward III.'s refusal to kiss the foot of Ludwig the Bavarian attests those claims which Charles the Bold acknowledged by seeking leave of Friedrich III. to elevate his duchy into a kingdom. That the imperial office became annexed to German sovereignty, to Karoling, Saxon, Hohenstaufen, or Hapsburg dynasties, was no more an essential feature of the imperial, than that all modern popes have been Italians is of the papal theory. It was as 'Romans,' as heirs to Julius and Justinian, that emperors asserted their right to universal arbitration, which right was widely recognised throughout the Middle Ages, with mingled good and ill results, nor till it had come to be a sham did the H. R. E. pass for ever away. See EMPEROR, GERMANY, and Bryce's *Holy Roman Empire* (3d ed. Lond. 1871).

Romanesque Style, The, so far from being a mere corruption of classic Roman architecture, was, says Mr. Freeman, 'a more perfect carrying out of ideas which classical Rome attempted only imperfectly.' Falling back on the earlier round-arched construction exemplified in the pre-classical emporium by the Tiber in aqueducts and military towers, it abandoned the Grecian architecture of the entablature for a design where columnar capitals immediately support the arches of the arcades, as seen in Diocletian's palace at Spalato (*circa* 304 A.D.). To the 5th and 6th c. basilicas of Ravenna, marking the gradual development of Romanesque, succeeded the buildings of Lucca,

and to these again the crowning glory of the cathedral of Pisa. The invention of bells had given rise to the erection of lofty campaniles, and the Italian type of church stood perfect, with its triumphal arch, long-drawn arcades, and apse within, while without the whole effect depended on the slender tower. The Norman Style (q. v.) grew from a fusion of Byzantine with Romanesque, but England, down to the Conquest, or at least to Edward the Confessor's reign, retained the Primitive Romanesque which Augustine brought with him direct from Italy. To this style belong the scanty specimens spared us by Norman builders of so-called 'Anglo-Saxon' architecture—the crypts of Ripon and Hexham, the nave and tower of Deerhurst, and the small but highly-finished church of Bradford-on-Avon,—besides the original minsters of Sherborne and Malmesbury, Æthelwold's church at Winchester, Oswald's at Worcester, with others long perished utterly. The leading features of all these buildings connect them with the earlier Italian rather than the later Norman style, the 'long-and-short' work, namely, resembling the masonry of the Verona amphitheatre; the small and narrow windows, spayed within and without; the columns, rude, but still recalling classical proportions; and above all the tall, unbuttressed towers, e.g., of Earls Barton and St. Benet's at Cambridge, whose single ornament consists in hard, square strips. In Italy, in the 13th c., the native Romanesque was superseded by an imitation of the architecture of the N.; along the Rhine Primitive Romanesque lived on into the 12th c. and was the direct predecessor of Gothic, but in Northern France it had already a hundred years before made way for the Transition style, distinguished by vaulting and domical construction, which, as Norman, was introduced into England in the 11th c. See vol. v. of Freeman's *Norman Conquest* (Oxf. 1876).

Roman Law. The law of ancient R. was based on the constitutions of its kings, on the *twelve tables* of the laws of the *Decemviri* (q. v.), on the statutes enacted by the senate and people, on the edicts of the prætors, and on the *Responsa Prudentium*, that is, the opinions of learned lawyers; and, latterly, on imperial decrees. Due weight was given by the Roman law to customary or unwritten law (see CUSTOM; COMMON LAW). The material constructed on the above bases was first reduced into a *Code* (q. v.) by order of the Emperor Theodosius (A.D. 438). It continued for several centuries to be the only legal compilation recognised in the Western Empire. The operation of Justinian's embodiment of R. L., compiled by Tribonian about A.D. 529, was limited to the Eastern Empire. It consists, 1st, of the *Institutes*; 2d, of the *Digest* or *Pandects* (q. v.); 3d, of a new *Code*, or collection of imperial constitutions; 4th, of the *Novellæ* (q. v.). These form the *Corpus Juris Civilis*, as published about the time of Justinian. The systematic manner in which the Romans completed their conquests, combined with the general wisdom of the Roman law, have caused it to be adopted as the foundation of nearly every system of jurisprudence in Europe. It has had less influence on English jurisprudence than on that of Continental Europe generally, and of Scotland. The term *Civil Law* is sometimes specially applied to Roman law. See Taylor's *Introduction to the study of Civil Law*, *Elements of Civil Law*; Gibbon's *Decline and Fall*.

Romanoff, a famous old Russian Boyar family, which ascended the imperial throne of Russia in 1613. Its founder Andrei, surnamed Kobyla ('the mare'), is said to have come in 1341 from Prussia to Moscow, where he entered the service of Simeon the Proud. His son Feodor, called Koshka ('the cat') had, five sons, from which are descended the families of R., Suchovo-Kobylin, Kalysheff, and Sheremetieff. Feodor's grandson Zachorji Ivanovitch Koshkin, left two sons, Jakoff, a general whose descendants call themselves Zacharjin-Jakovleff, and Jurji, who by his son Roman became founder of the family of Zacharjin-Jurieff. Roman's daughter Anastasia was in 1547 married to the Czar Ivan II., and her brother Nikita to Eudokia, Princess of Susdal, descended from a brother of Alexander Nevski. Of this family Michael Feodorovitch R., son of Philaret or Feodor, the Metropolitan of Rostov and Patriarch of Moscow, was chosen Czar to put an end to anarchy. On his death in 1645 he was succeeded by his son Alexei, who died in 1676, leaving two sons, Feodor III. and Ivan III., and a daughter Sophia, by his first marriage; and by his second Peter the Great, the regenerator and first Emperor of Russia. By his first marriage Peter had a son Alexei (died 1718), whose

son Peter II. was Emperor, 1727-30, and by his second the daughters Anna and Elizabeth (Empress 1741-62). With the latter the imperial house of R. died out, and the house of Holstein-Gottorp ascended the throne with her sister Anna's son, Peter III.; yet this house is also often called R., by reason of its female descent therefrom. See Campenhausen, *Genealogisch-Chronologische Geschichte des Hauses R.* (Leips. 1805); Fredeburg, *Rossijskij Zarstvenny Dom Romanovych* (Petersb. 1853 et seq.).

Roman Religion. The close connection of the religions of the Greeks and Romans in their earliest form is proved by the identity of the names of their chief gods, *Jupiter* (*Diæus*) and *Zeus pater*, *Vesta* and *Hestia*, *Juno* and *Diônè*, *Janus* and *Zên*, *Mars* and *Arês*. But while the character and circumstances of the Hellenes led them more and more to the complete anthropomorphism that Attic sculpture perfected and developed, as the dominant elements in Greek mythology, personality, freedom, and the richest diversity, the Roman theology is throughout characterised by the abstract idea, by necessity, and by the severest order and monotony. In prayer the Greek looked to heaven, the Roman veiled his face. The powers of nature were to the Roman only personified ideas, and the nebulous character of his gods is seen in the formulæ, '*Sive Deo, sive Deæ*,' '*Sive Mas, sive Femina*,' '*Sive quo alio nomine te appellari volueris*.' While the remains of early Roman mythology are therefore scarce, every social condition, every operation of husbandry, had its representative in the spirit-world. This Mommsen traces to 'the profound sense of the existence of the general in the particular,' and the devotion and self-sacrifice of the individual to the whole, which he regards as 'the basis of the political union and universal dominion of the Roman Empire.' The difference between the Greek and the R. R. corresponds exactly to that between the Hindu and Persian religions, to the latter of which the Roman affords a complete parallel. As in Parsism, the ethical rises above the mythological, while the number of *geniis* is unlimited. Chief of these are the roughly distinguished *Lares*, *Penates*, *Manes*, *Larvæ*, and *Lemures*. The *Dii* or *Diæi* include all personal and intelligent beings of sky, earth, or under-world that rule nature by their will (as *numina*). A few evil deities like Vediovis, Robigo (god of corn-rust), Consus (of the hidden germs), and Carmentis (of incantation), are worshipped; but the good gods like Faunus and Saturnus, Vulcanus and Vesta, and especially the three greatest, Jupiter, Janus, and Mars, have absolute power over men and morals, as well as over nature. Other deities named in the festival calendar are Tellus (the nourishing earth), Ceres (goddess of growth), Pales (of fruitful flocks), Ops (of the harvest), Terminus (the boundary-stone), Neptunus, Mater Matuta (the morning goddess), Liber and Libera (the deliverers). From the fusion of the Sabines with the Roman shepherds, when R. became more of an Italian centre, the three chief gods were raised still higher above the others, Jupiter as the good father, pure and holy, Mars as the protector and god of war, and Janus as the god of summer, the opener of the day and of all life. To the practical Roman the *cultus* was everything, and true religion was piety according to the letter of the law. The root of Roman religion was the belief that the gods might be used to gain practical advantages. All had equal access to the deity. The priest was in no sense a mediator, but was a skilled ritualist who could perform with exactness the complicated ceremonies of the sacrifices. Of the twelve *flamines* ('fire-kindlers'), the three principal (*maiores*) were the *Flamen Dialis* (of Jupiter) and the two priests of Mars (*Flamines Martialis et Quirinalis*), the heads of the two Sabian Colleges. The Augurs and the College of the Chief Pontifex (q. v.) served no special duty. From the foundation of the temple of Jupiter on the Capitol by the Tarquinii and Servius Tullius to the decline of pre-Christian Rome, the R. R. held an even course. Splendid games and a magnificent ritual were associated with this citadel of 'mightiest and greatest Jove' (Jupiter O.M.—formula for *Optimus Maximus*), which should be the head of the whole world, as he was the divine personification of conquering Rome, before which all the nations should tremble and bow down. However favourable the influence of this religion on political life, it supplied nothing to the spiritual wants of the people, who turned in time to the rites of the East. The Massilian Artemis was worshipped on the Aventine, and the books of the Cumean Sibyl were removed to Rome. To these first traces of Hellenic influence were quickly added the

rites of Dēmētēr, Persephonē, and Dionysos (who were identified with Ceres, Libera, and Liber), and of Apollo, Æsculapius, Castor and Pollux. Aphroditē was identified with Venus, goddess of gardens, and ere long the popular worship gathered round the Erycinian Venus, the mother of Æneas. The Hellenic deities were followed by the Asiatic, as 'the Great Mother,' whose image, an unhewn stone, was brought at state expense from Pessinūs to Rome. Still, it was chiefly the corrupt and sensual elements of these religions that were received by the Romans. Among the upper classes, philosophy replaced the state religion with incredulity, which was quickly overgrown with the rankest superstition. The policy of Augustus might restore the forms of the national worship, it could not rekindle their old life. The age of the empire is marked by the development of the universalism that found Jupiter in the supreme gods of every nation, and by the deification of the Emperor, his incarnation upon earth. In the composite Græco-Roman civilisation, the highest of the ancient world, Christianity—'the last and most precious gift of the East to the West'—found a favourable soil. The first form in which Christianity became an established religion was Roman, and the Roman Catholic Church is but the Roman world-empire ennobled by the spirit of the gospel. See Hartung, *Die Religion der Römer* (2 vols. Erlangen 1836); Heffer, *Die Religion der Griechen und Römer* (4 vols. Brandenb. 1845); Schwegler, *Römische Geschichte im Zeitalter der Könige* (Tüb. 1853); Preuner, *Hestia-Vestia* (Tüb. 1864); Preller, *Römische Mythologie* (2d ed. 1865); Mommsen, *Römische Geschichte* (6th ed. Berl. 1874; Eng. trans. 1867); Roscher, *Studien zur Vergleichung der Griechen und Römer* (2 vols. Leip. 1873-75); and Tiele, *Geschiedenis van der godsdienst tot aan de heerschappij der wereldgodsdiensten* (Leiden, 1877; Eng. trans. 1877).

Romans, a town in the French department of Drôme, on the right bank of the Isère, 12 miles N.E. of Valence by rail. It is connected with Péage, on the opposite side of the river, by a bridge built in the 9th c. by the monks who had the right of toll (*péage*), and owes its origin to the abbey founded in 837 by St. Bernard, Bishop of Vienne. It manufactures silks and woollens and trades in wine, oil, and skins. Pop. (1872) 9893.

Romans, Epistle to the, was written by St. Paul from Achaia, probably Corinth (*cf.* xv. 25, 26). The circumstances indicate that this was his last stay in Achaia (Acts xx. 3); so that the Epistle would be written about 58. It is generally assumed that there was a Christian Church at Rome, composed, according to different critics, in different proportions of Jewish and Gentile Christians. The assumption is really no better founded than the tradition that Peter was the founder and first bishop of that Church. The community in Rome to whom Paul wrote were Hellenistic Jews, very similar to those in Alexandria, with whom they had much intercourse. See PAUL.

The great theme of the Epistle is the Gospel doctrine of justification by faith. In showing that this is the only possible means of salvation for all men, Jews as well as Gentiles (i. 18-ii. 29), the apostle has to combat the prejudices of the former regarding their national privileges (iii.-v., ix.-xi.), as well as Antinomianism generally (vi., vii). The latter part of the Epistle (xii.-xvi.) is practical. By many critics the doxology, xvi. 25-27, and by some the whole of xvi., is regarded as spurious. See Davidson's *Introd. to the New Test.* (Lond. 1868); Jowett's *Commentary* (1859); Meyer's *Commentary* (1859).

Roman'ticism, the reaction from classical to medieval forms, originated in the Gottsched and Bodmer controversy (1740) on the respective merits of French (Voltairean) and English (Miltonic) poetry. From *Paradise Lost* Bodmer, with Haller, Wieland, and Klopstock, turned to the old Teutonic literature; and his editions of the Minnesingers, faulty though they were, roused in the German mind an admiration of bygone German poetry, akin to that awakened for our ballads by Percy's *Reliques*. The movement, traceable through Lessing's, Goethe's, and Schiller's writings, acquired fresh force and first received its name when towards the close of the last and the beginning of the present century 'nationality' became the general watchword, and Tieck, the brothers Schlegel, and Novalis dreamed of a school of poetry where 'all the picturesque life of the Middle Ages of Germany should be renewed.' These, the founders of R. proper (so named because the Minnesingers had drunk their inspiration from Romance sources), were followed by Arnim, Fouqué, Uhland,

Körner, and other worshippers at medieval shrines. In England, Scott worked a similar movement mainly by his own unaided genius; to France R. was communicated through Madame de Staël, but there became less an assertion of new laws than a denial of all existing traditions. The members of the Cénacle, or Romantic Pleiad—Victor Hugo, Sainte-Beuve, Gautier, Deschamps, &c.—renounced the classicism of Racine and Corneille without exclusively adopting medieval themes or models; and French R. is defined by Hugo himself as 'liberalism in literature.' Everywhere the political and literary influences of R. have well-nigh passed away; its action on art and on religion has been more permanent, as shown in England by the Gothic revival, Pre-Raphaelism, and Tractarianism, which last Newman ascribes to Scott's romances. See Haym's *Romantische Schule* (1870); and Gautier's *Histoire de Romantisme* (1872).

Rome, the metropolis of the Roman republic and empire, the ancient centre of Western civilisation, the Eternal City of the Popes, and the capital of the modern kingdom of Italy. It lies in an undulating volcanic plain, now called the Campagna (q. v.), on both banks of the 'tawny Tiber,' 14 miles from its mouth. R. is girt by an old brick wall 14 miles long and 55 feet high on the outside, but by far the greater part of the enclosed space is occupied by ruins, gardens, and vineyards. The city is divided into two unequal portions by the river, which has here an average breadth of 65 yards and a depth of 20 feet. The Tiber describes three curves in flowing through the city, and is spanned by five bridges, including a new suspension-bridge. Ancient R. is situated on the left bank, partly in the plain which stretches along the river, the ancient Campus Martius, and partly on the far-famed seven hills. Further N. lies the closely-packed and tortuous city of the Middle Ages, now the abode of the poorer classes, and between this and the Quirinal and Viminal Hills on the E. is modern R., the fashionable strangers' quarter, and the chief centre of business. The much smaller portion of R. on the right bank of the Tiber is divided into two parts: to the N. the Borgo, surrounding the Vatican and St. Peter's, and encircled by a wall built by Leo IV. in 851; and to the S. Trastevere, lying along the river, and on the slopes of the ancient Mons Janiculus.

Once densely peopled, ancient R. is now almost tenantless, but contains the grandest monuments of antiquity. Five of the hills, joined together by a ridge, form a semicircle bounding the Campus Martius. Furthest N., the Monte Pincio (175 feet) is now laid out in public pleasure-grounds, and was the *Collis hortorum*, on which were situated the famous gardens of Lucullus. The 'hill of gardens' was not included among the seven hills of the city, these being the Quirinal, Viminal, Esquiline (the highest, 246 feet), Cælian, Aventine, Palatine, and Capitoline. Between the Palatine and Capitoline, in the S., is situated the ancient Forum (q. v.). On the summit of the Capitoline are the church of Santa Maria in Araceli, which is mentioned in the 9th c., and occupies the site of the temple of Juno Moneta; the Piazza del Campidoglio, designed by Michael Angelo, and in which is placed a bronze equestrian statue of Marcus Aurelius; the Palazzo del Senatore, re-erected by Boniface IX. in 1389 on the site of the ancient Tabularium; and the Palazzo del Conservatori and Capitoline Museum (founded by Innocent X.), containing the precious relics of recent excavations. The site even of the great Temple of Jupiter (see CAPITOL) is matter of dispute, and the only relic of the ancient buildings which covered the mount are the imposing ruins of the Tabularium. Popular assemblies were held in the *Area Capitolina*, and here, on the suppression of the revolt of Tiberius Gracchus (B.C. 133), the blood of the citizens flowed for the first time in civil war. On the S. height of the Capitol, the Monte Caprino, are the so-called *Casa Tarpeia*, with the Protestant hospital and the German Archæological Institute, erected by Laspeyres in 1874-76. The Palatine, the germ of the ancient city, and subsequently the site of the palaces of the emperors, is now covered mainly by two recently dissolved religious houses, S. Bonaventura and the Villa Mills, and by the old Farnese gardens. Since the purchase of the Farnese gardens by the Italian Government in 1870, the extensive excavations carried on here have been entrusted to the sole management of M. Rosa. Between the Palatine and the Aventine lay the Circus Maximus (q. v.). Designed for the drainage of the Forum Boarium, or cattle-market, lying between the Palatine and the

Tiber, the Cloaca Maxima (q. v.), the earliest known application of the arch principle in R., has defied the vicissitudes of 2000 years. The Pantheon (q. v.), near the centre of the Campus Martius, is the only ancient edifice of R., the walls and vaulting of which are in a perfect state. To the S.E. of the Aventine were the Baths of Caracalla (see BATHS), and in the depression between the Palatine, Esquiline, and Cælius stands the Coliseum (q. v.), the interior arrangement of which has been revealed most minutely by the excavations of 1874. Among the grandest memorials of R. are the triumphal arches (see ARCH), the most elaborate and best-preserved of which are those of Constantine, Septimius Severus, and Titus. The principal street of ancient R. was the Via Sacra, part of the basalt pavement of which is still visible; the Via Appia was the great road leading S. from the city; the Via Lata that leading N. At the N.E. base of Cælius is the Basilica of the Lateran (q. v.). Beyond the S. slope of the Esquiline the ruins of ancient R. become scarcer. During recent years archaeological research has been carried on with great enterprise. At three different periods R. has been defended by three distinct walls—that encircling the Palatine, that of Servius Tullius, enclosing the Seven Hills, and that of Aurelian still standing. Four fragments of the Palatine wall have been discovered, while that of Servius Tullius may now be traced at forty-two different points. Some vestiges of the citadel or *arx* on the N.E. summit of the Capitoline were laid bare in 1875. There are now no fewer than thirty temples, and of those recently discovered the chief are the temples of the Flavians, with a colossal head of Titus (discovered 1872), of the Fortuna Primigenia, with many inscriptions (1873), of Julius Cæsar, with many fragments of the *Fasti Consulares et Triumphales* (1873), of Honour and Virtue (1873), and of Jupiter Capitolinus (1865-76). In the period of her splendour R. had eleven large thermæ, some of which could receive as many as 2000 bathers at a time, and 856 baths of an inferior order. Several of the thermæ still exist, and have been explored since 1870. The excavation of the Forum Romanum was resumed 2d April 1878, the plan of the Italian Government being to clear the whole space to the front of the Palace of the Cæsars. The workmen engaged in digging the foundations for the new quarters on the Esquiline recently discovered the Forum Esquilinum and the surrounding markets. The Palace of the Cæsars on the Palatine has been shown by recent research to have no unity either of plan or decoration, but to consist of a suite of palaces built independently of each other and at different periods. The gardens of Mæcenas on the Esquiline have been excavated, and the most interesting discovery is a splendid conservatory, the walls of which are decorated with beautiful landscapes. But perhaps the most important of all recent discoveries was that of a palace (1876) in the Horti Lamiani, containing bath-rooms of extraordinary splendour, from one of which was taken the group of sculptures now forming the chief treasure of the New Museum of the Capitol. Nearly all the foundations of the buildings in the Esquiline gardens are composed of fragments of statuary. A single wall scarcely 100 feet long yielded 2500 pieces of sculpture, out of which the archaeologist with equal patience and skill furnished the New Museum with seventeen statues and two sculptured vases. The Catacombs (q. v.), which form so interesting a link between ancient and Christian R., extend round the city in a wide circle, and, according to Michele di Rossi, cover an area of 615 acres. Pope Leo XIII., who is president of the Archaeological Society of R., resumed the work of excavation in the great catacomb of St. Calixtus at his own cost in July 1878.

The great architectural monuments of modern R. are on the right side of the Tiber, in the Borgo, or Civitas Leonina, so called because Leo IV. surrounded it with a wall (848-52) as a protection against the Saracens. Here are situated the stupendous piles of the Vatican Palace (q. v.), and the noble basilica of S. Peter's (q. v.). The Castle of S. Angelo (*Moles Hadriani*) with its massive tower was begun by Hadrian and finished in 140 by Antoninus Pius as a family mausoleum; but when the Goths conquered R. under Vitiges, it was used as a fortress, and during the feuds of the Middle Ages was a stronghold of great importance. The Ospedale di S. Spirito, established by Innocent III., embraces a general hospital for 1000 patients, a lunatic asylum for 500, and a founding institution for 3000, besides a reformatory, a refuge, and a large medical library. In the Trastevere, to the S. of the Borgo, are the church of S. Pietro in Montorio, built in 1500 by Ferdinand and Isabella; the Villa Farnesina, built by Peruzzi in 1506, and famed for its Raphael frescoes; and the

magnificent Acqua Paolo, the finest of R.'s many fountains, erected 1611. Outside the Porta S. Pancrazio, is the Villa Doria Pamfili, the most delightful and extensive of all the Roman villas. The Mausoleum of Augustus, converted during the Middle Ages into a stronghold, is now used as a theatre and circus. The Palazzo Borghese, begun in 1550, has an imposing façade, and contains the most important picture-gallery in R. next to that of the Vatican. The Palazzo Farnese, one of the finest palaces in R., begun by Da Sangallo in 1534, continued by Michael Angelo, and completed by Della Porta in 1580, has been occupied since 1874 by the French embassy. The Università della Sapienza which was founded in 1303, and attained its greatest prosperity under Leo X., Leo XII., and Gregory XVI., has still faculties of law, medicine, physical science, and philology, and possesses the *Biblioteca Alessandrina* of 90,000 vols. S. Luigi de Francesi, consecrated in 1589, is the national church of the French, and S. Maria dell Anima (1514) is that of the Germans. S. Maria Sopra Minerva, probably begun in 1285, and restored 1848-55, is the only Gothic church in R., and contains many rare works of art. The Palazzo della Cancelleria, designed by Bramante, contains within its precincts the church of S. Lorenzo, and is a structure of majestic simplicity. Between the *Pescheria*, or fish market, and the Tiber, lies the Ghetto, still inhabited exclusively by Jews. What is known as the 'strangers' quarter,' the elegant northern part of the city, is intersected by the Corso, which corresponds to the Via Flaminia, and is now the principal street of R. and the scene of the Carnival (q. v.) festivities. Among the many notable edifices in this district are the Villa Medici (1540), which became the seat of the French Academy of Art in 1801; the Collegio di Propaganda (q. v.); the S. Carlo al Corso, the national church of the Lombards, and the resort of the fashion-able world; the Palazzo Chigi (1526), with a fine picture-gallery; the Camera de Disputati, since 1871 the Italian Parliament House; the superb palaces of Colonna, Sciarra-Colonna, and Palazzo Doria, containing valuable art-collections; the church of S. Marco, rebuilt in 833; and Gesu, the gorgeous church of the Jesuits, erected 1568-77. The Collegio Romano contains the new *Biblioteca Vittorio Emanuele*, which consists of the old library of the Jesuits (63,000 vols. and 2000 MSS.), and the libraries of the suppressed monasteries (450,000 vols.). The massive building is now also the home of the new *Museo Preistorico*, the *Museo Kircheriano*, founded by the learned Jesuit Athanasius Kircher (born 1601), &c. Since the Italian occupation buildings have been rapidly springing up in the long-deserted E. part of R., and on the Esquiline in particular an entire new quarter is being erected. In this direction are the Palazzo Barberini, with important collections of pictures and sculpture, and a famous library containing 7000 valuable MSS., the Palazzo Reggio (1574), formerly the Apostolico al Quirinale, but since 1870 the residence of the King of Italy, the church of S. Pudenziana, traditionally the oldest in R., and the old S. Maria Maggiore, deriving its name from its being the largest of the eighty churches in R. dedicated to the Virgin. Opposite the baths of Diocletian is the railway station. Beyond the Porto Salara is the famous Villa Albani, and in the N. is the Villa Borghese.

The temperature of R., which has a mean of 60° F., ranges in the shade from 100° in summer to 21° in winter. The pleasantest season is from the beginning of October to the end of May, after which the fever-laden *aria cattiva* prevails. With its priceless libraries and galleries, R. is a cosmopolitan home of art and learning. Its commerce and industry are gradually reviving. A railway to the port of Fiumicino was opened in March, 1878, and the port is now provided with piers and wharves. The industrial products of R. are chiefly woollens, silks, velvets, leather, glass, mosaics, jewellery, cameos, casts, photographs, and 'Roman pearls.' There is a considerable trade in antiquities. In 1877 R. had 235,302 inhabitants, and of these 29,000 were temporary residents, 5687 soldiers, 1428 secular clergymen, 2175 monks, and 1824 nuns.

While the origin of R. is traditionally referred to Romulus (q. v.), its early extension is ascribed with more certainty to Servius Tullius. Under the kings it developed rapidly, and the second or Servian wall, the Circus between the Palatine and Aventine, and the Cloaca Maxima, date from before the expulsion of Tarquinius Superbus (509). After its destruction by the Gauls (390) it was hastily re-erected, and not until the overthrow of Carthage had made it the first city of the world did its archi-

ecture begin to reflect the prevailing wealth and luxury. Cæsar formed extensive architectural plans, but their execution was reserved for his nephew, and of all the existing ruins those of the buildings of Augustus are both the grandest and most numerous. The Flavian dynasty is perpetuated in the memory of R. by many imposing works, above all by the Colosseum, which has ever been the symbol of Roman power and grandeur. Under Trajan, R. attained the culminating point of art and political greatness. The name of Constantine the Great marks the latest important ruins of antiquity. Goths, Vandals, Franks, and Saracens successively destroyed and pillaged the city, and as the cultivation of the Campagna was abandoned, it was attacked by the deadly malaria. On the termination of the Papal schism (1378-1417), the city received a new impulse, quickened by the vast sums which flowed into the papal coffers, and by the revival of a taste for art and science, promoted by Nicholas V., Julius II., Leo X., and others. To Sixtus V. the modern city is mainly indebted for its characteristic features. In 1798 a republic was formed in R., which was under the supremacy of France 1809-14. A republic was again declared in 1849, but Pius IX. was restored in 1850 by the French, who placed a garrison here till 1866, [and again after the Garibaldian hostilities till 1870. On the 20th September of that year the Italian troops entered R. after a bombardment of five hours. See Ampere's *l'Histoire Romaine à R.* (3d ed. 4 vols. 1856-64), Fournier's *Rom und die Campagna* (2 parts, 2d ed. Leip. 1865), Dyer's *City of R.* (Lond. 1865), Reumont's *Geschichte der Stadt Rom* (3 vols. Berl. 1867-70), Burn's *R. and the Campagna* (Lond. 1870), Hare's *Walks in R.* (4th ed. 1874), C. J. Hemans' *Historic and Monumental R.* (1874), *Pittura e Sepolcri scoperti nell' Esquilino della Compagnia Fondiaria Italiana, nell' anno 1875* (Roma, 1876), Parker's *Archæology of R.* (Pts. I. to XII. 1873-77), and Von H. Jordan's *Topographie der Stadt Rom im Alterthum* (Berl. vol. ii. 1878).

Rome, the capital of Oneida county, New York, U.S., at the junction of the Erie Canal and Mohawk River, on the New York Central and Hudson River Railroad, 110 miles W. of Albany. It contains 13 churches, a public library, 6 banks, and the Central New York Institution for Deaf Mutes. It is the centre of a great cheese-making and dairy industry, and has considerable hardware manufactures. Pop. (1876) 11,000.

Rome. The history of the foundation of R. is lost in antiquity. If authentic records on the subject ever existed they have irretrievably perished. Lack of reliable information gave rise to numerous myths, which, though valueless as history, are yet, from the importance and interest of the subject, eminently worthy of record. It is needless to mention more than three of the many mythical accounts of the foundation of R.:—(1) R. was founded by the Pelasgi, in the age before the Trojan War; (2) By Æneas, immediately after the fall of Troy; (3) By Romulus, grandson of Numitor, on 21st April, 753 B.C. The third myth came to be generally accepted.

Ethnology.—The Romans were essentially a mixed people. They were in fact a combination of at least three distinct races,—the *Latini*, *Sabini*, and *Etrusci*. The first of these was itself a mixed race—a fusion of the Pelasgian with the early Italian stock. This amalgamation, effected at an early epoch, produced strange ethnic results, both with regard to character and creed. When with these two races the Iapygians, perhaps the primal or autochthonous element, combined, the complication became still greater. The last named possessed a language till now undeciphered and uninterpreted. The *Latini*, with whom may be classed the Umbro-Sabellians, mainly from the fact of their intercourse with them at a very early period in Italian history, had settled in Latium long before the Etruscans had set foot on Italian soil. They were, indeed, by far the most important of the races inhabiting Italy—in fact, the germ whence sprang that wondrous people the mantle of whose power for many centuries overshadowed the world. The ethnological origin and affinities of the *Latini* are clearly defined. Their language entitles them to be classed as members of the great Indo-European family (see *ARYAN*). They were, in fact, a sister race to the Hellenes. The *Latini* were, therefore, a race carried by the westward wave of civilisation from the far distant east; whether directly through Asia Minor or by the region of the frozen Danube it is impossible with certainty to say. Mommsen takes the latter view, which has been adopted by most ethnolo-

gists. According to him, the *Latini*, after entering the hilly region of Northern Italy, crossed the great chain of the Apennines, and gradually occupied the Western seaboard, driving the aboriginal tribes into the south-eastern corner of Italy, and cooping them up in the Calabrian Peninsula. In these remote times the latter lost their distinctive character by the influx of the Hellenic element. Rich and powerful Greek colonies were planted all along the shores of Southern Italy (see *MAGNA GRÆCIA*), eradicating the pre-Latin races, and leaving here and there only a word or relic to indicate faintly their origin; while at a later period Samnite hordes, coming down from the highland districts, still farther obliterated their distinctive character. Even the Samnite colonists themselves lost somewhat of their Italian traits in their lowland and southern homes. In Latium alone the *Latini* took deep and lasting root. No Greek colonies were founded there, and no Græcising element for long appeared in the neighbourhood of the little city which, from small beginnings, was to cover the Seven Hills and wield the sceptre of the world.

The Sabines and Umbrians entered Italy at a later period than the *Latini*, and took up their position in the highland districts N.E. of R. The chief of the tribes of this warlike and vigorous people were the Picentes, Peligni, Marsi, Aequi, Vestini, Marrucini, Samnites, Volsci, and Hernici. The origin of the Etruscans has hitherto proved one of the insoluble problems of history; but the recent researches of Corssen, Taylor, Sayce, and others in the language of this mysterious people give considerable hope of its ultimate solution (see *ETRURIA*). Freeman considers that most likely they were an Aryan people; but their language, quite different from that of the other nations of Italy, seems to bear strongly against such a supposition. Indeed, it points distinctly to a Turanian origin. Besides these three peoples another claims attention. Just as the Greeks settled in and occupied the S. in pre-historic times, the Gauls, a Celtic race, and consequently a branch of the great Aryan family, at a period much later, and almost within historical times, acquired the N. of Italy. This race, however remotely connected with the other Italian races, had in pre-historic times fixed their habitat in Gallia Transalpina. Of a restless and impetuous nature, they turned their steps to the E. and S.E.—the Atlantic barred their westward progress—crossed the Alps in the 3d c. after the foundation of Rome and settled in the fertile valley of the Padus (*Po*). In this invasion the Galli Insubres took the lead. Their capital was Mediolanum (*Milan*). Other tribes soon followed, the Cenomani, who occupied Brixia (*Brescia*) and Verona, the Boii, and the Senones who crossed the Po and took possession of the modern Romagna, occupying the Adriatic coast as far as Ancona. The Alps formed at first a boundary between the Gauls and the Etruscans and Umbrians, but when the former penetrated to the S. of the natural barrier the terms Gallia Cisalpina (*i.e.*, on the Italian side) and Gallia Transalpina (on the farther side) became the recognised designations of the two territories. The Padus also formed a boundary-line that gave to its river-banks a distinct nomenclature: Gallia Cispadana and Gallia Transpadana. Lastly, the Greeks, immigrating into Italy in pre-historic times, colonised the southern portion of the country. They settled mainly along the coasts, built cities and established commercial relations with neighbouring countries. But the fine and plastic culture of Athens was destined to enter R. through this channel, and the first writer of note in Italy was Livius Andronicus (q. v.), a Greek slave. The literature and culture of R. was a borrowed element, the warlike spirit was alone their own.

Primitive Condition of the Latins.—The *Latini* must be viewed as the people of the country. In pre-historic times they were the race *par excellence*. Their region was the Plain (Latium). Whether the term Latium is radically connected with *latus*, a side, inasmuch as it was a 'sideland' is open to doubt. The derivation from *latus* 'wide,' Gr. *plátos*, Eng. *flat*, seems to have more significance. The ancient traditions lead us back to the time when Saturnus hid (*latus*) on the W. of Italy from the anger of Jove, the name *Latium* denoting the place of his concealment.

The organisation of the *Latini* is purely a matter of conjecture. They were originally 'Nomads,' wandering herdsmen. But this condition ceased at an early period in their history. Ennius has written the character of his countrymen in a line:—

'Bellipotentes sunt magi' quam sapientipotentes.'

War, not philosophical or even agricultural occupations, engaged their attention. The language of the people goes far to bear

out this statement. They were certainly, to begin with, tillers of the soil and gatherers of its fruits. The terms *Siculi* ('sickle-wielders') and *Osii* (Opisci, 'field-labourers') establish the fact. But the oldest agricultural terms clearly prove that the Greeks and Latins sprang from the same stock. The terms *oinos, vinum; hortus, hortus hortiortos* (Scotice *stours*), and the form of the plough point indubitably to a common origin of the Greek and Italian races. *Zancla* and *Drepanum* are enduring evidences of the earliest pursuits of the people as well as of the configuration of their towns. The terms *toga* and *tunica* in Latin are merely forms of the Greek *cheiton* and *himation*. Their modes of building, wine-making, gardening, clothing, were, if not an accurate copy, in many respects kindred with those evolved by their Greek brethren. Socially their characters differed, and especially as to their ideas of infant training. The vigorous and stern regime of Sparta had no place even among this stern and semi-barbarous people. To them the milder forms of Athenian discipline were probably unknown, or, if known, were alike unpractised and unheeded.

Early Roman Political Life.—The 'state-life' of the Italians, if we are to trust tradition, was of very early growth. It was transmitted from the Hellenes. So, too, were their habits in a somewhat marked degree, as well as their social institutions generally. The *pagi* or clan-villages were quite independent of each other. Each had its own magistrate. The *pagi* were local centres with a certain religious status, and possessing the privilege of performing certain religious rites, just as by the *Comitia Calata* afterwards; the fast days and feast days, the court days and market days, were arranged and fixed by the representatives of the clans.

A centre like that of which we have been speaking was termed a *Capitolium* (*head* or *height*), from its being situated on a hill top (*cf. Gr. akron*). Round this strong place houses were built surrounded by the *oppidum* ('work,' from *opus*), or by the *urbs* ('ringwall,' *cf. urvus, curvus, orbis*). So grew the Latin towns from small beginnings. But in the mountainous districts of Italy, especially in those of the Marsi, *Æquicoli*, and among the inhabitants of the highlands of Umbria, these mysterious strongholds ringed with walls along the beetling cliffs remained, as if to mock the Roman antiquary, while they evoked his wonderment, in their primitive form. (See *Propert. de Arisio*, v. i. 125, *d seq.*).

The earliest of these centres are to be found on the Alban hillsides. The chief consideration in their selection were fine air, fresh water, secure position. Alba Longa is probably the oldest of them all. Lanuvium, Aricia, and Tusculum were of little later birth. Tiber, Præneste, Gabii, Labici, Nomentum, the coast cities of Laurentum, Lavinium, and the 'City of the Seven Hills' were the most important of the primitive Latin centres. It is impossible, from the want of definite information on the point, to determine the order of their constitution, or to fully estimate their relative political influence in prehistoric times; but it may be safely asserted that R. was one of the latest, as it certainly was of all the most powerful, political centres of the Latin people. With Curium it formed an alliance at an early period in its historic and national life. Constantly and persistently through the gradual rise of an undisputed sovereignty, and long after, when the conquests made abroad began to threaten its stability, R. was ever ready to accord the right of citizenship to its allies and conquered foes. *Roma Nutrix* was its motto. And herein lies its distinctive and unique character in history—the secret of its great and enduring power.

Rome during the Regal Period.—The legends regarding the origin of R. have already been noticed. According to the most popular myth, it was founded by Romulus, a son or descendant of *Æneas*. We dismiss for the moment the descent of the founder from Mars and Ilia—a late invention, for the glorification of the Roman State. It is much more likely that R. (comp. *Gr. Romē*, 'strength') owed its origin to its position as an outpost to guard the frontier or border-land against the Etruscans on the opposite bank of the Tiber. Like the old Greek cities, R. was at first governed by kings, aided by a senate and a popular assembly. Its monarchs, however, unlike those of Greece, were not hereditary. The first four kings seem—if we trust the legend—to have been chosen from the Romans and Quirites of Curium. It is not unlikely, from the league existing between the two cities, that this was the practice. The last three are the dynasty of the Tarquini. Here we begin to tread on, if still unstable,

comparatively firmer ground, and to find that we are dealing with real persons. All of the Tarquins seem to have been foreigners, perhaps Etruscans. The buildings with which they adorned the city, and their traditional patronage of art, go far to bear out their Etruscan origin. Be that as it may, under their rule the power of R. grew daily. The last of them; surnamed *Superbus* from his despotic and haughty conduct, was driven from the throne, B.C. 509, about the very time when the tyrant Hippias was expelled from Athens. Putting aside, as history, the Romuleian and Pompiliian myths, we must nevertheless notice these as reflecting more or less the early development of Roman civilisation, and the gradual growth of a great and potent state. The Palatine Hill was the earliest settlement of the rude band destined to conquer and control the neighbouring tribes. The Asylum or the Capitoline was certainly of very ancient date (see *CAPITOL*). So, too, were the ancient fortresses on the Capitoline and Tarpeian heights. The legendary wars with Tatius, the beautiful yet tragic legend of Tarpeia, and other myths of that early time, do not, we believe, contain in them much of reality, but they certainly point to an early alliance between the Romans and Sabines. The tale of the *Rape of the Sabine Women*, and the record by Livy of the wars with the people of Cæcina, Antemne, and Crustumium, are in themselves valueless as history; but they point emphatically to the beginnings of a warlike race, and indicate clearly the irrepressible spirit of aggrandisement which from century to century characterised the Romans. It is barely necessary to refer to the reforms of the kings who succeeded Romulus, to the myths of Egeria, of Tanaquil, and the Sibylline leaves. These every scholar has long since learned to estimate at their proper value. What is known as the history of this period was concocted centuries after the events occurred, and long after all records had perished, by chroniclers who were anxious to construct a probable theory of their nation's being and begetting, and to do so in consonance with the national feeling and to the fostering of the national pride.

The natural as well as the earliest division of all peoples includes two classes, freemen and slaves—*i.e.*, 'householders' and their 'dependents.' So it was in R. The former were termed *patricii* (from *pater*, 'a father'), the latter *servi* (from *servus*), but at a very early period in the history of R. there was a distinct class—the *clientes*, *i.e.*, the 'listeners' (from *clere*, 'to listen'). These were dependents on the original *populus*, who alone possessed burgess rights. The *populus* had a political, the *clientes* a non-political existence. How the *clientes* originated, and whence their inferiority arose, cannot now be ascertained. The opinion of those who have given much attention to the subject is that they were a conquered race. Still, the *patricii* and *clientes* had reciprocal duties to discharge, and these were sacredly observed. The *patronus* was bound to interpret and expound the laws (*promere leges*) to his client, and to watch over his personal interests. The client, on the other hand, was bound to support his patron; to furnish a dowry to his daughter if required, and to ransom his patron if the latter happened to be taken prisoner in war. The two, moreover, could not appear against each other in a court of law or assume a hostile attitude in anywise. In connection with this subject we adopt the ingenious hypothesis of Niebuhr. The following propositions express his views:—(1) The plebs and clients were originally distinct. (2) The original Roman population consisted of patricians and clients. (3) The plebs were the inhabitants of conquered Latin towns transported to Roman territory. (4) The term *populus* included the patricians and clients: the term *plebs* those mentioned in 3 *supra*. The plebs (from *pleo*, 'to fill') were therefore clearly of later date than the *clientes*. In short, the *clientes* were attached to the original Roman people long before the plebeian element was politically entertained or acknowledged. The plebs were the *vulgi* (digammated form of *Gr. ochlos*, Eng. *folk*).

The primitive constitution of the Romans was very simple, in fact, based on the family relation. The whole people must be viewed as a *familia*. From among themselves they chose their king (*rex*), who was looked up to as the *genitor*, or father of them all. Hence the uncircumscribed nature of his functions—the absolute power conveyed by the expression *patria potestas*. The *rex* of the Romans, like the *lucumo* of the Etruscans, was priest as well as king. The consultation of the gods, the declaration of war, and the conclusion of peace, the highest political

and military power (*summum imperium*), by which must be understood the debts, duties, and obligations of the ruler as well as the supreme military command, were all vested in this chosen 'leader.' On all great occasions he was preceded by the *lictors*, 'summoners' (from *licere*, 'to summon'), bearing the *fascēs* (axes and rods), denoting that invincible power which is the birth of union and that unswerving justice whose prerogative is death.

Though the sole power was in the hands of the king, subordinate officers, from an increase of 'state duties,' were gradually appointed. Such were the *præfectus urbi* (city warden), the *quæstores parricidii* (trackers of heinous murder), the *tribuni militum* and *tribuni celerum*, all of whom were merely, in Mommsen's view, *commissioners* rather than *magistrates* in the later meaning of the term. The *Senatus*, or advising council (from *senex*), composed of ten elders, was coeval with the monarchy. The members thereof held office for life. The burgesses were divided into Curies (*curia*) or wardships, probably so called from *cura*, *curare* ('to care for'), with special reference to the supervision of the *curio*, the superior officer or warden of each. Varro connects the title *curio* with *quiris* ('a spear'), and *Curies* the capital of the spearmen of Sabinum; but this, like most of the derivations of the early Roman writers is purely fanciful. A special priest (*flamen curialis*) managed the religious ceremonies and festivals of each ward. See COMITIA and GENS.

Aggrandisement was from the first the policy of R. The 'Long White City' (*Alba Longa*), the sacred capital of Latium, was absorbed by the strong outpost. Sometimes, in the case of a conquest of a neighbouring city, the dwellers were allowed to remain after the destruction of the *Arx* or *Capitolium*. Sometimes the conquered tribe was transferred to the city of the victors. The gods of the subjugated were, however, invariably removed to R. In the case of *Alba Longa*, the citizens were granted equal rights with the Romans. Many of the greatest families in the later history of R. were proud to boast of their Alban lineage. The Julii, Servilii, Quintilii, Clælii, Curiatii, &c., claimed from *Alba*. The earlier wars with the Fidenates and Veientes, and the struggle with the Rutulians and Volscians, though apparently all in favour of R., are the inventions of a later time. Even the conquests of the Tarquins are hazy in the extreme. The Roman Assemblies are treated under the article COMITIA.

The Commonwealth.—The history of R. is even at this period very uncertain. Legends, fine though they be, cannot be accepted as history. A foul outrage on Lucretia, the wife of Tarquinius Collatinus, is said to have led to the expulsion of the kings. There is little doubt as to the actual dethronal of Tarquin, but the real cause and the time (509 B.C.) are, seeing that the account was written ages after, matter of uncertainty. When the kings were driven out, *prætors* (from *præ* and *tor*) took their place. They were afterwards called *consuls* (from *cum* and *sedeo*, 'to sit,' or *salio*, 'to leap'), and held office for a year only. The patricians had long the right of electing them. The first plebeian consul was not elected till 366 B.C.

The legends of Valerius Publicola, Spurius Lucretius, M. Horatius, Lars Porsena of Clusium, Aulus Postumius, and the thrilling stories of Horatius Cocles and the battle of Lake Regillus will not bear scrutiny. The first act of R. was to make a league with Carthage, both on her own behalf and in the interest of the Latin states. But the Æquians and Volscians continued to cripple her. The conquest of Veii in 396 B.C. by Camillus materially added to her power; but her defeat by the Gauls at Allia in 390 B.C. more than counterbalanced the former victory. The invasions of the Gauls told severely on R. and though in the end she was victorious, her progress was greatly retarded thereby. In 343 B.C. began a series of wars which lasted more than half a century. The first was with the Samnites—no despicable foe. The next was with the Latins, the result of which was the breaking up of the Latin League. In 326 B.C. the second Samnite war broke out, lasting eighteen years, and in 298 B.C. a third extending over eight years. By 282 B.C. R. had acquired all Italy with the exception of the cities in *Magna Græcia*. About this time the Tarentines gave offence to R. and asked the aid of Pyrrhus, King of Epirus. He responded to their invitation, and the Romans had to face under a new mode of warfare the greatest warrior of the day. He defeated them in two battles, but with so great loss to himself that he was glad to leave the country. He returned in 276 B.C., was defeated at Beneventum, and left

Italy for ever. The conquest of all Italy by R. soon followed. She now turned her eyes to Carthage, a headship like herself, with many Phœnician cities in Africa under her sway, and possessing, moreover, as a great trading power, large territories in foreign lands. Sardinia, Corsica, and a large portion of Sicily owned her rule. In Sicily a cause of quarrel arose. R. undertook the protection of the Mamertines, who had seized the town of Messana (see HIERO). The struggle that ensued is known as the First Punic War. It began 264 B.C., and lasted twenty-four years. Regulus (q. v.) carried the war into Africa. But the power of Carthage lay in her fleet. R. was not a commercial power, and as yet possessed no navy, but she learned a lesson from her enemy; and a stranded Carthaginian vessel enabled her to construct a fleet with which she gained a brilliant victory (241 B.C.). The Carthaginians sued for peace; and Sicily became, with the exception of Hiero's dominion, a Roman province. After twenty-three years the Second Punic War broke out. While R. had increased her strength by the acquisition of Corsica and Sardinia, Carthage had secured her position in Spain, and immense territory had been acquired there by Hamilcar (q. v.), Hasdrubal (q. v.), and Hannibal (q. v.). The details of this war are so fully given under these lives that nothing more need be said here. See, moreover, the lives of *Metalus*, *Fabius*, *Marcellus*, *Scipio*, and the articles CARTHAGE and NUMIDIA. The battle of Zama ended the conflict (202 B.C.), Carthage surrendering all her foreign possessions. The Third Punic War occurred in 149 B.C. This was the last attempt by the Carthaginians to recover their lost prestige. Carthage was taken by the younger Scipio in 146 B.C., the year in which Corinth was destroyed by Mummius. The territory was divided between the Numidian king Massinissa and R. The share of the latter became the province of *Africa*. In 229 B.C. war broke out in Illyria. The island of Corcyra and the Greek cities of Epidamnus and Apollonia submitted to R. In 215 B.C. Philip of Macedon leagued with Hannibal, and in 213 B.C. the First Macedonian War broke out. Peace was concluded in 205 B.C. The Second began in 200 B.C., and ended in 197 B.C. with the defeat of Philip at Cynoscephalæ. The conquest of Ætolia soon after gave to R. the control of all Greece. The Third Macedonian War broke out in 171 B.C., and closed with the battle of Pydna, 168 B.C. The Fourth and last of these wars broke out in 149 B.C., and ended in the following year with the defeat of Andronicos. Corinth succumbed in 146 B.C., but Athens and several of the Greek cities retained a nominal independence. R. now turned to Asia. The defeat of Antiochus at Magnesia in 189 B.C. by Lucius Scipio, forms the first great event in her Asiatic conquests. The Seleukid kings were thereafter shut up in the small kingdom of Syria, and Western Asia became a Roman possession. In 133 B.C., Attalus, the last king of Pergamus, bequeathed his dominions to R. Cisalpine Gaul was acquired in 191 B.C., Liguria and Venetia soon after. Spain was next wrested from the Carthaginians and native races by the indomitable valour of the Scipios. R.'s dominions in Spain may be said to have been completely established by the taking of Numantia, 133 B.C. Only a few native tribes in the N. retained their freedom. The conquest of Transalpine Gaul soon followed. In 125 B.C. part of it became a Roman province—a name which it still retains (*Provence*). The wild hordes of the Cimbri and Teutones for a time barred the progress of R. The latter were utterly defeated in 102 B.C. by Caius Marius, and the Cimbri in the following year by the consuls Marius and Catulus.

We will glance now for a moment at the internal condition of R. From the beginning of the Samnite wars to the conquest of Numantia she had become the mistress of many nations, and these she ruled with a sovereign power. The *Provincials* and *Allies* had no part in the settlement of national questions. The plebeians and patricians now stood on the same legal footing. The government was thoroughly *democratic*: the people were the lawgivers. Still there continued to exist a large amount of the *aristocratic* element, and the nobles fought strenuously for the retention of their ancient rights and privileges. The strife between the patricians and plebeians was succeeded by one of still more threatening aspect—that between the *rich* and the *poor*. The cause of the latter was undertaken by the Gracchi (q. v.). Then came the Jugurthine War, 111–106 B.C.; the Social or Marsic War, 90–88 B.C.; the Civil War between Marius and Sulla; the Mithridatic Wars, 88–84, 83–81, 74–64 B.C.; the Servile War, 73–71 B.C.; and the Catilinarian conspiracy, 63 B.C. In 54 B.C.

Crassus was defeated in Parthia. A tolerably full account of the events of this and of the immediately succeeding period will be found in the lives of *Sertorius*, *Lucullus*, *Crassus*, *Pompeius*, *Mithridates*, *Cæsar*, *Cicero*, *Catiline*, *Mark Antony*, *Lepidus*, *Cleopatra*, *Clodius*, *Brutus*, *Cassius*, and *Cato*. It is therefore unnecessary to repeat it here. After the death of Cæsar 44 B.C. confusion reigned for thirteen years. This period includes the Second Triumvirate; the wars between Brutus and Cassius on the one side and Antony and Octavius on the other; the amours of Antony and Cleopatra; the war between Octavius and Antony, which ended in the defeat of the latter and Cleopatra at Actium, B.C. 31. Egypt now became a Roman province, and Octavius was undisputed master of the Roman world.

The Empire.—On the return of Octavian, B.C. 29, he was the idol of the senate and people, and honours were heaped on him on all sides. In 27 B.C. he was voted the title of Augustus (q. v.). This date marks the beginning of the empire. R. was rapidly advancing to the plenitude of her power. When Augustus died (14 A.D.), she had extended her dominion over the civilised world. Her dominion was bounded by the Rhine, the Danube, the Euphrates, and the great African deserts. In her western provinces, her customs and language took deep and lasting root. Her civilisation there was all but universal. In the Greek-speaking provinces the Greek language and culture maintained their ground. But centuries after, the Greek people paid homage to the Roman power in a signal degree, surrendering the very name of their language, the Greek or Hellenic, for the still enduring term *Romaic*. In the distant nations of the East the native languages, religions, and modes of thought still survived. The Roman franchise was gradually extended to the province, and in course of time all the free inhabitants under the sway of R. were granted citizenship. The absolute rule of a single individual became from day to day more firmly established, and old distinctions gradually disappeared. The most important event that marks the reign of Augustus is the birth of Jesus Christ. Now, too, was the golden age of Latin Literature (q. v.). After Augustus come the Claudian emperors: Tiberius (q. v.), Caligula (q. v.), Claudius (q. v.), Nero (q. v.), and the Flavian emperors in rapid succession, Galba (q. v.), Otho (q. v.), and Vitellius (q. v.), all—with the exception, perhaps, of Galba and Otho—presenting in their lives a fearful and grim chronicle of crime, lust, and debauchery. Nevertheless, owing to the internal peace that had obtained since the accession of Augustus to imperial power, the material prosperity of R. had increased, and the population had been nearly doubled. But, withal, the rich were rapidly becoming more degenerate, especially the females; and men who were called virtuous preferred concubinage with a slave to marriage with a Roman lady, however high her rank. In the year 70 A.D. Vespasian (q. v.) inaugurated a better era, which, Domitian's reign excepted, lasted for a century. He was succeeded by his son Titus (q. v.), 79–81 A.D., an emperor whose noble character and imperial bearing secured for him the title of the 'Delight of Mankind.' His brother Domitian (q. v.), who succeeded him, and was killed in 96 A.D., was one of the greatest tyrants of R. The reigns of Nerva (q. v.), 96–98 A.D., of Trajan (q. v.), 98–117 A.D., under whom the Empire may be said to have attained its greatest extent (see MAP), of Hadrian (q. v.), 117–138 A.D., of Antoninus Pius (q. v.), 138–161 A.D., and of Marcus Aurelius, 161–180 A.D., known to history as the good emperors, were all characterised by signal ability, moderation, and dignity. How far the salutary change in rule and morals was due to the fast-spreading religion of Christ we cannot say, but that its influence was both widely and deeply felt is unquestionable. The acts of the above-mentioned emperors will be found in their biographies. Marcus Aurelius was succeeded by his son Commodus (q. v.), a monster of vice and cruelty, with whose reign begins the decline of the Roman Empire. But R. took centuries to fall after all hope of her stability was lost. The names of the emperors during the next century (192–285 A.D.) need not all be given here. They were set up by the soldiers and slain by them at will. In the reign of Septimius Severus (193–211 A.D.), the Christians obtained a certain amount of recognition, and their religion made rapid strides. The government, too, became daily of a more military character. Severus was succeeded by his son Antoninus, generally called Caracalla (q. v.), after whose murder Elagabalus and Alexander Severus, the former one of the basest, the latter one of the best of emperors, occupied the throne.

After the assassination of Severus, a fearful period of anarchy and confusion followed. The names of Maximin Maximus, Balbinus, Gordianus (q. v.), and Philip recall scenes of internal strife only paralleled by the ferment beyond the Roman frontier. Frank, Swabian, and Goth were alike ready to swoop down on the Empire. During the reigns of the succeeding emperors—Valerian (q. v.), Gallienus (q. v.), and the *Thirty Tyrants*—the Empire was a scene of wild disorder. The most famous of the Greek cities were burnt and pillaged by the Goths, while the Asiatic hordes devastated the province of Asia. By the valour and skill of Odenathus, husband of Zenobia, Queen of Palmyra, the progress of the latter was checked. Zenobia's kingdom was afterwards suppressed by Aurelian, one of the ablest of the Illyrian Emperors (271 A.D.). Claudius Gothicus (268–270 A.D.), Aurelian (q. v.), Probus (q. v.), and Carus were all employed in crushing the barbarians; and when Diocletian (q. v.) assumed the purple (284 A.D.) the worst seemed to be over. He instituted a new order of things. The Empire was now to be governed by two *Augusti*, and two *Cæsars* subordinate to them. A series of civil wars ensued, in which the more prominent names are those of Maximian, Constantius, Galerius, Maxentius, Maximin, Licinius, and Constantine (q. v.). Under the last the Empire was again re-united. He began his reign at York (*Eboracum*) in 306 A.D., obtained the whole Empire 323 A.D., and reigned till 337 A.D. Under his rule two events occurred, both pregnant with great results—the establishment of Christianity as the state religion, and the transference of the government to Byzantium (q. v.). The partition of the Empire among his three sons again led to mutiny and disunion. But the political history of the Empire is now of secondary interest. The fortunes of the Catholic Church have a greater charm for the historian. The freshness and newness of life thereby imparted to the effete Empire saved it from disappearing for ever from the roll of mighty nations, and enabled R. to reap, centuries after, a rich harvest from the culture of the past. Of Julian's frantic attempt to revive paganism, we need only say that it was mistimed and ill-judged. All succeeding Emperors professed Christianity, and the Christians soon formed a majority in the land. Under Valentinian (q. v.), Gratian, and Theodosius (q. v.), the pagan creed came to an end. These three Emperors were all men of signal mark; but 'the beginning of the end had come.' The integrity of the Empire was gone, and foreign foes, like ravenous vultures, were hovering round the rotting carcass. On the death of Theodosius, Alaric (q. v.), with his West Goths, rose against Honorius (q. v.), Emperor of the West. The bravery and tact of Stilicho (q. v.) for a time paralysed the foe and stemmed the torrent of invasion; but in 410 A.D. they sacked Rome, now first taken by a foreign enemy since the days of Brennus (q. v.), the Gallic chief. Franks, Burgundians, Vandals, Teutons, had not only attacked, but obtained a settlement in, the Empire. On their heels followed Turanian hordes, led by Attila, King of the Huns. He was defeated at Châlons in 451 A.D. by the united powers of the Romans, Goths, and Franks. 'This,' says Freeman, 'was one of the most important battles in the history of the world: it was a struggle for life and death between the Aryan and Turanian races; and Christianity and civilisation, and all that distinguishes Europe from Asia and Africa, were at stake.' The only Emperor now worth naming is Majorian (457–61 A.D.), a man whose character for bravery and wisdom entitles him to lasting remembrance. In 476 A.D. Romulus Augustulus, the last Emperor of the West, who by a singular coincidence bore the names of the founder of the city and the founder of the Empire—a weak and pusillanimous creature—was dethroned by Odoacer, King of the Heruli, who now claimed from the Emperor of the East the sovereignty of Italy. The Eastern or Greek Empire, however, continued to exist for nearly a thousand years longer, until in 1453 A.D. it was overthrown by the Turks (see BYZANTINE EMPIRE). Consult the ancient histories of Polybius, Cæsar, Livy, Sallust, Tacitus, &c., and the modern histories of Gibbon, Niebuhr, Arnold, Merivale, and Mommsen.

Rom'ford, a market-town of Essex, 12 miles E.N.E. of London by rail, has a large parish church, rebuilt in Decorated style (1850), a townhall, corn exchange (1862), courthouse, and literary institute, and publishes two newspapers. Brewing is the principal industry, 'R. ale' being widely celebrated. Pop. (1871) 8239.

Rom'illy, Sir Samuel, the son of a jeweller, was born at London, March 1, 1757. While a law student he visited Geneva, where he formed the foundation of a lifelong friendship with Dumont; and at Paris he became intimate with Diderot, D'Alembert, and many of those who subsequently took prominent positions in the Revolution. His interest in the cause of liberty in France was intense; several times he crossed the Channel to mix among the revolutionary politicians, with whom his correspondence was constant. In 1789 he drew up for the benefit of the National Assembly a treatise which Mirabeau translated under the title of *Reglemens observés dans la Chambre des Communes*, and in the same year he wrote a pamphlet called *Thoughts on the Probable Influence of the French Revolution on Great Britain*. Before that time a tract of his, *A Fragment on the Constitutional Power and Duties of Juries*, had obtained considerable notice. In 1792 he translated some observations of Dumont's upon the events of 1789, under the name of *Goewelt's Letters*. By 1806 he had attained a larger practice than that of any other barrister in the Chancery Court, and in that year he was appointed Solicitor-General by the Fox and Granville Ministry. He was then knighted. He sat in Parliament successively for Queenborough (1806), Horsham (1807), Arundel (1812), and Westminster (1818). R. had a large share in the management of Melville's impeachment and trial, and effected considerable changes in the bankruptcy laws; but the greatest of his reforms was the amelioration of the criminal code, his first pamphlet on this subject appearing at a time when nearly 300 offences were punishable by death. Lady R. died in October 1818, and her death so preyed upon the mind of her husband as to cause him to commit suicide on the 2d of November. His speeches were collected in 1820; in 1840 appeared the *Memoirs of the Life of Sir Samuel R., written by himself, with Selections from his Correspondence*, edited by his sons.—**John, Baron R.**, son of the preceding, born in London, 1802, graduated at Trinity College, Cambridge, in 1826, and in the following year was called to the bar at Gray's Inn. He sat in Parliament as a Liberal from 1832 to 1835, and from 1846 to 1852. He was knighted and made Solicitor-General in 1848; in 1850 he became Attorney-General and a privy councillor; and in 1851 he rose to the position of Master of Rolls. It was he who caused the publication of the *Rolls Series of Calendars of State Papers*, and other historical papers. R. was raised to the peerage on January 3, 1866, as Baron R. of Barry, Glamorgan. He died at London, December 23, 1874.

Rom'ney, George, a famous portrait painter, was born at Dalton-in-Furness, Lancashire, 15th December 1734. He was brought up to his father's business of cabinetmaking, but at the age of nineteen was placed with Steele, a painter at Kendal, with whom he remained for five years. In 1756 he married, and after practising at York as a portrait painter, removed to London in 1762. Rapidly attracting public attention, and making many influential friendships, he became in the course of a few years the successful rival as a portrait painter of Reynolds and Gainsborough. In 1773 he visited Italy, and returning two years later, continued to work in London and at Hampstead till 1799, when he retired to Kendal in broken health to join the wife whom he had only visited twice in thirty-seven years. He died at Kendal, 15th November 1802. In his later years he gained a high reputation as a painter of historical subjects. Several of his works are engraved in Boydell's *Shakespeare*. He never exhibited at the Royal Academy or sought academic honours. Lacking the delicacy of Reynolds and the charming vivacity of Gainsborough, and ranking below either as a colourist, R. yet surpasses both in intense dramatic feeling and a passionate sense of female beauty. See the elaborate Life by the poet Hayley (1809); a briefer one by the Rev. John R., son of the painter (1830); and *English Art under George III.*, by Sidney Colvin, in the *Fortnightly Review* for March 1874.

Romorantin (Lat. *Rivus-Morentini*, 'the bank of the river Morantin'), a town in the French department of Loire-et-Cher, situated on the Soudre, an affluent of the Cher, 25 miles S.W. of Blois. It manufactures cloth, oil, and sword blades. Pop. (1872) 6667.

Rom'ulus, the mythical founder of the city of Rome. He was the twin-brother of Remus, and the son, by the god Mars, of the vestal Rhea Silvia, daughter of Numitor, who had been deposed

by his brother Amulius from the throne of Alba. Thrown in a cradle into the Anio, the infants were drifted into the Tiber, and left on dry land by the receding river at the foot of Mount Palatine. There they were miraculously suckled by a she-wolf, until found by Faustulus, the king's shepherd, who brought them up with his own children. When they learned their paternity, they rose against Amulius, defeated and slew him, and restored their grandfather to the throne. Now, however, they longed to erect a city on the spot where they had spent their years of infancy, and accordingly the site of Rome was chosen. Disputes arose between the brothers, which ended in Remus being slain by the hand of R. R. made his stronghold an 'asylum' for every desperate stranger, and soon found himself at the head of a horde of exiles, robbers, murderers, and runaway slaves, to provide wives for whom he perpetrated the celebrated rape of the Sabine women. This act led to a series of wars with the Sabines, which were ultimately settled by an incorporating union between the two peoples. R., after reigning thirty-seven years, and enacting many wise laws, was carried up to heaven by his father Mars. Such was the form which the myth assumed in the hands of successive poets and historians. It cannot be considered as having even any traditional historical value. 'The early legends must be considered,' says Professor Seeley, 'not as exaggerations or perversions, however extravagant, of incidents which really happened in the 8th c. before Christ, but confused and imaginative attempts to account for institutions and worship which existed in the third and fourth centuries.' See Professor Seeley's edition of *Livy*, Book I. (Oxf. Clarend. Press, 1871).

Rom'ulus Augustulus. See ODOACER.

Ronaldshay, N. and S., two of the Orkney Islands (q. v.).—**N. R.**, the most northerly of the Orkneys, is 3 miles long by little more than 1 broad. The land is tolerably fertile, and fish and seals abound on the coast. Pop. (1861) 532.—**S. R.**, 6 miles N.E. of Duncansby Head, is about 9 miles long, and from 2 to 5½ broad, with an area of about 18 square miles. A considerable part of the land is loamy and very fertile, wild fowl are abundant, and the fisheries are rich in cod, herrings, and lobsters. St. Margaret's Hope, Water Sound Ferry, and Widewall Bay are excellent harbours. Pop. (1861) 2551.

Roncesvalles ('Briar Valleys'), a Pyrenean valley of Navarre, 23 miles N.N.E. of Pamplona, where in 778 the rearguard of Karl the Great was treacherously cut off by the Basques, Roland (q. v.) falling in the action. Near the same spot the Spaniards were defeated by the French in 1794, and Soult was forced from his position by Wellington, July 28, 1813.

Bonciglio'ne, a town of Central Italy, province of Viterbo, on the margin of the Campagna di Roma, 34 miles N.N.W. of Rome. It is well built, and has a Gothic cathedral and a castle, extensive iron and copper works, and manufactures of cottons, powder, soap, and hats. Pop. (1874) 6084.

Bon'da, an ancient Moorish town of S. Spain, province of Malaga, 41 miles W. of the town of that name. It is situated on a rocky plateau, surrounded on three sides by the Tajo de R., a precipitous ravine more than 650 feet deep, crossed by two bridges. The magnificence of the scenery and the salubrity of the town attract many summer visitors from Seville and Malaga. R. has several churches, a large circus for bull-fights (held annually in May during the eight days' market), and a fine alameda. The inhabitants manufacture cloth, knives, oil, and armour. Pop. 14,100. R., the *Arunda* of the Romans, was the chief fortress of Granada under the Moors. It was taken by the Spaniards in 1485.

Bon'deau, Rondo, or Rondel (Fr.), literally something that goes round, or returns upon itself; hence, a short poem of from one to three stanzas, each of which ends either with the first two or three words, or with the first or first two lines of the first stanza. Originally peculiar to French literature, it consisted in the 14th c. of eight verses, of which the first was repeated in the middle, and the two first were the same as the two last. In the 15th c. it was usually divided into three stanzas, the second and third of which ended by repeating the first or first two verses of the first, the total number of verses being twelve to fourteen, running on but two rimes.

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Ron'do (Ital.), in music, a light form of composition, consisting of two or more strains, the first recurring at the end of each of the others, which conduct the ear naturally back to it. It is thus in music what the *rondeau* is in poetry. The R. often forms the last movement of a symphony and sonata, though it is also popular as an independent composition.

Rong'e, Johannes, born at Bischofswalde in Silesia, October 16, 1813, proceeded from the Neisse gymnasium to the University of Breslau (1837). He received the chaplaincy of Grottkau (1840), but was suspended for an article *Rom und das Breslauer Domkapitel* (1842), and became a teacher at the Laura-hütte ironfoundry. A second article, this time denouncing the exhibition of the Holy Coat of Trier as idolatrous, was followed by his excommunication (1844), and straightway R. appeared as the founder of a new sect, the 'German Catholics' (q. v.). From religion he turned to politics, and for his part in the Revolution of 1849 was forced to take refuge in London, whence in 1851 he issued with Kinkel and Ruge an *Aufruf an das Deutsche Volk*. On the publication of an amnesty (1861) he returned to Breslau, established the Religious Reform Association at Frankfurt (1863), and since 1873 has lived at Darmstadt.

Rönn'e, the chief town in the island of Bornholm (q. v.), has a fine harbour, large fisheries, and a considerable commerce. Pop. (1874) 5505.

Ron'sard, Pierre de, born at the Château de la Poissonnière, in Vendomois, 11th September 1524; after six months' schooling at the Collège de Navarre became page to the Dauphin (1534), and on that prince's death to the Duc d'Orleans (1536). A twelvemonth later he entered the household of James V. of Scotland, but after three years spent at the Scottish and a half-year at the English court, returned to France, and served as secretary to De Baif, ambassador to the Diet of Speier, and to Du Bellay, whom he accompanied to Piedmont. It was at the close of this last journey that R., then eighteen, was attacked with the 'fortunate' deafness which turned him from diplomacy to letters. Familiar with English, German, and Italian, he as yet knew nothing of the dead languages or literatures; however, seven years of study at the Collège de Conqueret not only repaired the defect, but stirred in him a wish, shared by his brethren of the rising Pleiad (q. v.), to regenerate his native tongue and poetry by forming them on classic models. Du Bellay, a cousin of his old master, put forth the programme of their design in the *Défense et Illustration de la Langue Française* (1549); R. was the first and boldest to fill it in—by copious borrowing from Greek and Latin, by the coinage of current words, and lastly by drawing, where needful, on local dialects. One thing was wanting to crown his labours, a work which should, like Dante's, immortalise his diction and ideas. R. perceived the want, but failed to satisfy it with either *Odes* or *Amours* (1550), those studied, lifeless copies of antiquity, which Demogot likens to old suits of armour, helm, hauberk, buckler, everything but the man within. But if Rabelais and Marot's followers satirised, kings, nobles, and scholars hailed them rapturously; master-spirits like L'Hospital, Scaliger, and De Thou viewed R. as the Phoenix of their day; no writer save Voltaire was ever the object of such idolatry. Tasso, coming to Paris in 1571, was overjoyed by his approval of the *Gerusalemme*. Charles IX. outvied his predecessors' bounties to the poet, who paid him back by furious anti-Calvinistic pamphlets and by *La Franciade* (1572), an epic fragment on the origin of the French nation. On Charles's death in 1574 R. retired to one of his many benefices, the Abbey of Croix-Val, but not to oblivion, Elizabeth sending him thither splendid jewels, and Mary Stuart, from her English prison, a salver valued at 2000 crowns. His later years were spent in the task of revision, often for the worse, and he died 27th December 1585. His poems, condemned by Malherbe and Boileau, lay long unread, awaiting their rehabilitation by the Romantics (1828). The blind enthusiasm of the 'Cénacle' has also passed away, and calmer critics now value R. less for his graceful pedantry and borrowed lustre than for the debt his language owes to him. Selections of his works have been published by Sainte-Beuve (1828), La Croix (1840), and Becq de Fouquières (1873), and a complete edition by Blanchemain (8 vols. 1857-58). See Colletet's *Vie de R.* prefixed to the *Œuvres inédites de R.* (Par. 1854), and

Demogot's *Histoire de la Littérature Française* (13th ed. Par. 1873).

Rood (Old Eng. *rod*), a cross or crucifix generally, and specially the large crucifix flanked by figures of Our Lady and St. John, which in Catholic churches is placed at the entrance to the chancel, either on a mere beam (R.-beam) or on a gallery (R.-loft) surmounted by the Screen (q. v.).

Rood (Old Eng. *rod*), a measure of surface, equal to the fourth part of an acre, or forty square poles.

Roof (Old Eng. *hrif*), the top covering of a building, to protect it from the weather and also to bind the walls together. It generally consists of a framework of wood which carries a covering of slates, lead, or other materials. Roofs are of varied forms. Usually they are formed of two or more sloping sides, but sometimes they are flat or dome-shaped; when flat they are termed 'platform' roofs. Among the nations of antiquity roofs were made flat, as they still are in the East at the present day. The Greeks introduced sloping roofs, the *pitch* or slope of the rafters being 12° to 16°. The Romans pitched their roofs at an angle ranging about 23° or 24°, and at later times in more northern latitudes the slope was greater. In Gothic architecture the pitch was 60°, or in other words, the rafters and the *span* (the width between supports) formed an equilateral triangle. In buildings of the Elizabethan age the pitch was still greater, the rafters being longer than the span. Later, the rafters were made three-fourths of the length of the span, and this was called the *true* pitch. A slope of 30° is now very common, and sometimes roofs are executed still lower. The simplest form of R. is that in which timbers are arranged in an inclined plane, all on one side, as in fig. 1; it is called a 'shed' or 'lean-to' R. A rectangular building is usually covered with two inclined planes abutting at their upper ends, and forming what is termed a 'pent' R. This form of R. has a tendency to drive the walls outwards, therefore a horizontal *tie beam* is introduced to which the feet of the rafters are mortised; and further, to prevent *sagging*, or sinking in the middle, the tie-beam is strapped to a *king-post* which depends from the apex, the rafters abutting against it. Such an assemblage of timbers forms a 'truss' (fig. 2). These trusses are placed at intervals of about 10 feet, and across them horizontally are placed timbers called *purlins*, which serve to support the *common* rafters. The latter are placed at closer intervals than the *principal* rafters, and to them is fastened the boarding which carries the slates or other covering. The trusses rest on *wall-plates*, pieces of timber laid along the walls to distribute the pressure equally; the feet of the common rafters rest against a *pole-plate* set into the tie-beam, and their heads abut on a *ridge-plate*. All these parts are shown in fig. 3,

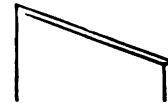


Fig. 1.



Fig. 2.

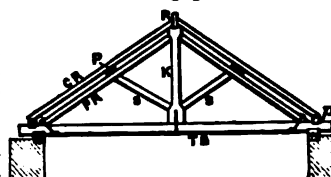


Fig. 3.

which represents a king-post roof suitable for a span of 20 to 30 feet. TB is the tie-beam, PR the principal rafters, or *principals*. K the king-post, P the purlins, CR the common rafters, *p* the pole-plate, W the wall-plate, R the ridge, and SS are *struts*, introduced as an additional support to long rafters. Fig. 4 illustrates another common form of R. adapted for a wider span than the foregoing. It is called a *queen-post* R. The king-post is strapped to a *straining-beam* SB, which keeps apart the upper ends of the *queen-posts*, QQ, supporting the rafters. The 'Mansard R.', named from the inventor, is constructed on the principle of a queen-post R., but by employing two sets of rafters and giving the upper set, extending from the queen-posts to the ridge, a less slope than the lower, the height of the building is kept down, while as in fig. 4 a roomy apartment is obtained inside. The Mansard R. is sometimes called a 'curb' R., and, on account of its being very fashionable in France, a 'French' R. De Lorme, a celebrated French architect of the 16th c., invented a system of building arched roofs with short curved planks securely

jointed together. It has been largely adopted for domed roofs on the Continent. The high-pitch open timber roofs of the Middle Ages are much admired for their beauty. In one

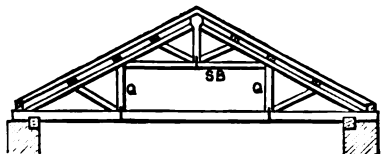


Fig. 4.

common form of Gothic R., short beams, called *hammer-beams*, project from the top of the walls, and carry queen-posts which support the principals, a tie, in the form of a *collar-beam*, being there introduced. The ridge and the collar-beam are connected by a king-post. Concave struts or ribs springing from corbels support the hammer-beams, and on these again rest other curved struts which meet under the centre of the collar-beam. The effect of a vaulted ceiling thus obtained is occasionally greatly enhanced by the introduction of carved figures, tracery, bosses, &c. Large spans are now usually covered with roofs constructed of malleable iron rods and bars, as may be seen in many railway stations.

Rook (*Corvus frugilegus*), a *Corvirostral* bird, belonging to the *Corvidæ* or crow family. It attains a length varying from 16 to 18 inches. Its colour is a deep, bluish black, and a distinctive mark is found in a patch of bare whitish skin on the forehead and base of the neck of the adult. The habits of the R. are well known. The bird is wary and active, and speedily familiarises itself with the scarecrows and other objects placed in fields with the view of terrifying it. It usually builds near man's dwellings, but is suspicious of every movement of its landlord, and at the first sound of the gun will leave its nest and hover about as if in alarm and distress. The idea that the R. is destructive to growing crops has been hotly combated by the opposite assertion that the bird is not usually a vegetable feeder, and that whatever injury may be done to the crops is fully compensated by the eradication of noxious insects and their larvæ. The actual injury inflicted upon vegetation is thus held to be necessary for the capture and destruction of the larvæ. The R. is known to attack the young of other birds. It has been seen to kill young partridges, and even to destroy the eggs of game birds. But on the whole it may be accounted rather the friend than the foe of farmers. White or piebald varieties of the R. are known. Occasionally the R. may be domesticated, or may even be taught to mimic sounds.

Law Regarding Rooks.—There is no right of property in rooks; the owner of a rookery having no ground of action against any one shooting the rooks from the land of another. But he may close his own land against the public; and should any one trespass, the proprietor may proceed against him by, in English law, *Injunction* (q. v.), in Scotch law, by *Interdict* (q. v.).

Rooke, Sir George, was born at Canterbury in 1650. He entered the navy as a volunteer, by regular stages became vice-admiral of the blue, and in the battle of La Hogue, 22d May 1692, led a night attack on the enemy's squadron, burning six French three-deckers and seven other ships of the line, with the loss of only ten men. He then became vice-admiral of the red, was knighted, and obtained a pension of £1000. During the reign of William he twice represented Portsmouth in Parliament. Upon declaration of the war of the Spanish Succession, he commanded a fleet sent to Cadiz, and before returning home attacked and pillaged the town of Vigo and seventeen ships of the Plate fleet. In July 1704 he joined with Sir Cloudesley Shovel and the Prince of Hessen before Gibraltar, and caused the Spanish garrison to surrender within a week. In August of the same year he forced a battle with a French fleet of 78 sail off Malaga; the French lost 3000 men and the English 2000. Party intrigue forced R. soon after to retire to his seat in Kent. He died January 24, 1708. See *Life and Glorious Actions of Sir George Rooke, Vice-Admiral of England* (Lond. 1707).

Roos, Albrecht Theodor Emil, Graf von, a celebrated Prussian general and military reformer, was born at the family seat of Pleusberg, near Kolberg in Pommern, 3d April 1803, entered the cadet school of Kulm in 1816, became lieutenant of infantry in 1821, studied at the Berlin Kriegsschule 1824-27, was appointed teacher of cadets in 1828, member of the general staff topographical survey in 1833, and teacher in the Berlin Kriegs-

schule in 1835. As chief of the staff of the Eighth Army Corps, he took part in quelling the revolt of Baden in 1849, and after rising step by step to the chief command of the 14th Division, was made Minister of War in 1859, an office which he held from 1861 in conjunction with that of Minister of Marine. During the struggle between the Government and the majority of the Diet (1861-66) he carried out his plan of army reorganisation in the face of strenuous opposition. After the war of 1866, which demonstrated his ability in organisation, he received the Cross of the Black Eagle, and after the French campaign of 1870-71 was rewarded with the rank of Graf. He resigned the office of Minister of Marine in 1871, and on the unexpected resignation by Bismarck of the presidency of the Cabinet after the triumph of passing the Districts Organisation Bill (1872), the office devolved on him as senior Minister of State. It is generally supposed that he merely held the premiership as a *locum tenens* till Bismarck was reinstated with increased authority and prestige, at the head of a larger Liberal majority, 11th November 1873. Since then, Graf von R. has lived in retirement, chiefly at his Potsdam estate of Gützeritz. He is the author of various works on military subjects, of which the principal are *Grundzüge der Erd-, Völker- und Staatenkunde* (3d ed. 3 vols. 1847-55), *Militär. Länderbeschreibung von Europa* (1838), and *Anfangsgründe* (12th ed. 1868).

Roopur (Rupar), a town in the district of Hoshiarpur, Punjab, British India, on the left bank of the river Sutlej, 1120 miles N.W. of Calcutta. It was the scene of the celebrated meeting between Lord W. Bentinck and Runjeet Singh in 1831, which has been called the 'Indian field of the cloth of gold.' After much military display on both sides, the Sikh ruler received a document guaranteeing to him the perpetual friendship of the British.

Roorkee (Rurki), a town in the district of Saharanpur, N.W. Provinces, British India, 112 miles N.E. of Delhi, on a ridge overlooking the Ganges Canal. Pop. (1872) 10,778. It is the headquarters of the Ganges Canal workshops, and has cantonments for 1000 men, chiefly sappers and miners, who maintained in 1857. R. has an excellent meteorological observatory; an ironfoundry, established in 1852; and the Thomason civil engineering college, founded in 1847, and attended in 1873 by 157 students, European and native.

Root, in Algebra, is any quantity which, when substituted in a given equation for the variable quantity, renders that equation an identity. Thus in the equation $x^2 - 3ax + 2a^2$, a and $2a$ are roots, because when either is substituted for x , the equation becomes identically zero. This is more readily seen if the equation is written in the form $(x - a)(x - 2a) = 0$. The most general equation of the n th degree may be thrown into the form $(x - a_1)(x - a_2)(x - a_3) \dots (x - a_n) = 0$, when a_1, a_2, a_3 , &c., which may be real or imaginary, are the roots of the equation. In the equation $x^n - a = 0$, there is, arithmetically, only one root, namely, the number which, multiplied by itself n times in succession, gives a . This number is called the n th root of a , and is written $\sqrt[n]{a}$. The square root of a quantity is commonly called the root, and its symbol is $\sqrt{\quad}$. See EQUATIONS.

Root, in flowering plants, is the *descending axis* of the plant; it is that part which is the development of a *radicle*, and always bears at its apex a *root-cap*. The R. produces neither buds, leaves, nor flowers, has seldom if ever any distinct pith, the epidermis has no Stomata (q. v.), and it does not branch symmetrically. Its functions are—(1) to fix the plant in or to the soil or other substance on which it grows. (2) To absorb nourishment from the soil, water, or air into which the fibres have penetrated (or from other plants in the case of parasites), and to transmit it rapidly to the stem. The absorption takes place through the young growing extremities of the fibres, and through a peculiar kind of hairs or absorbing organs which are formed at or near those growing extremities. The transmission to the stem is through the tissues of the R. itself. The nutriment absorbed consists chiefly of carbonic acid and nitrogen, or nitrogenous compounds dissolved in water. (3) In some cases roots secrete or exude small quantities of matter in a manner and with a purpose not satisfactorily ascertained.

Roots grow in length constantly and regularly at the extremity of their fibres, in proportion as they find the requisite nutriment.

They form no buds containing the germ of future branches, but their fibres proceed irregularly from any part of their surface without previous indication. The R. of exogens when perennial increase in thickness like stems by the addition of concentric layers, but these are usually much less distinctly marked, and in a large number of perennial exogens and most endogens the roots are annual, perishing at the close of the season, fresh adventitious roots springing from the stock when vegetation commences the following season.

Although roots proceed usually from the base of the stem or stock, they may also be produced from the base of any bud, especially if the bud lie along the ground, or is otherwise placed by nature or art in circumstances favourable for their development, or indeed occasionally from almost any part of the plant. They are then often distinguished as *adventitious*, but this term is applied by some to all the roots which are not in prolongation of the original radicle. Roots are *fibrous* when they consist chiefly of slender fibres; *tuberous* when either the main R. or its branches are thickened into one or more short, fleshy, or woody masses called *Tubers* (q. v.); *taproots* when the main R. descends perpendicularly into the earth, emitting only very small fibrous branches. The stock of a herbaceous perennial, or the lower part of the stem of an annual or perennial, or the lowest branches of a plant, are sometimes underground, and assume the appearance of a R. They then take the name of *rhizome*. The rhizome may always be distinguished from the true R. by the presence or production of one or more buds, or leaves, or scales (*Bentham*). The roots in Cryptogamia are always adventitious, and are termed *heterorhizal* (Gr. *heteros*, 'dissimilar'), the rootlets proceeding from various parts of a spore during germination.

Root-Mildew, or **Root Fungus**, is a name given by horticulturists to a garden pest arising from the *mycelia of fungi* developing amidst the roots of plants, causing the death of such roots, followed by the stoppage of growth and visible sickening of the plant, and ultimately causing its death. This plague probably originates from the use of unsuitable manures; e.g., it has shown itself in a bad farm where the raspings and parings of horses' hoofs from the shoeing-smith's shop had been mixed with the manure applied to a vine border.

Root Parasites comprise the section of Parasitic Plants (q. v.) which are attached by suckers to the roots of other plants, and draw nourishment therefrom. The broomrape and toothwort are examples.

Roots, the primitive elements of language, at which analysis must stop, but to which all words are ultimately reducible, have mostly a material meaning so comprehensive as to be capable of application to a variety of objects. Thus from the root *mar*, 'to crush,' come words denoting mill, death, sea, milk, &c., an economy which helps us to understand how Hebrew manages with only 500 R. (Renan), Gothic with 600 (Benloew), and Sanskrit with 1706 (Bensley). Till recently it was believed that all R. in all languages were necessarily monosyllabic; but this theory, founded on a one-sided study of the Aryan family, is now exploded by the recovery of Accadian from the cuneiform inscriptions, where dissyllabic R. like *dugud*, 'heavy,' occur, although less frequently than monosyllables, and also by Bleek's investigations into the Ba-ntu of Southern Africa, in which they appear to be rather the rule than the exception. There are, moreover, even in Aryan, a certain number of so-called 'demonstrative' R., the basis of the pronouns, in which it is impossible to discover any underlying abstract concept, and Semitic R. are as distinctly nominal in their character as those of Aryan are verbal. See LANGUAGE and PHILOLOGY, COMPARATIVE.

Root-Stock, **Rhizo'ma**, or **Rhizome**, is a prostrate rooting stem, progressively throwing up leaves. The name is applied among ferns to the creeping stem, which may be either superficial or subterranean. See ROOT.

Rope. A R. is a strong heavy cord, usually made of common hemp, Manila hemp, sunn, esparto, or other similar vegetable fibre, or of iron, steel, or other metallic wire. Hemp, Manila, and iron wire are by far the most frequently employed materials. A R. is composed of a certain number of yarns or threads, which are first spun or twisted into strands, and the finished R. goes under special names, according to the number and arrangement

of the strands of which it is composed. A *hawser-laid R.*—the commonest form—is composed of three strands twisted together; a *cabie-laid R.* consists of three such hawser-laid ropes twisted into one, and ropes of this construction, when they are of less than 10-inch girth are termed *cablets*. A *shroud-laid R.* is composed of four strands, three outer strands being twisted around another employed as a core or heart. *Flat ropes* usually consist of a series of *hawser-lays* placed side by side and bound together by sewing in a zigzag direction. The maximum of resistance to tensile strain in fibres or wire is obtained when the individual fibres are laid parallel to each other, under which circumstances the strength of the whole is found by adding together the strength of each separate fibre. Therefore, for the sake of strength alone, the less of tension or twisting to which the fibres are subjected the better will be the result, and the twisting is only serviceable to keep a compact whole, and to give the necessary amount of friction to prevent the fibres from slipping away from each other. The building up of the R. of distinct small yarns and separate strands serves to keep a greater parallelism in the fibres than could be otherwise secured. The manufacture of ropes was formerly entirely conducted under long narrow sheds called R. walks, the entire length of which extended to about a quarter of a mile, the twisting of the yarns and strands having been almost entirely a matter of manual labour. A machine for spinning ropes, termed the *cordelier*, was invented in 1792 by Cartwright, the principle of which was subsequently developed and improved by many hands; but still manual labour and the R.-walk continued to prevail till very recent times. Within the last two or three years R.-making machinery, invented by Mr. Good in the United States, and now manufactured by Messrs. Lawson & Sons, Leeds, has been very extensively adopted. Good's automatic spinner, which is the essential machine, is a small, exceedingly compact, and wonderfully adjusted piece of mechanism for preparing yarn or cord of any particular dimensions. If the feed of fibre is too great, the apparatus accelerates its motion proportionately, and when too little fibre approaches the trumpet mouth the motion is similarly retarded, and again when the feed ceases, immediately the machine is thrown out of gear. At the same time the apparatus puts a gloss or surface on the yarn which cannot be approached by other means. Iron, steel, and other metallic ropes are twisted from huge bobbins, which revolve horizontally on a framework, the strands rising from these, and being twisted in a neck at the apex of the machine. Steel ropes, which possess great strength and flexibility, are now extensively employed.

Bo'qual (*Physalus*), a genus of *Cetacea*, or whales, belonging to the family *Balanida*, or that of the Whalebone whales, in which teeth are wanting; the palate bearing plates of *baleen* or *whalebone*, while the nostrils or *blowholes* are placed on the top of the head. These whales include the largest cetaceans, specimens having been captured 120 feet in length. The R. is not in request amongst whalers, as the whalebone and oil are present in small quantity, and the habits of the animal are fierce, and render its capture difficult and even dangerous. The R. is included amongst the so-called 'finner' whales, which possess a small dorsal fin—a structure absent in the whalebone or Greenland whale (*Balena mysticetus*). The name 'Piked' whale is also given to the R., from the comparative sharpness of the muzzle as compared with that of the Greenland whale. The skin is furrowed, and hence the term 'Furrowed' whale, given to the R. The best-known species are the P. or *Balanoptera Boops* of the N. Seas, and the *B. Australis* of the W. Ocean. The species known as the *B. rostrata* or *B. musculus* is now regarded as the young of the *B. Boops*. The R. is frequently stranded on British coasts while pursuing shoals of herrings. The term 'R.' means a 'whale with folds in the skin,' and is derived from the Norwegian.

Ro'sa, **Salva'tor**, painter, poet, and musician, was born at Renella, near Naples, 20th June 1615. He received a liberal education, and despite the opposition of his father, who intended him for the Church, he became a painter, and after studying under Francanzano and Ribera, proceeded to Rome in 1635. Here he drugged in obscurity for some time, but catching fever in his lonely rambles in the Campagna, was forced to return to Naples, only to find his family dispersed and the profession ready to taunt him with his failure. He found, however, a patron in the Cardinal Brancacci, and his fame was at last established

by the exhibition of his 'Prometheus' in the Pantheon. In 1639 he returned to Rome, where he rapidly acquired favour and fortune, and where henceforth he resided, except during short intervals spent at Naples, Viterbo, Florence, &c. His six satires, on music, poetry, painting, war, Babylon, and envy, written at Volterra, made him many enemies, and were extensively circulated before they were first printed in 1719. R. took part in the Neapolitan risings under Masaniello (who sat to him for a portrait), and joined the Compagnia della Morte (1645). Restless and impulsive, he spent his later years in intense devotion to his art, broken in upon by fits of gloom and inactivity. He died at Rome, 15th March 1673, leaving a considerable property. His works almost invariably represent nature in a portentous or angry mood, and their spirit is in strict harmony with the artist's character. He painted many striking historical and *genre* pieces, but his chief works are landscapes—wild mountain masses and sombre woods, surf-beaten coasts and treacherous defiles—in which the prevailing sentiment is loneliness, desolation, or fear. R. played on various musical instruments, and, as a composer, was 'superior in melody to most of the masters of his time.' He also excelled as an engraver, a dramatist, a poetical satirist, a comic actor, and an improvisatore. See, besides the works of Passeri and Dominici, the biographies by Baldinucci (new ed. Ven. 1830) and by Lady Morgan (new ed. Lond. 1855).

Rosa'cea, or **Ac'ne Rosa'cea**, known also as Gutta Rosea, and popularly, though inaccurately, as Grog-blossom, is a disease which usually appears on the nose, which is often considerably enlarged by the morbid action. R. sometimes extends to the cheeks, forehead, and chin, and may cover the entire face. It is a disease of adult life, and is more frequent in the female than in the male. It may depend on a disordered state of cutaneous innervation, or direct congestion of the integument, or torpidity of the capillary circulation and obstruction. R. may occur at puberty, and at the critical period of life in females; but it is more frequently the result of exposure of the face to extremes of temperature, of excesses in diet or stimulating drinks.

The general treatment of R. must be adapted to the cause. The diet should be moderate and nutritious, and all stimulants should be avoided. Laxatives, antacids, and tonics may be administered. In the acute or inflammatory stage the pimples may be punctured, and bleeding encouraged by warm fomentations or poultices, or emollient lotions may be applied. In the chronic or indurated stage, friction and gentle stimulation are useful, while in the severer forms iodide of sulphur ointment may be applied, or the follicles may be pressed out and a lotion of dilute acetic acid applied.

Rosa'cea, a large and important natural order of herbs, shrubs, and trees, with usually alternate stipulate leaves, and regular, often showy flowers. The petals and calyx lobes are four or five; the stamens usually indefinite, inserted on the calyx tube or disc; the fruit various—a pome, or of one or many drupes, achenes, or follicles; rarely a berry or capsule. The order is botanically distinguished from *Leguminosæ* by the superior fifth lobe of its calyx; in that order it is anterior. R. numbers upwards of 70 genera, and more than 1000 broadly defined species, and is represented in all quarters of the globe. It is divided into nine tribes or sub-orders. In the *Potentillæ* and *Rosæ* the properties are astringent, and in *Prunæ* and *Pomeæ*, hydrocyanic and malic acids are secreted. Many of the plants of the order yield edible fruits, others constitute some of the choicest ornaments of the garden, and the timber of others is valuable.

Rosario, a town in the Argentine Republic, 170 miles W. of Buenos Ayres, on the right bank of the river Paraná (q. v.). Being the entrepôt for a large region, the trade of R. is very extensive: 3189 vessels, with an aggregate tonnage of 321,778, entered and cleared at the port in 1876. The chief exports are wool, hides, bones, dried beef, maize, and wheat, together with copper and silver from the mines of Catamarca and San Luis. R. is the centre of railway lines which had a combined length of 748 miles in 1876, and one of which will eventually connect it with Valparaiso on the Pacific. Pop. (1877) 25,000.

Rosary, a number of beads strung together, used in devotional exercises by Hindus, Buddhists, Mohammedans, and Roman Catholics. The beads are of various materials, stone,

coral, amber, wood, seeds, and ivory being employed. The R. probably had its origin in India, where it has been used for upwards of 2000 years. The R. of the Hindus and the Buddhists consists of 108 beads, which when used by Vaishnavas and Buddhists, are always made of the smooth wood or seeds of the Toolasee plant (*Ocimum sanctum*). The beads of the Saivas consist of the rugged berries of the Rudracha tree (*Elacarpus tuberculatus*). The Mohammedan R., or *tusbeeh*, is made up of 100 beads in honour of the same number of names of the Deity. The Lady Psalter of the Roman Catholics contains three groups of fifty-five beads each, or fifteen decades, in honour of the five glorious, five joyous, and five sorrowful events of Our Lord's life, death, and resurrection.

Rosary of the Blessed Virgin Mary is a form of prayer used by Roman Catholics, especially by families, as a daily evening prayer. The devotion of the Rosary, which consists of a series of fifteen prayers, with repetitions throughout of Pater Noster, Ave Maria, and Gloria Patri, was introduced by St. Dominic (q. v.) about 1206. It is divided into three parts—the Joyful, the Sorrowful, and the Glorious Mysteries, each of which contains five subdivisions. Each subdivision contains a statement of a mystery connected with the life of our Saviour, or his blessed Mother, to be meditated on, and a prayer for the special grace appropriate to it; besides a Pater Noster at the beginning, a Gloria Patri at the end, and ten Ave Marias, from which last each division gets the name of a decade. At the end of each of the three parts, or each five decades, the Salve Regina is said. From containing 150 Ave Marias, the number of the Psalms, the R. has been called the Psalter of Mary. The Living R. is an association of fifteen persons who divide amongst them the fifteen mysteries of the R. Each member recites one mystery or decade daily, so that the entire R. is gone through every day. The association was instituted at Lyons by Sister Maria Jericott, and confirmed by a brief of Pope Gregory XVI. in 1832.

Ros'as, **Juan Manuel Ortiz de**, the founder of the Argentine Confederation, was born of an old Asturian family at Buenos Ayres, March 30, 1793. He spent a wild, irregular youth among the 'Guachos' of the Pampas, and acquired great influence by his bold exploits on the Indian frontier. Entering the army of Buenos Ayres, he was made a commander in the Pampas, and in 1829 overthrew Lavalle, in whose place he became captain-general, proclaiming 'Federal' principles. In concert with the governor of the interior provinces he established the Argentine Confederation (1831), retaining in his own hands the direction of foreign relations, and visiting political opponents with the utmost severity. He was chosen president in 1835, and maintained his position for eighteen years, partly by a restless energy which had no mercy for his enemies, the 'savage Unitarians,' and partly by popular appeals to 'the holy principle of federation.' He cruelly suppressed four great risings of the Argentine Liberals; struggled fiercely throughout five years with Brazil for the possession of Paraguay; and for nine years besieged Montevideo, the stronghold of the 'Unitarians.' At last his chief officer, Urquiza, went over to the Liberal party, defeated R. at Monte Caseros, and succeeded him as president in February 1852. R. escaped in disguise, reached England, and settled at Southampton, where he died, 14th March 1877.

Ros'cius Quin'tus, the most famous of Roman comic actors, was born at Solanum, a town of the Sabine territory near Lanuvium, and flourished in the 1st c. B.C. He was said to have been found, when an infant, in the folds of a serpent, a presage, it was thought, of that extraordinary skill which gained him the favour of the noblest Romans. R. enjoyed the friendship of Cicero, who, when a young man, received instruction from him in elocution, and in a later time used often to compete with his eloquence against the actor's gesticulation in expressing a thought. In 68 F. C. Fannius Chærea sued R. for 50,000 sesterces, and Cicero defended him in an oration which we still possess. R. died in 62, leaving an immense fortune, and a name which has become proverbial as synonymous with perfection in any profession.

Roscoe, **William**, the historian of the Italian Renaissance, was the son of a respectable tavern-keeper and market-gardener at Mount Pleasant, Liverpool, where he was born, March 8, 1753. In his sixteenth year he was articled to a Liverpool attorney, and in 1774 was admitted an attorney of the Court of King's Bench.

Though he practised assiduously, he yet found leisure to acquire a knowledge of Greek, Latin, Italian, and French. In 1777 he published a collection of poems, one of which being a protest against the slave-trade, and the precursor of several eloquent pamphlets on the same subject. A zealous advocate of the French Revolution, he taxed Burke with apostasy in his *Strictures* on that statesman's *Two Letters Addressed to a Member of the Present Parliament*. In 1799 appeared the *Life of Lorenzo de Medici, called the Magnificent*, a work which at once established his reputation as a solid historian and an agreeable writer. The charge brought against R. by Sismondi, of his having in this work veiled the tyranny of the Medici, and the accusation by other critics of his having defended the part taken by Pope Sixtus IV. in the Pazzi conspiracy, which led to the murder of Giuliano, Lorenzo's brother, received an able reply in the *Illustrations, Historical and Critical, of the Life of Lorenzo de Medici* (1822). Meantime the work passed through several editions, and was translated into various European languages. R.'s second great historical work, *The History of the Life and Pontificate of Leo X.* (4 vols. folio, 1805), distinguished equally by the fine literary qualities of the first, drew upon its author the censure of various critics, on the alleged ground of undue partiality for his subject, and hostility to the reformers who struggled against the absolutism of papal Rome. The two works give a luminous and accurate account of the revival of letters, and form an admirable link between Gibbon's *Decline and Fall* and Robertson's *Charles V.* In 1806 R. was returned to Parliament for Liverpool in the Whig interest, but exciting violent opposition by his speeches on the Catholic disabilities, he withdrew at the time of the dissolution, and resolutely declined to appear again as a candidate. Still, however, taking a warm interest in passing events, he issued several pamphlets on the topics of the day. Pecuniary embarrassments clouded his declining years. A banking firm, of which he was a partner, became bankrupt in 1816, and he had to part with his valuable library and collection of pictures. But his intellectual ardour remained undiminished, and in his latter years he aided in founding the Royal Institution of Liverpool, edited an edition of Pope in 10 vols., and acquired a superior knowledge of botany. In 1827 he received the gold medal of the Royal Society of Literature. He died at Liverpool, June 30, 1831, leaving the sketch and materials for a projected history of art and literature.—His son, **Henry R.** (born 1799, died 1836), who rose to distinction at the bar, is the author of *Lives of Eminent British Lawyers* (1830), and of a *Life of W. R.* (2 vols. 1836).—**Henry Enfield R.**, B.S.E., son of the preceding, and a celebrated chemist, was born at London, January 7, 1833. He graduated at University College, London, in 1852, and after completing his chemistry studies at Heidelberg, became professor of chemistry in Owens College, Manchester, in 1857. He has published numerous papers in the *Philosophical Transactions* and other scientific journals, and in 1873 received the Royal Medal of the Royal Society for his chemical researches, especially for investigations into the chemical action of light and into the compounds of vanadium. He is author of *Lessons in Elementary Chemistry* (1866, new ed. 1875); *Lectures on Spectrum Analysis* (1869, 3d ed. 1873), and in conjunction with Schwellenbamer a *Treatise on Chemistry* (2 vols. 1877-78). He has also written the *Chemistry Primer* in Macmillan's Science Primer Series, of which he is joint-editor with Professors Huxley and Balfour Stewart.

Roscomm'on, an inland county of Ireland, separated on the E. from Longford and W. Meath by the Shannon, on the W. from Galway and Mayo by the Shannon and its affluent the Suck, and having on the N., Sligo and Leitrim. Area, 607,691 statute acres, of which 469,400 are arable and 101,244 uncultivated. Pop. (1871) 140,670. The surface is mostly level and undulating, highest in the N., where the Curlew Hills rise above 800 feet, and the Brailieve Mountains and Slieve Curkagh to 1000 feet. The chief rivers are the Shannon and Suck, which together form about two-thirds of the whole boundary-line of the county. The lakes, which are numerous and beautiful, are either expansions of the Shannon or communicate with it. The principal are Loughs Allen, Corry, Tap, Ree, Skean, Gara, and Key. In its geological formation the county is a continuation of the central limestone district of Ireland. In the N. are coal-measures. The soil is fertile, but agriculture is in a back-

ward state. There is excellent pasturo for sheep throughout R. In 1876 there were 8097 horses, 8067 asses, 108,520 cattle, 194,725 sheep, 35,687 pigs, 11,694 goats, and 475,032 poultry. There are some manufactures of brick and earthenware. The chief towns are R. (q. v.), Boyle, Elphin, Castlereagh, and Strokestown. The county returns two members to Parliament.

Roscomm'on (Ir. Gael. 'the wood of St. Coman'), chief town of the preceding county, near the centre of the county, 96 miles W. by N. of Dublin. It dates from the 13th c., when an abbey was founded here by O'Conor, King of Connaught, and a few years later a castle by Sir Robert de Ufford. It returned previous to the Union two members to the Irish Parliament. R. has a considerable corn market. Pop. (1871) 2722, of whom 300 were Protestants.

Roscrea (Ir. Gael. 'Cre's wood'), a town of Tipperary, Ireland, 94 miles S.W. by W. of Dublin, on a feeder of the Lower Brosna river, is of great antiquity, having arisen round a monastery built in 620. R. has a small manufacture of coarse woollen cloths, and a great deal of agricultural produce is sold at the weekly markets. It contains a parish church built in 1812; Wesleyan, Primitive Methodist, and Quaker places of worship, a very handsome Roman Catholic church, a national school, and others partially endowed, a savings-bank, court-house, market-house, fever-hospital, dispensary, union workhouse, bridewell, infantry barracks, Ormond Castle, now used as a military storehouse, and an ancient round tower, 80 feet high. Fairs are held seven times a year. Pop. (1871) 3725.

Rose. See ERYSIPELAS.

Rose (Lat. *rosa*, Gr. *rodon*, 'red,' Sansk. *rohida*, 'red') is the type genus of *Rosaceæ*, and consists of erect, scrambling, or climbing shrubs, more or less prickly, with imparipinnate leaves, serrate leaflets, and stipules more or less adnate to the petiole. The flowers are terminal; and are solitary, corymbose, or paniculate. The calyx-tube is persistent, globose, urceolate, or ovoid; the mouth is contracted, and the limb divided into five foliaceous segments. The petals are five, rarely four; the stamens are numerous, inserted on the edge of disc, at the mouth of the calyx-tube, the styles protruding from the tube, and sometimes united. When in fruit, the carpels are dry, hairy, one-sided achenes, enclosed in the more or less succulent calyx-tube, the whole forming a dry or pulpy red or black 'Hip' (q. v.). The genus is predominant in the temperate regions of the northern hemisphere—much less so in America than in the Old World—extending S. into India, Abyssinia, and Mexico. The number of species is very differently estimated by different botanists.

The R. is a general favourite; and whether we look to the position which it occupies in the poetry of almost all lands, to its historical, literary, and legendary associations, to its universal popularity as a garden flower, to its delicious scent, or to the attention it has attracted amongst horticulturists, we find it pre-eminent among flowers. It is mentioned by Homer and Anacreon—by the former in his hymn to Ceres, by the latter in many of his odes. Theophrastus specifies four kinds, and Pliny gives a fair description of the shrub, and enumerates eleven kinds, which, he says, were well known to the Romans. He also speaks of the *rosaria*, or places set apart for the cultivation of R.-trees, the most celebrated of these being at Pæstum. The R. was used at festivals and sacred ceremonies; and as an article of luxury at banquets (cf. *Horace*, lib. i., ode xxxviii.). Suetonius relates that Nero spent upwards of £30,000 at one supper in the purchase of roses, and a like extravagance is recorded of Cleopatra (Athenæus, *Dipsosoph.*, lib. iv. c. ii.).

Five well-marked groups of *Rosa* are indigenous to Britain, divided into about 70 recognised sub-species or varieties. Of the species of R. generally cultivated the following are some of the most important. The Cabbage R. and Moss R. (*R. centifolia*), a native of the Caucasus and seemingly of other parts of the Orient, is excelled by no other species in beauty and fragrance. The Damask R. (*R. damascena*), a supposed native of Syria, is much cultivated for ornament, and is, with the above, the source of the attar of roses. The French or Dutch R. (*R. gallica*) is indigenous in S. and central Europe and Asia Minor; the intensely coloured buds of this species are particularly chosen for drying. The India or China R. (*R. Indica*), a native of China, but brought early into India, is a glabrous evergreen of the *canina* section, with large double or half-double (rarely

single) white, yellow, pink, red, or purple flowers, in long slender pedicels. The scent is powerful, though not so delicate as in the *Gallica* group above mentioned. From the present species the large host of 'hybrid perpetuals' are mostly derived, and to it belong the Tea R. (*R. fragrans*), with very fragrant yellow flowers, and *R. semperflorens*, with dark-red flowers, and numerous other varieties. The Noisette R. is a cross of this species and *R. moschata*. Lady Banks' R. (*R. Banksia*) is a climbing species from China and Japan, with rarely more than three or five leaflets on the leaves, and corymbs of small white or yellow flowers. The yellow R. (*R. lutea*) is another yellow-flowered species, a native of the Himalaya and neighbouring territory, and now naturalised in central and S. Europe; the smell is disagreeable. The Musk R. (*R. moschata*), in its wild state in India, &c., forms masses of thorny, scrambling scrub, and climbs to the top of lofty trees, hanging down therefrom in elegant festoons. Its white flowers, in large compound corymbs, have a strong and delightful fragrance, and the plant has been cultivated in Britain for 300 years. The evergreen R. (*R. sempervirens*), ranging from S. Europe through Southern Asia to Japan, is one of the most desirable roses for covering walls, fences, and similar structures. The Prairie R. (*R. setigera*), a native of the Western and middle United States, is one of the best ornamental midsummer hardy plants, with profuse, dense corymbs of single, deep-rose flowers. Of native British species, the burnet-leaved or Scotch R. (*R. spinosissima*) has furnished numerous varieties now in cultivation; the sweet-briar (*R. rubiginosa*), which is truly wild in the chalk hills of the S. of England, is grown in most gardens; and the field R. (*R. arvensis*) is frequently planted and trained to cover trellises and walls. The strong straight shoots of the common dog R. (*R. canina*) are used as stocks for budding the choice varieties of garden R. upon—thus making them into standards. Homer speaks (*Il.* xxiii. 186) of rich unguents and oils prepared from the R. The modern preparations obtained from it are *R. water*, used as an agreeable perfume; *R. vinegar*; a *conserve* of the petals employed as a basis for pills, and a feeble astringent; a *syrup of roses*, used for flavouring and colouring purposes; a *conserve* of the fruit (see *HIP*); and the celebrated Otto or Attar of Roses (q.v.).

The so-called Rock R. is *Helianthemum* (see *CISTUS*); the Christmas R. is *Helleborus niger* (see *HELLEBORE*); the Corn R. is *Papaver Rhæas* (see *POPPY*); the Guelder R. is *Viburnum Opulus* (q.v.). See Hole's *Book about Roses* (5th ed. Blackwood, 1874).

Rose, in heraldry, is sometimes represented with five leaves, but usually with ten, of which five are placed within or upon the other five. The R. is without a stalk, unless that be named in the blazon. It is not blazoned proper, being tintured sometimes *gules* (Lancastrian), sometimes *argent* (Yorkist). When it is *barbed and seeded* proper, the bars are green and the seeds gold. As a mark of cadency, the R. distinguishes the seventh son. The badges of the Stuart kings of England were a *thistle*, and a *R. and thistle dimidiated and crowned*, and of Anne, a *R. branch and a thistle growing from one stalk and crowned*. From the time of Anne the personal badges of English sovereigns have gone out of use, and the *R., thistle, and shamrock*, the imperially crowned badges of England, Scotland, and Ireland, have been permanently placed in the Royal Arms.

Rose-Aca'cia. See *ROBINIA*.

Rose-Apple. See *EUGENIA*.

Rose-Beetle, or Rose-Bug, name applied to several insects belonging to the order *Coleoptera*. The *Cetonia aurata* is the British R.-B. In this genus the jaws are feebly developed. The species mentioned attains a length of an inch, and is green above and red beneath. It infests the rose in the adult states, its larvæ being found in decaying timber, &c. The R.-bug of N. America is the *Macrodactylus subspinosus*, and is also named the 'R.-chafer.' It is of a brown colour, and has slender legs and claws. This beetle injures the rose leaves. The eggs are deposited beneath the soil, and the larvæ appear in autumn. The pupa is developed in the succeeding May, and is of a yellowish-white colour.

Rose-Engine Lathe. See *TURNING*.

Rose'mary (*Rosmarinus*, 'sea spray,' from its usually growing on the sea-coast, and its odour) is a genus of *Labiata*, consisting of a single species, the common R. (*R. officinalis*), a bush

native of the countries around the Mediterranean. The leaves are evergreen, linear in shape, with a white coating on the under side; the flowers are few, of a dull leaden-blue or white colour, and arranged in short, axillary racemes. The principal value of R. is as a perfume, and owing to its pleasant fragrance it has been used from time immemorial. In olden times it also served for making garlands, and was considered useful in relieving headache and stimulating the flagging mental powers. It was also recognised as a token of remembrance at funerals (*Romeo and Juliet*, act iv., scene 4). The aromatic oil which is distilled from the flowering tops is given medicinally for hysteria, and a lotion and wash is applied in cases of baldness to promote the growth of the hair.

Rosen, Friedrich August, an able Orientalist, born at Hannover, 2d September 1805, studied Semitic languages and Sanskrit (1822-27) at Göttingen, Leipsic, Berlin, and Paris, and was the first professor of Oriental languages in the London University (1827-31). In the latter year he resigned this post, and on the 12th September, 1837, died at London. R. wrote *Radices Sanskriticae* (Berl. 1827), and edited *The Algebra of Muhammed-ben-Musa* (Lond. 1831), Haughton's *Dictionary, Bengali, Sanskrit, and English* (ib. 1835), Colebrooke's *Miscellaneous Essays* (2 vols. ib. 1837), and *Rigveda Sanhita* (Lib. I., Sansk. et Lat. ib. 1838), the last being published by the Asiatic Society, of which R. was secretary. A *Catalogus Codicum Manucriptorum Syriacorum et Carshunicorum in Museo Britannico* by R. appeared (Lond. 1839) after his death.—**Georg B.**, brother of the above, born at Detmold, 24th September 1820, is the author of *Rudimenta Persica* (Leip. 1843), *Ueber die Sprache der Lazen* (Lemgo, 1844), *Ossitische Grammatik* (ib. 1846), and *Geschichte der Türkei von 1826 bis 1856* (2 vols. Leip. 1866-67).

Rosenau, a town of Hungary, on the river Sajo, an affluent of the Theiss, 112 miles N.N.W. of Pesth. It carries on linen-bleaching, pottery, the manufacture of wax-tapers and leather, besides a trade in honey and wax. Near the town are mines of iron, lead, copper, and antimony, and also medicinal springs. Pop. (1869) 5053.

Rosenmüller, Johann Georg, born 18th December 1736 at Ummerstädt, near Hildburghausen, became preacher at Königsberg in 1772. In 1773 he was elected unexpectedly to a chair of theology at Erlangen, where in 1775 he got his doctor's degree. In 1783 he removed to Geissen for his health. There he acted as First Professor of Theology till he was elected in 1785 chief pastor of the church of St. Thomas, and Professor of Theology at Leipzig, where he died, 14th March 1815. R.'s preaching was full of unction, and he also did a great deal for the primary schools. His chief writings are *Morgen und Abend-nachten* (7th ed. Leip. 1820); *Betrachtungen über die vornehmsten Wahrheiten der Religion auf alle Tage des Jahres* (4 vols. Leip. 1801); *Predigten über auserlesene Stellen der Heiligen Schrift* (3 vols. Leip. 1811-13); *Auserlesenes Beicht- und Communionbuch* (12th ed. Nürnberg. 1827); *Pastoralanweisung* (Leip. 1788); *Anleitung für angehende Geistliche* (Leip. 1792); *Beiträge zur Homiletik* (Leip. 1814); *Scholia in Novum Testamentum* (6 vols. 6th ed. by his son, E. F. K. R., Leip. 1815-31); *Historia Interpretationis Librorum Sacrorum in Ecclesia Christiana* (5 vols. Leip. 1795-1814); his *Handbuch eines allgemein. fasslichen Unterrichts in der Christlichen Glaubens- und Sittenlehre* was published posthumously (2 vols. Leip. 1818-19).—**Ernst Friedrich Karl R.**, eldest son of the preceding, famous as an Orientalist and Old Testament critic, was born at Hildburghausen, 10th December 1768. He studied at Leipzig, where in 1795 he became extraordinary, and in 1813 ordinary, Professor of Oriental Literature. He died 17th September 1835. R.'s great work was the *Scholia in Vetus Testamentum* (23 vols. Leip. 1788-1835), comprehensive, erudite, and still a valuable book of reference. He published also an abridged edition of this work in 5 vols. (Leip. 1828-35). His principal other works are the *Handbuch für die Literatur der Biblischen Kritik und Exegese* (4 vols. Gött. 1797-1800); *Das alte und neue Morgenland, oder Erläuterungen der Heil. Schrift* (6 vols. Leip. 1818-20); *Handbuch der Biblischen Alterthumskunde* (4 vols. Leip. 1823-31); *Institutiones ad Fundamenta Linguae Arabicae* (Leip. 1818), founded on De Sacy; and *Analecta Arabica* (2 vols. Leip. 1825-26).—**Johann Christian R.**, the famous anatomist, was a younger brother of the preceding. He was born at Hildburghausen.

in 1771, and in 1804 became ordinary professor of anatomy and surgery at Leipzig. He died 29th February 1850. His principal works are *Beiträge zur Zergliederungskunst* (2 vols. Leip. 1800); *Chirurgisch-anatom. Abbildungen für Ärzte und Wund-ärzte* (3 vols. Weimar, 1804-12); and *Handbuch der Anatomie* (Leip. 1808, 5th ed. by Weber, Leip. 1834).

Rose-Noble (Lat. *rosatus nobilis*, Fr. *noble à la rose*), an English gold coin, worth about 19s. 6d., first struck by Edward III., and so named from the rose figured on each side. The obverse presents a ship (with roses figured on its side), in which sits the king with sword and shield; the reverse, the eight-leaved rose and the legend *IHS Autem Transiens Per Medium Illo-rum Dat*, probably referring to the king's disputes with the Holy See. This obscure inscription led to the R.-N. being held as an amulet against witchcraft and a protection against dangers on sea. A similar coin (the Rose-Rial), bearing on the reverse a rose supporting three lilies, was struck by Henry VII. and Henry VIII.

Rose of Jericho is a curious cruciferous plant named *Anastatica Hierochuntina*—the sole species of the genus. It grows in the sandy deserts of Syria, Arabia, and N. Africa, and is remarkable for the hygrometric property of the old, withered annual stems. When in flower the branches spread rigidly, but as the seed ripens, the leaves begin to wither and drop off, the branches curl inwards, and the plant becomes coiled up so as to resemble a small ball. In this state it is loosened from the soil, and is drifted about with the sand over the arid plains. Should rain fall, or should it be blown into water, the branches expand, the pods open, the seeds fall out, and it is a remarkable fact—only recently discovered—that in the short space of twenty hours the seeds germinate and root. The plant retains its hygroscopic susceptibility for years.

Rose-ola, or **Rose-Rash**, sometimes called false measles, is a common skin disease characterised by febrile symptoms, and small irregular red patches of the skin distributed over more or less of the surface of the body, and by redness of the fauces. The eruption is usually accompanied by itching, pricking, or tingling of the skin, and the disappearance of the eruption is not followed by desquamation of the epidermis, one of the natural sequelæ of scarlatina and measles. One attack affords no immunity from a second. There are several varieties of R. The chief are *R. infantilis*, or *false measles* in children; *R. æstiva*, or *false measles* in the adult; *R. autumnalis*, peculiar to children; *R. annulata*, appearing first as red-coloured spots, increasing into rings of variable size; *R. variolosa* frequently accompanying the eruptive fever of inoculated small-pox; *R. vaccina* frequently following the development of the vaccine vesicle; *R. rheumatica* appearing in spots and patches upon different parts of the body in persons affected with rheumatism and gout; and *R. cholericæ* described by Rayer, who observed it during the prevalence of cholera in Paris in 1832. R. in infants may be caused by teething or intestinal irritation; in adults by exposure to cold when heated; drinking cold water when heated; indigestion; gastric and intestinal irritation; and disordered menstruation. R. is a slight affection, and may be treated by laxatives, diluents, and salines, followed by tonics combined with mineral acids.

Rose Quartz, a beautiful rose-red or pink variety of quartz, largely used as an ornamental stone. Beautiful specimens come from Ratnapura in Ceylon; and it is also found in Aberdeenshire, the Shetlands, near Belfast, and in various parts of the continent. The colour is due to the presence of manganese.

Ro'ses, The War of the, was a civil disturbance which desolated England for thirty years—from 1455 to 1485. The war was caused by the accession to the English throne of the Duke of Lancaster, Henry IV., instead of the presumptive heir, the Duke of York. The York faction chose a white rose for emblem, and the Lancastrians a red. The quarrel raged with greatest violence during the reigns of Henry VI., Edward IV., and Richard III. The first battle was fought at St. Alban's, May 22, 1455; the last at Bosworth, August 22, 1485. The union of the Roses was accomplished by the marriage of Henry VII. with Elizabeth, daughter of Edward IV., in 1486.

Rosett's (Arab. *Raschiâ*, 'headship'), a town in Egypt, on the W. bank of the ancient Bolbitic branch of the Nile, 4 miles from

its mouth, and 43 miles N. E. of Alexandria. It was built by one of the Califs in 870 A. D., near the site of the ancient *Bolbitinum*, and at one time possessed a very large Oriental and European trade; but since the construction of the Mahmudieh Canal, connecting Alexandria with the Nile, its commerce has been absorbed by that port, the entrance to the R. branch of the Nile being obstructed by a bar of sand, which is frequently impassable by vessels. R. is built of red brick, and is celebrated for the beauty of its gardens and the salubrity of its climate. It was captured by the French in 1798, and repelled a British attack in 1807, but its fortifications are now insignificant. Pop. 15,000. For an account of the famous R. stone, discovered in 1799, see **HEROGLYPHICS**.

Rosett's Wood is a handsomely veined East India wood of a lively orange-red colour, and close, hard texture. It is imported in logs about a foot in diameter, and is used on a small scale as a furniture wood. As yet it is not ascertained of what tree it is the timber.

Rose-Water is prepared by distilling rose leaves, fresh or pickled in brine, and water. Six pounds of pickled roses with one gallon and a quarter of water will yield one gallon of 'double distilled' liquid. R.-W. is employed in perfumery and pharmacy.

Rose-Window, a circular window with mullions and tracery springing from the centre.

Rose-wood, a valuable S. American fancy wood, of which the finest descriptions are now understood to be the produce of several species of large leguminous trees of the genus *Dalbergia*, chiefly *D. nigra*, called by the natives *Jacaranda* (q. v.). Inferior kinds are yielded by other trees, which also bear the name of *Jacaranda* in Brazil, notably three species of *Macharium*. For a long time the belief was current, based upon the authority of the French traveller and botanist Guillemain, that the true R. was obtained from two species of *Triptolemea* (a sub-genus of *Dalbergia*); but according to Dr. Allemão of Rio Janeiro, confirmed by Mr. Benthams, the facts are as stated above. It seems strange that notwithstanding the length of time R. has been known to European trade and manufactures, and the large quantity of it annually imported, its botanical history should be so very obscure. Indian R. or Blackwood is *Dalbergia latifolia*, a large tree of dry forests in various parts of India. The heart-wood varies from deep brown to blackish-purple, with veins, streaks, and specks of white and purplish colour, and is fine-grained, strong, and heavy. When fresh sawn it has the agreeable smell of R., and is much valued for furniture and a variety of other manufactures. The timber of *D. Sissoo* is also an excellent and beautiful furniture-wood, and is highly esteemed in India for all purposes where joint strength and elasticity are required.

R. of the best quality comes from Rio in half-round planks about 12 feet long and 18 inches wide. It is hard and heavy, close in texture, beautifully veined and figured in the grain, the dark parts affording a rich contrast to the purple red ground. Bahia furnishes a large supply of R. of the second quality, and inferior varieties are brought from Honduras and Jamaica. R. is a very valuable cabinetmaking timber, and is much used for drawing-room and library furniture.

Rosicrucians (Ger. *Rosenkreuzer*), a mystic brotherhood revealed to the outer world in the *Fama Fraternitatis R. C.* (1614), the *Confessio Fraternitatis R. C.* (1615), and the *Chymische Hochzeit Christiani Rosenkreuz* (1616), which last was acknowledged by, as the two former works were commonly ascribed to, Johann Valentin Andreæ (q. v.). From them we learn that a German noble of the 14th c., one Christian Rosenkreuz, after long travel in the East, founded on his return a brotherhood of seven adepts, the R., and dying at the age of 106 was buried in their temple, the 'House of the Holy Spirit,' with the inscription on his grave—'Post CXX. annos patebo.' The laws of the order, thus made known in the fulness of time, were that its members should heal the sick gratis, should meet once every year in a certain secret place, should adopt as their symbol *R. C.* (i. e., *Rosea Crux*), or a rose springing from a cross (the device, be it observed, of Luther's seal), and should assume the habit and manners of whatsoever country they might journey to. It is now supposed that Andreæ simply intended a hoax upon the credulity of the age, and that Christian Rosenkreuz and all the attendant mysteries were wholly the coinage of his fertile brain. However,

the hoax, if hoax there were, was taken seriously, and as early as 1622 societies of alchymists at the Hague and elsewhere assumed the title R.; while Rosicrucian tenets powerfully influenced Cabalists, Freemasons, and Illuminati, and were professed by Cagliostro and similar impostors. Even to-day a Rosicrucian lodge is said to exist in London, whose members claim by asceticism to live beyond the allotted age of man, and to which the late Lord Lytton sought entrance vainly. His novel *Zanoni* has popularised the subject of Rosicrucianism, and for minuter information reference may be made to Buhle's *Ueber Ursprung und Schicksale des Ordens der Rosenkreuzer* (Gött. 1803); and H. Jennings' *The R., their Rites and Mysteries* (Lond. 1870).

Rosin is the residual product of the distillation of oil of turpentine from crude Turpentine (q. v.). If the distilling process stops short of the thorough expulsion of the water, yellow R. is the result; and if it is protracted till the residue is on the point of decomposition, black R., called colophony, is obtained. Alcohol, ether, and the volatile oils are solvents for R. It is employed in making varnishes, soap, and sealing-wax, and also for caulking ships and rubbing the bows of violins. Yellow R. is likewise used in pharmacy as an ingredient in ointments, plasters, &c.

Ross, a Gaelic word signifying a headland or promontory, also an isthmus and a wood. It enters into the composition of numerous geographical names, chiefly in Scotland and Ireland; e.g., 'Ross-dhu,' 'Culross,' 'Ardrossan,' 'New Ross,' 'Muckros,' 'Rosscastle,' 'Roscommon,' &c. The Cymric *rhos* or *ros*, 'a moor,' is seen in the 'R.' of Hereford, Penrhos, and Roskilly.

Ross (Cym. *rhos*, 'a moor'), a market-town of Herefordshire, on the Wye, 18 miles W.N.W. of Gloucester by rail, has a fine parish church, restored at a cost of over £3000, with a spire 208 feet high; seven fine chapels, a quaint 17th c. market-house, a corn-exchange (1862), Blue Coat School (1786), large board schools (1874), and a free library, with reading-rooms and recreation-grounds (1873). R. publishes two weekly newspapers, and has manufactures of farming implements, a brewery, tanneries, and salmon-fisheries, &c. Pop. (1871) 4589. Pope immortalised this town in his *Man of Ross*, the subject of which, the philanthropist John Kyrie (1637-1724), lived in an ancient timbered house (still shown as one of the lions of the place), and now lies buried in the chancel of St. Mary.

Ross, the name of a clan, called in Gaelic *Clan Rosich na Gille Andras*, 'the offspring of the followers of St. Andrew,' to whose service and honour one of its early chiefs had devoted himself. The clan was one of eighteen that fought on Bruce's side at Bannockburn, and as late as 1427 could muster 2000 fighting men. The *Earldom of R.* dates from the middle of the 12th c., and its possessors were in the earlier period of Scottish history notable enough. Ferquhard, the second earl, called *Fearchar Mac an t-Sagirt* ('Ferquhard, the son of the priest'), in the reign of Alexander II. crushed a Celtic revolt in the N., headed by a son of Donald Bane, and another of the Gallowegians in the S. (1235). He was the founder of the Abbey of Fearn in Rosshire. William, the fourth earl, fought for Bruce at Bannockburn (1314), and signed the memorable letter to the Pope (1320), asserting the independence of Scotland. His daughter Isabel married Edward Bruce, brother of the Scottish king. He had two sons, Hugh and John, the latter of whom married a daughter of the Earl of Buchan, and received the half of her father's lands. Hugh fell at Halidon Hill 1333, and his son William left no male heir. But through the female line the succession was carried on till another female heir, Euphemia, Countess of R., becoming a nun, resigned the earldom to her uncle, John, Earl of Buchan, son of the Regent Albany. The marriage of her aunt Margaret, however, with Donald of the Isles, induced that formidable chief to assert a claim to the earldom, and led to the great Celtic insurrection that was crushed at Harlaw in 1411. On the death of the Earl of Buchan at the battle of Verneuil in France (1424), the earldom of R. reverted to the crown. James I. restored it to Margaret, widow of Donald. Her son, Alexander, Lord of the Isles and master of R., was a very conspicuous, turbulent, and treasonable character in the 15th c. In 1429, at the head of 10,000 clansmen from the Hebrides and the mainland, he wasted the crown-lands round Inverness, and burnt the town itself to the ground. Imprisoned in Tantallon for two years, he received a free pardon for all his

crimes in 1431. During the minority of James II. he was Justiciar of Scotland N. of the Forth. In 1445 he entered into a league with the Earls of Douglas and Crawford to destroy the influence and authority of the young king, but died in 1449 before he could carry out his evil purpose. This was partly accomplished by his son and successor, John, who joined Douglas in his rebellion against the crown, wasted the shores of the Frith of Clyde from Innerkip to Arran, but was finally compelled to make his submission to his sovereign. Received again into the royal favour, he remained apparently loyal till the reign of James III., when he opened negotiations with Edward IV. of England with a view to obtain that monarch's help in the complete conquest of the Highlands. The result was the forfeiture of his lordship of the Isles in 1476, while the earldom of R. was finally vested in the crown. John, however, was not absolutely disgraced. He was created a lord of Parliament, and was allowed to retain territorial, though not sovereign, lordship of the Isles. The Rosses of Pitcalnie, descended from Hugh R. of Rarichies, brother of the last earl, are the representatives of the ancient Earls of R.

Ross, Alexander, was born at Aberdeen in 1590, educated for the Church, became chaplain to Charles I., and master of the Free School of Southampton. He died in 1654. R., who had managed to gather a good deal of money in his lifetime, left, among numerous other benefactions, £200 to the town council of Aberdeen to found bursaries, and £50 to the Bodleian library. He wrote about thirty works in prose and verse, all of which are entirely forgotten, and such unquestionably would have been the fate of Alexander himself, in spite of his charities, had it not been for the couplet in *Hudibras* :—

'There was an ancient sage philosopher,
And he had read *Alexander Ross* over.'

Ross, Alexander, a Scottish poet, born in the parish of Kincardine-O'Neil, Aberdeenshire, 13th April 1699, studied at Marischal College, and was successively parish teacher at Aboyne, Laurencekirk, and Lochlee, where he died 20th May 1784. His *Helenore, or the Fortunate Shepherdess, a Pastoral Tale in the Scottish Dialect, to which are added a few Songs by the Author*, was published at Aberdeen in 1768. The volume at once gave R. a place by the side of Ramsay, as a master of the native Doric, and time has not robbed his verses of their charm. *Helenore* has still her ardent admirers, while the simplicity, blythe-heartedness, and racy vigour of the songs, give unabated pleasure. The very titles of some recall delightful memories; *Wood and Married and a'*; *The Rock and the Wee Pickle Tea*; and *To the Begging we will go*. To the 5th edition of *The Fortunate Shepherdess* (Dundee, 1812) there is prefixed a memoir of the poet by his grandson, the Rev. Alexander Thomson, minister of Lintrathen, Forfarshire. The latest and best edition is that by Dr. Longmuir (1866), containing a sketch of R.'s unedited works.

Ross, Ludwig, a German philologist and archæologist, was born of a Scottish family, at the paternal estate of Horst, in Holstein, 22d July, 1806, and studied at Kiel and Leipsic. In 1832 he set out to travel in Greece, and two years later was made conservator of antiquities at Athens. He held a professorship of archæology in the University of Athens from 1837 till the revolution of September 1843, and in 1845 was appointed to a similar chair at Halle. By intense devotion to study he greatly impaired his health, and perished by his own act, 6th August, 1859. His chief works are *Inscriptiones inedite* (3 parts, 1834-45), *Denkmäler von Attika nach Inschriften* (1846), *Handbuch der Archæologie der Kunst* (1841), *Reisen auf dem Griech. Inseln &c. Ægäischen Meeres* (4 vols. 1840-52), *Italer und Græken* (1858), *Hellenika* (2 vols. 1846).

Ross, Sir John, K.C.B., a famous Arctic explorer, the fourth son of the Rev. A. Ross of Inch, was born at Balsarroch, in Wigtownshire, Scotland, June 24, 1777; entered the navy in his tenth year, and served gallantly throughout the French war, receiving, among other acknowledgments of his skill and courage, a sword worth £100 from the Patriotic Society, and another sword worth £200, with a knighthood from the King of Sweden. In 1818 he set out in command of the sloop *Isabella*, the consort of the *Alexander* brig under Sir W. E. Parry, for the purpose of exploring Baffin's Bay and searching for a N.W. passage. On his return in December of the same year he was advanced to post rank, and subsequently

he detailed the results of his investigations in *A Voyage of Discovery, made under the Orders of the Admiralty* (1819). In May 1829 he again set out for the Arctic regions in the *Victory* steamer, equipped at the expense of Sir Felix Booth. The *Victory* became ice-bound in the Gulf of Boothia in September 1830, and having made little further advance by May 29, 1832, was then abandoned, the party being rescued by a whaler in August 1833. R. was knighted in 1834, and received the gold medals of the London and Paris Geographical Societies, and various foreign orders. From 1839 to 1845 he was consul at Stockholm, and after a fruitless voyage in search of Sir John Franklin (1850-51), he attained the rank of rear-admiral. He died in London, August 30, 1856. His best-known works are *Letters to Young Sea Officers*; *Residence in the Arctic Regions*, &c. (1829-34); *Memoirs of Admiral Lord de Saumarez* (2 vols. 1832), and *Narrative of a Second Voyage* (1835).

—**Sir James Clark R.**, nephew of the preceding, was born in London, April 15, 1800, entered the navy in 1812, and served in the Baltic and the White Sea under his uncle, whom he accompanied in his two searches for a N.W. Passage, on the second of which he made his famous discovery of the magnetic pole. He went with four Arctic expeditions under Parry (1819-27), was engaged in a magnetic survey of Great Britain and Ireland (1835-38), and commanded the *Erabus* and *Terror* expedition to the Antarctic Seas (1839-43), which reached latitude 78° 10' S., and collected a rich store of scientific data. He was knighted in 1844, and published *A Narrative of a Voyage in the Antarctic Regions* (in 2 vols. 1847). In 1848 he made a search voyage for Franklin in the *Enterprize*. He died at Aston House, near Aylesbury, April 3, 1862. A fellow of many societies, he received the founder's medal of the London Geographical Society, and from Oxford the degree of D.C.L. See D. M. Smith's *Arctic Expeditions* (T. C. Jack, Edin. 1877).

Ross and Cromarty, two counties of northern Scotland, now treated as one, owing to the intricate manner in which they are intermingled. They are bounded N. by Sutherlandshire, S. by Invernessshire, and stretch E. and W. from the North Sea to the Atlantic. Pop. (1871) 80,995. Their area is 3151 sq. miles, or 2,016,375 statute acres, of which in 1876 there were 47,413 under corn crops, 27,259 under green crops, 29,987 under clover, sainfoin, and grasses in rotation, and 19,395 in permanent pasture, exclusive of heath and mountain land. The principal crops are oats, barley, wheat, and rye. In 1876 there were in R. and C. 7099 horses, 41,609 cattle, 362,980 sheep, and 6535 pigs. Ross comprises the districts of Easter and Wester Ross, Ardeanach, or the Black Isle, Ardross, Applecross, Fearnonald, Greinord, and the Island of Lewis in the Hebrides. Cromarty consists of a peninsula between the Friths of Moray and Cromarty, together with ten detached portions included in R. The high grounds afford excellent pasturage, and the soil of the valleys is generally fair. The valued rent in 1877-78 (exclusive of railways) was £270,426, and the valuation of railways was £21,777. To the W. and N. the country is very mountainous, the highest peak being Ben Wyvis, 3722 feet. The Oikill and Conon are the chief streams flowing eastward, while the Broom and Carron flow westward. The W. coast is broken by the great sea-lochs Broom, Greinord, Torridon, Carron, and Alsh. The beautiful Loch Maree is the most notable freshwater lake. On both coasts the geological formation is Old Red Sandstone, but the interior is composed of igneous rocks, chiefly granite and granitic gneiss. The mineral waters of Strathpeffer are in considerable repute, and there are several other mineral springs in the counties. The chief town is Dingwall.

Rossano, a town of S. Italy, province of Cosenza, in Calabria, 2 miles from the Gulf of Taranto, 93 miles S.S.E. of Taranto by rail. It has a castle and fourteen churches, among them a fine cathedral. There are quarries of marble and alabaster in the neighbourhood. Pop. (1874) 14,881.

Roszbach (Ger. 'Horse brook'), a village of Prussian Saxony, 9 miles S.W. of Merseburg, with some coal-mining. Pop. 689. It is celebrated as the scene of the brilliant victory of Friedrich the Great, with 22,000 men, over the combined French and Austrians, 60,000 strong, November 5, 1757. The Prussian loss was 300 men, that of the allies 1200 killed and 6000 prisoners. An iron monumental pillar on the field commemorates the battle, which was long known as the 'Rout of R.'

Rosse, William Parsons, Earl of, the celebrated British astronomer, was born at York, June 17, 1800. He graduated at Oxford in 1822, with first-class mathematical honours. As Lord Oxmantown he represented King's County in Parliament from 1821 to 1831, succeeded to his father's title in 1841, and was elected one of the representative peers of Ireland in 1845. After 1830 he devoted his leisure to science, and especially to astronomy. At Birr Castle, where he chiefly resided, he set up his first reflecting telescope, which was furnished with a speculum of 3 feet diameter. The success of this instrument encouraged him to construct a second and larger telescope, having a speculum 6 feet in diameter. The speculum was moulded and polished by an improved method; and the instrument, 52 feet in length, was mounted at Parsonstown at a cost of £30,000. Though weighing twelve tons, it was so delicately poised as to be with great ease moved in any required direction. By its means, many nebulae, which had resisted Herschel's instruments, were at once resolved; and numerous new binary and ternary stars were discovered. Sketches of various nebulae were published in the *Philosophical Transactions* for 1850. In 1849 Lord R. was elected President of the Royal Society. He died at Monkstown, Ireland, October 31, 1867.

Rossetti, Gabriele, was born at Vasto, in Italy, March 1, 1783. In 1804 he went to study painting at Naples, and there also he developed his poetical tastes. Under Murat he became keeper of the Royal Museum; and during the disturbances of 1820 he gained great notoriety by his patriotic songs, one of which, beginning with the line 'Sei pur bello con gli astri sul crine,' stirred every village in Italy. The fortunes of his party being shattered in 1822, he hid himself for three months at Naples, and then escaped to Malta, disguised as a British naval officer. Two years after he settled in London as a teacher of languages, and in 1831 he was appointed professor of Italian literature at King's College. In 1826 he published in 3 vols. a *Commento Analitico* on Dante's *Divine Comedy*, in which he maintained that the mediæval poets all used a symbolism under which they expressed a hatred of the papacy. In defence of this theory he wrote *Sullo Spirito Antipapale che produsse la Riforma e sulle Influenza che esercitò nella Letteratura di tutta l'Europa e principalmente d'Italia* (5 vols. 1820). His doctrine on the subject was finally formulated in *Il Mistero dell'Amor Platonico Svelato* (1840); and the same idea permeates his commentary entitled *La Beatrice di Dante* (3 vols. 1852). The following are his poems:—*Dio e l'Uomo* (1840), *Il Veggente in Solitudine* (1846), *Poesie di G. R.* (1847), and *L'Arpa Evangelica* (1852). R. died in London, April 26, 1854.—**Dante Gabriele R.**, son of the preceding, born at London, 1828, was educated at King's College. He early devoted himself to the study of art, and with Holman Hunt, Millais, Madox-Brown, and others, he founded the school of Pre-Raphaelites which has asserted its principles with such wonderful vigour in spite of all the opposing tendencies of English painting. R., however, is almost the only member of the school who has adhered consistently to its severe canons. In 1850 he edited the *Germ*, a magazine devoted to the support of Pre-Raphaelism, of which the few numbers published are now highly prized. R. has never allowed his pictures to be exhibited at the Academy, and only visitors to the Grosvenor Gallery can enjoy any extensive acquaintance with his works. 'The Girlhood of the Virgin,' 'Ecce Ancilla Domini,' 'Dante's Dream on the Day of the Death of Beatrice,' 'A Christmas Carol,' are some of his most famous studies. In 1861 he published *Early Italian Poets*, rearranged in 1874 as *Dante and his Circle*. No more exquisite translations exist in our language than those contained in this volume. In conjunction with his brother William, R. edited Gilchrist's incomplete *Life of Blake* in 1863, and in 1870 his *Poems* appeared. All of these poems contain marks of inspiration, but also marks of the greatest care bestowed on their workmanship. Gautier's are scarcely more fastidiously finished. R.'s is a fine rather than a daring imagination; and in his use of quaint modulation and images he is like a musician drawing from some old and forgotten instrument its fullest strains. As a poet he has much in common with his friends Swinburne and Morris. His style is not so bold as that of the one, nor so rich as that of the other. He has not the charm of their voluptuous music; but he excels them in the delicate quaintness of his thoughts.—**William Michael R.**, brother of the preceding, was born in London about 1832. He is not a genius

like his brother, but he has done much service to English literature. In 1865 he published Dante's comedy, *The Hell*, translated into literal blank verse. He has likewise written *Criticisms on Swinburne's Poems and Ballads* (1866); *Fine Art, chiefly Contemporary* (1867), and edited one of the standard editions of Shelley, with Life, in 1869. He edited Walt Whitman's poems (1868) and Moxon's series of the poets; and the memoirs prefixed to the several volumes of that series have been collected under the title of *Lives of the English Poets* (1878).—**Maria Francesca R.**, sister of the preceding, born at London, February 17, 1827, devoted the greater part of her life to teaching. She published *The Rivulet*, a prose allegory, in 1846, *Idiomatic Italian Exercises* in 1867, and *A Shadow of Dante*, in 1871. She died 24th November 1876.—**Christina Gabriella R.**, sister of the above, born in London, December 1830, is one of the truest of England's poetesses. She published *Goblin Market, and Other Poems*, in 1862; *The Prince's Progress, and Other Poems*, in 1866; *Commonplace and Other Short Stories*, in 1870; *Sing-Song, a Nursery Rhyme Book*, in 1872; *Speaking Likenesses, and Annus Domini, A Prayer for Every Day in the Year*, in 1874. Her *Poems* were collected in 1875. C. R. is a woman of the deepest spirituality, and, like her brother Dante, only writes as if after long thought. In her long pieces she is occasionally fantastical without being poetical, but some of her shorter poems for lyrical perfection must be compared to Tennyson's best. Of the latter kind is *Maude Clare*, a poem in which it is impossible to detect a flaw.

Rossi, Count Pellegrino Luigi Odoardo, was born at Carrara, 13th July 1787, studied law at Bologna, and at nineteen held the office of Procurator-General's substitute there. He was appointed Professor of Law at Bologna (1812). In 1816 he removed to Geneva, where he became Professor of Criminal Law (1819), Member of the Council (1820), and deputy to the diet (1830). Entrusted with a diplomatic mission to Paris in 1833, he was persuaded by Broglie and Guizot to settle in France, where he was at first employed in writing for the *Revue des Deux Mondes*, then naturalised, and was successively made professor of political economy and of constitutional law at the *Collège de France*, and a count and peer of France (1839). In April 1845 he was sent as ambassador extraordinary to Rome, where he persuaded Gregory XVI. to recall the Jesuits, and remained as ambassador till the Paris Revolution of February 1848. R. gained the confidence of Pius IX., who made him the head of the new ministry of the 14th September, in which he also took the portfolios of police and finance. R. had set before himself the high task of reconciling Italy, crushing or converting republicanism, and promoting a good accord with Austria; but his vigorous measures provoked some of his opponents, and he fell by the hand of an assassin on the 15th November 1848. His death was the signal for the outbreak of the revolution that drove the Pope to flight on the 23d November. R. wrote *Traité du Droit Pénal* (3 vols. Par. 1825); *Cours d'Économie Politique* (2 vols. *ib.* 1839-41, and 1843); *Traité du Droit Constitutionnel Français* (2 vols. *ib.*); a masterly *Préface à l'Essai sur le Principe de Population de Malthus* (*ib.* 1845); *Notes aux Œuvres de Ricardo* (*ib.* 1847); and a great number of articles in the *Revue Française* and the *Annales de Legislation et d'Économie Publique*. See Garnier, *Notice sur la Vie et les Travaux de R.* (Par. 1849).

Rossieny, a town of the government of Kovno, in European Russia, stands on the Dubissa, 88 miles N.W. of Kovno. It was formerly capital of the Polish province of Samogitia. Pop. (1870) 10,700.

Rossi'ni, Gioacchino, the most celebrated of Italian operatic composers, was born at Pesaro, in the Papal States, February 29, 1792. His father was a performer on the French horn, and his mother an operatic singer. He began to study music in Bologna in 1802 under D. Angelo Tesel. In 1816 he made a musical tour through the Romagna, and in the following year received lessons from Mattei at the Bologna Lyceum. The first opera he composed was *Demetrio e Polibio* (1809), but his earliest performed work was *La Cambiale di Matrimonio* (Milan, 1810). The *L'Inganno felice* (Vienna, 1812) and *La Pietra del Paragone* (Milan, 1812), were steps in advance, but his delightful *Tancredi* (Venice, 1813) evoked a storm of genuine applause. His fame at once became European, and when little more than twenty years of age, he was the favourite operatic composer of the day.

Of the extraordinary series of thirty operas which he produced with amazing fertility during the next ten years we can only mention a few of the best, viz., *L'Italiana in Algieri* (Venice, 1813), *Aureliano in Palmira* (Milan, 1814), *Elisabetta, Regina d'Inghilterra* (Naples, 1815), *Il Barbiere di Siviglia*, the most popular of comic operas (Rome, 1816), *Otello*, a fine serious work (Naples, 1816), *La Cenerentola* (Rome, 1817), *La Gazza Ladra*, an extraordinary success (Milan, 1817), *Mosè in Egitto* (Naples, 1818), *La Donna del Lago* (Naples, 1819), *Maometto Secondo* (Naples, 1820), *Zelmira* (Naples, 1822), and the grand and classic *Semiramide* (Venice, 1823), his last work for the Italian stage. He married Mdle. Colbran, a primadonna in 1821, and became conductor of the Italian Opera in Paris in 1824. In this city he produced *Le Siège de Corinthe* in 1826, an improved edition of *Maometto Secondo*, but little else of much importance except his last and most earnest opera, *Guillaume Tell* (1829), which, notwithstanding an inferior libretto, is a fitting pinnacle to his fame. The remaining thirty-nine years of his life were as barren as his youth had been prolific; indeed, he wrote nothing more except his celebrated *Stabat Mater* (1832), more frequently performed than any other, the *Messe Solenne* (1865), and a few musical trifles. He lived in Italy from 1836 till 1855, but afterwards principally in Paris. He died November 13, 1868, and was buried in Père-la-Chaise. R.'s operas number about forty, some half-a-dozen of which are still favourites of the first class. They are distinguished by melodioc invention, skill in writing for the voice, and florid instrumentation. The rapidity with which he worked, and a certain contemptuous carelessness of rule, render his compositions of unequal merit, while his scoring is frequently defective. But his genius was exuberant, versatile, and brilliant. His range was wide, and whilst the vivacity of his style found a natural vent in opera buffa, it enlivened his efforts at opera seria. His influence on his art was great, particularly upon the Italian and French schools. See R., *sa Vie et ses Œuvres*, by Azevedo (Par. 1865); *The Life of R.*, by Edwards (Lond. 1869), and *Della Vita e delle Opere di G. R.*, by Silvestri (Milan, 1875).

Ros'ter (formerly *Rolster*, probably a corruption of *Regider*), a list in the British army regulating the regimental, garrison, and other services of officers and men in rotation. The officers' R. for regimental duty is kept in the adjutant's office, the R. for brigade duty in the brigade-major's office. A R. is kept of the rotation in which troops are to proceed on foreign service.

Ros'tock, the chief seaport of the Grand Duchy of Mecklenburg-Schwerin, on the river Warnow, 44 miles N.E. of Schwerin by rail. The river here is only eight to ten feet deep, and vessels drawing a greater depth than this load and unload at Warnemünde, 9 miles N., and at the mouth of the river. R. is surrounded by walls with twelve gates, and with its numerous gabled houses rising to seven stories, and its many fine old buildings, it presents a peculiar and very mediæval appearance. Among its squares are the Neumarkt with the Rathhaus, and the Blücherplatz, containing a statue in brass of Blücher, who was a native of the town. R. has six churches, the chief of which are the Marienkirche of the 13th c. (309 feet long, 115 feet wide, and 85 feet high); the Petrikirche, with a tower 430 feet high; and the Nikolaikirche, with a tower 340 feet high. The University, founded in 1419, has a library of 120,000 vols., and had, in 1878, 39 professors and 157 students. The chief industries of R. are cotton, linen, tapestry, machinery, vinegar and brandy manufacture, tanning, shipbuilding, straw-plaiting, iron-founding, and brewing. It has large fisheries, and important commerce in corn, wool, flax, and wood. In 1874 there entered the harbour 611 vessels of 64,738 tons, and cleared 600 of 67,345 tons. R. has the largest commercial fleet on the Baltic. Pop. (1875) 24,172. R. is of Wendish origin. Burnt by the Danish king Waldemar I. in 1161, it was rebuilt in 1170. From 1237 to 1301 ruled by a dynasty of its own; in 1323 it fell to Mecklenburg. It was a prominent member of the Hanseatic League from its commencement until 1630, and still enjoys many of its peculiar privileges. In 1695 it fell to Mecklenburg-Schwerin, and though taken by the Swedes in 1712, the Danes in 1715, and the Russian in 1716, was recovered in 1719.

Rostof, the name of two towns in European Russia. (1) R., one of the most ancient towns in Russia, on the lake of R.,

government of Jaroslav, 34 miles S.S.W. of the town of that name. It has 33 churches, and is the seat of an archbishop. It has manufactures of linens, silks, and candles, and is the scene of an active trade during the great annual market (February 21 to March 11). Pop. (1870) 9683.—(2) **R.**, on the right bank of the Don, government of Ekaterinoslav, 34 miles E. of Taganrog by rail. The foundation of the fortress of St. Dmitri here in 1749 was the commencement of the town, which has increased rapidly, owing to its advantageous situation as a ferry over the Don. **R.** has 5 churches, and carries on an active manufacture of cast iron, bricks, tobacco, soap, and leather. In 1873, the value of articles imported was £174,600; of articles exported, £1,734,680. Pop. (1870) 44,453.

Rostop'schin, Feodor Vassilievitch, Count of, was born at Moscow, March 23, 1765, of a family tracing its descent from Genghiz Khan. Distinguished as a soldier and court official, he rose under Catharine and Paul to be first chamberlain and a general in the army, but in 1801 fell into disgrace through his open disapproval of the alliance with France. Appointed by Alexander governor of Moscow (1812), he raised for the defence of the town a body of 122,000 volunteers, but on the approach of Napoleon left the town with these and the greater part of the population. The burning of Moscow, laid at his door by Niebuhr and others, he indignantly denied to be his doing, imputing it to the enemy in *La Verité sur l'Incendie de Moscou* (Par. 1823). It is certain that **R.** in leaving Moscow devastated his own rich estates near the town. **R.** accompanied Alexander at the Vienna Congress, after which he lived chiefly in Paris. He died at Moscow 18th January 1826. An incomplete collection of his works appeared at St. Petersburg in 1853.—His daughter-in-law, **Countess Eudokia Petrovna R. (né Sushkoff)**, born at Moscow January 4, 1812, published two novels, *On the Shore* (St. Petersburg, 1857), and *The Happy Lady* (ib. 1858), and a collection of popular poems (4 vols. ib. 1855-59). She died at Moscow, December 15, 1858.

Roswitha (properly *Hrothsulth*, from the Old High Ger. *Hruodsuind*; Latinised *Hrotsvitha* and *Hroswitha*), a German poetess, born 935 A.D. of a noble Saxon family, became a nun at Gandersheim about 980, and died there about the beginning of the 11th c. She wrote six comedies in Latin after Terence, a poem in Latin hexameters on the deeds of Otto the Great, eight 'legends,' &c. Her works were first published by Konrad Celtis (Nürnberg, 1501); the last critical edition is that by K. A. Barack (Nürnberg, 1852). Their genuineness has recently (1867) been challenged by Aschbach, and vindicated by Köpke (1869) in his *Ottotonische Studien*. There is a French translation of the 'Comedies' by Magnin, with an admirable introduction (Par. 1845). The best edition of the poem on Otto is that by Pertz in the *Monumenta Germaniæ Historica*. See also the *Essays* by Hoffmann and G. Freytag (Brest, 1839), and by Dorer (Aarau, 1857).

Rotation. Under Kinematics certain elementary theorems relating to **R.** have been pointed out. It remains to supplement these, and then touch upon the dynamical bearings of the subject. A rigid system which is under no restraint, has six degrees of freedom, three of translation and three of **R.**; in other words, it requires six conditions to fix it. If one point is fixed translation is impossible, and there remain only the three degrees of freedom of **R.**; that is to say, the system is at liberty to rotate round any of three arbitrary non-planar axes, and a **R.** round any other axis can be resolved into independent rotations round these. Fix a second point, or, what comes to the same thing, fix any line through the first point, and two other conditions of restraint are introduced, so that the system has only one degree of freedom, namely, **R.** round this line as axis. Fix any plane passing through this line, and the system is under complete restraint. **R.** is simply displacement, or a succession of displacements, made according to a certain law; and it is a theorem in the kinematics of **R.** that any displacement of a rigid system is equivalent to a translation together with a **R.** round some axis in the system. Now a **R.** and translation are equivalent to a screw motion or twist; and hence any displacement can be represented by a definite twist. Again, since there is no translation if one point be fixed, it is evident that, displace a rigid body (with one point fixed) how you will, there is always at least one line of particles which occupies the same position before and after the displacement. This line of particles, of course, passes through the fixed point,

and it is the axis round which the **R.** equivalent to the displacement takes place. If a body is rotating round any axis, the motion of every point must be in a plane perpendicular to this axis, and must be normal to the plane passing through the axis and the point. The velocity of any point depends upon the distance of the point from the axis, and is indeed strictly proportional to this distance, since the angular velocity of every point is the same. If we regard the axis as a vector or directed line drawn in the direction from which the **R.** appears positive, and of length proportional to the angular velocity, we may completely represent the **R.** by this localised vector or *rotor*, as it has been called. And now the ordinary theorems of composition and resolution of rotations may be thus enunciated. The vector resultant of the representative rotors of a number of independent rotations is the rotor of the resultant **R.**; and the resolved portion in a given direction of the rotor of a **R.** is the rotor of the resolved portion of the **R.** The complete analytical statement of the most general problem in rotations was first given by Euler. Assuming the body to rotate with given angular velocities under the action of given couples round three rectangular axes, he obtained a system of three equations involving as co-efficients of the variables the moments of inertia of the body round these axes. When no external force is acting, the analysis is much simplified; and there are three rectangular axes, known as the *principal axes*, passing through the origin, about which the mass is so disposed that **R.** round any of them generates no couple or precessional motion. The axis of **R.** is permanent and the **R.** is stable; while an initial **R.** round any other axis is accompanied by a continual shifting of the real axis of **R.** In other words, the body rotates round an *instantaneous axis*, passing through the origin. Such a **R.** may be conceived of kinematically as the rolling of a cone fixed in the body upon a cone fixed in space. Except for special cases, Euler's equations cannot be integrated. From the space (—) symmetry, and directed character of rotations, the subject is evidently peculiarly fitted for quaternion treatment. See Poincaré's *Théorie Nouvelle de la R.*; Thomson and Tait's *Natural Philosophy*, vol. i. (1867); Tait's *Quaternions* (1872), and Clifford's *Elements of Dynamics* (1878).

Rotation of Crops. Experience has shown that one crop after another of the same kind greatly reduces the fertility of all soils. It has also shown that one crop after another of a different kind does not materially impoverish the soil. From these two facts the deduction is fair that the fertility of the soil is best maintained by taking *different* crops after one another. Accordingly, in practice a limit is placed on the number of crops taken in succession of whatever kind, and this number and succession is called the **R. of C.** As the inorganic materials which enter into the composition of plants vary much in their nature and relative proportions, it is evident that a soil may contain those necessary for the growth of certain species, while it may be deficient in those required by others; and it is on this principle that the rotation is founded, those plants succeeding each other in rotation which require different inorganic compounds for their growth. That the same crops grown several years in succession in the same field will deteriorate in a marked degree, has been tested by taking the returns of the plant grown on the same and on different plots through a series of five years, the result showing a manifest advantage in shifting crops of 6 per cent. in beans, 14 in oats, 27 in potatoes, 33 in flax, 55 in barley, and 66 in turnips.

In all countries where particular attention has been paid to agriculture, the most advantageous succession of crops is generally known—necessarily depending upon local circumstances, such as the quality of the soil, and its fitness for particular crops, the wants of the farmer, and the special market demands of his neighbourhood, the scope for the maintenance of stock to produce a sufficient supply of manure, the facility for purchasing manure, &c. As the most universal rule, it may be laid down that every alternate crop should be consumed by animals on the farm, or an equivalent in introduced manure be supplied, and that, as much as possible, the plants which succeed each other should be botanically of different orders.

The exhausting power of various farm-produce in ordinary cultivation is thus tabulated by Mr. Stephens:—1, the *corn crops*, in the order of wheat, oats, barley, rye; 2, *flax*; 3, the *potato*; 4, the sown grasses, when made into *hay*, in the green state they

ought to be; 5, *pease* and then *beans*; 6, the *root-bearing* crops, in the order, carrots, parsnips, Swedish turnips, yellow turnips, mangold-wurzel, white turnips; 7, *vetches and clover* when cut, as also lucerne and sainfoin; 8, *sown grasses*, rye-grass and clover, when pastured; 9, *permanent pasture* of the natural grasses. The following conclusions may be drawn from the above data—namely, that the highest class of exhausting plants, such as wheat, oats, barley, and rye, should not follow in immediate succession; that the less exhausting plants, such as the green crops, turnips, mangold, cabbage, carrots, or potatoes, should intervene; that the tuberos and fusiform-rooted green crops, such as potatoes, carrots, parsnips, being the most exhausting, should be associated directly with fresh manure; that the round-rooted green crops, such as turnip and mangold, should also be directly provided with fresh manure, but will thrive with less than the preceding class of green crops; that forage plants, such as vetches and clover, may be regarded as substitutes for round-rooted plants, but being less exhausting may be placed further from the manure; that the pasture grasses, being the least exhausting of all crops, may be placed furthest from the manure, and the longer they remain in pasture the soil receives the greater amelioration.

The principles of R. of C. applicable to agriculture also govern the horticulturist. Crops in horticulture are made to follow each other according to two distinct plans or systems, which may be termed *successional* cropping, and *simultaneous* cropping; the former is generally followed in private gardens, and the latter in market gardens. Successional cropping is that in which the ground is wholly occupied with one crop at one time, to be succeeded by another crop, also wholly of one kind. Simultaneous cropping is that in which several crops are all coming forward at the same time. The object to be attained by a system of cropping is that of procuring the greatest quantity and the best quality of the desired kind of produce at the least possible expense of labour, time, and manure.

Rotatoria. See ROTIFERA.

Rotche, a genus of Auks or *Alcida*, of which the *Mergulus* (or *Cephus*) *melanoleucas* is a familiar example. This bird is also named the 'little auk' and 'sea dove.' It is found on the Arctic coasts, and is almost entirely oceanic in habits, rarely visiting the land save for the purpose of breeding. Its general colour is black with a white mark on each wing, whilst the under parts are also white.

Rothe, Richard, a German commentator, theologian, and preacher, was born at Posen, 28th January, 1799. In 1823 he became preacher to the Prussian embassy at Rome, where he worked along with Bunsen. In 1828 he was appointed professor of divinity at Wittenberg, and in 1837 ordinary professor and director of the new Theological School at Heidelberg. This position he exchanged in 1849 for that of professor and university preacher at Bonn, but returned in 1854 as successor of Ullmann to Heidelberg, where he died 20th August, 1867. R.'s first work was the *Neuer Versuch einer Auslegung der Paulinischen Stelle Rom v. 12-21* (Wittenb. 1836). It was followed by *Die Anfänge der Christl. Kirche und ihre Verfassung* (Wittenb. 1837); his greatest work, the *Theologisch. Ethik* (3 vols. Wittenb. 1845-48, of which the first 2 vols. were republished in a completely new edition in 1867); *Zur Dogmatik* (Gotha, 1863); *Sermons and Stille Stunden* (1872); and *Entwürfe zu der Abendandachten über die Briefe Pauli an den Timotheus und Titus*. (Wittenb. 1876). R. was the connecting link between the great conservative school of Neander, Olshausen, and the rest, and the modern critical school of men like Schenkel and Holzman, being at once profoundly religious and keenly scientific in spirit. An interesting biography of him has been written by Nippold (Wittenb. 1873).

Rothenberg-an-der-Tauber, a small and ancient town of Bavaria, on the Tauber, an affluent of the Main, near the Würtemberg frontier, and 33 miles S.S.E. of Würzburg by rail. It was formerly a free town of the empire, and has walls still in good preservation. The most interesting buildings are the Gothic church of St. Jakob (1373-1453), the Gothic Rathaus (1574-89), and the Romanesque chapel of St. Blasius, a remnant of an ancient ducal castle. R. manufactures woollens, paper, and gunpowder, and has trade in corn and cattle. Pop. (1875) 5772.

Rotherham, a manufacturing town in the West Riding of Yorkshire, 5 miles E.N.E. of Sheffield by rail, on the right bank of the Don, which here receives the Rother ('red river'). The town was incorporated in 1871. The cruciform parish church, in Perpendicular style, with a crocketed spire and fine W. front and clerestory, is said to have been founded by Thomas Scott, a native of R. and Archbishop of York (1480-1500). It was restored in 1875 by the late Sir G. G. Scott at a cost of £9000. Other buildings are St. John's (1864), in Early English, and St. Stephen's (1875), in Second Pointed style, a handsome Roman Catholic church (1843), a Congregational chapel (1867), with a spire of 130 feet, a hospital and dispensary (1871), a free grammar-school (founded 1584), and the Independent College, established in 1755, and rebuilt (1874-75), in Collegiate Gothic style, at a cost of £20,000. R. Park, a picturesque recreation-ground of 20 acres, 300 feet above the town, was opened in 1876, and a new covered market, to cost £6000, is now (1878) in course of erection. A five-arched bridge over the Don, with an ancient chapel built on the central pier, connects R. with the suburb of Masborough, for more than a century and a half the seat of celebrated ironworks, where Southwark, Sunderland, and Staines bridges were cast. In 1871 the local ironworks employed 2087 hands, the manufacture of steel 124, of brass 156, of engines and machines 319, of glass 227, of earthenware 254, and the coal-mines in the district 1937. R. publishes one newspaper, and had a pop. (1871) of 25,892. See *Notes on R. Ecclesiastical and Civil*, by J. Guest, F.S.A. (1878).

Rothesay, a royal burgh and favourite watering-place of Scotland, and capital of the county of Bute, is beautifully situated on the E. side of the island, and at the head of a splendid bay, 40 miles from Glasgow by steamer. It is built round the head of the bay, and on the steep, woody slopes of an encircling belt of hills. Near its centre stands R. Castle, formerly a royal residence, which dates from about 1100. It was given by Robert III., who died here, to his son David, with the title Duke of R. (a title still borne by the Prince of Wales), and was partly destroyed in 1685. The picturesque ivy-clad ruin, having fallen into a wretched state of neglect, was tastefully restored by the Marquis of Bute in 1874-75. R. has several excellent hotels, a large hydropathic establishment, an elegant aquarium (1875), a handsome promenade (extended in 1877), and a good harbour. It is visited by nearly all the Clyde steamers on their way to and from the West Highlands, and is a great resort of invalids on account of the singular mildness of the climate. Its charter as a royal burgh dates from 1401. Pop. (1871) 7800. The name R. means 'island of Rother,' the ancient name of Bute.

Rothschild, Meyer Anselm (Amschel), was born in 1743 at Frankfurt-am-Main, his father, a Jewish trader, keeping a shop with the sign 'Zum Rothen Schilde,' from which the family takes its name. Destined at first for a rabbi, he eventually exchanged the Talmud for a ledger, and acquired at Hannover a small capital, on which he married Gutle Schnapper (1755-1849), and settled as money-lender on his own account in his native city (1770). In 1801 the Landgraf of Hessen appointed him court-agent; a year later, he engaged in his first important operation, a Danish loan. When in 1806 the Elector (late Landgraf) of Hessen fled before the French, he entrusted to R. the care of his abandoned treasures; nor was the confidence misplaced. R. died 19th September 1812, having with the aid of his five sons established the foundations of a house which 'not only has attained unparalleled wealth and financial pre-eminence, but has also become famous for its munificent and almost unrestricted charity.' The third of these sons, Nathan Meyer, born at Frankfurt, 16th September 1777, came over to England in 1798 as his father's Manchester agent. First on the outbreak of the Peninsular War (1808) did his boundless resources reveal themselves to the mercantile world in the shape of remittances to the English forces; and by degrees his financial transactions, dwarfing those of Gideon or the Goldsmids, extended over the entire Continent, his own or his brothers' agencies arising in every capital of the Eastern and Western hemispheres. Though not the eldest, he came to be looked on as head of the R. firm, and in 1822 was created Freiherr von R. by the Emperor of Austria, two years after his appointment as Austrian Consul-General. He died at Frankfurt, 28th July 1836, and was succeeded as head of the English house by his eldest son, Baron Lionel Nathan de R. The latter, born

at Frankfurt, 22d November 1808, and educated at Göttingen, has signalised himself by his successful efforts for the removal of Jewish disabilities, being himself elected member for the city of London in 1847, but not assuming his seat till 26th July 1853, and holding it till 1874. His eldest son, Nathaniel Meyer, born 8th November 1840, succeeded his uncle Sir Anthony R., Bart., (1810-76), and has sat for Aylesbury since 1865. The English branch of the R. family is allied by marriage with the houses of Yorke, Fitzroy, and Primrose.

Of Meyer's other sons, Freiherr Anselm Meyer von R. (1773-1855), head of the Berlin house, was succeeded by his nephew Meyer Karl (born 5th August, 1820); Freiherr Salomon Meyer von R. (1774-1855), head of the Vienna house, by his son Anselm Salomon (1803-74), and he in turn by his youngest son Salomon, and Baron James de R. (1792-1868), head of the Paris house, by his eldest son Edmund (born 1826), who is known since the Franco-German war for his hostility to Prussia. See *Das Haus R., seine Geschichte und seine Geschäfte* (2 vols. Leips. 1857); vol. i. of Otto's *Buch berühmter Kaufleute* (2d. ed. Leips. 1870); and chap. xlvii. of Picciotto's *Sketches of Anglo-Jewish History* (Lond. 1875).

Rotifera (Lat. 'wheel-bearers'), a group of animalcules usually classified with the *Scolecida* or Vermes, and distinguished by an anterior ciliated apparatus for effecting locomotion. They were discovered by Leeuwenhoek about the end of last century. He observed them in the rainwater which had collected in one of the gutters of his house-roof. R. occur in both fresh and salt waters, and are readily obtainable for microscopic observation. The body varies greatly in shape, but most of the species exhibit traces of a jointed arrangement of their frames, and have a terminal appendage either in the form of a jointed tail (*Brachionus*), or of pincers or nipper-like organs intended to attach the body to fixed objects. The shape of the wheel-like ciliated disc also varies in different genera. In some it consists of two circular lobes fringed with cilia, in others it is oval, in some kidney-shaped; whilst in place of the disc, tentacles provided with cilia may exist. The first observers of the R. gave them the name of 'Wheel Animalcules,' from the idea that the ciliated discs actually revolved. This is now known to be erroneous; the discs are stationary, but the cilia bending rapidly in succession appear like movable discs. The R. have a complete digestive system, and in this, among other things, are superior to the *Infusoria*. A complicated apparatus of jaws, regarded by Mr. Gosse as homologous with the jaws of insects, is found. The nervous system consists of a single nerve mass or ganglion placed near the anterior extremity, the ganglion being very large relatively to the size of the creatures. The sense-organs consist of several pigment-spots, which may represent rudimentary visual organs, and of certain appendages subserving the sense of touch. There are no heart or blood-vessels in R., but a special circulatory apparatus occurs in connection with the so-called *water-vascular system*. This system appears to convey water throughout the body, and may be either excretory or respiratory in its functions, or may perform both offices. The sexes are situated in different individuals. The females are the most highly organised, the male R. as a rule wanting the digestive organs and other parts, and having only the generative apparatus well developed. The R. are highly productive, nearly 17,000,000 eggs being calculated to be produced by a single *Hydatina* in twenty-four days. The R. are noteworthy as illustrating the phenomena of *Dormant Vitality* (q. v.). A good classification of these animalcules is still a desideratum. Amongst the best-known genera are *Hydatina*, *Rotifer*, *Floscularia*, *Melicerta*, *Stephanoceros*, *Brachionus*, *Notus*, &c.

Rot of Sheep, a well-known disease caused by the presence of parasites in the liver and bile-ducts of these animals. It appears to be developed in marshy grounds, and in situations in which the eggs and larvae of the parasites are freely disseminated. The most noted outbreaks of the disease in Great Britain occurred in 1809, 1816, 1824, 1830, 1853, and 1860. The western and southern counties of England were chiefly affected in 1860. In 1872—a wet season—R. was also prevalent. The parasite which causes R. is the liver fluke, the *Distoma* or *Fasciola hepatica*. R. is known as *Cootie* in Dorset, *Iles* in Cornwall, and *Bane* in Somerset. The Germans name it *Egelsmuche*, or *Die Fäule*. R. is most prevalent in spring. The eggs are transferred with the fæces to the meadow-lands. The eggs find their

way into water, and there undergo the primary phases of development. Sooner or later the larvæ, which are free-swimming creatures, become encysted within the bodies of freshwater snails. Ultimately escaping from their molluscan hosts, they pass into the body of the sheep along with the water used in drinking, and from the stomach enter into the liver and bile-ducts and their branches, where they become fully developed and mature. The affected animals are dull and inactive, the mucous membranes are white, and the sheep lose flesh rapidly; thirst is present, and diarrhoea is a common symptom; the wool may also drop off in patches, and dropsical swellings take place; the blood wants albumen, and the tissues generally are wasted. The liver, as the seat of the disease, presents a characteristic appearance; the ducts are full of flukes, the liver-tissue is thickened and unhealthy, and in some cases is disintegrated.

R. is difficult to treat. Affected sheep should be destroyed, but if the disease has only made little progress, the sheep may be removed to dry pasturage, and be supplied with nutritious food, along with sulphate of iron and common salt.

Rottenburg, an old town of Würtemberg, on the Neckar, 8 miles W.S.W. of Tübingen. In the Bischofshof, formerly a Jesuit monastery, is a valuable collection of Roman antiquities. Round R. hops are extensively grown. Pop. (1875) 6416.

Rotten Stone is a silicio-aluminous compound, found in Derbyshire and other localities, and used in a state of powder as a polishing material for soft metals and glass.

Rotterdam (*dam of the Rotte*), the second largest city and commercial centre of the Netherlands, and capital of the province of S. Holland, on the right bank of the Maas, and on either side of its affluent the Rotte, 16 miles inland from the North Sea, 36 S. by W. of Amsterdam by rail, and in ordinary weather 12 hours from London. It is a busy, thriving city, of quaint, picturesque appearance, known on account of the intricate network of canals (*grachten* or *havens*) by which it is intersected, as 'vulgar Venice.' Stretching along the Maas, which is here about a mile wide, it narrows in the N. towards the Delft Gate, forming a triangle. The Boompjes ('little trees'), a handsome quay 1½ miles long facing the river, is flanked by fine buildings, and shaded with a row of elms planted in 1615 and now grown to large size. The river here is about 40 feet deep, and the canals, three of which (*Leuve Haven*, *Oude Haven*, and *Nieuwe Haven*) are strictly arms of the Maas, are of sufficient depth to admit of vessels discharging in the very heart of the city. Numerous drawbridges (*ophaalbrug*) span the canals, and a great dyke or embankment runs through the centre of the town, protecting the lower quarters (*Binnenstad*, 'inner town') from inundation during high tides. The high street or Hoogstraat extends along this dyke, while the finest part of the town, the *Buitenstad* ('outer town'), lies between it and the Maas. An immense railway viaduct, the connecting link between various Dutch and Belgian lines (completed 1877), traverses R. from N.W. to S.E., and is continued by a vast double-railed bridge across the Maas at Moerdijk. Among the more notable buildings are the Grootte Kerk of St. Lawrence, a brick Gothic structure, dating from 1472, and containing several monuments of naval heroes (De Witt, &c.) and a fine organ; the town-house with handsome Corinthian colonnade; the hospital of Coolsingel, which has accommodation for some 250 patients; and an elegant pile of public buildings (telegraph, and post office and railway station), erected near the heart of R., and in connection with the viaduct in 1876. R. has also 15 other churches, a synagogue, a medical school, a scientific Batavian Society, and many benevolent and intellectual institutions. The Museum Boijmans with its valuable art treasures were destroyed by fire with the Schieland Palace in 1864. Itself a market for several articles of import, R. has a great transit trade, chiefly for the supply of Germany. There are 28 regular steam lines to England, 5 to Scotland, and 2 to Ireland, and some of the vessels of these lines carry important mails. In 1877 there were, besides a fortnightly line to New York and a monthly line to Java, various lines to ports in the Baltic, Mediterranean, &c., most of which employ large steamers built in England or on the Clyde. In 1875 there entered 2010 British vessels of 766,954 tons, and cleared 1978 of 755,867 tons. The total number of vessels that entered (1873) was 3828 (of which 91 were from the Dutch E. Indies), and of those that cleared 3889. Among the chief imports are coffee (in 1875, 1,363,300 bags), sugar (62,000 tons), cotton (183,783 bales),

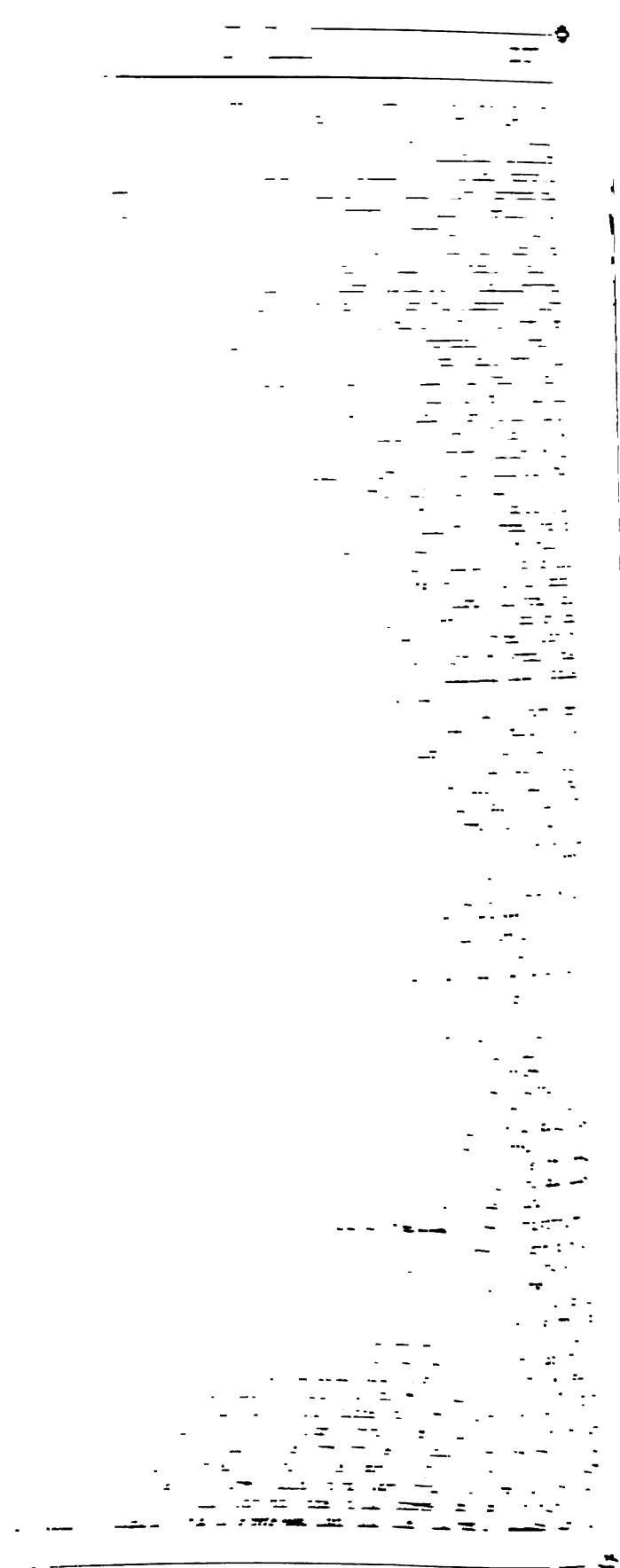
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feited to the bank, or his whole stake is 'put in prison,' the next deal determining its fate. This is the only advantage possessed by the bank, and at some tables it is necessary in a *refait* of 31 that the last card should be black. When the numbers are otherwise equal, as 33 and 33, the deal goes for nothing. A player may stake his money upon *rouge* or *noir* by placing it on the red or black spots on the table, or he may stake it on two other chances, *coulour* or *inverse*, which are dependent on the success or the contrary of the colour of the first card turned up. If he stakes on *coulour* he wins if this colour (red or black) wins, if on *inverse* he wins if it loses. The leading systems of play most in vogue at R.-et-N. are called *martingale* and *paroli*. The former consists of doubling a stake each time while losing until recouped by a win, which would be infallible in its results were not the highest stake limited to £405, the lowest being 4s. By *paroli* is meant a system of doubling the next stake while winning, and of playing single stakes after losses. R.-et-N. is sometimes called *trente-un* or *trente-et-quarante*. It became fashionable about 1798 in France, where it was forbidden by law in 1838. It was also suppressed in Germany in 1872.

Rough Casting, a process of plastering usually adopted for the external walls of cottages and farmhouses to render them waterproof. It consists in dashing over the plaster, while wet, a fluid mixture of fine washed gravel, lime, and water, called rough-cast or pebble-dash.

Rouher, Eugène, was born at Riom, in France, November 30, 1814. In 1828 he entered the Angoulême naval college, but he afterwards devoted his attention to law, and was admitted to the bar of Riom in 1836. After the February revolution a profession of republican principles secured for him the representation of the Puy-de-Dôme. On the 30th of October 1849, he succeeded Odillon Barrot as Minister of Justice. In January 1851, he shared the fate of his colleagues in the cabinet, and retired from the Ministry. In April he again became a member of the Government. R. held the portfolio of justice from the 2d of December to 22d of January 1852, and on the 25th of that month he became vice-president of the Council of State. In February 1855 he was appointed Minister of Agriculture, Commerce, and Public Works, and in 1860 he prepared the commercial treaty signed by France and England. He succeeded Billault as Minister of State in October 1863, and for five years with consummate ability defended government measures against the attacks of Thiers, Favre, and other eminent antagonists. On January 19, 1867, when the Imperial letter was addressed to him regarding the *Senatus Consultum*, he resigned, but was shortly reinstated. He was by Imperial decree made president of the Senate on the 20th of July, 1869. After the fall of the Empire he retired to England, where he exerted himself in the cause of Napoleon. In February 1872 he was returned to the National Assembly for Corsica, and is still (1878) the leader of the practical and prudent Bonapartists.

Roulers, or **Rosselaëre**, a town of Belgium, province of W. Flanders, 19 miles S. by W. of Bruges by rail, with considerable trade in flax, and manufactures of linen and lace. Pop. (1873) 12,433.

Roulette (Fr. 'a little wheel') was one of the principal gambling games in Paris from the end of the 18th c. until it was put down in 1838. From France, like Rouge-et-Noir, it fled to Germany, and became one of the attractions of the spas—Ems, Homburg, Wiesbaden, &c. It has been forbidden by law in Germany since 1872, but it is still played to some extent in various places in Europe and America. R. is played between a banker and any number of the public at an oblong table covered with green cloth, in the centre of which is a round cavity with a movable bottom, in the circumference of which are 38 holes, painted alternately in black and red, with the numbers 1 to 36, a zero, and a double zero. The banker throws with one hand a little ball of ivory into the cavity, which he sets in motion by turning with his other hand a handle in the form of a cross. After revolving a number of times, the ball falls into one of the painted compartments, thus determining the winning number. A player may stake on any number or numbers he chooses, and for this purpose rectangles are inscribed on the table to the right and left of the cavity, with the numbers 1 to 36 in 3 columns of 12 numbers each, a black zero, and a red double zero. All who have staked win in proportion to the numbers they have

chosen; thus, if a winning player has staked on one number alone he wins 36 times his stake, if on two numbers 18 times, and so on. There are also six chances, on either of which one may stake—viz, *impair* (an odd number), *manque* (the numbers 1 to 18), *rouge* (red), *pair* (an even number), *passé* (the numbers 18 to 36), and *noir* (black). When all these chances are staked upon, and the ball falls into zero, a player's stakes are either divided between the banker and himself, or 'put in prison' for another trial, to see to whom they belong. The bank, with its large capital, and the slight odds the zeros give in its favour, is a certain winner in the long run, and a steady gain of 4 per cent. may be calculated on. Some tables have a single zero, the total amount of stakes returned to the winners being then 35 to 1. In some American tables 27 numbers are only used, which gives, of course, a greater percentage in favour of the bank.

Round, a composition for three or any greater number of voices. It consists of a series of melodies, all of which harmonise. The first voice leads off, and on the termination of the opening melody the second voice takes it up, and so on, each part chiming in its turn, and all singing the entire round independently from their various starting-points an indefinite number of times. The effect is often exceedingly pretty. The R. is a sort of canon, but differs from it inasmuch as it can only be sung at the unison or octave. When of an amusing description it is sometimes called a catch.

Roundelay, in music, a vocal solo in rondo form.

Roundels or **Roundlets**, in heraldry, are circular charges of common occurrence. R. are of two sorts, of metal represented by discs, and of colour represented by globes. A roundel or is named a 'bezant'; *argent*, a 'plate'; *azure*, a 'hurte'; *gules*, a 'torteau'; *vert*, a 'pomme'; *purpure*, a 'golp'; *sable*, a 'pellet'; *tauny*, an 'orange'; *sanguine*, a 'guzé.' Another roundel, the 'fountain,' of two tinctures, *argent* and *azure*, is represented by wavy lines of those tinctures alternately drawn fesse-wise.

Roundheads, the nickname of the Cavaliers for the Parliamentarians, first publicly used, according to Rushworth (iv. 463) and Clarendon (i. 267), in December 1641, by one Captain David Hinc, who, drawing his sword, swore that he would 'cut the throats of those round-headed cropp'd-eared dogs that bawled against the bishops.'

Round Robin (Fr. *rond ruban*, 'round ribbon'), a document signed by a number of persons in the form of a circle, that no name may appear the first on the list. It was first used by French officers in remonstrances to their superiors.

Round Towers, The, of Ireland, were regarded by antiquaries of a former generation as relics of a primeval Baal worship, but are now clearly proved to be of post-heathen erection, some of the earliest standing on Christian graves (which accounts for their occasional divergence from the perpendicular), and the date of the building of several being expressly given in the *Irish Annals*. At the present day (1878) they number 76—there were 118 in 1800—and may be arranged according to style in four groups, extending from 900 to 1238. The earliest (e.g., the towers of Lusk, Antrim, and Clondalkin) are built of unrounded field-stones, cemented with coarse gravel mortar; the next group (Cashel, Iniscaltra, and Monasterboice), of rounded stones, roughly hammer-dressed, laid with mortar in irregular courses; the third (Killala, Devenish, and Glendalough), of well-dressed stones, with excellent mortar and regular courses; the last (Timahoe, Ardmore, and Annadown) are of good ashlar, rather open-jointed, resembling in this the English-Norman work of the 12th c. And in this last group we find the regular round arch, carved corbels, and other Romanesque details. The R. T. were all built in connection with churches, not, however, as belfries (though afterwards employed as such), since large bells were not cast till after 1200, and not till then were campaniles erected. They were due to the incursions of the Norsemen, being meant, as Mr. Ruskin says of church-towers generally, 'for defence and faithfulness of watch.' Similar structures occur at Ravenna, Nivelles, Maastricht, and in some of the Alpine valleys, along with churches dedicated to St. Bridget, relics of the Irish missionaries St. Gall and St. Columban. Extra-Irish instances in Great Britain are the towers of Brechin, Abernethy, St. Patrick's in the Isle of Man, Barra in the Outer

Hebrides, &c.; while a church at Deerness in Orkney, with two R. T., was demolished by the proprietor in 1832. See vol. ii. of Lord Dunraven's *Irish Architectural Antiquities*, edited by Miss Stokes (Lond. 1877), and O'Neill's *Illustrations of all the R. T. of Ireland* (1876).

Roup. See AUCTION.

Rous, or Rouse, Francis, was born at Halton, Cornwall, in 1579, and educated in Oxford at Broadgate Hall, near Pembroke College. He represented Truro in several Parliaments during the reigns of James and Charles I. In 1640 he sat in the Long Parliament; and in 1643 was made a member of the Westminster Assembly, and Provost of Eton College. He was unfit for this post, and the Royalists nicknamed him 'the old illiterate Jew of Eton.' In 1645 the Commons ordered the publication of his metrical version of the Psalms, a work which forms the basis of the modern Presbyterian Psalter. R. was made a privy councillor, and entered the House of Lords in 1657. He died at Acton, near London, 7th January, 1659.

Rou'say ('Rolf's Island'), or **Rowsa**, one of the Orkney Islands, lying to the N. of Pomona, from which it is separated by a strait $1\frac{1}{2}$ miles wide. R. is 4 miles long by 3 miles broad, and is generally hilly. Pop. (1871) 860.

Rousseau, Jean Jacques, born at Geneva, June 28, 1712, was the son of a watchmaker, and lost his mother at his birth. His childhood was cared for by a sister of his father, and for two years he received instruction from M. Lambezier, Protestant pastor at Bossey, but the boy educated himself by the help of Plutarch's Lives, Tacitus, and Richardson's novels. In 1725 he apprenticed himself to a watch-engraver, from whom he received the cruellest usage, and when scarcely fifteen he ran off to wander through Savoy. Mme. de Warens, a lady of property, was his first protector, and introduced him to the hospital or college of catechumens at Turin, where he renounced Calvinism for Roman Catholicism. Leaving this establishment, he engaged himself as servant, first to the Comtesse de Verceilis, and afterwards to M. de Gouvon, equerry to the Queen of Sardinia. Next he appeared at Lausanne as a teacher of music, and in 1732 he unsuccessfully sought employment in Paris. It was after his return from Paris that Mme. de Warens installed him as bosom friend in her house at Chambéry, and for eight years he remained happy with her. Finding himself at the end of that time supplanted in his mistress's affections, he left her house, although pressed to accept the post of second favourite. He spent a year in Lyon, then went to Paris with a new musical notation, which failed to impress the public, accompanied M. de Montaigu to Venice as secretary, and in a rage fled from this employer back to Paris. He tried in vain to bring out *Les Muses Galantes*, a light opera, of which words and music were his own. His lively comedy *Narcisse* was produced at the Théâtre Italien, and he wrote several articles for the *Encyclopédie*, but for all this he received no remuneration. He gained, however, the acquaintance of such celebrities as Grimm, Diderot, D'Holbach, and Mme. D'Epinay, the last of whom in 1759 provided for him a villa near Paris called the Hermitage, where he formed a connection with an ignorant plain-looking girl called Thérèse le Vasseur. He ultimately married her, but their five children he cast upon the care of the Foundling Hospital. In 1749 the Academy of Dijon offered a prize for the best essay on the question, 'Whether the progress of Science and the Arts has contributed to corrupt or improve the morals of mankind?' R. inclined to an essay on the affirmative side. 'Take the negative,' said Diderot, and R. won the prize with the brilliant *Discours* which stands first in his collected works. In 1752 appeared his pleasant opera *Le Devin du Village*, and his *Lettre sur la Musique Française* exasperated all Paris by his attacking the French school of opera. Next year he published his *Discours sur l'Origine de l'Inégalité parmi les Hommes*. Soon after he broke with Diderot and his set, and retired to a small house at Mont Louis, near Montmorency. There appeared in succession *Julie, ou la Nouvelle Héloïse* (1760), *Lettre sur les Spectacles, Du Contract Social* (1762), and *Émile ou de l'Éducation* (1764). *Émile* contains R.'s celebrated plea for a return to a state of nature, and while aiming at civilisation and the promulgation of Christianity, throughout denies both. It was burned by order of government, while its author, denounced as an enemy of public morals, had to flee from France. After

being hunted from town to town in Switzerland, he crossed to England in 1766, on the invitation of David Hume. Vanity, the disease that embittered and put an end to his life, caused him to quarrel with Hume; and he went back to France in the following year. In 1770 he was permitted to return to Paris, on condition that he did not write on religion or politics. He wrote his *Confessions*, but published nothing. He died at Erménouville, July 2, 1778. R.'s mind united all that is petty and mean in character with a great sympathy for suffering, an intense appreciation of nature, and a more splendid imagination than any other celebrity French literature possessed. He is not witty like Voltaire, but he is more elegant than his rival. His cardinal fault is an insincerity which, just when he seeks to convince, betrays himself unconvinced. Even his own life he treats in his *Confessions*, not as a history, but as a romance, begun with falsification of his mother's pedigree, and strewn throughout with lies. He is not a philosopher, but an enthusiastic sophist, who passed for more in a time when all the world was a stage, and all the men were actors. Strange that such a man, among such men, should proclaim the innocence and purity—the immaculate conception—of every human being! In order to give plausibility to this doctrine, he traces all evil to political institutions, apparently content to consider society a final cause. He has given the world no great truth; but he acted a Samson's part in pulling down the tottering pillars of error. His great work of destruction is now forgotten by most of his readers, who now regard him only as a prose poet, and master of style. His *Confessions* appeared in 1782. R.'s *Œuvres Complètes* have been repeatedly published, with additions to each successive issue. More than one appeared during his lifetime. The best edition is that by Musset-Pathay (26 vols. Par. 1823-27). R., like Voltaire, has created a library of literature. Nearly every great Frenchman has contributed something to the criticism of R. or the elucidation of his writings. His correspondence has also been carefully collected and edited at different times. See Morin's *Essai sur la Vie et la Caractère de J. J. R.* (1851); Saint Marc Girardin's *J. J. R., sa Vie et ses Ouvrages* (2 vols. Par. Charpentier, 1875); and Morley's *R.* (1873; new ed. 1878), the best biography of this author in any language.

Roussillon, a former province of France, now constituting the department Pyrénées-Orientales. It was surrounded N. by Languedoc, E. by the Mediterranean, S. by the Pyrenees, and W. by Foix. It was ruled by independent counts of its own from 904 to 1172, after which it passed to Aragon. Taken by Louis XIII. in 1642, it was formally ceded to France by the Treaty of the Pyrenees in 1659.

Rove'-Beetle, or Cock'tail, a name applied to beetles belonging to the family Staphylinidæ. The group is recognised by their long linear black-coloured bodies. The elytra or front wings are very short, and the antennæ usually consist of eleven joints. Most of the species are small. They live under stones, among moss, and in ants' nests. They have the habit of turning up the tail when alarmed; hence their popular name 'cocktail.' The larvæ resemble the adult insects. *Staphylinus oleus* is the common species.

Rovere'do, a town of Austria, in the Tyrol, beautifully situated in the Lägerthal, on both banks of the Leno, within a mile of its junction with the Etsch (Adige), 7 miles from the Italian frontier, and $14\frac{1}{2}$ miles S. of Trient by rail. The finest building is the Castello, in the Piazza del Podesta. Among the seven churches are those of San Marco, of the 15th c., and Santa Maria del Carmine, built 1768. R. carries on extensive paper-making and tanning, but is chiefly important as the centre of the silk trade in the Tyrol, a district which produces from Trient to Verona upwards of 120,000 lbs. of silk annually. It has sixty *filande*, at which the silk is wound from the cocoons, after which it is spun in the *filatoje*. More than 2000 persons are employed in this industry. In the neighbourhood of R. southern fruits and excellent red wine are produced. Pop. (1869) 9063. Near R. the Austrians sustained a defeat from the French under Massena, September 3d and 4th, 1796.

Rovigno, a town of Austria, on the Adriatic, on the W. side of the Istrian peninsula, 42 miles S.S.W. of Trieste by rail. It has two harbours, and is the seat of an active trade in oil and wine. It has also shipbuilding, and an extensive sardine and tunny fishery. Pop. (1869) 9564.

Ro'v'go, capital of a province of the same name in N. Italy, on both sides of the Adigetto, here crossed by four stone bridges, 27½ miles S.S.W. of Padua by rail. The town is surrounded by walls with towers and bastions. It has twelve churches, among them a still unfinished cathedral, two theatres, a fine picture-gallery in the Palazzo Communale, besides a library of 70,000 vols. The handsome Assize buildings were erected in 1873. Pop. (1874) 10,749.

Ro'ving. See SPINNING.

Ro'u'ma, river of E. Africa, rises in the mountains bordering the E. side of Lake Nyassa, and flows generally E.N.E. for about 200 miles, entering the Indian Ocean in a fine bay in 10° 40' S. lat., a little to the N. of Cape Delgado. Drs. Livingstone and Kirk ascended the R. in 1861 in a small steamer for 30 miles, and in 1862 in ship's boats for 156 miles, when they found its further navigation obstructed by rapids. Thirty miles higher up, at the confluence of the Liende, the principal tributary of the R., is the town of Ngomano ('meeting-place'), which has a considerable trade. Though free from a bar at its mouth, the R. is of small value as an artery of commerce, being navigable for only eight months of the year. For 8 miles above its mouth it flows through pestiferous mangrove swamps, which are succeeded for 80 miles by a healthy valley from 2 to 4 miles wide, and shut in by the edge of a table-land from 600 to 800 feet high. This valley is fertile and heavily timbered, but infested by the tsetse fly. Above the table-land the country through which the R. flows is a level plain, dotted with detached granite hills, and well peopled. Traces of coal exist at many points on the banks of the river, and Dr. Livingstone believed that a vast coalfield extends from it as far S. as the Zambesi.

Row, John, a Scottish reformer, was born near Stirling about 1525; studied at St. Andrews University, where he devoted himself to civil and canon law. In 1550 his reputation as a pleader was such that the Scottish clergy sent him to Rome as their agent and representative there. While in Italy R. took the degree of Doctor of Laws at the University of Padua. Returning to Scotland in 1558, he began to examine the doctrines of the Reformers, and in 1559 abandoned Catholicism. In April 1560 he was one of six ministers appointed to compile a *Confession of Faith* and the *First Book of Discipline*; became minister of Perth in July, and took part in the first General Assembly of the Reformed Church of Scotland which met at Edinburgh, December 20, 1560. He was conspicuous in all the ecclesiastical transactions of the time, and held the office of moderator four times. He also took part in compiling the *Second Book of Discipline*. R. died at Perth, October 16, 1580. By his marriage with Margaret Bethune, daughter of the Laird of Balfour, in Fife, he had eight sons, one of whom, also named John (born 1568, died 1646), was the author of a *Historie of the Kirk of Scotland*, extending from the year 1558 to August 1637, and continued by his son to July 1639. This valuable work was printed for the 'Wodrow Society,' and also for the Maitland Club.

Row'an or Roan Tree, Quick'en or Wick'en, Mountain Ash, are names applied to *Pyrus Aucuparia*, a moderate-sized graceful tree of the section *Sorbus*, in which it is distinguished by its pinnate leaves, its dense cymes of cream-white flowers, succeeded by globose two- to four-celled berries. In Britain it is common in woods and on hillsides, particularly in Scotland, where it ascends to an altitude of 2600 feet. It is also met with throughout Europe, in Siberia, and in some outlying stations, such as Madeira. Both the timber and the coppice wood are useful for various purposes where elasticity combined with strength is a desideratum, and the bark has been employed in tanning. A belief in the power of this tree against witchcraft and evil spirits of all kinds, seems to have been prevalent at a very early date. The name 'Mountain Ash' has been given to the R. from a superficial resemblance of its leaves to those of the Ash.

Rowe, Nicholas, an English dramatist, was the son of a serjeant-at-law, and was born at Little Barford, Bedfordshire, 1673. When twenty-five years old he produced a successful tragedy, *The Ambitious Stepmother*. In 1702 appeared *Tamerlane*, the play upon which R. prided himself most. His other pieces are, *The Fair Penitent* (1703, founded on Massinger's *Fatal Downy*); *Ulysses* (1707); *The Royal Concert* (1708); *Jane Shore*, the best of his

tragedies (1713); *Lady Jane Grey* (1715). He only attempted one comedy, and that a failure, *The Biter* (1705). R. does not stir the passions deeply; he has little imagination, and his plots are conventional; he is read only for the sober taste of his stately verse. He likewise wrote two volumes of short poems, all very poor; and in 1709-10 he published *The Works of William Shakespeare*, revised and corrected, with an account of his life and writings. This collection in 7 volumes is the first real piece of Shakesperian editing. R. was a very handsome man, and a great favourite in society. On the accession of George I. he was appointed poet-laureate and surveyor of customs; the Prince of Wales nominated him clerk of his council; and the Lord Chancellor gave him the office of secretary for the presentations. He left behind him a good translation of Lucan's *Pharsalia*, printed in 1728. R. died December 6, 1718. He was buried opposite Chaucer in Westminster Abbey, and Pope wrote his epitaph.

Rowlock (pron. *rullock*) is the name applied to a contrivance on the wale of a boat, to hold the oar in rowing. It consists of two vertical pegs of wood or iron, or of a pivoted iron hook or stirrup, or simply of a notch cut in the wale.

Rowing. See BOATING.

Roxburghe Club, a society named in honour of the illustrious bibliomaniac John, third Duke of Roxburghe, who died in 1804, and whose splendid collection of early English literature was brought to the hammer in his Grace's house, St. James's Square, in May 1812. The sale lasted forty-two days. The Club was instituted to commemorate the sale, 17th June, of No. 6292, a Boccaccio of 1471, which fetched £2260, and of No. 6350, *The Recuyell of the Historie of Troy* (Caxton, 1471), which fetched £1060, 10s., the latter of which had been bought by the Duke himself about the year 1793 from William Laing, Edinburgh for £50. There were originally 31 members; in 1875 the number was 38, and the entire number of members since its formation has only been 114. A list of the publications of the Club is given in Lowndes' *Bibliographer's Manual* (Bohn) up to 1864. Since then one or two volumes have appeared annually. The publications are extremely rare, and chiefly of antiquarian interest, though some are intrinsically important as literature, and all more or less valuably illustrate the history, languages, and manners of England in the olden times.

Roxburghia'ceæ is a very small natural order of monocotyledonous tall climbers, with broad leaves and axillary, large and handsome, but very foetid green flowers. The few species of which it consists are natives of India and the Eastern Archipelago. Of *Roxburghia viridifolia*, the thick tuberous roots after being boiled and soaked in lime-water are candied with sugar, and taken with tea; their flavour, however, is insipid. The order is named after Dr. Roxburgh, a celebrated Indian botanist.

Roxburghshire, an inland county in the S.E. of Scotland, bounded N. by Berwickshire, E. and S.E. by Northumberland, S. by Cumberland, S.W. by Dumfriesshire, W. by Selkirk, and N.W. by Edinburgh. Area, 428,494 statute acres; pop. (1871) 53,974. The county measures 40 miles from N. to S., and 38 miles from E. to W. It is divided by its waters into several districts:—Teviotdale, the basin of the Teviot and its affluents, 500 sq. miles; Liddesdale, which forms the S.W. corner of the county, embracing the territory drained by the Liddel and its tributaries, 120 sq. miles; the district between the Gala and Leader streams, 20 sq. miles; and that situated N. of the Tweed included in the Merse, 25 sq. miles. The whole surface is undulating and diversified, rising gradually to the Cheviot Hills in the S., which reach in Cheviot a height of 2602 feet, and in three other summits more than 2000 feet. The chief formation is New Red Sandstone with trap interspersed. The soil in the W. part of the county is thin, but in the E. it is extremely fertile, while the high districts afford excellent pasture. In 1876 there were 51,077 acres under corn crops, 29,445 under green crops, 56,139 under clover and grasses under rotation, and 37,507 of permanent pasture. There were also 4588 horses, 16,763 cattle, 489,357 sheep, and 3960 pigs. The rental (including railways) is valued for 1877-78 at £439,860. The manufactures are centred in the town of Hawick (q. v.). Jedburgh (q. v.) is the county town; Kelso (q. v.), the most attractive and agreeable residence; while Melrose (q. v.) presents the most celebrated and lovely scenes. R. is pre-eminently the 'Border' county, and

The following information was obtained from the records of the Department of Health, Education and Welfare, Bureau of Census, Office of the Director of Research and Statistics, Washington, D. C., regarding the amount of time spent in various types of physical activity during the week ending August 3, 1967, for the population aged 15 years and over, by sex, race, and education.

The information is presented in the following tables. The first table shows the amount of time spent in various types of physical activity during the week ending August 3, 1967, for the population aged 15 years and over, by sex, race, and education. The second table shows the amount of time spent in various types of physical activity during the week ending August 3, 1967, for the population aged 15 years and over, by sex, race, and education, for those who exercised at least once during the week.

The information is presented in the following tables.

TABLE 1. Amount of time spent in various types of physical activity during the week ending August 3, 1967, for the population aged 15 years and over, by sex, race, and education.

Amount of time spent in various types of physical activity during the week ending August 3, 1967, for the population aged 15 years and over, by sex, race, and education. (Minutes per week)

(Note: Figures are in minutes per week. "Total" includes all types of physical activity, including walking, climbing stairs, household work, and other activities.)

Amount of time spent in various types of physical activity during the week ending August 3, 1967, for the population aged 15 years and over, by sex, race, and education, for those who exercised at least once during the week.

(Note: Figures are in minutes per week. "Total" includes all types of physical activity, including walking, climbing stairs, household work, and other activities.)

useful in a very high degree. In 1662 the body was incorporated as the Royal Society by a charter granted by Charles II., His Majesty and the Duke of York enrolling their names as members. A council of 21 members was appointed, and Viscount Brouncker was elected the first president. An abstract of the charter and laws will be found in Dr. Sprat's *History of the Royal Society*, published in 1667, when the Society numbered nearly 200 members. These were not remodelled till the year 1776.

The first number of the *Philosophical Transactions* was published on 6th March 1665, and this work, probably the most valuable repository of scientific research in existence, has been regularly continued since. The series to the year 1878 is complete in 168 quarto volumes. The Transactions, which contain a record of the labours of the Society and the papers read before them, are sent to numerous societies and institutions all over the world, while every fellow is entitled to a copy. The *Proceedings of the Royal Society* is a supplementary and smaller work. Begun in 1800, it has now (1878) attained its 28th volume. The *Catalogue of Scientific Papers* is also an important publication regularly issued by the Society. In this catalogue for the decade 1864-73 alone 100,000 titles of papers are to be found.

In 1701 the Society removed from Gresham College to Crane Court, in 1782 to Somerset House, and in 1857 to Burlington House, in a wing of which building it is now accommodated. Sir Isaac Newton was president for a quarter of a century (1703-27); and one of the first great public works undertaken by the Society was the publication of the philosopher's *Principia*. In the presidency he has been succeeded by a brilliant series of illustrious men. For many years the Royal Society was the sole depository of science in Great Britain, and the numerous bodies which were subsequently formed on special scientific subjects are undoubtedly its offspring. Since its institution it has ever been indefatigable and generous in the support of scientific research, investigation, and discovery. Its money and its instruments have been freely given to the service of knowledge. It has sent forth numerous expeditions to all parts of the globe, the most important in recent years being the voyage of the *Challenger* from 1872 to 1876, which travelled 69,000 miles in the pursuit of scientific and geographical information. It awards 4 medals—the Copley, Rumford, and two Royal medals—annually. It has also a donation fund, several trusts bestowed by private benefactors, and the control of a sum of £1000 annually voted by Parliament for scientific purposes. Government in 1876 resolved to increase this latter grant by an annual sum of £4000 for the term of five years.

The meetings of the Society are held every Thursday at half-past 8 P.M., from the 3d Thursday in November to the 3d Thursday in June. The anniversary meeting is held on St. Andrew's Day, when the council of 21 members and the officers are elected. Fifteen gentlemen, each of whom must be recommended by at least six fellows, are selected annually by the council from the list of candidates for admission, and recommended for election as fellows, the election taking place on the 1st Thursday in June. The entrance fee for a fellow is £10, and the annual subscription £4. The buildings in Burlington House contain a library of 30,000 volumes on the ground-floor, a gallery of portraits, and a collection of curiosities. The fellows numbered 561 on 30th November 1876. For the year ending this date the revenue of the Society was £17,895, 13s. 11d., and its expenditure £17,744, 15s.

Boyer-Collard, Pierre Paul, a French politician and author, was born June 21, 1763, at Sompnis, department of Marne. He was educated at Chaumont and St. Omer, and at the age of twenty became a member of the bar at Paris. At the outbreak of the Revolution he embraced republican doctrines, and after the seizure of the Bastille he was appointed secretary to the first organised municipality; but ere long he was proscribed as a Moderate, and took refuge in Sompnis. He then engaged in correspondence with the Royalist council at Paris, and in 1797 he was sent to the Council of the Five Hundred by the department of Marne. On the creation of the Empire, R.-C. retired into private life. He devoted himself to study, read Pascal, Cornelle, Bossuet, Racine, kept Milton continually by his side, and devoted himself to the common-sense philosophy of Reid. He seized on Reid's *Analysis of the Mind* as a powerful weapon against the sensational school, then too powerful in France. In 1811 he was appointed professor of philosophy in

the University of France, but in 1815 he resumed political life, and became deputy for Marne, Councillor of State, and President of the Commission on Public Instruction. In 1827 he succeeded Laplace in the Academy. In 1831 he led the discussion on the constitution of the Chamber of Peers, but was too moderate, too frigid, and too severe, to be influential with ambitious schemers. In 1842 he finally retired from politics. He died at Châteaueux, near Saint Aignan, September 2, 1845. Little as he has left in the way of literature, the influence of his thoughts on men of his time was very great. Cousin and Jouffroy among others owed their teaching to him. R.-C.'s philosophical fragments are to be found in Jouffroy's edition of Reid. See Barante's *Vie Politique de R.-C.* (1861), Philippe's *R.-C.* (1861), and Lacombe's *Vie de R.-C.* (1863).

Roy Bareilly (*Rai Bari*), the chief town of the district of the same name in Oude, British India, on the river Sai, a tributary of the Ganges, 55 miles S.E. of Lucknow, and 73 N.W. of Allahabad. It has some trade by the river, which is navigable up to this town, where it is crossed by a brick bridge. Pop. (1869) 7092.—The district of R. B., which lies between the Ganges and the Gumti rivers, has an area of 1752 sq. miles; pop. (1869) 988,719. The crops are wheat and rice.

Rubev, a town of the government of Tver, in European Russia, stands on the Volga 80 miles S.W. of the town of Tver. It has nine churches, and carries on a considerable trade in fish, linen, and hemp-seed. Pop. (1870) 18,732.

Ruatan, **Roatan**, or **Battan**, an island of the Caribbean Sea, in the Bay of Honduras, 30 miles long by 9 broad at the widest part, was given up by the British in 1860 to the Republic of Honduras. R. is well wooded towards the W. level, and grassy, and the hills rise to about 900 feet. Good zinc ore is found, and the fertile soil produces plentifully all tropical fruits and vegetables. The value of the exports annually is about £5000, and of the imports £4000. R. was the rendezvous of General Walker and his filibusters in their attacks on Central America. Pop. about 2000 (200 whites).

Rubasse, the name given by the French lapidaries to a variety of rock crystal traversed by rose-coloured streaks. The finest varieties come from Brazil.

Ruba'to Tem'po (Ital. 'robbed time') is, in music, an alteration, according to the taste of the performer, of the length of certain notes, what is given to one note in a bar beyond its ordinary length being taken from another.

Rubefacients are medicines which are employed for the purpose of producing irritation, redness, and congestion of the skin so as to produce a temporary influence as the result of the large surface affected, and not of any permanent impression upon the nutritive acts of that surface. R. may cause disorganising inflammation if allowed to remain too long in contact with the skin. They are of great value when it is desirable to arouse or stimulate the system; and they are especially useful in cases of sudden, severe pain due to acute congestion of a part or to some internal irritation. The mildest R. are cloths wrung out of hot water, and hot cataplasms. If more powerful action is required, the hot cloths may be sprinkled with Turpentine (q. v.); or Mustard (q. v.) may be added to the cataplasm; and by such means all grades of intensity, from the mildest impression up to severe blistering, may be produced.

Rubens, Sir Peter Paul, the great Flemish 'colourist,' was born of an old Antwerp family, 29th June 1577. Records in the Antwerp archives trace the family through a long 'pedigree of toil' back to Arnold R., a tanner, in 1350. The father of the painter, Jan R., who had taken the degree of Doctor of Laws at Rome, became a magistrate of Antwerp, and was forced by the ascendancy of Philip II. and of Catholic power to seek refuge in Köln in 1568. He was engaged in diplomatic business by William the Silent, and for a disgraceful liaison with Anne of Saxony, wife of the prince, was imprisoned for two years, and eventually died at Siegen in 1587. R. was born at Antwerp, or Köln, or Siegen, according as we read a sentence in a letter written by his mother, the noble-hearted Maria Pypelinx. He certainly lived for about ten years in Köln, curiously enough, in the house which formed the last asylum of his great patron, Marie de Medici. After the father's death the family returned to Antwerp, and R., having served an apprenticeship with Verghæt, a land-

scape-painter, and also studied under Van Noort, entered the studio of Otho Van Veen (Otto Venius) in 1595. In 1598 he entered the Guild of St. Luke, and two years later started for Italy. At Mantua he first became familiar with court life, and thence went to Madrid on his earliest diplomatic mission. Returning to Italy, he visited Florence, Venice, and Rome, and from the Eternal City was summoned in 1603 to the death-bed of his mother. On the solicitation of the Archduke Albert and Infanta Isabella, he settled at Antwerp, where his house soon became a princely museum of art. For Marie de Medici (1628-31) he adorned the Luxembourg with twenty-four illustrations of events in her life, finishing the series in Paris. He spent eighteen months in Madrid on the diplomatic service of the Infanta, but his visit to Castile is now remembered by his pictures, not by his protocols. In 1630 he concluded the peace between Charles I. of England and Philip IV. of Spain, and, while in London was knighted by the king, who presented him with a diamond hatband, and defrayed his expenses. In 1634 he completed the famous decorations for Whitehall, to pay for which Charles had to pawn jewels and melt royal plate. The amazing number of pictures ascribed to R. can only be accounted for by remembering that he himself seldom did more than design and finish, and that in their production he was assisted by a host of pupils, including Van Thulden, Vandyck, Snyders, and Jordaens. Incessant toil seems to have broken his constitution, and after suffering severely from gout, he died 30th May 1640. Temperate, scholarly, high-bred, and generous, R. paints almost without sentiment and pathos. When he gives expression, it is often disagreeable, sometimes shocking. If his hunting pieces are savage, there is an absolute delight in representing pain visible in such works as the 'Scourging of our Saviour,' 'Martyrdom of St. Lievin,' 'Brazen Serpent,' and 'Great Judgment.' But though never tender or imaginative, and often voluptuous, he rises at times through sheer creative energy and complete mastery of his art into the region of the sublime. Inferior only to Titian as a colourist, and to Raphael in fertile ingenious composition, he fails adequately to conceal his artifice, or rather distracts attention by the wonderful display of his artistic power. As Thackeray says, 'In R. I am admiring the performer rather than the piece.' His female figures are strangely unequal, some noble and stately, others marred by all the defects of the Flemish type. Among the masterpieces of R. are the 'Descent from the Cross,' 'Elevation of the Cross,' and 'Crucifixion of St. Peter.' To the student R. is known both as an etcher and an author. His centenary was celebrated at Antwerp in 1877. See the *Catalogue du Musée d'Anvers* (1857); Sainsbury, *Original Papers, illustrative of the Life of R.* (1859); Gachet, *Lettres inédites de R.* (1840); *Contributions to the Life of R.* in the *Edinburgh Review*, January 1863; G. F. Waagen, *Kleine Schriften* (1875); Ruelens, *R., Documents et Lettres* (1877); and Gachard, *Histoire Politique et Diplomatique de R.* (1877).

Rube'ola. See MEASLES.

Rubia'cea, an order of Dicotyledons now extended from its original limit so as to include the plants formerly classed under *Cinchonaceæ* and *Galiaceæ*, which makes it one of the largest orders of phanerogamia—numbering about 350 genera and 4500 known species. It is cosmopolitan, including all monopetalous plants with opposite leaves, interpetiolar stipules, stamens inserted in the tube of the corolla and alternating with its lobes, and having an inferior compound ovary. The properties of the order in general are tonic, febrifuge, and astringent. It furnishes valuable articles of materia medica, of domestic use, and of trade, besides yielding in some genera edible fruits. The wood of *Garдения Fovis-tonentis* of Angola is of very fine grain, very compact, heavy, and of extraordinary strength. The tree itself is regarded by the natives (probably an inference from the strength of the wood) as a preventive against thunderbolts—hence the name given to it by Welwitsch.

Rubicon, a small river of Central Italy, falling into the Adriatic, which formed the southern boundary of Gallia Cisalpina, and whose passage by Cæsar in 49 B.C. with the words '*facta alia esto*,' was the signal for war between him and the Pompeians. The latest investigations identify it with the Pisciatello, immediately to the N. of Rimini.

Rubidium (Rb = 85), an alkaline metal, discovered in 1860 along with Cæsium (q. v.) by Bunsen and Kirchhoff, by means of

spectrum analysis. The spectrum of its vapour consists of one strong band in the red and two in the violet. In its physical properties it resembles potassium, and has even greater affinity for oxygen than that metal, taking fire spontaneously in the air. Its oxide *rubidia* (K₂O) is a powerful alkali, and gives rise to a series of salts isomorphous with the potassium salts. It is present in small quantity in mineral waters, in certain minerals such as lepidolite, lithia-mica, and felspar, and in the ashes of the beet-root and other plants.

Rubinstein, Anton, a modern composer and pianist, was born at Wechwotynetz, near Jassy, November 30, 1829. He played at a concert at Moscow at the age of nine, and was sent a year afterwards to Paris, where he studied for a year and a half. R. settled in St. Petersburg in 1848, where he wrote *Dmitri Donski*, his first opera, produced in 1852. He founded the conservatory of music at St. Petersburg, of which he was for nine years director. For many years he has been known as one of the most powerful and brilliant of pianists, and his concerts in this country, and appearances in connection with the London Philharmonic, have been numerous. He visited America in 1875. R. has composed over 100 separate works, including operas, cantatas, symphonies, string quartets, and numerous pianoforte compositions and songs. Among them are the operas *Die Kinder der Haide* (Vienna, 1861), *The Demon* (St. Petersburg, 1875), *Die Macabaer* (Berlin, 1875), *Feranors* (*Lallah Rookh*) and *Nero*, the oratorio *Paradise Lost*, and the *Ocean and Dramatic* symphonies. In his works, as in his performances, he has two separate styles, one full of savage energy and strength, the other possessing an infinite charm of tenderness and sensibility. His younger brother **Nicholas** enjoys a high reputation in Russia as a pianist and composer.

Rubrics (Lat. *rubrica*, 'red chalk,' from *ruber*, 'red'), in missals, breviaries, and the Anglican prayer-book, are rules for the conduct of divine service, formerly written or printed in red ink, at present more usually in italics.

Rubruquis, Guillaume de (the name was latinised from Rysbroek), born early in the 13th c., in Brabant, entered a Franciscan order and was sent by Louis IX. of France into Central Asia on an embassy to Sartch, son of Batû Khan of Kiptchak, a supposed Christian prince, whose assistance was required against the infidels in the Holy Land. With two brother monks he sailed from Constantinople for Soldaria, crossed the steppes between the Dnieper and the Don on August 2, 1253, reached Sartch, and posted on to the court of Batû, on the Volga. Batû sent him on to the Tartar emperor, Mangû Khan, whom he reached on the 27th December, and with whom he subsequently removed to Karakorum. The mission was entirely unsuccessful. R. returned through Armenia, Persia, and Asia Minor to Syria, arriving at Tripoli in August 1255. He was detained in a monastery at Acre, and there compelled to write an account of his travels. R. was still living in 1293. Both Hakluyt and Purchas give translations of R.'s book.

Rubus, a genus of almost always trailing shrubs or creeping herbs, representing the tribe *Rubeæ* of the natural order *Rosacæ*. The leaves are alternate, simple, or compound, with stipules more or less adnate to the petiole; the flowers white or red, in terminal or axillary corymbose panicles, rarely solitary; the calyx broadly cup-shaped, deeply cleft into five persistent lobes; the petals five; the stamens numerous; and the drupes one-seeded, and crowded on a dry or spongy conical receptacle. R. is a genus in which great diversity of opinion exists regarding the limit of the species. *Rubi* are abundant in the N. hemisphere, rare in the southern. Of the interesting species, *R. Idæus* and *R. Chamaemorus* have already been noticed in articles RASPBERRY and CLODBERRY; see also BRAMBLE and DEWBERRY. There still remain a number of other noteworthy



R. Arcticus.

species, of which the following are the most prominent. *R. lanicarpus*, a spreading shrub, with round glabrous stems and red flowers, abundant in many parts of India, producing a black fruit, which is very good to eat. *R. Canadensis*—the Dewberry of N. America—a shrub of trailing habit, giving an early black fruit of excellent taste. *R. deliciosus*, an erect shrub from the sources of the Missouri, is an exceedingly handsome species, and has large, raspberry-like, grateful fruit. *R. geoides*, of the Falkland Islands, Patagonia, &c., has greenish-yellow fruit, resembling the Cloudberry, and of a very agreeable taste. *R. rosifolius*, native of the hot parts of Africa, Asia, and E. Australia, gives an abundant and long-continued supply of fruit of a large size. *R. trivialis*, of the southern United States, has large edible fruit; it thrives in dry soil, and is rich in tannic acid. *R. arcticus*, a small herbaceous species of cold northern latitudes, has a purplish-red fruit of fine flavour, much appreciated by the Swedish epicures; a syrup, a jelly, and a wine are made from it.

Ru'by, a term applied to two distinct varieties of jewel-stones. The real R. is the blood-red pellucid variety of the sapphire, and is composed almost wholly of alumina. It is called the *Oriental R.*, to distinguish it from the less valued and softer spinel rubies, which contain a considerable percentage of magnesia, silica, oxide of iron, &c., along with alumina. The latter are named according to their various tints; thus, the scarlet spinel is called *Spinel R.*, the pale red or rose red, *Balas R.*, the violet red, *Almandine R.*, and the orange red, *Rubicelle R.* Oriental R. ordinarily ranks next in value to the diamond, but when it exceeds 4 carats in weight of perfect quality, which is rarely, it is more highly prized than a diamond of equal weight. The true R. is found chiefly in the valleys and watercourses of Ceylon and Burmah, and the spinel rubies occur in the riversands of India, Ceylon, Pegu, North America, and also in Wicklow.

Rückert, Friedrich, born at Schweinfurt in Bavaria, May 16, 1789, proceeded from the gymnasium of his native town to Würzburg University (1805), and there studied philology with such success that later he could say, 'All written languages live for me.' Sickness forbade his sharing in the War of Liberation, or following up the career of *privat-docent* for which he qualified at Jena (1811). The air of home restored his health and stirred his poetic powers. These first found utterance in *Deutsche Gedichte* (1814), whose *Geharnischte Sonnette* have much of Körner's ring. In 1816 R. undertook the poet's corner of the *Stuttgart Morgenblatt*; a year later he travelled to Italy, where he made fast friends of Overbeck, Cornelius, and others of the 'Artist Commonweal.' At Koburg, where he settled on his return, he met Louise Fischer, object of the melodious *Liebesfrühlings* (10th ed. 1876), and afterwards his wife (1821). Lyrics, scattered through almanacs and periodicals, extended R.'s fame in constantly widening circles, but the necessity of earning more than fame forced him to exchange the idyllic quiet of his Koburg life for a chair of Oriental languages at Erlangen (1826). Here, as poet and Orientalist, he published several excellent translations of Eastern poetry, the long didactic poem, or series rather, of Alexandrine verses, *Die Weisheit des Bramanen* (6 vols. 1836-39; 9th ed. 1875), and the Persian epic, *Rostem und Suhrab* (1838), besides preparing a carefully-selected edition of his works (1843; 19th ed. 1876), which alone fills 700 closely-printed pages. A residence at Berlin, whither a pension and privy-councillorship drew him in 1841, bore fruit in four singularly undramatic dramas, and in 1848 R. retired to his country estate of Neussa near Koburg, where, after eighteen years of whimsical seclusion, he died, January 31, 1866. His *Gesammelte Werke* (12 vols. Frankf. 1867-69) include, besides the poems cited above, the *Zeitgedichte* (songs of the old war time), *Pantheon* (hymns, legends, and allegories), *Wanderungen* (scenes of foreign travel), and *Haus- und Jahrlieder* (pictures of every-day life). R. wrote, indeed, too much, and the Horatian vaunt, *Exegi monumentum*, so often in his mouth, will probably prove true of few beyond his lyrical productions. Yet these alone mark him the greatest of German poets since Tieck and Uhland, alike by their exquisite harmony and a sensibility to the relations of the outer and inner worlds, which to the English reader recalls now Tennyson, now Wordsworth. R.'s Eastern translations and didactic poems are tedious from over-fidelity to their originals or models, not in sense only, but rhythm, rhyme, and mannerisms. See his *Life*,

by Beyer (1868), and Berger's *Nachgelassene Schriften F. R.'s und neue Beiträge zu dessen Leben* (Vien. 1877).—**Heinrich R.**, son of the preceding, was born at Koburg, February 14, 1823, and died, professor of German language and literature, at Breslau, September 11, 1875. From many valuable historical and philological works of which he was the author, may be selected *Annalen der Deutschen Geschichte* (1850), *Geschichte des Mittelalters* (1852), *Geschichte der Neuzeit* (1854), *Deutsche Dichtungen des Mittelalters* (4 vols. 1872-76), and *Geschichte der Neu-Hochdeutschen Schriftsprache* (1875). His *Kleinere Schriften* are appearing in a collected form (vol. i. 1877). See H. Schulze, *H. R. und das Dichterhaus zu Neussess* (Bresl. 1875).

Rudd'er, a flat, heavy frame of wood, hung upon the stern-post of a vessel, round which, as on an axis, it is turned by the tiller. When the R. is in a straight line with the keel, equilibrium is maintained; but if the R. be forced to one side, the resistance which it then offers to the forward motion of the ship calls into existence a pressure acting perpendicularly to the R. on the side towards which it has been forced. The part of this pressure resolved perpendicularly to the ship's length acts upon the stern so as to force it to rotate round the ship's centre of mass.

Rudd'iman, Thomas, born at Raggel, in the parish of Boyn-die, Banffshire, in October 1674, proceeded at the age of sixteen to King's College, Aberdeen, where he graduated after four years' study. A year later he became parish schoolmaster at Laurence-kirk. There he met Dr. Archibald Pitcairne, who procured him the post of assistant-keeper of the Advocates' Library, Edinburgh, with an annual salary of £8, which R. had to eke out by revising and correcting for publishers, keeping boarders, &c., and even in 1707 by commencing business as an auctioneer. He had, however, here ample opportunities for study, the first fruit of which was his edition of Volusenus's (Florence Wilson) *De Tranquillitate Animi Dialogus*. In 1709 he edited Arthur Johnston's Latin *Cantica*, and *Paraphrase of Canticles*, and in 1714 appeared the work which still keeps his name familiar, the *Rudiments of the Latin Tongue*. It went through fifteen editions in his lifetime. Some years before this the Faculty of Advocates had trebled his salary in order to retain him. His edition of the *Opera Omnia* of Buchanan (2 vols. folio) appeared in 1715, in which year he set up business as a printer. In 1728 he was made printer to Edinburgh University. In 1725 he brought out the first part of his greatest work, *Grammaticae Latinae Institutiones*, treating of etymology; and the second part on syntax in 1732. Stallbaum re-edited, and Freund in his Lexicon frequently refers to this work. In 1729 he became proprietor of the *Caledonian Mercury*, which he had printed since 1724, and in 1730 he was appointed principal keeper of the Advocates' Library. Nine years later he published a splendid edition of Anderson's *Diplomata et Numismata Scotiae*, and in 1751 his 'immaculate' edition of Livy in 4 vols. In this year his sight began to fail, and he had soon to resign the librarianship which he had held for nearly half a century. He died at Edinburgh, January 19, 1757. George Chalmers, the antiquary, wrote his life (1 vol. 8vo. 1794).

Ru'denture (Lat. *rudens*, 'a rope'), in architecture, a rope-like mass filling the flutes of a column to about one-third of the height of the shaft; also called a *cable*.

Rü'desheim, a town of Prussia, 17 miles from Wiesbaden, province of Hessen-Nassau, on the Rhine, celebrated for its wine, known as *Rüdesheimer*. The neighbouring heights are studded with numerous ruined castles. Pop. 3197.

Ru'dolf I., of Habsburg or Hapsburg, founder of the imperial house of Austria, born at Limburg, May 1, 1218, was the eldest son of Albrecht IV., Graf von Habsburg, and Hedwig of Kyburg. The death of his father in 1240 gave him a large territory and the command of a considerable force, which he hastened to place at the service of Friedrich II., under whose eyes he gained his spurs at the battle of Faenza in 1241. By his marriage with Gertrude, daughter of Burchard, Graf von Hohenberg, his repeated feuds with his uncles, the Graf von Habsburg and the Graf von Kyburg, and his quarrels with the Bishops of Strassburg and Basel and the Abbot of St. Gall, he acquired so much territory that his dominions extended from Mt. St. Gothard to the Schwarzwald, from the Bodensee to the Vosges, rendering him the most powerful prince in the S. of Germany. His bravery and love of

scape-painter, and also studied under Van Noort, entered the studio of Otho Van Veen (Otto Venius) in 1596. In 1598 he entered the Guild of St. Luke, and two years later started for Italy. At Mantua he first became familiar with court life, and thence went to Madrid on his earliest diplomatic mission. Returning to Italy, he visited Florence, Venice, and Rome, and from the Eternal City was summoned in 1608 to the death-bed of his mother. On the solicitation of the Archduke Albert and Infanta Isabella, he settled at Antwerp, where his house soon became a princely museum of art. For Marie de Medici (1628-31) he adorned the Luxembourg with twenty-four illustrations of events in her life, finishing the series in Paris. He spent eighteen months in Madrid on the diplomatic service of the Infanta, but his visit to Castile is now remembered by his pictures, not by his protocols. In 1630 he concluded the peace between Charles I. of England and Philip IV. of Spain, and, while in London was knighted by the king, who presented him with a diamond hatband, and defrayed his expenses. In 1634 he completed the famous decorations for Whitehall, for which Charles had to pawn jewels and melt royal plate. An amazing number of pictures ascribed to R. can only be accounted for by remembering that he himself seldom did more than design and finish, and that in their production he was aided by a host of pupils, including Van Thulden, Vandeweyer, and Jordaens. Incessant toil seems to have broken down his constitution, and after suffering severely from gout, he died in 1640. Temperate, scholarly, high-bred, and generally almost without sentiment and pathos. When his passion, it is often disagreeable, sometimes shocking. His painting pieces are savage, there is an absolute delight in the pain visible in such works as the 'Scourging of Christ,' 'Martyrdom of St. Lievin,' 'Brazen Serpent,' 'Judgment.' But though never tender or voluptuous, he rises at times through sheer complete mastery of his art into the sublime. Inferior only to Titian as a colourist, and his ingenious composition, he fails adequately to express or rather distracts attention by the display of his artistic power. As Thackeray says, 'He is a performer rather than the piece.' His style is unequal, some noble and stately, others of the Flemish type. Among his best works are 'Descent from the Cross,' 'Fixation of St. Peter.' To the etcher and an author. His works are catalogued in 1877. See the *Catalogue of the Royal Academy*, *Original Papers*, by Gachet, *Lettres inédites de Rubens*, *Kleine Schriften* (1875), and Gachard, *Histoire de Rubens*.

Rube'ola. See Measles.

Rubia'cea, an original limit so-called *Cinchonaceae* and of phanerogams species. It is with opposite the tube of an inferior general are articles of yielding *Fovis* heavy, by the wood given:

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R. muraria, on account of the red

(*R. muraria*), a migratory. *Crallatensis* of England in April, and leaving a series of eggs in the male during the breeding season. The first and second quills are the longest, and is elevated on the tarsus. The plumage is mixed with chestnut, the abdomen is tawny. The average length is 12 inches. The male wages war for the perch, or 'Reeve.' The birds are much sought after for the London market. They are snared in great quantities.

Perch (*Acerina cernua*), a little freshwater fish of the perch family, and is of a light olive and silver white below. The fins are spotted with black. The dorsal fin is single. The R. is readily caught, the most common being a red worm.

Roche'berie (Domesday *Rocheberie*), a market-town of Warwickshire, on the Avon, 83 miles N.W. of London, and 23 miles from Birmingham, is one of the principal railway junctions in the county. The parish church of St. Andrew is now (1878) a memorial to the poet Moultrie, its rector for many years, and there are also two distinct churches, St. Matthew and the Holy Trinity (1853), the latter a cruciform structure with a spire 200 feet high. Other buildings are the corn-exchange (1858), a Second Pointed Roman Catholic church by E. W. Pugin (1864), and St. Mary's Convent, which had 14 inmates in 1871. Iron-founding, brick-making, and the manufacture of cement, are the leading industries of R., which publishes two weekly newspapers. Pop. 1871, 2,325.

Rochester founded in 1567 by Lawrence Sheriff, a London lawyer, for the children of R. and Brownover [his birthplace], and for such as be of other places thereunto adjoining. It was under the headmastership of James (1778-93), Arnold (1793-1822), and Temple (1822-69), the present Bishop of Exeter, one of the first Public Schools (q. v.) in England. In 1858 it had 27 masters and 455 boys, besides 70 in the day school. A middle-class school opened last May. The 'pile of the Gothic,' as Moultrie terms the school building, erected 1808-20, has been greatly improved and added to since the Tercentenary of 1867. Out of the fund then started, which in 1878 amounted to £33,376, the chapel has been rebuilt by Mr. W. Butterfield—the porch, two western bays, monuments and memorial windows only having been retained; a gymnasium and new schools have been erected, the latter comprising two natural science schools, six class-rooms, &c.; a library, a reading-room, and art-museum are now building; and a new 'High School' is to follow. A long list of distinguished names (Abereromby, Landor, Macready, Clough, Hughes, Henson, Stanley, &c.) might be formed from Whittaker's *R. Register*, 1853-1867 (Lond. 1868).

Rugeley, a town of Staffordshire, on the Trent, 9½ miles E.S.E. of Stafford by rail, has a Roman Catholic church with a lofty spire (1863), a town-hall, mechanics' institute, and a new grammar-school. On June 26, 1878, the foundation-stone was laid of new Public Buildings, to be erected in Geometric style, which comprise a market-hall (66 feet by 41 feet, and 30 feet high), an assembly room, and numerous public offices. The iron and brass foundries employ a large number of the workmen, and in the neighbourhood are extensive collieries. Pop. 1871, 4630.

Rügen, the largest island of Germany, lying in the Baltic, on the coast of Pommern, from which it is separated by the Rügen Sound, 1½ miles wide at its narrowest part. Area 362 sq. miles. Pop. 47,048. On every side it is indented by deep bays, and a number of peninsulas connected by narrow strips of land with the main body of the island, and of which the largest are Wollin and Jasmund in the N., and Mönchgut and Zudar in the S. The surface is level in the W., but is hilly in the E. and S.E. On the E. coast of Jasmund is the Stubbenkammer

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Rule of Three, a technical term for the arithmetical process by which a fourth proportional to *three given numbers* is found. From its great importance in commercial transactions, it has also been called the golden rule. See PROPORTION.

Rum, a kind of spirits distilled from the skimmings of sugar-cane molasses, or from the latter alone, mixed with a considerable proportion of *dunder*, or lees of former distillations. The fermentation proceeds for several days before the spirit is put into the still. The distilled spirit is combined with molasses or sugar. The peculiar flavour of R. is due to other ethereal principles develop with age and improved flavour. *Pineapple R.* is made with slices of pineapple. The alcoholic strength is equal to that of brandy. The distillation of R. is conducted conjointly with the manufacture of sugar in the W. Indies, Guiana, Reunion, Tahiti, &c. Jamaica produces the highest market value. W. Indian produce is almost entirely from that island, and the annual value of its exports range from £240,000 to £290,000. The imports of R. into the United Kingdom, during the year 1876, amounted to 1,335 proof gallons, valued at £1,073,707. British Guiana and the W. Indian Islands sent four-fifths of the whole quantity. In 1875, 17,075 gallons were entered for home consumption, on which a duty of £2,554,260 was paid. R. is largely consumed in the navy; in the towns of Great Britain its general consumption is small and on the decline.

Rum, a mountainous, rugged, and barren island of the Hebrides, 15½ miles N.N.W. of Ardnamurchan Point, Argyleshire, 8 miles long by 7½ broad. At Ben More the surface is 2320 feet above the sea; at Cresal, 1800. Of the area of 30,000 acres, only about 1800 are under cultivation. Pop. (1861) 73.

Ruma'nia, since 1861 a principality under Turkish suzerainty, but erected into an independent state by the Treaty of Berlin (July, 1878), consists of the two 'Danubian Principalities' of Moldavia and Wallachia, together with the Dobrukscha and the delta of the Danube. The two latter districts were annexed to it by the Treaty of Berlin, in return for the retrocession to Russia of the small part of Bessarabia which it had formerly held. Its boundaries are now—on the E. the river Pruth, the Kilia mouth of the Danube (separating it from Bessarabia), and the Black Sea; on the S., a line drawn from Mangalia on the Black Sea to the Danube E. of Silistria, and the course of the Danube (separating it from Bulgaria and Servia); and on the W. and N. the Transylvanian Alps and the Carpathians (separating it from Siebenbürgen and Bukowina). Its area is now about 49,800 sq. miles, or almost that of England. The greater part of R. consists of rich, alluvial plains, but along the W. and N. there is much hill country and table-land, some of the peaks, such as the Negoï and the Surul, rising to about 7000 feet. There are four great passes leading through the Transylvanian Alps into Siebenbürgen—the Vulkan, the Rother Thurm, the Törzburg, and the Tömös passes. Through the Carpathians the principal passes are the Borgo and Oitoz. The rivers are for the most part deep and sluggish. The Danube (q. v.), and its tributary the Pruth (q. v.), now form the boundary rivers. The principal Moldavian tributary of the Pruth is the Schischija. Rising in Bukowina, the Sereth (q. v.) flows through the whole length of Moldavia until it joins the Danube at Galatz, its chief tributaries being from the left the Berlat, from the right the Moldava, the Bistriza, the Drotusch, and the Buseo, the last flowing through Wallachia. The other rivers of the latter state are all tributaries of the Danube, the chief being the Jalomitza, the Argisch, the Aluta (which rises in Siebenbürgen and flows through the Rother Thurm pass), and the Schyl. Along the course of the Danube, even from W. of the mouth of the Aluta, there are large marshy lagoons, the largest being the *Balta* lake, near the mouth of the Argisch. The chief towns of Wallachia are Bucharest (q. v.), Braila (q. v.), Giurgevo (q. v.), Kralova (q. v.), Fokshan (q. v.), Plojesti (q. v.); and of Moldavia, Jassy (q. v.), Galatz (q. v.), Piatra (q. v.), Berlat and Botochani.

Climate.—R. is subject to very severe cold in winter, as well as great heat in summer. Even on the plains the thermometer often stands at -28° F. in winter, while it rises to 99° F. in summer and autumn. The approach of winter is marked by N.E. winds, which sometimes reduce the temperature by as much as 30° in a day. In the marshy lowlands, malaria is at

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and Rink, F.

from the right
W.N.W. through
Ruhrt after a course
of communication
the district and the Rhine.

the maritime hymn of Great Britain,
national anthem to *God Save the Queen*, was
masque of *Alfred*, performed for the first
August 1, 1740, before Frederick, Prince of
the words have been variously attributed
to James Thompson, the joint-authors of the
and soul-stirring melody is by Dr. Arne.

R. Faith is the ultimate authority to which Christians
for instruction as to what they are to believe.
opinions prevail as to what is the R. of F. Roman
hold it to be a divine revelation, which is partly writ-
tly unwritten; in other words, it includes Scripture
ition. But as ordinary people are unable to decide
canonical Scripture and what not, what is divine tradition
at merely human, the Church is appointed by God to be
illible teacher in these matters. Protestants hold that 'the
of God, as contained in the Scriptures of the Old and
w Testaments, is the only infallible R. of F.' Certain mystics
ect all external authority, and hold their R. of F. to be an
ward divine influence.' Rationalists hold that the only R. of
F. is reason, which is the source and ground of all religious
nowledge and conviction.

Rule of the Octave, a system of adding harmonies to the
diatonic scale which is used as the lowest part. It was formerly
taught as a formula to students.

justice caused the forest cantons to put themselves under his protection, Uri, Schwyz, and Unterwalden in 1257, Zürich in 1264. In 1273 he was elected Emperor, having purchased the acquiescence of Pope Gregory X. by his concession of all feudal rights over the temporal possessions of the Pope, and of the right of interference in internal ecclesiastical affairs in Germany. He now turned his attention to the consolidation of the imperial power, which had fallen into decay, the nobles having acquired most of the crown lands and dues. His most powerful enemy was Ottokar (q. v.), King of Bohemia, who refused to acknowledge his election, but who was defeated and slain in 1278. R. accepted the homage of Ottokar's son, Wenceslaus, for Bohemia and Moravia; but he stripped him of Austria, Styria, Carinthia, and Carniola, which he gave in fief to his own sons, Albrecht and Rudolf. He now devoted himself to improving the internal condition of Germany. He purified the administration of justice, organising an efficient system of police, and clearing the country of robbers. His measures were thorough—in Thuringia alone he put to death twenty-nine robber nobles, and razed sixty-nine strongholds. In the midst of this reformation he died, much regretted by his poorer subjects, September 30, 1291. See Lichnowski, *Geschichte Kaiser R.'s I. und seiner Ahnen* (Vienna, 1836), and Schönhuth, *Geschichte R.'s von Habsburg* (2 vols. Leipz. 1843-44).—**R. II.**, German Emperor, the son of Maximilian II. and Maria, daughter of Karl V., was born July 18, 1552. At the age of twelve he was sent to the court of his uncle, Philip II. of Spain. In 1570 he returned from Spain, and in 1572 he received the crown of Hungary, and that of Bohemia with the title King of the Romans in 1575. He was elected Emperor, October 12, 1576. Indolent and vacillating in his imperial policy, he left all power to his ministers, whose corrupt and reckless measures both lost him the support of the Catholics and exasperated still more the Protestants, thus preparing the way for the Thirty Years' War. R. devoted almost his whole attention to alchemy, astrology, and astronomy, attracting to his court by his liberality many impostors, besides several learned men, of whom the most famous were Tycho Brahe and Kepler, who have commemorated his patronage in the name of the Rudolphine Tables. R.'s weakness in government having made his kinsmen apprehensive that he would diminish the influence of their house, the archdukes met in 1606, and formally acknowledged as its head Matthias, his brother, to whom R. was obliged, in 1608, to yield all his dominions save Bohemia. In 1609, R. granted the Bohemians religious freedom by a royal charter, called the *Majestätsbrief*, but they, distrusting his sincerity, shut him up in his castle at Prague, and (1611) invited Matthias, who accordingly entered the city in triumph, March 29, and proceeded to his coronation on May 23. R., stripped of all his states, was spared the humiliation of losing all that he retained of imperial power, its name and shadow, by his death, January 20, 1612. See Gindely, *R. II. und seine Zeit* (2 vols. Prague, 1863-65).

Rudolstadt, a town of Germany, in the principality of Schwarzburg-R., situated in a fine valley on the left bank of the Saale, 23 miles N.N.W. of Weimar by rail. Pop. (1875) 7638.

Rue is the genus that gives name to the natural order *Rutaceæ* (q. v.), and consists of herbs and undershrubs, natives of temperate regions of the Old World. The much-divided leaves are beset with small glands containing a powerfully-smelling, acrid, volatile oil. The flowers are yellowish or greenish, arranged in terminal corymbs or racemes. Common R. (*R. graveolens*), a native of the Mediterranean countries and the Orient, is a somewhat shrubby plant of a peculiar bluish or yellowish-green colour. It has long been cultivated in gardens, being formerly considered a safeguard against witchcraft, potent to ward off contagion, and employed in domestic medicine. The name of 'herb of grace' given to it (e.g., *Hamlet*, act iv. scene 5) is a pun upon R. as the name of the plant, and the word 'rue' as an equivalent of the 'repentance' necessary to secure God's grace. The smell of R. when fresh is very strong, and to many very obnoxious; yet the chopped leaves are sometimes eaten with bread and butter as a stomachic, and are frequently given to poultry for the croup. They also make a beautiful garnish. The materia medica preparation of R. is a pale-yellow, acrid, and bitter oil of a disagreeable odour, distilled with water from the fresh herb. It is stimulant and antispasmodic, and is given in hysteria, colic, and other convulsive disorders. Water or Meadow R., and Wall R., are old names given to *Thalictrum flavum* now applied to the

genus), and *Asplenium Ruta-muraria*, on account of the rue-like, much-divided foliage.

Ruff (*Philomachus pugnax*), a migratory, *Grallatorial* bird, arriving in the fen-counties of England in April, and leaving in September. The name R. was given from the great development of the feathers of the neck in the male during the breeding-season. The bill is straight, and the first and second quills are the longest. The hind toe is very short, and is elevated on the tarsus. The male is of a black colour, mingled with chestnut, the abdomen being white, with a brown tint. The average length is 12 inches. The R. is pugnacious, and the male wages war for the possession of the female, or 'Reeve.' The birds are much in request in the fen districts for the London market. They are easily fattened, and hence are snared in great quantities.

Ruffe, or **Pope** (*Acerina cernua*), a little freshwater fish found in most English rivers, and attaining a length of five or six inches. It belongs to the perch family, and is of a light olive-brown above and silver white below. The fins are spotted with brown. The dorsal fin is single. The R. is readily caught, the bait usually employed being a red worm.

Rugby (in Domesday *Rocheburie*), a market-town of Warwickshire, on the Avon, 83 miles N.W. of London, and 20½ E.S.E. of Birmingham, is one of the principal railway junctions in the kingdom. The parish church of St. Andrew is now (1878) being rebuilt as a memorial to the poet Moultrie, its rector for forty years, and there are also two distinct churches, St. Matthew (1841) and Holy Trinity (1853), the latter a cruciform structure with a central spire 200 feet high. Other buildings are the townhall and corn-exchange (1858), a Second Pointed Roman Catholic church by E. W. Pugin (1864), and St. Mary's Convent, with 144 inmates in 1871. Iron-founding, brick-making, brewing, and the manufacture of cement, are the leading industries of R., which publishes two weekly newspapers. Pop. (1871) 8385.

R. School, founded in 1567 by Lawrence Sheriff, a London grocer, 'for the children of R. and Brownover [his birthplace], and next for such as be of other places thereunto adjoining,' has risen under the headmastership of James (1778-93), Arnold (1828-42), and Temple (1858-69), the present Bishop of Exeter, to be one of the first Public Schools (q. v.) in England. In July 1878 it had 27 masters and 455 boys, besides 70 in the subordinate middle-class school opened last May. The 'pile of questionable Gothic,' as Moultrie terms the school buildings erected 1808-20, has been greatly improved and added to since the Tercentenary of 1867. Out of the fund then started, which in June 1878 amounted to £33,376, the chapel has been rebuilt by Mr. W. Butterfield—the porch, two western bays, monuments, and memorial windows only having been retained; a gymnasium and new schools have been erected, the latter comprising two natural science schools, six class-rooms, &c.; a library, reading-room, and art-museum are now building; and a new 'Big School' is to follow. A long list of distinguished Regbeians (Abercromby, Landor, Macready, Clough, Hughes, Hoatson, Stanley, &c.) might be formed from Whittaker's *R. Register*, 1675-1867 (Lond. 1868).

Rugeley, a town of Staffordshire, on the Trent, 9½ miles E.S.E. of Stafford by rail, has a Roman Catholic church with a lofty spire (1863), a town-hall, mechanics' institute, and a free grammar-school. On June 26, 1878, the foundation-stone was laid of new Public Buildings, to be erected in Geometric Gothic, which comprise a market-hall (66 feet by 41 feet, and 40 feet high), an assembly room, and numerous public offices. Iron and brass foundries employ a large number of the inhabitants, and in the neighbourhood are extensive collieries. Pop. (1871) 4630.

Rügen, the largest island of Germany, lying in the Baltic, opposite the coast of Pommern, from which it is separated by the Strelasund, 1½ miles wide at its narrowest part. Area 362 sq. miles. Pop. 47,048. On every side it is indented by deep bays forming a number of peninsulas connected by narrow strips of land with the main body of the island, and of which the largest are Witton and Jasmund in the N., and Mönchgut and Zudar on the S. The surface is level in the W., but is hilly in the E. and interior, while the N. and E. coasts usually consist of bold chalk cliffs. On the E. coast of Jasmund is the Stubbenkammer

(Slav. *stopien* 'steps,' and *kamien* 'a rock'), a perpendicular rock 420 feet in height; and extending for 12 miles along the same coast, the Stubbenitz, a beech forest, having in its centre the Hertha-see, on the W. bank of which is the Herthaburg, a semicircular mound 50 feet in height, the traditional scene of the mysterious rites of the goddess Hertha (v. Tacitus, Germ. 48). R. has a fertile soil, and extensive fisheries along its coasts. The chief towns are Bergen (pop. 4000) and Putbus, a favourite sea-bathing place.

Ruhmkorff, Heinrich Daniel, a philosophical mechanician, was born at Hannover in 1803. In 1819 he went to Paris and was porter in Chevalier's laboratory. In 1839 he started business as a scientific manufacturer, and 1844 constructed an improved and convenient thermoelectric battery. After a lengthened series of experiments in magneto-electricity, he brought out his induction coil or inductorium in 1851, hence known as the R. coil. At the Paris Exhibition of 1858 he was awarded a prize of 5500 francs for his collection of scientific apparatus, and in 1863 he obtained a grant of 50,000 francs from Napoleon III. for his improvements in the galvanic battery. He died December 21, 1877.

Ruhnken, David, a celebrated German scholar, born at Stolp in Lower Pommern, January 2, 1723, passed from the Friedrichskollegium at Königsberg to the universities of Wittenberg (1741) and Leiden (1743), where he gained the favour of Hemsterhuis. R. was appointed Greek 'Lector' at Leiden in 1757, and professor of history and eloquence in 1761. He died May 14, 1791. His works are still valuable for their correct and elegant Latinity. Chief of these are his *Epistola Critica* (Leid. 1749-51; new ed. Leips. 1827), and his editions of Timæus' *Lexicon Vocum Platonicarum* (Leid. 1755-89; enlarged by Koch, Leip. 1833), and of *Rutilius Lupus* (1768), *Velleius Paterculus* (2 vols. 1779), and *Hesychius* (the latter begun by Alberti). See Daniel Wytttenbach, *Vita Ruhnkenii* (Leid. 1799; new ed. by Frotscher, 1846), and Rink, *F. Hemsterhuis und D. R.* (Königsb. 1801).

Ruhr, the most important affluent of the Rhine from the right side in Prussia, rises near Winterberg, flows W.N.W. through fertile valleys, and joins the main stream at Ruhrort after a course of 142 miles. It is an important channel of communication between the productive coal mines of the district and the Rhine.

Ruhrort, a town of Rhenish Prussia, on the Rhine, at the mouth of the Ruhr, 12 miles N.N.E. of Crefeld by rail. With the best harbour on the Rhine, it is capable of accommodating 400 vessels, while its quays are of great extent. It is the seat of an immense coal trade, besides commerce in wood, wool, and corn. The export of coal amounts to 125,000 tons annually, for the transport of which R. has 16 powerful tug steamers and 400 barges, some of which are upwards of 500 tons burden. Pop. (1875) 9053.

Rule Britannia, the maritime hymn of Great Britain, second only as a national anthem to *God Save the Queen*, was originally sung in the masque of *Alfred*, performed for the first time at Clifden, August 1, 1740, before Frederick, Prince of Wales. The patriotic words have been variously attributed to David Mallet and to James Thompson, the joint-authors of the masque. The grand soul-stirring melody is by Dr. Arne.

Rule of Faith is the ultimate authority to which Christians are to look for instruction as to what they are to believe. Very various opinions prevail as to what is the R. of F. Roman Catholics hold it to be a divine revelation, which is partly written and partly unwritten; in other words, it includes Scripture and Tradition. But as ordinary people are unable to decide what is canonical Scripture and what not, what is divine tradition and what merely human, the Church is appointed by God to be an infallible teacher in these matters. Protestants hold that 'the Word of God, as contained in the Scriptures of the Old and New Testaments, is the only infallible R. of F.' Certain mystics reject all external authority, and hold their R. of F. to be an inward divine influence. Rationalists hold that the only R. of F. is reason, which is the source and ground of all religious knowledge and conviction.

Rule of the Octave, a system of adding harmonies to the diatonic scale which is used as the lowest part. It was formerly much taught as a formula to students.

Rule of Three, a technical term for the arithmetical process by which a fourth proportional to *three given numbers* is found. From its great importance in commercial transactions, it has also been called the golden rule. See PROPORTION.

Rum, a kind of spirits distilled from the skimmings of sugarcane juice or molasses, or from the latter alone, mixed with water and a considerable proportion of *dunder*, or lees of former distillations. Fermentation proceeds for several days before the 'wash' is transferred to the still. The distilled spirit is commonly coloured with burnt sugar. The peculiar flavour of R. is due to butyric ether; other ethereal principles develop with age, imparting mellowness and improved flavour. *Pineapple R.* is simply R. flavoured with slices of pineapple. The alcoholic strength is about equal to that of brandy. The distillation of R. is generally conducted conjunctly with the manufacture of sugar in the W. and E. Indies, Guiana, Reunion, Tahiti, &c. Jamaica R. commands the highest market value. W. Indian produce comes almost entirely from that island, and the annual value of the exports range from £240,000 to £290,000. The imports of R. into the United Kingdom, during the year 1876, amounted to 10,395,335 proof gallons, valued at £1,073,707. British Guiana and the W. Indian Islands sent four-fifths of the whole quantity. 5,037,075 gallons were entered for home consumption, on which a duty of £2,554,260 was paid. R. is largely consumed in the navy; in the towns of Great Britain its general consumption is small and on the decline.

Rum, a mountainous, rugged, and barren island of the Hebrides, 15½ miles N.N.W. of Ardnamurchan Point, Argyleshire, 8 miles long by 7½ broad. At Ben More the surface is 2320 feet above the sea; at Cresal, 1800. Of the area of 30,000 acres, only about 1800 are under cultivation. Pop. (1861) 73.

Rumania, since 1861 a principality under Turkish suzerainty, but erected into an independent state by the Treaty of Berlin (July, 1878), consists of the two 'Danubian Principalities' of Moldavia and Wallachia, together with the Dobrukscha and the delta of the Danube. The two latter districts were annexed to it by the Treaty of Berlin, in return for the retrocession to Russia of the small part of Bessarabia which it had formerly held. Its boundaries are now—on the E. the river Pruth, the Kilia mouth of the Danube (separating it from Bessarabia), and the Black Sea; on the S., a line drawn from Mangalia on the Black Sea to the Danube E. of Silistria, and the course of the Danube (separating it from Bulgaria and Servia); and on the W. and N. the Transylvanian Alps and the Carpathians (separating it from Siebenbürgen and Bukowina). Its area is now about 49,800 sq. miles, or almost that of England. The greater part of R. consists of rich, alluvial plains, but along the W. and N. there is much hill country and table-land, some of the peaks, such as the Negoi and the Surul, rising to about 7000 feet. There are four great passes leading through the Transylvanian Alps into Siebenbürgen—the Vulkan, the Rother Thurm, the Törzburg, and the Tömös passes. Through the Carpathians the principal passes are the Borgo and Oitoz. The rivers are for the most part deep and sluggish. The Danube (q. v.), and its tributary the Pruth (q. v.), now form the boundary rivers. The principal Moldavian tributary of the Pruth is the Schischija. Rising in Bukowina, the Sereth (q. v.) flows through the whole length of Moldavia until it joins the Danube at Galatz, its chief tributaries being from the left the Berlat, from the right the Moldava, the Bistriza, the Drotusch, and the Buseo, the last flowing through Wallachia. The other rivers of the latter state are all tributaries of the Danube, the chief being the Jalomitza, the Argisch, the Aluta (which rises in Siebenbürgen and flows through the Rother Thurm pass), and the Schyl. Along the course of the Danube, even from W. of the mouth of the Aluta, there are large marshy lagoons, the largest being the *Balta* lake, near the mouth of the Argisch. The chief towns of Wallachia are Bucharest (q. v.), Braila (q. v.), Giurgevo (q. v.), Kralova (q. v.), Fokshan (q. v.), Plojesti (q. v.); and of Moldavia, Jassy (q. v.), Galatz (q. v.), Piatra (q. v.), Berlat and Botochani.

Climate.—R. is subject to very severe cold in winter, as well as great heat in summer. Even on the plains the thermometer often stands at -28° F. in winter, while it rises to 99° F. in summer and autumn. The approach of winter is marked by N.E. winds, which sometimes reduce the temperature by as much as 30° in a day. In the marshy lowlands, malaria is at

some seasons prevalent, but the excessively high death-rate is probably due rather to lack of sanitary knowledge on the part of the inhabitants than to unhealthiness of climate.

Agriculture and Commerce.—R. is almost entirely an agricultural and stock-raising country. The forests, it is true, are extensive, covering altogether nearly 5,000,000 acres, but the timber trade is small. In 1872 there were 6,111,136 acres in grain crops, producing 8,531,288 quarters, principally of maize, of which the "mamaliga," which forms the staple food of the population, is made. There were 9,511,040 acres in pasture and meadow lands, on which 1,886,090 cattle, 4,786,204 sheep, and other stock (pigs, horses, and goats) to the number of 1,575,775, are reared. There were 380,545 acres of gardens, 234,758 acres of vineyards (producing a very poor sort of wine), and 9,384,227 acres, or nearly one-third of the whole country, were waste. Agriculture is as yet extremely primitive, but is advancing. R. is reported to possess great mineral riches, but they are almost entirely undeveloped. There are three salt-mines in Wallachia and one in Moldavia, worked under a state monopoly, and producing annually about 87,386,000 lbs. of salt, not of the finest quality. Petroleum abounds on the sides of the Carpathians. In 1872 there were 400 wells at work, yielding annually about 1,254,000 gallons. The Regie Company, established in 1872, has a monopoly of the tobacco-growing industry for fifteen years, and in 1875 the crop was about 6,722,000 lbs. The consumption of tobacco in that year was about 4 fr. 15 centimes per head of population. The exports for 1872 were valued at £6,662,280, the exports of grain amounting to over £5,000,000, and of mineral products to £80,000, the remainder being composed of wool, hides, tallow, &c. Grain to the value of £500,000 was exported to England. The imports for the same year amounted to £4,373,111. Including the Kusten-He-Tchernavoda Railroad in the newly-annexed Dobruddza, there are about 800 miles of railroad in R. The main line runs from Suczawa, in the N. of Moldavia, by Roman, Fokshani, Plojeski, Bucharest, Pitesti, and Kralova, to Orsova on the Transylvanian frontier, from which a line to Temesvar opened June 1875, places Bucharest in direct communication with Vienna. There are branches from Bucharest to Giurgevo, from Buzeo to Braila and Galatz, and from Galatz to Berlin.

Army and Finance.—The regular army consists of 36 battalions of infantry, with 716 officers and 18,652 men; 17 squadrons of cavalry, with 122 officers and 2174 men; and 12 batteries of artillery, with 112 officers, 2076 men, and 96 pieces of artillery. There is also a territorial army of about 45,000 men. Those who draw the highest numbers in the conscription are drafted into the latter; those who draw the lowest, into the former. The period of service, both active and in the reserve, is eight years. Those who have completed their term of service are enrolled in the militia, and there is also a national guard, consisting of the whole body of citizens between 37 and 46 years of age. The navy consists of 2 steamers and 6 gunboats, with 400 sailors. According to the budget of 1877, the revenue was £3,217,585, the expenditure £3,451,664, leaving a deficit of £234,078. The national debt at the beginning of 1877 amounted to £24,828,408.

Religion and Education.—The national religion of R. is that of the Greek Church. The Metropolitan of Wallachia is the Primate of R., and there is also a Metropolitan of Moldavia. R. is divided into six bishoprics. Besides the secular clergy, of whom there is one for about every 200 of the population, there are numerous monastic orders, the total number of monasteries and nunneries in the Principalities amounting to nearly 300. Education is not good, but is said to be improving. In 1877 there were 2014 village schools, with 2016 teachers and 52,249 pupils; and in the towns 234 schools, with 500 teachers and 27,285 pupils. There are 35 higher Government schools, and about 214 private schools. The Universities of Bucharest and Jassy have together 63 professors and 660 students.

Language and Literature.—There is some difficulty in distinguishing the component parts of the population of R. Moldavia and Wallachia are parts of the ancient Dacia, vii, which was conquered by Trajan, A. D. 107, and shortly after colonized by his orders. It is a point of honour with the Rumanians (who call themselves *Romani* and their language *Romani*), to believe themselves descended from these colonists of the divine Trajan, as they even now call him in their legal documents. Their language is, in point of fact, of Romance origin, but has

been enormously modified, both *a priori* by the pre-existing dialects of the region, and *a posteriori* by Greek, Slavonic, and even Teutonic influences. There are two dialects, the Daco-Rumanian in Moldavia and the North, much tinged with Slav elements, and the Macedono-Rumanian in Wallachia and the South. More than a third of those who speak the Rumanian language live beyond the boundaries of the Principalities. In Transylvania there are 2,321,906 Rumanians, while S. of the Danube there are probably almost a million. There has been no census of R. since 1859, but at the end of 1873 the population was estimated as nearly as possible at 5,073,000, and it has probably remained almost stationary since. This estimate includes about 400,000 Jews and 200,000 gipsies. The literature of the Principalities is almost confined to popular ballads and tales, in which Wallachia is particularly rich. See Arthur Schott's *Wallachische Märchen* (Stuttg. and Tub. 1845), and E. C. G. Murray's *Doina, or the National Songs and Legends of R.* (Lond. 1875). There are now newspapers both at Bucharest and Jassy. For the language, see *Grammatica Daco-Romana*, by Johannes Alexi (Vienna, 1826), *Historia Linguae Daco-Romanae*, by Laurianus (Vienna, 1849), Diez's *Introduction to the Grammar of the Romance Languages* (Lond. 1863), and Stanesco and Lazar's *Praktischer Lehrgang zur Erlernung der R. Sprache* (Pest, 1867).

History.—It is not until the 10th c. that a people bearing the name of *Viachs* (of Slavonic origin, but probably equivalent to the German *Walach*, Eng. *Walach* = foreigners) make their appearance in history. For centuries before this the Principalities had been the scene of the unrecorded struggles of Goths, Huns, Slavs, Bulgars, and other tribes, so that the Viach people was now an extremely composite race, spreading over both the Principalities and the surrounding provinces. They were probably not converted to Christianity until about the middle of the 12th c., and then through the agency of Slavonians, their ecclesiastical terminology being still Slavonic. It was not long after their conversion that they first began to suffer from the Moslem invasions. The present R. was overrun but not annexed by the Turks. By a treaty between the Voivod Mircea and Bajazid I., in 1391, Wallachia accepted the Turkish suzerainty and agreed to pay a yearly tribute of 10,000 ducats, Moldavia meanwhile remaining independent until the reign of Soliman the Magnificent. The conventions with the Principalities were systematically violated by the Porte, and in 1711 Moldavia concluded a treaty with Peter the Great of Russia, which did not, however, produce any permanent good effect. About 1716 the Porte placed the financial affairs of the Principalities in the hands of a number of Phanariote Greeks, and this rapacious class continued its legal extortions almost without intermission until 1853. In 1769 an unsuccessful attempt was made by the Principalities to place themselves under Russian protection, and in 1774 the Porte conceded the right of the Russian ambassador at Constantinople to exercise a sort of protectorate over them, from which point dates the legitimized influence of Russia in R. Napoleon's intrigues led to several vicissitudes in the fate of the Principalities. They were occupied by Russian troops from 1806 to 1812, and in 1808 Napoleon formally assigned them to Russia, confessing to the Austrian minister at Paris that he had merely done so "in order to throw an apple of discord between Russia and Austria." By the peace of Bucharest in 1812, Russia gave up all claim to R., but stipulated for Bessarabia. The Russo-Turkish war of 1828-29 led to a five years' occupation of R. by Russia. From 1834 to 1848 Russia and Turkey intrigued against each other for preponderance of influence in the Principalities, the population breaching them both equally. In 1848 a joint occupation by Russia and the Porte was agreed to, but this arrangement soon fell through. It was the Russian occupation under Prince Gortschakoff in 1853 that led to the Crimean War, which ended in the Treaty of Paris 1856 binding the Porte "to preserve to the Principalities an independent and rational administration, as well as full liberty of worship, of legislation, of commerce, and of navigation." It provided at the same time for the raising of a national armed force. After considerable difficulty the Principalities obtained the consent of the powers to their consolidation into one province and under one Hospodar. The first Hospodar was a certain Colonel Cozza, elected by the Moldavian Assembly at Jassy and the Wallachian Assembly at Bucharest in 1859. He reigned under the title of Prince Alexander John, and it was under his reign that the first joint parliament of the two Principalities met at Bucharest in 1862. He, too, promulgated

the new Constitution (1864). It established a Senate and Chamber of Deputies, the former to consist of bishops, generals, and holders of high offices, as well as 64 other members, half of whom were to be nominated by the Prince, the latter to consist of 160 members—85 for Wallachia, 75 for Moldavia—to be chosen by indirect election, the voters choosing electors by whom the Deputies were to be named. Every Ruman above twenty-five years of age who could read and write, and paid about 35 shillings in taxes, was to have a vote. In 1866 a revolution occurred by which Prince Couza was dethroned, and Prince Karl of Hohenzollern-Sigmaringen, who is at present (1878) the reigning Prince, was elected in his place. When, in the spring of 1877, war broke out between Russia and Turkey, a Convention was signed between Russia and R. by which the troops of the former power were to have free passage through the Principalities. On the 21st of May 1877 R. declared itself independent of, and began active hostilities against, Turkey. The Rumanian troops, commanded by Prince Karl, distinguished themselves greatly in the campaign. The independence of R. was confirmed by the Treaty of Berlin (July 1878), and the changes in its frontier described above were agreed upon. At the same time absolute religious equality was insisted on, this clause being intended to ensure the emancipation of the Jews, who had hitherto laboured under severe political, social, and commercial disabilities. The serfdom of the gipsies had been abolished as early as 1849. See Henke, *Rumänien, Land und Volk* (Leip. 1877), and R. J. W. Ozanne, *Three Years in R.* (Lond. 1878).

Rum'ford, Benjamin Thompson, Count, was born at Woburn, Massachusetts, March 26, 1753. After getting into some trouble as an officer of militia, for supposed disaffection towards the cause of the colonies, he came to England, where he acquired the confidence of Lord George Germaine, Colonial Secretary of State, and was appointed secretary for the province of Georgia. In 1780 he was made under-secretary of State. Soon after he went to America to command the king's American dragoons. Returning to England when peace was proclaimed, he was raised to the rank of colonel. He then entered the Bavarian service. In 1790 R. began the work of suppressing the professional beggars who infested Bavaria, and he succeeded. For other reforms and improvements, such as the establishment of a military school, the improvement of breed in horses and horned cattle, and the transformation of a large tract of hunting-ground near Munich into a public park, he was raised to the rank of major-general, and he became successively member of the council of state, lieutenant-general, commander-in-chief of the general staff, minister of war, and Count of the Holy Roman Empire. After the death of Karl Theodor, Elector of Bavaria, R. retired to Paris, where in 1804 he married the widow of Lavoisier. He spent the remainder of his life in scientific pursuits at Auteuil, where he died 21st August 1814. Of his numerous contributions to scientific journals some of the best are to be found in his *Essays* (4 vols. Lond. 1795-1800). As a physicist, he is famous in connection with the theory of heat, being one of the first who disproved by experiment the then universally accepted caloric theory. (See THERMODYNAMICS). Professor Tait in his *Recent Advances in Physical Science* has not only given prominence to R.'s experiments, but has pointedly called attention to the justness and penetration of the reasoning by which he interpreted them in his *Essays*. To R. the Royal Institution owes its existence. See the elaborate Memoir by G. E. Ellis prefixed to the *Complete Works of Count R.*, published by the American Academy of Arts and Sciences (5 vols. 1876).

Rum'illi or Roumelia (i.e. 'Roman land'), the name given by the Turks to the first government which they formed out of the territories wrested from the eastern emperors, and which comprised the whole of the peninsula S. of the Danube and Save, excepting Constantinople, Adrianople, Gallipoli, and Bosnia. The entire European dominion of the Sultan was designated *R. taraf* ('Roman side'), and the Asiatic territory *Anatol taraf* ('Eastern side'). In modern times, after the liberation of Greece, R., subdivided into twenty sandjaks, consisted of Albania, Thessaly, Macedonia, and parts of Bulgaria and Thrace. Sofia was made the capital, and a pasha of two tails governor-general, with the rank of Vizier. By a Hatti-Sherif of 1836 the province was reduced in area, and in 1855, as an eyalet, it was further contracted to the limits of W. Macedonia and N. and Central Alba-

nia, with an area of 15,130 sq. miles, and a pop. of some 1,200,000. Since 1867, when the eyalets of Prisen, Monastir, and Scutari were organised, the name R. has been used only in a geographical, and not in an administrative sense. But since the negotiation of the Treaty of Berlin (13th July 1878), the territory of the former eyalet of R. has been designated *Western R.*, in contradistinction to a newly created province which has received from the Congress the name of *Eastern R.* This new province, extending from the Black Sea to the Rhodope Mountains, and from the Balkans to an arbitrary line drawn across the former vilayet of Adrianople, 'remains under the military and political authority of the Sultan, subject to conditions of administrative autonomy.' Its length from E. to W. is 270 miles, and its greatest breadth from N. to S. is 85. A Christian governor-general is to be appointed by the Porte, with the assent of the Great Powers, for a period of five years. The Sultan has the right of fortifying the frontiers, and appointing the officers of a native gendarmerie and local militia, charged with the maintenance of internal order. After the signature of the Treaty a European Commission was formed for the purpose of settling with the Porte the administrative organisation of Eastern R. and the functions of the governor. All treaties concluded by the Porte shall be applicable to Eastern R., and the Porte engages to maintain the general laws of the Empire as to religious liberty.

Ruminan'tia, a division of quadrupeds belonging to the order *Ungulata* or that of the 'Hoofed' Mammalia. R. are *Artiodactyl* mammals, i.e., they have an even number of toes. The foot is 'cloven,' and consists of a pair (third and fourth) of symmetrical toes encased in hoofs. The metacarpal and metatarsal bones are united to form a single bone—the so-called *cannon bone*, which supports the two useful toes. There are two other smaller and supplementary toes on the back of the foot in most R. A peculiar bone, the *malleolar*, replaces the distal or lower end of the fibula of the hind limb, and articulates above with the *astragalus*, and below with the *calcaneum* of the ankle. There is rarely more than one pair of incisors in the upper jaw of the adult, and these are most frequently wanting, as also are the upper canine teeth. The place of the upper incisors is taken by a hardened pad of gum, against which the lower incisors—numbering six—and lower canines—numbering two—bite, in the act of mastication. There are six molars on each side of the upper jaw, and the same number in the lower jaw, the molars and canines being separated by a considerable *diastema* or interval. The molars are marked on their crowns by two double crescents, the convexities of which are turned outwards in those of the lower, and inwards in those of the upper jaw. The exceptions to the ordinary dentition of the R. as thus described, are found in camels, in which there are two tusk-like upper incisors and upper canines; and in the musk deer, in which are well-developed canines in the upper jaw of the males. The *stomach* of R. is complex, and constitutes the most important feature of the group. It consists of four compartments, erroneously described as distinct 'stomachs.' Probably the first and second compartments of the R. stomach correspond with the anterior or *cardiac* half of the human stomach; the third and fourth compartments corresponding to the *pyloric* portion. The first and largest cavity is named the *rumen* or *paunch*, the walls being set with a number of coarse papillæ. It opens into the second stomach, or *reticulum*, by a wide aperture. The reticulum, also named the *honeycomb*, has its walls thrown into folds forming hexagonal cells. The reticulum opens into the *psalterium* or manyplies (the third compartment) by a small aperture, and its lining membrane is thrown into longitudinal folds resembling the leaves of a book. The fourth compartment, into which the manyplies opens, is called the *abomasum* or *rennet*. It is a slender, elongated portion of the stomach, and its walls are glandular, and secrete *gastric juice*—a fact clearly showing that this latter compartment is to be regarded as the true digestive sac. The *œsophagus* or *gullet* opens into the stomach about midway between the 'paunch' and 'honeycomb.'

In the act of rumination, the animal first swallows the cropped grass, which has been abundantly mixed with saliva, the food passing into the rumen or paunch. There it is moistened, and passes thence into the reticulum, the office of whose honeycombed walls appears to be that of moulding the food into pellets. When the animal is watched, a slight movement of the body, resembling that produced by hiccough, is noticed, and the pellets

masses are propelled upwards into the mouth. Here the food is thoroughly masticated, and is then swallowed for the second time, the food now passing directly into the third stomach or ventricles by the arrangement of the gullet already described. The manophyls appears to serve as a strainer for the food, and thus may strain the food which passes between the reticulum and ventricles, and also separate the liquid from the solid parts of the food after the nutriment has been swallowed for the second time. From the manophyls the food passes into the rennet, which is the true digestive cavity. In the latter compartment the nutriment is dissolved by the action of the gastric juice secreted by its glandular walls. The R. are divided into three chief groups—the *Capreolidae*, or musk deer; the *Cotylophora*, or sheep, deer, oxen, antelopes, &c.; and the *Camelidae*, or *Tylopoda*. When horns are present in R. they are usually double. In the giraffes the horns are outgrowths of the frontal bone of the skull, and thus differ in nature from the core-supported horns of the sheep, deer, &c.

Rump Parliament, The, lasted from December 6, 1648, to April 20, 1653. Cromwell blockaded the parliament with two regiments under command of Colonel Pride. All but the most rigid Independents were excluded; and by this method—'Pride's Purge,' as it was called—forty-one members were confined below the house in a room denominated Heil, 160 were sent home, while only sixty entered the hall. The sixty formed the Rump, passed resolutions approving the conduct of their general, and declared the acts of the parliament for the few days previous illegal. The R. P. likewise arraigned Charles I. for levying an army against the Commons. It tried him, condemned him, and awarded him a traitor's death. Five years afterwards Cromwell quarrelled with the parliament of his own creation, and dissolved the assembly. At his death the R. P. resumed sway, but the soldiers expelled it from Westminster on the 13th of October 1659. The army had soon to give in, however, and allowed the R. P. to govern once more. But the Independents, on March 16, 1660, found themselves in a minority, and this singular travesty of a representative government was soon after broken up.

Rum Shrub is a kind of Liqueur (q. v.), prepared from rum by adding sugar, orange or lemon juice, and water. It is imported from the W. Indies and other places, and like rum it is subject to a duty of 10s. 2d. per gallon.

Run-corn (orig. *Rum-cofan*, 'the wide cove or inlet'), a river-port of England in Cheshire, 28 miles W.S.W. of Manchester by rail, on the S. bank of the Mersey, which is here spanned by a splendid railway viaduct (1864-68) of 101 arches, the bridge proper consisting of three clear spans of 305 feet each, flanked at either end by towers 128 feet above high-water mark. R. has two churches, All Saints (1849) and Holy Trinity (1838), several chapels, a townhall (1830), market-hall (1856), public hall (1867), theatre, &c., and publishes two newspapers. Since the transfer of the R. and other property to the Bridgewater Navigation in 1872, upwards of £50,000 has been expended on the improvement of the port, including a canal connecting R. with Weston Point. Opened in 1876, this canal is 1 mile long by 100 feet wide, and admits vessels of 15 feet draught. In 1877 there entered 2297 vessels of 175,307 tons, and cleared 1661 of 157,096 tons; and on December 31st of that year 137 vessels of 7763 tons, besides 24 fishing-boats, were registered as belonging to the port. The exports amounted (1876) to £21,575; the imports to £136,999, and the customs to £1059. A soap and alkali factory employed 92 men in 1871, the chemical works 329, the tanneries 113, and the limestone quarries 161 men; and there are also rope and sail factories, shipbuilding yards (three British sailing-vessels of 232 tons in 1877), corn mills, and an iron foundry. Pop. (1871) 19,460. R. is an ancient place, where Ethelfleda founded a castle in 916, and William of Chester an Augustine priory in 1133, but it had sunk to a mere fishing-village in the last century, and owes its prosperity to its situation as terminus of the Bridgewater Canal.

Rune (Old Eng. *run*, Ger. *rune*, Goth. *runa*, and Icel. *runn*) is a word probably connected with the Low German verb *runnen*, 'to cut,' or 'to carve'; hence, as the runes were in olden times invariably cut or carved, they came in a special sense to mean the cutting or carving of letters, consequently the letters themselves. From the runes being known in the sense of letters, many other significations are found in the oldest writings of the Teutonic nations. Already by Ulfilas the word *runn* is employed

to translate *mysterion*. This meaning was directly derived from the fact, that comparatively few persons were skilled in the use of the runes, and the knowledge of them was looked upon as something hidden and mysterious, if not magical. In Scandinavia they were, from the earliest times, connected with sorcery and witchcraft, and the tradition of their being so used has hardly yet died out in Iceland. From the fact of the runes being used in the communication of thought, may be derived several other meanings which we find attached to the word; e.g., it came to mean counsels, secret and confidential communications; lastly, every kind of acquired knowledge, ancient lore, and traditions. Nouns, adjectives, and verbs derived from the word *run* conveyed analogous meanings, as friendly counsellor, confidential friend; studious, well skilled in ancient lore; and to inquire into.

In course of time the word R. came to be exclusively applied to the alphabets used by the Teutonic nations before the introduction of Christianity, and of the Greek and Roman letters. In the Icelandic sagas we are told that Odin first taught the people of the North the use of runes. It is not, however, probable that they were a Teutonic invention. It is much more likely that they owe their origin to a still earlier alphabet. Some are of opinion that they are only a transformation of the Greek characters; and there is certainly great similarity between many of the Greek characters and the Runic letters. Others have suggested that they may have been derived from the Phœnician alphabet, or even from the cuneiform character. However that may be, it is certain that their origin dates further back than the earliest historical records which we have of the Teutonic nations.

The runes have been divided into three classes, viz., the Old English runes, the German runes, and the Scandinavian runes. There is, however, no greater difference between these three alphabets than there are in the respective modern alphabets themselves. The division is therefore more local than real, that is, the runes have been divided into classes according to where the Runic monuments have been found. One peculiarity they have in common, viz., the arrangement of the letters. The alphabet does not begin with *a*, and run on *b, c, d, e, f, &c.*, but with *f*, and runs on *u, th, o, r, k, &c.*; hence it is by some antiquarians called the *Futhork* alphabet. Usually the runes read from left to right, yet sometimes from right to left. The following are the Runic alphabets in order of the English alphabet:—

Mod. English Alphabet.	Scandinavian Runes.	Old English Runes.	German Runes.
a	ᚦ	ᚦ	ᚦ
b	ᚷ	ᚷ	ᚷ
c			
d		ᚩ	ᚩ
e		ᚱ	ᚱ
f	ᚱ	ᚱ	ᚱ
g		ᚨ	ᚨ
h	ᚨ	ᚨ	ᚨ
i	ᚱ	ᚱ	ᚱ
j		ᚨ	ᚨ
k	ᚱ	ᚱ	ᚱ
l	ᚱ	ᚱ	ᚱ
m	ᚱ	ᚱ	ᚱ
n	ᚱ	ᚱ	ᚱ
o	ᚱ	ᚱ	ᚱ
p		ᚱ	ᚱ
q		ᚱ	ᚱ
r	ᚱ	ᚱ	ᚱ
s	ᚱ	ᚱ	ᚱ
t	ᚱ	ᚱ	ᚱ
u	ᚱ	ᚱ	ᚱ
v	ᚱ	ᚱ	ᚱ
w			
x		ᚱ	ᚱ
y	ᚱ	ᚱ	ᚱ
z			
<i>Additional letters.</i>			
th	ᚱ	ᚱ	ᚱ
ö	ᚱ	ᚱ	ᚱ

Both in the Old English and the German runes there are a great many variations which have been omitted. It will be seen from these alphabets that there are several letters wanting in the Scandinavian alphabet. Some of them are not even yet wanted in the Scandinavian tongue, or Icelandic, as *c* and *g*; no more are the *x* and *s*, if the language is written phonetically. The *d*, *e*, *j*, and *p*, are, however, necessary to the language as it now is, and have been all the time since we had any literature in it. In later runes the *d* has been represented by ᚛, the soft *d*, or *ḍ* by ᚛, the *e* by |, or †, the *g* by ᚷ, the *j* by | and the *p* by ᚱ. We do not know whether these letters were necessary at that state of the language when the runes first came into use. The probability is that they were not. Each letter of the runes was named by a word which began with the letter in question, thus *A* was called *dr*, 'year, season.' In other respects the word had no more connection with the letter than books has with *b*, or dove has with *d*; just as we see in the nursery books, *b* means a book, and *d* means a dove.

The question has been raised, which of the three alphabets was the oldest, or the original, from which the others were derived? It has been surmised that the Old English alphabet was the original, and that the Scandinavian was merely an abridgment of it. The common opinion, however, is that the Scandinavian is the oldest, and it certainly seems to point to a language in a less perfect state of development than the Old English. This fact, together with the simplicity of the Scandinavian runes, may almost be regarded as establishing its greater antiquity. On the other hand, it is quite possible that the three alphabets are independent offshoots from a parental stem which has now wholly disappeared.

There is no such thing as a Runic literature. The runes were not used for literary purposes, but for inscriptions only. These inscriptions are found on stone monuments; on implements of war, e.g., swords, shields, &c.; on personal ornaments, as arm-rings; on household furniture and other implements in common use, as chairs, benches, doors, spoons, drinking-horns, dice, &c. Not only were the runes used in the times of heathenism, but also long after Christianity was introduced, and several stone crosses have been found in the N. of England with Runic inscriptions. By far the largest number of these monuments have been found in Scandinavia, Denmark, and Iceland; but a considerable number have also been discovered in Shetland, the Orkneys, the N. of Scotland, the N. of England, and especially in the Isle of Man. In fact, the Northmen seem to have left traces of their runic writing, or rather carving, wherever they went. It is worth remarking for those who believe in the prior origin of the Old English runes, that nearly all the runic monuments found in England occur in the N., where the Scandinavian element predominated. In Germany hardly any Runic monuments have been found.

The most important publications on runes are:—*The Old Northern Runic Monuments of Scandinavia and England, now first collected by George Stephens (1866-68)*. An interesting chapter on the Old English runes is in D. H. Haigh's *Conquest of Britain by the Saxons (1861)*. Other publications on the runes are J. G. Liljegren, *Runlära (1832)*; J. M. Kemble, *Runes of the Anglo-Saxons, in the Archaeologia (vol. xxviii., 327, 1840)*; Finn Magnussen, *Om Runamo og Runerne (1841)*; A. Kirchoff, *Das gothische Runen Alphabet*; R. von Liliencross and K. Müllenhoff, *Zur Runenlehre (1852)*; R. Dybeck, *Svenska Runurkunder (1855)*, *Sveriges Runurkunder (1860)*; J. G. Cumming, *The Runic and other Monumental Remains in the Isle of Man (1857)*; James Farrer, *Notice of Runic Monuments in the Orkneys (1862)*; P. G. Thorsen, *De danske Runemindermaerker (1863)*; L. F. A. Wimmer, *Runeskiftens Oprindelse og Udvikling i Norden (1874)*; W. C. Grimm, *Über deutsche Runen*; and Wilhelm Grimm, *Zur Literatur der Runen*, in vol. xliii. of *Jahrbücher der Litteratur*. Throughout the *Annaler for Nordisk Oldkyndighed and Antiquarisk Tidsskrift* are found numerous descriptions of Runic finds.

Bu'neberg, Johan Ludvig, Sweden's greatest lyricist, was born February 5, 1804, at Jakobstad, in Finland (then under Sweden), and brought up at Uleaborg, on the Gulf of Bothnia. At eighteen he left Vasa school for the University of Abo (q. v.), where he graduated in 1827. After this he was appointed 'Docens eloquentiæ' at Helsingfors in 1830, in which year he published his first volume of *Dikter*, and a collection of *Serviska*

folksaenger. The poem *Grafven i Perrho* followed in 1831. From 1832 to 1837 R. edited the *Helsingfors Morgonblad*, which he enriched with many critical essays. To this period of intense activity belong some of his noblest works, *Elgskytterne (1832)*, a second volume of *Dikter (1833)*, the comedy *Friaren fraan Landet (1834)*, and the charming love-idyll *Hanna (1836)*. With his appointment to the Latin 'Lectorship' at Borgaa Gymnasium (1837), R.'s life entered on a new phase. No longer forced to write prose for bread, he gave his whole soul to the poetic art. To this period belong the romance *Nadeschda (1841)*, the idyll *Julvällen (1841)*, a third volume of *Dikter (1843)*, the epic *Kung Fjalar (1844)*, and the first series of *Fänrik Staals Sägner*, among which are the finest lyrics in the Swedish language. From 1842 R. had confined himself to lecturing on Greek at Borgaa, and from 1847 to 1850 he was rector of the college. In 1851 he visited Sweden for the first time. He was everywhere received with enthusiasm, and was made a member of the Swedish Academy. In 1854 his critical prose writings were collected in a volume named *Smärre berättelser*, and from 1853 to 1857 he was engaged in bringing out a Swedish psalter for Finland. His last writings were a second series of *Fänrik Staals Sägner (1860)*, the domestic comedy *Kan ej (1862)*, and the Greek tragedy *Kungarne paa Salamis (1863)*, closely modelled upon Sophocles. In 1864 he was attacked by a fatal disease, under which he lingered on till the 6th May 1877, when he died at Helsingfors. In Scandinavia R. is the most popular poet of our time. Yet the form of his verse is of classic precision, and his works are distinguished by a masterly union of antique sobriety and modern romanticism which gives to them a stamp of classical delicacy and refinement. See *J. L. R.'s Lyrical Songs, Idylls, and Epigrams, Done into English* by Elfrik Magnússon, M. A., and E. H. Palmer, M. A. (Lond. 1878).

Rungpur, the chief town of the district of the same name in Bengal, British India, on the left bank of the Ghogat River, 268 miles N. E. of Calcutta. Pop. (1872), including suburbs, 14,845. It will be the terminus of a branch from the new State Railway to Darjeeling.—The district of R., which is bounded E. by the Brahmputra, and intersected by many tributaries of that river, has an area of 3476 sq. miles. Pop. (1872) 2,149,972, chiefly Mahommedans. It is throughout flat and swampy, but fertile. The crops are rice, jute, and tobacco, of which the two latter are largely exported. The manufactures are paper-making, carpet and silk-cloth weaving, mat-making, and ivory-carving. In 1876-77 the exports by river were valued at £932,000, including jute £346,000, tobacco £278,000, cotton £67,000, and rice £37,000; the imports were valued at £480,000, chiefly piece-goods £163,000, salt £99,000, and betel-nuts £32,000. The principal mart is Ghoramara.

Bunjeet Singh (Ranjit), the Lion of the Punjaub, the great warrior and statesman who welded the religious community of the Sikhs into an independent nation. He was the son of a powerful Sikh chieftain called Maha Singh, and was born at Gugaranwalla, 2d November 1780. He first distinguished himself in 1799, by affording assistance to Zeman Shah, the Afghan Emperor, in transporting his heavy cannon across the Jhelum river. For this service he was made governor of Lahore. In 1802 he acquired Umritsir, the sacred city of the Sikhs. In 1805, at a general council of the community, he was virtually admitted as their temporal chief, on the policy of excluding from the Punjaub all foreigners—Afghans, Mahrattas, and English; and in the following year he entered into a formal engagement of friendship with Lord Lake. In 1809, owing to suspicions of French designs, Mr. (afterwards Lord) Metcalfe was sent to him as ambassador, and a treaty was entered into, and always faithfully kept, which confined him to the N. and W. of the Sutlej river. Meanwhile he was gradually extending his power in other directions. He conquered Ládiana in 1806 and Kangra in 1809. In 1813 he took advantage of the necessities of the exiled Afghan Emperor, Shah Shujah, to extract from him the celebrated Kohinur diamond. Multan and Peshawar were captured in 1818; and the valley of Cashmere, the great object of his ambition, in the following year. His system of government was based upon his army of native Sikhs (disciplined by French and Italian officers), who numbered 50,000 men, with 300 cannon. Though he could neither read nor write, he transacted all business himself; and all his acts were asserted to be done 'for the sake of the gurn, for the advantage of the

Khalsa, and in the name of the Lord.' Latterly, he was drawn closer to the English. In 1826 he requested the aid of an English surgeon, which led to the appointment of a political agent at Ludiana, then a British cantonment. In 1831 occurred the celebrated interview between him and Lord William Bentinck, at Rûpur, on the banks of the Sutlej, which has been called 'the Indian field of the cloth of gold.' The succeeding governor-general, Lord Auckland, persuaded him to give up his designs upon Scinde, and co-operate in the ill-fated expedition to Afghanistan; but he died on 27th June 1839, before the first capture of Cabul was effected.

Runn of Kutch (*Ran of Kachh*), a peculiar depression of the soil, extending over about 8000 sq. miles, which separates the native State of Kutch (q. v.), in India, from the neighbouring province of Scinde on the N. It is reckoned as part of the State. It is believed to represent the dried-up bed of an ancient inland sea, and the neighbourhood is especially liable to earthquakes. During the greater part of the year it is dry ground, and the surface becomes encrusted with a thick layer of salt, which attracts antelopes and wild asses. But at the time of the monsoons the sea pours in both at the E. and S.W. end, and being augmented by some small swollen rivers, turns Kutch into an island.

Runn'er, in botany, is a name given to young plants formed at the end, or at the nodes of branches or stocks creeping wholly or partially above ground, or sometimes it is applied to the prostrate creeping stocks themselves. The strawberry is a familiar example.

Runn'ers, Scar'let. See KIDNEY BEAN.

Runnymede, a Surrey meadow stretching along the southern bank of the Thames, opposite Charter Island, and 2 miles W. of Staines. Here, June 15, 1215, the barons were encamped, John lying on the opposite shore, and either here or on the island (it is not determined which) was signed the Great Charter (q. v.). Horse-races have been held here from time immemorial, and hence the name is interpreted by some as 'running-mede,' by others as 'the meadow of the runes,' or 'of the *runes*' (Old Eng. 'water-brooks').

Rup'es (from the Sansk. *rupiya*, 'silver'), the silver coin which is the standard measure of value throughout India. It was first struck by the Afghan Emperor Shere Shah, and forthwith adopted by Akbar and the Mogul dynasty. It then weighed 175 grains Troy, and was supposed to be pure. In early days the right of coinage was exercised by many grades of subordinate governors, and the variations in value were a regular source of profit to the *shroffs* or money-lenders. The English first received permission to open a mint at Calcutta in 1757 as a result of the battle of Plassey. From 1773 the Sicca R. was coined, weighing 170.66 grains troy, and worth about 2s. 2d. This gradually drove out the native rup'es of Moorshedabad, Benares, and Furruckabad. At Madras the Arcot R., and at Bombay the Surat R., were adopted. In 1835, the present coin (then called the Company's R.), weighing exactly 180 grains troy, including 5 of alloy, was introduced for all India. It was regarded, at par, as equal to 2s. 0½d.; but in 1876 the Indian rate of exchange fell to 1s. 7d. The weight of the R. is one *tola*, and is the universal standard of weight, both for jewellers and as a multiple also for heavy goods.

Ru'pert (Ger. *Ruprecht*), Prince, of Bavaria, born in 1619, was the son of Friedrich V., Elector Palatine, and Elizabeth, eldest daughter of James I. of England. Charles I., his uncle, in 1642 put him at the head of a cavalry regiment, and he captured Cirencester, Hereford, Lichfield, and took part in the battles of Worcester, Edgehill, and Chalgrove Field. Henrietta Maria had said of him that he was 'a person that is capable of doing anything that he is ordered, but he is not to be trusted to take a single step out of his own head.' His impetuous bravery compensated in the king's eyes for his want of caution, and he was created Knight of the Garter and Duke of Cumberland. He took Bristol, July 27, 1643, and routed the Parliament army at Newark, but at Marston Moor ruined his cause by disregarding the movements of his colleague, the Marquis of Newcastle, and hastily retreating from the field. Notwithstanding this error, he was soon afterwards appointed commander of all the royal troops. After the defeat of Naseby (June 14, 1645), he retired to Bristol, but surrendered that city on the 22d of

August. The king thereupon deprived him of his commission. In 1648, for lack of any competent man, he was appointed to command the fleet. He was blockaded by Blake in Kinsale Harbour, and in October, 1649, forced his way out and steered for Lisbon. Blake pursued him, and R. was only saved by assistance from the King of Portugal. R. was again attacked by the same admiral at Carthage, and this time invoked the protection of Spain. But in January, 1651, the prince destroyed some British merchantmen at Malaga, and Blake burnt nearly all his vessels. R. escaped to the West Indies, where for a time he was little better than a pirate. After the restoration of Charles II. he was made a privy councillor, and served under the Duke of York against the Dutch. He again commanded the fleet for a short time, but during the last nine years of his life occupied himself in artistic and scientific pursuits at Windsor Castle, of which he was governor. He died at Spring Gardens, November 29, 1682. He was buried in Henry VII.'s Chapel, Westminster Abbey. See Treskow, *Leben des Prinzen R. von der Pfalz*. (2d ed. Berl. 1857); and Spruner, *Pfalzgraf R. der Cavalier* (Münch, 1854).

Ru'pert's Land, the official name of that part of the N.W. Territories in the Dominion of Canada, the waters of which flow into Hudson's Bay. Its W. boundary runs S.E. from Deer Lake, and on the N., S., and E. it is bounded by the watersheds of the Arctic Ocean, the river St. Lawrence, and the Atlantic Ocean. It slopes inwards to Hudson's Bay, and is well watered by the Churchill, Nelson, Hill, Severn, Equan, Albany, and Rupert rivers. The soil is very fertile, but the severe and variable climate is unfavourable to agriculture. Beavers, bears, otters, and musk-rats are abundant, and are pursued for their skins, which form the only commercial product of the district. Foxes, wolves, reindeer, wapiti, moose, and musk-oxen are also found. The population is extremely scanty.

Ru'pia is a skin disease, sometimes caused by general debility, intemperance, previous diseases, such as smallpox or scarlatina, but more frequently syphilitic in its origin. R. commences as a bullous eruption. The serous fluid degenerates into pus, which dries up into a rough, coarse, prominent scab, which remains attached for some time and then falls off, leaving a circular ulcer. Sometimes the ulcer spreads without any falling off of the scab, and thus a larger scab forms under the original one and raises it up, and so on until a projecting mass is formed like a limpet-shell.

All forms of R. being attended with debility, the treatment must be by generous diet, fresh air, and tonics. Iodide of potassium should afterwards be administered, and this should be followed by mild mercurial fumigations. In the early stage of the eruption the bullæ should be punctured, and when the scabs are formed they should be removed by poulticing, and the exposed surfaces dressed antiseptically.

Rupp'in, Neu, a small town of Prussia, province of Brandenburg, on the Lake of R., which has communication with the Elbe, 37 miles N.W. of Potsdam. It has a castle, lunatic asylum, tanneries, spinning-mills, cloth and chicory manufacture, and large cattle markets. Pop. (1875) 12,501.

Rup'ture. See HERNIA.

Ru'ral Dean, a beneficed clergyman charged with the inspection of a deanery, or subdivision of an archdeaconry, under the supervision of his bishop. The office having fallen into disuse was revived by Bishop Burgess of Salisbury in 1825, but its duties are for the most part still practically transferred to the archdeacon.

Ru'rik, according to Russian chroniclers the founder of the Russian monarchy, was the leader of a band of Northmen called 'Russians' (*Roussi* is to this day the Finnish name for the Swedes), who in 862 A.D. crossed the sea from the part of Sweden now called Sönderjylland, and penetrated the country of the Slavs as far as Novgorod, where they established themselves, and R. ruled till his death in 879. In 864 another body of Russo-Northmen, under Dyr and Oskold, seized the Polish city of Kiev, and founded there a new state under the name of the Duchy of Kiyof or Kiev. Fresh bands poured into the country, and by the year 1000 Wladimir, great-grandson of R., became ruler of the Grand Duchy of Kiev, which was extended under the new dynasty from the Gulf of Finland to beyond the confluence of the Dnieper and the Desna. It is said that the line of R. ruled Russia till it died out with Feodor, son of Ivan the Terrible.

Ru'sa, a genus of *Cervida* or Deer, represented by the Sambar or Sambu (*Rusa Aristotelis*) of India, which attains a size exceeding that of the red deer. It inhabits the neighbourhood of water. The male has a prominent mane. The horns are long, and have a snag or branch just above the crown. The tips of the horns are forked. The colour is a dark brown. The R. is powerful and vicious. The Axis deer (*Axis maculata*) is another of the Rusinive deer.

Rus'ous. See BUTCHER'S BROOM.

Rush (Old Eng. *risc*), or *Juncus* (Lat. *jungo*, 'I join,' from its use in 'tying'), is the type genus of the natural order *Juncaceæ*, and consists of upwards of 100 species of glabrous herbs, distributed chiefly through the temperate and Arctic regions: 23 species are met with in the range of British Floras. The plants have small greenish or brown flowers arranged in heads or panicles. The perianth consists of six scarious segments; the stamens are usually six; style one, with three stigmas; the ovary mostly three-celled; the ovules numerous; the capsule completely or incompletely three-celled; and the seeds with a very minute embryo. Most of the species are found in damp or wet ground, either inland, or on the sea-coast, or on high mountains. Previous to the introduction of carpets, the common species of R. were used for covering the floors of rooms. The stems of *J. conglomeratus* and *J. effusus* also serve for plaiting into mats, for chair-bottoms, &c.; and the 'pith' of these species was made use of for the slow-burning rushlight candles. The name R. has been given to a number of plants of various genera from their more or less R.-like appearance; thus bog R. is *Schamus nigricans*, bulrush is *Scirpus lacustris*, flowering R. is *Butomus umbellatus*, and Dutch R. or scouring R. is *Equisetum Hyemale* (q. v.).

Rush, Benjamin, M.D., LL.D., born near Philadelphia, 24th December 1745, graduated at Princeton, and after studying medicine in Philadelphia, Edinburgh, London, and Paris, began practice in Philadelphia in 1769, when he was made professor of chemistry in the college there. He took a leading part in bringing about the Declaration of Independence, was a member of the Continental Congress in June, and one of those who signed on July 4, 1776. Next year he became surgeon-general and physician-general to the army of the middle department; resigned next year from disgust at the mismanagement of the military stores; established in 1785 the first dispensary in the United States, and was a member in 1787 of the Pennsylvania Convention for ratifying the Federal Constitution. In 1789 he became medical professor at Philadelphia; is said to have saved the lives of 6000 persons during the yellow-fever epidemic of 1793; gained a practice so wide that he is said to have prescribed for 100 patients a day; and from 1799 till his death (19th April 1813) held the office of treasurer of the United States Mint. Besides valuable medical works, such as his *Medical Inquiries and Observations, Diseases of the Mind, Medical Tracts, &c.*, he wrote much upon political, religious, social, and ethical topics, as in his *Essays, Literary, Moral, and Philosophical*.

Rush-Nut, a name for the tubers of *Cyperus esculentus* (q. v.).

Rush'worth, John, born in Northumberland about 1607, studied for a short time at Oxford, entered Lincoln's Inn, and was called to the bar. He never, however, practised; and as early as 1630 would seem to have entered on the task of chronicling the history of his times, from day to day taking down shorthand notes in the Star and Exchequer Chambers, the Council, and other public places. In 1640 he became assistant clerk to the Long Parliament, in 1645 secretary to his kinsman Sir Thomas Fairfax, and in 1649 member for Berwick-upon-Tweed. The Restoration proved R.'s undoing, for though he became Sir Orlando Bridgman's secretary (1677), and sat again for Berwick (1679-81), he was arrested for debt (1684), and lodged in the King's Bench, where he died, May 12, 1690. R.'s single but enormous work, *Historical Collections of Private Passages of State, Weighty Matters in Law, and Remarkable Proceedings in Parliament* (8 vols. Lond. 1659-1701; 2d ed. 1721), described by Mr. Green as 'invaluable for any exact study of the times,' covers the period 1618-48, one entire volume being devoted to the trial of the Earl of Stafford.

Rus'kin, John, the son of a wealthy wine-merchant, was born at London, February 1819. He entered Christ Church, 358

Oxford, as a gentleman commoner, took the Newdegate Prize in 1839 for a poem entitled *Salsette and Elephanta*, and proceeded to his degree in 1842. He studied the rudiments of art under Copley Fielding and J. D. Harding, and commenced his literary career as a defender of Turner, in *Modern Painters, their Superiority in the Art of Landscape Painting to all Ancient Masters Proved, &c.*, by a Graduate of Oxford (vol. i. 1843). The glow of a youthful and sensitive imagination threw its charm over all the pages of this volume. The critics, however, fell foul of its great faults—faults of all his subsequent works—an extreme dogmatism, and a passion for singularity. This defence of Turner developed into a plea for fidelity to nature, and ultimately into a system of art, occupying five volumes (vol. ii., 1846; vols. iii. and iv., 1856; vol. v., 1860). R. next determined to attempt a reform in domestic architecture, and the result was the publication of his *Seven Lamps of Architecture* (1849), and *Stones of Venice* (3 vols. 1851-53), both treatises illustrated by himself. His curious politico-ecclesiastical brochure, *Notes on the Construction of Sheepfolds*, appeared in 1851, followed by *The King of the Golden River* (1851); *The Two Paths* (1854); *Lectures on Architecture and Painting* (1854); *The Opening of the Crystal Palace* (1854); *On the Nature of Gothic Architecture* (1854); *Giotto and his Works* (1855); *The Harbours of England* (1856); *Notes on the Turner Collection* (1857); *The Political Economy of Art* (1858); *The Cambridge School of Art* (1858); *Elements of Perspective* (1859); *Decoration and Manufacture* (1859); *Unto this Last* (1862); *Ethics of the Dust* (1865); *Sesame and Lilies* (1865); *The Study of Architecture in our Schools* (1865); *The Crown of Wild Olive* (1866); *Time and Tide* (1868); *The Queen of the Air—the Greek Myths of Cloud and Storm* (1869); *Lectures on Art* (1870); *Aratra Pentelici—the Elements of Sculpture* (1872); *The Eagle's Nest* (1872); *Michael Angelo and Tintoret* (1872); *Ariadne Florentina* (six lectures on wood and metal engraving delivered at Oxford, 1872); *Love's Meinie* (1873); *Val d'Arno* (1874); *Proserpina* (1875-76); *Frondes Agrestes—Readings in Modern Painters* (1875); *Deucalion* (1876); *Mornings in Florence* (6 parts, 1877); *The Laws of Ffsole* (1877); an edition of Xenophon's *Economics*; the first volume of a series entitled *Bibliotheca Pastorum*; and *Notes on the Turner Collection* (1878). *Unto this Last* is an attack upon the doctrines of political economy, and exhibits many of the extravagances of R.'s social teaching in the strongest light. R. early embraced Pre-Raphaelitism, and in letters to the *Times*, his pamphlet entitled *Pre-Raphaelitism* (1850), and his *Notes on the Academy Exhibition* (1850-60), pled its cause. He was appointed Rede Lecturer at Cambridge in 1867, and Slade Professor of Fine Arts at Oxford in 1870.

As a social reformer R. has attained small success. The dreams of Owen or Fourier do not contradict the teaching of history and of common sense so manifestly as the doctrines of R. on political and social economy. *Fors Clavigera*, a series of letters to working men begun in 1871, is read only by the cultivated; and by these, not for the arguments it contains, but for the beauty of its language. The Society of St. George, founded by Mr. R. about 1870, is an Arcadian republic, delightful to contemplate, wherein man lives contentedly by the sweat of his brow alone, no steam-engine or machine of any kind desecrating nature. R. has devoted a tenth of his remaining fortune to the support of this society, the rules of which form a little gospel. The earnestness and pure benevolence of its founder, however, in a manner hallow even the wildest pages of *Fors*. As an art-critic R. is supreme. Perhaps, like that of the commentators on Shakespeare, his criticism too often becomes creation, taking more from the canvas than the painter dreamt of; but in his spiritualisation of art—his revelations of its true scope—his whole philosophy of æsthetics, he has done more to refine the mind of the world than all the other art-critics of Europe put together. He preaches absolute reverence towards every created thing, declaring that the true end of the artist is, not to paint a picture, but to preserve faithfully a phase of nature. Different as it is in many respects, subtler and more spiritual in some, R.'s influence on the modern English mind may be compared to that of Carlyle. His teaching has the noblest aims, and no man running counter to the doctrines of so many authorities has made fewer enemies. Charlotte Brontë long ago recognised and fitly characterised him as 'the consecrated Priest of the Abstract and Ideal.' A volume of *Selections from the Writings of R.* appeared 441

in 1871, and a complete edition of his works is being published by G. Allen, Orpington, Kent (10th vol. 1877). A collected edition of R.'s own painfully elaborated drawings was exhibited in conjunction with his magnificent collection of Turners in 1878.

Russell, The House of, even if we reject the pedigree that traces it back to a Hugh de Rozel figuring in the Roll of Battle Abbey, or further still to a 6th c. monarch, Olaf of Kerik, is of a high and ancient lineage. 'Vertue,' says quaint old David Lloyd, 'flowed in every Age of that family, with its honour and worth keeping pace with its Advancements.' The historic founder, Sir Ralph R., held the governorship of Corfe Castle (1221), and among his descendants were Sir William, member for Hampshire in the 1st of Edward II.; Sir John, Speaker of the House of Commons in the 2d and 10th of Henry VI.; and the Sir John, who, 'as it is thought,' slew James IV. at Flodden, and, raised to the peerage as Baron R. of Cheney's (1539), was created first Earl of Bedford (1550), receiving the present family seat of Woburn Abbey, Bedfordshire. His grandson, Sir William R., as Lord-Deputy of Ireland (1594), 'brought Tyrone upon his knees, and Iniskillyn to a surrender;' and another William, fifth Earl of Bedford (1614-1700), fought for the Parliament at Edgehill, and for the King at Newbury, acquiesced in both Restoration and Revolution, and was created first Duke of Bedford, May 11, 1694.—**William Lord B.**, son of the latter, was born September 26, 1639, and after studying at Cambridge, spent some time on the Continent. Entering Parliament in his twenty-second year, he rose to be head with Cavendish and Coventry of the 'Country' party; and in 1679, when rumours of the Popish Plot were at their height, was returned by two separate counties, 'a fact,' Ranke remarks, 'almost unprecedented in parliamentary history.' Having already intimated that were the Duke of York to ascend the throne men must make up their minds either to turn Papists or be burnt, he brought the Exclusion Bill into the Upper House, November 16, 1680. In 1682, a Whig Society, the 'Southampton,' began to assemble at R.'s country house, holding to the principles of the Bill, but discountenancing rebellion. Meetings, however, did take place, on R.'s own showing, in which an attack upon Whitehall was seriously discussed; and on one occasion, when in presence of him and Monmouth it was proposed to overpower the palace guards, he opposed the plan, saying that it might lead to the slaughter of the guards in cold blood, and 'what an atrocious deed were that.' On the discovery of the Rye-House Plot, from which his own designs for securing the succession of Monmouth were wholly distinct, R. was arrested and brought to trial. He did not deny the fact of the meetings themselves, but represented them as always accidental. Nevertheless, court lawyers skilfully blending the two conspiracies, he was convicted, and, in spite of all his kinsfolk's efforts on his behalf, beheaded in Lincoln's Inn Fields, July 21, 1683, 'dying,' says Ranke, 'for the doctrine of the right of resistance, which to him had become almost a religion.' See Earl R.'s *Life of William Lord R.* (1819; 4th ed. 1853), and vol. v. of Ranke's *History of England, principally in the 17th c.* (Egg. trans. Oxf. 1875). Lord R.'s cousin, Edward R. (born 1651), as Torrington's successor in command of the fleet, overthrew the Jacobite hopes by his signal victory over the French off Cape La Hogue, May 19, 1692, at the very time that he was intriguing with James II. He was raised to the peerage as Earl of Orford in 1697, and died in 1727.—**Lord John B.**, fourth Duke of Bedford, born September 30, 1710, was First Lord of the Admiralty (1744-48), Lord-Lieutenant of Ireland (1756), and President of the Council in Grenville's Ministry (1763), that 'narrow and selfish oligarchy,' as Green terms it, whose greed of power surmounted every other feeling. He died January 15, 1771, and Earl R. has published his *Correspondence* (3 vols. Lond. 1842-46). John R., the sixth Duke (born July 6, 1766; died October 20, 1839), did much for the improvement of agriculture, and rebuilt Covent Garden Market (1830), but only once held office, as Lord-Lieutenant of Ireland (1806-07). He was the father of Earl R. (q. v.), and grandfather of Odo R. (born February 20, 1829), English Ambassador at Berlin since 1871, and third plenipotentiary in the Berlin Congress (1878), whose elder brother, Charles Hastings (born October 16, 1819), succeeded his uncle as ninth Duke of Bedford, May 27, 1872. See Wiffin's *Memoir of the H. of R.*

Russell, John, Earl, third and youngest son of the sixth Duke of Bedford, was born in London, 18th August, 1792. Ill-

health forbade his continuance at Westminster School, and when fifteen he accompanied Lord and Lady Holland on a two years' tour in Spain. This over, he resided some months at Edinburgh with Professor Playfair, attending the lectures of Dugald Stewart and Thomas Brown; and after a second visit to the Peninsula he entered Parliament in July 1813 as member for the 'family borough' of Tavistock. Though destined from infancy for the leadership of the Whigs, in spite of high birth and industry he rose but slowly to the foremost ranks, and during the earlier years of his political career excited little interest by persistent efforts in favour of parliamentary reform, the repeal of the Test and Corporation Acts being his first success (1828). On the fall of the Wellington and formation of the Grey Ministry (1830), R. found himself excluded from the Cabinet, merely receiving the post of Paymaster of the Forces; but by this time he had acquired a kind of vested interest in Reform, and Lords Grey and Durham requested him to prepare a draft Reform Bill. He explained the scope of his proposed measure (1st March, 1831), a measure so sweeping that it took men's breath away, and the Opposition greeted it with shouts of scornful laughter. Not so the nation. 'The Bill, the whole Bill, and nothing but the Bill!' was England's cry; 'hundreds,' says Macaulay, 'waited round our doors till sunrise to hear how we had sped;' and on 4th July 1832 the Reform Act was passed, its author meanwhile, by ripened oratory and the expansion of his intellectual powers, having come to the front among the statesmen of the day. The success of his motion for a Committee to inquire into the Irish Church Establishment (30th March, 1835), the General Registration Act (1836), and other important measures. Disturbances in Canada induced him to take the post of danger at the Colonial Office (1839); two years later the fall of the Whigs left him head of the Opposition, as member for the city of London, which he represented up to his elevation to the peerage. The history of R.'s next five years is also the history of the Corn Laws (q. v.). His celebrated 'Edinburgh Letter' (1845), calling for total repeal, broke up the already disorganised Peel administration, and R. was called on to form a ministry, but failed to do so owing to Whig dissensions. He was more successful in 1846, when Sir Robert having carried the Repeal and then by a factious attack on his Coercion Bill been driven to resign, the R. ministry succeeded to the difficult task of grappling with Irish agrarian outrages, the famine of 1846, and the political disaffection of '48. Little was accomplished in the way of legislation, the Jewish Disabilities Bill (1848) being thrown out by the Lords, and the Ecclesiastical Titles Act (q. v.) severing Peelites from the Government. Lord Palmerston, dismissed from the Cabinet (1851), within two months, by an amendment to the Militia Bill, defeated his former colleague; and to a short-lived Derby Ministry succeeded the Coalition Government of Aberdeen, where R., waving the premiership, assumed the leadership of the House, and became successively Foreign Secretary and President of the Council. Thenceforth his reputation waned. The quarrel with Palmerston broke out afresh; the Reform Bill of 1854 proved most inopportune; and suddenly, on Roebuck's motion for the Crimean Committee, Lord John resigned (1855). His negotiations at the Vienna Congress also miscarried, and in explanations to the House he was forced to own that he had offered to accept the Austrian compromise, which later he had publicly denounced. In 1857 R. united with Peelites, Conservatives, and Radicals for Palmerston's overthrow, but their efforts proving only temporarily successful, he consented in 1859 to serve once more as Foreign Secretary. His new Reform Bill (1860) was withdrawn without a division, and in June 1861 he was raised to the peerage as Earl R. of Kingston Russell, Dorsetshire, and Viscount Amberley of Amberley, Gloucestershire. In the Upper House his foreign policy was conspicuous for its policy of judicious, if somewhat inglorious, non-intervention, which kept England clear of broils with the United States (1861) and Germany (1864). In 1865 he succeeded Palmerston as Premier, but the unfortunate Reform session of the following year left him, in Gladstone's words, 'no alternative' but resignation, with which act his career as statesman came to a timely close. He died in London, 29th May 1878. R.'s oratory, if mannered and slightly provincial, was clear, incisive, and effective. Honesty was the sterling feature of his character, coldness and self-assertion its

defects. He had a sincere contempt for all dissenters from orthodox Whiggism, was rarely troubled by doubts, and though free from every mean party vice, was led into frequent blunders by his identification of party with national interests. Sydney Smith hit off his 'ignorance of moral fear' in the famous soubriquet, 'Lycurgus of the Lower House;' his obstinacy in the saying, 'The Russells must be trepanned before they can be convinced.' Ambitious of writing as well as making history, R. wielded a pen less ready than productive. Besides blue-books and pamphlets, he published a *Life of Lord William R.* (1819); a tale, *The Nun of Arronca* (1821); an *Essay on the English Government and Constitution* (1822); a five-act tragedy, *Don Carlos* (1822); *Memoir of the Affairs of Europe, 1713-48* (1824); *Establishment of the Turks in Europe* (1828); *Causes of the French Revolution* (1832); *Selections from the Correspondence of John, Fourth Duke of Bedford* (3 vols. 1843-46); *Memoir and Correspondence of Moore, and of Fox* (both in 4 vols. 1853); selections from his own correspondence and despatches (2 vols. 1870); *Essays on the Rise and Progress of the Christian Religion in the West of Europe* (1873); and *Recollections and Suggestions* (1875).—**John, Viscount Amberley**, Earl R.'s eldest son, was born 10th December 1842. From Harrow he proceeded to Edinburgh, and thence to Trinity College, Cambridge, contested Leeds unsuccessfully (1865), but sat for Nottingham (1866-68). He was a frequent contributor to the *North British, Fortnightly*, and *Theological Reviews*, and had for some years been occupied on a crude, daring *Analysis of Religious Belief* (2 vols., 1876), when he died at Ravenscroft, near Chepstow, 8th January 1876.

Russia, the largest empire in the world, and after China and the British Empire, the most populous, embraces over one-half of Europe and nearly one-third of Asia, or more than one-sixth of the land-surface of the globe. It is as remarkable for compactness as the British Empire is for the world-wide dispersion of its parts. Alaska (q. v.), the only out-lying portion of R., was purchased by the United States in 1867. The population of R. is remarkably small in proportion to its enormous area. European R., which is five and a half times more populous than the Asiatic part, ranks, with the exception of Sweden and Norway, as the least densely peopled state in Europe. It has only 34 inhabitants to the sq. mile, as against 469 in Belgium, 389 in England and Wales, 238 in Italy, and 201 in Germany. The component parts of the empire, and the distribution of the inhabitants, are shown in the following table for 1870-76:—

	Area. Sq. miles.	Population.
Russia (European),	1,999,715	65,704,559 (1870)
Kingdom of Poland,	47,101	6,528,018 (1872)
Grand-Duchy of Finland,	140,000	1,912,647 (1875)
Lieutenancy of the Caucasus,	7,938	5,391,744 (1873-76)
Siberia,	4,824,408	3,440,362 (1873)
Central Asia,	1,304,830	4,490,213 (1870)
	8,323,992	87,467,543

Boundaries.—In the N. the empire is bounded by the Arctic Ocean, in the E. by Behring Strait and the Seas of Kamtschatka and Okhotsk, by the inlets of the Pacific, and in the W. by Sweden, the Baltic, Prussia, Austro-Hungary, and Rumania (q. v.). The southern frontier has undergone much rectification in recent years. Starting in the extreme E. from the coast to the S. of Vladivostock, near the Corea, the boundary-line follows the Usuri and the Amoor (q. v.), which separate R. from Manchuria. It is then formed by the Altai Mountains, and is carried S.W. by the Thian-Shan Mountains into Turkestan, where it passes in a wavy line from the upper course of the Sir Daria to the delta of the Amu Daria in the Sea of Aral. Within it are now included almost the whole basin of the Sir Daria, with the towns of Tashkent, Khojend, and Samarcand, and the Khanate of Khokan (since 1875), and part of Bokhara. Russian power is supreme in Central Asia, and is maintained by a line of forts on the Sir Daria, and by the presence of a strong body of troops under General Kaufmann. Khiva and Bokhara are actually Russian dependencies. From the Sea of Aral, the frontier of R. is carried S.E. across the Ust-Urt plateau to the river Atrak, and then W. to the Caspian. The Atrak separates R. for some 50 miles from Persia, which surrounds the S. shore of the Caspian, and again touches Russian territory at Astana, in the extreme S.E. of Trans-Caucasia. Hence the Aras river divides R. from Persia

W. as far as Mount Ararat, from which point Trans-Caucasia is separated from Turkey in Asia by a line fixed by the Berlin Congress Treaty (July 1878). It includes the ceded districts of Ardahan, Kars, and Batoum, and terminates at Makrialos, on the Black Sea. With the Black Sea begins the old boundary of R., the only other important modification of which was effected in Bessarabia by the Berlin Congress, which extended Russian territory S. along the Black Sea to the Kilia mouth of the Danube.

Seaboard and Islands.—While the rest of Europe has about 19,500 miles of coast, R. with a greater area has only 5518 miles. The Arctic seaboard is rendered comparatively profitless by the severity of the climate. Beyond the Kara Sea drifting fields and bergs of ice oppose terrible obstacles to navigation even in summer. The chief islands are Novaya Zemlia (q. v.), Kolgouiev, Vaygatz, and White Island, Spitzbergen (q. v.), the Toumatak group (comprising six large islands) at the mouth of the Lena, and New Siberia or Liakhov Islands. In the E. the vast Sea of Okhotsk penetrates so far inland as almost to convert the eastern part of Siberia into a peninsula. It is confined on the N. by the volcanic promontory of Kamtschatka, from the extremity of which the Kurile Islands stretch in a chain towards the Japanese archipelago. In 1875 R. gave up the Little Kuriles to Japan in exchange for territory in Sakhalia (q. v.). Of the inland seas of R. by far the most important is the Caspian (q. v.); the two great marine outlets of Russian commerce are the Black Sea (q. v.) and the Baltic (q. v.). The Sea of Azov, the shallowest of seas, has a depth of only 48 feet. In the Baltic the Russian islands of Åland (q. v.), Ösel, and Dago, besides several of smaller size.

Divisions.—Finland, Poland, and the Caucasus are in strict sense rather Russian possessions than integral parts of the empire. For administrative purposes, R. is divided into fifty governments, the areas and populations of which are as follows, according to the *Almanach de Gotha* of 1878:—

Governments.	Area in sq. miles.	Population.
Archangel	331,503	281,212
Astrakhan	86,688	601,514
Bessarabia	13,473	1,078,932
Courland	10,550	610,154
Don Cossack Territory	61,911	1,085,264
Ekaterinoslav	26,037	1,352,300
Esthonia	7,610	323,661
Grodno	14,700	1,008,521
Jaroslav	122,988	1,000,748
Kaluga	11,934	996,252
Kazan	24,600	1,704,624
Kharkov	20,737	1,694,015
Kherson	27,497	1,595,809
Kiev	10,687	2,175,132
Kostroma	38,701	1,176,097
Kovno	15,775	1,156,041
Kurak	17,937	1,954,807
Livonia	18,150	1,000,876
Minsk	35,254	1,182,230
Mohilev	22,700	947,625
Moscow	12,522	1,772,624
Nijni-Novgorod	10,390	1,271,564
Novgorod	47,213	1,011,443
Olonetz	59,167	296,302
Orel	18,040	1,596,881
Orenburg	73,890	900,547
Penza	14,826	1,172,186
Perm	128,245	2,108,666
Podolsk	16,221	1,032,188
Poltava	19,261	2,102,614
Pskov	17,069	775,701
Riazan	16,250	1,477,433
St. Petersburg	17,065	1,324,471
Samara	60,207	1,837,081
Saratov	39,614	1,751,268
Sibirsk	19,108	1,806,881
Smolensk	21,637	2,140,015
Tambov	25,683	2,150,977
Taurida	24,537	704,997
Tchernigov	20,231	2,659,600
Tula	11,955	1,167,278
Tver	25,223	1,528,881
Ufa	47,031	1,364,225
Viatska	59,114	2,406,024
Vilna	16,411	1,001,909
Vitebsk	17,438	888,727
Vladimir	18,862	1,259,523
Volhynia	27,738	1,704,018
Vologda	155,492	1,003,039
Voronej	25,437	2,122,666
	1,999,715	65,704,559

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The N. differs from the E. and west as in the European R. the W. and a large part of the common presence of Lapland is infested with its nightless days of R. are sledge-ways of the 'season of bad weather'—Beaulieu, the countess, under the latitude of the Sea of Aral the extreme. Although the S. shore of the Crimea is of R. lies too far inland to rise Western Europe. The soil of 20 inches, while those of the climate of R. is singularly among the marshes of the R. in the vicinity of the Caspian and not unfrequently a cause of death. Forests cover some two-fifths of the empire. To the N. of the R. are immense tracts of oak, beech, spruce, and other coniferæ. According to a report of 1878, there were 302,417,160 acres directly administered by the Crown; 14,700,000 acres by private individuals. The Crown mines and factories; 14,987,570 acres and coal gives wood in R. an unusual character. The large churches and palaces, and the value of the timber used in R. amount to £2,645,500 in 1878, and of that exported to £157,938,000 bushels of cereals, and of buckwheat \$6,256,000. Further \$14,410,000 bushels of seed and 1,934,888 cwts. of seed are brought to perfection, while immense quantities of flax and hemp are grown all over the country. But the grain of black bread is the principal food of the peasantry. The principal crops are oats (240,000,000 bushels), barley (124,750,000 bushels), and rye (102,545,137 lbs.), potatoes (370,000,000 bushels), and the annual yield is about 54,000,000 gallons of good wine. Around the Black Sea and the Crimea the berry, etc. and a Transcaucasia, rice, cotton, madder, and even the sugar-cane.

About one-third of the arable land belongs to the State, and are governed by a special system of management to a steward or to a village commune. The land is mostly cultivated under the system of a winter sowing and summer as pasturage. The Bashkirs, who are the most advanced wave of Russian colonization, present the interesting spectacle of a transition from the nomadic life of the wild animals a large number of these the chief are the bear, the wolf, and badger, found in the N. of the R. and widely distributed are the elk, marmot, and squirrel. The line of perpetual snow passes the Caucasus, and the sources of the Nile, and has a greater in R. than in any other part of the world. In 1872 the population of the R. was 125,000,000.



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largely bred in the N.; camels and buffaloes in the southern steppes, and dromedaries in the Crimea. On the N. coast are found the seal, the walrus, the eider duck, and other wild-fowl. Cattle-rearing is extensively carried on in the S. and W. provinces. In 1874 R. had 28,500,000 head of horned cattle, and in 1875 exported 748,976 head of live stock (except horses), value £1,523,847, and hides to the value of £466,215. The horses are of a good breed, and the export (to Germany and Austria) numbered 33,343, value £334,580, in 1875. Of sheep (64,500,000 in 1874) there are several breeds. In the Lithuanian oak forests are immense herds of swine, of which R. had 11,000,000 in 1874. In 1875 the export of tallow amounted to £312,672, and of hogs' bristles to £694,088. Bee culture is general in Poland and on the Volga; the yearly yield of wax is 7,000,000 lbs., and of honey 21,000,000 lbs. The fisheries are a very important source of revenue. Cod and herring are caught in the White Sea, mackerel, sardine, &c., off the Crimean coast, sturgeon in the Caspian, salmon, trout, &c., in the rivers and lakes. The value of the Caviare (q. v.) exported in 1875 was £166,724.

Geology and Mineralogy.—The heart of European R. is occupied by the Permian system, so named by Murchison on account of its development in Perm, which extends beyond the Urals. This vast tract is enclosed by two extensive branches of the Devonian strata, extending from the Gulf of Finland, the one reaching N.E. to Archangel, the other S.E. to Veronej on the Don. To the S. of the latter branch are cretaceous deposits and carboniferous patches. The Silurian, along the S. of the Gulf of Finland, are the oldest stratified rocks in R. The whole of Finland may be said to be formed of granite, which also crops out in the middle course of the Dnieper. The Urals present most of the Secondary and Palæozoic formations down to stratified gneiss, while the S. part of the empire is mainly covered with Tertiary beds. In R. the carboniferous formation contains only the members of the group up to mountain limestone, in which occur many thin seams of coal, usually of poor quality. The field in the basin of the Donetz, an affluent of the Don, which is exceptionally rich, produced 660,000 tons of excellent coal and anthracite in 1873. The total output of coal in R. in 1872 was 1,097,832 tons, while the coal imported was 1,520,278 tons in 1875 (value £1,380,645). Perm and Orenberg, which both stretch across the Urals into Asia, are singularly rich in minerals. The production of iron (8 million cwts. in 1874) is less even than that of Belgium and Austria. The Urals are the centre of the iron industry, but there are mines in Minsk, Volhynia, and Finland. In 1870-74 the total product of gold in R. (chiefly in the Urals and Altai) was 720 cwts. (value £5,000,000), and of silver 266 cwts. Nijni-Tagilak is the only district in Europe where platinum is found, the yield amounting to 24 cwts. yearly. Other important minerals are copper, lead, zinc, tin, quicksilver, sulphur, arsenic, nitre, gypsum, and lignite. Salt (538,800 tons) is obtained from the lakes in the S., and from the vast rock-deposits at Iletk (q. v.). Naphtha is found in the Caucasus, amber in Poland and Lithuania, and small diamonds and other precious stones in the Urals.

Industries.—The native industries are protected by the imposition of a heavy tariff on foreign manufactures. The principal manufactures are cottons and woollens. Peter the Great, who may be said to have started R. in the industrial race, founded 21 large and several small factories. In 1820 the number had risen to 3724, in 1854 to 18,000, and in 1870 to 19,431, employing 410,225 workmen, and producing goods to the yearly value of £6,000,000. The import of raw cotton in 1875 was 79,783 tons (value £8,322,314), and the cotton goods produced in that year by 1508 factories were valued at £35,000,000. In the same year 1831 woollen factories, employing 105,135 hands, produced £10,000,000 worth of goods. The silk industry has suffered recently from disease among the silkworms, and from the emigration of the Mennonites, but there are still 518 factories, with 12,000 hands. In 1874 R. had 3600 breweries (778 in Poland), and 325 beet-sugar factories. In 1873 there were 202 iron foundries, and 150 blast-furnaces, the product in 1875 being 420,484 tons of pig-iron and castings, 299,032 tons of finished iron, and 12,730 of steel. One of the specialties of R. is its unrivalled leather (russia and morocco) for bookbinding. Nijni-Novgorod and Tula have important manufactures of firearms and cutlery. Other notable products are sailcloth, ropes, malachite wares, ornamental glass, shagreen, caviare, and pottery.

Commerce, Railways, &c.—The commerce of R. is mainly internal, and is largely transacted at the great fairs of Nijni-Novgorod (q. v.), Berdichev, Kursk, and Lublin. The barter of its widely varied products renders it less dependent than perhaps any other country on foreign commerce. The internal trade is in great part conducted by the rivers and canals, and in Asia by caravans. The railways, begun in 1838, are rapidly increasing; the total length of lines in 1860 was 634 miles; and in December 1877, 17,685 miles. The principal ports are St. Petersburg, Riga, Odessa, Sebastopol (since 1875), Astrakhan, and Archangel. In 1877 the total exports (wheat, rye, oats, barley, flour, groats, pease, flax, tow, linseed, wood, hemp, raw wool, horses and other animals, brandy and corn spirit, leather, unwrought metals, seed oil, yarn, butter, &c.) amounted to £72,000,000; the imports (raw cotton, cotton yarn, raw wool, engines and machinery, wrought iron, metal wares, rails, tea, chemicals, woollens, wine, &c.) to £52,000,000, and the customs' revenue to £7,885,089. In 1877 Great Britain sent to R. merchandise to the value of £6,243,973, and Germany (in 1875) to £17,400,000; the former country received of the exports £22,142,422 (northern ports £18,925,959), the latter £35,983,512. The merchant fleet in 1874 numbered 2504 vessels of 520,584 tons; besides 385 steamers on the rivers and lakes. There were 50,686 miles of telegraph lines in R. in 1874. In 1875 a scheme was sanctioned for the construction of 4400 miles of railway in Siberia and the Don valley. The continuation of the Orenburg line into Central Asia has been condemned on account of the inhospitable nature of the country.

Ethnology.—According to an elaborate series of papers (with maps) in the late Dr. Petermann's *Mittheilungen* for 1877-78, there are 58,049,395 Slavs and 12,421,087 non-Slavs. They are distributed as follows:—of Slavic race, Great Russians 34,389,871, Little Russians 14,201,279, White Russians 3,592,057, Poles 4,764,713, Bulgarians 93,685, Czechs 77,901; of races allied to the Slavs, Lithuanians 811,051, Schmdes 623,700, Letts 1,047,929. To the Greco-Latin group belong 77,132 Greeks, 648,464 Rumanians, and 1036 French; to the Germanic group, 985,689 Germans (188 English), and 273,021 Swedes; and to the Iranic group, 342,000 Armenians, and 111,654 Gypsies. The Semitic stem is represented by 2,552,145 Jews. The Turanian race is divided into the Finnish and Tartar groups. The first comprises the Karelic and Tchudic people, the Volga-Finns, and the North Finns, amounting to 3,068,456; the latter, the Tartars proper, Bashkirs, Tepjares, Tchuvasches, Kirghis, and Kalmucks, amounting to 4,270,476. It is the object of the government to assimilate the language, religion, &c., of all parts of the empire to those of Great R. The recent efforts to Russianise the Poles and non-Slavic nations have been so tyrannical as almost to defeat their purpose. The pure Slav dialect of Little R. is also banished from churches and schools. Between 1872 and 1876, 32,461 Russian emigrants embarked at Hamburg. See POLAND and MENNONITES.

Classes.—According to official statistics (Livron) for 1875, R. has 652,887 hereditary nobles, 374,367 personal nobles, 695,905 clergy, 7,196,005 town people, 63,840,291 country people, 4,767,703 military, and 153,135 foreigners. Mr. Wallace estimates the merchant class at 446,000, the burghers at 4,033,000, and artisans at 260,000. Titled families are numerous, and all the children bear the titles of the parents even while the parents are alive. There are hundreds of princes and princesses who have no right to appear at Court, and would not be admitted to refined society in any country. *Tchin* or rank, military or official, plays an important part in social life. The *Mir*, or village commune, one of the most singular institutions of R., is a pure democracy for the management of village affairs, and has arbitrary control over its members. It is responsible for the taxes, and in the event of insolvency, cannot be deprived of its land by creditors. Supplementing the action of the *Mir* is the *Zemstvo*, an institution created ten years ago, to lighten the duties and correct the abuses of the administration by means of local self-government. It is composed partly of nobles, partly of peasants, and there is no trace of antagonism between these classes. The nobles have adopted French fashions, and speak French with perfect accent; the lower classes, nonchalant and pleasure-loving, indulge excessively in gambling and vodka-drinking.

Religion and Education.—For the doctrine of the Russian Church, see GREEK CHURCH. In 1875 the Greek Church of

R. possessed 38,602 churches (including 59 cathedrals), 12,860 chapels and oratories, 62 archbishops and bishops, 98,887 archpriests, priests, and deacons, and 56,500,000 members. There are also 385 monasteries, with 5750 monks, and 154 nunneries, with 3226 nuns; these have an income of about a million sterling, and possess funded property and treasures of bullion and gems estimated at many millions. The grant to the Holy Synod was 9,615,425 rubles in 1876. For an account of the dissenting sects see RASKOLNIKI. In 1873 the number of Roman Catholics (mostly in Poland) was 7,495,000; of Protestants (Baltic provinces) 4,530,000; of Armenian Gregorians 39,000; of Jews 2,760,000; of Mahomedans 2,760,000; heathen 258,000. Roman Catholics and Protestant have civil rights equal to those of the orthodox Greek Catholics. The Greek Church holds the sole right to proselytise, and claims all the children of mixed marriages. The bishops are always taken from among the monks or 'Black clergy'; the 'White clergy,' or parish priests, are in great part drunken and illiterate. Of late years the caste barriers have been removed, and hundreds of 'propouitches' or priests' sons are making their way in secular lines. The Russian peasant has unbounded and childlike confidence in Church rites, and in the efficacy of the Icons, or holy pictures. A 'miraculous Icon' is a thing to be worshipped in itself, because it is capable of conferring temporal fortune, warding off evil, and curing disease. But the 'Molkani' and 'Standisti,' the Protestants of R., intelligently study the Bible, and sincerely regulate their lives thereby. How little diffused instruction is appears from the fact that, in 1870, only eleven out of every hundred recruits could read or write. The experiment of compulsion has been made in St. Petersburg since 1875. In 1875 R. proper had 22,768 public elementary schools, with 942,487 pupils—14 to the 1000 inhabitants, as against 150 in Germany. There are also 133 gymnasia (with 40,000 pupils), 42 pro-gymnasia, 45 real-schools, and 50 training-schools for teachers, besides several higher institutions for engineering, architecture, mining, &c. R. has 8 universities, with (1875) 569 instructors and 6408 students. At none of these is there a faculty of Greek theology, which is taught in 5 church seminaries. R. is amply provided with the apparatus of the highest culture in its magnificent libraries, art galleries, and theatres. There are 117 Russian journals, 30 German, 20 Finnish, &c.

New Law-Courts and Secret Societies.—The old system of legalised injustice, in which the tribunals had become 'dens of pettifogging rascality,' was in great part swept away with the institution of serfdom. The chief reforms were (1) the complete separation of the judicial system from all other branches of the administration; (2) the introduction of publicity, with trial by jury, in criminal cases; (3) the creation of justice of peace courts for petty affairs; (4) the simplification of procedure in ordinary courts. The judges are not always profound jurists, but 'are at least honest, educated men, generally having a fair knowledge of law,' (Wallace). The barristers, an entirely new class in R., not only sell their service as dear as possible, but even use dishonest means of raising the price. There is reason to believe that the empire contains within it ill-regulated desires and forces, which may lead to political convulsions. Erckhardt asserts that revolutionary ideas are spreading fast among all classes. The most formidable society is that of Nihilists, which aims not only at the life of despotism, but at the subversion of society. Odessa is a great centre of Nihilism, and on account of the threatening aspect of affairs there, nearly all the authorities were removed (October 1878), and 400 picked soldiers despatched to reinforce the police.

Army and Navy.—Having already the power to place over a million men in the field, this force was augmented by another half million by the grand measure of universal conscription, sanctioned by the ukase of 1875. With a few stated exceptions, all are liable at the age of twenty-one, and the period of service is fifteen years—six in the active army and nine in the reserve; in Asiatic R. the period is ten years, and the Cossacks serve twenty years. In 1877 the regular army, under the war levy, consisted of 1036 battalions, of 1,626,780 men and 44,894 officers (besides 169,080 non-combatants), with 3004 guns and 217,760 horses. In time of peace the total numbers are 662,073 men, 97,380 non-combatants, and 28,645 officers. The irregular army, including the Cossacks, numbers, in time of war, 131,290 men and 3505 officers, with 726 guns and 120,999 horses. In 1875 the army grant amounted to 181,532,505 rubles. In 1876 the fleet in the

Baltic comprised 71 vessels (and 66 transports) of 143,004 tons, with 374 guns; and that in the Black Sea, 31 of 31,336 tons and 85 guns. There were also squadrons in the Caspian, the Sea of Aral, in Siberia, and in the White Sea. In 1878 over 100 torpedo vessels were constructed, and the fleet was further augmented by the addition of 13 rapid cruisers and 3 new ironclad frigates (among them the *Duke of Edinburgh*).

Government and Finance.—The government is a pure despotism, and the Emperor, the 'autocratic monarch,' is the source of all power and authority. Immediately below him are the Council of State, the Committee of Ministers, and the Senate. The Council has merely a consultative character; the ministers are individually responsible to the Emperor. The Senate is now little more than a supreme court of appeal. A committee was appointed (October 1878) to devise a scheme for the convention of a deliberative parliamentary assembly. The whole empire suffers under excessive centralisation, although 'the jobbery, venality, and extortion of the officials' used to be far worse than they are now. For 1877 the budget estimate of revenue was 570,777,802 roubles, and the expenditure 570,769,280 roubles. The chief items of revenue are indirect and direct taxes and customs; and of expenditure, public debt, army, and ministry of finance. The poll-tax and land-tax amount to £15,000,000 sterling, the excise on spirits to £25,000,000, and the bulk of these are paid by the peasants, who are perhaps more heavily taxed than any other in the world. R. is burdened with a debt of £300,000,000 sterling, bearing interest at 5 per cent., two-thirds of which are held abroad. During the war of 1877 a foreign loan of £15,000,000 was negotiated, and new paper money was issued to the amount of nearly £40,000,000. The *Statist* (Oct. 1878) speaks of a new loan as probable.

History.—Some ten centuries ago the greater part of what is now called R. was occupied by the nomads of non-Aryan, chiefly of Ugrian, race. To the S.W. and W. dwelt Slavs, the easterly flank of that great Slavic wave of population which then occupied a large portion of Europe, and which is now chiefly represented by the Poles, Bohemians, and Croats in the W., and the Russians, Servians, and Bulgarians in the E. According to the oldest chronicle, the Novgorodian Slavs in the N. sent legates 'beyond the sea' to the head of the 'Variat tribe called Rūs,' saying, 'Our land is great and fruitful, but there is no order in it; come and reign and rule over us.' Three brothers accepted this invitation, and appeared with armed followers. The eldest, Rurik (q. v.), settled in Novgorod; the second, Sineus (Sind), at Byelo-ozero; and the third, Truvor, in Isborsk. This legend has given rise to a vast amount of learned controversy. The extreme Russian patriots hold that these armed men of Rūs were Slavs from the Baltic shores, but the commonly-received opinion accepted by the Slavophiles is that they were Normans from Scandinavia. 'Whether they really came on invitation may be doubted,' says Mr. Wallace, 'but that they adopted the language, religion, and customs of their adopted country does not militate against the assertion that they were Normans.' From the appearance of the new-comers dates the great historical expansion of the Russo-Slavs. To the N., E., and S. new principalities were formed and governed by men who all claimed to be descended from Rurik, and down to the end of the 16th c. no one outside the great family attempted to establish independent sovereignty in R. The seat of government was transferred by Rurik's successor, Oleg (879-912), to Kiev, and there Christianity was first imposed on the Russians by the Grand Prince Vladimir in 988. Vladimir, the apostle (*Isapostolos*) of R., is immortalised in popular song as a pagan hero, little inferior to the gods whom he overthrew. The typical warrior of the period, he extended R. from Lake Ilmen S. to the falls of the Dnieper, and from the Vistula E. to the basin of the Don. Descending on Taurida, he took Chersonesos, and demanded of the Byzantine emperors, Basil and Constantine, the hand of their sister Anne, which he received on becoming a Christian. And so R. was Christianised in turn, just 124 years after the Bulgarians, the first among the Eastern Slavs to renounce heathenism. Vladimir divided R. between his sons and nephews, and after much fighting, Jaroslav, who had originally received Novgorod, made himself master of the whole kingdom in 1036. He resembles Karl the Great in his skillful generalship, but still more by his love of letters in a barbarous age. Bent on the improvement of his subjects, he founded schools, promoted trade, and compiled the *Ruskaia Pravda*, the first Russian law code. On his death in 1054 ensued the

long, dreary period of the quarrels of the appanaged princes. At this time Kiev was the greatest city in R., and was worthy of the honour. Like Byzantium, it had a richly-decorated cathedral of St. Sophia, and a Golden Gate, and its monastery of the Catacombs was visited yearly by thousands of pilgrims. Jaroslav girdled it with stout ramparts, and the Dnieper brought the merchandise of the world to its feet. In the N., the city of Novgorod was growing in strength and riches. Later it became an outpost of the Hanseatic League, and proudly styled itself 'Lord Novgorod the Great.' It is distinguished particularly by its republican constitution, the princes possessing merely such authority as was granted by the people. Meantime the descendants of Rurik, each with his following of Bojars (q. v.), or large landed proprietors, continued to quarrel among themselves, and incessant civil strife left the country powerless before the wave of Mongol invasion that swept over it three times between 1223 and 1240. Having advanced victoriously through Poland, Hungary, Bulgaria, Servia, and Dalmatia, the terrible hordes retreated to the Lower Volga, and thither the Russian princes were summoned to do homage to the victorious Khan. Here was formed the state commonly known as Kiptchak (q. v.) or the Golden Horde, the capital of which, Serai, on one of the arms of the Lower Volga, was, when visited by John Batuta in the 15th c., a populous and beautiful city. No attempt was made to Tartarise R., but for over two centuries it lay prostrate under the Mongol yoke, its realm a dependent province, its princes humble vassals who held their rank by the grace of an Asiatic despot. In course of time mutual distrust lessened; the 'godless Tartars' more than tolerated Christianity, for a bishopric was founded in Serai in 1261, a member of the Khan's family founded a monastery and became a saint of the Russian Church, and the orthodox clergy were exempted from the poll-tax. But the Tartars later on adopted Islam, and this raised an impassable barrier between the two nationalities. The princes, despairing of liberty, adopted a policy of conciliation, and in return were made the Khan's lieutenants and collected his tribute. The shrewd, ambitious, unscrupulous princes of Moscow outbid all rivals, and their city sprang into life while Kiev lay in ruins. They lived parsimoniously at home that they might lavish their savings on the Horde. They were bound to the Khan by matrimonial alliances. When haughty, turbulent Novgorod refused tribute, they quelled the insurrection and punished the leaders. When Tver revolted, they received the principality from the Khan, with 50,000 Tartars to support his authority. But the cunning Muscovite only 'loved the Tartars beyond measure' until their power began to wane. The domination helped to unify the realm and create the autocratic power of the Czars. From the Horde a new court-ceremonial was borrowed; the nobles in approaching their august master prostrated themselves in Oriental fashion. When they incurred his displeasure they were summarily flogged or executed. R. was the first Slavic country to fall under the Tartar yoke, and it was the first to free itself. Under Ivan Kalita (q. v.) the Greek metropolitan removed from Vladimir in 1325 to Moscow, and subsequently Muscovy became the grand-duchy. Dmitri made a brave but premature effort at emancipation in his victory over Khan Manai (1380), but this was followed by the burning of Moscow and a heavy indemnity. In the reign of Vassili I. (1389-1425) R. was invaded by Timur and again by Edijei, and was attacked by the Livonians. At length Ivan III. (q. v.), the wisest of his race, the consolidator of R., found himself strong enough to defy his Oriental suzerain, and with Ahmed Khan's unsuccessful invasion of 1480 the Tartar dominion came to an end. After their conquest the restless Tartars had to be pacified, and what increased the difficulty of this task was that a large section of the Horde, inhabiting the Crimea and the steppe N. of the Black Sea, had escaped conquest by becoming tributaries to the Sultan. These tribes harassed Polish and Russian territory and made Kaffa (Theodosia) the centre of a white-slave trade, which flourished till the final conquest of the Crimea in 1783. The Czars of Muscovy built forts, raised palisades, dug trenches, and kept up a military cordon of Cossacks (q. v.). The genuine free Cossacks lived beyond the frontier on the debatable border-land; the Dnieper, Don, and Volga, and Yalk or Ural were each held by separate communities. The kidnapping of Tartar women introduced a certain admixture of Tartar blood, but the Cossacks were Russians by origin, language, and religion, and regularly received supplies and ammunition from Moscow, as is proved by recently-

published documents. Meantime, having broken the Tartar bond, Ivan turned to the provinces of St. Vladimir, which had been annexed by Lithuania. From the time that Jagellon, Grand Duke of Lithuania, married Hedwiga, Queen of Poland, in 1386, and insisted on all his subjects passing into the Roman Church by a unique baptismal ceremony—arranging them in groups, and calling one group 'Peter,' another 'Paul,' and so on—strife between R. and Poland was inevitable. But little came of the present campaign, and the Popes strained their power to effect a formal union of the two churches. Paul II. negotiated the marriage of Ivan with Sophia Palæologus (1472), hoping thereby to get a footing in R. His means, however, were badly chosen, for henceforth Ivan assumed the two-headed eagle, and regarded himself as the heir of Byzantium. To R. Byzantium had all along been the representative of civilisation; hence they drew their religious creed, their military code, their civil polity, their artistic and literary tastes, their choicest merchandise. And when the august city fell to the Turks in 1453, the prince of Moscow, the pioneer of Slavic emancipation, took up, by a bold political fiction, the succession of the empire. To the present day this idea dwells in the minds of prince and people, and that the sympathy with the Christians in Turkey is more than a philological sentiment has been demonstrated by the events of 1877. Ivan deserved the epithet 'Great,' if only for the material benefits he conferred on R., and the architectural monuments with which he adorned its cities. It was he who first assumed the title of 'Czar (Cæsar) of all the Russias,' which gave place officially in Peter's time to that of 'Emperor.' ('Cesarevitch,' *i. e.*, 'Son of the Czar,' is a title only given to the eldest son, who is Crown Prince, *Nashlyednik*, and heir-apparent; his consort is 'Cesarevna.' 'Czarevitch,' on the other hand, only means king's son or prince.) The Reign of Ivan IV. (q. v.), 'The Terrible,' is divided into two periods. The earlier or glorious period, while the Czar was advised by Adachef and Sylvester, saw the conquest of the Khanates of Kazan, Kiptchak, and Astrakhan, the successful invasion of Livonia and Esthonia, and the organisation of the Streltzi (q. v.). The death of his wife Anastasia marks that change in the very character of Ivan which led to the banishment of his two counsellors, the fierce persecution of the Bojars, and cruel massacres in Tver, Novgorod, and Moscow. M. Rambeaud is more lenient in his judgment of Ivan than Karamsin, and is inclined to limit the number and horror of his atrocities, while rating less highly the characters of Adachef and Sylvester. A small body of Cossacks under Emack in this reign annexed to R. the W. part of Siberia (q. v.). Boris Godounof was the virtual ruler during the reign of Feodor (1584-98), the last monarch of Rurik's line. His only brother, Dmitri, died mysteriously in 1591, and suspicion attached to Boris, who had banished him to Uglitch, and who now, after the mockery of a convocation, usurped the throne. 'False-Dmitris' sprang up (see DEMETRIUS), and one of these, supported by a Polish army, was crowned in 1605. A period of internal disorder followed, accompanied by famines and plagues. Prince Vassili Shomisky seized the crown in 1606, and held it till the King of Poland, Sigismund Augustus, with the help of the Cossacks, overran Muscovy, and made his own son, Vladislaf, Czar of Moscow, in 1612. This was the signal for the uprising of the orthodox against the Roman Catholic Poles, which ended in the liberation of R., and in the election to the throne in 1613 of the House of Romanoff (q. v.), which has ruled ever since. Michael Feodorovitch (1613-45) restored order and reformed the administration; the reign of Alexei Michaelovitch (1645-76) witnessed the dissemination of the art of printing, and following upon it the revision of the liturgy, psalter, and other religious books by the patriarch Nikon, and the exodus of the Raskolniks (q. v.). Under Feodor Alexievitch (1676-82) R. gained Smolensk and great part of White R. from Poland, and rescued Little R. from the claims of Turkey. The regency of the subtle, energetic Sophia (1682-89), an audacious attempt at usurpation, was followed by the reign of Peter the Great (q. v.), the most remarkable in Russian annals. Thoroughly cosmopolitan in his sympathies, and endowed with courage only equalled by his Titanic energy, Peter modernised R. by a series of gigantic reforms, and by the success of his arms mightily extended her territory. Hitherto R. had belonged to Asia rather than to Europe, and 'was doubtless regarded by Englishmen and Frenchmen pretty much as we nowadays regard Bokhara and Kashgar. Since then

she has formed an integral part of the European political system, and her intellectual history has been but a reflection of that of Western Europe, modified and coloured by national character and local conditions. Utilitarian to the core, Peter raised R. to the level attained by the more advanced nations in material well-being, flooding the country with scientific men and cunning artificers. The nature of Peter's policy is well illustrated in the democratic character he gave to the nobility, and in the liberty he granted, on payment of a double poll-tax, to the dissenters, who regarded him as Antichrist. The reigns of Catharine I. (1725-27) and Peter II. (1727-30) were alike uneventful, but that of Anna (q. v.), Peter's niece, previously Duchess of Kurland, is remarkable as the period when German influence became almost exclusive, and the court, the official world, and the schools, were Germanised. Biron (q. v.), to whom Anna entrusted the whole administration, by his harsh, tyrannical rule brought on a revolution, which raised Elizabeth, Peter's unmarried niece, to the throne in 1741. She tried to rid R. of foreigners, but in displacing the Germans she was only making more easy the entrance of the prevalent Gallomania. During the year-long reign of Peter III. (1762), the obligatory service of the nobility was abolished, and in strict justice the liberation of the serfs should have followed. Peter was assassinated by a court conspiracy, but the truth of this was doubted by the serfs, who hailed the rising of the Cossack pretender, Pugatchef. The revolt of the Cossacks was only quelled (1775) after it had assumed alarming proportions. Meanwhile, Peter was succeeded by his consort, Catharine II. (q. v.), the friend of Voltaire and the Encyclopedists, under whom French influence went far beyond external forms. After the Turkish wars and consequent annexations, South R. was almost uninhabited, and she introduced great numbers of foreign settlers. She removed the disabilities of the Raskolniks, founded educational institutions, built towns, created a *noblesse* on the French model, and tried hard, but failed, to call into existence a rich, intelligent *bourgeoisie*. The most brilliant of her many victories, the conquest of the Crimea (1783), revived the dream of a resuscitated Byzantine Empire. Her violent, eccentric son, Paul I. (q. v.), embittered by the demeanour of his mother's favourites, humiliated the nobles, forbade the introduction of foreign publications, and organised a secret police. After allying himself against France with Austria and Britain, he was on the eve of war with the latter power when his assassination (1801) made way for Alexander I. (q. v.), who early showed great zeal in advancing a grand educational scheme, and in purging the law of its harsher penalties. In the Napoleonic wars he sided with the allies, till compelled by the Treaty of Tilsit (1807) to accede to the policy of France. He wrested Finland from Sweden, and Bessarabia and Moldavia from Turkey; but commercial distress in R. forced him again to change sides, and in rapid succession followed the French invasion of 1812, the destruction of the grand army, and the overthrow of Napoleon. At this time R. stood forth as the liberator of enthralled Europe and the arbiter of her destinies. After the fall of the Napoleonic empire Alexander reverted to a policy of repression, which was carried by Nicholas I. (q. v.) to an extreme; and this opposition to liberalism and progress had its literary counterpart in the nationalistic reaction of the Slavophiles. Successful wars against Persia and Austria added to the territory of R., which was further enlarged by annexation of Poland (q. v.) in 1830. R. aided Austria to quell the Magyars (1849), and fought single-handed against the French, English, and Turks in the Crimean War (1853-56). In spite of the heroic defence of Sebastopol, the campaign resulted only in disaster. But by exposing the incapacity and dishonesty of the military administration, it gave the death-blow to the repressive system of Nicholas, 'the Don Quixote of Autocracy,' and produced an intellectual movement and a moral revival which led to gigantic results. Alexander II., sensible of the spirit of the time, removed the restrictions on the universities and the press, promoted the construction of railways, roads, river-steamers, and on the 3d March 1861 freed the Serfs, 23,000,000 in number. During the Franco-German War, R. suddenly intimated her intention of setting aside the principal condition of the Treaty of Paris, and keeping a fleet of sufficient capacity in the Black Sea. In Central Asia, the policy of pacification by annexation, carried out with singular vigour and ability by Kaufmann (q. v.), had by 1875 extended the frontier as set forth in the paragraph on Boundaries. But attention was suddenly

withdrawn from what appeared a menace against British India by the re-opening of the Eastern Question and a momentous European war (see TURKEY). After the failure of the new Turkish Constitution of 1877 devised by Midhat Pasha, R. initiated the curious diplomatic proceedings resulting in the Protocol of 31st March, by which the Great Powers agreed to see the promised reforms of Turkey carried out. The blunt repudiation of the Protocol by Turkey was followed by a declaration of war by the Czar, 24th April 1877. Lord Derby, in a despatch, censured R. for breaking away from the European concert and forcing on an unnecessary war. The apologetic reply of Prince Gortchakoff protested that R. would respect 'British interests,' which were defined subsequently as the safeguard of Constantinople, Egypt, the Suez Canal, and Persian Gulf. By the 26th June the Russians had found their way into Bulgaria, actually without serious opposition, the crossing of the Danube (begun 21st June) having been effected at Galatz, Braila, and Hirsova on the Dobrudscha, and from Simnizta to Sistova. Then followed the taking of Tirnova (q. v.) and Nicopolis (q. v.), and, in the third week of July, General Gourko's celebrated march through the Balkans, taking the Shipka Pass (q. v.) in reverse. But with nothing, apparently, to oppose his advance on Adrianople, Gourko had no power, for want of support, to complete his brilliant exploit, and his defeat by Suleiman Pasha (q. v.) at Eski Sagra compelled him to retire into the Balkan passes. In the desperate but futile attempt to take Fort Nicholas, at the summit of the Shipka Pass, Suleiman in a ten days' struggle threw away 20,000 of the best soldiers of the Porte. The unexpected gallantry and obstinacy of the Turks broke in upon the paralysis which for a time seemed to hold both combatants. The prolonged resistance of Plevna (q. v.), ending in the dramatic sortie of Osman Pasha (q. v.), had its counterpart in the brilliant feat of arms by which Kars (q. v.) was captured. The conquest which inevitably followed led to the projection of the Treaty of San Stefano, which at first R. declined to submit to a Congress. This decision was reversed on the representations of Lord Salisbury, the new head of the British Foreign Office, backed by the despatch of an English squadron to the Sea of Marmora. A Congress met at Berlin in June 1878, under the presidency of Prince Bismarck, and a Treaty was concluded on 13th July. Its chief terms were the erection of Bulgaria into an 'automatic and tributary principality,' and of Serbia and Rumania into independent states, the cession of the Bessarabian and Armenian districts, the conditional retention by Turkey of Eastern Rumelia (q. v.), with the Balkans for its boundary, and the 'occupation and administration' of Bosnia and Herzegovina by Austro-Hungary. The Russian army of occupation was limited to 50,000 men, and the period fixed at nine months from the signature of the Treaty. On the withdrawal of the troops towards Adrianople in the first week of October 1878, grave disorders were reported, especially at Silivria, and the commander-in-chief, General Todleben, ordered re-occupation, while making energetic representations for the purpose of inducing the Porte to prevent the outbreak of atrocities. By the 10th October the Russians had re-occupied Tchekmedje and Tchataldja, and positions under the walls of Constantinople. Since the Treaty of Berlin, perhaps it would be more correct to say since the publication of the Anglo-Turkish Convention, R. has developed a more active policy in reference to Afghanistan, the issue of which it is difficult to foresee. See Schnitzer, *Les Institutions de la Russie* (2 vols. 1867); Eckardt, *Modern R.* (Lond. 1870, enlarged ed. 1874); Ralston, *Early Russian History* (Lond. 1874); Prof. Solovief, *History of R.* (25th vol. 1875); D. Mackenzie Wallace, *Russia* (2 vols. Lond. 1877); Alfred Rambaud, *Histoire de la Russie* (Par. 1878); Rev. Malcolm MacColl, *Russian and English Diplomacy* (Lond. 1878), and *Turkey and Russia* (Edinb. T. C. Jack, 1877-78).

Russian Language and Literature. The Russian language is the most important member of the Slavonic branch of the Aryan family of speech, being spoken by about sixty millions of people. Of these, however, nearly four millions in 'White Russia,' and some fourteen and a half millions in 'Little Russia,' employ dialects deriving their names from those districts, both of which were long subject to the Lithuanians and Poles, the 'Little Russian' dialect being almost entitled to be styled a distinct language. But the remainder speak Russian proper, or

'Great Russian,' a language singularly free from *patois*, varying but slightly in the numerous provinces in which it prevails. There once existed a cultivated 'White Russian,' in which several works were written, but what is now so called is merely a dialect confined to peasants. 'Little Russian' still endeavours to hold its own as a literary language, and it can boast of several recent writers of note both in prose and verse. But its cultivation is discouraged by the Russian authorities, and it seems to be destined to the same fate as 'White Russian.' But 'Great Russian' has long been enlarging its area, is now spoken over a large portion of Europe and Asia, and appears likely to spread still farther. Modern Russian is sometimes called a descendant of the 'Church-Slavonic,' the language of the liturgies of the Russo-Greek Church; but that is incorrect. 'Old Russian,' the mother of modern 'Great Russian,' and 'Old Bulgarian,' the language employed by Cyril and Methodius in the translation of the Scriptures they made for their Slavonic converts to Christianity in the 9th c., seem to have been sister dialects of Slavonic speech. When the Russians in their turn became Christians, towards the end of the 10th c., they received from their Byzantine instructors the 'Old Bulgarian' version of the Scriptures, and the alphabet which had been invented for the purpose of writing it, and which was called, in memory of its inventor, Cyrillic. Their speech remained what it had been, 'Old Russian,' but the literature which began to exist among them, due at first entirely to the pens of monks, expressed itself in 'Church Slavonic,' a language now widely differing from that spoken by the Russian people. From a mixture of this 'Church Slavonic' with 'Old Russian,' gradually grew up the language in which Russian literature until a comparatively recent period expressed itself. The earliest writers of whose works specimens have been preserved were Luke Zhidyata, Bishop of Novgorod in 1036, Hilarion, Metropolitan of Kiev in 1051, and Theodosius, Abbot of the Petchersky Monastery at Kiev in 1062. Of the writings of each of the first two only a single homily or exhortation has survived; the third is known by an *Epistle to the Grand Prince Iyaslaf on the Latin Faith*, ten short exhortations to his monks, and one longer exhortation to the people. Most of the religious writings of this period, such as *Lives of the Saints* and similar works composed by monks, were of no great intrinsic value. But most valuable were the *Chronicles* which began to be compiled in monasteries, some of which have been preserved, and form the basis of Russian history. Chief among these is the work known as Nestor's *Chronicle*, its commencement being attributed to a monk of that name, who entered the cloister at Kiev about 1073, and died about 1115. Four 11th c. *Chronicles* have been preserved; two from the N., known as those of Novgorod and of Souzdal, and two from the S., the Kiev and the Volhynian. Those of the N. are meagre and dry; the Southern are richer in details, and more poetic in language. Next to the *Chronicles*, the most valuable written relics of the early period of Russian history, that in which the successors of Rurik ruled at Kiev, are the *Russkaya Pravda* or 'Russian Rights,' the code of laws issued by Yaroslaf I., who reigned from 1019 to 1054, its enlarged recension issued by his grandson, Vladimir Monomachus, who reigned from 1113 to 1125, and the quaint *Instructions to his Children*, composed by the latter prince. To the 12th c. are attributed also the curious Letter or Petition addressed by Daniel Zatochnik (or the Exile) to a prince of Pereyaslav, and the celebrated poem *About the Expedition of Igor*, describing an expedition undertaken by a Russian prince of that name against the Polovtzy in 1188. Unfortunately the unique MS. attributed to the 14th or 15th c., from which it was edited by Count Mussin Puschkin in 1800, is said to have been burnt during the fire of Moscow in 1812. In the fires kindled by the Tartars during the 13th c. many of the records of early Russian literature doubtless perished, and its development was long checked by the results of their conquests. During the long period of Tartar rule, little was written except in the cloister; only when it came to an end in the 15th c. did culture begin slowly to revive. Its principal fosterer was Maxim Grek, or the Greek (1480-1556), a monk from Mount Athos, who during his stay of thirty-eight years in Russia composed 140 different works, mostly of a polemical nature, directed against various heresies. He was himself, towards the end of his career, charged with heresy and with perversion of the Scriptures, and was banished to the Troitsa monastery, where he died. But the impulse he had given to education and study continued to act, and produced good results.

Writings became numerous, but they were still chiefly of a religious character. One of the most interesting of the literary records of the reign of Ivan IV., surnamed the Terrible (1533-84), is the Correspondence between that monarch and Prince Andrew Kurbsky, one of his nobles who fled into Lithuania, and who afterwards wrote a history of the Tsar's life and reign down to the year 1578. Another very interesting and valuable work belonging to the same period is the *Domostroi*, or *Household Management*, attributed to the priest Sylvester, whose influence prevailed during the brightest part of that Tsar's career. As Prince Kurbsky's *History* and his correspondence with Ivan IV. throw much light upon the life led by the public men of the day, so does the *Domostroi* bring clearly before its readers the private and social life of Russia, its sixty-three chapters showing how a citizen ought to live and conduct his household, and what should be his relations with his family and his neighbours. Among the most important works compiled about this time must be classed the *Great Chety Minei*, a long series of *Lives of the Saints*, due to the labours of the Metropolitan Makary; the *Sudebnik*, a code of laws, compiled by the order of Ivan IV.; and the *Stog-laf*, or *Hundred Chapters*, a clerical statute-book, drawn up by a council of the Church convened by that Tsar in 1551. The want of correctness in the then existing scriptural and liturgical MSS. led, soon after that date, to the introduction of printing into Russia. In neighbouring Slavonic states it already prevailed, printing presses having existed in Cracow since 1491, and in Vilna, then a Lithuanian city, since 1525. In 1548 Ivan IV. sent to Germany for printers, but they were prevented from entering Russia. In 1553 he ordered a printing-office to be constructed at Moscow, and in 1564 appeared the first book printed in Russia, the *Acts and Epistles of St. Paul*. In 1565 another work appeared, but then the printers were accused of heresy, and obliged to leave Moscow. Two of them took refuge in Lithuania, where one of them managed the press set up at Ostrog by Prince Constantine Ostrozhsky (or of Ostrog), and there, in 1581, printed the first complete Slavonic Bible. In 1568 the Moscow printing-press resumed its labours, a *Psalter* appearing in that year. But the influence of the press was for a long time very slight. The transcribing of MSS. still went on, the printing of Church books being looked upon with a distrust which, among some of the Raskolniks or Dissidents, is still kept up, only written liturgical books being accepted by them. The avowed severance of the Raskolniks from the Established Church dates from the time of the correction of the Church books by the Patriarch Nikon, whose subsequent trial gave rise to one of the most important records of the time, the *Replies* which he made to the charges brought against him. The greater part of the books printed at the Moscow press were on religious subjects, but in 1647 appeared a work on the *Art of War*, and in 1649 the *Uloshenie*, or *Code of Laws*, drawn up by the order of the Tsar Alexis Mikhailovitch. During his reign dramatic performances commenced in Russia. The students of the Theological College founded at Kiev towards the end of the 16th c., were in the habit of acting mysteries or sacred dramas, and a literature of that kind sprang up in Little Russia, encouraged by the Metropolitan Peter Mogila (1597-1646), himself an author both in prose and verse. After a time these theatrical representations made their way to Moscow, some of them being composed by ecclesiastics of note, such as Simeon of Polotsk (1628-82), and Demetrius of Rostof (1651-1709). But although some progress in culture had by this time been made, it was not till Peter the Great had carried out his reforms that a Russian literature became possible. These extended to the Russian alphabet, which he modernised, its letters being made simpler and clearer than the Slavonic characters till then in use. Under his guidance, numbers of foreign books were translated, several printing-presses were set up, and (in 1703) the first Russian newspaper was founded. Many young men, of different social ranks, were sent abroad to study. Among these was a peasant named Pososhkof, who wrote several works, the most remarkable being a book *On Poverty and Riches*, containing a detailed account of the condition of Russia in his time. Another writer educated abroad was Vassily Talishtchef (1686-1750), who wrote a *History of Russia*, brought down to the year 1462. It was not published till thirty years after his death, when it was edited by command of Catherine II. He also did much for Russian geography, especially with respect to Siberia. Under Peter's successors, poetry began to be cultivated in Russia. Prince

Antiochus Kantemir (1708-44), the son of a former Hospodar of Moldavia, wrote eight rhymed satires, which rank among the best which Russia has produced. He also translated much, including the Epistles of Horace. Vassily Trediakovsky (1703-69) produced much verse, and attempted to draw up laws for poetical composition. He also turned his attention to the neglected field of Russian grammar, especially with regard to its alphabet and to orthography. But it was not till the time of Michael Lomonosof (1711-65) that anything systematic in that direction was done. That remarkable man, the son of a fisherman in the Archangel government, began his literary career under great difficulties, but he ultimately achieved success, and used it well. He wrote much on many subjects, chiefly scientific, both in prose and verse. But his great merit was that he systematised and simplified Russian grammar, and drew a clear line between modern Russian and the older language which had been so much influenced by Church Slavonic. Alexander Sumarokof (1718-77) was another prolific writer. He has been styled the creator of the Russian theatre, being the author of numerous dramas both in prose and verse, as well as of many other works. The first national theatre was opened in 1746 by a merchant at Yaroslaf, but not long afterwards Russian pieces began to be performed both at St. Petersburg and at Moscow. Under Catherine II., who was herself the author of several Russian comedies, much was written for the stage. The chief dramatist of the period was Denis von Vizin (1744-92), of whose numerous writings, on various subjects, two are still in vogue—*The Brigadier* and *The Minor*. Among the numerous writers in verse who rendered this period so brilliant, the chief lyric poet was Gabriel Derzhavin (1743-1816). He wrote a large amount of poetry, which is still highly esteemed, one of his odes, 'To God,' having extended his fame over a great part of Europe, and even as far as China. As an epic poet Michael Kheraskof (1733-1807) occupied the first place, the title of 'the Russian Homer' being gained for him by two long works, the *Rossiyada*, celebrating the capture of Kasan by Ivan IV., and the *Vladimir*, describing the conversion of Russia to Christianity. Hippolit Bogdanovitch (1743-1803) was rendered famous by his poem called *Dushenka*, an imitation of La Fontaine's tale of Cupid and Psyche. He wrote several other works, the most interesting of which was the *Collection of Russian Proverbs* which he made at the request of the Empress Catherine. Another imitator of La Fontaine was Ivan Khemnitser (1745-84), the son of a Saxon who settled in Russia. His fables became famous after his death, and still continue to be read. Meanwhile a considerable periodical literature had sprung up. The Academy of Sciences, which was founded by Peter the Great in 1724, and inaugurated the following year by Catherine I., began to publish, in 1755, a literary journal, under the title of *Monthly Works for Edification and Diversion*. This was edited by Gerhard Müller (1705-83), a Westphalian who became naturalised in Russia, and who, besides writing many valuable books, rendered excellent service by editing a number of old Russian works hitherto preserved in MS. only, such as the *Statute-Book of Ivan IV.*, and the *Stepennaya Kniga*, or *Step Book*, a genealogical table of the House of Rurik, drawn up by command of the same monarch, also the Russian histories of Tatishchev and Chilkof, and many others. This journal was followed by numerous periodicals of a similar kind, several of which were edited by Nicholas Novikof (1744-1818), the first Russian bibliographer, and the founder of the first circulating library at Moscow. After a time the number of journals increased rapidly, owing to the activity of Russian literature during the second half of the 18th c., till it was checked by the troubles to which the French Revolution gave rise. The first Russian author who obtained a European reputation was Nicholas Karamzin (1765-1826). Beginning as a writer of translations, lyric poems, and short romances, he commenced in 1803 his great *History of the Russian Empire*, on which he worked during the rest of his life. The twelfth volume, bringing the history down to the year 1611, was not published till after his death. Karamzin had a great influence on Russian prose, introducing a light, simple style. Most of his literary contemporaries were poets, all of whom were more or less imitators. The writers of the romantic school which flourished up to the time of Gogol, derived their inspiration from Germany, France, or England. Chief among them was Vassily Zhukovsky (1783-1852), a graceful translator and imitator, and an excellent writer of Russian verse. During the reign of Alexander I. the taste for poetry spread rapidly, the

number of its cultivators being immense. Ivan Dmitrieff (1760-1837) was a fluent writer of lyrics, and his fables gained him a reputation which still survives. Baron Anton Delvig (1798-1831) wrote numerous idylls and other poems, some of which he contributed to the *Polar Star*. This 'literary almanack,' which political events afterwards rendered famous, first appeared in 1822, edited by two representatives of the party of progress, Kondraty Ryleyef and Alexander Bestujef. They both took part in the military insurrection which followed upon the accession of Nicholas in December 1825. The former was hanged, the latter was reduced to the ranks and exiled. Eugene Baratynsky, Nicholas Yazykof, Constantine Batyushkof, and a host of other writers, belonged to this period, so fertile in Russian verse. Many of them were dramatists. Such a service as Karamzin rendered to Russian narrative was rendered by Vladislaf Ozerof (1770-1816) to Russian tragedy, which he made more natural than before, better fitted to touch and to interest. Several other dramatists of note belong to this period. One of them, Alexander Griboyedof (1795-1829), is still remembered as the author of a very successful satirical comedy, *Gore of uma*, or *Misfortune from Cleverness*. Prince Alexander Shakofsky (1777-1846) is said to have exercised considerable influence on the development of the Russian theatre, for which he wrote numerous pieces and trained many actors; and Nicholas Khmelnitsky (1789-1846) was another popular writer for the stage. Ivan Krilof (1768-1844) also began his literary career as a dramatist, and some of his comedies are worthy of note. But it is to his *Fables* that he owes his widely spread reputation. Beginning as an imitator, almost translator, of La Fontaine, he gradually developed an original talent for satire and epigram which was appreciated not only at court and in fashionable society, but also by the middle classes and even the common people, into whose memory many of his couplets have sunk deep. His fables have been translated into many languages. The last twenty years of his life belonged to the most brilliant period of Russian literature. Both in prose and in verse, fiction was represented by writers who were far superior to most of the elegant imitators who preceded them, and they created a national literature which, based on a broad and solid foundation, is likely to endure. Russians usually name as their most illustrious and most characteristic author, Nicholas Gogol (1808-52). He was a native of Little Russia, and he owed his first success to his sketches of the life and manners of that part of the empire. Describing places and people as they were, he founded a realistic school of prose fiction which, as was the case elsewhere, completely displaced the romantic school which preceded it. His works have the merit also of being thoroughly Russian, founded upon incidents, and representing manners and customs, which are typical of the country and of the period in which he lived. No other Russian comedy was so successful as his *Revisor*, first represented in 1836, in which he depicts the official life of a provincial town, describing the commotion produced by the arrival of a stranger who is supposed to be on a visit of inspection, and portraying, in caricature, but still with truth and vigour, the various types of Tchinovniks or civil servants. And no other Russian novel has produced such a sensation as was caused by the appearance in 1842 of his *Mertvuiya Dushi*, or 'Dead Souls.' In it, while describing the expedition of an adventurer who swindles the government by means of fictitious purchases of 'souls,' as male serfs were called in olden days, he brings upon the stage a series of representatives of Russian life, landed proprietors, officials, and peasants, all seen from the point of view of a satirist, but all clearly distinguished from each other. The position held by Gogol among Russian novelists is occupied among Russian poets by Alexander Pushkin (1799-1837), whose *Eugene Onegin* is a work of real genius, a poem in which the individuality of the author makes itself clearly discernible, although the influence is sufficiently perceptible of Byron, the writer whom Pushkin most profoundly admired, and most often imitated. Outwardly it bears some resemblance to *Don Juan*, but the thought which inspires it is thoroughly Russian, and so are its characters and the life they lead. His other poems, especially the *Tsigane* or 'Gipsies,' *Fountain of Batchesarai*, and *The Prisoner of the Caucasus*, as well as his prose tales, bear witness to great powers which might, when matured, have produced still greater works; but in his thirty-eighth year he was killed in a duel. Such was also the fate, at a still earlier age, of the second of Russia's poets, Michael Lermontof (1815-41), who traced back his descent to a

Scotch family named Lermont. Like Pushkin, he was greatly influenced by Byron, but he also possessed, together with a remarkable mastery over verse, such intellectual qualities as might have enabled him to do much more than the works by which he is best known. Among these are *The Demon* and *Mtsyri* (a Georgian name for a lay-brother), in both of which he turned to good account his acquaintance with the then unfamiliar Caucasus; his novel, a *Hero of Our Times*, which has been widely translated; and many lyric pieces. In one of his poems he touched ground which might have yielded him rich material for song. His metrical romance *About the Tsar Ivan Vasilievitch* is written in imitation of the semi-historical poems, peculiar to Russia, called *bulinas*. It was from his study of another branch of Russian popular song that Alexis Koltsof (1809-42) gained the power which he possessed of expressing himself in a manner quite distinct from that of any of the poets of Western Europe. The son of a small cattle-dealer in the town of Voroneje, he pursued his literary career under great difficulties, but his intimate acquaintance with the life of the common people enabled him to write about them, and to express their thoughts and feelings, with truth. His native place gave birth also to another poet of the people, Ivan Nikitin (1826-61), who kept a small bookshop there. His poems resemble those of Koltsof in their truth to nature as well as in their genuine pathos. Another recent writer of great power was Nicholas Nekrasof who has left behind him a number of pictures of peasant life, drawn with singular force, truth, and pathos, as well as many other poems which are likely to survive. But recent imaginative writers have devoted themselves almost entirely to prose fiction. The best known among them is Ivan Tourguenef (born 1818), whose *Memoirs of a Sportsman* first gained him a reputation, which is now very widely spread, his works having been translated into many languages. Most of his writings, but especially his *Noble Nest*, and a number of minor tales, prove that he is a master of pathos, and a most subtle analyser and delineator of character. His more recent works, such as *Fathers and Children*, *Smoke*, and *Virgin Soil*, show how great is his power of representing the different phases through which during the last twenty years Russian thought has passed on all that concerns the social and political questions of the day. Another novelist of real power is Count Leo Tolstoy, whose principal work, *War and Peace* (1868), contains a series of remarkable pictures of Russian life at home and in the field during the early part of the present century. His later work, *Anna Karenina*, is also a novel of great power. One of the most striking of recent Russian novels is the *Oblomof* of Ivan Gontcharof, which has given rise to the term 'Oblomofism,' to express the peculiar mixture of indolence and despondency to which Russian natures are peculiarly liable. Among other noteworthy novelists may be mentioned Grigorovitch and Pisemsky, authors of very realistic descriptions of Russian life; Dostoievsky, best known by his *Notes from a Prison House*, giving an account of convict life in Siberia, and by his *Crime and Punishment*, a psychological study of a murderer's career; Tchermiashevsky, the author of a Nihilist story entitled *What is to be Done?* which produced a great sensation; and Soltykof, who, under the pseudonym of Stehedrin, has produced a number of satirical works, such as the *Provincial Sketches* and the *Tashkentians*, intended to lash the faults and follies of his countrymen. Of the writers of recent historical novels, a branch of fiction much cultivated in Russia, Count Alexis Tolstoy may be taken as the representative, the author of *Prince Serabryanny*, a tale of the times of Ivan the Terrible. He was also the author of several historical dramas. But the only dramatic writer of note who has appeared for some years past is Ostrovsky, the author of a great number of plays, chiefly devoted to depicting the life led by the commercial and official classes. Poetry and the drama have for some time been neglected in Russia. Prose fiction flourishes, supported by the aid of several excellent reviews or magazines, one of which, the *Messenger of Europe*, yields in merit to scarcely any Western periodical. On graver subjects much has been written. Among the critical writers whom Russia has produced, the most remarkable was Vissarion Bielinsky (1815-41), to whom the literary men of the early portion of the reign of Nicholas, the most brilliant period of Russian poetry, were greatly indebted. He was an ardent supporter of the cause of the *Zapadniki*, or 'Occidentals,' whose great object was to raise Russia to the level of Western Europe in culture and general civilisation against the

Slavophiles. To the latter party belonged several writers of note, such as the poet Alexis Khomyakof (1804-60). Among works of research, the best have been those devoted to the history, archæology, literature, and resources of Russia. The time has not yet come for the completely free handling in that country of political, religious, and metaphysical questions; and the Russian writers who have turned their attention to them in exile have not, with the exception of Alexander Hertenzen, so long the influential editor of the *Kolokol* or *Bell* and the *Polar Star*, produced any works of note. But on all that concerns the history of their native land, a number of Russian authors have thrown light by means of very many excellent works. The histories of Russia by Solovief and Bestujef-Ruimin are of great value, and an immense amount of historical material has of late years been printed by learned societies, and in such periodicals as the *Russian Antiquary*, and the *Russian Archive*. Other writers of note on Russian history and archæology are numerous, such as Kostomarof, Pogodin, Polevoi, Ilovaisky, Zabyelin, and a host of others. One subject connected with Russian literature has of late years been well worked, the folklore of Russia. In the memories of the common people have been preserved rich stores of legendary fiction, both in prose and verse, and numerous collections have been made and commented upon. The collections of folk-tales by Afanasief, and of *bulinas* or metrical romances by Ruibnikof, the Kireesky Brothers, Bezsonof, and Hilferding, and the comments upon them by Buslaef, Stassof, Orest Miller, and many others, yield in merit to no similar works produced elsewhere. Theology has produced a literature of its own, but, like the Russo-Greek Church to which it owes its existence, it is formal, narrow, and antiquated. Science is represented yearly by many volumes, but there are few of its branches in which contributions have been made by Russia to the literature of the world. The study of the Oriental languages has been forced upon Russia by her geographical position, and many valuable works upon them have been published in that country, especially as regards the languages of Central Asia and the Caucasus. And from the time of Athanasius Nikitin, a merchant of Tver, who made a journey in 1470 to the East Indies, of which he left behind him an interesting account, there have been many books of travel written, some of which, like the recently-published *Mongolia* by Przewalski, have become generally known by means of translations. In many branches of knowledge the Russians still occupy the position of learners, and have not yet begun to teach. And the masses of the people being all but utterly unlettered, in spite of the efforts which have been made to educate them during the reign of Alexander II., the public to which literature has to appeal for support is comparatively small. Up to the end of the year 1823, there were printed in Russia, according to Sopikof, 13,249 Russian and Slavonic books. Under the repressive government of Nicholas, the publication of Russian books fell off, but with the accession and the early reforms of Alexander II., literature began to flourish anew. Mezhof's catalogue of books, published in 1875-76, mentions 1217 literary works, 798 theological, 44 philosophical, 500 educational, 351 judicial and political, 163 technological, 521 historical, geographical, &c., 204 mathematical, 223 military and naval, 180 on natural science, 336 medical, 496 linguistic, 42 artistic, and 395 periodical works, making a total, including miscellanies and also re-issues of the same work, of 5865 publications. See Otto, *History of Russian Literature* (Oxf. 1839); Talvi, *Languages and Literature of the Slavic Nations* (New York, 1850); Galakhof, *Istoriya Russkoi Slovesnosti* (2 vols. St. Petersburg, 1863-76); Polevoy, *Istoriya Russkoi Literatury* (2d ed. 1874); C. Courrière, *Histoire de la Littérature Contemporaine en Russie* (Par. 1875).

Russian Leather. The manufacture of leather is one of the oldest staple industries of Russia. One variety of soft tanned leather, white in colour or dyed red or black, is prepared from heifer hides. It is called *yousf*, or R. L. White and black *yousf* is chiefly consumed within the bounds of the empire for making boots, belts, cartridge-pouches, &c. for the army, and for many other purposes. The red kind, however, is well known as R. L. in Western Europe, where it is extensively employed in bookbinding, for travelling-bags, cigar-cases, porte-monnaies, &c. It is soft and pliant, grained, unaffected by damp, and possessed of a peculiar and somewhat fragrant odour which repels insects and thereby protects the leather from their ravages.

The red colour is produced with a solution of alum and extract of red sandalwood, and the peculiar smell is due to the empyreumatic oil of birch bark, which, mixed with oil or fat, is employed in the process of currying. Paris now manufactures R. L. from sheep and goat skins after the methods pursued in Russia with heifer-hides.

Rust is the common name for a parasitic fungus which attacks the leaves, glumes, stalks, &c. of cereals and grasses, showing itself in the form of orange and brown rust-like spots and blotches breaking out from the internal tissue of the plant. It is most common on barley, wheat, and oats, less so on rye and the wild grasses, though many of the grasses are infected, thereby maintaining a supply of the fungus ready to attack the corn-crops whenever these are brought into a state adapted to receive the protospores. This pest is now named by botanists *Trichobasis Rubigo vera* (and one or two allied species), belonging to the order *Pucciniae* (see UREDO). Amongst farmers the names R., red-rag, red-robin, and red-gum are current.

Rus'tchuk, a picturesque town of Bulgaria, on the S. bank of the Danube, opposite Giurgevo, 40 miles S. of Bucharest and 38 N.W. of Rasgrad by the R. and Varna Railway. It is defended by several batteries, and has thirty mosques, several Greek and Armenian churches and synagogues, two public baths, &c. Till 1877, when it was captured by the Russians, R. was the residence of a Turkish vali-pasha, and it is still the chief industrial town in the lower course of the Danube, manufacturing extensively linens, silks, muslins, leather, cigars, pipe-heads, and pottery. Pop. 22,000, of whom about half are Turks, one-fourth Bulgarians, 956 Jews, 778 Armenians, and 469 gipsies. In the war of 1877-78 the left division of the Russian army under the Czarévitch was called the army of R., and proceeded after the crossing of the Danube in the direction of the city, but did not venture to attack it.

Rus'tic, or **Rus'ticated Work**, masonry in which the joints are grooved or channelled. Sometimes only the *horizontal* joints are so treated, sometimes all. The grooves, either moulded or plain, are formed in different ways, and the surface of the stone is either artificially roughened, or, as is now more usual, left smooth. R. is frequently used in rough Gothic work, but is most common in classical or Italian architecture.

Butabaga. See TURNIP.

Buta'ceæ is a natural order of thalamifloral Dicotyledons of Hooker's cohort *Geraniales*, consisting of shrubs or trees, or rarely herbs, with compound or simple ex-stipulate leaves dotted with translucent glands; from four to five sepals, petals, and stamens; an annular disc, between stamens and ovary; four or five carpels, mostly connate; oblong or reniform seeds, and large embryo. The orders *Aurantiaceæ* and *Zanthoxylæ* being now included under R., render the number of species belonging to it about 700, divided into seven tribes, and distributed through the hot and temperate zones of both hemispheres. Many genera are confined to tropical America (tribe *Cuspariæ*), to the Cape of Good Hope (tribe *Diosmeæ*), to Australia (tribe *Boronææ*), and to S. Asia (most of tribe *Aurantiææ*).

Bute'beuf, a famous trouvère of the 13th c. Almost nothing is known of his history. From his writings we learn that he had no other profession than that of *rimneur*; while a phrase in his *Dit de l'Erberie* leads to the conclusion that he was a native of Champagne. R., however, was no common minstrel or jongleur. If misery forced him to beg, he addressed himself to the King and to the most illustrious personages of France. That he suffered from poverty is not wonderful. By his own admission he was idle, debauched, evil-tongued, and addicted to gambling. The fifty-six pieces which R. has left are mostly short; they comprise satirical or devotional *dits*, historic songs, hymns, plaints, in which he celebrates the memory of his dead benefactors or mourns over public calamities, *tensons*, a small number of *fabliaux*, two legends, some allegorical trifles, and a drama. R. is a very unequal writer; he is rude and full of affectations, but there is withal so much verve, originality, and energy in his poems—so much, in a word, of genuine inspiration—that modern criticism has assigned him a foremost place in the ranks of the trouvères. Satire is his true element. In this respect he foreshadows the characteristic feature of later French literature, and may be regarded as a mediæval Voltaire or La

Fontaine. Princes, popes, prelates, barons, burgesses, advocates, even serfs, are in turn the butt of his ridicule; but it is against the religious orders that he darts his keenest and most pungent epigrams. Perhaps the finest of his *fabliaux* is *Charlot le Juif*. One of his pieces, entitled *Mort ou la Repentance R.*, has given rise to the conjecture that this merciless mocker of priests closed his career in the cloister, seeking there the repose denied him in the world. See A. Jubinal, *Œuvres Complètes de R.* (2 vols. Par. 1838-39).

Ruth, Book of, gives the family history of the great-grandparents of David, King of Israel. Ruth was a Moabitess, who had married a Jew of the name of Mahlon, one of two sons of a family which was driven to the Land of Moab in the time of a famine. When both were now widowed, Ruth accompanied her mother-in-law on her return to Bethlehem, where she was married to Boaz, a relative of her first husband. By him she became the mother of Obed, the father of Jesse, the father of David. The circumstances described thus happened in the third generation before David, which is more definite than 'the time when the Judges ruled' (i. 1). As to the date of its composition, it must have been written at least as late as the reign of David, whose genealogy it gives. Ch. iv. 7 implies that it was not written till a considerable time after the events related. As an idyllic picture of antique unsophisticated life it possesses an enduring charm. See Bleek's *Einleit. in d. Alt. Test.* (Eng. trans. 1869).

Ruthe'nians, or **Russ'niaks**, a branch of the Slavonic race, chiefly inhabiting Galicia and Northern Hungary, their total number in the Austro-Hungarian empire amounting (1876) to 3,200,000, according to Dr. A. Ficker's estimate. The R. are ethnologically almost identical with the Little Russians of Podolia and Volhynia (also sometimes known as R.), and belong, for the most part, to the Greek United Church. They preserved their dialect through the Polish domination of the 17th and 18th centuries, a domination that led to the massacre of hundreds of Polish nobles by infuriated peasants in 1846, and to the opposition offered by the Ruthenian to the Polish members in the Slavonic Congress at Prague (1848). Of late years the Russniak dialect has sunk to a patois, being superseded in literature by Russian. The songs and folklore of the race, however, had been already collected in Vailav's *Piśni Polskie i Ruskie* (Lemb. 1833). See Biedermann, *Die Ungarischen Ruthenen, ihr Erwerb und ihre Geschichte* (Innsb. 1862-68).

Ruthe'nium (Ru = 104.2), one of the platinum metals, associated with iridium, osmium, and rhodium in platinum ores. The metal is hard, brittle, almost infusible, and scarcely affected by even aqua regia. Four oxides are known, of which one, *Ruthenic acid* (RuO₃), has not been obtained separate from its salts. The binoxide (RuO₂) and sesquioxide (Ru₂O₃) have feeble basic properties. The protoxide (RuO) is a dark-grey powder insoluble in acids.

Ruth'erford, Samuel, a Scotch divine, born about 1600 in the parish of Crailing, Roxburghshire, studied at Edinburgh, was chosen professor of classical literature in 1623, but soon turned his attention to theology, and in 1627 was settled as parish minister of Anwoth in Kirkcudbrightshire. In 1636 he published at Amsterdam an elaborate work in Latin on the Arminian controversy, entitled *Exercitationes Apologice pro Divina Gratia*. For this he was deposed in 1636, and ordered to confine himself to the city of Aberdeen, then a stronghold of Episcopacy. Here he wrote most of those Letters (first published in 1664) which have given him so great a celebrity. R. took part in the famous Glasgow Assembly of 1638, and was soon after appointed professor of divinity at St. Andrews. He went in 1643 as one of the Scotch Commissioners to the Westminster Assembly, issued his famous *Lex Rex* in 1644 against the doctrine of absolute monarchy, became Principal of St. Andrews in 1649, and was twice offered a chair of divinity in Holland in 1651. He died March 19, 1661. R. wrote numerous other works both in Latin and English. He was a man of great piety and intellectual fervour.

Ruth'erglen, popularly **Rug'len**, a town in Lanarkshire, on the left bank of the Clyde, 2½ miles S.E. of Glasgow by rail. It formerly consisted of one long and wide but irregularly built street, with smaller streets branching from it from N. to S., but of late years it has been almost entirely rebuilt, and largely

extended. It is separated from the river by a low and rich tract of burgh land, known as the Green. The townhall in Main Street, erected in 1861 at a cost of £7,000, is the finest building. R. has six churches and a public library. Its trade is chiefly dependent upon that of Glasgow, and many of its inhabitants are engaged in weaving muslins for its manufacturers. It has also (1878) very extensive chemical works, three power-loom manufactories, a paper-mill, a pottery, tube-works, and a boat-building yard. Its fairs are noted for a great show of horses, particularly of Clydesdale breed. R. unites with Kilmarnock, Dumbarton, Port-Glasgow, and Renfrew in returning a member to Parliament. Pop. (1871) 9543. R. is one of the most ancient royal burghs in Scotland, having received its charter from David I. in 1126. In 1226 its boundaries were fixed to exclude Glasgow, which had previously formed a part of it. Its old castle was demolished by the Regent Murray after the battle of Langside. Until recently the town did not advance with the prosperity of the times.

Bu'thin (Cym. *Rhyd-din* or *Castell-Coch*, 'red castle'), a town of Denbighshire, N. Wales, on the Clwyd, 7 miles S.E. of Denbigh by rail, has an old collegiate church, a corn-exchange and market-hall in Continental Gothic style (1864), a county-hall and prison (enlarged 1867), and a grammar-school (founded in 1592). The ancient castle, built in the 13th c., was dismantled by the Roundheads in 1646, and its site is now occupied by a fine castellated mansion. Lead-mining in 1871 employed 185 men. R. returns one member to Parliament with Holt, Denbigh, and Wrexham. Pop. (1871) 3298.

Ruthven (pron. *Riven*), **The Raid of**, was a conspiracy contrived in 1582 by William, first Earl of Gowrie, in conjunction with Lord Lindsay of Byres, the Earl of Mar, and the Master of Glamis. These determined to seize young James VI. at the castle of Ruthven, to remove from power his guardians, the feeble Lennox and the profligate Arran, and to take the government into their own hands. A thousand men surrounded the castle and surprised the king. Arran was imprisoned, and Lennox forced to take refuge in France, where he died broken-hearted. The conspirators kept possession of the king for a year, but at the end of that time he escaped their vigilance and put himself under the protection of the governor of the castle at St. Andrews. Gowrie and the others were at first pardoned, but afterwards declared traitors. Gowrie, when about to leave Scotland at Dundee, was induced to join in a plot to seize Stirling Castle, and failing, was tried for treason and executed.

Butlam (*Rattam*), the capital of the native state of the same name in Central India, 44 miles W. by N. of Oojain. It is well built, and forms a centre of the opium trade. The state of R., which is the chief Rajput state in W. Malwa, has an area of 1200 sq. miles; pop. about 100,000; revenue, £130,000, of which £70,000 is alienated in feudal grants. A tribute of £8400, formerly paid to Scindiah, is now received by the British.

Rutlandshire (Celt. *rhudd*, 'red'), the smallest of the English counties, is bounded N.E. by Lincoln, S.E. by Northampton, and W. by Leicester. Area, 94,889 statute acres; pop. (1871) 22,073. The formation is Oolitic, and the soil is loamy, devoted chiefly to tillage in the eastern, and to pastures in the western half of the county. The south-eastern boundary is formed by the Welland, which receives the Eye Brook, the Chater, and Wash. The surface, with the exception of a slightly-elevated tableland in the N.E., is generally level. In 1876 there were 26,401 acres under corn crops; 7692 under green crops; 7585 in clover, sainfoin, and grasses in rotation; 40,900 in permanent pasture, and 3094 in woods. There were also 3119 horses, 16,756 cattle, 97,256 sheep, and 3423 pigs. Two members are returned by the county, the capital of which is Oakham. Uppingham is the only other place with more than 2000 inhabitants.

Rutnagherry (*Ratnágiri*), the chief town of the district of the same name in the Bombay Presidency, British India, on the shore of the Arabian Sea, 150 miles S. of Bombay. Pop. (1872) 10,614.—The district of R., which lies between the E. Ghauts and the Arabian Sea, N. of the Portuguese territory of Goa, has an area of 3789 sq. miles; pop. (1872) 1,019,136. The crops are rice and other grains, betel, and cocoa-nuts. R. suffered, though not severely, from the famine of 1877.

Buviga'do, a town in the United States of Colombia, province of Antigua, at a height of 8900 feet above the sea. It has a considerable trade. Pop. 10,000.

Buvo di Puglia (the *Rubi* of the Romans), a town of S. Italy, province of Bari, 23 miles W. of the city of that name. It has two museums of ancient vases, some trade in grain and dried fruits, and considerable pottery. Pop. (1874) 15,083.

Buys'dael, Jacob, one of the chief Dutch landscape painters, was born at Haarlem, about 1625. He was the pupil and friend of Berghem, but little is known regarding his life. His pictures represent Dutch scenery on or near the Rhine, and one of his pictures in the Louvre is allowed even by Ruskin to have 'freedom of action and power of colour.' He is less conventional than Hobbema, whom he excels in breadth of treatment and general airiness. The catalogues ascribe to him 448 works. He died at Haarlem, November 16, 1681.—**Salomo E.** (1613-70), was also a good landscape painter, noted for his faithful rendering of marble.

Buyter, Michiel Adriaanszoon van, the famous Dutch naval hero, was born at Vliessingen, 24th March 1607. After a long and adventurous career as a trader, he made a sufficient fortune, and proposed at the age of forty-five to quit the sea and take to gardening. But soon the war with England broke out, and R., against his will, was made an admiral. He wrote to the Government, 'I have beaten about the seas, and braved so many dangers, that I would fain end my days in rest.' He fought under Tromp in all his battles with the English, and having succeeded to the chief command of the fleet, fought three great battles with the English, ran up the Thames to Gravesend, forced the boom that protected the Medway, burnt three men-of-war anchored in the river, and for six weeks sailed proudly along the southern coast of England, master of the Channel. The peace of Breda (1667) was more due to his valour than to diplomacy. In 1673 he resisted the combined fleets of France and England till the English nation grew tired and ashamed of the war. Sent to Sicily to support Spain against France, R. was severely wounded in the affair of Mongibello near Messina, and died at Syracuse, 29th April 1676. He was buried in the Nieuwe Kerk at Amsterdam, where, as at Vliessingen (1841) and Rotterdam (1856), a monument was erected in his honour. See Otto Klopp, *Leben und Thaten des Admirals de Ruiter* (Hannover, 1852), and Jacob de Liefde, *The Great Dutch Admirals* (Lond. 1873).

Ryan, Loch, a land-locked arm of the Firth of Clyde, which runs S.E. into Wigtownshire from Corsill Point, with a length of 10 miles and an average breadth of 2 miles. It affords safe and commodious anchorage, being of great depth close to its E. shores, and sheltered by the hills of Finnart and Craiggaffie. The W. shore is low, but slopes gently to the beautifully wooded hills of Kirkcolm and Leswalt. It has been rendered classic by the pathetic ballad, *Fair Annie of Lochryan*, and by the late Hew Ainslie's spirited song, *The Rover o' Lochryan*.

Rybinak (Slav. 'fish town,' from *ryba*, 'a fish'), a town of European Russia, government of Jaroslav, on the right bank of the Volga, 416 miles S.S.E. of St. Petersburg, has immense transit trade, chiefly in corn, flour, tallow, timber, metals, and spirits. The landing-place is several miles long, and upwards of 7000 barges are built here every year. In summer there are sometimes about 100,000 people in the town. Pop. (*St. Petersburg Calendar*, 1878) 15,047.

Ryde (Celt. *rhyd*, 'a fort'), on the N.E. coast of the Isle of Wight, 4 miles from Southsea Pier across the Solent, is greatly changed from what it was in 1753, when Fielding wrote of it as 'a pleasant village, separated at low-water from the sea by an impassable gulf of mud.' The modern fashionable watering-place has capital sands, an esplanade nearly a mile in length, two piers, one of them 768 yards long; while its wooded slopes are lined with well-built villas. There are six churches, eight chapels, and twelve hotels, besides a town-hall, theatre, school of arts and museum, masonic hall, infirmary, and the Royal Victoria Yacht Club-house (1847-64). R. publishes five newspapers, and had a pop. (1871) of 12,576, largely increased by summer visitors.

Rye, a town of Sussex and one of the Cinque Ports, 11 miles E.N.E. of Hastings by rail, lies nearly 2 miles inland from its

harbour, owing to changes in the coast-line. The parish church, one of the largest in the kingdom, has a Transition nave, the central tower, aisles, transept, and chancel being mainly Early English. Other edifices are the 12th c. Ypres Tower (now used as a police station), the ancient Land Gate, a Carmelite chapel (converted into a dwelling-house), the town-hall, and Pocock's Grammar-school (1644), where Thackeray's 'Denis Duval' learnt 'to speak English like a Briton.' The harbour, formed by the confluence of the Tillingham and Rother, was entered in 1877 by 306 vessels of 22,409 tons, and cleared by 85 of 6000 tons; while on 31st December of that year 90 ships of 6627 tons were registered as belonging to the port. The imports amounted (1876) to £13,946; the customs to £200. Shipbuilding (in 1877, 22 British sailing-vessels of 1151 tons) and fishing are the leading industries, the latter employing 226 boats and 1020 men and boys. R. publishes a weekly newspaper, and returns one member to Parliament. Pop. (1871) 4366. The *Novus Portus* of Ptolemy, R. was the landing-place of Danish pirates (893), furnished nine ships to Edward III., and became a Huguenot asylum (1572).

Rye (Old Eng. *ryge*; Welsh, *rhys*; Old Norse, *rygr*), or *Secale cereale*, is a corn-plant related to the wheat genus (*Triticum*), and is distinguished by its spiked inflorescence bearing spikelets with two perfect florets, and one long-stalked rudimentary floret. It is reported to occur in a wild state on mountains in the Crimea, and it is probably also indigenous in the district between the Black and Caspian Seas. Formerly R. was raised in considerable quantity in England, either alone or mixed with wheat, obtaining in the latter case the name of *meslin* (old Fr. *meslé*, 'mixed'), the mixed grain, when ground, furnishing a wholesome and palatable household bread. At present it has passed out of use for this purpose, but is grown as a green crop for fodder. It dislikes wet ground. In the colder parts of Europe, and in some parts of Asia, R. is still much cultivated. The bread made from it—known as black-bread—is heavy and sourish, but keeps moist for a long time. R. is also cultivated on the Continent for distillation, the spirit which is called Hollands being principally obtained from it. The malted grain makes a good beer. The straw of R. is solid, causing it to be inferior as fodder, but making it more valuable for litter, and particularly for thatching and straw-plaiting. There are annual, biennial, and perennial varieties of R. The grain is liable to the attacks of a fungus producing the Ergot (q. v.) of R.

Rye-Grass (*Lolium*) is a small genus of *Gramineæ* differing from the allied genus *Triticum* by having the upper glume absent, except in the terminal spikelet, and the lower persistent, facing the rachis. The most important species is *L. perenne*, with its cultivated annual and biennial forms such as *L. italicum*, *L. multiflorum*, &c. Its value as a fodder-grass has long been recognised. The plant is a native of Europe, the neighbouring parts of Asia, and N. Africa. In Britain it is common in waste places, and grows naturally in meadows and pastures. The good qualities recommending the type form to cultivation are its suitability to a great variety of soils, the facility with which it is propagated, the abundance and uniform ripening of its seeds, and the fibrous structure of its roots, which eminently fits it for alternate husbandry. It has been introduced into N. America and Australia. Italian R.-G., which is a variety of biennial or triennial duration, is rapid and luxuriant in its growth, with the further advantage of being highly relished by cattle. It is usually chosen as an early temporary shelter for tenderer but more lasting grasses, intended to form permanent pasture.

Rye House Plot, The, was originated for the purpose of securing the Duke of Monmouth as successor to Charles II. Colonel Rumsey, Lieut.-Colonel Walcot, Goodenough, Under-Sheriff of London, Ferguson, an Independent minister, and others—the first and last of those mentioned being ringleaders—determined to assassinate the king on the way from Newmarket. The plot was laid in a house called the Rye House, belonging to one of the conspirators. By the plan agreed upon, the king's coach was to be overturned, and its occupants were to be fired at from behind the hedges. But the king's house

at Newmarket took fire, and his majesty left the place eight days sooner than was expected, so escaping the trap laid for him. The scheme was discovered: Lord Russell, Algernon Sidney, and Walcott were executed; John Hampden was fined £40,000, and every one concerned was punished except the Duke of Monmouth himself. Some assert, however, that the R. P. was entered into without the duke's connivance.

Rymer, Thomas, born in Yorkshire, 1639, was educated at the grammar-school of Northallerton, entered Sydney-Sussex College, Cambridge, and was called to the bar at Gray's Inn, 1666. In 1677 he published a play—*Edgar, or the English Monarch*—and this was followed by *A View of the Tragedies of the Last Age* (1678), *The Antiquity, Power, and Decay of Parliament* (1684), *A Short View of Tragedy* (1693), and a translation of Rapin's *Reflections on Aristotle's Treatise of Poëtic* (1694). He was appointed historiographer to the king when Shadwell died in 1692, and was employed on a scheme of Montague and Lord Somers for the collection of state papers relating to transactions between England and the States. In 1703 the first volume of this work appeared under the title of *Fœdera, Conventiones et cujuscunque generis Acta Publica inter Reges Angliæ et alios Principes*. Seventeen volumes of the *Fœdera* were edited by R., and three more by Sanderson. It was reprinted at the Hague in 10 vols. (1739). R. died in poverty, December 14, 1714.

Rymour, Thomas, the father of Scottish poetry, flourished towards the close of the 13th c. His name appears to have been Thomas Learmount of Ercildoun (Earlston); but an ancient charter designates him Thomas Rymor, while his son describes himself as heir of Thomas Rymour of Ercildoun, and Blind Harry speaks of Thomas the Rhymer. His prophetic, more than his poetical powers, seem to have attracted attention at an early date. The story goes that he was snatched from earth when a child by the queen of the fairies; that he returned among mortals for seven years; and that, as he was one day feasting in the tower of Ercildoun, word was brought that a hart and a hind were walking through the village, upon which he rose to follow them, and was seen no more. His famous prophecy regarding the death of Alexander III. was made in 1280 (according to the continuator of Fordun); and in 1299 his son, in assigning the estate of Ercildoun to the convent of Soltra, calls himself *pius et hæres Thome Rymour de Ercildon*. Thomas must accordingly have died between these dates. The poems at a late date popularly ascribed to him are to be found in *The Whole Prophecies of Scotland, England, Ireland, France, and Denmark, prophesied by Thomas R., marvellous Merlin, Beid, Berlington, Walhara, Eltrain, Bannester, and Sybilla*, a book the first known edition of which was printed by Waldegrave in 1603. Robert of Brunne commemorates Thomas as the author of a romance founded on the story of Sir Tristram. A MS. in the Auchinleck collection, supposed (but not with great probability) to be this romance, was edited by Sir Walter Scott in 1804. The other poems ascribed to Thomas, viz., the *Gest of Kyng Horn* and *Thomas of Erssildoune*, a series of prophecies introduced by a wondrous fantastical fairy tale, belong to a later age.

Ryot (*raiya*, derived from an Arabic word meaning 'to pasture or protect'), the word used throughout India for the actual cultivator of the soil. It was introduced by the Mahomedans, and, like the rayah of European Turkey, owes its origin to the maxim of the Koran that submissive subjects, even though infidels, are to be protected so long as they pay tribute.

Ryotwar (the adjective formed from *ryot*), the Indian term for the settlement of the land-revenue concluded by the Government with each actual cultivator of the soil, without the intervention of a third party. The R. system which principally prevails throughout the Madras Presidency, introduced chiefly by the efforts of Sir T. Munro, governor from 1820 to 1827, makes a fresh settlement every year; the Bombay R. settlement is concluded for a term of thirty years.

Ryswick, Treaty of, in 1697, between England, France, and Spain on September 20, and by Germany on October 30, closed the war of the Orleans succession to the Palatinate. The scene of the treaty is a Dutch village between Delft and Hague.

S.



The nineteenth letter of the alphabet, corresponding to the Semitic Samech and the Greek Sigma. It must be distinguished from the Semitic Shin, which is found in archaic Greek as San or Sampi, but has not maintained its position in any European language. This was a double letter = sh. The form of S can be traced through inscriptions from M to Z and Z. It is a sibilant semi-vowel, with two sounds in English, one sharp and the other flat. The sharp sound, heard everywhere but at the end of syllables, is its proper phonetic value; the flat S, as pronounced at the end of words, is really identical with Z. As a compound letter, S combines with the gutturals to make X, and with P to make the Greek Psi. It is perhaps more used than any other letter in grammatical inflexions, e.g., to form the plural in most languages of the Aryan family. S interchanges with R, as *honor* = *honor*, and with T, as *tension* and *tent*, Greek *thalatta* and *thalassa*. But the most instructive change is with H, Gr. *hex* = Lat. *sex*; so Scinde and Hindu have the same root. The English pronunciation of final S as Z may be paralleled by the change of Lat. *narus* into Fr. *nez*.

As an abbreviation S stands for south, and frequently for society and secretary. S.T.P. = Sanctæ Theologiæ Professor or Doctor of Divinity; S.L. = Serjeant at Law; S.V. = *sub voce*, or look under the word mentioned; SC. = *scilicet*, or forsooth; S., or St., = saint.

Saad-ed-din, Mohammed, a Turkish historian, was born in 1536. He was the son of Persian Hassan, chamberlain of Selim II., and was brought up among the pages of the imperial palace, and early instructed in theology and jurisprudence. In 1573 he was appointed by Selim II. *Rodja* ('preceptor') to his son Murad, on whose accession to the throne he was appointed royal historiographer. With Mahomet, whose education he had also superintended, he had great influence, and was raised by him to the dignity of *mufiti*. He died at Constantinople, October 2, 1599. His great work, which, however, is more distinguished for its style than its accuracy, is a general history of the Ottoman sultans from 1299 to 1520, called *Taj-al-Towarik* ('crown of histories'). It has been in part translated into Italian by Vincent Bratiutti under the title *Cronaca degli Ottomani* (Vienna and Madrid, 1646-52). S. also wrote a History of Selim II.

Saa'di, Sheikh Muslih Addin, one of the most popular of Persian poets, was born at Shiraz in 1184, and educated at Bagdad, where he studied science and theology. A great part of his life was spent in travelling. He is said to have made the pilgrimage to Mecca fourteen times, and besides, to have visited Europe, Egypt, Barbary, Abyssinia, Palestine, Syria, Asia Minor, Turkestan, and Hindustan. The last thirty years of his life were spent in retirement in his native and beloved Shiraz, where he died in 1275. In modern times a beautiful tomb was erected to his memory by the Wâkil Kerim Khan, and endowed with gardens and lands for the support of dervishes to watch over it. At Shiraz, S. composed his two famous poems—the *Gulistan* ('Rose Garden') and *Bustan* ('Pleasure Garden'), the one consisting of stories in prose interspersed with couplets, verses, and moral apologues in verse; the other entirely in verse. These works were followed by the *Pend-Nameh* ('Book of Instructions'). The poems of S. are without the exaggerations customary with Persian poets. They show the depth of religious sentiment, the independence of mind, hatred of tyranny, generosity and wide charity of their author, and they are filled with a placid wisdom of experience. Some of his love-songs are

exquisite, full of the tenderest affection blended with refined and delicate feeling. The first complete edition of the works of S. was that published by Harrington (Calcutta, 1791-95). The *Gulistan* was edited with a Latin translation by Gentius (Amsterdam, 1651), the text alone by Eastwick (Hertford, 1850), and F. Johnson (Lond. 1863), and has been translated into English by Gladwin (Calcutta, 1806; reprinted Lond. 1808 and 1827), Eastwick in prose and verse (Hertford, 1852, and John Platts (Lond. 1873). The *Bustan* has been edited with a commentary and vocabulary by Maulavre Tummuzdey (4th ed. Cawnpore, 1832), and the Persian text with a Persian commentary by C. H. Graf (Vienna, 1858).

Saale, a river of Germany, rises near Zell, in Upper Bavaria on the N.W. slope of the Fichtelgebirge, at a height of 2293 feet, flows generally N. with a winding course, and joins the Elbe at Barby after a course of 225 miles. The S. receives from the right the Elster, and from the left the Ilm, Unstrut, Wipper, and Bode. It is navigable from Naumburg. The Franconian S., 69 miles long, joins the Main at Gmünden.

Saal'feld, an old town of Germany, and capital of a former duchy of the same name, in Sachsen-Meiningen, situated on the left bank of the Saale, 6½ miles S.S.E. of Rudolstadt by rail. The chief buildings are the Rathhaus, built (1533-37) in the latest Gothic style; the Gothic Johanniskirche of the 14th c.; and the Schloss of the former dukes. S. manufactures sewing-machines. Pop. (1875) 6784. On a plain two miles distant, October 10, 1806, the French defeated the Prussians under Prince Ludwig Ferdinand, to whom a monument has been erected on the place where he fell. See Wagner and Grobe, *Chronik von S.* (1867).

Saarbrücken, a town of Rhenish Prussia, until 1871 the nearest town of Prussia to the French frontier, situated on the left bank of the Saar, which here becomes navigable, 44 miles E.N.E. of Metz by rail. It is connected by two bridges with the town of St. Johann, and is the seat of an active industry in woollen and linen spinning, tanning, besides iron, porcelain, and tobacco manufacture. There are coal mines in the district of S. which yielded 4,403,958 tons in 1877. Pop. (1875) 9047; of St. Johann, 10,940. Here, August 2, 1870, the Germans received a slight check from the French army under Napoleon III. in person, which was revenged by a severe defeat inflicted (August 6) upon the French on the heights of Spicheren, 3 miles distant. See Köllner, *Geschichte der Städte S. und St. Johann* (Saarb. 1861).

Saarlon's, a town of Rhenish Prussia, on a peninsula formed by the river Saar, 16 miles W.N.W. of Saarbrücken by rail. It has a fortress of the second rank, erected by Vauban (1687). S. has mines of lead and iron, and manufactures leather and hardware. At Wallerfangen, near S., is a large porcelain manufactory. S. was the birthplace of Marshal Ney. Pop. (1875) 6807.

Saar'gemünd (Fr. *Sarreguemines*), a town of Lothringen, Germany, on the Saar, 11 miles S.S.E. of Saarbrücken by rail. It manufactures velvet, plush, red pottery, earthenware, and articles of papier-maché. Pop. (1875) 8471.

Saaz (Czech. *Zatec*), a town of Bohemia, on the river Eger, 45 miles W.N.W. of Prague by rail. Its chief buildings are the Rathhaus of 1559 and the Decanatskirche (1383). Hops are largely grown in the vicinity. S. was a stronghold of the Hussites in the 15th c. Pop. (1870) 8869.

Sabadell', a town of Spain, province of Catalonia, on the river Ripoll, 14½ miles W.N.W. of Barcelona by rail. It has 88

woollen and 20 cotton-spinning and weaving factories. Pop. 16,000.

Sabadilla, or **Cevadilla**, has been by different botanists placed as a member of the genera *Veratrum*, *Helonias*, *Schannonaulon*, and *Sabadilla*, but is now generally known as *Asagraea officinalis*—a genus established by Lindley in honour of the celebrated American botanist, Asa Gray (q. v.). S. is a Mexican bulbous plant of the Colchicum family (*Melanthaceæ*), with long narrow grass-like leaves, from among which rises a round leafless stem about 6 feet high, bearing a dense raceme of small yellowish flowers, each flower succeeded by three light-brown pointed follicles of papery consistence and about half an inch long, containing from one to three each of shining dark-coloured slightly winged seeds, which have an acrid bitter taste. The analysis of the fruit shows cevadic acid, fatty matter, veratria in union with gallic acid, gum, colouring matter, and sabadilline. Its properties are anthelmintic, stimulant, cathartic, but also highly poisonous, and internal use requires the utmost caution. In Britain it is little used on account of the dangerous nature of the drug, but in other European countries medical men prescribe it for tapeworm and ascarides, and also apply it for destroying pediculi, and as a stimulant in chronic rheumatism, neuralgia, and paralysis. The stimulating but poisonous veratria is prepared from it by maceration in water and spirit, and precipitation by solution of ammonia, &c. The actions and uses of this alkaloid are similar to those detailed above, in more concentrated form.

Sabæans is the name of three different tribes mentioned in Scripture, whose ancestors or themselves are called Sheba or Seba. 1. The S. of Job i. 15 seem to have been a Bedouin tribe in the N. of Arabia, which, according to Gen. xxv. 3, was descended from Abraham. 2. A Seba is mentioned in Gen. x. 7 as the son of Cush, along with a nephew, Sheba. Now, according to Gen. ii. 13, Cush was the country S. of Egypt on the Nile and the Red Sea. This, therefore, means that there were two closely allied Ethiopian tribes called by these names, as, indeed, it appears from Is. xlv. 14 (cf. xliii. 3) that the S. were Nubians (cf. Ps. lxxii. 10; Ezek. xxvii. 22, 23). Josephus mentions that the capital of Ethiopia (q. v.), which was afterwards called Meroë, was in the time of Moses called Saba; and Strabo, a town of the same name on the Red Sea. The principal exports of the Ethiopian ports were slaves, gold, ivory, precious woods and stones, spices, perfumes, &c. (cf. Ezek. xxvii. 15, 20; xxxviii. 13). It was the queen of this people who visited Solomon (1 Kgs. x. 1; cf. Jos. Ant. viii. 6, 5). 3. The S. of Yemen (Gen. x. 28) probably never attained to any great degree of wealth or civilisation. The glowing and exaggerated statements of the ancients regarding Arabia Felix clearly show that almost nothing was practically known of the country; and may be accounted for by that very ignorance itself, by the fact that its inhabitants were confounded with the Cushite S., and by statements regarding the latter being simply transferred to the former. But perhaps the confusion might be still better explained by supposing that the S. on both sides of the Red Sea belonged to the same race. At any rate, the ruins found in Arabia Felix are in the Nubian style of architecture, and it is known that that part of Arabia was often subjugated by the Nubians. See Wetzstein's Appendix to Delitzsch's *Com. on Isaiah* (Eng. trans. Edin. 1869); Strabo, xvii.; Pliny, vi. 32; Diodorus Siculus, iii. 38, 46, &c.

Sabbath (Heb. *shabbath*, said to be derived from *shabat*, 'to rest,' but perhaps originally connected with *shebâ*, 'seven,' Exod. xx. 10, 11; Deut. v. 14). The division of time into weeks is one that has prevailed among nations in all parts of the world—e.g., the Hindus, Egyptians, tribes in the interior of Africa, and the Peruvians—from a very remote period, and is probably to be traced to the influence of the veneration paid to the moon, with its four phases of about seven days' duration, and the seven stars or planets generally. Those who see in Mosaism or Jehovism only a late form of the Hebrew national faith, endeavour to show that in the primitive nature-worship of the people the S. was sacred to Baal, and affirm that only with the final triumph of Jehovism was it made sacred to the new god Jehovah. They do not recognise at first any properly religious motive for the observance of the seventh day as a S. In what they consider the earliest form of the fourth commandment (Exod. xxxiv. 21,

'Six days thou shalt work, but on the seventh day thou shalt rest'), there is only a human motive. The somewhat fuller form given in Exod. xxiii. 12, exhibits exactly the same thing. So does Deut. v. 12-15; all were to rest on the seventh day, even their cattle and their slaves, because they themselves had once been slaves in Egypt. After the Chaldean account of the creation was received into the Jewish literature (probably at the period of the Captivity), the Creator's working six days and resting on the seventh was adopted as a religious sanction for the fourth commandment (Exod. xx. 11). The traditional theory of the S. utterly repudiates the notion of a Mosaism developed out of an antecedent nature-worship, and denies the validity of the criticism on which it is based.

In the Mosaic law there was a complete cycle of Sabbaths, all combined by the sacred number seven: the S. of days, the S. of weeks, the S. of months, the S. of years, and the S. of seven times seven years. 1. The great observance of the weekly S. was rest from 'all manner of work': from all servile work on the part of slaves and hired servants, and all worldly business on the part of masters. The naturalness of making the rest on the last day of the week, after the circle of toil, is seen from the account of the creation (Gen. i.). We have seen that the measurement of time by weeks was a natural and primitive one; but the peculiar use to which Mosaism turned the seventh day was new. In renouncing on that day the gain and enjoyment to be found in the ordinary labours and occupations of the other days, there was offered to Jehovah a self-denying sacrifice. And as none of the business of ordinary life—agriculture, handicrafts, trade, &c.—could be carried on, this was all the greater a sacrifice, inasmuch as the Eastern nations were accustomed to hold their markets on their festival days, and to take advantage of the assemblies on such occasions for the purposes of trade. And this sacrifice was further sanctified because man was not to rest on the S. for his own sake alone, so as to sink into a vacant condition of inactivity, far less to give himself up to dissolute pleasures, for the sake of passing the time. On the contrary, he was to release his body and mind from all their burdens, only in order that he might devote himself to the service of God with fewer hindrances and greater purity; that he might refresh himself from the toil of the world, and have his spiritual nature elevated by communion with God.

2. *The S. of Weeks.*—This idea of the S. Moses introduced into the whole series of sacred seasons which had previously been observed by the people; the chief of which were the Spring and Autumn festivals. The first month of the year was the one whose full moon followed the Spring equinox. Seven weeks were counted from the full moon or the fifteenth day of this month, which period was consecrated to the corn-harvest; then the fiftieth day was observed as 'the festival of the (seven) weeks,' 'of the corn-harvest,' or 'the day of the first-fruits,' on which 'there was to be a holy convocation, and no servile work to be done' (Lev. xxiii. 9-21, Deut. xvi. 9-12). See PENTECOST.

3. *The S. of Months.*—Starting from the first or Passover month, the S. of the year was held on the seventh month, when the labours of the year had been accomplished. This was from the first a true national festival, the festival *par excellence*, and was celebrated with the greatest joyfulness. Its new moon was saluted with greater solemnity than that of any other month, and was exalted to the dignity of a special annual festival (Lev. xxiii. 23-25; Num. xxix. 1-6; Deut. xvi. 13-15). 4. *The S. Year, or Sabbatical Year* (q. v.), was kept every seventh year. 5. *The Year of Jubilee* (q. v.) occurred at the end of seven times seven years, or every fiftieth year.

Again, besides the weekly Sabbaths, there was a series of seven annual Sabbaths, although two of the above series are in a way included among them; (1) Two at the Passover (q. v.), the first and the seventh days of the Feast of Unleavened Bread (Lev. xxiii. 7, 8; Num. xxviii. 16-25). (2) One at Pentecost, as described above. (3) Four at the Feast of Tabernacles—the first day of the (seventh) month, or the Feast of Trumpets; the tenth day, called the Day of Atonement or the Great S.; the fifteenth, or the first day of the Feast of Tabernacles proper, and the twenty-second, or the eighth day of the feast (Lev. xxiii. 23-43, Num. xxix.). A special name given to all these Sabbaths was Holy Convocations—that is, days on which the worshippers were to be called together to the sanctuary by the sound of trumpets (cf. Num. xxix. 1).

A new era in the observance of the S. began with the return

from the Captivity, when Nehemiah restored the old laws, which would seem to have been greatly disregarded, if, indeed, some of them were not enacted then for the first time (*cf.* Neh. xiii. 15-22). Attempts were now made to 'fence about' the ordinance in a minute manner. The 'work' which before had only been generally forbidden was defined by a multitude of special precepts and prohibitions; and about a hundred years after the time of Nehemiah the S. was kept with such severity that the people would not on that day even defend themselves against the attacks of their enemies (*cf.* 2 Macc. vi. 11). But the incessant wars of the last period of the Jewish national existence, and the fact that their enemies continually seized the opportunity of the S. to gain an advantage over them (*e.g.*, this was done both by Pompey and Herod when besieging Jerusalem), rendered it absolutely necessary that the law in this matter should be relaxed. Accordingly, in this later time it came to be interpreted so as to admit of fighting on the S.; and human life was placed higher than any precept about the S. But, at any rate, all this had reference merely to work. The vulgar notion that the Jewish S. was a thing of grim austerity is altogether erroneous. 'It was precisely the contrary, "a day of joy and delight," a "feast day," honoured by fine garments, by the best cheer, by wine, lights, spices, and other physical joys; and the highest expression of the feeling of self-reliance and independence is contained in the adage, "Rather live on your S. as you would on a week-day, than be dependent on others."'*Deutsch's Remains*, p. 30.

The teaching of our Lord on the observance of the S. was liberal. 'The S. was made for man and not man for the S.' (Mark ii. 27), points it out as a privilege and a blessing. 'My Father worketh hitherto, and I work' (John v. 17), shows that, as the repose of God does not exclude a certain kind of work or activity in providing for the wants of his creatures, so the rest of the S. only requires a cessation from ordinary, everyday avocations, without rendering sinful any activity enjoined by necessity or mercy. In the early Church the S. continued to be observed by Jewish Christians, that is, specially in the Eastern Church, as a feast. It was also observed in the Western Church, but as a fast, on account of its being the time when our Lord lay in the grave. The first day of the week, the day of our Lord's Resurrection, was observed by the whole Church as a feast and for religious services; the Lord's day being at first carefully distinguished from the S. By an edict of the Emperor Constantine (321) it was enacted—'Let all judges, citizens, and artificers rest on the venerable Sun-day (Dies Solis). But those in the country may freely and lawfully apply themselves to agriculture, since it often happens that the sowing of corn and planting of vines cannot be so well performed on any other day, lest by neglecting the opportunity, the benefits bestowed by the divine bounty should be lost.' From this time a tendency began to manifest itself to confuse the Sunday with the Jewish S.; although the confusion was very slight till the end of the 5th c. When in 469 the Emperor Leo I. repealed the exemption made in the edict of Constantine of agricultural labourers from the prohibition imposed on citizens and mechanics, the Sunday was thoroughly established as a day of rest. From that time the tendency above mentioned, Sabbatarianism, as it has been called, rapidly increased; and the Schoolmen adopted the principle that Jewish enactments formed a precedent for Christian holy-days, and that the whole of the Jewish Decalogue was obligatory on Christians. This theory was opposed by the Reformers, although they freely acknowledged the importance of the Sunday as a day of rest and worship. The English Puritans adopted the Scholastic theory regarding the Decalogue and embodied it in the *Westminster Confession and Catechisms*. They and their descendants in England and New England, as well as the Scotch Presbyterians, have always observed the S. with an asceticism entirely foreign to the Jewish observance. The Sabbatarians or Seventh-day Baptists even thought it necessary on this principle to observe the seventh day of the week as the S. See Spencer's *De Legibus Hebr.* (11ag. 1686); Kalisch's *Com. on Exodus and Leviticus*; Heylin's *History of the S.* (1836); Hessey's *Bampton Lectures* (1860); Cox's *Literature of the S. Question* (1865); Kuenen's *Rel. of Israel* (Eng. trans. Lond. 1874-75); Ewald's *Alterthümer d. Volks Israel* (Eng. trans. Lond. 1876).

Sabbatia is a genus of N. American herbs belonging to *Gentianacea*. *S. angularis*—the American centaury, or rose-pink of N.E. America—is used as a substitute for gentian. It

has a secondary place in the United States pharmacopœia for its tonic, anthelmintic, and deobstruent properties. *S. stellaris* is grown as a garden flower.

Sabbatical Feasts. See SABBATH.

Sabbatical Year. As the seventh day of every week was observed among the Jews as a Sabbath (q. v.), or rest-day, so every seventh year was a Sabbath-year, during which the land was to rest, 'that the poor of the people may eat, and what they leave the beasts of the field shall eat' (that is, of course, what the land produced without tillage). It has been maintained, however, that the first form of the law in Exod. xxiii. 11—'the seventh year thou shalt let it rest and lie still'—does not bear this meaning, as the *it* does not refer to the land but to the crop, the produce of ordinary tillage, and that it was only introduced by the later writer of Lev. xxv. 4-7. It is at any rate clear that there is a new feature in this latter form of the law, for the 'increase' of the S. Y. is to be meat, not for the poor, but for the owner, his servants, strangers, and cattle, as well as the beasts of the field. Still another new feature is introduced in Deut. xv., namely, the remission of debts. See Kalisch's *Commentary on Exodus and Leviticus*.

Sabbionett'a, or Sabbione'ta, a decayed town of N. Italy, province of Cremona, in the plain between the Oglio and the Po, 18 miles S.W. of Mantua. It has a citadel, a castle, and a theatre, built in 1588. Pop. nearly 7000.

Sabell'a, a genus of marine worms or *Annelida*, belonging to the order *Tubicola*, in which the animals form tubes of various materials to inclose their bodies. The tube formed by *S.* is of membranous or leathery consistence. It is buried in the sand, only the gills appearing above the surface. The 'blood' or pseudo-hæmal fluid in *S.* is of an olive-green colour.

Sabell'ius, a presbyter of Ptolemais (about 250-260 A.D.), wrote on the side of the Unitarian protest made in the 3d c. against what was considered the Ditheism and Tritheism of the Church doctrine regarding the Father, Son, and Holy Spirit. According to *S.*, 'God, by means of the Logos, became successively Father, Son, and Holy Spirit—these three names signifying not three distinct personal beings, but three aspects or modes of the Deity, corresponding to as many periods of history,—the time of the Law, of the Gospel, and of the Church, respectively. But when God revealed himself as the Son and as the Spirit, the Father and the Son were re-absorbed into God; the monad of the Godhead is not to be confounded, as is generally done in describing Sabellianism, with the Father. Philosophically considered, Sabellianism was slightly Pantheistic; as opposed to orthodoxy, its principal feature was a denial of the distinction of persons in the Godhead, in order to substitute for them modes of being; and hence all writers fell into this heresy who tried to reconcile the idea of the Trinity with human reason by comparing the three divine persons to three qualities united in the same man. See Gieseler's *Kirchengeschichte* (Eng. trans. 1855); Reville, *Hist. du Dogme de la Div. de Jesus-Christ* (Eng. trans. Lond. 1870).

Sab'icu, also called *Sav'icu-wood*, a shipbuilding wood of Cuba, the produce of *Lysitoma S.*, a large leguminous tree allied to *Acacia*, and confined to that island. The wood is very heavy, hard, and durable. For these qualities it was selected to construct the stairs of the Crystal Palace in the Great Exhibition of 1851.

Sab'ine, General Sir Edward, K.C.B., F.R.S., was born at Dublin, 14th October 1788. As captain in the Royal Artillery he took part in the American campaign of 1814. He accompanied Ross and Parry in 1819 to the Arctic regions, and by close study of magnetic phenomena greatly increased our knowledge of terrestrial magnetism. His results were given in two papers before the Royal Society; and his interest was so aroused in this branch of physical science that in 1821 he commenced a series of voyages to places between the equator and the arctic circle, determining at every convenient point the amount of dip and declination and the length of the seconds' pendulum. The results of these investigations were published in 1825. Excepting a brief period of military service in Ireland, when he rose to the rank of major, his subsequent career was wholly devoted to science. He continued his observations on magnetic variation, and organised a complete system of magnetic observations at home and in the colonies. He was president of the British Association

in 1853, president of the Royal Society in 1861, was made a Knight Commander of the Bath in 1869, and was elected a corresponding member of the French Academy in 1875. His memoirs and papers are for the most part published in the *Philosophical Transactions* and the *British Association's Reports*. He edited his wife's translations of Humboldt's *Kösmos* (1846); *Ansichten der Natur* (1849), and Arago's *Essais Météorologiques* (1855).

Sabine River, a river of the United States, rises in Texas and flows S.E., then turning S. it forms for 250 miles the boundary between Texas and Louisiana, and enters the Gulf of Mexico at Sabine Lake. The S. is 500 miles long and navigable in its lower course. Much timber is shipped from the valley.

Sabi'ni, one of the most important of the early Italian tribes, from whom the Samnites, Lucanians, Bruttii, &c., were offshoots, occupied a mountainous strip of territory in Central Italy about 80 miles long, between the Nar and the Anio. The S. seem to have been generically of the same stock as the Oscans, but the Romans magnified their differences in origin, character, and language. The ancient Roman myth makes them one of the constituent elements of the Roman city, and in their function of giving a religious system to the state they were personified in Numa Pompilius. Frequent wars are recorded between the Romans and S. till 449 B.C. when M. Horatius seems to have crushed them. Though seldom mentioned after their incorporation with Rome (268 B.C.), they retained their individuality, and their land is still called *La Sabina*. Like most mountaineers, they were hardy, frugal, and brave, and did not congregate in towns. Wine and oil were raised in abundance from their fertile valleys. See **ROME**.

Sable (*Martes sibirica*), a species of mammal, belonging to the order Carnivora and to the weasel family (*Mustelidae*). It occurs in the N. of Europe and Asia, its capture forming an important industry. The fur is amongst the most valuable of this class of products, and is heaviest during the depth of winter. In colour it is of a very deep rich brown, exhibiting grey tints in the neighbourhood of the back and neck. The tail is bushy. The average length of the animal is about 18 inches. The S. burrows in the ground, or may construct its nest in trees. It is wary and active, and its capture (chiefly by traps) is, therefore, a matter of great difficulty. The young are born in March and April, and from four to five young are produced at a birth. Other species of S. are the Japanese S. (*M. melanopus*), and the N. American S. (*M. leucopus*). The value of a skin of the Russian S. ranges from two to ten guineas, the finest being dark in colour. Most of the skins are sold in Russia, but over 7000 are annually imported into England. The Tartar S. is the *M. sibirica* of naturalists, whilst the name Hudson's Bay S. is given to the *M. canadensis*, otherwise named the Pekan or Wood-Shuck of N. America.

Sable, in heraldry, the tincture or colour black, represented by vertical and horizontal lines crossing each other.

Sables D'Olonne, Les, a small seaport and watering-place of France, department of Vendée, 67 miles S.S.W. of Nantes by rail. Its harbour receives vessels of 200 tons, and it has a considerable export trade in corn, wine, wood, salt, cattle, and fish. Pop. (1876) 9183.

Sabot (Fr. *sabot*), a wooden shoe extensively worn by the lower classes of France and Belgium. Common sabots are made of beech, willow, or Lombardy poplar, and finer kinds of walnut and other expensive woods. Beech sabots are less pervious to water than the other kinds. They are roughly shaped while the wood is yet green, and set aside to season for several months. Sometimes the drying and seasoning are hastened by exposing the sabots to the heat and smoke from fires of beechwood chips; this measure imparts a brown colour to the wood and preserves it from insect ravages. After drying, the exterior is pared and smoothed, and the interior scooped out to a certain gauge. The shoes are frequently carved and painted black.

Sabotière (Fr.), an apparatus for making confectioners' ices. It consists of an outer fixed pail of wood, and an inner movable vessel (*sabotière*) of metal, the space between the two being filled with a freezing mixture. The cream to be iced is placed in the S., and by means of a handle it is rocked or rotated for several

minutes till the cream is frozen. In large ice-cream manufactories a number of sabotières are fitted up and connected with strap-gearing, by means of which simultaneous motion is transmitted to all.

Sabre (Fr.), a heavy one-edged sword, curved towards the point, used principally by cavalry.

Sabre-tache, an ornamental leather case suspended at the left side of the sword-belt, worn by all mounted officers of the British army.

Sabri'na Land, an Antarctic region of unknown extent, in 70° S. lat., 120° E. long., discovered by Balleny in 1839.

Saccharic Acid (C₆H₁₀O₈), a non-crystallisable deliquescent acid, produced by the action of nitric acid on sugar. It is soluble in water and alcohol, and combines with bases to form crystalline salts.

Saccharometer, an instrument for measuring the strength of saccharine solutions. There are two perfectly distinct forms, the one being simply a hydrometer for taking the specific gravity of the solution, and the other a form of polariscope. The latter is so arranged that the solution may be interposed between the polariser and analyser, and by observing the angle through which the plane of polarisation is turned in passing through the solution, the datum is given for the calculation of the strength. See **POLARISATION**.

Saccharum. See **SUGAR-CANE**.

Saccharum Lactis, or **Sugar of Milk**, a crystallised sugar obtained from the whey of cows' milk by evaporation, is prescribed as a non-nitrogenous article of diet in certain pulmonary diseases, and in cases of great irritability of the stomach. Dissolved in water, and mixed with cows' milk, it forms a good substitute for that of the mother. Dose, 60 to 120 grains, or more, in water.

Sacchini, Antonio Maria Gasparo, one of the most popular of the older Italian operatic composers, was born July 23, 1734. His works include 38 operas, 5 oratorios, and much church and instrumental music. At the time of his death, October 7, 1786, he was the idol of the Parisian public. Though his compositions are now almost obsolete, his free and happy style and rich instrumentation had a powerful effect upon his art, and live in the works of many of his successors. See *Fétis, Biogr. Univ. des Musiciens* (new ed. 1878).

Sacheverel, Henry, was born at Marlborough in 1672. His grandfather had been a Dissenter, but his father was rector of St. Peter's Church, Marlborough, and a strong High Churchman. S. was educated at Magdalen College, Oxford, where he made the acquaintance of Addison, and wrote some Latin poems of little merit. He graduated M.A. in 1696, and after holding for some time a benefice in Staffordshire, was in 1705 made preacher at St. Saviour's, Southwark, London. In 1707 he took the degree of B.D., and the year following was promoted to D.D. In 1709 he preached the two sermons which have made him famous—one at the Derby Assizes, the other before the Lord Mayor in St. Paul's. In these sermons S. maintained the doctrine of Non-resistance to the regal authority, declared that the Church was in danger, and called upon the nation to suppress Dissent. His sermons were printed, and 40,000 copies were soon sold. Popular feeling ran high in his favour. Queen Anne was on his side. The whole Tory party supported him. Unwisely for themselves, the Government resolved to impeach him. He appeared before the House of Lords in 1710, and was found guilty by a majority of 17. He was suspended for three years, and his sermons were publicly burned. Great excitement ensued; raising the cry of 'the Church and Dr. Sacheverel!' the mob wrecked meeting-houses, and burned the effigies of the leading Whigs. A general election soon followed, and was fatal to the Government. When in 1713 S.'s suspension expired, he received an ovation. He preached before the House of Commons, and made a triumphant progress to a benefice in Wales. He soon, however, sank into oblivion, except in 1718, when he was temporarily suspected of aiding the Jacobite Rebellion. He died June 5, 1724. S. was, according to all accounts, a vain and shallow man, though with some versatility and address. But from the historical importance of the questions involved in his trial, and the extraordinary popular excite-

ment be kindled, a certain interest will always attach to his name. See Burnet's *History of His Time* (vol. ii.); Swift's *Journal, &c.*; *History of the Reign of Queen Anne*, by Hill Burton.

Sachs, Hans, a famous German *meistersinger* of the 16th c., was born at Nürnberg, 5th November 1494. His father was a tailor, and he was trained to the trade of a shoemaker. He served his apprenticeship in his native town, where, at the same time, he managed to acquire the rudiments of a classical education at the Latin school. In 1570 he started, according to the custom of his time, on a series of travels, working at his trade in Regensburg, Passau, Salzburg, &c. At Innsbrück he entered the hunting-train of the Emperor Maximilian, and here his love of meistersongs was awakened. Again he travelled, visiting (1513) Munich, Würzburg, Frankfurt-am-Main, &c. At Munich under his fellow-townsmen Nunnenbeck, and at Frankfurt, he studied in the *singschulen* of the meistersingers. Returning home in 1515, he worked at his trade, at the same time diligently cultivating his art. S. married in 1529 Kunegunda Kreuzer, and continued for some time to prosper peacefully and steadily. The excitement of the Reformation disturbed his calm. He sympathised warmly with Luther. A poetical tale called *Die Wittenbergisch Nachtigal*, a short poem called *Wachet auf, es nahet gen dem Tag*, and a series of dialogues, had appeared by 1523. The influence of these and numerous other fugitive pieces was very great, not only in his native town of Nürnberg, which declared for Protestantism, but all over Germany. S. wrote also plays, which were at the time successful, numerous *Schwänke* or merry tales, and some songs. His wife died in 1560, but next year he married again. In 1562 the outbreak of the plague brought him once more prominently before his townsmen as an adviser and friend. He died, 25th January 1576, at the age of eighty-two. S. was a real genius, and his writings had a strong and lasting effect on Germany. He helped to make his mother-tongue a literary language. He introduced a new era for German poetry, and revolutionised the drama. Before his time the artisan guilds had composed mysteries and carnival farces. S. increased the number of personages, introduced better scenery, and worked many radical changes. He was an intense patriot. Many of his poems were exhortations to self-abnegation and public spirit. He was a keen satirist, but although the intense humour and gay irony of his *Schwänke* were coloured by the prevailing coarseness, he never sank to personality or abuse. When sixty-three, S., believing his vein of poetry to be worked out, ceased to publish fresh pieces, and proceeded to collect his writings. The standard edition appeared at Nürnberg (1558-79) in 5 vols., and includes 80 tragedies, 52 comedies, 64 farces, several thousand *Meistergesänge*, *Schwänke*, &c. During the 17th and greater part of the 18th centuries S. was almost entirely forgotten, but in 1776 Goethe's poem, *H. S.*, revived his memory, and since then he has again received the affectionate study he so well deserves. At Zwickau, in 1853, 13 volumes of his MSS. were discovered; others have been found at Dresden and Göttingen. A collected edition of his works was begun at Stuttgart in 1870. There is a good selection by Goedeke (3 vols. 1870-72). See Hofmann, *Hans S. seine Leben und Wirken* (Nümb. 1847); and Neumann, *Über einige Handschriften von Hans S., nebst ungedrucktem Gedichten* (Leip. 1843). There is also a later (1868) work by Weller.

Sachsen, the German form of *Saxony* and *Saxe*. The kingdom of S. is treated under the more familiar heading SAXONY, but the Prussian province and the minor states under their proper German designation.

Sachsen, a province of Prussia, bounded on the E. by Brandenburg, on the S. by the kingdom of Saxony and the minor Saxon duchies, on the W. by Hessen-Nassau, Braunschweig, and Hannover, on the N. by Hannover and Brandenburg. Area, 9740 sq. miles; pop. (December 1875) 2,168,988. It is divided into the three districts of Magdeburg, Merseburg, and Erfurt. About 93 per cent. of the population are Protestant. Education is highly advanced, only 322 per cent. of the recruits enrolled being unable to read and write. S. is interspersed by detached portions of other districts and by the province of Anhalt, which almost divides it into two parts. It is very irregular in shape in consequence of having gained accessions by conquest at various times. The S. portion of the province is

mountainous, but the rest is level. The chief rivers are the Elbe and its tributaries, the Black Elster, Mulde, Unstrut, Bode, and Saale. The country is very fertile, especially in the valleys of the Mulde and Saale, and in the *Goldene Aue*. Forest occupies 20 per cent. of the entire area. The province contained in 1875, 164,311 horses. It is rich in minerals—silver, iron, lead, copper, coal, lignite, clay, and various salts. The industries are cotton, linen, and woollen manufactures; oil-mills, chemical works, glue-boiling works; also vinegar, chocolate, and chicory manufactures. S. produces 5000 tons of paraffin and 15,000 of lamp oil annually. The capital of the province is Magdeburg (122,000). Halle, Erfurt, Halberstadt are next in importance. The University of Halle, founded in 1694, has 104 professors and teachers, and 827 students (1878).

Sachsen-Al'tenburg, the most easterly of the Saxon duchies, is divided by Gera into two parts, the 'Ostkreis,' watered by the Pleisse, and the 'Westkreis,' forming part of the valley of the Saale. Area, 516 sq. miles; pop. (1875) 145,844. The W. is hilly and two-fifths forest; in the E., which is very fertile, cattle-rearing and tillage are in an excellent condition, and the peasantry are the best-off in Germany. There are manufactures of wool, gloves, porcelain, delf, and wooden wares. By the law of 29th April 1831 (modified in 1848 and 1849), S.-A. is a constitutional hereditary monarchy. Its internal affairs are managed by a diet of 30 deputies. To the German Confederation it sends one member; to the Imperial diet, two. The budget of 1875-77 shows a revenue and expenditure each amounting to £111,178. In 1877 the public debt was £456,887. The S.-A. territory belonged originally to the markgrafsdom of Meissen, and in 1482 fell to the Ernestine line; was in 1547 given to the Albertine, but returned to the former in 1553. It had dukes of the elder Weimar line from 1603 to 1672, when it came to the line of Gotha, with which it was connected down to 1826. It was then made an independent duchy for Duke Friedrich of Hildburghausen (died 1833), who ceded it to Meiningen. In 1848 Duke Joseph abdicated in favour of his brother Georg, whose son Ernst (born 1826) has ruled since 1853. S.-A. joined the Zollverein in 1834, and the North German Confederation in 1866. See Töpfer, *Landeskunde von S.-A.* (1867).

Sachsen-Koburg-Gotha, a duchy of the German Empire, comprises the former duchy of *Gotha* (area 542 sq. miles), bounded by Preussen, Schwarzburg, Meiningen, and Hessen, with two detached portions included in Preussen; and that of *Koburg* (area 214 sq. miles), lying S. of Gotha, and bounded by Meiningen and Bayern, with a detached portion in Bayern. Pop. (1875) 182,599 (Gotha, 128,092; Koburg, 54,507). The Thüringerwald intervenes between the two duchies, and its spurs render the southern portion of Gotha mountainous and broken in surface, while the whole of Koburg is hilly in its formation. The northern portions of Gotha, on the other hand, are level or undulating. The Werra, a tributary of the Weser, and the Unstrut, a tributary of the Saale, flow through Gotha, while Koburg is watered by the Itz and Rodach, tributaries of the Main. The duchies are almost entirely agricultural, and are farmed with industry and skill. Of the whole surface 68 per cent. is cultivated, 30 per cent. is forest-land, and only 2 per cent. waste. Wheat, rye, barley, oats, and flax, as well as potatoes, beet-root, &c., are extensively grown, and there is a large production of garden-vegetables and fruit. Cattle, sheep, and goats are reared in considerable numbers. Iron, coal, copper, cobalt, and manganese are found, principally in Gotha, and there are also marble quarries and salt mines. There are some hardware and porcelain manufactures in Gotha. Glass-works and toy-manufactories are common, and there is a great manufactory of tobacco-pipes at Ruhla. The Thuringian railroad runs through Gotha, and the Werra railroad through Koburg. The capitals are Gotha (q. v.), and Koburg (see COBURG).

A common constitution was promulgated 3d May 1852, by which each duchy has a *Landtag*, Gotha of 19 and Koburg of 11 members, from whom a common *Landtag* is chosen, consisting of 14 of the former and 7 of the latter, to deal with matters affecting the whole state. The military force of the duchies forms, along with that of Sachsen-Meiningen, the 6th Thuringian infantry regiment. The budget is voted for four years, and a distinction is made between crown and state revenue. In the budget for 1877-81, the annual revenue and expenditure of the crown were stated at £124,285 and £74,395 respectively, leaving a surplus of £49,890; the state revenue and expenditure for the same years

being £168,549 annually. The public debt amounted in 1877 to £45,175. There are 230 elementary schools in the duchies, and 9 higher institutions. The population is almost entirely Protestant. Both duchies belonged to the Ernestine branch of the house of Sachsen. The founder of the present line was Johan Ernst, seventh son of Ernst the Pious. The present duke, Ernst II., who ascended the throne in 1844, is a younger brother of the late Prince Consort, whose second son, the Duke of Edinburgh, is heir-apparent to the throne. The ducal house is also allied to the royal families of Belgium and Portugal.

Sachsen-Meiningen (called also *S.-M. Hildburghausen*), next to Sachsen-Weimar-Eisenach, the largest of the Saxon duchies, consists of the ancient duchy of Meiningen with the principalities of Hildburghausen and Saalfeld, and lies in the form of a semicircle S.W. and S.E. of the Thuringerwald. Area, 953 sq. miles; pop. (1875) 194,494. The surface is mountainous, the highest points being Blesberg (2825 feet), Kiefern (2878 feet), and Gebaberg (2466 feet). It is abundantly watered by the Werra, which traverses the whole duchy, the Saale, Itz, Rodach, Milz, and Steinach. Of the soil, 44.2 is arable, 39.5 wood, 12.8 meadow-land, and 2.3 in gardens. The chief crops raised are grain, tobacco, potatoes, hemp, and flax. In the E. are productive mines of copper, iron, coal, cobalt, sulphur, salt, and porcelain-clay. Active manufactures are carried on of cottons, woollens and linens, cast and wrought iron wares, glass, porcelain, beer, paper, and wooden toys, the last being chiefly carried on at Sonneberg. S.-M. is a constitutional and hereditary monarchy. The reigning line springs from Duke Bernhard, third son of Ernst I. of Sachsen. The Diet consists of 4 deputies of the large proprietors, 4 of the largest taxpayers, and 16 deputies of the people. S.-M. sends two deputies to the Imperial Diet. The budget for the three years 1875-77 shows a revenue of £211,182, and an expenditure of £189,682. The civil list amounts to £19,000, and the public debt on January 1st, 1876, was £632,910.

Sachsen-Weimar-Eisenach, the smallest German grand-duchy, consists of three main districts—Eisenach in the W., Neustadt in the E., and between these Weimar—besides numerous smaller portions. Area 1403 sq. miles; pop. (1875) 292,933. The N. is undulating country; the middle belongs to the Thuringian Forest, and the S.E. is part of the Voigtländ. The chief rivers are the Saale in the E., and the Werra in the W. One-fourth of the surface is forest. The chief products are wheat, oats, fruit, flax, wine, and oil; the industries, tillage, cattle-rearing, wood-cutting, and the manufacture of linens, woollens, cottons, leather, paper, and metal-wares. Iron, coal, and salt are found. The University of Jena is common also to the three Saxon duchies. By the law of the 15th October 1850, S.-W.-E. is a constitutional hereditary monarchy. The diet has 31 deputies, and sends to the German Confederation one member, and to the Imperial Diet three. The budget for 1878-80 states the annual receipts at £338,340, and expenditure at £336,884. The public debt in 1877 was £407,025. The line of S.-W.-E. was founded in 1640 by Wilhelm, third son of Johann III. of Weimar. Its possessions, divided into three in 1672, were re-united under Ernst August (1741), whose grandson, Karl August, was the famous patron of literature. In 1815 S.-W.-E. was made a grand duchy, and was augmented by 659 sq. miles, with a pop. of 77,000. In the crisis of 1866 it declared for Prussia, but its troops, lodged in Mainz, were held in inaction by the Austrians and Bavarians. See Schütz, *Staatsleben des Großherzogthums S.-W.-E.* (Weim. 1859).

Sack, a large bag made for holding and transporting grain, flour, and other substances generally in a condition of comparatively fine division. Grain and flour sacks or bags being made of a uniform size, generally are filled with definite weights of these substances; hence a S. has come to be a recognised weight = 280 lbs. of flour. Sacks are largely made in Dundee of tow or jute sacking-cloth, and an 'overhead' sewing-machine has been invented for sewing their sides.

Sack (Old Fr. *sec*, Span. *seco*, 'dry,' from Lat. *siccus*), a name attached to a variety of wine during the Elizabethan period, and which continues to be known to the present day chiefly by the esteem in which it was held by Sir John Falstaff and his associates. It was probably a dry sherry.

Sackbut. The Greek *sakbuta* was a large harp, and the instrument called sackbut by the translators of the Bible (Dan. iii) was probably similar. The old English sackbut was an instrument like the trombone.

Sackville, Thomas, Lord Buckhurst and Earl of Dorset, son of Sir Richard S., was born at Buckhurst, Sussex, in 1536. He entered Hart Hall, Oxford, in his fifteenth or sixteenth year, afterwards took his degree at Cambridge, and was called to the bar at the Inner Temple. His poetical reputation had been established before he left college, but none of his early productions remain to us. At nineteen he married the daughter of a privy councillor, and at twenty-one he sat for Westmoreland in the Parliament of Mary. About this time he formed the plan of writing a series of poems as sequel to Lydgate's *Falls of Princes*, but all he accomplished was the *Induction*, and the *Complaint of Henry Stafford, Duke of Buckingham*. The *Myrrour for Magistrates*, a series of metrical biographies, written by Baldwin and others, was first published in 1559. S.'s *Induction* and *Complaint* appear only in the second edition of 1563. But what he contributed to the *Myrrour*, besides giving a basis of the work, is immeasurably its noblest part. The *Induction* displays a rich, sombre, and potent imagination. It was the first piece of vivid poetry in England since the death of Chaucer, and its allegorical descriptions are scarcely inferior in graphic force and beauty to those of the *Fairy Queen*. In 1561 S. joined Thomas Norton, also of the Temple, in providing a play for the recreation of the Templars, entitled *Ferrex and Porrex*. Of this play, the plot taken from Geoffrey of Monmouth's *History of the British Kings* is of the simplest description; the language is heavy and the versification monotonous; but it forms the first true specimen of our dramatic literature; and its use of Surrey's blank verse was the result of a happy instinct. A spurious edition of it appeared in 1575 under the following title—*The Tragedie of Gorboduc, whereof three Actes were written by Thos. Nortone, and the two last by Thomas Sackvyle*. In 1571 the authorised edition appeared in blackletter, with the title of *Ferrex and Porrex*, but the play was afterwards known by the name of *Gorboduc*. S. was long a member of Parliament in Elizabeth's reign. Soon after his father's death he was created Lord Buckhurst; in 1571 he was sent as an ambassador to France; in 1586 was one of the commissioners who tried Queen Mary; in 1591 he was elected Chancellor of the University of Oxford; in 1598 he succeeded to the office of treasurer Burleigh; and in 1601 he sat as lord high steward at the trial of Essex and Southampton. On the accession of James I. he was named lord high treasurer for life, and created Earl of Dorset. He died suddenly in the council chamber at Whitehall, April 19, 1603, and was buried in Westminster Abbey. See the edition of his Works by R. W. Sackville-West (Lond. 1858), and the *Memoir* by W. D. Cooper in his edition of *Gorboduc* printed for the Shakspeare Society. The *Induction* is printed along with Surrey's *Poems* in Bell's 'Edition of the English Poets.' It is also given in Skeat's *Specimens of English Literature, A.D. 1394-1579* (Oxf. Clarendon Press, 1871).

Sackville, Viscount, a soldier and statesman of the reigns of George II. and III., was the third son of the first Duke of Dorset. He was born on January 26, 1716, and entered the army under the title of Lord George S. At Dettingen (1743) and Fontenoy (1745) he served with credit, and obtained the rank of colonel at Culloden (1746). He subsequently became a privy-councillor, and was secretary for Ireland in 1751. At the Battle of Minden (1759) he was in command of the allied cavalry, and, refusing either from cowardice or jealousy to obey the order to charge given him by Prince Ferdinand of Brunswick, he saved the French army from annihilation. On this charge he was tried by court-martial, and adjudged incapable of serving thereafter in any military capacity. George II. struck his name off the list of privy-councillors, and for eight years he lived in retirement and disgrace. In 1770 he inherited the property of Lady Elizabeth Germain, and assumed her name. The cloud under which his questionable conduct had placed him gradually dissolved, and having been noted for his opposition to the claims of the American colonists, he became in 1775 Secretary for the Colonies in Lord North's ministry, and carried on the American War, with what success is well known. He retired from office in 1782, and was created V. S. and Baron Bolebrook. He died on August 26, 1785, and his eldest son afterwards became Duke of Dorset.

The *Letters of Junius* were at one time very commonly attributed to S., but this theory seems now to be abandoned.

Sa'co, a town of Maine, U.S., on the S. River, near the famous 'Great Falls,' 100 miles N.N.E. of Boston by rail. It has 6 churches, 4 banks, a large library, and one weekly newspaper. It has also large cotton manufactories and some shipping, and is the scene of Methodist national camp-meetings. Pop. (1870) 5755.

Sa'cra'ment (Lat. 'something sacred'), in ecclesiastical usage meant (1) anything sacred or consecrated, and (2) anything which had a sacred or hidden meaning, as rites and ceremonies. (3) In this sense it was connected with the Greek *mysterion*, which properly means a secret, something into which a man had to be initiated, and for which it is used as an equivalent in the Vulgate, e.g., in Eph. i. 9, &c. In Christian theology various definitions of a S. were framed. Two of the simplest and most expressive of the older ones were those given by Augustine and Peter Lombard: 'A word is added to an element, and a S. is made,' and 'A S. is a visible form of an invisible grace.' The definition accepted is of importance, because on that depends the number of S. held by the various churches. Thus the definition given in the Roman Catechism is 'A thing subject to the senses, which by the institution of God has the power both of signifying and of producing holiness and justice.' Accordingly, in this wide sense, the Church of Rome has seven sacraments—Baptism, Penance, the Mass, Matrimony, Orders, Confirmation, and Extreme Unction. According to the Westminster Catechism, with which all the other Protestant symbols substantially agree, 'A S. is a holy ordinance instituted by Christ; wherein, by sensible signs, Christ and the benefits of the new Covenant are represented, sealed, and applied to believers.' The only two ordinances which answer the terms of this definition are Baptism and the Lord's Supper, which, accordingly, are the only two sacraments observed in the Protestant churches.

Various opinions are also held regarding the efficacy of the S. The Church of Rome holds (1) that the efficacy common to all sacraments has (in the case of Baptism, Orders, and Matrimony) an indelible character, (2) that they convey the grace which they signify 'ex opere operato,' and (3) that the conditions of their efficacy (a) on the part of the administrator, are that he have authority in the case of baptism, and the intention of doing what the Church intends to be done, and (b) on the part of the recipient that he do not oppose an obstacle. The Lutheran Church holds (1) that the efficacy of the sacraments is due to their own inherent virtue; but (2) that faith is absolutely necessary to any real benefit being derived from them. The doctrine of the Reformed churches is (1) that the sacraments are real means of grace, but (2) that they become so 'not from any virtue in them or in him that doth administer them, but only by the blessing of Christ and the working of his Spirit (3) in them that by faith receive them.' See Hodge's *Syst. Theol.* (Edin. 1873).

Sacramen'tarians was the name given by the Lutherans to the party who opposed the Lutheran doctrine of the Real Presence (q. v.), or of Consubstantiation (q. v.), maintaining that the presence of Christ in the Eucharist was only spiritual or sacramental. The leader of the S. in North Germany was Karlstadt, the colleague of Luther, with whom, in the controversy which began about 1524, sided many of the people and several of the leading divines; although some of the latter, e.g., Bucer and Capito, tried to diminish as much as possible the difference between Karlstadt and Luther. Ecolampadius and other divines in South Germany, as well as Zwingli and most of the Swiss, substantially sided with Karlstadt, and although the controversy subsided after the death of Ecolampadius and Zwingli (1531), it was the means of producing the two great parties among the Protestants of Lutherans and the Reformed. See Mosheim's *Church History* (Reid's ed. Lond. 1860).

Sacramen'to, the capital of the State of California, U.S., stands on the left bank of the S. River, at its junction with the American River, 135 miles N.E. of San Francisco by rail. It is at the head of navigation for large steamboats, and is regularly laid out, on a flat plain only 30 feet above the sea-level. S. has numerous churches and public schools, three newspapers, and is the centre of a large mining, wheat-raising, and agricultural region. It has woollen manufactures, and large carriage, furniture, and agricultural-implement making industries, as well

as railway workshops employing 1500 operatives. The State Capitol, a handsome building erected at a cost of \$2,500,000, is situated at S. Great damage was done to the city by floods in 1853 and in 1861; but in 1862 substantial levees were constructed, and the chief streets and buildings were raised 8 feet. The climate is almost tropical, but the nights are always cool and pleasant, owing to the sea-breezes. The pop. in 1849 was estimated at 150, in 1853 at 12,000. In 1870 it was 16,283, and in 1876 it was estimated at 20,000. The school census of 1875 returned 6878 children under seventeen years of age, of whom 150 were Chinese.

Sacramen'to River, a river of California, U.S., rises in the Sierra Nevada, flows westward past Mount Shasta, and then southward through a broad and fertile valley, a northward extension of the great San Joaquin valley. It is 500 miles long, and is navigable for steamers for 50 miles from its embouchure in Suisun Bay, and for small vessels as far as Red Bluffs, 320 miles.

Sa'cra'd Heart of Je'sus, The Feast of, observed in the Roman Catholic Church on the Friday after the Octave of Corpus Christi (q. v.), originated in a vision seen by Marguerite Marie Alacoque, a nun at Paray la Moniale, in 1675. The special devotion henceforth paid to the Sacred Heart was approved by Popes Clement XII. (1732 and 1736), and Clement XIII. (1765). Pope Pius VI. granted to all who should, with contrite heart, visit a picture of the Sacred Heart and there offer certain prayers, an Indulgence of seven years; and Pius VII., to all who should offer a daily prayer to the Sacred Heart, two Plenary Indulgences every month, the Indulgence of seven years on the four Sundays before the feast of the S. H. of J., and of sixty days for every good work, and a Plenary Indulgence at death. See Tickell's *Life of Blessed Margaret Mary* (1869); Garside's *Blessed Margaret Mary Alacoque* (1874).

Sa'cra'd Mu'sic. The alliance of music with religion is probably nearly as ancient as the art itself. The Egyptian priesthood cultivated sacred music; and the religious music of the Hebrews, possibly derived from this source, is often referred to in the Old Testament. David appointed a great corps of musicians, and wrote his Psalms for alternate choirs, while a considerable variety of instruments were used in the Temple service. It is safe to assume that grandeur of effect was more successfully aimed at by the Jews than beauty of style and harmony. The Greeks, who were doubtless more scientific in their treatment of the art, assigned a prominent place to it in their religious celebrations; though almost all that we know of ancient practical music has been transmitted to us through the services of the early Christian Church. Here chanting and the singing of Greek and Hebrew melodies, so simple that the whole congregation might join in the service, seems to have been the practice until the first Council of Laodicea, after which the singing was almost entirely left to the clergy and trained musicians. St. Ambrose and Pope Gregory I. gave a fixed constitution to church music, so far as it related to chanting. The venerable Gregorian Chant (q. v.), still exclusively used in the Roman Communion on certain occasions, particularly during the penitential season of Lent, has lately come into high favour among the High Church party of the Church of England. The services at the court of Hlodwig, King of the Franks, are said to have been rendered by a fine choir of singers and instrumentalists. The rise of the organ dates from the 8th c., and in the 10th c. it was extensively used in different parts of Europe. After the introduction of counterpoint, church music became more elaborate and showy, with a strong admixture of profanity. Airs frequently taken from French chansons and other secular sources, and turned and twisted to display the skill of the composer or performer, were frequently sung in holy places. The Council of Trent therefore deliberated on the means of suppressing music in churches, and Pope Marcellus II. had decided to reduce it to the simple Gregorian chant, when the noble Masses of Palestrina, the great reformer of church music, initiated a more solemn and lofty style. Since the time of this composer the Mass has been treated in a recognised and definite manner, and many of the greatest composers—Haydn, Mozart, Beethoven, Schubert, Weber, Rossini, Gounod, &c.—have embellished this branch of S. M. by some of the most sublime efforts of their genius. The origin of the Oratorio (q. v.) is ascribed to Filippo Neri.

With the Reformation a new form of S. M. was born in Germany. Translations of the Psalms and spiritual songs were

set to chorales, and these *Geistliche Lieder* took firm root in the hearts of the German people. Many, such as *Ein Feste Burg* (Luther's Hymn) and *Nun Danket alle Gott*, have to this day the sacredness of national anthems. Sung in unison by the entire congregation, their effect is grand in simplicity. The chorale has been treated in a masterly manner by Bach in his *Passion Music* (q. v.), and more recently by Mendelssohn in his oratorios. It is the forerunner of the modern Hymn (q. v.), which forms so large an element in the S. M. of Protestant countries such as Germany, England, and America.

Various collections of psalm tunes appeared in England prior to Ravenscroft's *Whole Book of Psalmes*, published in 1621. Andrew Hart's *Scotch Psalter*, containing the Psalms of David with melodies, was published at Edinburgh in 1615. In the services of the Church of England, the Psalms according to the prose version of the Prayer-Book are chanted. The Anglican chant is of two kinds. The first, single, has two strains, one of three bars and one of four; the second, the double chant, is twice the length of the first. Each verse is divided into two parts; one of which, whatever the number of words, goes to one strain in the chant. In cathedrals and churches where there are choirs the choristers are divided into two bodies, who chant the verses alternately. Various parts of the service, particularly the *Te Deum* (q. v.), the Communion Service, and the Anthem (q. v.), are of a more ambitious musical character.

The Dissenters of England, and even to a greater extent the Presbyterians of Scotland, were long opposed to any but the plainest music in their services. Till a very few years ago the use of the organ was violently denounced. The result in Scotland has undoubtedly been to retard the musical progress of a people naturally gifted with a love of the art. With a trained organist and choir in every parish, there must always be a more widely-spread musical culture. This prejudice in the North is now, however, on the wane, and a more moderate feeling begins to prevail. The organ is rapidly establishing itself in the church as a legitimate musical instrument.

Sacrifice (Lat. *sacrum*, and *facio*) is the act of dedicating something to a deity, or the thing which is dedicated. It has been suggested by a great variety of causes, and expresses a great variety of notions. 1. As, in dealing with his fellow-men, man seeks to express love and gratitude to his benefactors, as well as to propitiate the anger of those he fears and avert their ill-will by bringing gifts, he acts on the same principle in dealing with the deities whom, as it happens, he loves or fears. Among a primitive people it is not thought to be right to approach a deity, any more than a prince, empty-handed. The first offerings or gifts of this kind would naturally be of the fruits of the ground, as a token of gratitude to the god of fertility. But afterwards animals and even human beings came to be offered. (1) When a tame animal was slain for food, it seemed fitting that the sanction and the blessing of the Giver of all life should be asked. In this light the killing came to be regarded as a religious act, and the butcher to be identified with the priest, who was rewarded for his services by a portion of the slain beast. Thus in the Mosaic Law every animal, though its flesh were intended for domestic use, had to be brought to the sanctuary to be slain by the priest as a thank-(peace-) offering (Lev. xvii. 3-5). (2) From this it followed that, as the life of every animal killed for food was offered to the deity, the blood, in which the life was supposed to be, could not be eaten. Closely connected with this was the notion that the deity himself had pleasure in the blood which was poured out at the altar, and partook of the S., especially by the smell of the roasting flesh (cf. Gen. viii. 21). (3) As the perquisite of the priests was a part of the animals sacrificed, it was their interest to urge sacrifices as a religious duty, that is, of such animals as were considered fit for human food; and to ensure a regular supply it came to be enacted that the first-born of all such animals (at any rate the males) should be 'given to God.' In the most primitive times the rule that the first-born should be offered to the Giver of life included even the first-born of man, as well as of animals. This was especially the case among the Semitic tribes of the W. of Asia (cf. Ex. xiii. 2, 11-16; xxii. 29, 30; Lev. xxvii. 26; Deut. xv. 19, 20).

Human sacrifices certainly formed a part of the regular worship of the gods of the Moabites and Ammonites, Chemosh and Milcom or Molech; and as this part was not omitted by the

Israelites when the worship of these deities was practised in Israel, even at a late period (cf. 2 Kings xvi. 3; xxi. 6; xxiii. 10; Is. lvii. 5; Jer. vii. 31, xix. 5, &c.), so there is reason to believe that originally it formed a part of the worship of their own national god Jehovah (cf. Ex. xiii. 2, 11-16; xxii. 29, 30; Lev. xxvii. 26; Deut. xv. 19, 20). The practice was too terrible, however, to continue after some little progress had been made from an utterly barbarous to a more civilised life. It became customary to redeem the first-born of man by the substitution of some animal or the payment of a sum of money to the priest (Ex. xxxiv. 20; Num. iii. 11-13, 40-51; viii. 5-19; xviii. 15, 16). Many scholars consider that circumcision, which was practised by so many Eastern nations, was a substitutionary rite—the sacrifice of a significant part for the whole (cf. Ex. iv. 24-26), on the day (the eighth) on which the literal sacrifice used to be made (Lev. xii. 3, cf. Ex. xxii. 29, 30), as also the Jewish Passover (cf. Ex. xiii. 15). Be this as it may, human sacrifices were undoubtedly offered among the Israelites, as among other nations, on extraordinary occasions. Thus Jephthah sacrificed his daughter (Jud. xi. 29-40; although much ingenuity has been expended in trying to explain this away). Samuel hewed Agag in pieces 'before the Lord' (1 Sam. xv. 33). David gave seven of the sons of Saul to be hanged up 'before the Lord' by the Gibeonites in order to avert a famine which had visited the land (2 Sam. xxi. 1-9). Mesha, King of Moab, sacrificed his eldest son when he was hard pressed by the Kings of Judah and Israel (2 Kings iii. 26, 27).

2. Another occasion for offering S. was the making of Vows, that is, incurring obligations to the Deity on the fulfilment of certain conditions, such as granting deliverance from death or danger, success in an enterprise, &c. Thus Jacob vowed that if he returned safe from Padan-Aram he would dedicate to Jehovah the tenth of his goods, and make the place of his vision (Bethel) a place of worship (Gen. xxviii. 18-22; cf. Jer. xli. 25; Jon. i. 16; Homer, *Il.* i. 64, &c.; Xenophon, *Anab.* iii. 2, 12; Virgil, *Georg.* i. 436, &c.; Horace, *Carm.* i. 5, &c.; Livy, xxii. 9, 10). Even human victims were sometimes offered in this way, as was done by Jephthah. Saul on one occasion devoted ('cursed') the man who should eat anything that day, and his own son Jonathan would have been sacrificed for the vow had not the people prevented it (1 Sam. xiv.).

3. Another occasion for S. was the making of Covenants. Among the Greeks, on such occasions, a lamb or other animal was slain and a libation of wine made, with an imprecation to this effect: 'As this animal is slain and this wine poured out, so may he who breaks this covenant be slain or have his brains poured out.' Among the Semitic tribes the form of S. was to cut one or more animals into halves, between which the parties to the covenant passed. An account is given in the book of Genesis of a covenant made between Abraham and Jehovah, which was ratified in this way, Jehovah being represented by a smoking furnace and a burning lamp (Gen. xv. 7-21; cf. Jer. xxxiv. 18-20). So Moses sprinkled the altar and the people with the blood of the covenant (that is, of the sacrifices offered in ratifying the covenant) which was made between them and Jehovah (Exod. xxiv. 3-8).

4. Of less important matters there was an endless variety that called for a gift to the altar: such ordinary occurrences as the birth of a child, touching a dead body, &c.; ill-omened occurrences, such as a monstrous birth, a shower of stones, &c. In the Mosaic Law there were four kinds of S.: Burnt-offerings—of a lamb offered night and morning for all the people; Peace- or thank-offerings; Sin-offerings—for inadvertent transgressions of ordinances; and Trespass-offerings—for wilful transgressions.

The idea of S. has been introduced into the Christian Church by the fact that Jesus Christ is spoken of in the New Testament as a S. Besides incidental references in the other Epistles, the analogy between his S. and those of the Mosaic Law is the great argument of the Epistle to the Hebrews. Now the meaning attached to the S. of Christ by the New Testament writers turns on the meaning attached to sin-offerings in the Old Testament. The received doctrine on the subject is, (1) 'That the design of such offerings was to propitiate God; to satisfy his justice, and render it consistent therewith that the offences for which they were offered should be forgiven.' (2) 'That this propitiation of God was secured by the expiation of guilt.' (3) 'That this expiation was effected by the victim being substituted for the offender, and suffering the penalty which he had incurred.'

4) 'That the effect of such sin-offerings was the pardon of the offender, and his restoration to the privileges he had forfeited.' It is therefore inferred that when the New Testament declares that Christ was a S., it is intended to teach that he was the substitute for sinners, that he suffered the penalty of the law in their stead, thereby rendering it consistent with the justice of God that they should be pardoned and restored to the divine favour. On the other hand, it is maintained that there is no standing-ground at all for imputing to the Hebrews, Greeks, or Romans the belief that the slaying of victims could atone for conscious, wilful sin. Even the Epistle to the Hebrews says distinctly that S. could not purify the conscience, but only the flesh, that 'the blood of bulls and of goats could not take away sin' (ix. 6-13, x. 4, 11). It has therefore been urged by Maurice and other theologians that the essence of Christ's S. consisted in doing his Father's will against the antagonistic influences of human frailty; that he 'devoted' himself to God and triumphed through perfect self-oblation; that the cross was only the consummation and crown of his life-sacrifice; and that men first become conscious of the 'exceeding sinfulness of sin,' when they see it made visible in his unmerited sufferings and pangs. In this way only, it is affirmed, was he 'made sin for us;' and it is only by a penitence springing from a living perception of this self-sacrificing love that we become 'the righteousness of God in him' (2 Cor. v. 21). Cf. ATONEMENT. See Spencer's *De Legibus Hebr.* (Hag. 1686); Potter's *Archæologia Græca* (4th ed. Lond. 1722); Kalisch's *Com. on Leviticus*; Kurtz's *Der All-test. Opfercultus* (Eng. trans. Edinb. 1863); Delitzsch's *Com. zum Briefe an die Hebræer* (Eng. trans. Edinb. 1868); Hodge's *Syst. Theol.* (Edinb. 1873); and Duncker's *Gesch. des Alterthums* (Eng. trans. Lond. 1878).

Sacrilege (Lat. 'the stealing of anything sacred') is not now a legal term, but as popularly understood, the crime is punishable under 24 and 25 Vict. c. 96, which enacts that theft from any place of worship, or breaking into any place of worship with intent to steal, is a felony, punishable by imprisonment or penal servitude.

Sacristan (Lat. *sacer*, 'sacred'), an ecclesiastical official who takes charge of the sacred books and utensils employed in the service of a church. The word sexton is a corruption of S.

Sacristy (Lat. *sacer*, 'sacred'), a chamber in which are preserved the articles in charge of the sacristan. In Roman Catholic and other churches in which great value is sometimes set upon such articles, the S. is regarded with much veneration, and is adorned in the most costly manner.

Sacroboſo, Johann'es, or John of Holywood, was born probably at Halifax, Yorkshire, entered the order of St. Augustine, studied subsequently at Paris, where he became professor of mathematics, and there died in 1256. His works are *De Sphæra Mundi*, based on Ptolemy's *Almagest*; *De Anni Ratione, seu de Computo Ecclesiastico*, and *De Algorithmo*, one of the first works in which the Arabic numerals were introduced.

Sacrum, the name given to the vertebræ of the spine intervening between the lumbar vertebræ, or those of the loins and those of the tail. The S. in man consists usually of five vertebræ united to form a wedge-shaped bone, inserted between the haunch bones behind, and thus entering into the formation of the Pelvis (q. v.). By its base the S. articulates with the last lumbar vertebræ, whilst the four small vertebræ called the *coccyx* are in turn articulated to the apex of the S. The S. is curved somewhat upon itself, its anterior surface is concave from above downwards, the posterior surface being convex. The *sacral canal*, continuous with the *spinal canal* which lodges in the *spinal cord*, runs through the S. The name 'S.' is derived from the fact that in ancient sacrifices this bone was esteemed specially sacred. The Jews called this bone 'luz,' and supposed it resisted decay. Eight and ten vertebræ are found in the S. of certain monkeys and armadillos; while in birds as many as twenty vertebræ may enter into the composition of this bone.

Sacy, Antoine Isaac Silvestre, Baron De, one of the most distinguished of Oriental scholars, was born at Paris, September 21, 1758. He early applied himself to the study of Oriental languages, becoming especially proficient in Arabic and Persian. In 1795 he was appointed Professor of Arabic at the newly founded *École des Langues Orientales*; and in the same year, with Camus Langlès and other scholars, he undertook the

management of the *Journal des Savants*. A member of the French Academy as early as 1785, he became Professor of Persian at the Collège de France in 1806; in 1808 he was elected to the Corps Législatif, and in 1813 created Baron. In 1822 he became administrator of the Collège de France, and in the same year founded with Abel Rémusat the Société Asiatique. In 1832 he entered the Chamber of Peers, and was immediately appointed inspector of the Oriental type in the royal printing-office. Next year he became keeper of the Oriental manuscripts in the royal library, and perpetual secretary of the Académie des Inscriptions. He died at Paris, February 21, 1838. To this profound scholar modern Oriental learning owes perhaps more than to any other man. He exerted a vast influence not only over France but all Europe by his numerous works, his liberal teaching, and his incessant correspondence. Some of his most distinguished pupils were Chézy, Quatremère, Jaubert, Reinaud, Saint-Martin, Freitag, Kosegarten, and Rasmussen. The creation of the chairs of Sanscrit, Chinese, and Hindustani, in the Collège de France, was also due to his ardent advocacy of their claims. His principal works were *Annales des Sassanides*, translated from the Persian of Mirkhond (Par. 1793); *Chrestomathie Arabe* (3 vols. 1806, 1826-27); *Grammaire Arabe* (2 vols. 1810, 1831); *Relation de l'Égypte*, translated from the Arabic of Abd-Allatif (1810); *Mémoires d'Histoire et de Littérature Orientales* (1818); and *Exposé de la Religion des Druses* (2 vols. 1838). Besides these he made many contributions to the *Magasin Encyclopédique*, *Moniteur*, *Bibliothèque Française*, *Revue des Deux-Mondes*, *Journal des Savants*, *Annales des Voyages*, *Journal Asiatique*, *Biographie Universelle* &c. See Reinaud, *Notice Hist. et Littér. sur Silvestre de S.* (Par. 1838).—**Samuel Ustazade Silvestre de S.**, son of the preceding, was born at Paris, October 17, 1801. After a course of study in law, and a short time of practice as an advocate, in 1818 he became attached to the *Journal des Débats*, and until 1852 wrote two-thirds of all the political articles which appeared in its columns. The establishment of the Empire, however, in that year, restricted him to pure literature, and he has since been the principal reviewer of the same journal. In 1854 he was elected a member of the French Academy, in 1836 keeper, and in 1848 administrator of the Mazarin Library, and in 1864 he became member of the Council of Public Education. He has published a selection from his articles under the title *Varités Littéraires, Morales et Historiques* (2 vols. Par. 1858; 2d ed. 1861); and an edition of the *Lettres de Madame de Sévigné* (11 vols. Par. 1861-64).

Saddle (Old Eng. *sadel*, Ger. *sattel*, Lat. *sella*, dim. of *sedile*, 'a seat'), a seat or pad for the back of a horse, used in riding or in driving. It is secured by a girth-strap passed round the animal's belly. Driving or harness saddles have been employed from a very remote period, as Egyptian wall-paintings and Assyrian sculptures testify. It is uncertain at what time and in what country the riding-S. was invented. Beckmann (*History of Inventions*) is of opinion that it originated in Persia, and it is generally asserted that it was unknown before the 4th c. of our era. On the other hand, Ginzrot, a German author of a valuable work on carriages and harness, believes that the Greek *ephippion*, usually interpreted as a horse-cloth, signified a proper S. In 4th c. writings, the phrase *sella equestris*, the exact equivalent of a riding-S., occurs. In the year 385 Theodosius the Great restricted the weight of a S. and bridle (*sella cum frenis*) for post horses to 60 lbs. Horsemen in Scandinavia were acquainted with the S. prior to the 6th c., and in England, according to the venerable Bede, in the 7th c. It appears from Old Eng. MSS. (Cottonian Collection) that the side-S. for the use of ladies was known in England at a much earlier period than is commonly ascribed to it, viz. the 14th c., when, it is said, Anne of Bohemia, queen of Richard II., introduced it. On certain occasions, however, as in hunting, ladies rode astride like men long after the side-S. was introduced. In the 16th and 17th centuries unskilful horsewomen rode on a *pillion* or padded seat behind a cavalier or servant.

A S. has a foundation or framework of beechwood strengthened with strips of iron, called a 'saddletree.' It is covered on the underside with serge and on the upper with leather, a padding of flock, hair, or other soft material, being inserted between to secure softness and elasticity. The parts of a riding-S. are called the 'seat,' 'skirts,' and 'flaps,' very often having 'kneepads;' these parts are joined so as to form one piece, and under

it is nailed a firm cushion named 'the pannel.' The fore part of a 'saddletree' is termed the 'head' or 'pommel,' the back part the 'candle;' to the latter the 'crupper-loops' are attached, and on the sides are the 'spring-bars' from which the 'stirrup-leathers' depend. The different kinds of saddles vary much in weight; a racing-S. weighs 2 lbs. only, an ordinary S. from 9 to 13 lbs., and a military S., in which the 'pommel' and 'candle' rise higher than usual, 25 or 30 lbs.

Saddlery is an important industry, and is concerned with the manufacture of saddles and harness of all kinds, holsters, valises, cartridge cases and pouches, gun-cases, belts, portmanteaus, travelling and letter bags, leggings, satchels, dog-collars, and many other articles made of leather. Whipmaking, though sometimes combined with saddlery, is generally carried on separately. 'Brown' saddlery comprises all articles in uncoloured leather, and 'black' saddlery carriage harness and other articles in black or japanned leather. The metal mountings of saddlery are obtained by the saddler from his ironmonger. Walsall, Birmingham, Ashton, and London are noted seats of the saddlery industry, the first three having, in 1871, 2644 out of the total of 23,011 saddlers in England and Wales. English saddlery enjoys high repute for serviceableness and durability, and the value of the saddlery and harness exported to British dependencies, notably Australia, and other countries, in 1876 amounted to £397,561. In the United States, this industry in 1870 employed 23,557 persons, and produced goods valued at \$32,709,981.

Saddleback, a mountain in Cumberland, 4½ miles N.E. of Keswick, with a height of 2787 feet.

Sadducees [Gr. *Zaddoukaioi*, Heb. *Tsaddukim*, most probably derived from Zadok, either as the name of the well-known priest in the time of David (2 Sam. viii. 17, &c.), or more probably of a disciple of Antigonus of Socho (B.C. 200-170)] were the priestly aristocracy among the Jews after the Captivity; being distinguished from the Pharisees (q. v.) in the first place by their *higher rank* as a social order. The names by which they were afterwards known were first applied to the two classes as parties under Jonathan Maccabæus (B.C. 161-143). 2. In Political matters the S. went on the principle that human ingenuity and statecraft are to be employed in a nation's dealings with other powers, and hence they promoted foreign alliances, and the introduction of Hellenism. 3. But as in Politics the S. were the liberal party and the Pharisees the conservative, in religious, legal, and ritualistic matters the chief peculiarity which distinguished the S. from the Pharisees was their conservatism. (1) They held that the canonical Scriptures, with the authoritative explanations, were the only rule of faith and practice, denying the Traditions of the Pharisees. (2) They denied the resurrection of the dead, although without denying the immortality of the soul. (3) They interpreted literally many laws which the Pharisees had modified. (4) Standing on their priestly dignity and ancient prerogatives, they maintained with great rigour the old enactments regarding the sacrifices, the treasury, &c.

Well-nigh extinguished at the destruction of Jerusalem, the S. benefited specially by the revival of Judaism at the foundation of Islamism, and renewed their youth as the Karaites (q. v.), a name ('Scripturalists') which they are said to have borne at first. See Ginsburg in *Kitto's Cyclop. of Bib. Lit.* (3d ed. Edin. 1876).

Sadleir, Sir Ralph, was born at Hackney, Middlesex, in 1507. In his eleventh year he attracted the notice of Henry VIII., by whom he was afterwards employed in the dissolution of the religious houses, and rewarded from their spoils. From 1537 to 1542 he made several journeys to Scotland upon diplomatic business, first to strengthen the English interest at the northern court, twice thereafter to persuade James V. to cast off the supremacy of the Pope, and again to bring about the proposed match between Edward, Prince of Wales, and the infant Mary, afterwards Mary Queen of Scots. Upon the accession of Mary Tudor to the English throne, he retired to his estate near Hackney. Elizabeth called him to the Privy Council, and appointed him keeper of Queen Mary in the Castle of Tutbury. After the execution of the unfortunate queen, he was sent to pacify King James. He died at Standon, Hertfordshire, 30th March, 1587. His *State Papers and Letters* (Edin. 1809) were prefaced by his memoir by Sir Walter Scott. See *A Memoir of the Life and Times of the Right Hon. Sir R. S.*, compiled from *State Papers* by his Descendant, Major F. Sadleir Stoney (Lond. 1877).

Sadole'to, Jacopo, a celebrated Italian humanist, was born at Modena, July 14, 1477. He was ordained a priest in 1502, and appointed apostolic secretary by Leo X. in 1513, and by Clement VII. in 1523. Nominated Bishop of Carpentras in 1517, and Cardinal by Paul III. in 1536, he died at Rome, October 18, 1547. S. was much esteemed in his own age for his sincere piety and his love of learning, while his moderation and desire for the reform of the Church from within, led to his employment in various negotiations between Karl V., François I., and the Popes. Of his works, which are distinguished for the clearness and Ciceronian dignity of their style, the chief are—*De Libera recte Instituendis* (Paris and Venice, 1533, often reprinted; French trans. by Charpenne, Paris, 1855); *In Pauli Epistolam ad Romanos* (Venice, 1536); *Hortensius, sive de Laudibus Philosophia* (Lyon, 1538); *Epistola ad Senatam Populumque Genevensium* (Strasb. 1539; French trans., with a reply from Calvin, Geneva, 1540); *Poemata* (Leipz. 1548); *Philosophia Consolationes et Meditationes in Adversis* (Frankf. 1577). By his *Epistolarum Libri xvii.* (Lyon, 1550; 5 vols. Rome, 1759-67) alone he is now remembered. See Joly, *Étude sur S.* (Caen, 1857).

Sad'owa, a village near Königgrätz (q. v.) in Bohemia, after which the French name the great battle fought there, 3d July, 1866.

Safe, a structure meant to secure money, jewellery, valuable books and documents, and other precious articles, first against fire, and second against thieves. Safes are of two forms, vaults or strong rooms, and portable safes. The security of a strong room depends on the thickness of the masonry of which it is entirely built, and on the nature of the non-conducting medium with which the walls are surrounded. Only as regards their doors are fire-proof vaults subject to the same rules as the ordinary movable safes. In making a common S., the two points, security against fire and thief-proofing, have to be kept in view; and fortunately these two objects are rather mutually helpful than antagonistic. The fire-proofing of safes is effected by building up an outer case of strong plates of malleable iron, between which and an inner casing of the same metal is a space which is filled with some heat-resisting and non-conducting medium. The substance originally used was charcoal in its natural state or steeped in an alkaline solution (Scott's patent, 1801); afterwards, in 1840, Thomas Milner patented the use of sawdust packed with tubes or closed vessels containing alkaline solutions which only burst under the influence of heat. Other valuable fire-resisting compositions consist of ordinary plaster of Paris prepared with water, and poured into the cavity, where it 'sets;' secondly, powdered plaster and alum in equal proportions; or thirdly, 50 per cent. alum, 25 of clay, and 25 of pounded marble. For thief-proofing of safes, the joints have to be made of great strength, the door strongly hinged, and made to lock so that the S. is fastened, not by one, but by a series of bolts all round the edges of the door. These bolts are shot by the handle, and only secured in position by the bolt of a small lock shot by the key. The keyhole and seams have to be secured against the admission of gunpowder; and to prevent drilling, the plates on which the lock is riveted are thickly studded with hard steel spikes. In the S. by Bash & Co., Glasgow, the bolts not only pass into the side of the safe, but through heavy studs strongly secured to the door itself.

Safe-Conduct. See PASSPORT.

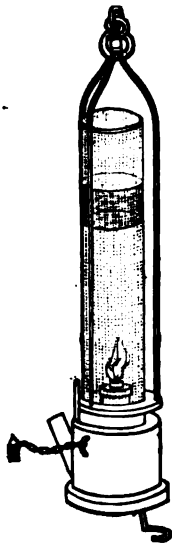
Saf'ed, a town of Palestine in the ancient Roman province of Galilee, situated on a mountain nearly 2700 feet high, 12 miles N. of Tiberias. On the N. side stands the old citadel of the crusaders, and on the S. a quadrilateral building resembling a fort, between which is the Mussulman quarter. W. of it, and on the slopes of the mountain, is the Jewish quarter. S. is much frequented by the Jews, who believe it will be the capital of the expected Messiah. It has 30 synagogues and a famous college, which is one of the principal seats of Hebrew learning. There are manufactures of cloth and dyeing, besides considerable trade in wine and oil. Pop. 4000. S. was almost destroyed by an earthquake in 1837, when 2000 Jews and 300 Mohammedans were destroyed.

Safety-Cage. See MINING.

Safety-Fuze is the name applied to a waterproof woven tube containing an inflammable composition which has a regular

rate of combustion. It is employed to ignite gunpowder cartridges in blasting, in lengths sufficient to allow of the workmen reaching a place of safety before the blast.

Safety-Lamp. The frequency and often terrible fatality of accidents in coal-mines caused by the explosion of accumulations of fire-damp, led Sir Humphrey Davy and other inventors in the early part of the present century to devise a means of carrying light into fiery mines without thereby causing explosion.



'Davy' Lamp.

* *Geordie*, similar in principle to the 'Davy,' but having inside the wire-gauze a cylinder or shield of glass. The wire-gauze cylinder of the Geordie is about 6 inches high by 2½ in diameter, and air for combustion is admitted by perforation in the bottom, the products of combustion being passed out through a metal disc perforated with small holes. The *Clanny S. L.*, invented by Dr. Clanny of Sunderland, has a glass tube placed outside and around the wire cylinder. The *Upton and Roberts* lamp has also an internal cylinder of gauze covered externally at the lower part by a band of strong glass, the upper part, where light does not require to be transmitted, being surrounded by a brass cylinder. In the *Mueseler* or *Belgian* lamp the light is surrounded by a thick glass cylinder. The products of combustion are carried by a metal furnace upwards through a cylindrical cap of wire-gauze. This form is extensively used in Belgium, but in England it is not thought so safe as a light protected throughout by both gauze and glass. A great number of different forms of lamp have been proposed and used from time to time, but without exception they are based on the principle of separating the light by wire gauze from the explosive compounds in which it may be placed. The security of safety lamps, so that they cannot be opened by miners while in the pit, is a point of great importance and has given rise to numerous devices. Some are so made as to be self-extinguishing when any attempt is made to withdraw the light. Locking the cover to the cistern and lamp is commonly resorted to, and combination-letter locks have been proposed. In another form the lamp is locked by a magnetic bar turned into staples internally by a powerful magnet, and only opened on being reversed by the magnet. It is obvious that all devices however ingenious are of no avail so long as men can carry and light matches in fiery pits, and it may be said that the best and only efficient lock for a S. L. will consist in educating miners to understand the fearful risks to which they expose themselves and their fellows by the reckless use of open lights, and by the habit of smoking when they are underground.

Safety-Valve, in the steam engine, is a circular valve which is forced open when the pressure of the steam in the boiler becomes too great. For lower pressure, the valve is kept in position by its own weight or by a lever pressing down upon it. When the S. V. is in perfect order there can be very little chance of the boiler bursting, since the strain can never exceed a particular amount. Cases, however, are not uncommon when accidents have occurred through the jamming or over-weighting of the S. V. See STEAM ENGINE.

Saff'i, Asaff'i, or As'fi, a port of Morocco, 107 miles W.N.W. of the capital. It is built in a sterile mountain basin, and its only harbour is an exposed roadstead. From 1508 to 1641 it was held by the Portuguese, and prior to the rise of Mogador its trade was extensive. In 1877 its imports amounted in value to £44,260, and its exports (of which beans, maize, wool, and gum were the chief items) to £148,384. Pop. about 12,000, of whom a fourth are Jews.

Saff'lower, or Bastard Saff'ron (*Cathamus tinctorius*), a rather handsome annual herb from 2 to 3 feet high, belonging to *Compositæ*, is cultivated for its flowers and seeds in India, China, and other parts of Asia, also in Egypt and Southern Europe. The florets after being plucked are usually pressed into small round cakes and carefully dried. The principal use of S. is for dyeing silk, a series of red and yellow shades being produced according to the various admixtures employed. Carthamin (q. v.) and Carthamus-yellow are the pigment principles, and the first, when precipitated from its alkaline solution and mixed with very finely powdered talc, constitutes *rouge*. S. is also used to adulterate the more expensive saffron. The seeds yield by expression an oil which when properly prepared and refined is transparent and of a light yellow colour. In India it serves for culinary purposes, &c., and it is believed to constitute the bulk of 'Macassar oil.'

Saffron (Fr. *safran*, Sp. *Azafran*, Ar. *Al zahafaran*) is the carefully-dried, deep orange-coloured stigmata of *Crocus sativus*, an autumnal flowering species of this familiar genus, native of Asia Minor, and now more or less naturalised in many parts of Europe. The plant is extensively cultivated in Spain, France, Austria, Italy, the mainland and isles of Greece, &c., for the production of S., which is used as a flavouring and colouring ingredient in culinary preparations, liqueurs, confectionary, and other articles of food; also as a perfume, and the extract in painting and dyeing. The yellow colouring principle named polychroite is remarkable for being totally destroyed by the action of the solar rays, and of forming blue tints when treated with sulphuric and nitric acid. Up to about a century ago this crocus was cultivated in England, a reminiscence of the fact existing in the name S.-Walden (q. v.). *Medicinally*, it is sometimes administered as a stimulant, but is of little power, and is chiefly used merely for improving the colour of mixtures. On account of its high price considerable adulteration takes place in this drug.

C. serotinus of S. Europe also produces S. rich in pigment. Cape S. is the flowers of *Lyperia crocea* (*Scrophulariaceæ*), which when dried have a S.-like odour and give a fine orange dye.

Saffron-Walden ('the wood or waste land where saffron was grown'), a town of England, county of Essex, on the river Cam, 45 miles N.E. of London by rail. It stands on a hill on the borders of Cambridgeshire, and is a place of great antiquity. The chief public buildings are the townhall, corn-exchange, post-office, Gibson's Hospital (1866), a museum of natural antiquities, and a literary institute. The parish church of St. Mary has a fine peal of bells, and was restored (1860-67). R. has a free grammar-school, and carries on a trade in malt, barley, and cattle. Pop. (1871) 5718.

Sa'ga (Icel. 'a tale,' from *segja*, 'to relate;' comp. Old Eng. *saga* and *sagu* (later 'saw'), from *sagan*, 'to tell'), a prose tale, so named from the rich collection of such in the old literature of Iceland. They long passed from mouth to mouth before being written down. This probably began to be done in the 12th c. The Sagas are very various; many relate to Iceland (as the S. of Njal, translated into English by G. W. Dasent, Lond. 1861), the Orkneys, the Færoes, and Greenland; others describe events in Scandinavian and adjacent countries (as Snorri Sturluson's *Heimskringla*, the *Jomsvinga-S.*, the *Knyttlinga S.*); others again are mythical and romantic (as the *Völsung-S.*, *Hervarar-S.*, *Halfs-S.*, *Frithiofs-S.*, *Orvarods-S.*, *Rolf S.-Krakes*, *Regnar Lodbroks-S.*); while some are romances and legends translated from foreign tongues. The sagas are often marked by great literary art, not least in depicting character, and by choice and powerful language. Their authors are mostly unknown. P. C. Müller's *Sagabibliothek* (Copenh. 1817-20) affords a useful survey of the S. literature, which is equally important for history, poetry, and language.

Sag'an, a town of Prussia, province of Schlesien, on the Bober an affluent of the Oder, 37 miles W. of Glogau by rail. It has a castle and four churches, and is the seat of a large manufacture

of cottons, paper, and woollens, the latter alone giving employment to 1600 hands. Pop. (1875) 10,541.

Sage. See LE SAGE.

Sage (*Salvia*, from Lat. *salvus*, in allusion to its supposed healing properties) is a large genus of *Labiata*, represented in all temperate and tropical regions. The 450 species of which it consists are all herbs or shrubs with whorled bracteate flowers; a tubular or campanulate calyx; the upper lip of corolla erect, the lower three-lobed; the stamens two, with diverging branches. Common or garden S. (*S. officinalis*), a native of countries bordering the Mediterranean—preferring a calcareous soil—is a familiar evergreen 'sweet herb' of the kitchen garden, the leaves and tender tops being used in stuffings and sauces, as well as to improve the flavour of various articles of cookery. The Clary (q. v.) (*S. Sclaria*) is sometimes used as a substitute for S. From the S. an essential oil is obtained by distillation, and a popular domestic astringent and tonic infusion called *S. tea* is made from the dried leaves and shoots.

Among ornamental species of S. may be mentioned *S. candidabrum*, a native of Spain, with contrasted yellowish-green and rich violet flowers, *S. lyrata*, *S. urticifolia*, *S. verticillata*, &c., for the garden; while for furnishing large conservatories brilliant flowers are produced in the greatest profusion by *S. splendens*, *S. Heeri*, *S. gioneraefolia*, through the winter and spring.

Saghalien. See SAKHALIN.

Sag'inaw, a town of Michigan, U.S., 18 miles above the mouth of the S. River, 100 miles N.W. of Detroit by rail. It has eight churches, four libraries, two banks, and two newspapers, besides numerous saw-mills, saltworks, shingle-mills, &c. In 1875, S. produced 60,844,939 feet of lumber, 143,861 barrels of salt, and 54,421,560 shingles, besides \$500,000 worth of other articles. Pop. (1870) 7460.—**S. Bay**, in the W. of Lake Huron, is 30 miles broad, and extends S.W. for 60 miles. It has valuable fisheries.

Sa'go (Malay, *sagu*, 'bread') is a variety of starch obtained from the cellular tissue of the S. palms, *Sagus Rumphii* and *S. Lavis*, natives of the E. Indian Archipelago. The trees for S.-making are felled at the period their flowering spike forms, which is when they are about fifteen years old. The stems are cut into sections about 2 feet in length, which are split up and the pithy substance scooped out and beaten in water to separate the starch granules from the associated ligneous tissue. After repeated washing and straining, the starch is obtained in a purified form, and may in that state be used for food or the other purposes to which ordinary starches are applied. To prepare the round pellets, in which shape it is found in Western commerce, the moist starch is spread out in a thin layer and allowed to dry in the sun. It is then broken and pounded to small fragments, which are assorted into sizes, placed in bags, hung up, and shaken, and the attrition of the pellets rounds off their edges, and thus produces 'pearl,' 'medium,' and 'bullet' S. A factitious S. is made in France from potato starch; but the difference of the two starches is easily detected by the microscope. A coarse variety of S. is made in India and Ceylon from the nuts of *Cycas revoluta* and *C. circinalis*, and various palms in addition to those above mentioned also yield a similar starch. The amount of S. imported into Great Britain for 1876 amounted to 338,230 cwts., valued at £237,903.

Sagou'in (*Callithrix*), a genus of *Platyrrhine* or New World monkeys, popularly named 'Squirrel Monkeys.' They belong to the family *Cebidae*, and are small, active, and readily tamed. The fur is long and thick. A typical example is the *C. sciurus* of Brazil.

Sag'ua-la-Gran'de, a town of Cuba, on the River S., 12 miles from its port, Concha, at the mouth of the river, and 35 miles N. of Villa Clara by rail. In 1867 it exported 1,024,358 cwts. of sugar, and 390,200 cwts. of molasses. Pop. 9632.

Saguenay, a river of Canada, tributary of the St. Lawrence, which it joins 120 miles below Quebec. The Chomouchuan, or main branch of the S., rises in the Laurentian mountains, and flows first E. then S.E. for 215 miles, when it enters Lake St. John. Here it receives the Mistassini, 180 miles long, the Paribonsa, 165 miles long, and the Metebetchuan, 110 miles long. On issuing from the lake it forms numerous rapids, and gradually widens till it attains a breadth of 2 miles, after which it

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again narrows and proceeds to the St. Lawrence through a deep gorge whose cliffs are often more than 1500 feet high. The S. drains an area of 23,700 sq. miles, which, being mostly mountainous and densely wooded, discharges a very large volume of water. Its great depth, sometimes above 100 fathoms, renders it navigable for 110 miles, and much timber is shipped from its banks.

Sagun'tum, anciently a town of Hispania Tarraconensis, on the Mediterranean, was founded by Greek colonists from Zacynthus, but contained also an Italian element. It was a commercial town of great importance, and its possession became matter of contest in the Punic Wars. Siding with Rome it was besieged by Hannibal in 218 B.C., and held out for eight months. This siege led directly to the Second Punic War. Afterwards S. was made a Roman colony, and became famous for its earthenware and for the fruits grown in the fertile soil around. Murviedro (*Muri Veteres*) occupies the site of S.

Sah'ara, a vast region of Northern Africa, extending in its widest signification, from the southern slope of the Atlas range to the basins of the Senegal and Niger, and from the Atlantic to Egypt and Nubia, its area being variously estimated at from 2,000,000 to 2,436,000 sq. miles. In its more restricted sense the term S. is applied to the region lying between the Atlas and the rainless desert tracts of the south, whose northern boundary is not clearly defined. The surface of the S. declines from elevated steppes in the N. to sandy downs, and then spreads out into wide rolling plains covered with stones or sand, which are usually plateaux, but in some parts are said to be depressed below the sea-level. There are two principal areas of depression, viz., one in the N.W. known as El Juff, and one in the N. between the Great Syrtis and Gulf of Sidra. In 1877-78 an expedition was engaged in ascertaining the feasibility of a project for flooding El Juff—which is said to present evidence of having once been the bed of a sea—with the waters of the Atlantic, to be introduced by a short canal cut at the mouth of the Belta Valley. In the central S. there are occasional mountain regions, of which that of Air or Asben attains a height of 5000 feet, and a peak in the region of Tibesti, farther to the N.E., a height of 7880 feet. The most purely desert portion of the S. is the Erg, or Areg, a belt of sand dunes stretching from the interior of Tunis to the basin of the Senegal, a distance of 2000 miles, and having a general breadth of 200 miles. The desert portions of the S. are almost rainless, and are swept by burning E. winds for three-fourths of the year. The nights, however, are very cold, owing to the radiation. Much of the S. is capable of cultivation if artificially irrigated, and in Algeria it is being steadily encroached upon. (For a list of its principal oases see the article OASES.) In some cases the streams are subterranean, the most remarkable instance being that of the Wed Mzi, in central Algeria, which runs underground for most of its course of 400 miles, till it is finally dissipated in the large lagoon called the Shott Melrir. Only a conjectural estimate can be formed of the pop. of the S., whose inhabitants may be classified in three divisions, viz.:(1) in the W. the Moors and Arabs, nomadic races; (2) in the centre the Tuareg, or Tuaricks, a warlike Berber race, predatory in their habits and Mohammedans in religion; (3) in the E. the Tibbus, a negro race, with fixed dwellings, flocks, and cultivated fields, and in part Pagans. Slaves, gold-dust, ostrich feathers, ivory, salt, gums, and dates are the chief articles of Saharan commerce. They are carried across the desert in caravans, which return with manufactured goods. The great mart of the S. is Timbuktu (q. v.) on its southern edge. See *The Great S.*, by H. B. Tristram (Lond. 1860); *L'Avenir de la France en Afrique*, by Paul Soleillet (Par. 1876); *The Flooding of the S.*, by Donald Mackenzie (Lond. 1878); Dr. Chavanne's *Die S., oder von Oase zu Oase* (1st Pt. Vien. March, 1878); and the works of Barth, Rohlf's, and Nachtigal.

Saharanpore, the chief town of the district of the same name in the N.W. Provinces, British India, a station on the railway, and close to the E. Jumna Canal, 90 miles N.N.E. of Delhi. It contains an old fort, a newly-built mosque, and many public buildings, and is the headquarters of the canal establishment. S. is famous for wood-carving and silversmiths' work. There is also a stud farm, and botanical gardens established in 1817. The trade is considerable in grain, spices, and piece-goods. Pop. (1872) 43,844.—The district of S., which lies in the upper doab,

between the Ganges and Jumna rivers, and is bounded N. by the Shiwalak hills, has an area of 2217 sq. miles; pop. (1872) 884,017. It is also watered by the river Hindun, and by the Ganges and E. Jumna Canal. The crops are wheat, barley, rice, pulses, millets, and cotton. The breed of horses is good. The total railway traffic in 1872 was 21,000 tons. The towns are Rurki, with its engineering college; Hurdwar, with the greatest annual fair in India; and Rampur, where there is a manufactory of glass bracelets. In the Mutiny of 1857, the women and children were sent up to the hills; and after the first outbreak order was maintained by means of a Gurkha regiment.

Sáheb, or **Sáhib** (originally an Arabic word, meaning 'master,' 'lord,' 'companion'), universally used throughout India by the natives in addressing European gentlemen. In vernacular patois, it is often prefixed or affixed to the official title, as *sahib-shikstani*, 'assistant-judge.' Europeans generally are known as the *sahib-logue*.

Sáhebgunge ('the market-place of the English lord'), a common name for modern towns in India, which have grown up under English rule. (1) The suburb of Gaya (q. v.), where the civil quarters are situated. (2) A town in the district of the Sonthal Pergunnah, Bengal, 154 miles by rail N. of Calcutta, on the right or S. bank of the Ganges. It has lately supplanted Rajmehal as the great trading centre where the river traffic changes to the rail, and *vice versa*; and it is also the station for registering all the Ganges-borne traffic. In 1876-77 the exports by rail were valued at £182,000, and the imports by river at £143,000. The chief articles of trade were indigo, £86,000; rice, stone, and hides, each £27,000; piece-goods and oil-seeds, £38,000; wheat, £17,000; and salt, £12,000.

Sa'ga. See ANTELOPE.

Saigon, the capital of the French possessions in Cochinchina, 37 miles from the Chinese Sea, on the navigable Donnai, which is connected with a network of river. The town is surrounded by fortifications, and in 1872 was garrisoned by 4153 men, while several ships of war are permanently stationed in the harbour. S. has two hospitals, large dockyards, and excellent stone quays. A cathedral is to be built (1878) at a cost of £32,000. In 1876 there loaded at S. 317 vessels of 234,299 tons (215 British, of 158,151 tons). The export of rice amounted in 1876 to 340,000 tons (value £1,567,904), and was chiefly to China (about 250,000 tons), America, and Europe. Other exports are cotton, sugar, opium, pepper, and coffee. Pop. 120,000 (10,000 Chinese). S. was acquired by the French in 1860, and its possession was ratified in the treaty of 1864 by the government of Anam. The Chinese, who have long solely carried on the import trade, have been gradually taking possession of the export trade, till in 1876 they shipped nine-tenths of the rice crop and the whole of all other articles of produce. The success of the Chinese is due to their greater economy, and their ability to purchase directly from the natives. See COCHIN-CHINA, LOWER or FRENCH.

Sail (Old Eng. *segel*), a sheet of canvas spread out on a mast, spar, or stay of a vessel to catch the wind by which the vessel is propelled. A S. usually bears the name of the mast, yard, boom, or stay to which it is attached, as fore-sail, foretop-sail, maintopgallant-sail, &c. In a square-rigged vessel the sails extended on the yards athwartships are termed *square sails*, and those supported by gaffs, booms, or stays lying lengthwise of the vessel, *fore-and-aft sails*. Most of the latter are triangular or 'shoulder-of-mutton' shape; the others are four-sided. Trysails are fastened to small spars or gaffs abaft the lower-masts; that of the mizzen is distinguished as the *spanker*. *Staysails* traverse the stays of a mast. The square sails on the lower masts are known by the general name of *courses*. *Studding-sails* are suspended from booms rigged out beyond the extremities of the yards, and form wings to the square sails. Some of the parts of a square S. are the *head*, the *foot*, the *leeches*, the *earings* or upper corners, the *clews* or lower corners, and the *reef-bands*, stretches of canvas sewed across where eyelet holes are formed for the *reef-points*, or lengths of braided cordage, called *semit*, used to tie up the sails. A *boll-rope* is sewed round the edges of a S. for strength, and *cringles* or loops are placed on the leeches for the attachment of *reef-tackle* to raise the S. in reefing. The leech on the weather side is the *luff*, and that on the lee-side, the *after-leech*. The *tack* is the lower

weather corner of a square S., and also the forward corner of a fore-and-aft S.; the after-corner of the latter is termed the clew. Square sails are presented at pleasure to the wind by turning the yards by means of braces hanging from the ends. Sails are said to be *set* when expanded, *furled* when folded up to the yard, and *reefed* when the area is reduced by drawing up a portion. Only large sailing-vessels carry a full equipment of canvas. The accompanying illustration shows the position of the various sails of a ship, *i. e.*, a three-masted vessel, square-rigged on each mast.



Merchantman under full sail.

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|-------------------------------------|-------------------------------------|
| 1. Flying-jib. | 14. Main-top-gallant-sail. |
| 2. Jib. | 15. Main-royal. |
| 3. Fore-topmast-staysail. | 16. Main-skysail. |
| 4. Fore-course. | 17. Main-royal-studding-sail. |
| 5. Fore-top-sail. | 18. Main-top-gallant-studding-sail. |
| 6. Fore-top-gallant-sail. | 19. Main-topmast-studding-sail. |
| 7. Fore-royal. | 20. Mizzen-course. |
| 8. Fore-skysail. | 21. Mizzen-topsail. |
| 9. Fore-royal-studding-sail. | 22. Mizzen-top-gallant-sail. |
| 10. Fore-top-gallant-studding-sail. | 23. Mizzen-royal. |
| 11. Fore-topmast-studding-sail. | 24. Mizzen skysail. |
| 12. Main-course. | 25. Mizzen spanker. |
| 13. Main-topsail. | |

A desire to lessen the risk to life in working the sails aloft, and to reduce the number of hands on the vessel, has led to several inventions for performing the several operations from the deck. None of the inventions has been widely adopted. That of Mr. Henry D. P. Cunningham, R.N., secured by several patents since 1850, is probably most favoured, and consists in giving a rotatory motion to the yards by means of ropes from the deck, while taking in or setting S. This plan necessitates the splitting up of the S. vertically, and the use of a separate slip of canvas to cover the slit when the S. is expanded.

Sailcloth, or **Oan'vas**, a fabric of hemp, flax, cotton, or jute, woven in pieces, called *bolts*, measuring from 36 to 40 yards in length, and 24 to 30 inches in width.

Sail'ings, in navigation, include various approximate methods by which a navigator, from a knowledge of a vessel's course and rate of sailing, deduces the position of the vessel. The course is obtained from the indications of the compass, and the speed by means of the log-line. For a short course, such as a day's sailing, the earth's surface may be assumed to be plane, and the course may then be taken as the hypotenuse of a right-angled triangle, one of whose sides is the true difference of latitude made, while the other, known as the *departure*, is the actual distance made E. or W. When the latitude is known, the departure may be readily converted into difference of longitude. This method is known as plane sailing, and is the roughest approximation in use. When longer courses are considered, the sphericity of the earth can no longer be neglected. The problem now becomes one of spherical trigonometry. The shortest line connecting two points upon the surface of a sphere is the intercepted arc of the great circle through these points. A vessel, however, steered by a compass, does not traverse a great circle except in two very special cases; namely, when it is directed along a meridian, or along the equator. If a ship sails due E. or W. from a point, there is no change of latitude, and the distance traversed is simply the departure, from which, if the latitude is known, the difference of longitude can be deduced.

This is a case of *parallel sailing*. *Great-circle sailing* is noticed under a special heading. If a vessel is steered towards the same azimuth, its course cuts all meridians at a constant angle, and is therefore a rhumb line. On Mercator's projection, rhumb lines are represented by straight lines, and for this and other reasons what is called Mercator's sailing is the most accurate of all. This method, however, is not extensively employed, though the tabulated corrections are not difficult of application. When a ship's course is along a rhumb line, other than a parallel of latitude, the departure is ordinarily calculated according to the method known as Middle Latitude Sailing. It is evident that, supposing a vessel to sail for many days in the northern hemisphere from N.E. to S.W., her departure for the earlier latitudes would give too great a difference of longitude, and for the later latitudes too small. The average of the two, however, will give an approximation to the difference of longitude, and in the best nautical tables corrections are supplied for making this method more accurate.

Sain'foin, or Saintfoin (Fr. *sain*, 'wholesome,' *foin*, 'hay;' Lat. *sanum fenum*), is *Onobrychis sativa*, a leguminous fodder-plant much cultivated as a shifting crop on dry calcareous or oolitic soils because of its deep-penetrating roots, which act beneficially to the land by fertilising it from their own decay, and by working up organic matter from below, thus forming a thicker surface crust, and so preparing the land for cereal culture. S. is fond of a marly soil, but stagnant underground humidity is fatal to it. The hay it yields is extremely nourishing for every kind of cattle, at the same time it is most advantageous to cut and use the plant in a green state. In favourable situations it may be made into hay twice a year, or mowed oftener for green fodder.

The genus *Onobrychis* consists of about fifty species of herbs or plants with imparipinnate leaves; leaflets quite entire; stipules scarious; flowers purple, red, or white, in axillary spikes or racemes; calyx lobes subulate; pod compressed, indehiscent, one- to two-seeded, often spiny, winged, or crested. Its area of distribution is Europe, temperate Asia, and Africa. The S. is native of W. and S. Europe and W. Asia, with the appearance of being indigenous also in dry fields and pastures of S.E. England; but from its long-standing cultivation in the country (since 1651) it exists in many cases merely a relic of that cultivation.

Saint (Lat. *sanctus*, Gr. *hagios*, Heb. *kadosh*, 'holy,' or *chasid*, 'pious'), in the Bible, means a holy person; either (1) as being specially dedicated to the service of God, in which sense the Israelites were a 'holy nation' (Exod. xix. 5, 6, &c.), as the Christian Church was composed of 'saints' (Rom. i. 7, &c.); or (2) absolutely holy in life (Pa. xvi. 10, lxxxix. 5, 7, 19), and among the blessed after death (Deut. xxxiii. 2; Matt. xxvii. 52, &c.), as Jehovah was the Holy One of Israel (Isa. x. 17, &c.). In the Christian Church those who endured persecution for their faith were from the first held in high honour. Martyrdom was regarded as a baptism in the person's own blood, which procured the grace of God and the pardon of all sins, and served as a direct passport to heaven (Matt. v. 10-12, x. 39; Rev. vi. 9). According to Tertullian, it was the second baptism with which our Lord himself was baptised (Mark x. 39; Luke xii. 50). Again, the day of a martyr's death was regarded as his birthday; and these birthdays were celebrated as festivals by families and churches, generally at the martyrs' tombs, with divine service, the celebration of the Eucharist, for which an altar was erected over the tomb, and a recital of the martyr's acts and passion. The names of the dead who were commemorated in this way, as well as of the living who brought oblations, were enrolled in the canon of the Mass (q. v.), or in double catalogues (*Diptycha*). This was the first form of Canonisation (q. v.).

As the intercession of a martyr was allowed to have great weight in getting the Lapsed (q. v.) re-admitted to communion with the Church, which was associated with the forgiveness of sins, the idea grew up that the intercession of martyrs in the other world was efficacious in obtaining the forgiveness of sins, as their sufferings not only blotted out their own sins, but were also sufficient to atone for the sins of others. It was only natural that the heathen converts should transfer to the martyrs the honours they had formerly paid to their heroes; and a kind of omnipresence was attributed to them such as was attributed to the heathen Demons (q. v.). Thus to the former notion of their efficacious intercession was added the belief that it was pos-

sible to communicate desires to them directly. Out of this veneration arose an elaborate system of S.-worship. In proportion as men thought they needed such heavenly intercessors the number of saints was increased. Martyrs before unknown announced themselves, or the places where their bodies were buried, in visions; and new saints were made, metropolitans having the right of creating saints for their provinces. In the Eastern Church a Feast of all the Martyrs had been observed since the 4th c. In the year 610 Pope Boniface V. obtained possession of the Pantheon at Rome, and this temple, which had been sacred to all the gods and especially to Cybele (q. v.), was now consecrated to Mary the Mother of God and all the Martyrs. The festival, which at first was held in the month of May, was transferred (834) by Pope Gregory IV. to the 1st November, and called All Saints. See INVOCATION OF SAINTS; BEATIFICATION; CANONISATION; also Hospinians, *De Festis Christi* (Tigur. 1393); the Bollandists' *Acta Sanctorum* (begun 1643, and not yet completed); Bingham, *Orig. Eccl.* (2d ed. Lond. 1726).

St.* Alban. See ALBANS, ST.

St. Alban's Hall, Oxford, was founded in 1547, and took its name from Robert de St. Alban. It early came into the possession of Merton College, and was sometime after established as an academical hall. It has (1878) 66 undergraduates, 32 members of Convocation, and 125 members on the books.

Saint Amand, a town of France, department of Nord, 6 miles from Valenciennes, is famed for its hot sulphur springs, and has some small manufactures of porcelain, linen, &c. Pop. (1876) 10,716.—**Saint-A.-Mont-Rond,** a town of France, department of Cher, 27 miles S. of Bourges, has manufactures of porcelain, iron-foundries, and some trade in agricultural products. The castle of Mont Rond dominates the town, and the Canal du Cher passes through it. Pop. (1876) 8499.

Saint-Amour, Guillaume de, a famous doctor of the Sorbonne of the 13th c., was born at St. Amour in Franche-Comté. He was an active member of the Church, went to Rome to plead for the independent rights of the University of Paris, and wrote vigorously against the mendicant orders. He incurred the wrath of the Pope and of St. Thomas, but was popular with the French people. He died 13th September 1272. His works, the chief of which is *De Periculis Novissimorum Temporum*, were printed at Constance in 1622.

St. An'drews. See ANDREWS, ST.

St. An'thony's Fire. See ANTHONY'S FIRE, ST.

St. Arnaud. See LEROY.

Saint Augustine, a town in the E. of Florida, U.S., 2 miles from the Atlantic Ocean, 160 S. of Savannah, stands on a peninsula between the Matanzas and San Sebastian Rivers. S. A. is the oldest city in the United States, the Spaniards having landed here in 1512, and made it a permanent settlement in 1565, when it received its name in honour of 'the greatest of the Fathers.' It was ceded to the British in 1763, and remained in their hands till after the War of Independence. There is an old Roman Catholic cathedral of 1793. Fort Marion was commenced by the Spaniards about 1660, and finished in 1756. There is an old custom-house and a very handsome sea-wall built by the United States Government (1843). S. A. has a small trade in straw manufactures and some shipping. The pop., of which three-fourths are still Spanish, only amounted in 1870 to 1717.

St. Austell, a market-town on the S. coast of Cornwall, England, 40 miles W. of Plymouth by rail. It has a fine old church (restored 1870), and its district is rich in minerals, chiefly tin, copper, lead, and very fine china clay. There is a large pilchard fishery on the coast. Pop. (1871) 3803.

St. Bees, or Kirk'by Bees'cock, a village in Cumberland on a bay formed by S. B. Head, 4 miles S. of Whitehaven by rail, with a pop. (1871) of 1122. It is the seat of a Church of England Theological College, founded in 1816 by Dr. Law, then Bishop of Chester, for the education of young men wishing to enter the Church, but unable to afford the expenses of Oxford or Cambridge. The Earl of Lonsdale, in 1817, fitted up as

* In the arrangement of articles, 'St.' is equivalent to the full form 'Saint.'

lecture-rooms, library, &c., the chancel of the chapel of an old Benedictine priory built in the reign of Henry I. to replace a still older nunnery founded by an Irish princess, St. Bega, in the 7th c., but destroyed by the Danes in the 10th c. The nave of the chapel has been used since 1611 as a parish church, where the students attend daily service. The college was intended originally to replace the 'priest class' of the northern grammar schools, where candidates for holy orders were frequently educated, but it has long ago enlarged its sphere. The Principal of the college, who is also vicar of the parish, selects the staff of lecturers, and has a right of personal supervision over the students who lodge in the village. The students in matters of discipline have a right to appeal to the visitor—the Bishop of Carlisle since 1871. The fees are £10 per term, there being four terms (January 28th to May 5th, and August 28th to December 5th), and the whole course occupying two years. The chief subjects of study are English divinity, the Greek Testament, and the composition of sermons. Students are admitted at the age of twenty-one, and the average attendance is about 60. The diploma of the college is now accepted in most English dioceses, and not merely in the N., as was at first intended. A new lecture-hall and library were built in 1863. There is a free grammar-school at S. B., founded by Archbishop Grindal in 1587. Possessing good sands and a grand rocky coast, S. B. has in recent years been resorted to as a watering-place.

St. Cassian Beds, an interesting series of rocks exposed at St. Cassian, on the southern flank of the Austrian Alps, and at Halstadt on the N., and attaining a thickness of about 800 feet. They are referable to the base of the Keuper or Upper Trias, in which they form the only well-developed marine deposit. They are exceedingly fossiliferous, having furnished about 700 species, many of them new and peculiar, but showing collectively a singular mixture of typical Paleozoic and typical Mesozoic forms.

St. Catharine's, a town in the Dominion of Canada, province of Ontario, situated on Lake Ontario, at the mouth of the Welland Canal, 12 miles N. of the Falls of Niagara, and 34 miles S.S.E. of Toronto by rail. It has mineral artesian wells, a convent, marine hospital, and several fine hotels. There are 2 daily and 4 weekly newspapers. Iron wares, pottery, and cloth are manufactured, while there is shipbuilding and an important transit trade. Pop. (1871) 7364.

St. Charles, a town of the State of Missouri, U.S., on the Missouri River, 20 miles above its mouth, and 19 miles by rail from St. Lewis. It has thirteen churches, four newspapers, and ten schools. The Missouri is here crossed by an iron railway bridge 2 miles in length, with its approaches; erected at a cost of \$2,000,000. S. C. has extensive flour and starch mills, and breweries. Pop. (1870) 5570.

Saint-Cloud. See CLOUD, ST.

St. Croix, a river of the United States, flows E.S.E. from Grand Lake to Passamaquoddy Bay, separating Maine from New Brunswick. Length, 75 miles.

St. Croix, a tributary of the Mississippi, 150 miles long, forms a boundary between Wisconsin and Minnesota, and has famous falls.

Saint-Cyr, Laurent Gouvion, Marquis de, Marshal of France, was born at Toul, 13th April 1764. In 1792 he joined the French army as a volunteer, and rose rapidly during the campaigns on the Rhine and in Germany between that year and 1797. In 1794 he became a general of division, and in 1798 he received the command of the French troops in Rome. He subsequently distinguished himself in the German and Italian campaigns, and in the Peninsular War. He was not among the eighteen marshals created by Napoleon on his ascending the throne in 1804, but received his baton during the Russian campaign of 1812, when he gained a brilliant victory over Prince Wittgenstein at Polozk. In the disastrous Saxon campaign of 1813 he twice defended Dresden with much gallantry. On the news of his final capitulation being announced to Napoleon, a general standing by remarked, 'We have lost another 30,000 men.' 'Worse than that,' replied the Emperor, 'we have lost Saint-Cyr!' On the Restoration he was created a peer of France, and remaining faithful to the royalist party in 1815, was appointed Minister of War at the close of the Hundred Days. This office he resigned in a few months, but was reappointed in 1817, and introduced several important reforms. In 1821 he

retired from public life, and devoted himself to agriculture and to the composition of historical works. These are *Matériaux pour servir à l'Histoire de la Guerre d'Espagne* (Par. 1821), *Mémoires sur les Campagnes des Armées du Rhin et de Rhin et Moselle* (4 vols. Par. 1829), and *Mémoires pour servir à l'Histoire Militaire sous le Directoire, le Consulat, et l'Empire* (4 vols. Par. 1831). He died at Hyères, 10th March 1830. In personal character he was singularly upright and devoted to duty, while his military talents were rather suited to cautious and defensive, than to brilliant and aggressive, operations. See M. Gay de Vernon, *Vie de S.-C.*

Saint-Denis. See DENIS, ST.

Saint-Die. See DIE, ST.

Saint-Dizier. See DIZIER, ST.

Sainte-Beuve, Charles Augustin, was born at Boulogne, December 23, 1804. At the age of thirteen he proceeded to the Collège Charlemagne at Paris, and after studying medicine for some time, obtained a post in the hospital of St. Louis. About 1825 Dubois engaged him on the staff of the *Globe* newspaper, and one of his first contributions was a eulogistic criticism of Victor Hugo's *Odes et Ballades*. The step thus taken introduced him to the small circle of the 'romantic' poets, of whom Hugo was the chief. In 1828 he published a *Tableaux Historique et Critique de la Poésie Française au seizième Siècle* (new ed. 1870), and in the following year he produced some of his own poems in the romantic style as *Vie, Poésies et Pensées de Joseph Delorme*. These poems sufficed to stir up the fiercest strife between the classical and liberal or romantic schools of critics; but neither in them nor in S.-B.'s volumes of verse—*Les Consolations* (1830), *Pensées d'Août* (1837), and *Poésies Complètes* (1840: new ed. 1863)—is any real poetical genius discoverable. His true genius was critical, and Buloz was not slow in perceiving this, and engaging S.-B. to write for the *Revue des Deux Mondes*. Lammennais, too, manifested an interest in him, and influenced S.-B.'s strange novel *Volupté* (1834), an unpleasant study of the conflict between the flesh and the spirit. In 1837 S.-B. delivered at Lausanne a course of lectures, which afterwards took shape in his *Histoire de Port-Royal* (5 vols. 1840-60). In 1845 he entered the Academy; in 1848 he accepted a chair of literature at Liège; but on the accession of Louis Napoleon he returned to Paris as a contributor to the Bonapartist paper, *Le Constitutionnel*. In the columns of this journal appeared the famous articles reprinted under the title of *Causeries du Lundi* (15 vols. 1857-62). Never before or since has such newspaper writing been seen. Each of these essays is a learned and profound study of history. In the hands of S.-B. the most trifling character is shown to bear a significance in its times, the analysis of a book becomes a spiritual biography of its author, and the soberest, most unexaggerating criticism produces the fascination of fiction. A taste even among Frenchmen pre-eminently delicate, a keen appreciation of all that might be called social aesthetics, varied sympathies, a transparent love of truth and fairness, and an indomitable patience in the acquisition of facts, all graced by a perfect mastery of style, have made him the prince of critics. He indeed founded a school of criticism, the principles of which have been carried out—sometimes ludicrously far—by M. Taine. S.-B.'s other contributions to periodical literature have been collected under the titles of *Portraits Littéraires* (8 vols. 1832-39; new ed. 3 vols. 1864), *Portraits de Femmes* (1844), *Portraits Contemporains* (2 vols. 1846), and *Nouveaux Lundis* (10 vols. 1863-68). He likewise published an elaborate *Étude sur Virgile* (2 vols. 1857). S.-B. became a senator in 1865. He died October 13, 1869. A re-issue of his miscellaneous essays—critiques, causeries, portraits, &c., under the care of Emile Troubat—was completed in 30 vols., 1875. See *Correspondance de S.-B.* (vols. i., ii., Par. 1878). Of the numerous biographical and critical notices of S.-B., which have appeared since his death, the most respectable is contained in M. Juste Ollivier's *Mémoires*, published in the *Bibliothèque Universelle et Suisse Revue* for 1876.

Sainte-Marie-aux-Mines (Fr.), or **Mar'kirch** (Ger.), a town of the German Empire, province of Elsass, on the Lieporette, 16 miles W. of Schlettstadt by rail. It has considerable wool and cotton factories. Its once rich silver mines are long since exhausted. Pop. (1875) 12,245.

Saintes, a town of France, department of Charente-Inférieure, on the left bank of the Charente, 45 miles S.E. of Rochefort by rail. It was the ancient *Mediolanum* of the Santones, and has interesting Roman remains, the chief of which are the ruins of a triumphal arch, circus, aqueduct, and an amphitheatre nearly as large as that at Nîmes. Pop. 1876) 11,150.

Saint-Étienne. See ÉTIENNE, ST.

Saint-Evremond. See EVREMOND, ST.

Saint-Germain-en-Laye, a town of France, department of Seine-et-Oise, on the left bank of the Seine, and on the outskirts of the great forest of Lyda or Laye (10,873 acres in extent), 6 miles N. of Versailles, and 15 miles W.N.W. of Paris by rail. It is mainly remarkable for the royal château built by François I. (1547) in place of an older edifice which dated from the reign of King Robert, and which was sacked by the English in 1346, 1419, and 1438. The French court resided here for part of the year from about the reign of Philippe-Auguste to that of Louis XIV. When the latter king reconstructed the château of Versailles, that of St.-G. became the refuge of James II, the exiled monarch of England, who here kept up the mockery of a court till his death in 1701. Since 1862 the château has been used as a museum of antiquities. Pop. (1876) 16,978.

St. Hel'na. See HELENA, ST.

St. Hel'ens, a town of Lancashire, England, 12 miles N. of Liverpool by rail. It is altogether modern, and owes its prosperity to the Sankey Canal (the first in England), which gives it transit to the Mersey, and to productive coal-seams in the vicinity. In 1872 the Lancashire and N. Western Railway made a branch, for the purpose of running the northern traffic from Huyton via Prescot and St. H. to Wigan. St. H. has very extensive manufactures of plate, sheet, crown, and flint glass, while the bottle-works of Messrs. Nuttall and Co. and Messrs. Cannington, Shaw, and Co. are the largest in Lancashire—if not in England. There are also large alkali, copper-smelting, and iron works. A handsome town-hall, comprising public offices, police-court, public library, &c., was opened in 1876. Pop. (1871) 45,134; (estimated, 1878) 55,000. As yet St. H. is not a parliamentary borough.

St. Helier, capital of the island of Jersey, Channel Islands, 9 hours by steamer from Southampton, and 33 from London, is defended by Fort Regent and Elizabeth Castle. There are also the ruins of an old hermitage, the traditional abode of St. Helier. S. H. has a court-house or meeting-place for the 'States-Assembly,' Victoria College (1851), a library, a prison, and handsome piers. There is some fishing and shipbuilding. Besides the parish church there are 5 Methodist, 4 Independent, 2 Roman Catholic, and several other meeting-houses. Pop. (1871) of town and parish, 30,756.

Saint-Hilaire', Geoffroy. See GEOFFROY, ST. HILAIRE.

St. Ives. See IVES, ST.

St. John's Bread. See CAROB.

St. John's Wort, a popular name of the type genus of the order *Hypericaceæ* (q. v.), and so called from being formerly gathered on the eve of St. John's day.

St. Jo'seph, a city of Missouri, U. S., on the right bank of the Missouri, 350 miles W. of St. Louis by rail. Founded in 1843 by Joseph Robidout, it was long an important Indian frontier station and halting-point for emigrants and gold-seekers on their journey W. It suffered heavily during the Civil War, but has since rapidly increased. There are now (1878) thirty-two schools and colleges, twenty-four churches, nine newspapers, five public libraries, &c. It is a great railway centre, and has a magnificent railway bridge, completed in 1873 at a cost of \$1,500,000. In 1875 its wholesale trade exceeded \$20,000,000. Pop. (1870) 19,565; (1874) estimated at 30,000.

Saint-Julien, a village of France, department of Gironde, near Bordeaux, and on the left bank of the Gironde, gives name to a light claret made in the neighbourhood. Pop. (1876) 1832.

Saint-Just, Louis Antoine Léon de, a notable French revolutionist, born at Decize, Nivernais, August 25, 1767, was educated at Soissons by the Oratorians, went to Rheims to study law, and afterwards returning to Decize, devoted himself to literature. He published two dull and somewhat licentious

poems, *Organt* (2 vols. 1789), and *Mes passe-temps, ou le Nouvel Organt* (1792), and a work entitled *Esprit de la Révolution et de la Constitution de France* (1791). On the outbreak of the Revolution he was sent to Paris to represent his commune at the Fête of the Federation, and through the influence of Robespierre he entered the National Convention in 1792, quickly declaring his extreme views, which may be gathered from his maxim that 'those who make half-way revolutions only dig their own graves.' After the defeat of the Girondists, he was appointed to the Committee of Public Safety, accompanied Le Bas as commissioner to the army of the Rhine, and established the guillotine in Alsace. In February 1794 he became president of the Convention, and with Couthon and Robespierre he formed the triumvirate of the reign of terror. With the other terrorists he ascended the scaffold on July 28. The austere purity of S.-J.'s private life heightens the interest with which his terrible public career is regarded. His *Ceuvres Politiques* were republished in 1833-34. See Hamel's *Histoire de S.-J.* (Par. 1859).

St. Kil'da. See KILDA, ST.

St. Kil'da, a town in Victoria, situated on the E. side of Hobson's Bay, 3½ miles S.E. of Melbourne, with which it is connected by railway. It is much frequented for sea-bathing, and has been styled the Victorian Brighton. Pop. (1875) 9676.

St. Lawrence. See LAWRENCE, ST.

Saint-Lô, the chief town of the department of Manche, France, on the summit and slope of a rocky ridge which rises from the right bank of the Vire, 55 miles S.E. of Cherbourg by rail. It has still some remains of fortifications, and two interesting buildings, the fine ogival cathedral of Notre Dame, and the abbey church of Sainte-Croix, in Romanesque style. The town is said to be named after a St. Lô (*Laudus*), bishop of Coutance, and remained in English possession from 1346 till 1449. Besides manufacturing cottons, ribbons, lace, cutlery, &c., it has an active trade in grain, cattle, horses, and cider. Pop. (1876) 9519.

St. Lou'is, in the State of Missouri, the third city in the American Union, on the right bank of the Mississippi, 20 miles below its confluence with the Missouri. Its distance by rail from New York is 1097 miles; from New Orleans 750 miles. It was founded in 1764, and remained chiefly in French possession till 1804, when it passed to the Union with Upper Louisiana, of which it was capital. Its population was then mostly French, and the trade was chiefly in fur. In 1817 the first steamer began to ply on the Mississippi, and from that date its progress was exceedingly rapid. The slave-trade caused much excitement about 1822, but did not affect the prosperity of the city. A time of commercial depression, which extended from 1837 to 1847, together with floods, ravages of cholera (1848), and a terribly destructive fire (1849), slackened the rate of increase till 1851, when the introduction of railways gave it a fresh impetus. In 1877 S. L. had 111 churches, of which 28 were Roman Catholic, 18 Methodist, 16 German Evangelical, and 14 Presbyterian. There is a Roman Catholic cathedral, and a Roman Catholic archbishop has his seat here. S. L. is famed for the excellence of its educational institutions, chief among which are the St. Louis University (a Jesuit establishment), and the Washington University and Mary Institute (unsectarian). The denominational schools (36 of which are Roman Catholic) number upwards of 60, and about as many are included in the public school system, which supplies instruction for nearly 40,000 pupils, employs 800 teachers, and is supported at the rate of nearly \$900,000 per annum. There are also a Western Academy of Sciences, a Polytechnic and a Mercantile Library (with 33,000 volumes), numerous hospitals and industrial homes, and a lunatic asylum (cost, \$900,000). The other principal public structures are, the Custom House being constructed (1878) at a cost of \$4,000,000, the Exchange (completed 1878), with a hall 223 feet by 93, the Four Courts (comprising a prison and criminal courts), and the Court-house, a cruciform building (cost, \$1,280,000). The magnificent iron railway bridge over the Mississippi is 2225 feet long, and has a central span of 520 feet. The steel and iron used in its construction amounted to 5600 tons, and its entire cost was \$10,000,000. S. L. has 57 banks, with a capital of \$19,559,542. and annual bank-clearings of

\$1,151,372,654. S. L. is in the centre of a large coal and iron field, and its iron trade is one of the most extensive in the world. The capital employed in this industry amounts now to nearly \$200,000,000. S. L. also exports vast quantities of machinery, flour, meat, and timber. It is a great shipping station, and at its wharves, which extend 11 miles along the river, there arrived, in 1876, 2200 steamers and 743 barges, with aggregate freights of 663,525 tons, while the merchandise received and despatched by rail amounted to 3,232,770 tons. The waterworks supply more than 20,700,000 gallons a day. S. L. is surrounded by several splendid parks, of which the largest is Forest Park, covering 1374 acres, and the finest Tower Grove Park, of 350 acres. The value of real and personal property is estimated (1876) at \$166,999,660. Pop. (1810) 1400; (1840) 16,469; (1850) 74,439; (1860) 185,587; (1866) 204,327; (1876) 498,182.

Saint Lou'is, the capital of the French possessions in Senegambia, is situated on a sandy island, 2500 yards long, 5 miles from the mouth of the river Senegal. It is fortified, and has a considerable trade, but is dirty and poorly built. Pop. (1875) 15,748, of whom only a very small number are whites.

St Lu'cia. See LUCIA, ST.

Saint-Malo, a fortified seaport of France, department of Ille-et-Vilaine, at the entrance of the Rance into the English Channel, 44 miles N.N.W. of Rennes by rail. It completely covers the Rocher d'Aaron, 3 miles in circumference, and is connected with the mainland by Le Sillon, a causeway 215 yards long. The harbour, which is spacious, is left dry at ebb tide, but the flood tide here rises from 45 to 50 feet, and a basin is now (1878) under construction at a cost of 5,000,000 francs. The town is defended by several strong forts, situated on the mainland and on the rocks that stud the roads. In 1877 there entered the port 489 British vessels, with cargoes to the value of £94,788, and cleared 474 with cargoes valued at £176,302 (these are exclusive of the steamers in the service of the London and South-Western Company). The exports include grain, apples, cartridges, and lead ore; the imports, coal, pig-iron, cement, hemp, and planks. S.-M. has considerable shipbuilding, and sends forth many vessels to the whale, cod, and mackerel fisheries. There are also manufactures of spirits, oils, cordage, chains, biscuits, tobacco, &c. Pop. (1876) 10,061.

St. Maurice River, a northern tributary of the St. Lawrence, which rises 216 miles N.N.W. of Montreal, and flows in a southerly course 363 miles, joining the St. Lawrence at the city of Three Rivers in the province of Quebec. It is navigable for steamboats about 66 miles, from a point 34 miles above its mouth. Its valley contains iron mines and great forests, where about 500,000 logs of pine and spruce are cut annually. The Falls of Shawenegan, 180 feet in height, 22 miles above its mouth, are said to be the finest in Canada with the exception of Niagara.

St. Michael's, the largest, most populous, and most fertile of the Azores (q. v.), is situated in lat. 37° 44' N., long. 25° 30' W. Area 297 sq. miles; pop. 81,000. The island is 40 miles long and from 5 to 10 miles in breadth. It is of volcanic origin, and is mountainous in the interior, rising in Pico di Vara to 3570 feet, and in Serro da Agoa de Pas to 3070 feet. The climate is mild and healthy, and the soil is fertile, yielding abundant wheat, Indian corn, and beans, which are exported to Portugal. The staple articles of produce, however, are oranges and fruits. In 1876 the island exported to England 273,181½ large boxes of oranges valued at £136,580, 4800 malotes of tangerines, 694 bunches of bananas, and 29,558 pine-apples. In the same year the imports from Great Britain and British colonies amounted to £48,527, being £16,521 less than in 1875, and of this coal amounted to £2710. The total number of British vessels which entered the ports of St. M. in the same year was 132 of 35,960 tons, and cleared 138 of 37,170 tons; and of the vessels that cleared 127 (with cargoes valued at £129,716) were in the direct trade between Great Britain and British colonies.

St. Michael's Mount, a granite rock off the S. coast of Cornwall, England, near Penzance, communicating with the mainland by a causeway passable at low water, is 1 mile in circumference, and fully 200 feet high. It was mentioned by Pliny, and by Diodorus Siculus, who called it Bellerium, and knew it was near the Cassiterides. It was a place of much note among the ancient Britons; and after Christianity was introduced formed

a common pilgrims' goal. The apparitions of St. Michael and other legends about it have been frequently mentioned by poets, e.g. Milton in *Lycidas*. It is crowned by a castle which was the subject of contest during the Civil War and at other times, and which is now occupied by Sir J. St. Aubyn. There is a small fishing village (pop. about 127) at the base of the rock. The formation of S. M. M. is of great interest to the geologist, and the botanist finds many rare plants upon it.

Saint-Michel, Mont, a conical granite rock in the French department of Manche, which rises to a height of 400 feet from the sands of Cancale Bay, 7 miles W. of Avranches. On its summit are a church and a castle, and on the steep slopes is built the town, which has a pop. of 200. The surrounding sands are under water at every tide, but at low water there is a road 1 mile in length which joins it to the mainland. On the rock, which was called *Tumba*, stood in ancient times a temple of Jupiter; and in the time of the Normans it was the site of a strong fortress. An apparition of St. Michael here in 708 led to the building of a church by Auxbert, Bishop of Avranches, which is spoken of as *in monte tumba*. To the monastery here was given soon after the Conquest the Cornish Mount St. Michael and its priory, by Robert, Earl of Mortain and Cornwall, half-brother of William the Conqueror. See *Les Curieuses Recherches du Mont-St.-Michel*, by Dom Thomas Le Roy (2 vols. Caen, 1878).

Saint-Nazaire, a seaport of France, department of Loire-Inférieure, at the mouth of the Loire, and on the right bank, 40 miles W. of Nantes by rail. It has grown more rapidly in recent years than perhaps any other French town, its pop., 2391 in 1851, having increased in 1861 to 6500, and in 1876 to 14,761. A chief cause of its prosperity is the gradual silting up of the Loire, which has led to the formation here of large docks to save vessels destined for Nantes the troublesome navigation of the river. With the exception of coal, most of the cargoes are forwarded in transit by rail or in barges to Nantes, where the duties are payable. There are regular weekly steam lines hence to London, Hamburg, and Santander, and fortnightly to Liverpool; and from this port also sail the mail steamers for Colon, Vera Cruz, and the W. Indies. In 1876 there entered 299 British vessels of 116,513 tons, and cleared 237 of 96,124 tons. One of the largest docks in France is now (1878) in process of construction here, but will not be opened till 1880.

St. Ne'ots, a town of England, county of Huntingdon, on the Ouse, 8 miles from Huntingdon, and 52 from London by rail, has some manufactures of lace. There is a parish church built in 1507. S. N. is named from a monastery founded here in 974. Pop. (1871) 3200.

Saint Nicolas, a town of Belgium, province of E. Flanders, in the middle of the fertile and populous Pays de Waes, at the intersection of the Ghent-Antwerp and the Mechlinheuzen railways, 12 miles E.S.E. of Antwerp. It has a great flax market, and large manufactures of cotton, woollen, and silk stuffs, linens, carpets, shawls, laces, and tobacco. Pop. (1874) 24,567.

Saint-Omer, a strongly fortified town of France, department of Pas-de-Calais, on the left bank of the Aa, 177 miles N.N.W. of Paris by rail. It is surrounded on three sides by marshes, and has four forts. The chief buildings are the church of Notre-Dame, the hospitals, the museum, with a rich collection of coins and antiquities, the barracks, the theatre, and the remains of the splendid abbey of St. Bertin (built 1320-1520; restored 1792). It has a library of 15,000 volumes, and is the seat of the famous antiquarian society, *La Morinie*. S. has flax, wool, and cotton spinning, and salt-refining; and manufactures lace, tobacco, leather, paper, beet-sugar, brandy, and clay-pipes. Pop. (1876) 21,404. S.-O. was during the penal times the seat of a college for English Catholics.

Saint-on-Dol'by, Madame Charlotte Helen, an English contralto singer, was born in London in 1821, and was educated at the Royal Academy of Music, where she became King's Scholar in 1836. On leaving that institution she proved herself one of the most accomplished and cultivated of native artists, and immediately took high rank as a concert and oratorio singer. Mendelssohn formed an appreciative opinion of her powers, engaged her at the Gewandhaus concerts at Leipsic in 1846-47, and wrote the contralto part in *Elijah* for her. Till her retirement in 1870 she enjoyed a great and deserved popularity. Her style was marked by declamatory power, correct expression, and

extraordinary versatility. Many of the choicest modern songs have been introduced by her, while she has few equals in the rendering of the simple English ballad. She is married to Mons. Prosper Philippe Catherine Sainton, the celebrated violinist, at present leader in Her Majesty's Theatre, who was born in Toulouse in 1813, and has been for many years identified with the Italian Opera in London.

St. Pan'cras, a very extensive parish in the N. of London, including the suburbs of Camden Town, Kentish Town, &c. Area, 2716 acres. Pop. in 1871, 221,465. The parish church is one of the finest in the metropolis. St. Pancras gives its name to the terminus of the Midland Railway Company, and the gigantic hotel attached thereto.

St. Paul, capital of Minnesota, United States, on the Mississippi, was founded in 1838 and incorporated in 1849. It has 38 churches, 3 libraries, 2 theatres, and 2 daily and 9 weekly papers. It has a good educational system, with 13 schools and 5000 scholars. There are several fine public buildings, chief among which is the State Capitol. There are seven banks, several hospitals and asylums, a large custom-house, and a fine park of 260 acres. The chief manufactures are machinery, furniture, boots and shoes. Pop. (1850) 1083; (1870) 20,030. The assessed valuation of property was \$27,000,000 in 1878.

Saint-Paul, a town in the island of Réunion (q. v.). Its pop. at the census of 1876 was 26,979.

St. Paul de Loan'da. See SAO PAULO DO LOANDA.

St. Petersburg, a government of W. Russia, includes the old Ingermanland, with parts of Karelia and the Grand-Duchy of Novgorod, and is surrounded by the Gulf of Finland, Finland, Lake Ladoga, and the governments of Olonetz, Novgorod, and Pokov, Lake Peipus, and Esthonia. Area, 17,065 sq. miles; pop. (1870) 1,326,875. St. P. is a plain, sloping to the N.W. About half the surface consists of woods, marshes, and lakes. The chief rivers are the Neva (q. v.), the Volchov, which runs into Lake Ladoga, and the Narova, which drains Lake Peipus, receives the Plussa, and flows past Narva to the Gulf of Finland. Timber is the chief product of St. P.

St. Petersburg, the capital of the Russian Empire, occupies the delta of the Neva on the Gulf of Finland, and is intersected by ten branches of the river and numerous navigable canals. It is 400 miles N.W. of Moscow, and 20 miles E. of Kronstadt (q. v.). No European capital, save London and Vienna, impresses the mind with such a sense of wealth, power, and ostentation as the city of St. P. From near Kronstadt the river appears wide as an estuary, and thronged with shipping like the Tagus or the Thames, while to the traveller approaching St. P. by land the city seems 'a magnificent artificial oasis in a waste, howling wilderness of forest and morass.' Its wide, regular, and ill-paved streets on perfectly level ground wear, like those of Berlin, a general look of stiffness and symmetry suggestive of bureaucracy and military discipline, and the large scale on which St. P. is planned, with the prevalence of a certain pretentious and pseudo-classic architecture, reminds one irresistibly of Munich. Even the private houses are built in great blocks, each having a *dvornik* or porter, who also acts as a police-agent, and by night as a watchman. The city covers an area of 42½ sq. miles. It consists of two parts, the 'Great Side' (*Bolshaya Storona*), on the S. bank of the Great Neva, and the 'Petersburg Side,' scattered over the N. bank and the islands, chief of which is Vassiliostrof ('Basil Island'), connected with the S. bank by three bridges of boats and the magnificent Nikolaievsky bridge (1850) of granite, resting on seven arches, and 1200 feet long. Communication is also kept up by the Annitchkoff bridge, 110 feet long, and 150 other wooden bridges built on piles, by steam-launches and two-oared ferry-boats in summer, and by sledges in winter, when the jolting little *droshkies* (14,105 in 1874) are out of use. The river-banks are lined with quays of red granite, which for solidity, strength, and area are without parallel in Europe. On the S. bank these form a promenade, on Vassiliostrof they are used as wharves. The E. point of this island, where stand the Custom-House and the Exchange, is the chief resort of the foreign merchants, in whose hands are the export and import trade of St. P. On the same island are the Academy

of Sciences, founded in 1728 by Peter the Great, with a library of over 200,000 vols., and great scientific collections, the University (1819), which in January 1878 had 80 teachers and 1425 students, and the Academy of Fine Arts (1764), dominated by a colossal Minerva, and in its various squares are the monument of Count Romanoff, the colossal statues of Kutosoff-Smolensky, Barclay de Tolly, and Svarof-Rymnikski (in the Zariyn Square or Field of Mars, where 40,000 men can manoeuvre), the Cathedral of St. Nicholas, and a monument to Catharine II., erected in 1873. On an island a little higher up the river is the Fortress, built by Peter the Great in 1708, which surrounds the mint, the arsenal, and the buildings of the Military Department. On an adjoining island is the little wooden house occupied by Peter the Great during the founding of St. P. The central point of St. P. is the Admiralty, built by Alexander I., with one front to the Neva, the other facing the magnificent Admiralty Square, the largest in the city, where also rises the Winter Palace, rebuilt by Rastrelli in 1839, after the fire of 1837, a square edifice 455 feet long by 350 broad, the lavishly-adorned residence of the Emperor. Near and also facing the Neva is the palatial museum of the Hermitage, designed and constructed by Klenze (1840-51), containing vast art and antiquarian collections, including 1500 pictures, 11,880 sketches, 1890 vases, 200,000 coins and medals, 361 ancient marbles, a library of 120,000 vols., and one of the largest collections of gems in the world. The style is bastard Grecian externally, grotesque and florid Renaissance in the portico (which is sustained by 10 colossal caryatides), and in the interior, which has 140 monoliths of Finland granite, while the noble entrance-hall is supported by 16. The three central galleries are assigned to the Spanish school (over 100 pictures), to the Italian school (327), and to Rubens (60) and Vandyck (34). Rembrandt is represented by 41 pictures. Here also is the famed Kertch Collection of antiquities, taken since 1825 from fifty-eight Greek tombs in the Cimmerian Bosphorus. Between the Winter Palace and the imposing quarters of the General Staff stretches Palace Square, with the Alexander Column, 150 feet high, whose shaft is a monolith of red granite 80 feet high. W. of Admiralty Square are the buildings of the Directing Senate and of the Holy Synod, and stretching S.W. is Peter's Square, with the Nicholas Monument and the magnificent equestrian statue of Peter the Great, and the Cathedral of St. Isaac, completed in 1859, a huge building in Renaissance style, 330 feet long, 290 feet broad, and 310 feet high, with monolithic pillars of red granite, the interior of which is marred by gaudy ornament. From Admiralty Square extends S.E. the finest street of St. P., the Nevsky Prospect, 4 miles long and 130 feet broad, lined with palaces and rows of trees, the chief promenade and line of traffic. In the Nevsky Prospect is the Imperial Public Library (1810), which in 1868 contained 1,044,045 vols., 34,178 MSS., and 85,691 engravings. No city in the world can compare with St. P. in the number of its palaces. The most noteworthy, after the Winter Palace, are Peter's Palace, an unpretentious two-storied house in the Summer Garden; the Annitchkoff Palace (1748), on the Nevsky Prospect and the Fontanka Canal, the residence of Nicholas I., now of the heir-apparent to the throne; the Marble Palace (1783), on the Great Neva, now belonging to the Grand Duke Constantine; the splendid Palace of the Grand Duke Vladimir (1871), also facing the Great Neva; the Tauric Palace in the E. of the city, built by Catharine in 1784; the fortress-like Michailoff Palace (1800), on the Fontanka Canal; the new Michailoff Palace (1825), and the Leuchtenberg Palace (1838), on the Moika Canal. After St. Isaac's, the chief churches are the Kasan Cathedral in the Nevsky Prospect, with numerous relics and military trophies, the Church of St. Peter and Paul, with a gilded spire 208 feet high, the Church of the Transfiguration, whose court is surrounded by 300 Turkish and French cannon, and the Vladimir church, with five gilded cupolas. St. P. has in all 139 churches (44 of wood) and 51 chapels, besides 30 of other denominations. The Alexander Nevsky monastery, in the E. part of St. P., incloses four churches, a considerable library, and an ecclesiastical college with 1000 students. St. P. is richly provided with scientific and practical schools. The most important benevolent institutions are the Foundling Hospital, and the Obuhoff and Nicolai Infirmaries. St. P. has no less than 25 cemeteries. There are six imperial and two private theatres. The largest are the Grand Theatre (finished 1832), holding 4000 persons, for Italian opera and the ballet; the Maria Theatre (2000), for Russian dramatic

works, and the Alexander Theatre (1700). The Ciniselli Circus was erected in 1876 at a cost of £40,625. The public gardens are numerous and tasteful. The chief are the Summer Gardens, the Alexander Park (the newest and finest), the Tauric Garden, and the Botanical and Zoological Gardens. St. P. is one of the most important manufacturing towns of Russia. In 1872 it had 621 imperial and private manufactories, with 41,164 workmen, producing goods worth £13,267,762. The manufactures include carpets, mirrors, bronze wares, locomotives, glass, porcelain, soap, leather, stearine, flax, and yarn. The trade of St. P. is also very important, though the river is only open from the middle of April to the middle of November, and a bar across its mouth prevents vessels drawing more than 9 feet of water from reaching the city. The total number of vessels entered at St. P. and its out-port Kronstadt in 1874 was 2899; and cleared, 2823. Of these 945 were English. The chief exports are corn, flax, linseed, tallow, hemp, bristles, potash, Russia leather, spirits, wood, bones, and oil-cake. In 1873 they amounted to £15,694,001, while the imports were valued at £2,339,770. St. P. has five railway stations, where the Baltic, Zarskoe, Moscow, Viburg, and Warsaw railways terminate. The district around St. P., notwithstanding the severe climate (the winter temperature averages 18° F., and has sometimes fallen as low as -51° F.), is studded with country seats and fine gardens. Further off are the Imperial pleasure-palaces of Zarskoe-Selo, Paulovsk, Strelina, Gatchina, Peterhof, and Oranienbaum, and the village of Pulkova with its famous observatory. St. P. was founded as a fortress by Peter the Great in 1703, and was declared his capital in 1712. Catharine II. made it one of the most brilliant capitals of Europe, and an important industrial and commercial centre. It grew rapidly under the government of Alexander I., who built a considerable number of bridges, and did great service by draining the swamps. The pop. of St. P. (according to the *St. P. Calendar* for 1878) is 667,963, of whom 524,329 are Russians, 45,515 Germans, 13,749 Finns, 9796 Poles, and 5001 Swedes. The Orthodox Greeks number 557,173, Protestants 76,831, Roman Catholics 20,882, Israelites 6654, Raskolniks 3138, and Mohammedans 2071. Of the pop. 54,398 belonged to the hereditary, and 40,186 to the personal nobility; 38,363 were of the military, and 207,000 of the peasant class. See *Schenswürdigkeiten von St. P.* (3 parts, St. P. 1870-71); J. Beavington Atkinson, *An Art Tour to Northern Capitals of Europe* (Lond. 1873); Mackenzie Wallace, *Russia*, (vol. ii. *ib.* 1877).

St. Peter's Port, the capital of Guernsey, Channel Islands, contains Government buildings, a college library, handsome piers, &c. There are three episcopal churches, and numerous dissenting chapels. Pop. of town and parish (1871) 16,166.

Saint-Pierre, a town in the French island of Martinique, in the W. Indies, on a bay of the W. coast, 16 miles N.W. of the capital Fort-la-France. It has a good harbour, several handsome churches, a theatre, &c., and carries on an active trade in sugar, rum, and coffee. Pop. 25,000.—**St. P.** is also the name of the second largest town in the French island of Réunion (q. v.), which has a pop. (1876) of 30,615.

Saint-Pierre-lès-Calais, a town of France, department of Pas-de-Calais, about a mile inland from Calais, has manufactures of linens, tulles, leather, beet-sugar, &c.; and a pop. (1876) of 22,349.

Saint-Pol-de-Léon, a town in the department of Finistère, France, near the coast of the inlet which receives the small river Perze, 10 miles N.W. of Morlaix. It has a grand Gothic cathedral of the 13th c., and an imposing church of Notre Dame de Creizker, dating from the 14th c. There are industries in linen, flax, hemp, wax, &c. Pop. (1876) 3503.

Saint-Quentin. See QUENTIN, ST.

Saints' Days. See SAINT.

Saint-Servan, a small seaport of France, department of Ille-et-Vilaine, at the mouth of the Rance, opposite to St. Malo, with which it is connected by land at low-water. It is a new town with two harbours, the largest of which is Port Solidor, and is much frequented as a watering-place. An Anglican chapel was built here in 1875. It has shipbuilding and trade in timber. Pop. (1876) 9912.

Saint-Simon, an ancient French family, whose family name

was derived from a seignury in Vermandois. Its two most famous members were—(1) **Louis de Bouvroi, Duc de S.-S.**, born at Versailles January 16, 1675, entered the army when scarcely sixteen, and distinguished himself on several occasions during the war of the Augsburg League. Disappointed of a brigadier-generalship, he resigned his commission in 1702, and on the death of Louis XIV. he aided the Duc d'Orleans in seizing the regency, and was himself appointed a member of the regency council. S.-S. was a staunch Jansenist, opposed the Jesuits, warned the people against the financial schemes of Law, and strove to counteract the machinations of Dubois. On the death of Orleans and the accession to power of Louis, the old *grand seigneur* retired from politics, and occupied his remaining years in writing his *Mémoires*. He died March 2, 1755, at Paris. He had ordered that his inimitably graphic *Mémoires* should not be printed for forty years. Fragments of them first appeared in 3 vols. 1788, followed in 1789 by 4 supplementary vols. The first complete edition is that of 1829-30, in 21 vols., printed by command of Louis XVIII. The best is that of Chéruel, with introduction by Sainte-Beuve (20 vols. 1856-57; new ed. by Chéruel and Regnier, 20 vols. 1872 *et seq.*) English selections by Bayle St. John were published in 4 vols. 1857; new ed. 3 vols. 1876. See Pontalis, *Discours sur la Vie et les Œuvres de S.-S.* (1855), and Chéruel, *S.-S. Considéré comme Historien de Louis XIV.* (Par. 1865).—(2) **Olaude Henri, Comte de S.-S.**, grand-nephew of the preceding, born at Paris, October 17, 1760, entered the army and was made a captain before the age of seventeen. In 1779 he went to America, fought under Bouillé and Washington, was made prisoner with the Comte de Grasse in 1782, and on the conclusion of peace returned to France, obtaining a colonelcy in his twenty-third year. After visiting Holland and Spain he arrived in Paris just in time to witness the outbreak of the great Revolution. He says that he took no part in the stirring events which followed, but remained an interested spectator. At anyrate he adopted the plain name of Citizen Bonhomme, and in partnership with Baron von Redern he made enormous profits by buying and selling confiscated or national property. But in 1797 Redern quarrelled with his partner, and managed to get quit of him for £6800. With this little fortune S. S. began the real study of sociology. He studied the whole circle of the sciences until perfectly acquainted with all, in his own estimation; he married, just as an experiment, and ere long obtained a divorce; he gambled, and played the debauchee; he gave balls and dinner-parties in rapid succession; he attempted to realise old age artificially by means of medicaments, and even inoculated himself with contagious diseases. His scheme of human existence was—(1), To spend one's vigorous youth in a manner the most original and active possible; (2) to gain a knowledge of all human theories and practices; (3) to mingle with all classes of society, placing one's self in all possible situations, and even creating situations that do not exist; (4) to spend one's old age in resuming one's observations, and in establishing principles. £6800 was too small a provision for such a programme, and in 1808 S.-S. at the age of forty-eight was glad to receive a clerkship in the government pawn-broking office, with a yearly salary of £40. The charity of friends supported him in misery, and precisely when his circumstances were most wretched he pursued his socialistic dreams most enthusiastically. In his *Lettre d'un Habitant de Genève à ses Contemporains* (1803), he had propounded a compendium of his system as follows: 'The spiritual power in the hands of the savans; the temporal power in the hands of the men of property; the power of naming the individuals called to perform the functions of leaders, in the hands of the masses; for salary to the governing class, the consideration which they receive.' This system, still more briefly put by its author thus, 'To each man a vocation according to his capacity, to each capacity a recompense according to its works,' he continued to elaborate, with many extravagances, in the *Introduction aux Travaux Scientifiques du Dix-neuvième Siècle* (1807); *Prospectus d'une Nouvelle Encyclopédie* (1810); *Réorganisation de la Société Européenne* (1814); *Opinion sur les Mesures à Prendre contre la Coalition de 1815*, and *L'Industrie, ou Discussions Politiques, Morales et Philosophiques* (4 vols. 1817-18). The last three works were in part written by Augustin Thierry, his disciple. His *Opinions Littéraires, Philosophiques, et Industrielles* (1820), *Système Industriel* (1821), and his *Catéchisme des Industriels* (1824), continued the exposition of his doctrines, which were formulated in his great work *Le*

Nouveau Christianisme (1825), and kept before the eyes of the public in a journal called *La Producteur*. This strangely philanthropic egotist, who believed that he had transformed society into a church universal, developed Christianity to its final issues, and accomplished the salvation of the world, died on the 19th of May 1825. His last words were:—"It has been imagined that all religion whatever ought to disappear; but religion cannot disappear from the world; it can only change its form. Do not forget that in order to do great things one must be enthusiastic. My whole life sums itself up in a single thought—"To assume to all mankind the freest possible development of their faculties." "The future is ours." The same thought is expressed in his well-known saying, 'The golden age is before us, not behind us.' It was more than the contagion of an insane enthusiasm that drew around St. S. such men as Comte, Thierry, Rodrigues, Bazard, Enfantin, Armand Carrel, Michel Chevalier, Barrault, and Talabot. In 1831 these founded the *Globe* newspaper, which disseminated the broadest socialism throughout the land. Soon, however, the Saint Simonian Church was torn by schism. The two leaders, Bazard and Enfantin, fell out regarding the emancipation of women, and Enfantin continued to head the old society on the principle of the equality of the sexes, and proclaiming almost perplexedly that 'the only position of the true Saint Simonian with regard to woman is to declare his incompetence to judge her.' Enfantin finally made it the aim of his association to find a woman of genius who would reveal a new future to humanity; balls and fêtes were given to all the fair Parisiennes. These eagerly came, but among them no inspired prophetess; and the funds of the society being dissipated, the *Globe* was abandoned and the Saint Simonian establishment in the Rue Monsigny—a sort of socialist monastery—broken up. Enfantin and about forty others formed themselves into a band of mystics, who entered their meditations in a manuscript called *Le Livre Nouveau*. These meditations were shaped into a body of rhythmical metaphysics, or, as Reybaud puts it, 'an algebra of religion,' expressed in Biblical language. But in August 1832 this association was dispersed before the Cours d'Assises. His *Œuvres Complètes* were published at Paris (20 vols. 1865-69). See *Essai sur la Doctrine de St.-S.*, prefixed to his *Œuvres Choisies* (Bruss. 1859); Hubbard's *St.-S.* (Par. 1857); and Fournel's *Bibliographie Saint-Simonienne* (Par. 1833).

St. Thomas, one of the Virgin Islands, and one of the three Danish possessions in the W. Indies. Area, 45 sq. miles; pop. (1870) 13,854, of whom one-twelfth are whites. The island is formed by a volcanic ridge, extending E. and W., and attaining a height of 1480 feet. It is girt by barren rocks or 'keys,' and about 2 miles N.E. lies the almost deserted and harbourless island of St. John's, with a pop. (1870) of 1054. To the W. 37 miles is Porto Rico, and 40 miles S. is the Danish St. Croix. The light sandy soil of the island, though it has been proved capable of producing grapes, oranges, cotton, ginger, &c., now (1878) only yields a few inferior vegetables, a little bad fruit, and some Guinea grass. The town of St. T. had a pop. (1870) of 11,681, but is only noteworthy on account of its excellent harbour, which is of the first importance as a calling station for mail steamers, a coaling port, and a refuge for vessels in distress. A floating dock, completed in December 1875, is 250 feet long by 70 broad, with a draft of 20 feet. In 1876 there entered 3519 (29 in distress) vessels, and cleared 3655; while of these, British vessels numbered 1250, with an aggregate of 360,000 tons, and the imports (coal, drygoods, spirits, &c.) amounted (1875) to £911,842.

St. Thomas (Port. *São Thomá*), an African island belonging to the Portuguese, lies in the Gulf of Guinea. Area, 140 sq. miles; pop. (1875) 29,441 (1000 whites and mulattoes). Of volcanic origin, S. T. is rugged and densely wooded, but very unhealthy. Sugar as the principal crop has recently given place to coffee. Cabinet woods of fine quality are also among the exports. The chief town, S. T. or Chavres, is a bishop's seat, and has some 4000 inhabitants, including a garrison (1875) of 27 officers and 399 men.

Saint Thom's Mount, a town in the district of Chingleput, Madras, British India, 10 miles S. W. of Madras city. Pop. (1871) 15,490. It is generally known as 'the Mount,' and contains the headquarters of the Madras artillery. It must not be confounded with St. Thomé or Mailapur, a little port about 7 miles further N., which has now been included within the

suburbs of Madras city. Both these spots lay claim to be the scene where St. Thomas, the apostle of India, suffered martyrdom, and are accordingly much frequented by Oriental Christians.

St. Vincent, one of the British W. Indian islands, 100 miles W. of Barbadoes, has an area (according to the new Statistical Abstract, &c. 1877) of 147 sq. miles and a pop. (1871) of 35,688, of whom 2500 are whites. It is picturesque and fertile, and is traversed from N. to S. by a volcanic range, which attains its greatest height of 3000 feet in La Soufrière. The climate is hot and humid, but not unhealthy. Two-fifths of the whole area are under cultivation, and the chief exports are sugar, rum, and molasses. In 1874 the total exports amounted to £188,916 (£123,752 of sugar alone), and the imports to £160,772, while the public revenue was £27,441 and the expenditure £29,788. The vessels that entered and cleared the ports in 1874 had an aggregate tonnage of 79,901 tons. The chief town is Kingston (q. v.).

St. Vincent, Cape, a lofty headland in the S.W. of Portugal, noted for the naval victories gained there. In 1693 Admiral Rooke was defeated by the French, in 1780 Admiral Rodney defeated the Spaniards, and on the 16th of February 1797 Admiral Sir John Jervis scattered the Spanish fleet in a great battle, ever since known as *the battle of C. St. V.*

St. Vitus' Dance. See CHOREA.

Sa'is, now called **Sa-el-Hagar** ('Sa of the Stone'), a city of ancient Egypt, in the Delta, on the right bank of the W. or Canopic branch of the Nile. The modern village lies somewhat to the S. of the mounds of ruins. At the village itself are some remains of a thick brick wall. The 24th, 26th, and 28th dynasties of Manetho originated here. S. was also a religious centre of ancient Egypt, and its colleges were famous for the learning and sanctity of their priests. It was much visited by the Greeks, and had even a considerable resident Greek population.

Sais'an. See ZAISAN.

Sakhalin (native name *Taraika*), an island belonging partly to Russia and partly to Japan, lying opposite the mouths of the Amur, and separated from Yesso by the straits of La Perouse, and from Asiatic Russia by the Channel of Nevelski and the Channel of Tartary. Area, 22,642 sq. miles; pop. 13,000 (Russians, 3000; Japanese, 3500; Giliacks, 3000; Ainu, 3000; Orokovs, 400; Chinese, 100). Although pronounced an island by La Perouse in 1787, it was laid down on English maps as a peninsula until 1857, the separating straits of Mamio Rinzo, 4 miles in width, having been surveyed by Captain Nevelski in 1852. The island, from Cape Elizabeth in the N. to Cape Crillon in the S., is 514 miles long, with a breadth varying from 78 to 17 miles. A range of hills (2000 feet), called in the N. Vakazey, extends down its whole length, and is generally covered to the top with thick forests. In the middle is a parallel range, the Tiara Mountains. In the S. half the highest points are Koshka, Bernizet, and Ichara (4000 feet). The principal rivers are the Poronai and Timir, which rise near each other and flow the one to the N., and the other to the S., the latter falling into Tarpenia Bay. The lakes are mostly small, and united with the sea by deep narrow channels. The largest are Lake Tunaicha, 37 sq. miles, Lake Taraika, 28 sq. miles, and Lake Baikal, 23 sq. miles. S. is rich in timber, especially along its W. shores, and has rich deposits of a coal containing 60 to 70 per cent. of pure carbon. The mines at Dui and Sertunai are worked by the hard-labour exiles. The chief articles of export are fish (to Japan) and skins; 24,000 otters', 1300 sables', and 6000 foxes' skins being exported annually. The mean temperature of S. at Kusunai, in lat. 48°, is 34° F. The hottest month, July, has a temperature of 62° F., and the coldest, January, of 14° F. The principal Russian stations are at Korsakoff, Mouravieff, Dui, Sertunai, Kusunai, and Takoi; the Japanese live in the S. part of the island, and have their principal stations on the W. shore, near Manka Bay and Siranusi, near Cape Crillon. The latter have also erected posts at all the Russian points S. of 48° lat. The Giliacks inhabit the N. part of the island, and the Ainu the S. part, from 50° lat. See *On the Island of S.*, by Colonel Veniukof (translated from the Russian *Voyenni Sbornik* by Captain Spalding), in the *Journal of the Royal Geographical Society*, vol. xlii. (1872); and J. M'Carthy's abstract of the *Kisa Yoo Dsuetsu* ('Illustrated Descriptions of Japan'), by Mamia Rinzo (pub. 1855), in the *Geographical Magazine* for August 1878.

Sakhalin-Ula-Ohoton, the Manchurian name of the place known to the Chinese as **Hai-lun-tai-an**, and properly called **Aigun**, lies on the right bank of the Amur, not far from Blagovestchensk, the capital of the Russian possessions on that river. It is surrounded with palisades, has a citadel, is the seat of a Chinese governor, and the headquarters of the Chinese 'flotilla of the Amur.' S. has considerable trade. Estimated pop. (1868) 5000. Here, May 28, 1858, a boundary treaty between the Russians and Chinese was concluded.

Sakhya-muni, ('the hermit of the tribe of Sakhya'), the name by which Gautama, the founder of the Buddhist religion, is best known in India at the present day. His father was rajah of a small colony of Aryans, whose tribal name was Sakhya. See **BUDDHISM**.

Sak'i, or **Sak'e**, a kind of beer or fermented liquor prepared from rice grain, and constituting the national beverage of Japan, where it is largely consumed. The liquor is prepared by an elaborate series of steaming, fermenting, and mashing of rice, the product of a number of such operations being mixed in the mash tun and finally fermented in large vats. The fermented mash is strained and pressed through bags, and the liquor, when cleared by settling, is run off, heated, and filled into large butts for use. S. is drunk hot by the Japanese at their meals. In 1874 there were 6,501,083 hectolitres of S. made in Japan, with 127,446 hectolitres of inferior fermented liquor, 60,557 of distilled spirit, and 56,712 of sweetened spirit.

Sakkhar, a town of Scinde, district of Shikarpur, British India, on the right bank of the Indus, 330 miles N. of Kurrachi. Pop. (1872) 13,318. It has a large transit trade. In the neighbourhood are many tombs and mosques, and a leaning minaret of brick, 100 feet high, built in 1607.

Sal is the vernacular for *Shorea robusta* (*Dipterocarpea*), a large tree, generally gregarious, occupying two extensive, but irregular, fairly defined belts in India separated by the Gangetic plain. The heart-wood is dark-brown, coarse-grained, hard, heavy, strong, and tough, with a remarkably fibrous and cross-grained structure. Its durability is considerable, but not equal to that of teak. For buildings, gun-carriages, river-boats, and railway sleepers it is the most important timber of N. India. The tree when tapped exudes large quantities of a whitish aromatic transparent resin or dammar, used to caulk boats and ships, and also for incense. Large forests have been destroyed by the process of tapping the trees.

Sala, **George Augustus Henry**, an English journalist of Italian parentage, was born in London in 1828. He early began to write for Dickens' *Household Words*, contributed the Hogarth papers to the *Cornhill Magazine*, was correspondent of the *Daily Telegraph* (1863-64) during part of the Civil War in the United States, and in the Franco-German War of 1870-71, founded and first edited *Temple Bar*, and still (1878) records the 'Echoes of the Week' in the *Illustrated London News*. Of his many humorous stories and sketches, all characterised by ceaseless vivacity, the best are, perhaps, *Twice Round the Clock* (1859), *Accepted Addresses* (1863), and *Adventures of Captain Dangerous* (1863).

Salaam, an Arabic word meaning 'peace, safety.' It is universally used throughout India as a form of salutation on meeting or parting—such as *salaam-ali-kum* = 'peace be with you.' Among Europeans the word has come to express specially the reverent homage which is paid in the East by an inferior to a superior.

Sal'ad is the general name for numerous vegetables eaten in a green state, either with or without the admixture of oil, vinegar, and other ingredients. The principal plants thus used are lettuce, endive, celery, succory, cucumber, radish, onion, sorrel, beetroot, among those of larger growth; and among the smaller, cress, mustard, and rape (used when in seed-leaf), lamb's lettuce, water-cress, chervil, purslane, &c. In France the variety of S. herbs in common use is much greater than in England, and the skill in preparation is more marked. It is necessary to bestow care in cleansing the herbs to avoid the introduction of entozoa into the body; and to secure a juicy and crisp consistence the plants must be 'morning gathered,' and not when drooping after a hot sun. S. herbs are beneficial not only

because they are comparatively rich in potash salts, but because they introduce large quantities of water into the system.

Sal'adin, as the Westerns have termed **Malek Al-Nasser Salah Ed-Din Abu-Mojafer Yusef**, was born in the castle of Tecrit, on the Tigris, in 1137. He was the son of Ayub, a Kurd in the service of Nouredin of Syria, and in the employment of that sovereign fought through three campaigns in Egypt, winning a great name by his skilful defence of Alexandria. On the death of his uncle, Shirkoh, he became grand-vizier to Nouredin; and when Nouredin died in 1174, S. seized Egypt. His first care was to secure his position by defeating Nouredin's youthful heir in several great battles; and in four years he had mastered southern Syria and a large portion of Mesopotamia. By the year 1185 his empire extended from Tripoli in Africa to the Tigris, and from Yemen on the Arabian Sea to Taurus. He now assumed the title of Sultan, and turned his arms against his only remaining foes, the Christians. Picking a quarrel with the freebooter Reginald de Chatillon, he inveigled the Latins into a pitched battle at Hittin (July 1187), and routed them entirely, killing 30,000 men. Guy de Lusignan, king of Jerusalem, though taken captive, was treated courteously, but Reginald was decapitated. Acre, Ascalon, and other important cities quickly gave way to the Sultan, and on October 2, 1187, Jerusalem surrendered after a siege of two weeks. The news inflamed Christendom; and the Third Crusade was undertaken. Richard Cœur de Lion, at the head of French and English, twice defeated S., captured Jaffa and Caesarea, and in 1192 obtained a treaty of peace for three years, with protection and privileges to the Christians. Saladin died in the following year. He was a chivalrous warrior and a wise sovereign—undoubtedly the greatest Kurd that ever appeared in history. The Ayubite dynasty which he founded held sway in Syria till 1259 and in Egypt till 1250. See Gibbon, *Decline and Fall of the Roman Empire*; Marin, *Hist. de S.* (Par. 1763); Reinaud, *Notice sur la Vie de S.* (Par. 1874).

Salado, a tributary of the Purana, rises in a spur of the Andes, and after flowing 600 miles S.S.E. through the Argentine Republic, joins the main river below Santa Fé. It forms the southern limit of El Grand Chaco, and is in great part navigable for small vessels.

Salaman'ca, a town of Spain, capital of the province of S., situated between and on three small hills on the right bank of the Tormes, a feeder of the Douro, 83½ miles S.W. of Valladolid by rail. It is still surrounded by a wall which is pierced with 9 gates, and the river is crossed by a bridge of 27 arches built on Roman foundations. The streets are narrow and crooked, but contain many fine old houses which present an antique and imposing appearance. The town suffered much from the violence of the French, who on their retreat in 1812 left its western part almost entirely in ruins. The Plaza Mayor is the largest square in Spain, being capable of accommodating as a plaza de toros from 16,000 to 20,000 persons. The finest buildings are the two cathedrals, the older of the 12th c., and the later in the florid Gothic style, begun 1513, finished 1734; the Seminario, or former Jesuit college, in the Florentine style; the former Dominican monastery with 200 cells and a noble church; and the University, a fine Gothic quadrangle founded in 1200, and incorporated with the University of Palencia in 1243. It had in the 14th c. 14,000 students, and in the 16th c. 7000, though the attendance has now sunk to 600. It consisted of 21 smaller colleges (*colegios menores*), all of which are now ruined, and 4 superior colleges (*colegios mayores*) which still remain, viz., San Bartolomé, the oldest, hence known as El Colegio Viejo, modernised in 1767; Colegio de Cuenca, in the Cinque-cento style, now in great part ruined; the Colegio de Santiago, or El Colegio del Arzobispo, in the Cinque-cento style, begun 1521; and the Colegio del Rey, commenced in 1625. The University library has 250,000 vols. and 1500 MSS. S. has manufactures of cloth, hats, leather, and earthenware. Pop. (1877) 16,292. S. was a municipium under the Romans, by whom it was called *Salmantica*. Near it the French under Marmont suffered a disastrous defeat from the British under Wellington, July 22, 1812.

Salaman'der, in the superstition of the Middle Ages, an animal whose element is fire. Theophrastus Paracelsus (q.v.) includes the S. or 'Vulcan' among the '*Sagana*,' or 'Elementary spirits.' Randle Holme, in his *Academy of Armory and Blazon*, describes it as 'a creature with four short feet like the lizard, without ears,

with a pale white belly, one part of the skin exceeding black, the other yellowish-green, both very splendid and glittering, with a black line running all down the back. The skin is rough and bald; they are said to be so cold that they can go through the fire, nay, abide in it, and extinguish it, rather than burn.' Benvenuto Cellini (q. v.) says in his Autobiography that when he was about five years of age his father one day showed him a S. in the fire. In the diverting work *Le Comte de Gabalis*, by the Abbé Montfaucon de Villars, from which Pope derived the hint of his 'machinery' for the *Rape of the Lock*, it is said that the S. is 'composed of the most subtle parts of the sphere of fire, conglobated and organised by the influence of the universal fire, so called because it is the principle of all the motions of Nature. . . . If we would recover our empire over the salamanders'—lost at the fall of Adam—'we must purify and exalt the element of fire that is in us. For this there is no more to be done but to concentrate the fire of the world by concave mirrors in a bowl of glass; and this is the operation which all the ancients have religiously concealed, till divine Theophrastus revealed it.'

Salamander, the name given to certain newts or Amphibian *Urodela*, credited in classic ages with venomous powers, and still regarded with suspicion by the ignorant. Pliny placed a S. in the fire and found it to be consumed, but the popular idea of the S.'s powers of resisting incineration survived for many centuries after. Salamanders form a distinct family (*Salamandridæ*). None of the members occur in Britain, but one species, the spotted S. (*S. maculosa*), about 6 or 7 inches in length, is found in S. Europe, and a well-known species the Alpine S. (*S. Alpina*) inhabits dry places in the Alpine range. The tail is cylindrical, and the skin warty; the glands secrete a watery fluid, the rapid excretion of which may have inspired the belief of the S.'s powers of quenching fire. The palatine teeth are arranged in a double series. The head is broad and the tongue well developed. The S. closely resembles the lizard, from which, however, it is to be carefully distinguished. It brings forth its young alive (*ovo-viviparously*), and the young are provided, as in all *Amphibia* (q. v.), with gills, which are afterwards cast off when lungs are developed. The young of the Alpine S. shed their gills before birth, a curious adaptation to the want of water in their native districts.

Salamis (mod. *Kuluri*), an island of Greece in the Gulf of Aegina, near Athens, 10 miles long by 10 broad. It originally formed an independent state, and contributed its quota to the Greek fleet in the Trojan war. Subsequently it was conquered by Sparta, Athens, and Macedonia. Off S. was fought the famous naval battle between the Persians and Greeks, 480 B.C., in which the former were completely defeated.

Sal Ammoniac. See HYDROCHLORATE OF AMMONIA.

Sal Volatile. See AMMONIA.

Salang' or **Thalang'** (called by Europeans Junk-seylon), an island on the W. coast of the Malay peninsula, within the kingdom of Siam. Formerly a place of considerable trade, and the seat of a French Christian mission as early as 1670, it was conquered and desolated by the Burmese in 1809. Within the last five years it has become an important centre of tin-mining industry. The pop. is estimated at 32,500, of whom 27,000 are Chinese miners. The exports of tin are about 100,000 *pikuls* (one *pikul* = 133 lbs.). The title of the Siamese governor is Phya Puket. The chief town is Puket or Tongkah, with a harbour at which more than twenty steamers call every month.

Salar Jung Behaudur, Sir, G.C.S.I., the prime minister of the native State of Hyderabad, or the Nizam's dominions, in India. His personal name is Mir Turab Ali; and among his titles are Salar Jang, Mukhtar-ul-Mulk = leader in battle, governor of the country. He has been since 1853 Diwan or Vizier, in which capacity he presides over the administration of the country in all its branches, without much opposition from any quarter; and since 1869 he has been one of the two co-regents for the infant Nizam. His loyalty to the British was conspicuous during the Mutiny of 1857; and in 1876 he paid a visit to England as the guest of the Duke of Sutherland. His position may be said to be tending to become hereditary, and two of his nephews now superintend the Departments of Revenue and Public Works.

Saldanha, Oliveira e Daun, João Carlos, Duke of, a Portuguese statesman, grandson of the Marquis de Pombal, was

born at Lisbon, November 17, 1791. He was educated at the College of Nobles in Lisbon and the University of Coimbra, and after filling several minor posts was appointed minister for foreign affairs by João VI. in 1825. Next year he became minister of war, but resigned in 1827. He led the insurgents at Oporto in the war against Dom Miguel, and on his defeat retired to England. Returning to Portugal with Dom Pedro in 1832, he became his generalissimo, and took Oporto in 1833 and Lisbon in 1834, receiving the capitulation of Dom Miguel at Evora in the same year. He now joined the opposition, and took part in the conservative attempt at a revolution in 1836, after which he was again obliged to retire to England. Recalled in 1836, he became chief minister; was displaced in 1849, but recovered his power in 1851, and maintained it after the accession of Pedro V. (1853) till 1856, when he again became leader of the opposition. Recovering from the severe illness which led to a false report of his death (1861), he acted as ambassador at Rome, 1862-64 and 1866-69, and at Paris 1869. On the 19th May 1870 he marched up with a considerable force to the Ayuda Palace at Lisbon, and obliged the king to dismiss his minister, the Marquis de Loulé, and appoint himself in his place. His administration lasted until September 13, 1871. In the following month he went as ambassador to London, where he died November 21, 1876. His body was conveyed in a Portuguese vessel of war to Lisbon, where he was buried with great pomp in the Royal Pantheon of San Vicente.

Saldanha Bay is on the W. coast of Cape Colony, 80 miles N. of Cape Town. It is a magnificent natural harbour, being easy of entrance, deep, roomy, and sheltered, but its shores, owing to the total absence of fresh water, are desert and uninhabited. The bringing of a supply of water from the Berg river has been long projected, but, though easy of accomplishment, the work has never been commenced, and the finest harbour in S. Africa remains unutilised in consequence.

Sale. In English law, an article sold becomes the property of the purchaser, on completion of the contract of S. In Scotch law, the right of property remains in the vendor until the subject of contract has been delivered to the vendee. The distinction is important, in case of bankruptcy. See REPUTE OWNERSHIP, MARKET OVERT, GOODS, PURCHASE AND SALE OF.

S. or Return.—When goods are sold upon S. or return, no right of property rests in the conditional vendee, and the S. of them by him, contrary to terms agreed on, renders him liable to pay damage. Yet, in the event of the consignee's insolvency, goods so consigned would fall to his creditors.

S. of Horses.—A purchaser acquires no property in a horse which has been stolen by the vendor, according to the general rule of law that no one can give another a better title than he himself possesses. If the S., however, be in open market, in which the horse has been kept for at least one hour, the purchaser acquires a good title. A warranty of soundness does not imply a guarantee against injury, easily and wholly curable. A contract of exchange is the same as a contract of S.; but delivery, on one side at least, is essential as proof of the agreement.

S. of Real Estate.—The law, as a general rule, affords no redress for oversights in the purchase of estates, when these might have been avoided by ordinary judgment and vigilance. But if the vendor knowingly conceal *latent* defects, either regarding the estate or its title, he cannot compel execution of the contract (see FRAUD). From the moment of S., the vendee becomes owner of the property; and, consequently, from that time entitled to any profit and subject to any loss which may accrue from it. In trust estates, the purchaser is bound to see to the application of the purchase-money, according to the terms of the trust, unless released from that obligation by its terms. Persons holding an official position, adverse in case of S. to those interested in the subject, are generally legally disqualified from purchasing it. Contracts of S. must be in writing, with terms of agreement fully stated. 8 & 9 Vict. c. 119 regulates the conveyance of real property in England, and abbreviates the form.

Sale, George, the well-known Orientalist, was born in Kent between 1680 and 1700, was educated at King's College, Canterbury, and became a lawyer. He aided in the publication of the *Universal History*, and wrote the introductory portions in a reverential though somewhat rationalistic spirit. He also wrote

for the *General Dictionary*, and assisted in starting several learned societies in London. His fame rests chiefly on his translation of the *Koran* (1734), with dissertation and notes. The latest reprint of this invaluable work—by far the best translation of the *Koran*—is by F. Warne & Co., in the *Chandos Classics* (1877). S. approached the study of the anti-Christian religions in a more liberal and appreciative spirit than was prevalent in his day, and with a singularly wide knowledge of Oriental literature, history, &c. He died 14th November 1736. His valuable collection of Oriental MSS. was purchased for the Radcliffe Library, Oxford.

Sale, Sir Robert Henry, a distinguished British general, was born in 1792, and entered the army at the age of thirteen. He led the storming party against the stockades at Kemendeen, near Rangoon, in the first Burmese war of 1825, and also was conspicuous at the storming of Ghuzni, in the Afghan war of 1839. When the British force was destroyed at Cabul, he fortified himself at Jellalabad, where 'the illustrious garrison' held out from 12th November 1841 to 7th April 1842, when relieved by General Pollock. S. was killed at the battle of Mūdki (q. v.), 18th December 1845. See Greig, *S.'s Brigade in Afghanistan*.

Salem, the chief town of the district of the same name, in the Madras Presidency, British India, on the right bank of the Tyromany River, 207 miles S.W. of Madras by rail, and 70 N.W. of Trichinopoly. It is an improving town, with many brick houses; and there are manufactures of cotton and silk cloth. Pop. (1871) 50,012.—The district of S. consists mostly of a tableland among the E. Ghauts. Area 7483 sq. miles; pop. (1871) 1,966,995. It is bounded S. by the Cauvery River, and traversed by the Palar and Pennar. It contains the Shevaroy Hills, which have an excellent climate. The products are rice, maize, *ragae*, cotton, tobacco, and coffee. Iron ore is worked, and saltpetre is collected. The district suffered severely in the famine of 1877.

Salem, a town and seaport of Massachusetts, U.S., 14 miles N.W. of Boston by rail. It was formerly a leading commercial town, and carried on a large trade with China and the E. Indies. Its trade now consists chiefly in the exportation of coal, and in the manufacture of leather, cotton, and jute. The chief institutions are the Essex Institute and the Peabody Academy of Science, which have each good libraries. There are seven papers, two semi-weekly and three weekly. Pop. (1870) 24,117; (1876) 26,430. S. was the scene of the famous witchcraft delusion of 1692, and here in 1774 the state of Massachusetts first resolved itself into a sovereign political power.

Salem, the capital of the State of Oregon, U.S., on the Willamette River, 50 miles S. of Portland by rail. It has eight churches and four newspapers, and is the seat of a university. Near it are situated the State penitentiary, and the State institutions for the deaf, dumb, and blind. The falls of Mill Creek afford good water-power, but the manufactures are as yet small. Pop. (1870) 1139; estimated in 1875 at 6000.

Salemi (Arab. 'place of delight'), a town of Sicily, province of Trapani, 48½ miles S.W. of Palermo, with a considerable trade in wine and oil. It is commanded by a ruined castle of Arabo-Byzantine architecture. Pop. (1874) 14,096.

Sal'ep (Mod. Gr. *salepi*, Pers. *sahaleb*) is a nutritious substance, consisting chiefly of bassorin, some soluble gum, and a little starch, obtained from various species of *Orchidaceae*, and forms, when prepared with water or milk, a demulcent and emollient drink. The ordinary S. of commerce consists of the tubers of the wild *Orchis mascula* and several allied species, dipped in boiling water for a few minutes, and quickly dried. For dietary purposes the dried tubers are reduced to powder. The bulk of that imported to Western countries comes from Smyrna. The tubercular roots of several species of *Eulophia* furnish the S. of Cashmere and of the Neilgherries.

Salerno (anc. *Salernum*), a town on the W. coast of Italy, in the province of S., 34 miles S. of Naples by rail. It is the seat of an archbishop, and has 18 churches, 19 monasteries, a *peum*, and a fine Marina or quay, a mile long, at the end of which is a large theatre. The Gothic cathedral of San Matteo, founded in 1084, though 'restored' in 1768, is still very interesting, and has valuable pillars, sarcophagi, &c., and the tombs of St. Matthew, Margaret of Anjou, Gregory VII., &c. S. has a monument to Carlo Pisacano, the 'precursor of Garibaldi.'

The neighbouring country is rich in oranges, palms, vines, &c. There are a number of paper-mills, and some silk and cotton looms. Pop. (1877) 29,969. S. first rose into importance during the Middle Ages. It was held in the 9th and 10th centuries, first by the Saracens and then by the Lombards, and in the 11th c. by the Normans. Robert Guiscard, the Norman, founded the castle whose ruins now overlook the town, the cathedral, and the medical school, the latter of which continued to flourish after the houses of Hohenstaufen and Anjou became masters of the place, and was for a long time the most famous in Europe.—Gulf of S., anciently the *Sinus Pasticus*, measures 36 miles between Points Campanella and Della Licosa. The only towns now on it are Amalfi and S.

Sales, St. Francis of. See FRANCIS, ST., OF SALES.

Salford, a municipal and parliamentary borough of Lancashire, nominally separated by the Irwell from Manchester, of which city it virtually forms part, although possessed of separate jurisdiction. Apart from Manchester it returns two members to Parliament, and has a pop., according to the Registrar-General's estimate for 1877, of 162,978. Its town-hall was enlarged in 1874, and it has three public parks, of 16, 15, and 13 acres respectively, opened 1876-77. The Free Museum and Library, visited since their foundation in 1849 by 14,000,000 persons, have been enlarged by the addition of a N. wing (1852), a S. wing (1857), a portico (1864), and the Longworthy Gallery (1878), their total money value, exclusive of the last, being set down at £42,000. See MANCHESTER.

Salian Priests (Lat. *salii*, 'the lepers' or 'dancers'), a college of twelve priests, instituted by Numa (q. v.), at the close of whose reign an *ancile* or shield fell from heaven and warded off a pestilence. Lest this shield should be stolen, Numa had other eleven made exactly the same, and appointed the S. P. to keep them. They were priests of Mars Gradivus, and celebrated his festival annually on 1st March, with great dancing and singing, after which they partook of a sumptuous feast in the temple of Mars on the Palatine. Tullus Hostilius is credited with the foundation of another college of twelve Salii, but this less famous body was probably distinguished from the other chiefly by being chosen from a different tribe. The S. were always patricians.

Salicine (C₁₂H₁₂O₆) is a bitter substance extracted from willow bark by boiling it in water. It is sparingly soluble in cold water and insoluble in ether, but dissolves readily in boiling water and in alcohol. It is the chief member of the class of substances known as *Glycosides* (q. v.).

Medicinal Properties of S.—S. has been employed in medicine for several years as a simple bitter, but is now used chiefly in acute rheumatism, its therapeutic action being manifested in lowering the temperature and diminishing the length of the disease. In such cases S. should be given in 15 gr. doses every two hours. *Salicylic acid* is a powerful disinfectant and antiseptic. It is three times more powerful than carbolic acid in preventing fermentation. Its antiseptic properties seem to be confined to the acid itself.

Sal'ic Law was an ancient law of the Salian Franks (see FRANCE), by which males only could inherit certain lands. The principle of excluding female succession came to be extended to the crown of France, and has been invariable in the history of that nation.

Sal'ient, in geometry, is the name given to any angle less than two right angles. Hence in any polygon the salient angles project outwards, the re-entrant angles inward. In the same sense, the term is applied in fortification to the projecting angles of a fortress.

Sal'ient (Lat. 'leaping'), in heraldry, is applied to animals to signify that they are in the act of leaping or springing. Thus a lion S. is erect upon his hind-legs, with his tail and both fore-paws raised.

Saliferous System, a disused term for the Triassic formation (q. v.), which originated in the fact that that system yields all the *British* deposits of salt.

Sal'ifiable Base, a term sometimes used in chemistry to denote those substances which, like metallic oxides, combine in definite proportions with acids to form salts.

Sal'ina, one of the Lipari Islands (q. v.).

Saline Plants. Among the influences affecting the distribution of plants, with the exception of climate, heat, and moisture, none is more potent than the sea. Excluding Algæ or sea-weeds, and a number of phanerogamic sea-grasses which are subaqueous along the coasts, belonging to the genera *Halophila*, *Zostera*, *Cymodocea*, *Thalassia*, &c., and numbering twenty-six species, we find a large group of plants of diverse natural orders that flourish *only* when subjected to the influence of a soil impregnated with, and an atmosphere laden with, saline particles. Others, again, that seem to relish these conditions, have a constitution enabling them to thrive also when situated in inland localities. Both are ordinarily spoken of as S. P. Of the first, the samphire, the saltworts, the sea-blites, the sea-holly, and the sea-convolvulus are familiar examples; and of the second may be mentioned the scurvy-grass, the thrift, the sea-campain, the sea-plantain, the tamarisk, the rosemary, the beet, the celery, the seakale, and many others. As a rule, seaside plants have succulent stems with thick, fleshy leaves, whilst those inhabiting the saline plains of Asia and S. America are often hard and spiny. Reckoning the British flora at 1670 species of flowering plants and ferns, about 70 of these may be classed as saline plants, and a large proportion bear the specific name *maritima* or *marina*.

Saline Powder, Com'pound, may be prepared by drying to a gentle heat and then pulverising 4 oz. of pure chloride of sodium, or common salt; 4 oz. of sulphate of magnesia, or Epsom salts; 3 oz. of sulphate of potash; and 4 oz. of the sulphate of soda. The salts should then be mixed and triturated together, and kept in an air-tight bottle. Dose, 2 or 3 drachms, dissolved in half a pint of water. Effervescent saline powder may be prepared thus:—Take half an ounce of carbonate of magnesia, and an ounce of each of the following substances—viz., sulphate of magnesia, bicarbonate of soda, tartrate of soda and potash, and tartaric acid. Expel by heat the water of crystallisation, and mix. Dose, one or two tea-spoonfuls in water, with a drop of oil of lemon and a little powdered sugar to each dose.

Salins, a town in the department of Jura, France, with important salt-springs in its neighbourhood, whence much salt is produced. S. has also gypsum mines. Pop. (1876) 5577.

Salisbury (pron. *Saulsbury*), or **New Sarum**, the county town of Wilts, England, 82 miles W.S.W. of London by rail, was formed in 1215 by the emigration of the bishop and villagers from the neighbouring hill of Old Sarum, where a cathedral and castle had long stood. A new cathedral was founded at S. and completed in 1258; at the same time S. was made a free city by Henry III. Since then the name of S. has often appeared in the annals of English history. The cathedral is one of the finest specimens of the Early or Pointed Gothic. It is built in the form of a double cross, is 469 feet long, and measures 203 feet across the great transept. At the intersection of the nave and great transept rises the spire, 404 feet in height, being the highest in England. The cathedral contains some interesting tombs and monuments. In 1789 Mr. Wyatt was employed to make many alterations within and without the church, and in so doing removed unfortunately much that was beautiful and curious. The work of restoration, however, has been going on since 1863 under the direction of the late Sir G. G. Scott, and £55,000 has been expended. The choir was reopened in 1876, and the nave is now in the hands of the restorers. The reredos, which had been removed, has been replaced by the munificence of Earl Beauchamp, and an open metal screen erected between the choir and nave. S. has several other churches and chapels, a theatre, three bridges, a number of hospitals and almshouses, and several schools in connection with the ecclesiastical foundation. Five newspapers are published here. S. is a municipal and parliamentary borough returning two members to Parliament. Pop. (1871) 13,839.—**S. Plain**, a once extensive unenclosed plain around the town of S., extending E. and W. from Hants to Dorsetshire. The uncultivated portion is now much diminished in size. The so-called 'Druidical' circle of Stonehenge (q. v.) is in Salisbury Plain, about 6 miles N. of the city.

Salisbury, Robert Arthur Talbot Gascoigne Cecil, Marquis of, K.G., eldest surviving son of the second Marquis, comes of the family founded by William Cecil (q. v.),

Lord Burleigh, whose son Robert became Earl of Salisbury in 1605, the marquise being added in 1789. S. was born at Hatfield, 13th February 1830, was educated at Eton and Oxford, and entered the House of Commons as member for Stamford in the Conservative interest in 1853. He sat until 1868, at first under the title of Lord Robert Cecil, and after the death of his elder brother as Viscount Cranbourne. In July 1866 he became Secretary of State for India under Lord Derby, but resigned on March 2, 1867, owing to a difference of opinion with regard to the Reform Bill. In 1868 he succeeded to the marquise on the death of his father, and in 1869 he was elected Chancellor of the University of Oxford. He became Secretary of State for India when Mr. Disraeli took office in 1874, and represented England in the Conference of Constantinople in December and January 1876-77. On the retirement of Lord Derby from the cabinet on March 28, 1878, he became Secretary of State for Foreign Affairs, and signalled his accession to office by a circular on the Eastern Question, which convinced Europe that England intended to re-assert its influence as a great European power. Along with Lords Beaconsfield and Odo Russell he represented England in the Berlin Congress of June and July 1878. On his return he was invested by Her Majesty with the Order of the Garter. As a parliamentary speaker, Lord Salisbury is distinguished for the force and weight of his utterances, as well as for the cutting satire he has always at command—'a master of jibes,' as Lord Beaconsfield once described him with malevolent accuracy. Though utterly different in temperament and character from the leader of his party, S. approves of his 'imperialist' policy, and is profoundly convinced that England cannot with dignity or safety become merely a 'nation of shopkeepers.'

Saliva and Salivary Glands. S. is popularly known as the 'spittle,' a fluid of the mouth; and the S. G. are the structures devoted to the secretion of this fluid from the blood. There are three pairs of S. G. in man. The first form the *parotid glands*, placed in front of and somewhat below the ears. These are the largest, and vary in weight from $\frac{1}{2}$ oz. to 1 oz. each. The *submaxillary glands* are the second pair, and lie below the jaw, in the anterior triangle of the neck. Each weighs about 2 drachms. The *sublingual glands* are the smallest; they lie in the floor of the mouth, and close to the front of the lower jaw on each side. The parotid glands each open into the mouth by a duct (*Steno's duct*) which enters by an orifice placed opposite the second molar tooth of the upper jaw. *Wharton's duct*, leading from each submaxillary gland, opens at the side of the *frenum*, or ligament of the tongue; whilst the ducts of the sublingual gland are known as the *ductus Riviniani*, and number from eight to twenty. They open separately near the termination of Wharton's duct. The parotid gland derives its bloodvessels from the external carotid artery; the sublingual from the artery of that name; and the submaxillary gland from the facial and lingual arteries. The *nerves* of the S. G. are derived from the various flexures. In structure, the S. G. are *racemose glands*. Each is composed of lobes, made up of lobules, of closed sacs or vesicles.

S. itself is a clear fluid, which in the mouth becomes mixed with *mucus* and with the *epithelial* debris of the mouth. When secreted the S. appears at first to be alkaline in its nature, and when digestion is proceeding, the alkalinity of the S. is still strongly marked. During fasting the S. is said to exhibit a neutral reaction, the alkalinity being neutralised by the acid mucus of the mouth. In 1000 parts of S., Frerichs found 994.10 parts of *water*, and 5.90 of *solids*. The solids were distributed as follows:—*Ptyalin*, 1.41; *fat*, 0.07; *epithelium* and *mucus*, 2.13; *salts* (sulphur-cyanide of potash; sodium, calcium, and magnesium phosphates; sodium chloride and potassium chloride), 2.29. The *ptyalin* is the important component of S., since by aid of this substance the *starch* of food is converted into readily digested *dextrin* and *grape-sugar*. The other uses of S. are to render deglutition easy and to assist in articulation. *Ptyalin* is thus seen to be a sugar-forming ferment. The *quantity* of S. secreted daily varies from 1 to 2 lbs. The S. of children is not capable of transforming starch into sugar until they have attained the age of six months, hence starchy foods should not be given to children before that period.

Diseases of the S. G.—The most common of these are *Ranula* (q. v.), *parotitis* (see *MUMPS*), and *salivary calculus*. *Salivary fistula* is one of the most disagreeable complications of wounds

of the face; but it may also be caused by an abscess which lays open Steno's duct. The saliva is constantly running out on the cheek; and, if the division be complete, the patient may be conscious of dryness of that side of the mouth. The disease is to be treated by restoring the passage for the saliva from the gland into the mouth, an operation sometimes attended with considerable difficulty. There are also certain functional disorders of the salivary glands, the most important of which is Salivation (q. v.).

Salivation or Ptyalism (Gr. *ptyalon*, 'saliva') is the term employed to denote an abnormally abundant flow of saliva. It may be idiopathic or spontaneous, occurring without any apparent cause, or it may arise from a specific form of inflammation of the parotid glands induced by the action of such medicines as mercury and iodide of potassium. Idiopathic S., not associated with any disease whatever, sometimes occurs. S. is also very common in the confluent form of smallpox, in scurvy, hysteria, hydrophobia, some forms of mania, and not unfrequently in pregnancy. The most common form of S., requiring medical treatment, is that induced by the action of mercury. When mercury has been administered so as to produce constitutional effects, the first symptoms of its action are to be looked for in the mouth. There is a slight fetor of the breath, some soreness of the teeth when touched, and a disagreeable metallic taste in the mouth. If the use of the mercury be persisted in, the gums become soft, spongy, and swollen, bleeding on very slight abrasion, and there is a marked increase in the secretion of saliva. In the more severe forms of S., emaciation goes on rapidly, and in some cases ulcers occur on the extremities; the blood becomes more fluid and watery than normal, and it contains a large quantity of foetid fatty material. To check this excessive S., chlorate of potash, in 20-grain doses three times daily, may be given. Gargles of the chlorate may also be used, and moistened tannin may be applied to the gums. Opium is also sometimes given, and belladonna is said to arrest the secretion of the salivary glands by paralyzing the extreme branches of the chorda tympani.

Salix. See WILLOW.

Sall'ee, or **Sla**, an Atlantic port of Morocco, at the mouth of the river Bu-Regreb, on the N. bank, the town of Rabat being built on the S. bank opposite. A bar renders the entrance to the port frequently unsafe. S. was formerly notorious as the headquarters of Moorish piracy, whence issued the dreaded 'Sallee rovers,' and so recently as 1851 both S. and Rabat were severely bombarded by the French for piratical conduct. S. has manufactures of carpets for home use; and exports wool, beans, and maize. Pop. about 12,000.

Sallow (from Old Eng. *sāl* and *sæl*, a 'tie' or 'band,' indicating a shrub fit for *wishes*) is the English common name for a group of willows ranging under, or in close alliance with, *Salix Caprea*—the common S. or goat-willow. The shoots are not flexible like the osier group, but those of two years' growth are sometimes split and used for barrel hoops. *S. Caprea* is the earliest-flowering British willow, and the twigs with male catkins, gathered at Easter, are called palm-branches. The flowers at this early period of the year are eagerly sought by bees. It is often only a big bush, but in suitable situations becomes a tree, when the wood is useful for implement handles, &c., and for charcoal. The bark serves for tanning, particularly glove-leather. See OSIER and WILLOW.

Sallow-thorn, so called from its white willow-like leaves and spinous branches, is known botanically as *Hippophae*, a genus of the small natural order *Elaagnacea*. *H. rhamnoides* (called also 'sea-buckthorn') is an ornamental shrub or small tree common in many places on the Atlantic, German Ocean, Mediterranean, and Baltic seaboard of Europe; is met with abundantly in the valleys of the Alps, Apennines, &c.; and extends across Asia to the Himalaya. In Britain it is indigenous on the S. coast, and is naturalised in Scotland, where it has been planted in numerous localities along the coast as far N. as Inslay and Fife as a screen for inland vegetation, and for binding the light sandy soil. The orange-yellow fruit is very acid, but boiled with sugar it forms a palatable and wholesome preserve.

Sallustius, Caius Crispus, known to English readers as **Sallust**, was born B.C. 86 at Amiternum, in the country of the Sabines. He was of plebeian origin; but that did not bar his promotion. At an early age he obtained the questorship, and in

B.C. 52 was elected tribune of the people. In B.C. 50 he was expelled from the senate at the instance of Appius Claudius Pulcher and L. Calpurnius Piso on the ground of his adultery with Fausta, daughter of Sulla and wife of T. Annius Milo. S. for his offence got a sound whipping from the irate husband, and was only allowed to go on paying him a sum of money (see A. Gellius, xvii. 18). There were probably other reasons for his ejection from the senate. In fact, the story has an apocryphal look, inasmuch as S. was elected tribune after the date assigned to the affair. Be that as it may, we hear no more of him for some years. On the outbreak of the Civil War he espoused the cause of Cæsar, and in 47 B.C. was prætor-elect, and was thus once more in his former rank. He nearly lost his life in a mutiny in Campania while conducting some of Cæsar's forces that were under orders to sail for Africa. We next find him in Cæsar's suite in the African campaign of B.C. 46. He was appointed by his chief to the proconsulship of Numidia, where he is said to have oppressed and pillaged the people. The fact of his acquiring the immense wealth which enabled him to lay out and adorn those splendid gardens on the Quirinal (*horti Sallustiani*), which still retain his name, lends colour to the charge. On his return to Rome he was accused of maladministration, but there is no evidence to show that he was ever brought to trial. S. now settled down on his princely estate, and devoted himself assiduously to literature. After passing quietly through the troublous times that followed Cæsar's death in the enjoyment of rich opportunities and lettered ease, he died 34 B.C. Only two of the works of S. have come down to us entire—1st, the *Catilina*, or *Bellum Catilinarium*, a history of the conspiracy of Catiline in the consulship of Cicero 63 B.C.; 2d, the *Jugurtha*, or *Bellum Jugurthinum*, which contains an account of the war between the Romans and Jugurtha, King of Numidia, B.C. 111-106. Of his work entitled *Historiarum Libri Quinque*, supposed to have been a record of the events that occurred 78-66 B.C., only a few fragments remain. The *Dua Epistola de Republica Ordinanda* and the *Declamatio in Ciceronem* are of doubtful authenticity.

In point of elegance, vigour, and concentrated energy S. as a writer has few equals; but his excessive love of brevity and his constant affectation of archaic words and forms ever and anon reveal the art which the finger of genius alone knows to conceal. He is an artist more occupied with his style and colouring than with the subject in hand. Moreover, considering the licentious character of his life, one can hardly help imputing a certain amount of disingenuousness to his philosophical introductions. Yet his reputation at Rome was of the highest. Martial (Epigr. xiv. 191-2) speaks of him as 'Crispus Romana primus in historia,' while Tacitus (Ann. iii. 30) calls him 'Rerum Romanarum florentissimus auctor.' S. was more of a party politician than a statesman, and his intense hatred of the nobility rather than his love for the people accounts for his narrow liberalism. The story of his marrying Terentia, the divorced wife of Cicero, is highly improbable (see Drumann, *Geschichte Rom.* vol. vi. p. 693). The *editio princeps* of S. was published 1470, fol., whether at Venice or Rome is uncertain. The best editions are those of Cortius (Leips. 1724), F. D. Gerlach (Basel, 1823-31, 3 vols. 4to), Kritz (Leips. 1828-34, 2 vols. 8vo), F. D. Gerlach (Leips. Tauchnitz, 1856), R. Dietsch (Biblioth. Teubner, 5th ed. 1867), and H. Jordan, with short critical notes (Berl. 1866). English translations are numerous.

Sally-Port, in fortification, a passage made in the glacis, leading from the terreplein of the covered-way to the exterior. In naval affairs the term S.-P. denotes either a landing-place for war-ships' boats, or the opening provided in a fire-ship for the escape of her crew.

Salma'sius, Claudius (Claude de Saumaise), was born near Sémur-en-Auxois, in Burgundy, April 15, 1588. At the age of ten he wrote Greek and Latin, and read Pindar with ease. At Paris and Heidelberg he showed himself an indefatigable student, and became renowned as a prodigy of learning. The Venetians, the Pope, and the University of Oxford vied in endeavouring to secure him, but in 1632 he accepted a professorship at Leyden. Upon the execution of Charles I., Charles II., then in Holland, employed S. in defending the monarchy, and the result was the famous *Defensio Regia pro Carolo Primo* (Leyden, 1649). The abuse so freely used in this book was simply coarse; Milton's reply to it—*Defensio pro Populo Anglicano*—contains plenty of

rude invective, but also masterly and piercing sarcasm. S. died at Spa, September 6, 1653, some have said from chagrin at loss of credit. The most important of his other works is *Pliniane Exercitationes in Cæsii Julii Solini Polyhistora* (2 vols. folio, Par. 1629). A collection of his letters was published in 1656. See Arkenholz's *Memoirs of Queen Christina*, and Prof. Masson's *Life of Milton* (vol. iv. 1877).

Salm'on (*Salmo salar*), a *Teleostean* fish, the type of the family *Salmonide* (q. v.), known by the blue-black lustre of its back, and the silvery colour of its under parts. It is the finest of food-fishes, and that which has been the subject of the most important legislation. Its natural history is full of interest. Briefly detailed, it may be divided into the following stages of (1) *egg-deposition*, (2) *hatching*, (3) *parr*, (4) *smolt*, (5) *grilse*, and (6) *S.* The S. breeds towards the end of autumn or beginning of winter, and ascends rivers for this purpose. The female fish excavates furrows in the gravelly bed of the river and therein deposits her eggs, which are duly fertilised by the male fish shedding the milt upon them. The eggs are covered with gravel by the action of the tail and fins. It is calculated that the female contains about 900 eggs for every lb. of her weight. The eggs are subject to the attack of many enemies amongst fishes and birds; and good authorities agree in stating that out of every 1000 eggs deposited hardly one fish reaches the market. In artificial S.-hatching practised at Stormontfield, Hünigen (q. v.), &c., about 1000 fishes in the form of smolts are obtained from every 3000 eggs. The S. eggs are hatched in from 90 to 130 days, and the temperature must not rise above 70°. From the eggs come forth the *parr*, and in this stage the young S. remain, some for 13 or 15 months, others for two years and over. It is a remarkable fact that of each brood of S.-parr some members become *smolts*, i. e., attain the second stage of growth, at a much earlier period than others. Observations made at the Stormontfield pond lead to the belief that one-half become smolts at the end of the first year, and the other half at the end of the second. Mr. Buckland maintains that the smolts swim seawards in May and June, some in the first year, others in the second, and others in the third year. Mr. Dunbar's experiments show that about 8 per cent. of the artificially-hatched parr become smolts at the end of the first year, 60 per cent. at the end of the second, and 32 per cent. at the end of the third. On becoming a *smolt* the parr acquires a silver armour. As the smolt it seeks the sea, the parr perishing in salt water. After the smolts pass to the sea they grow with wonderful rapidity. They may return to their rivers, after a six weeks' sojourn in the sea, as *grilse* of from 5 to 8 or 9 lbs. weight. The grilse on returning to the rivers they left as smolts spawn for the first time. Again returning to the sea, the grilse increase in size, and thus gradually become S. They increase materially in size during their seaward migrations. Three S. captured on their way to the sea in 1859 by the Duke of Athol, were duly marked, and were found to weigh 10 lbs., 11½ lbs., and 12½ lbs. Six months afterwards they were again caught, and were found to weigh 17, 18, and 19 lbs. respectively. It is probable that S. as a rule return from the sea to their native rivers, but at the same time there is no adequate reason for the belief that they may not enter other rivers. The rule that S. attain the largest size in the largest rivers, is supported by evidence of trustworthy kind, but large S. may sometimes be obtained in small rivers. The N. Esk near Montrose, the Stinchar in Ayrshire, and the Roy, which runs into the Spean, are instances of small rivers in which large S. are obtained. Mr. Yarrel mentions a S. of 83 lbs. weight as having been received by Mr. Forres of Bond Street, London, and Mr. Buckland's list of large S. mentions a Tay S. of 4 feet 3 inches in length, and weighing 70 lbs.; a Rhine S. 4 feet 8 inches, and 69 lbs.; a Shannon S. 54 lbs.; a Tay S. 4 feet and 53 lbs.; a Rhine S. 4 feet 3 inches and 51½ lbs.; a Tay S. 4 feet 3 inches and 51 lbs.; a Wye S. 4 feet 2 inches and 50 lbs.; a Shannon S. 4 feet 3 inches and 46 lbs.; a Wye S. 3 feet 10½ inches and 44½ lbs.; and a Tay S. 3 feet 8 inches and 42 lbs. Some interesting details have been given as to the largest S. caught by the rod. A Tweed S. so caught weighed 69½ lbs.; and in 1812 one of 67 lbs. was caught in the Nith. A S. of 61 lbs. weight was captured in the Tay in 1870; and one of 53 lbs. in the Tweed in 1876.

Recent reports of the inspectors of the English S. fisheries show that the annual value of the S. fisheries of England and Wales

amounts to at least £100,000. When the inspectors were originally appointed, their estimate of the annual value was £30,000. It is curious to note that the Tyne is the most productive S.-river in England, notwithstanding its pollutions. The statistics of the Tyne give 129,100 fish for 1872. In 1874 the 'take' amounted to only 21,746 fish, being a decrease of 107,354; but this decrease is attributed to the use of 'hang nets' placed at the estuary of the river. Each net is 140 yards long, and a series of nets may extend for a mile or more. Such nets prevent the ascent of the S.; but recent legislation may restore the Tyne to its former productive condition. In 1875 the Tyne gave a return of 23,290 S. The Usk is regarded as the best rod-river in England, 3000 S. having been captured in it by the net and 2000 by the rod in 1872. In England the S.-fisheries are protected by efficient inspection. The license-duties of the S.-fishings of England and Wales from 1867 to 1875 were as follows:—

Year.	Number of			Total men.	Revenue from			Total Revenue
	Net fisher-men.	Rod fisher-men.	General Licences.		Nets.	Rods.	Licences.	
1867	3029	2350	39	5379	£3851	£1816	£430	£6097
1868	3913	2076	29	5989	4921	1593	530	6844
1869	3083	2030	24	5113	4826	1420	320	6566
1870	2977	1616	23	4593	4757	1240	269	6266
1871	3383	2054	26	5437	5370	1469	307	7146
1872	2907	2310	24	5217	4552	1589	312	6453
1873	2990	2579	20	5589	4650	2031	143	6824
1874	3045	2779	27	5824	4974	2196	211	7381
1875	2970	2605	24	5575	4715	2086	202	7003

In Ireland a large number of rivers are supervised by the Irish Inspectors of S. fisheries. The Shannon, for instance, has a course of over 200 miles, a catchment basin of 4553 sq. miles, and its tributaries, the Erne, Nore, Suir, Barrow, Moy, Ballisodare, Galway, Lee, Bush, Blackwater (Cork), Bann, and Foyle are all notable S. rivers. It is a matter of note that the Irish S. fisheries are among the most valuable. The Report of 1874 estimates their annual value at £400,000.

The largest S.-rental of any river of the United Kingdom is that of the Tay, which in 1875-76 was £21,634, 4s. 4d., and in 1876-77 £20,381, 18s. 4d. The following table of the famous S. fishings in Loch Tay is interesting:—

Year.	Number of Salmon Killed.	Aggregate Weight.	Average Weight.	Sum Drawn for Fishing.
		lbs.	lbs. oz.	£ s. d.
1870	460	9,118	19 13	435 0 0
1871	114	2,270	19 14	807 15 6
1872	293	5,972	20 6	637 5 0
1873	779	17,770	22 13	684 9 6
1874	253	5,295	20 15	962 17 6
1875	903	20,106	22 2	1,148 8 0
1876	476	9,786	20 10	1,248 0 0
Average	468	10,045	20 15	854 16 6

In the beginning of the present century the Tweed was by far the most productive S. river of which we have any record. At present the Tay produces a little more than 100,000 S. and grilse annually, and the Tweed only from 50,000 to 60,000 fish. This falling off is imputed by Messrs. Walpole and Laing, in their Report of 1875, (1) to the effects on the river of the improved system of land drainage; (2) to pollutions; and (3) to poaching. The statistics given of the Forth, Spey, Dee, Don, Findhorn, Ness, and other productive S. rivers are of equal interest, but we may simply give an extract of two of the most remarkable feats of S. capture by a single rod—the one achieved in Scotland on the Beaully by the present Lord Lovat, and the other in Canada, on the Godbout River, by Comeau, the river-watcher:—

Date.	Salmon and Grilse.
June 27, 1864,	27
" 28, "	24
" 30, "	32
July 4, "	33
" 5, "	30
Total,	146

A. A. Comeau in July 1874 :—

Date.	Fish.	Weight.
July 8	7	80 lbs.
" 9	57	534
" 10	25	282
" 11	34	361
" 13	40	438
" 14	25	253
" 15	16	172
" 16	37	394
" 17	16	186
" 18	28	286
" 20	27	273
" 21	13	124
" 22	20	198
" 23	6	63
" 24	3	30
" 27	3	33
" 28	2	19
" 31	1	28
	360	3754

A subject of interest in connection with the S.-fishery has been the comparative lateness of some rivers as compared with others. Mr. Archibald Young, one of the commissioners of Scotch S. fisheries, from whose work much of the foregoing information is selected, has propounded a new theory to account for the comparative lateness or earliness of the S. rivers of Scotland. 'It may be stated generally,' he says, 'that the Scotch rivers that fall into the German Ocean to the Pentland Frith are early, whilst the streams that run into the Atlantic Ocean are late. What is the cause of this? As has been already stated, we have seen that the lake-at-the-head theory, and the more recent theory applied by Mr. Buckland to the English rivers, will not account for this difference. I do not presume to construct a theory to account for it, but I venture to hazard a conjecture, the truth of which farther observation may establish or overthrow. It is this: The Scottish rivers flowing into the German Ocean are almost all early rivers. They have comparatively long courses, and fall into the sea at considerable distance from their mountain sources, after running during some part of their career through districts not greatly elevated, and possessing a moderate climate. But the German Ocean into which these comparatively warm rivers flow, is a cold sea, and the slight difference between its temperature and that of the rivers running into it in winter and spring induces the S. to ascend early. Take the Tay, for example. It is well known that S. run into it in great numbers in the months of December and January; so that when the fishing begins in February, Loch Tay is fully stocked with clean and heavy fish. On the W. coast, on the other hand, the rivers that fall into the Atlantic are all late. They have short courses, and their sources are much tilted up, as they rise in that lofty and singularly picturesque chain of mountains, which, beginning not far S. of Cape Wrath, skirts the shores of Sutherlandshire, Ross-shire, and Inverness-shire for more than 100 miles, at distances varying from 5 to 29 miles from the Western sea. In winter and spring these mountains are snow-clad, and every partial melting of their snows brings down torrents of ice-cold water, which run through the short channels of these rivers into the sea. But the water of that sea, unlike that of the German Ocean that washes our eastern shores, is warmed by the soft influence of the Gulf Stream, and the S. consequently remain in it until the snow-water has run off, and the milder weather of May and June has raised the temperature of the river waters, and then they begin to ascend. This marked difference in the physical characteristics of the rivers of our eastern and western sea-boards is very clearly shown in the hydrographical map prepared for the Rivers' Pollution Commission, which faces page 24 of their sixth and last report.' It may be mentioned that the above theory, originated by Mr. Young, is being tested by means of observations taken by maximum and minimum thermometers of the different temperatures of the fresh and salt water by the Scottish Meteorological Society at their station on the river Ugie, and by other observers on the Spey and Tweed.

As there are no annual inspections and reports of the state of the Scotch S. rivers, it is, of course, far more difficult to ascertain their annual value than that of the English and Irish rivers, concerning which such reports are annually published. Mr. Young estimates their annual value at £250,000, though he states a much higher value might be assigned to them on very plausible

grounds. Thus, in the year 1874, 32,180 boxes of Scotch S. were sent to Billingsgate; so that, reckoning each box at £10, we get a sum of £321,800 as the money value of the Scotch S. sent to the London market alone in one year; and taking 12 lbs. as the average weight of each fish, we find a total of 300,346 S. as the number sent to London in the year mentioned. A statement of the value of the S.-fisheries in 1868 gives the annual value of the river fisheries of England, Scotland, and Ireland at £560,000. According to the latest calculation, their present value is about £750,000 annually.

The great rivers of N. America abound in S. of various species. The *Salmo salar* is found in some rivers in the State of Maine, and exists in very large quantities in the Canadian rivers, which are now taken charge of by the Dominion Government, and let to private persons for fishing. In the rivers of California, Oregon, and British Columbia, the *Salmo gairdneri* is very common. It grows to a great size, and can live in rivers of a much higher average temperature than the *Salmo salar*, while in the more northern and colder rivers it exists in almost fabulous numbers. S.-tinning and -exporting industries on the Columbia River, Oregon, have attained vast proportions since 1873, and have been begun in several parts of the British possessions. In 1876 the United States exported 415,218 cases of S., representing the enormous take (chiefly from the Columbia) of 10,000 tons of fish. The shipment to Great Britain was 210,348 cases. Attempts have been made to introduce the *Salmo gairdneri* in the rivers of the Eastern States, where it is now extinct. Efforts are also being made to naturalise the S. in the rivers of Tasmania, Victoria, and New Zealand, by exporting ova in large quantities from Europe.

Laws Relating to S. and S.-fishing in the United Kingdom.—The chief Act now in force in England is 24 and 25 Vict. c. 109, which declares that every fish of the genus *Salmo* shall be legally deemed a S. The Act imposes penalties on putting, or allowing to flow, into any water containing S., any substance poisonous to the fish. Illegal implements and lures are specified, and forbidden under pecuniary penalties. Among these are spears, gaffs, lights, and S.-roe. General superintendence is vested in the Home Office, which appoints two inspectors for three years, and defines their duties. In 1873, the S.-fishing laws of England and Wales were again amended. Power is given to the Home Secretary to alter and combine districts and to alter the number of conservators appointed at Quarter Sessions. Further regulations are made regarding implements of fishing. No eel baskets are to be fixed between 1st January and 24th June. Close time for rod-fishing is from 1st November, and for nets from 1st September to 1st February; the penalty for infringement being £5. Fishing, except with rod and line, is prohibited within 50 yards above, and within 100 yards below, a weir or mill-race. Fishing, except with rod or line, is made illegal between noon on Saturday and six A.M. on Monday. Catching unclean fish is illegal, and no one may buy or sell S. between 3d September and 1st February, both inclusive, under a penalty of £2 for each fish. This does not apply to fish cured in legal time. The provisions of the Scotch Acts for protection of the fish are similar. There, the weekly close time is from six P.M. on Saturday to six A.M. on Monday. Commissioners are appointed by the Home Secretary, their duties being to fix the close time, and make regulations as to implements of fishing. The northern rivers close for net-fishing mostly on 26th August; their rod-fishing on 15th October. Tweed closes for nets on 14th September; for rod-fishing on 30th November. All reopen early in spring, mostly in February. As regards the right of S.-fishing in England, see RIVERS, LAW REGARDING. In Scotland, the right may be vested in one who has no land on either side of the river. It is constituted by grant from the crown, *cum piscatione salmonum*, or by conveyance of lands *cum piscationibus*, followed by forty years' possession of the S.-fishing.

Salmonides, a family of *Teleostean* fishes, belonging to the division of the *Malacopteri abdominales*, in which the *ventral fins* are abdominal, being placed towards the rear of the body. The *swimming-bladder* is developed in S., and communicates with the throat by means of an air-duct. In the true S. the second dorsal fin is without rays, and is of soft consistence. In the genus *Salmo* itself, the head is smooth, and teeth are borne on the palate, vomer, and maxillary bones. In the nearly-allied genus *Scopelus* there are sharp teeth of conical shape in both

jaws. The genus *Serrasalmus* has triangular teeth in both jaws, and a serrated abdominal line. The typical members of the family *S.* are active voracious fishes, which spawn in rivers and migrate to the sea.

Saloni'ki (Turk. *Selanik*; the ancient *Therma*, later *Thessalonica*), the chief town of a Turkish vilayet of the same name, and next to the metropolis the most important commercial town of the empire, is situated on the N.E. shore of a spacious gulf on the *Ægean Sea*, and on the steep slope of the mountain of *Kortiasch*, 370 miles W.S.W. of Constantinople. Girt with cypress groves, against which its white buildings stand out in bold relief, it presents a highly picturesque appearance from the sea. Internally it is narrow, irregular, and gloomy, but it contains many interesting architectural monuments. The Greek quarter has a hippodrome of great antiquity, and ruins of a colonnade built under Nero. Most of the mosques were formerly Christian churches. One, inlaid with porphyry and jasper, was the celebrated church of St. Demetrius; that of St. Sophia was the prototype of the famous St. Sophia of Constantinople; while another is the former Rotunda, built after the model of the Pantheon. Other antiquities are the triumphal arch of Augustus commemorating the battle of Philippi, the arch of Constantine, and the ancient acropolis, now the *Vedi-Kuleh*, or citadel of 'the Seven Towers.' Many rich discoveries have been made of mosaics, bas-reliefs, coins, &c. Protected by its citadel and several forts, *S.* is the seat of a governor-general, a Greek metropolitan, and Jewish grand chakam, and has a splendid situation for commercial purposes, forming the terminus of the road which leads across the peninsula from Belgrade. The *S.*, -Uscup, -Mitrovitza Railway, 219 miles in length, the last section of which was opened in 1875, supplies the districts contiguous to Bosnia and Servia with iron and other British produce. In 1874 there entered the port of *S.* 812 vessels of 294,520 tons, and cleared 822 of 290,305 tons. The exports are wheat, barley, Indian corn, rye, cotton, and tobacco; the imports iron, coal, and manufactured goods. A large building for the storage of merchandise, to which are attached two piers, one for loading, the other for discharging, was constructed (1876) at a cost of £10,000. The works of the great *S.* quay were stopped in 1874 for want of an advance from the government of the funds required for its completion, some £15,000. Pop. 80,000, of whom 20,000 are Greeks and 20,000 Jews. The bulwark of the Eastern Empire during the barbarian inroads, *S.* was taken by the Saracens in 904, by the Sicilian Normans in 1185, and by the Turks under Amurath II. in 1430.

Saloop'. See SASSAFRAS.

Sal'pa, a well-known genus of *Tunicate* (q. v.) Mollusca existing in two forms—*single S.* and *chain S.* The latter consists of a connected chain of individuals often attaining a length of several feet, and found swimming on the surface of the sea by means of the inhalation and forcible expulsion of water from their bodies. Like other tunicates, the *S.* has a curious breathing chamber into which water is admitted from without. The body is small and gelatinous. There is a single nervous ganglion. The single *S.* cannot produce young save by a process of *gemination* or *budding*, and by throwing off long connected *chain salpas*. Each member of a *chain S.*, on the other hand, has the power of producing young by true sexual reproduction, the young of the *chain S.* being invariably *single S.* This feature illustrates the phenomenon properly known as *metagenesis*.

Sal Prunelle' is nitrate of potash cast in the form of cakes or balls. See NITRE.

Sal'aify (Fr. *salsifis*) is a purple-flowered biennial herb belonging to the *Chicoracea* tribe of *Compositæ*, called by botanists *Tragopogon porrifolius*, a native of N. Europe and Siberia. It has long been cultivated for its tap-roots, which are dressed for the table like carrots and parsnips, or served with white sauce, and are a delicate and pleasant vegetable. *S.* is now only occasionally seen in English gardens, but is extensively grown in other European countries, and judging from the writings of the last century, such was then the practice in England. As a remnant of this past cultivation the plant is sometimes met with in a semi-naturalised state in meadows, &c., but is not indigenous to the country. The root of *T. pratensis* (the goat's beard), a common British species, is also edible.

Salsette' Island, an island off the W. coast of India, between the island of Bombay on the S. and the mainland on the E., with both of which it is now connected by stone causeways and also by railway. Area, 150 sq. miles; pop. (1872) 93,000. It forms part of the district of Tanna, and is a picturesque tract, with cultivated fields and mountains, in the latter of which there are rock temples, older and of greater size than the better known rock temples of Elephanta. There are also ruins of the churches and villas of the Portuguese, who maintained themselves here till 1739, when they were expelled by the Mahrattas. The British obtained possession in 1774. *S. I.* contains the Vchar reservoir, from which Bombay is supplied with water.

Salt, Manufacture of. Common *S.*, the chloride of sodium, is an extremely abundant substance in nature. It is found in almost inexhaustible deposits as Rock *S.* in various parts of the world; from such deposits arise brine springs which are strongly impregnated with *S.*, and the water of the ocean, as well as that of various inland seas, hold it in solution in inconceivable amount. From these various sources *S.* is prepared for use as an indispensable condiment in human food, and as a raw material in several most important and extensive chemical manufactures. In the United Kingdom great deposits of Rock *S.* occur in the New Red Sandstone strata in Cheshire and Worcestershire. In Cheshire, where the deposits are most largely developed, it occurs in two main beds, found, owing to faults and dislocations in the strata, at varying depths. In the neighbourhood of Northwich, the upper bed is about 1400 yards in breadth, 1½ miles long, and 60 feet thick; while the lower bed at the same locality has been pierced to the depth of 110 feet without coming to the bottom of the stratum. The great *S.* mine of Wieliczka, in Galicia, occurs in Tertiary strata, and has been excavated to a depth of 1800 feet, and extends E. and W. 9500 feet. Great deposits are also found at Stassfurth, in Saxony, associated with several other saline substances, and in numerous other localities throughout the world. It rarely happens that rock *S.* is obtained in a condition of sufficient purity to be used direct in culinary operations. It is therefore generally dissolved and used in the form of brine, unlimited quantities of which are obtained from the deposits by pumping machinery. When brine is of sufficient concentration for direct evaporation by artificial heat, it is run into large settling reservoirs, in which suspended impurities fall to the bottom, and the solution is treated with a certain proportion of lime to cause the decomposition and precipitation of the chloride of magnesium always present. The evaporation is conducted in shallow pans of riveted boiler-plate, made about 60 or 80 feet long by 20 to 40 feet broad, and 2 feet deep, heated by two or more fires from which fumes carry the heat, as uniformly as possible, to all parts of the under surface. In such a pan the *S.* brine is evaporated down to the saturation point, and it is then run into another similar pan for boiling down, where the *S.* gradually falls to the bottom of the pan, and is scooped out by attendants, then drained and dried. The 'grain,' or size of the crystals of *S.* formed, vary with the rapidity of the evaporating process, small table *S.* being deposited by rapid boiling, while 'broad,' 'fishery,' and 'bay' *S.* are the result of increasingly slow crystallisation. Weak brines and sea-water are concentrated up to a definite strength before evaporating by heat. This is accomplished by a process of *gradation*, the most common method being to allow the liquid to percolate through a lofty stack built up of thorn faggots and branches. This process not only concentrates but purifies the brine. In the south of Europe the *S.* is obtained entirely by evaporation by the sun's rays, by exposing sea-water in shallow artificially formed beds, termed *Salines*; and in Norway highly saturated brine is obtained by freezing, pure water only congealing from the sea-water when exposed to intense cold. The total amount of *S.* produced in the United Kingdom during 1876 was 2,273,256 tons, of which 154,531 tons were in the form of Rock *S.* In the same year 854,538 tons, of a value of £529,547, were exported; British India, the United States, and Russia being the countries to which it was most largely sent. In the same year the Austrian yield amounted to 2,494,651 met. cwts., valued at 21,518,077 florins.

Salt, Spirits of. See HYDROCHLORIC ACID.

Salt, Sir Titus, an English philanthropist and great employer of labour, was born at the Manor House, Morley, 20th Sept. 1803. Owing less to a 'plain commercial education' received

at Wakefield than to the severe lessons of economy and diligence learned from his father, whom he assisted for some years as a wool-dealer, he began business independently as a wool-spinner in Bradford in 1834. He first introduced into England the manufacture of alpaca fabrics, and at the age of fifty, having made a large fortune as head of the great firm Titus S., Sons, & Co., he set himself to the task of improving the physical and moral condition of his workpeople. In the picturesque valley of the Aire, 11½ miles by rail from Leeds, he planted his vast factory, which in 1876 covered an area of 20 acres, and around it he erected 895 model dwellings. This village, to which he gave the name of Saltaire, is perhaps the nearest approach ever made to the Utopia of Socialist dreamers and the Hygeia of modern science. The founder never used his wealth to sap in others the feelings of self-reliance which had made himself so wealthy. A staunch Independent, he would not allow teachers to 'inculcate the doctrines of any sectarian religious creed,' but left 'the duty of providing distinctively theological instruction to parents or guardians.' When the Board schools were opened he at once converted the elementary schools which he had founded into higher-grade schools with scholarships, bequeathing for educational purposes not less than £40,000. He served as Mayor of Bradford, sat in Parliament (1859-61) as an advanced Liberal, and was made a baronet in 1869. His statue at Bradford was unveiled by the Duke of Devonshire in 1874. He died 29th December 1876. By his generous example he taught great capitalists that property has its duties as well as its rights. See a Life by Rev. R. Balmie (Lond. 1877).

Saltlake. See SODIUM.

Saltcoats, a seaport in the county of Ayr, Scotland, 7 miles N.W. of Irvine (q. v.), and 1 mile S.E. of Ardrossan (q. v.), and a station on the Glasgow-Ardrossan Railway. It had formerly some shipbuilding, and a trade in timber and salt. The latter industry now alone survives. The sea-bathing is good, and a large number of moderate-sized but elegant villas have been erected. Pop. (1871) 4264.

Saltill'o, capital of the state of Coahuila in Mexico, on the Tigre, was founded in 1586. It has long been a place of considerable importance, and its population in 1831 was upwards of 30,000. The battle of Buenavista was fought near S. in 1847. During the late wars the town has gradually declined, and now contains only about 15,000 inhabitants.

Salting is one of the processes most commonly adopted for preserving meat, fish, and other animal food from putrefactive change. In dealing with meat two processes are followed, dry S. and pickling or wet. In dry S. the meat to be cured is carefully rubbed over with a mixture of common salt and saltpetre in the proportion of 1 ounce of the latter to every pound of salt used. The meat is laid on a board where the brine may drain away from it, and the rubbing in of a proportion of the salt compound is occasionally repeated at an interval of a day or two till the meat is sufficiently cured. The addition of sugar to the salt mixture gives an improved flavour to mild-salted meat. In pickling, the meat is either treated as above indicated, but placed in a cask where brine accumulates around it, or it is at once plunged into a strong brine, and after sufficient exposure it is withdrawn and hung up to dry. The curing of mild-salted provisions is frequently finished by a process of smoking.

Sal'tire, or **Sal'tier,** in heraldry, is an honourable ordinary, consisting of a diagonal cross, formed by a bend and bend sinister crossing at right angles. The S. contains *one-fifth* of the field; when charged, *one-third*. From the belief that St. Andrew suffered martyrdom on such a cross, the S. is also called a St. Andrew's Cross.

Salt Lake City (called by the Mormons *Deseret*), capital of the U.S. territory of Utah, and the stronghold of Mormonism (q. v.), stands on a beautiful and fertile plain between the Great Salt Lake (from which it is 11 miles distant), and the Wahsatch Mountains, a branch of the Rocky Mountains. It is 16 miles S. of Ogden, the junction of the Utah Central Railroad with the Central and Union Pacific Railroads, and is regularly laid out in transverse streets, each 137 feet wide, with numerous avenues of trees, and in many cases with brooks of clear water flowing through them. The principal buildings are the Mormon Tabernacle, a huge oval building with a metal roof, capable of

seating 8000 persons, and containing one of the largest organs in the world; the Theatre, the City Hall, the Zion Co-operative Stores, and several handsome villas occupied by the leading Mormons. There are five churches, a 'University of Deseret,' and many public schools; two Mormon and two 'Gentile' newspapers, as well as a weekly newspaper published in Danish, a large number of the population being Scandinavians. There are hot sulphur-springs and baths close to the city. A United States military camp has been established at Fort Douglas, about 2 miles to the southward. A new and very large Mormon Temple is in course of erection close to the Tabernacle, but progresses slowly. Pop. (1870) 12,854; estimated in 1877 at 22,000.

Salt of Sorrel. See OXALIC ACID.

Salt of Tartar is the impure carbonate of potash, which results from the decomposition by heat of Cream of Tartar (q. v.).

Salt of Tin. See TIN.

Salt Range, The, a hilly tract which runs from E. to W. across the districts of Jhelum, Shahpur, and Kalabagh, in the Punjab, British India. It terminates abruptly on the bank of the Jhelum river. The northern ridges form a continuation of the Himalayas and Suleiman Mountains. The highest point is 3701 feet above the sea. The geological structure of this range is a series of belts of Devonian, Carboniferous, Oolite, Eocene, and Miocene formation. Besides salt, which is found in solid cliffs in the red marls and sandstone of the Devonian group, the following substances abound:—building-stone, marble, gypsum, coal, sulphur, copper, lead, and hematite. The salt was worked in the time of Akbar, and the best-known workings are now called the Mayo Mines. Shafts are sunk by pick and hammer, or by blasting; and the miners earn from 6d. to 9d. a day. The salt is a government monopoly. The annual out-turn is about 100,000 tons, and the revenue £400,000. A tramway now leads from the town to the newly opened railway. The coal has not yet been profitably utilised.

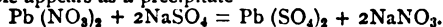
Salts, in chemistry, include a great variety of compound substances, concerning the properties of which no general statements can be made. The name, originally limited to common salt, was extended first to substances which in their solubility, crystallisation, or other property, resembled this widely distributed material. By the old chemists, common salt was regarded as formed by the union of hydrochloric acid and soda—that is, by the union of an acid and a base. By a natural generalisation all compounds which resulted from the combination of any acid and base were termed S.; and this was the accepted theory of the constitution of S. even after the prototype of the group, common salt itself, had been proved by Sir H. Davy to be not so constituted. This eminent chemist showed that a double action took place when hydrochloric acid (HCl) and soda (Na₂O) acted upon each other—the hydrogen in the acid combined with the oxygen in the base to form water, while the chlorine and sodium combined to form common salt,



Common salt, then, in its constitution is not a salt at all according to the dualistic theory indicated above. The nature of this theory is well illustrated by the sulphates. Thus sulphate of zinc has the formula ZnSO₄ or ZnO.SO₂, as the supporters of the dualistic theory would write it. Here the acid is SO₂, not H₂SO₄. Indeed, according to this theory, ordinary sulphuric acid is as much a salt as any sulphate, being the sulphate which has water for its base (H₂O.SO₂). From these examples it is evident that to accept the dualistic theory as a scientific truth, would necessitate a complete revolution in the nomenclature of our acids—all the hydrated acids being S. with water as base. Further, the failure of the theory in relation to the formation of the nalcid S., the chlorides, bromides, iodides, &c., marks it as unsatisfactory and unscientific; and among modern chemists the theory has been abandoned for another, which has been gradually gaining ground since the discoveries of Davy, who originated it. This theory, which receives powerful support from electrolytic decomposition, regards every salt as made up of a metal combined with another element, or group of elements, which is known as the salt-radical. An acid must now be regarded as composed of hydrogen in combination with one of these radicals, and if this hydrogen is, in whole or

in part, exchanged for a metal or something equivalent to it, a salt results. A base is simply a substance which is capable of neutralising an acid; hence S. may be defined as compound substances which result from the neutralisation of an acid with a base, the hydrogen of the acid being exchanged, in whole or in part, for a metal or some radical equivalent to it. This reaction is usually accompanied by the formation of water together with the salt. Upon this view the different compounds of a given metal differ only in the nature of their salt-radical, and the quantities of these which combine with the same quantity of the metal are chemically equivalent (see ATOMIC THEORY and EQUIVALENT). All the chlorides are formed by the union of an equivalent of chlorine with an equivalent of any metal or similar radical. The sulphates have the radical SO_4 (*sulphion*) where the chlorides have chlorine, and so on. The radicals, which thus form acids with hydrogen and salts with metals, are either the non-metallic elements, or groups of elements with a relatively large proportion of oxygen. If part of the metal or equivalent radical in a salt is replaced by hydrogen, the resulting compound is called an acid salt, and if part of the acid radical is replaced by oxygen or hydroxyl (OH), basic S. result. Thus plumbic chloro-hydrate (PbClOH) is a basic salt formed from plumbic chloride (PbCl_2), by the substitution of the radical OH for the element Cl.

S. may be formed in a variety of ways. Direct union of the elements is sometimes effectual, as in the case of common salt ($\text{Na}_2 + \text{Cl}_2 = 2\text{NaCl}$). Metallic zinc is acted upon by sulphuric acid, and sulphate of zinc is for evolution of hydrogen—a case of direct action of a metal upon an acid. Carbonic acid and lime combine directly to form the carbonate ($\text{CaO} + \text{CO}_2 = \text{CaCO}_3$). The most usual methods are, however, by the action of an acid upon a base, and by double decomposition of two S. An example of the former has already been given. As an example of the latter, mix together equivalents of plumbic nitrate and sodic sulphate in water, and there result sodic nitrate and plumbic sulphate, the latter of which being insoluble appears as a precipitate—



This more recent theory of the constitution of S., though not without many difficulties, is much more satisfactory than the dualistic theory. As a working hypothesis, too, it is the simplest; in this respect having a great advantage over a third theory, which we cannot do more than mention—that, namely, which regards all compounds as constituted upon the type of water.

Salts, Smelling, consist of the pungent sesquicarbonate of the carbonate of ammonia, with the addition of a few drops of one or more of the essential oils. The following is an example of a recipe:—Carbonate of ammonia 1 lb., oil of lavender 2 ounces, essence of bergamot 1 ounce, clove oil $\frac{1}{4}$ ounce, rub all together and sublime, keeping the produce in well-stopped bottles.

Salt'wort (Lat. *Salsola*) is a genus of about thirty species of maritime herbs and shrubs inhabiting saline districts in temperate regions. It belongs to the natural order *Chenopodiaceae*. One herbaceous species of rigid straggling habit, with spreading and recurved, fleshy, spine-pointed, nearly cylindrical leaves, is common on the sandy sea-shores of the British Isles, and was formerly burnt for Barilla (q. v.), as was also *S. Soda*, a succulent annual species of S. Europe and N. Africa, together with other allied species of Saline Plants (q. v.).

Salute', Military and Na'val, are made by the touching of the hat or cap, the lowering of swords or colours, the presenting of arms, firing of cannon, cheering, &c. A soldier in the British army on passing an officer salutes on the fourth pace before reaching him, and lowers the hand on the fourth pace after passing him. When an officer passes a soldier at the halt, the latter salutes when at a distance of four paces, and lowers the hand after a pause of six paces in quick time. A general salute to a distinguished person is made by troops presenting arms, officers lowering swords, the band playing, &c., and sometimes the firing of *feux de joie*. An artillery salute consists of firing twenty-one guns in the case of royal visits and anniversaries, and of various numbers of guns, according to rank, when in honour of officers and diplomatic dignitaries.

Saluzzo, a town of N. Italy, province of Cuneo, 10 miles W. of Saviglio by rail. The chief buildings are the old castle,

the former residence of the Marquises of S., used as a penitentiary since 1828; the Gothic cathedral, dating from 1480; and the churches of S. Bernardo and S. Domenico, with monuments. S. manufactures leather, silk, and hats, and has trade in cattle, corn, wine, and ice. Pop. (1874) 15,446.

Sal'vage. See WRECK AND SALVAGE.

Salva'tor Ro'sa. See ROSA, SALVATOR.

Sal'vo Regi'na, an old antiphony of the Roman Catholic Church, addressed to the Virgin Mary. It is sung from first Vespers of Trinity Sunday to Advent.

Salvi'ni, Tommaso, a distinguished Italian actor, born in Milan in 1829. His precocity procured his admission, at the age of fourteen, into a good dramatic company, where he received lessons from Modena. He was subsequently engaged in the royal company at Naples, and he played for six years in Domeniconi's company by the side of Adelaide Ristori. He afterwards retired for a time from the stage, during which he carefully studied the classic drama. He was a leading performer in the *fêtes* at Florence on Dante's sixth centenary in 1865. He subsequently undertook a lengthened tour through Italy, Spain, Portugal, and S. America, and in 1872-73 he visited the United States. His appearance at Drury Lane in 1875 in three of his most famous characters, 'Hamlet,' 'Othello,' and 'The Gladiator' in Soumet's tragedy, produced a furor of admiration. He appeared again in London in 1876. S. is a scholarly and cultivated man, of great ability as a comedian, of genius as a tragedian. He has a fine presence, a handsome and expressive face, and a noble bearing. His voice is magnificent in quality, and his elocution perfect. His excessive physical force, unequalled on the modern stage, sometimes mars his tragic style, by investing it with a certain savagery, while it unfits him for the illustration of pathos, tenderness, and the inner workings of the soul.

Sal'vo, a simultaneous and concentrated artillery-fire. Salvos come chiefly into requisition during the operations of a siege. Breaching guns when fired in salvos are terribly destructive to masonry, but in recent (such as the Russo-Turkish) wars their effect has not been so decided against powerful earthworks.

Salween', a considerable river of Asia, supposed to rise in the Chinese province of Yunnan. It debouches into the sea in British Burmah, after a total course, almost due S., of 750 miles; area of drainage basin, 62,700 sq. miles. The city of Moulmein (q. v.) has grown up at its mouth, shortly above which it is joined by the Gyne and Attaran rivers. Immense quantities of timber, chiefly teak, are conveyed down the stream; but the banks in British territory are said to be becoming denuded of large trees.

Salz'brunn, a straggling village in Prussian Silesia, the three parts of which are distinguished as *Ober-*, *Nieder-*, and *Neu-S.* It is situated on the river Salzbach, and lies about 5 miles S.E. of Friburg by rail.—The district has extensive brick and tile works, besides coal mines, and is, next to Warmbrunn, the most important bathing-place in Silesia. The baths are ten in number, and yield alkalo-saline water. Pop. (1871) Ober-S., 3238; Nieber-S., 941; Neu-S., 448.

Salz'burg (the ancient *Juvavum*, *Juvavia*), one of the most picturesquely situated towns of Austria, capital of the crown-land of S., is built on both sides of the Salzach under the Kapuzinerberg on the right, and the Mönchsberg, crowned with the fortress Hohen-S. on the left, 13 $\frac{1}{2}$ miles N.N.E. of Reichenhall by rail. The river is crossed by three bridges, below one of which, the Stadtbrücke, large embankments have been recently erected. On its left bank is the older quarter of the town, the finest part of which is the Residenz-Platz, containing the Residenz-Schloss, erected in 1593, and having in its centre the Hofbrunnen, 46 feet high, completed in 1644. Opposite is the Neubau, a pile of Government buildings; and on its S. side the cathedral, erected 1614-55. In the adjacent Mozart-Platz is a bronze statue to Mozart, who was born here in 1756, in a house still standing in the Getreidegasse. S. has seven monasteries and twenty-six churches, the finest of which are the church of St. Peter, a Romanesque edifice of 1127, with an ancient burial-ground, and the Franciscan church, a building of the 13th c. The town has a museum containing a library of 20,000 vols., and many valuable works of art; an upper gymnasium (which was a univer-

sity, 1623-1810), with a library of 36,000 vols., 1300 rare MSS. and early printed works; and several institutions for the study of the fine arts, among them the Mozarteum, a school of music, containing MSS. and the piano of Mozart. S. has manufactures of woollen wares, leather, tapestry, lead-pencils, mirrors, pianofortes, besides important lithographing, copperplate-printing, and type-founding establishments. Pop. (1870) 14,615.—The crown-land of S. has an area of 2767 sq. miles, and a pop. (1869) of 153,159.

Salzkamm'ergut ('Salt-exchequer property'), called also Austrian Switzerland, a mountainous district of Austria, lying between Styria and Salzburg, and bounded by the rivers Salzach and Enns. Area, 250 sq. miles; pop. 17,500 (3500 Protestants). Its scenery is of the greatest variety and beauty, presenting wooded mountains rising to the region of perpetual snow, alternating with verdant valleys interspersed with sequestered lakes. The chief mountain groups are the Tennengebirge (7967 feet), stretching to the right of the Salzach; the glacier-covered Dachstein (9848 feet), W. of the former and S. of the Hallstatter See; the Todt-Gebirge (6716 feet), in the N.E. corner, lying along the beautiful Gosanthal; the Höllern-Gebirge, in the N.W., between the Traunsee and Attersee; and the Schaffberg, between Attersee, Mondsee, and Wolfgangsee. The most beautiful lake is the Traunsee, 8 miles in length, and connected with the Hallstatter See by the river Traun. S. has valuable mines and springs of salt, producing annually 56,000 tons of salt, and giving employment to nearly 7000 of the inhabitants. The chief seats of the salt works are Ischl, Hallstadt, and Ausee. The capital of S. is Gmunden.

Salzwedel, a town of Prussian Saxony, on the right bank of the Jeetze, an affluent of the Elbe, 51 miles S.E. of Lüneburg by rail. It has five churches, and carries on manufactures of cloth, linens, woollens, and cottons, besides sugar-refining, brewing, and dyeing. Pop. (1875) 8205.

Samany and Dailamy Dynasties. See PERSIA, *History*.

Samar', one of the Philippine Islands (q. v.), with an area of 13,020 sq. miles, with a pop. (according to Dr. Meyer in the *Mittheilungen* of 1874) of 250,062, most of whom are Mestizoes. The mountains of S. are higher than those of any other island in the group, having an altitude of over 7000 feet. The trade is chiefly in wax, cabinet woods, palm-oil, and mat-work. Catalogan is the chief town and seat of trade.

Sama'ra, a government of Russia, bounded W. by the Volga, and E. by the Kirghiz steppes, and surrounded by the governments Astrakhan, Saratov, Simbirsk, Kasan, Ufa, and Orenburg. Area, 60,207 sq. miles; pop. (1870) 1,837,081, of a very mixed character. S. is everywhere fertile, save on the mountainous steppe, in the S.E. The W. has rich pastures occupied by German colonists. In the S. the chief occupations are corn-growing and cattle-rearing; in the N. are manufactured cloth, leather, potash, brandy, and tallow.—S., the capital, at the confluence of the S. river with the Volga, 208 miles E. of Sysran by rail. It has four churches, and one of the greatest corn and wool markets on the Volga. It exports also lambskins, fish, and tallow. Pop. (1870) 51,947.

Sama'rang, a town of Java, and the capital of a Dutch residency on the W. coast of the island, and at the mouth of a river of the same name. It is connected by railway with the town of Djokjokarta, on the S. side of the island, and is a great entrepôt for sugar, rice, pepper, coffee, &c. In 1877 the passenger receipts of the railway amounted to £42,947, and the merchandise receipts to £192,313. S. has a shallow harbour and an unhealthy climate. Pop. 30,000, including many Chinese.

Sama'ria (Lat., Gr. *Samaria*, Heb. *shomeron*, 'watch-height,' probably so called from the nature of its situation, although a different etymology is given in 1 Kings xv. 24), the ancient capital of the kingdom of Israel, was built by Omri (about B.C. 925), on an oblong hill about six miles to the N.W. of Shechem. S. continued to be the capital of Israel till its capture by Shalmaneser (B.C. 721). According to Eusebius (*Chronicon*) the city was taken by Alexander the Great; and it was again taken by John Hyrcanus and razed to the ground (B.C. 109;

10, 2, *Bel. Jud.* i. 2, 7). In the time of Alexander Jannæus (B.C. 105-79) it was in the possession of the Jews, but Pompey restored it to the descendants of the old Samaritans (*Ant.* xiv. 4, 4). It was rebuilt first by Galbinus (*Ant.* xiv. 5, 3), and more completely by Herod, who fortified it and peopled it with a colony of 6000, calling it Sebaste (Gr. Augustus), in honour of the Emperor (*Ant.* xv. 8, 5, *Bel. Jud.* i. 21, 2). Sebaste was taken by the Moslems during the siege of Jerusalem (637). A bishopric was established there by the Crusaders, which existed till the 14th c.; and at the present day all that remains of S. is an Arab village called *Sebustiek*.

The name of S. was also applied to the whole territory over which Jeroboam made himself king (*cf.* 1 Kings xiii. 32), but after the conquests of Tiglath-pileser (2 Kings xv. 29, 1 Chron. v. 26), it was confined to the central part of Palestine lying between Galilee and Judah. The people who were carried off by Shalmaneser to Assyria consisted of the greater part of the inhabitants of S. and the adjacent villages (not the whole of them, as some maintain; *cf.* 2 Chron. xxx. xxxiv. 6, 7, 9). To supply their place, colonists were brought from Assyria, probably by Esar-haddon, about B.C. 677 (2 Kings xvii. 24, Ezra iv. 2-10), so that the inhabitants of the province of S. were now a mixed race, the non-Jewish element having preponderance. On the return of the two tribes from Babylon the Samaritans wished to co-operate with them in rebuilding the temple at Jerusalem; and when this was refused, a feud began between them and the Jews, which only increased with lapse of time (Ezra iv. 2-10). After the Samaritans built on Mount Gerizim (q. v.) a temple which rivalled that at Jerusalem, the two communities hated each other with a perfect hatred (*Ant.* xviii. 2, 2, xx. 6, 1, John iv. 9). When this temple was destroyed by John Hyrcanus (*Ant.* xiii. 10, 2, 3), they built another at Shechem (q. v.); but Gerizim remained their holy place, on which they celebrate the Passover to this day. The Samaritans have now dwindled down to the scanty but tenacious community of Nablus. See Robinson's *Bibl. Researches* (3d ed. Lond. 1867), Stanley's *Sinai and Palestine* (new ed. 1871), *Jewish Church* (6th ed. Lond. 1875). *A Sketch of Samaritan History, Dogma, and Literature; Published as an Introduction to Fragments of a Samaritan Targum, edited from a Bodleian MS.* by J. W. Nutt, M.A. (Lond. 1874).

Samaritan Pentateuch, the version of the Pentateuch in use among the Samaritans, which is written in the ancient Hebrew or Samaritan character, was alluded to by certain early writers—Cyril of Alexandria, Eusebius, &c.—but was otherwise unknown till Pietro della Valle obtained a copy of it from the Samaritans in Damascus in 1616. This copy was presented by the French ambassador at Constantinople to the library of the Oratoire at Paris (1623); was first described by Morinus in his preface to the lxx. (1628), and then printed in the Paris Polyglott. Morinus in his *Exercitationes Eccl. in utrumque Sam. Pent.* (Par. 1631), pronounced the newly-found codex to be greatly superior to the Hebrew Pentateuch. A controversy on the subject was carried on for two centuries, but was almost finally settled against the view of Morinus by Gesenius, who in his dissertation (*De S. P. Origine, &c.*, 1815) showed that the S. P. is of no critical value.

Regarding the age and origin of the S. P. the most divergent opinions have been entertained. 1. One opinion, held by a great number of able critics, is that the S. P. was received by the Samaritans as an inheritance from the ten tribes. The arguments for this opinion are—(1) that it is improbable they should have received it from the Jews after the Captivity on account of the bitter enmity which existed between the two communities; (2) the Pentateuch being the only part of the Jewish canon included in the Samaritan canon, it is improbable that they had received it after the Hagiographa (q. v.) and the Prophets were added to the former; (3) being written in the ancient Hebrew character, it must have been written before the change of that character into the square Hebrew letters, which took place at the end of the Captivity. The correctness of this theory is intimately connected with the origin of the Hebrew Pentateuch. If the Pentateuch did not take its present form till the time of Manasseh or Josiah, as many critics hold, or even till after the Captivity, as others maintain, the above theory is obviously incorrect. 2. The other leading opinion is that the origin of the S. P. must be looked for at the time when the Samaritans (q. v.) separated themselves for ever from the Jews as an independent

sect. According to some, it was brought from Jerusalem about B.C. 409 by Manasseh. More probably it was got after their temple was built and their worship established, and since so many of its readings agree with the lxx., while differing from the Hebrew Pentateuch, it must have come directly or indirectly from the Jews in Egypt. On the other hand, as it undoubtedly originated before the lxx., its most probable date is about the end of the 4th c. B.C. See Smith's *Dict. of the Bible* (1863); Davidson in Kitto's *Cyclo. of Bibl. Lit.* (3d ed. 1876).

Samarkand', a town of Russia, government of Turkestan, Central Asia, 32 miles S. of the river Zerafshan, and 130 miles E. of Bokhara. It has followed the changes in the course of the river, so that it consists of an old and a new town, the former containing the most interesting buildings. These are the tomb of Kasim-bin-Abbas, the mosque and tomb of Timur, and the citadel, which is situated on a hill at the S. W. corner of the city, and has now a Russian garrison. Other buildings are the palaces of the early Emirs and the Begs, of which one has been converted into an hospital and magazine for stores, and the other into bureaux for the Russian officials. S. has considerable industry, chiefly in the manufacture of silk, cotton, and paper, and work in enamel. Pop. (as estimated by Schuyler in 1873) 30,000. S. was the *Maracanda* of the ancient Greeks, and was termed by its inhabitants *Tshim* until it received its present name from the Arab Samar, who introduced Islamism in 643. In 1219 it was taken by Jenghiz Khan, and 200 years later it was the capital of the vast empire of Timur. It was long the centre of the Mohammedan learning of Turan, and it has been much celebrated in the poetry and romance of Persia. In 1868 it was taken by the Russians under General Kaufmann after a bloody struggle, and it is now the furthest point of their mission of conquest and civilisation in Central Asia. See Vámbéry's *Travels in Central Asia* (Lond. 1864); Petermann's *Geogr. Mittheilungen* for 1865; and E. Schuyler's *Turkestan* (Lond. 1876).

Sámhbhur Lake, a shallow expanse of water, strongly impregnated with salt, in Rajputana, British India, lying between the two states of Jeypore and Jodhpore, each of which owns a half of it. It is about 50 miles in circumference, but varies greatly in extent according to the season of the year. In the hot weather, the salt is found crystallised on the bottom which has been left dry. When collected it is of a reddish colour, but on being exposed to the sun it becomes of an excellent quality. This lake is now leased by the British Government from the two Rajput chiefs to which it belongs. The N. W. Provinces are chiefly supplied from this source; and for the prevention of smuggling, a customs line consisting of a hedge is run along for a distance of 2375 miles. The salt revenue along this line amounts to £1,400,000, at £8, 8s. per ton. The new Rajputana Railway, opened in 1872, has its terminus at S. L.

Sam'bor, a town of Austria, in Galicia, on the left bank of the Dniester, has manufactures of linen and iron. Pop. (1869) 11,749.

Sam'bre (Lat. *Sabis*), a tributary of the Maas, rises in the French department of Aisne, and after a N. W. course of 115 miles, 58 of which are in Belgium, joins the main stream at Namur. The S. is navigable for 100 miles, and is joined with the Oise by a canal. On its banks Julius Cæsar defeated the Nervii, B.C. 56, and it formed the line held by the Allies which was carried by the French under Jourdan in the battles at Rouvroi, Merbes-le-Château, and Gosselies, May 10 to June 4, 1794.

Sambur or **Sambu**. See **RUSA**.

Sam'nites, a people of ancient Italy, who occupied a mountainous district in Central Italy, W. and N.W. of Naples, extending from about Isernia to the sources of the Calore. They were probably a body of Sabine (q. v.) emigrants, who, entering a district occupied by Oscans, conquered and amalgamated with them. The nation thus formed was one of the bravest in Italy, and long disputed with Rome the mastery of the peninsula. In 354 B.C. they formed a league with Rome (q. v.), but in 343 the First Samnite War broke out, and continued with varying success till 341. After another alliance, the Second Samnite War commenced in 326, and though the Romans were humiliated in 321 at the Caudine Forks, the S. had on the

whole the worst of it. The war ended in 304. In six years the Third Samnite War began, and lasted till 290, the Romans being again victorious. In the Fourth Samnite War (282-272) the S. were thoroughly crushed, but continued to treasure hostility to Rome, aiding Hannibal during the Punic Wars, and heading the Italian league in the Social War (89). They sided with Marius against Sulla, but the latter laid waste their lands and almost exterminated the nation (82 B.C.).

Samo'a, or **Navigator Islands**, a group in the S. Pacific, situated between 13° 40'–14° 40' S. lat., and 168°–173° W. long. They are nine in number, and possess an area of 1087 sq. miles, with a pop. estimated at 33,000 in 1875. The three largest islands are Savaii, Upolu, and Tutuila. Rose Island, the most easterly of the group, is of coral formation, but the others are of volcanic origin, and are very mountainous, some of the peaks being 3000 feet high. They are clothed with splendid forests, and possess a soil capable of yielding all kinds of tropical products. S. has a growing trade with Sydney, Germany, and the United States, and in 1876 the imports and exports (exclusive of goods merely in transit) amounted in value to £116,000 and £111,000 respectively. Cotton, copra, cocoa-nut oil, and béche-de-mer are at present the chief articles exported. Ethnologically the islands are of special interest (see **POLYNESIA**). The inhabitants possess the finest physique of any in Polynesia, and are brave and intelligent, but indolent. They are governed by a king and parliament (so-called) composed of hereditary chiefs, but to put an end to deadly internecine strifes the establishment of an American or British protectorate has been solicited on several occasions since 1872, though as yet (September 1878) without success. The capital is Apia, on the island of Upolu. Missionaries have long successfully laboured in the islands.

Samos (mod. Gr. *Samo*; Turk. *Syssam* or *Susam Adasi*), an island of the Ægean Sea, on the W. coast of Asia Minor, near Ephesus, is 25 miles long and of varying breadth. Area 175 sq. miles; pop. (1877) 35,878, of whom upwards of 34,000 belong to the Greek Church. The island is very mountainous, the chief summits being Mount Ampelos and Mount Kerkis (anciently Cerceteus) 4725 feet high. The soil is rich in marble, zinc, lead, and silver, but though a company has been formed to survey the island there are as yet no mines. The island produces excellent wine of various kinds, of which £25,000 worth was exported in 1875; and raisins, of which £30,000 worth was exported. The total value of the exports in that year was about £100,000; of the imports about £90,000. During 1875, 74 steamers (69 English) with aggregate tonnage of 28,037, and 4801 sailing vessels with aggregate tonnage of 41,138 entered the ports of S. There are in the island 41 schools with 2833 pupils. The nominal capital is Megah Chora, the seat of the bishop. The chief town and seaport is Vathy, to which belong 236 Samian ships with aggregate tonnage 5717. In ancient times S. was very important. Samian sailors were famous, and first passed through the pillars of Hercules. Under Polycrates S. rose to great maritime eminence, and here the Persians were finally expelled in 479 B.C. During the Roman rule its history was uneventful, but its possession was more than once contested in the Middle Ages, and its population, which in ancient times had exceeded 250,000, sank for a while to a few thousands. The Samians fought resolutely during the Greek War of Independence, but were not liberated. However, on the 11th December 1832 the Sultan issued a firman making the island a tributary principality. A Greek prince named by the Sultan calls an assembly of thirty-seven deputies. These select a council of four. There are native law courts and a native gendarmie, but 200 Turkish soldiers remain permanently at Vathy.

Samothrace (Mod. Greek, *Samothraki*; Turk. *Semendrek*, *Semadrek*), an island in the N. of the Ægean Sea, 23 miles from the Thracian coast, and belonging to the Turkish vilayet Djezir Bahri Sefid. Area, 71 sq. miles; pop. 1800, almost exclusively Greeks. The island is 8 miles long by 6 broad, and consists of a wooded mountain-mass rising in Mount Fingari to 5240 feet. No island in the archipelago attains such a height except Crete. There are several valleys of exceptional fertility. S. has no harbours; it was in ancient times described by Pliny as *insulatuosissima omnium*. The chief place is the village of Kastro on the S. coast.

Samoyèdes, a people of North Russia, allied apparently to the Lapps and Finns, but more degraded. Formerly the inhabitants of the whole Siberian plain, they are now mainly confined to a region in the extreme N., extending between the White Sea and the river Yenisei. Small, indolent, and peaceable, they are still little influenced by civilisation, and live by herding reindeer and collecting fish and furs. The *khasovo*, or *nenetch* (i.e., 'men'), as they call themselves, number 30,000, according to the *Statistique Militaire de la Russie* (St. Petersburg, 1871). A collection of all the articles in use among the Ostiaks and S. of N. Siberia, made by Dr. Finsch during his travels in 1876, was presented to the Berlin Ethnographical Museum in 1878.

Samphire (*Crithmum*) is a genus of Umbelliferae consisting of a single species named *C. maritimum*. It is a fleshy, glabrous, much-branched herb, with a woody root-stock; and has triternate compound leaves; many-rayed flat-topped umbels of greenish-yellow flowers; an oblong, terete fruit, each carpel having five elevated ridges and many vitæ. The plant occurs in Europe, on maritime rocks around the Atlantic and Mediterranean coasts from France southwards, also on the N. African seaboard. In the British Isles it extends N. to Ayrshire. From its native habitat, or from garden-grown plants watered with sea-salt, the leaves are gathered to form a very desirable and old-established pickle. In lieu of them, sometimes those of the golden S. (*Inula crithmoides*) are substituted, and are nearly as acceptable; but another and common substitute, *Salicornia herbacea* (see GLASSWORT), is stringy, and altogether lacks the piquancy of real S.-pickle. S. was long since dedicated to St. Peter, whence its name by contraction of the Italian *Herba di San Pietro*. The older and more correct spelling was Sampire and Sampier, from Fr. *Saint-Pierre*.

Samsø, a small and very fertile island of Denmark, lying between Zealand and Jutland. Area, 42 sq. miles. Pop. (1870) 6335. It is 16 miles long, and 5 miles at its greatest breadth. The principal place is Nordby on the N. coast.

Samson (Heb. *Shimshon*, from *Shemesh*, 'the sun') is described as a Danite, who was a Nazarite (q. v.) from his birth, and who killed many of the Philistines in the course of his life, and although finally overpowered by them, took a terrible revenge upon them at his death (Judges xiii.-xvi.). A twofold difficulty has been felt in the history of S., namely (1), that he is improperly called a 'judge,' even in the sense in which it is applied to the others, since his deeds do not aim at the liberation of the nation, or even of his own tribe, and (2), that 'most of these deeds far exceed the bounds of credibility.' It is the opinion of some modern critics that the life of S. is founded on a solar myth, similar to those in which the sun-god in other countries was personified as a king, a hero, a hunter, &c.; e.g., the Egyptian Osiris, Syrian Adonis, Grecian Herakles, Phœnician Baal, Babylonian Thammuz, or Norse Balder, with which have been interwoven the exploits of some Danite hero, such as Shamgar (Judges iii. 31), and the whole remodelled after the ideas of the prophets of later times. Various particulars of the story are so interpreted as to confirm this view. Thus he is called a Nazarite, although he has not a single characteristic of the class; indeed, his whole life is opposed to the idea of his belonging to it, with the single exception of his long hair, which, however, is a universal symbol of the sun's rays. Again, it is said, the well-known riddle (Judges xiv.) is not satisfactorily explained by the story on which it professes to be founded, but only by the idea that honey is made while the sun is in the constellation Leo! The story of the 300 foxes or jackals and the firebrands (Judges xv.) is explained as a myth of thunder-clouds, from the points of which the lightning-flashes dart. The story connected with it, of his killing a thousand Philistines with the jaw-bone of an ass, out of which there afterwards flowed a supply of water, is compared with the Hindu myth of Indra, the god of day, whose cows (the clouds) were stolen by a wicked spirit (the scorching drought), but who pursues the thief, beats him (with the rod of his lightning), and then brings back his cows, while their milk (the rain) is poured out over the earth. The Delilah-episode and the last scene in the temple of Dagon are explained as myths of the sun's course during the Winter, when he is encompassed by his enemies—mist and darkness,—shorn of his rays, and deprived of all his power and glory,—and of his final triumph over his enemies when

his strength returns in Spring. See *The Bible for Young People*, by Drs. Oort, Hooykaas, and Kuenen (Eng. trans. Lond. 1873-78); and Goldziher's *Hebrew Mythology* (Eng. trans. Lond. 1877).

Samuel (Heb. *Shemuel*, 'name of God,' 'placed by God,' or (1 S. i. 20) 'heard of God') was the son of Elkanah and Hannah. His father was a Levite (1 Chron. vi. 22-28), dwelling in Ephraim, and S. was dedicated as a Nazarite (q. v.) from his birth, and brought up at Shiloh as an attendant on Eli the priest. It is said that he was known to be a seer by all Israel, who listened to the revelations from God that were made to him (1 S. iii. 19-iv. 1a).

The great work of S. consisted in what he accomplished for the religious life of the people. The time was a transition period in the history of Israel, marked by a religious revival and a great political advance. After the sanctuary at Shiloh was broken up by the loss of the ark, which remained at Kirjath-Jearim when restored by the Philistines (1 S. iv.-vii. 1), the worship of Jehovah seems to have been neglected, the people being devoted to the worship of Baal and Astarte (vii. 3). But when they had been oppressed by the Philistines other twenty years, an enthusiasm began to grow for the national Deity (vii. 2). S. fanned this flame by telling them that all their disasters were due to their unfaithfulness to Jehovah, who would save them if they would only put their trust in him (vii. 3). That he actually gained his end as soon as he opened his mouth can hardly be reconciled with what we know of the subsequent prevalence of idolatry. The account of the consequences of the defeat of the Philistines at Mizpeh (vii. 13, 14) seems to be contradicted by the subsequent state of affairs (cf. ix. 16, x. 5, xiii. 19-22). But the people themselves were realising more and more that the cause of their weakness was the disorganised state of the tribes, and that the only hope of their being able to maintain their national existence among the surrounding nations lay in becoming united under one head. S., despising all statecraft, fought against this tendency, and maintained that the only road to prosperity was religious reformation, and zeal for the worship of Jehovah. Himself a Prophet (q. v.) and a Nazarite, he contributed greatly to the institution of the 'Schools of the Prophets,' and urged others to take the vow of the Nazarites. Like a second Moses he upheld the worship of Jehovah, combating all participation in the customs of the neighbouring nations, as well as worship of their deities. See Ewald's *Gesch. d. Volkes Israel* (Eng. trans. Lond. 1869); Kuenen's *Rel. of Israel* (Eng. trans. Lond. 1874-75); *The Bible for Young People* (Eng. trans. Lond. 1873-78).

Samuel, Books of, in the Hebrew Scriptures, form, with the Books of Kings (q. v.), one historical work. This work in the LXX. and the Vulgate is divided into four books called the Books of Kings; in the Hebrew canon it is divided into the Book of S. and the Book of Kings. The twofold division of each into two was only introduced into the printed Hebrew Bibles in the 16th c. The history contained in the B. of S. extends from the birth of Samuel (about B.C. 1150-60) almost to the death of David (about B.C. 1020, see JEW). There is reason to believe that the original book did not end where it does now, but carried on the history to the death of David, if not to that of Solomon (1 Sam. ii. 27-36, cf. 1 Kings ii. 26, 27; 2 Sam. v. 4, 5, and 1 Sam. xxvii. 6; 2 Sam. vii., cf. 1 Kings), the continuation having been used by the later writer of the Book of Kings. The writer of the B. of S. is altogether unknown. The only probable approximation to a date is after the death of Solomon (as above), and before the destruction of the kingdom of Israel (B.C. 721), to which it makes no reference. In the composition of his work the writer evidently made use of certain written records, as well as oral tradition.—1. There are certain poetical pieces taken from the former: the song (1 Sam. ii. 1-10) put into the mouth of Hannah (cf. v. 5), but which had been composed for some victorious king (cf. vv. 1, 4, 10), 2 Sam. i. 19-27) taken from the Book of Jasher (q. v.), iii. 33, 34, xxii.) which also appears in Psalm xviii., xxiii. 1-7. 2. The difficulty of making 1 Sam. xvii. 1-xviii. 5, in which David appears as a stranger to Saul, correspond with xvi. 14-23, makes it probable that the writer had incorporated a record of David's encounter with Goliath into his narrative. A similar explanation might be given of the correspondence between 1 Sam. xxiii. 19-xxiv. 22 and xxvi., and of 1 Sam. xiv. 47-52, 2 Sam. viii. (cf. x.-xiii.) xxi.

15-22, xxiii. 8-39. See Bleek's *Einleitung in d. Alte Test.* (Eng. trans. Lond. 1869).

Samyda'cea is a dicotyledonous natural order consisting of about eighty-five species of trees and shrubs. The type genus *Samyda* belongs to tropical America, *S. suaveolens* of the Brazilian forests being remarkable for its deliciously-scented flowers.

Sana, properly **Sanna**, the capital of Yemen in S.W. Arabia, and the residence of a native Imaum, lies in a beautiful valley within the great Arabian tableland 160 miles N.E. of Mocha (q. v.), and 162 N. of Aden. It has two fine palaces embowered in gardens, adorned with numerous fountains, 20 mosques, and numerous baths and caravanserais. In rainy weather the main street is transformed into a river, and in consequence is provided with a bridge. The merchants of S., among whom are many *Banians*, are very rich, but affect an appearance of poverty to escape spoliation. Coffee, dates, and tobacco are the chief articles of trade. The Jews, who are much despised and very ill-used, form an important part of the population, which is variously estimated at from 20,000 to 40,000.

San Antonio, a city of Texas, U.S., on the S. A. river, 120 miles S.W. of Austin by rail, was founded by the Spanish in 1714. It has ten churches, a hospital, a fortress (the Alamo), a fine public park, two daily and four other newspapers. The people are mostly Mexicans, Germans, and Americans, who occupy different quarters of the town. The Roman Catholics predominate, and have here a college (St. Mary's), with 10 professors and 360 students in 1876. The chief manufactures are flour, soap, prepared meat, and beer. S. A. was the scene of the massacre of 150 whites by the Mexicans in 1836. Pop. (1870) 12,256.

San Christ'obal (formerly *Ciudad Real*), capital of the state of Chiapas, Mexico, on the river Tabasquillo, 450 miles S. of the city of Mexico. It was founded in 1528, and was the seat of a bishopric, first filled by the benevolent Las Casas, whence it is sometimes called *Ciudad de las Casas*. It has manufactures of pottery, and of woollen and cotton stuffs, and is the centre of a cattle-raising district. Estimated pop. (1877) 12,000.

Sanchunia'thon, according to Porphyrius (*De Abstin.* ii. 56), the name of a certain ancient Phœnician writer, who wrote a Phœnician history in the Phœnician language, which was translated into Greek in eight books by Philo of Byblos, who lived in the latter half of the 1st c. A.D. Eusebius, who says (*Præp. Ev.* i. 6, x. 11) S. was a native of Berytus, seems to have read Philo's work himself, and states that Porphyrius made great use of it for his work against the Christians, not now extant. Subsequent writers who speak of S. or of this Philo draw their accounts either from Porphyrius or Eusebius. There is no evidence for the existence of S. except the testimony of Philo of Byblos himself, and not only from the circumstances of the case, but especially from the character of the contents of the work, it is now generally held that the so-called translation of S. was forged by Philo himself. Movers supposes that S. (originally *San-Chon-idth*, 'the whole law of Chon') was the title of the sacred books of the Phœnicians, and that Philo availed himself of this name for his imaginary writer. A useful edition of the extant fragments of the so-called S. was published by J. C. Orelli (Leip. 1826). In 1830 Wagenfeld published (at Hannover) a German translation of a Greek MS. found the year before in a Portuguese convent, which purported to be the entire work of Philo, and in 1837 printed at Bremen the original as well; but it is now agreed that it is the work of a later age, and that, curiously enough, Philo the forger has himself also been made the subject of a forgery. See Movers, *Die Phœnizier* (2 vols. Breslau, 1840-56), and Baudissin, *Studien zur Semitischen Religionsgeschichte* (Part i. Leip. 1876).

San'croft, William, an English prelate, born at Fresingfield, Suffolk, January 13, 1616, was educated at Bury St. Edmunds and at Emmanuel College, Cambridge, of which he became a Fellow in 1642. In 1660 he was elected University preacher, obtained the rectory of Houghton-le-Spring, and became a prebendary of Durham Cathedral. After various preferments, he rose to the archbishopric of Canterbury in 1677. With six other bishops he petitioned James II. against the declaration of indulgence 1687; and the seven were committed to the Tower. His attitude towards Dissent seems to have been

changed about this time more than once; but when William of Orange decided for a free Parliament and perfect toleration, S. refused to take the oath of allegiance, and retired to his native village, where he died November 24th, 1693. He produced what Macaulay characterises as 'a hideous caricature of Calvinistic theology' under the title of *Fur Predestinatus, sive Dialogismus inter Quendam Ordinis Prædicantium Calvinistam et Furem ad Laqueum damnatum habitus* (1651). See D'Oyly, *Life of William S.* (2 vols. 1821).

Sanctifica'tion, defined in Protestant theology as 'the work of God's free grace, whereby we are renewed in the whole man after the image of God, and are enabled more and more to die unto sin and live unto righteousness,' is distinguished from Justification (q. v.) as follows: Justification is (1) a transient, (2) objective, (3) forensic act, which (4) changes, or declares to be changed, the relation of the sinner to the justice of God, (5) is founded on what Christ has done for us, and (6) is complete and the same in all. S. is (1) a progressive, (2) subjective work, (3) due to the divine efficiency, and (4) involving a change of character; it (5) is the effect of what Christ does in us, and (6) is more complete in some than in others. See Hodge's *Syst. Theol.* (Edinb. 1873).

Sanctuary was a sacred place, such as a temple, in which those who took refuge were safe from violence. There was a S. at most of the important cities of antiquity, of whose privileges people had availed themselves from such remote times that, according to tradition, they were founded by the founders of the cities. Such was the case at Athens, Thebes, and Rome (cf. Livy, i. 8). Other famous sanctuaries were the temples of Apollo at Delphi and Delos (Livy, xxxv. 51), the temple of Diana at Ephesus; and the Jews had their well-known Cities of Refuge (q. v.). Although it was considered a crime of the deepest dye to kill anyone in a S., yet it might be done if the refugee could be got by force or fraud beyond the limits of the privilege (cf. 2 Macc. iv. 24); he might be driven out by fire, or, failing everything else, might be starved to death, provided he was not allowed to breathe his last within the sacred precincts (cf. Thuc. i. 134). Again, although a S. was intended for the protection of the innocent, such as the homicide from the Avenger of Blood, as among the Jews (Num. xxxv.), too often the privilege was abused. Thus Ephesus, through her temple-S., became a nest of robbers (Strabo, xiv. 641). Other temples were filled with insolvent debtors, runaway slaves, and criminals (Tac. *Annal.* iii. 60-63), and the ends of justice were so often defeated that Tiberius Cæsar deprived them all of their privileges but the temples of Juno Samia and Æsculapius. The privilege which was thus enjoyed by many temples was transferred to Christian churches. At first the privileged area was confined to the altar and the choir, as it was to the altar of the Jewish tabernacle and temple (Exod. xxi. 14, 1 Kings i. 50, ii. 28, Jos. B. J. iv. 4, 5). Afterwards the nave, and finally the whole enclosure, was included. All persons were secure there till their case was investigated, except public debtors, runaway slaves, Jews, robbers, murderers, and adulterers. This right had been conferred on churches by the Emperor Justinian in the 6th c., but in the 7th c. Pope Boniface V. ordained that no person who had taken refuge in a church should be delivered up; which led to boundless abuse. The right still exists in Italy; and there is yet one S. for debtors in Scotland—the Abbey of Holyrood.

Sanctus (in sacred music), a principal movement in the Mass of the Church of Rome; the 'Holy, Holy, Holy,' sung in the Communion Service of the Church of England.

Sand, the fine debris of crushed or water-worn rocks. As a rule it consists chiefly of quartz, often along with various colouring matters. Shell-sand frequently consists to a very large extent of broken fragments of the shells of molluscs, or of the entire shells of smaller species, along with foraminifera, sponge-spicules, &c. Coral-sand, in tropical countries, is formed of the detritus of coral reefs. Magnetic sand contains magnetic oxide of iron.

Sand, Georges (Armandine Lucile Aurore Dupin, Baronne Dudevant), born at Paris, July 1, 1804, was the granddaughter of Marshal Saxe's illegitimate daughter. Her father, M. Dupin, married her mother, the daughter of a bookseller, just before Aurora's birth, and left to his child the small estate of Nohant, in Berry, where the novelist lived latterly, and

died. In her youth she was surrounded by people who adopted the religion of Voltaire and the ethics of Rousseau. At thirteen she entered a convent, whence in three years she emerged to study philosophy. In 1822, of her own will, but with no real love, she married a M. Dudevant, whom she left in 1831, formally divorced in 1836, and from whom she bought the custody of their two children for £2000. In 1831 she went to Paris with her daughter, dressed in a man's clothes, and sought literary work. Jules Sandeau joined her, and the two produced *La Prima Donna* and *Rose et Blanche* (1831). These appeared in the *Revue de Paris*, the editor of which, Dupuy, asked from Madame Dudevant something entirely her own. The result was *Indiana* (1832), published as the work of G. S.; *Valentine* (1832), and *Lilia* (1833) followed. Thereafter she sought rest in Italy, and took Alfred de Musset as her companion. Some account of her travels was contained in the *Lettres d'un Voyageur* in the *Revue des Deux Mondes* for 1834-36, and a long stay in Venice produced *Metella* (1833), *Leone Leoni* (1834), *Mattea* (1835), *Les Maitres Mosaistes* (1837), *La Dernière Aldini* (1837), and *L'Uscoque* (1838). These last all relate to Venice; but to the same period belong *Jacques* (1834), *Le Secrétaire intime* (1834), *André* (1835), and *Mauprat* (a masterpiece, 1836). In 1838 she passed the winter with Frédéric Chopin in Majorca. Pierre Leroux next impressed her, and under his influence she wrote *Spiridion* (1839), and *Les Sept Cordes de la Lyre* (1840). Her other novels are, *Le Compagnon du Tour de France* (1840), *Pauline* (1840), *La Comtesse de Rudolstadt* (1843), *Teverino* (1843), *Consuelo* (1844), *Horace* (1844), *Jeanne* (1844), *Le Meunier d'Angibault* (1845), *Le Péché de M. Antoine* (1847), *Lucrezia Floriani* (1847), *François le Champi* (1848), *La Petite Fadette* (1848), *Les Maitres Sonneurs* (1853), *Elle et Lui* (1858; an account of the author's connection with De Musset), *Les Dames Vertes*, *Laure*, *L'Homme de Neige* (1859), *Constance Verrier*, *Flavie* (1860), *Valvèdre*, *Tamaris*, *Antonia*, *La Ville Noire*, *La Famille Germandre* (1861), *Mlle. de la Quintinie* (1863), *Laura* (1864), *La Confession d'une Jeune Fille* (1865), *Cadio* (1868), *Journal d'un Voyageur pendant la Guerre* (1871), *Impressions et Souvenirs* (1873). The Revolution of 1848 interrupted the labour of G. S. for a time. When she had recovered from the loss of hopes the great struggle raised, she turned her attention to the stage, and in addition to a drama called *Cosima*, coldly received in 1840, wrote the following plays:—*Le Roi Attend* (1848), *Claudie* (1851), *Le Mariage de Victorine* (1851), *Le Démon du Foyer* (1852), *Molière* (1853), *Le Pressoir* (1853), *Mauprat* (1853), *Flaminio* (1854), *Lucie* (1856), *Maitre Favilla* (1855), *Comme il Vous Plaira* (1856), *Françoise* (1856), *Les Beaux Messieurs de Bois-Doré* (1865). G. S. died June 8th, 1876. She is to be compared only with one Frenchwoman, Mme. de Staël, whom she surpasses in imaginative power and rich, flexible style. Each of her novels is an autobiographical fragment, a confession, a body of notes regarding some new experience actually undergone. No woman ever before or since has written with such varied and sustained effect. G. S. has added to the forms of fiction; when her powers seemed exhausted, they proved exhausted only in one direction, and a reserve of mental vigour enabled her to repeat her triumphs by other means. English prudence at one time delighted to picture her as a social virago, who aped the man even in the habit of smoking, and because of her peculiar views on social questions she has been called the Muse of Adultery. Her surroundings and her trials in youth must be studied along with her many faults of judgment and character. Good and bad, her influence on modern French thinking has been immense, scarcely inferior to that of Rousseau in his time, and such as none but sympathetic as well as commanding genius could have acquired. We may believe her when she says that however much she might be decried or blamed she clung to truth. Her somewhat tedious *Histoire de ma Vie* appeared in 1854 (10 vols.), and the *Dernières Pages de G. S.* in 1877. See Sainte-Beuve, *Causeries du Lundi*, Walsh, G. S. (1837), and James, *French Novelists* (1878).

Sandal (Gr. *sandalon*), a kind of shoe usually consisting of a sole strapped or fastened to the foot. The S. formed of papyrus and palm leaves was worn in ancient Egypt, and several varieties of it, made of wood, leather, or plaited fibres, were used by the Greeks and Romans. It is still worn in the East, in countries bordering on the Mediterranean, and in warm lands generally, where by reason of coolness it is preferred to the boot or ordinary shoe.

Sandal-wood is the produce of several trees of the genus *Santalum*—the type genus of *Santalacea* (q. v.). The commonest kind is obtained from *S. album*, a small evergreen glabrous tree, with opposite ovate leaves, and brownish-purple or blood-red flowers arranged in axillary panicles, followed by a round black berry. It is indigenous in the drier districts of India, also in Timor and Java. The yellowish-brown strongly scented heartwood is used as incense and perfume; for carving and engraving; and being insect-proof, for the manufacture of small cabinets, ladies' work-boxes, &c. S. oil, used as a remedy for gonorrhœa, is obtained by slow distillation from it and the root—the yield being about 2½ per cent. From ancient times this wood has been an important item in the export trade of India to China and Arabia. Yellow S. (*S. Freycenetianum*), the export of which from the Sandwich Islands to China has existed on a large scale since 1778, has similar qualifications to the above, as also *S. Yasi* of the Fiji group. *C. cygnorum* of S. W. Australia also yields a scented wood. The name red S. (or Red Saunders) has been given to two *Leguminosæ* called *Adenantha pavonina* and *Pterocarpus Santalinus*, both large trees natives of India. Of the first the hard and durable heartwood, when fresh cut, is of a beautiful coral-red colour; turning purple after exposure, and then resembling rosewood. The bright scarlet remarkably uniform seeds are used as jewellers' weights of four grains; they are also worn as ornaments. The dye obtained from the *Pterocarpus* is either red, crimson, scarlet, purple, or orange, according to the mordants employed.

Sandarach is a whitish-yellow inflammable resin, not unlike Mastic (q. v.), but brittle, occurring in tear form, and obtained as an exudation of the bark of *Callitris quadrivalvis*, a moderate-sized coniferous tree of Western N. Africa. It is used in making varnish under the name of gum S., and in a powdered state as Pounce (q. v.). The wood of the tree is hard, compact, durable, balsamic, and fragrant. Locally it is employed for superior building purposes, such as floors and ceilings of mosques, being considered indestructible.

Sand'ay or **Sand'a**, one of the largest of the N. isles of the Orkney group, extending from N. E. to S. W. for 12 miles, with an average breadth of 1½ miles. Pop. (1871) 2053.

Sand'bach, a town of Cheshire, England, 26½ miles S. E. of Chester, and 4½ from Crewe by rail. The chief buildings are the town-hall, assembly rooms, parish church (St. Mary's), and the grammar school. It manufactures salt and shoes, and has several silk factories. Pop. (1871) 5259.

Sand-bags, in military operations, are formed of coarse canvas, sometimes tarred. They are filled with earth or sand, and are used behind field-works to strengthen the parapets, and to afford shelter to the soldiery.

Sand-blast, an apparatus invented by Mr. Tilghman, an American, for cutting and abrading the surface of glass, marble, and other hard stones and like substances, by means of a jet of sand directed with great force by the pressure of steam or air at a high velocity. The essential portion of the apparatus consists of a kind of injector tube, into the upper portion of which sand is admitted, air or steam being admitted at a lower part of the tube, whence by its velocity it carries down the sand with great force against the surface to be acted on. The purpose to which the S. has been found principally applicable is the engraving of ornamental patterns on glass by grinding or depolishing the surfaces on which it is allowed to impinge. The parts to be protected against the abrading effect of the blast have simply to be covered with a stencil or a pattern in paper, lace, indiarubber, oil paint, or some similar soft yielding medium, and by a proper working of the blast even tender leaves are found to give sufficient resistance to enable their outlines to be shown on a glass surface. By using very high velocities exceedingly hard substances can be abraded with rapidity. Thus with steam at a pressure of 125 lbs., a cutting effect of 1½ cubic inches in granite, 3 inches in marble, and about 10 inches in soft sandstone per minute was obtained; and with steam of 300 lbs. a hole 1½ in. in diameter was drilled through a block of corundum 1½ in. thick in about twenty-five minutes. A remarkable feature in the operation of the S. is the abrading effect produced by comparatively soft substances thrown powerfully against hard surfaces. Lead shot propelled by 50-lbs. steam has been made to pierce a small hole

through hard quartz; and using steam at 100 lbs. pressure, a jet of sand cut a hole through a steel file $\frac{1}{4}$ in. thick in ten minutes.

Sand'crack, the name applied by veterinarians to a troublesome affection of the horse's hoof. In this lesion the hoof splits or cracks, and when the injury extends to the soft tissues below, great pain and lameness result. The *treatment* consists in paring the edges of the fissures very carefully, and in using the firing iron. The fissure may also be closed by aid of fine wire formed round the foot. Mild blisters stimulate the growth of new horny material.

Sandean, Léonard Sylvain Jules, a French novelist, was born at Aubusson, 19th February 1811. He went to Paris to study law, but soon discovered that his taste was for literature. About 1830 he formed an intimacy with Mme. Dudevant (see GEORGES SAND), and the two began to work together on the *Figaro*. The name under which their joint-productions appeared was Jules Sand. In 1834 S. published *Mme. de Somerville*, the first work that bore his own name. Of his subsequent writings the chief are *Les Revenants* (1836); *Mariana* (1839); *Le Docteur Herbeau* (1841); *Vaillance et Richard* (1843); *Fernand* (1844); *Catherine* (1845); *Valcreuse* (1846); *Mlle. de la Seiglière* (1848); *Madeleine* (1848); *La Chasse au Roman* (1849); *Un Héritage* (1850); *Sacs et Parchemins* (1851); *Le Château de Monsabrey* (1853); *Olivier* (1854); *La Maison de Penarvan* (1858); and *Un Début dans la Magistrature* (1862). He has also written largely for the stage.

Sandemansians. See GLASSITES.

Sand'ering (*Calidris*), a genus of *Grallatorial* birds belonging to the plover family, and also nearly allied to the snipes. The common S. (*C. arcuaria*) breeds in Arctic regions, but in winter is found in W. Europe, N. Africa, S. America, and India. It is a gregarious bird, and appears to live in small flocks. It attains a length of 8 inches, and in winter is of an ashen-grey hue on the upper parts, and white below. The plumage is of a reddish brown, mottled with black in spring.

Sand'hopper (*Talifus locusta*), an *Amphipodous* crustacean common amongst the sand on all the coasts of Britain. It leaps for a considerable distance from the sand when disturbed by an approaching footstep. As in other *Amphipoda*, the legs are disposed in two series, one directed forwards and the other backwards. There are seven pairs of thoracic limbs, and the three hinder pairs are bent backwards, forming with the last appendage of the body the powerful leaping tail. The S. is the food of many other animals, including shore-living birds.

Sand'hurst, a city of Victoria, on the Melbourne and Echuca Railway, 101 miles N.N.W. of the former place. It is the centre of the important Bendigo (q. v.) goldfield, and has also manufactures of iron and pottery. The houses and public buildings are of stone and brick, and many of them are very handsome. The streets are well paved and lighted with gas, and the water supply is ample. S. returns two members to the colonial Parliament. Pop. (1876) 26,927.

Sand'hurst, The Royal Military College, is at Sand'hurst, in Hampshire, 30 miles from London. It was formerly a college for cadets, succeeding a similar institution at Great Marlow in 1812, but since the abolition of purchase it has been used for giving one year's special military training to sub-lieutenants of the cavalry and infantry recently appointed, and to successful candidates in the competitive examinations for commissions. The college terms are from 10th February to 30th July, and from 10th September to 15th December. At the end of the course, after an examination in the field and on paper, those who pass are gazetted to regiments in which there are vacancies for sub-lieutenants. The subjects of examination are the Queen's regulations, military law, elements of tactics, fortification, military topography, and reconnaissance. The institution is under the presidency of the commander-in-chief, and has three professors and twenty-one instructors of various branches. In the year 1877 a further change was introduced into the college, which was thrown open to cadets for the line and cavalry who had passed their preliminary examination before the Civil Service Commissioners. For the college at Sand'hurst for the instruction of officers who wish to be placed on the staff, see STAFF-COLLEGE.

Sand'hurst, Sir William Mansfield, Lord, a distinguished British general, and grandson of Sir James Mansfield,

Lord Chief Justice of the Common Pleas. He was born 21st June, 1819, and entered the army from Sandhurst College in 1835. He served through the two Sikh campaigns, and was present in a diplomatic capacity during the Crimean War. On the outbreak of the Mutiny in 1857 he was made chief of the Staff, and took part in all the operations of the Sepoy War. In 1860 he was made commander-in-chief of the Bombay army, and in 1865 commander-in-chief in India. In 1870 he succeeded Lord Strathnairn as Lieutenant-General commanding the forces in Ireland, and was raised to the peerage in 1871. His knowledge of the details of military administration was very great, and it is understood that his advice was of much service to Mr. Gladstone in settling the measure for the abolition of purchase. He died 23d June, 1876.

Sand'Martin (*Hirundinaria*), a species of *Insectorial* birds belonging to the Swallow family (*Hirundinidae*), and named from building its nest in the sandy banks of rivers and in gravel pits. The nest is constructed in the form of galleries leading to an inner chamber, in which the white eggs are laid. The S.-M. is brown above and white below, with a dark-brown band on the chest. It is regarded as the smallest of the British swallows.

San Domin'go. See HAYTI and DOMINICAN REPUBLIC.

San Domin'go (town). See DOMINGO, SAN.

San'domir, a town of Poland, Russia, on the left bank of the river Vistula, 115 miles S. by E. of Warsaw. It has a fine cathedral and four churches. There is large trade in wood and wheat. At S., in 1570, was formed the well-known *Consensus Sandomiriensis* between the Bohemian Brethren and the Lutheran and Reformed Churches; and here also was concluded, in 1702, a convention of August II.'s supporters against Karl XII. of Sweden. Pop. (*St. Petersburg Calendar*, 1878) 4749.

Sand'piper, a name familiarly applied to several species of *Grallatorial* birds, belonging to the snipe family (*Scolopacidae*), and forming the type of a special sub-family included in the group just mentioned under the name *Totanus*. The nostrils are narrow, and the bill grooved. The under toe is long and slender, but barely touches the ground. The bill is slightly curved at the tip in the true S., and the first quill is the longest. The tarsi are covered by narrow scales in front. The genus *Totanus* includes the Redshank, the Green S. (*T. ochropus*), and the Common S. (*T. hypoleuca*). The Redshank (*Totanus calidris*) receives its name from its red legs. It is about 11 inches long. Though found in Britain all the year round, it is also known as a migratory bird, occurring as far south as Asia Minor and India. The Green S. inhabits the southern coasts of Britain, and is fond of marshy districts. It feeds on worms and insects, and attains a length of 9 or 10 inches. The colour is a dull or brownish green above, and white below. The tail is white, banded with dark brown. The Common S. is also named the summer snipe. Its average length is 7 or 8 inches, its colour being greenish brown above, diversified with black, white, and brown, the breast being grey and the under parts white. This bird migrates southwards in October, and arrives in Britain in April or May. The Greenshank (*T. glottis*) derives its name from its olive-green legs. Species of S. belong to the genus *Tringa*, and of these the Purple S. (*T. maritima*), the little S. (*T. minuta*), the *T. canutus*, named the Red S. or Knot (q. v.), are good examples.

Sand'ridge, a town in Victoria, on the N. shore of Hobson's Bay, 2½ miles S. of Melbourne, of which it is the principal port for large vessels. Besides its extensive shipping trade it has several factories. Pop. (1876) 7503.

Sandrocott'us, the Greek form of the Hindu *Chandragupta* ('moon-protected'), the name of a king whose reign is the one certain date in the early history of India. Though himself an adventurer, he founded a kingdom with Palibothra or Patna for its capital, which was strong enough to resist the army of Seleucus, the successor of Alexander the Great. Seleucus began to reign about 312 B.C.; and the story of his ambassador, Megasthenes, at the court of S., which is preserved to us in the pages of Strabo, is the first independent testimony we possess as to primitive Hinduism. It is thought by some that S. was a Buddhist convert, and identical with the celebrated Asoka, whose inscribed pillars are still standing in distant corners of the peninsula.

Sandstone, a rock resulting from compacted and consolidated sand. The grains usually consist for the most part of quartz, and may either cohere by simple pressure, or may be held together by some cementing material—*e.g.*, lime, peroxide of iron, &c. The latter substance imparts a red colour to the rock, while silicate of iron gives a green. The particles may vary in size from that of a pea to the finest powder, and the presence of such minerals as felspar, hornblende, mica, &c., may impart a distinctive character.

Sandusky, a town of Ohio, U.S., on S. Bay, an inlet of Lake Erie, 61 miles W. of Cleveland by rail, has thirty churches, a high school, three banks, and three newspapers. It is the greatest fresh-fish market in the world, and produces also much wine and timber. There is extensive trade in machinery and coal. Pop. (1876) 18,000.

Sandwich ('the place on the sands'), a town of Kent, England, 98 miles E. of London by rail. In the 11th c. it was described as 'the most famous of all the English ports.' It is now 2 miles distant from the sea. It has three established churches, three dissenting chapels, a grammar-school, and three hospitals. There is some shipbuilding and brewing. S. unites with Deal (q. v.) and Walmer to return two members to Parliament. Pop. (1871) of municipal borough, 3060. S. was probably an important military station under the Romans, and remains of their fortifications still exist. Under the English it was also important, and its possession was several times contested by the Danes. Edward the Confessor incorporated it, and made it one of the Cinque Ports (q. v.).

Sandwich, a well-known refecton consisting of a slice of meat between two slices of bread. It is said that a former Earl of S. commonly took it to lunch, and hence the name. The term S. is now applied to armour-plating made up of two plates of iron with an intervening layer of wood, or *vice versa*.

Sandwich or Hawaiian Islands, a group situated in the N. Pacific, between 18° 50'–22° 20' N. lat., and 154° 53'–160° 15' W. long., 2100 miles from San Francisco and 3400 miles from Japan. They number twelve, of which eight are inhabited, the remainder being little more than large rocks. The total area of the group is 7460 sq. miles, that of Hawaii (q. v.), the largest, being 4850 sq. miles. The other inhabited islands are—Maui, 750 sq. miles; Oahu, 700; Kauai, 680; Molokai, 170; Lanai, 150; Niihau, 110; Kahoolawe, 40. The whole group is of volcanic origin, and coral reefs are numerous only around the more westerly islands, where eruptions have ceased. Hawaii, which has been called 'a huge slag,' contains two immense volcanoes, Mauna Loa (13,760 feet), and Kilauea (3970 feet), whose craters are respectively 6 and 9 miles in circumference, and are constantly active. The eruptions of Mauna Loa have averaged one every nine years since the advent of Europeans, the last occurring in February 1877. Also in Hawaii is the snow-topped extinct volcano of Mauna Kea (13,953 feet), the highest mountain in Polynesia. On the island of Maui is the extinct volcano of Haleakala ('house of the sun'), 10,000 feet high, whose crater is the largest in the world, being 19 miles in circumference. The mountains of the S. I. are frequently cleft by tremendous gorges, whose precipitous sides are clothed with a tangled mass of vegetation, and in some parts the coast is formed of beetling cliffs, 1000 to 2000 feet high, at whose base the sea has hollowed out deep caverns. The N.E. trade-wind blows with great strength on the northern side of the islands for nine months of the year, rendering the climate mild and equable. From December to March, which is the rainy season, southerly winds prevail. The mean annual temperature on the coast is 68° on the windward and 80° on the leeward side of the islands.

Except on the mountain-slopes or the bare lava plains of central Hawaii, the soil of the S. I. is fertile and the vegetation abundant, though less varied than in the larger groups of the S. Pacific. The breadfruit, cocoa-nut, banana, and taro are indigenous, and every tropical crop can be successfully reared. At present only sugar and rice are largely cultivated, with coffee to a smaller extent. The indigenous mammals of the S. I. consist of the dog, rat, pig, and a species of bat which flies by lay. The native birds, with some exceptions, are not remarkable either for song or plumage, and in fish and insects the islands are also poor as compared with other parts of Polynesia. A lizard is the only reptile found in the group. Sheep, cattle,

and horses thrive well, and are now very numerous. In 1875 there were about 200,000 sheep in the islands, and it was estimated the number might be increased fivefold without encroaching on plantation land.

The inhabitants of the S. I. belong to the Polynesian race (see POLYNESIA), and are tall and well formed, with handsome features and a light-brown complexion. They are light-hearted and brave, passionately fond of athletic exercises, and daring swimmers and riders, but at the same time so indolent that it is found necessary to import Chinese to work the plantations. The immorality of the islanders is as marked as their courage, and is a prime cause of their numbers having decreased from 400,000 in 1778 to 49,000 in 1872. At the census in the latter year, the total pop. of the group, inclusive of half-castes and foreigners, was 56,897. The capital is Honolulu, on the island of Oahu, with whose commerce the foreign trade of the islands is identical. (See HONOLULU.) In 1876 the imports and exports of the S. I. amounted in value to £362,354 and £448,208 respectively.

Though sighted by one or two of the early Spanish navigators, the S. I. were practically discovered on 19th January 1778 by Cook, who was killed by the natives of Hawaii in the following year. He named them the S. I. after the Earl of Sandwich, First Lord of the Admiralty. At that time each island had a king of its own, but in the closing decade of last century Kamehameha I., who has been styled 'The Napoleon of the Pacific,' by force of arms consolidated the group into a single kingdom, which he placed under the protection of George III. in 1810. He died in 1819, and in that and the following year idolatry was abolished, and the idols everywhere destroyed, immediately after which missionaries began their labours in the islands, which are now wholly Christian. In 1840, Kamehameha III. terminated the period of despotic rule by granting a constitution, which has since been much improved. At the present time the king is aided by a Chamber of Nobles and a Chamber of Representatives, which are convoked every two years. The independence of the kingdom was formally declared by Britain and France in 1843, and is now universally recognised. See *History of the Hawaiian or S. I.*, by J. J. Jarves (Lond. 1843); *The Hawaiian Archipelago*, by Isabella J. Bird (Lond. 1875); *An Account of the Polynesian Race*, by Abraham Fornander (vol. i. published in London, 1878).

Sandwort. See ARENARIA.

Sandys, Edwin, a distinguished English prelate, was born at Hawkshead, Lancashire, in 1519. He was educated at St. John's College, Cambridge, where he adopted the tenets of the Reformers. In 1547 he was elected master of St. Catherine's Hall, and in 1553 vice-chancellor of the university. At the instance of the Duke of Northumberland he preached a sermon in favour of Lady Jane Grey, and was consequently imprisoned, but was soon released and fled to the Continent, where he wandered from place to place in great misery until the accession of Elizabeth. He then returned to England, and was consecrated to the sees of Worcester (1559) and London (1570), becoming in 1576 Archbishop of York. He died at Southwell on the 10th of July 1588. He had charge of the Books of Samuel, Kings, and Chronicles in the translation (1565) known as the 'Bishops' Bible.' His second son, **Sir Edwin S.** (1561–1629), endowed a philosophy lectureship at Oxford, and his youngest son, **George S.** (1577–1643), was well known as an Eastern traveller, and as the translator of Ovid's *Metamorphoses* (published 1632). See the Rev. R. Hooper's *Poetical Works of G. S., now first Collected, with Introduction and Notes* (2 vols. Lond. 1872).

San Felipe de Aconcagua, capital of the province of Aconcagua, Chili, is 60 miles N.E. of Valparaiso, with which, as well as with Santiago, it is connected by railway. Rich copper mines are worked in the neighbourhood. Pop. (1875) 9422.

San Felipe de Játiva. See JÁTIVA.

San Fernán'do, a town of Spain, province of Cadiz, on the Isla de Leon. It is joined to the mainland by a bridge of boats, the Puente Sanzo, and has a marine school and observatory. The Calle Real, above 1 mile in length, is its finest street. Salt, which is abundantly found on the strand, is largely exported. Pop. 15,300.

San Francisco, the commercial capital of the State of California, and the chief city on the Pacific coast of N. America,

stands on a peninsula 20 miles long by 6 wide, which separates S. F. Bay from the ocean. S. F. is situated about 5 miles from the 'Golden Gate' at the entrance to the bay, which extends nearly 50 miles inland, branching into the two separate bays of Benicia and Suisun. The peninsula was first settled by Europeans in 1776, when a Spanish military and missionary post was established at the *Presidio*, near the Golden Gate. Shortly after, the Franciscan fathers founded the mission of S. F., which is commemorated in the present Mission Street. In 1836 a town called *Yerba Buena* ('good herb') was planned around the mission, but did not flourish. In 1847, when it had 450 inhabitants, the name was changed to S. F. In 1848, almost simultaneously with the cession of California to the United States, gold was discovered, and the city began to increase with unprecedented rapidity. The pop. in 1852 was 34,776, of whom only 5245 were females. When the gold fever began to decline, the great silver mines of Nevada were discovered, and the agricultural capabilities of California began to be developed, so that a rapid growth has been steadily maintained. In 1860 the pop. was 56,000; in 1870, 149,473; in 1876, 301,020, of whom 32,000 were Chinese; and now (1878) the pop. is estimated at 330,000, including over 40,000 Chinese. In 1876 the arrivals by railroad and sea exceeded the departures by 35,326. Only a small portion, chiefly the business district of S. F., is built on level ground, the remainder of the city being situated on a series of hills in some cases so steep as to be almost inaccessible to vehicles. There are two systems of streets divided by the great thoroughfare of Market Street. In it and Kearney, Montgomery, and California Streets, the banks, offices, and especially the hotels, are extremely handsome buildings. The Palace Hotel, in Market Street, is said to be the largest building of its kind in the world. It is seven stories high, covers an area of 2½ acres, and contains, besides six enormous public rooms, 755 bedrooms, with a bathroom attached to every two. On Montgomery or California Street a foot of frontage with about 70 feet of depth now fetches a price of about \$6000. Outside the business portions of the town most of the houses are built of wood, though some of the wealthy residents have very handsome brick houses on Telegraph Hill and along the upper ridge of the city. S. F. is said to be the most cosmopolitan city in the world, the native-born American population being nearly outnumbered by the Chinese, Germans, British, Irish, and other foreign elements. The Chinese have hitherto congregated almost exclusively in their own quarter to the W. of Kearney Street, but recently they have begun to encroach on other sections, several streets E. of Kearney Street being almost entirely surrendered to them. S. F. has 85 churches and about 6 Chinese 'joss-houses,' 69 free schools and many private schools, 84 periodicals, of which 13 are daily and 34 weekly newspapers, 6 theatres, 2 Chinese play-houses, and 18 public libraries. In 1875 there were 553 manufacturing establishments, employing 18,000 men, and producing articles to the value of \$40,000,000 a year. The leading industries are cigar-making, boot and shoe manufacturing, furniture and carriage making, and fruit and meat preserving. In 1877 the export of treasure was £11,548,730, the other exports amounted to £5,998,480, and the imports to £7,117,574. In the same year 520 ships entered, and 612 cleared the port, with an aggregate tonnage of 598,289 and 718,583 tons respectively. There is a United States Mint in S. F., at which, in 1877, \$49,772,000 were coined. A very handsome City Hall is in course of erection, and will be completed about 1880. Only the Southern Railway of California comes into the city, the terminus of the Central Pacific transcontinental Railroad being at Oakland, on the other side of the bay, to which enormous ferryboats convey goods and passengers. The climate of S. F. is very equable, great heat and great cold being alike unknown, though chill fogs are very prevalent at certain seasons of the year.

San Fratello, a town in the N. of Sicily, 4½ miles from the mouth of the Fiumara, and 50 miles W.S.W. of Messina. It is a Lombard colony, and dates from the time of Adelaide of Montferrat, wife of Roger I., King of Sicily. Pop. (1874) 7489. At the base of the hill on which the town stands is the grotto of San Teodoro, containing numerous fossil bones of different species of mammalia.

Sangaree, a drink of West Indian origin, composed of Madeira wine, sugar, nutmeg, and water.

San'gerhausen, a town of Prussian Saxony, at the foot of the Harz Mountains, 12 miles W.S.W. of Eisleben by rail. It has two castles and five churches, and has manufactures of leather, saltpetre, and shoes, besides copper-smelting and weaving. Pop. (1875) 8474.

San'gha ('society'), the name of the monastic order or congregation of mendicants founded by Gautama Buddha, which exists to the present day as the nucleus of the Buddhist religion wherever that religion is professed. See BUDDHISM.

Sangir Islands, a group fifty in number, lying between the Celebes and Philippines, and belonging to the Dutch residency of Menado, in the Celebes. The total area is about 290 sq. miles, and the pop. 30,000. The largest islands are Great Sangir, Tagulandang, and Sijauw. The group is of volcanic formation, and there are three active volcanoes on the larger islands. With a fine climate and a rich soil there is but a slight production of maize, rice, sago, cocoa, sugar, and timber. The Sangirese, a Malay people, are nominally Christian, but are little removed from the savage state.

Sanguinaria is a monotypic genus of *Papaveraceæ* (q. v.). The species is named *S. Canadensis*, and is a small herb with a thick, creeping, underground rhizome. It is of common occurrence in Canada and the United States, where it is known as 'blood root' and 'red puccoon,' names derived from the orange to blood-red colour of the juice of the plant. *S.* is now inserted as officinal in the United States Pharmacopœia, a preparation of the root being used as a stimulant to the liver, as an alterative, and as a local application to fungus growths. At present it is only employed to a trifling extent in Europe. The odour of the root-stock is peculiar and somewhat narcotic; handling it incites sneezing, and the taste is bitterish and acrid. The earliest uses of the root-juice of *S.* was by the Indian warriors to colour their bodies, also for their rude drawings, and for dyeing and staining purposes. It has now been established as a dye agent in America and France.

San'guine, or **Murrey** (Old Fr. *moret*), in heraldry, signifies a dark red or blood colour, and is expressed by lines drawn diagonally and crossed by horizontal lines.

Sanguisorbææ is a sub-order or tribe of *Rosacæ* (q. v.), and represented in Europe by the genera *Agrimonia* (q. v.), *Alchemilla* (see LADY'S MANTLE), and *Poterium*, including *Sanguisorba* (see BURNET); and in temperate S. America and Australia by *Acaena*. An infusion of the leaves of *A. sanguisorba* serves in New Zealand as a tea and as a medicine.

San'hedrim or **Sanhedrin** (Heb., from Gr. *synedron*, as it is called in the New Testament, Matt. v. 22, &c., from *syn*, 'together,' and *hedra*, 'a sitting') was the supreme council of the Jewish nation at the time of Christ, although there was a distinction between the Great or metropolitan S. and the Small or provincial ones.

I. The Great S. was the highest ecclesiastical and civil tribunal, and was composed of seventy-one or seventy-two members, representing three classes of the nation. 1. The priests were represented by their chiefs, the 'chief priests' (Matt. xxvii. 1), probably twenty-four in number. 2. The people generally were represented by the 'elders' (Matt. xvi. 21), 'elders or rulers of the people' (Luke xxiii. 13, xxiv. 20; Acts iv. 5, 8), also numbering twenty-four (cf. Rev. iv. 4). 3. The literary laity were represented by the 'scribes' or 'lawyers,' as interpreters of the law in ecclesiastical and civil matters (Matt. xxvii. 3, 57, 59), who numbered probably twenty-two. The council was presided over by a *nasi* (Heb. 'prince,' 'patriarch') and a vice-president, who were elected by the council out of their number. The qualifications required in members of the S. were very numerous. They had to be both physically and morally without blemish, to be married and fathers, to be middle-aged, tall, good-looking, wealthy, learned—both in the divine law and in different branches of science—to know several languages, so as not to need an interpreter, and to have been members successively of the Small S. in their native town and of the two in Jerusalem.

II. The Small S. consisted of twenty-three members appointed by the Great S., and a president. A court of this kind existed in every town or village which had not less than 120 representative men, and two in Jerusalem. According to the oldest

tradition the S. was founded by Moses (Num. xi. 16-24; Jer. Targ. Ex. xv. 27; Jer. xxvi. 8, 16; Ezek. viii. 11). But according to the best authorities it developed itself from the Great Synagogue during the Greek dominion in Palestine. Josephus does not mention it till the conquest of Palestine by Pompey (B. C. 63), but it could not have been a new thing if it had the power immediately after to summon Herod before it (*Ant.* xiv. 9, 4). It seems to be described also in 2 Chron. xix. 8-11, which was probably written about the beginning of the 2d c. B.C.

After the destruction of Jerusalem the seat of the S. was transferred successively to Jabne (68-80), to Usha (80-116), and back again to Jabne and Usha (116-140), to Shafran (140-163), to Beth-Shearim and Sapphoris (163-193), and finally to Tiberias (193), where it became extinct with the execution of Gamaliel VI., the last nasi (425). See Ginsburg in Kitto's *Cyclo. of Bib. Lit.* (3d ed. Edin. 1876).

Sanitary Authorities and Sanitary Districts. See LOCAL AUTHORITY.

Sanitary Inspector. In the United Kingdom, the appointment of a S. I. is obligatory both for urban and rural authorities. Under the English Act, if the authority pay the S. I. the whole of his salary, he may be under the entire control of the sanitary authority, and be removable at their pleasure; but if, on the other hand, any portion of his salary be paid by Government, the appointment cannot be made without the consent of the Local Government Board, nor can he be dismissed within the period for which he is engaged without the consent of the Board. The sanitary authorities, in either case, control the duties and salary of the S. I.

The following are the principal duties of the S. I. as laid down by the Local Government Board:—The systematic inspection of the district in respect of the nuisances therein existing and that require abatement; the investigation of alleged nuisances or breach of bye-laws or regulations; reporting to the sanitary authorities any noxious or offensive businesses, trades, or manufactories established within the district, and the breach or non-observance of bye-laws or regulations; reporting damage done to any public works, and also any case of wilful or negligent waste of water, or any fouling by gas, filth, or otherwise, of water used for domestic purposes; the inspection of premises used for the sale of food, to ascertain if anything is exposed for sale unfit for such food; the procuring of samples of food or drink suspected to be adulterated, and submitting them for analysis. Upon receiving a certificate that the articles of food, or drink, or drugs are adulterated, he must cause a complaint to be made, and take the other proceedings prescribed by the Act (Sale of Food and Drugs Act, 1875); he shall give immediate notice to the medical officer of health of the occurrence within his district of any contagious, infectious, or epidemic disease of a dangerous character; and whenever it appears to him that the intervention of such officer is necessary in consequence of the existence of any nuisance injurious to health, or of any overcrowding in a house, he shall forthwith inform the medical officer thereof, &c. The Local Government Board does not deem it desirable that the offices of relieving officer and S. I. should be held by one and the same person, nor may the superintendent of police be S. I.; but in certain small towns or districts such public posts as surveyor, vaccination-officer, inspector of weights and measures, may be united with advantage. The duties of the S. I., more especially in large cities, are of the highest importance; and as it is impossible for all of them to be discharged by any single individual, assistant inspectors are employed, and to each a special department is assigned, such as inspector of food, epidemic inspector, &c.

Sanitary Science, sometimes called Preventive Medicine, State Medicine, Hygiene, and Public Health, has been variously defined by different authors. Dr. Mapother, in his *Lectures on Public Health*, describes this science as 'an application of the laws of physiology and general pathology to the maintenance of the health and life of communities, by means of those agencies which are in common and constant use.' Perhaps it may be more comprehensively defined as follows: 'An application of the laws of physiology and general pathology to the maintenance of the health of the human species, and to its development in the greatest perfection.'

S. S. is naturally divided into public and private; private

when it relates to the individual, commonly called Hygiene (q. v.); and public when it deals with communities, commonly called Public Health, or S. S. Regarding S. S. Dr. Guy says, in his *Lectures on Public Health*:—'It has to do with persons of every rank, of both sexes, of every age. It takes cognisance of the places and houses in which they live; of their occupation and modes of life; of the food they eat, the water they drink, and the air they breathe. It follows the child to the school; the labourer and artisan into the field, the mine, the factory, the workshop; the sick man into the hospital; the pauper into the workhouse; the lunatic into the asylum; the thief to the prison. It is with the sailor in his ship, the soldier in his barrack; and it accompanies the emigrant to his home beyond the seas. To all these it makes application of a knowledge remarkable for its amount, and the great variety of sources whence it is derived. To physiology and medicine it is indebted for what it knows of health and disease; it levies large contributions on chemistry, geology, and meteorology; it co-operates with the architect and engineer; its work commends itself to the moralist and divine.' This department of medical science has been cultivated, more or less, from the most remote times; and the fact of its having had a prominent position in the Mosaic code of laws, the ancient medical literature of the Hindus, the Chinese, and the Egyptians, shows that S. S. must have been regarded as a most important means for the independent existence of communities, even in the early dawn of civilisation. In ancient Greece, streams were sufficiently numerous to supply the cities with water, and they were frequently converted into public fountains by the formation of a head for their waters, and the erection of an ornamental superstructure. The inhabitants of Rome, however, were not so favourably circumstanced, and they had doubtless, for a long time, to depend upon the water of the Tiber, and to wells sunk within the city, for their water supply; but the water obtained from these sources was in course of time found to be unwholesome and deficient in quantity. The Aqueduct (q. v.) is mentioned by Strabo as among the structures neglected by the Greeks, and first brought into use by the Romans in order to bring pure water from the hills which surround the Campagna. In the 4th c. of the Christian era, the aqueducts of Rome amounted to fourteen, the length of the longest being nearly 59 miles, and some of its arches 109 feet high. Rome was also intersected with numerous sewers, some of which, especially the Cloaca Maxima (q. v.), were of gigantic size. The sewers were constantly flushed by the superfluous waters of the aqueducts. There was a distinct administration of the sewers, which was entrusted, under the republic, to the censors, and under the empire to particular officers appointed for that purpose, called *cloacarum curatores*, who employed condemned criminals in cleansing and repairing them. Under the empire, state physicians were appointed, who held the title of *archiatrus*, the first being Andromachus, physician to Nero. In later times, the order appears to have been divided into two classes, the *archiatri* of the palace and those of the people. The mode of election of the *archiatri populares* is described in the Theodosian and Justinian codes. In the largest towns there were ten *archiatri*, one to each district or subdivision; seven in towns of the second order; and five in the smaller ones; and in some respects the duties of these physicians seem to have been identical with those of our medical officers of health. In ancient Rome we have the best example of a large city possessed of an abundant and pure water supply, and well sewered; some of the sewers being of such superior construction that they serve their original purpose even to the present day.

From the downfall of the Roman Empire until very recent times, S. S. made no advances in Europe, but remained a dead letter. When the empire was overrun by successive hordes of barbarians, pillage and destruction were the order of the day. The aqueducts and sewers of Rome were destroyed, and allowed to remain in a state of disrepair, the salubrity of the place being completely vitiated. For many succeeding centuries, the various European states were almost exclusively employed in offensive and defensive wars, the only honourable occupation being that of arms. The cities were constructed with a view to defence alone; the streets and alleys were narrow and crooked; the houses were of the most vicious construction, and many had damp, underground apartments; no provision was made for potable water, except by the digging of deep wells to supply the population during a time of siege; most

of the principal towns were surrounded with walls and moats; there were no public arrangements for the removal of filth from courts, alleys, and streets, and personal cleanliness was unknown. Even in the 16th c., the filth and wretchedness of the English habitations were almost indescribable. An eye-witness says, 'The floors of the houses are generally made of nothing but loam, and are strewn with rushes which, being constantly put on fresh, without a removal of the old, remain lying there, in some cases for twenty years, with fish bones, broken victuals, and other filth underneath, and impregnated with the urine of dogs and men.' Macaulay in his celebrated chapter on 'The State of England in 1685,' says that at that time meat, though cheaper than in former years, was still so dear that hundreds and thousands of families scarcely knew the taste of it; that bread such as is now given to the inmates of workhouses was then 'seldom seen even on the trencher of a yeoman or of a shopkeeper, and that the great majority of the natives lived almost entirely on rye, barley, and oats. Soap was rarely used except by the wealthy; linen was so highly priced that it was beyond the reach of the lower classes, who, from their extreme indigence, lived in an utterly miserable condition and in a state of Scythian filth. The ministers of religion were also opposed to all measures of public and private hygiene, and the people were taught that the highest virtue consisted in mortifying the body, saintliness of character and filthiness of home and person being indissolubly associated. S. S. was thus utterly disregarded during the early and middle ages, as it was supposed to unfit man both for this world and that which is to come.'

The inevitable consequences of such insanitary modes of living at length appeared, and Europe was visited by a series of destructive plagues in the 14th, 15th, and 16th centuries such as had probably never before been experienced by the human race. Towards the close of 1347, four ships full of plague-patients returned from the Levant to Genoa, and introduced the Oriental plague, or as it was popularly termed the Black Death, into Italy. In 1348 it broke out at Avignon, and in the course of a few years it spread over the whole of Europe, devastating even Iceland and Greenland. It has been calculated that Europe lost at least a fourth of its population, and 25,000,000 of its inhabitants fell victims to the black death within three years. See BLACK DEATH. The Medical Faculty of Paris accounted for the cause of the plague as follows:—'It is known that in India, and the vicinity of the Great Sea, the constellations which combated the rays of the sun and the warmth of the heavenly fire, exerted their powers especially against that sea, and struggled violently with its waters. These vapours alternately rose and fell for twenty-eight days; but, at last, sun and fire acted so powerfully upon the sea, that they attracted a great portion of it to themselves, and the waters of the ocean arose in the form of vapour; thereby the waters were in some parts so corrupted that the fish which they contained died. These corrupted waters, however, the heat of the sun could not consume, neither could other wholesome water, hail, or snow, or dew, originate therefrom. On the contrary, this vapour spread itself through the air, in many places on the earth, and enveloped them in a fog. Such was the case all over Arabia, in a part of India, in Crete, in the plains and valleys of Macedonia, in Hungary, Albania, and Sicily. Should the same things occur in Sardinia, not a man will be left alive; and the like will continue so long as the sun remains in the sign of Leo, on all the islands and adjoining countries to which this corrupted sea-wind extends, or has already extended from India. If the inhabitants of these parts do not adhere to the following or similar means and precepts, we announce to them inevitable death, except the grace of Christ preserve their lives.' Such was the state of S. S. at the close of the 14th c. Public opinion, however, was directed to the Jews as the cause of the great mortality, and they were accused of poisoning the public wells. It never seems to have occurred to the Faculty of Paris, or to the populace, that their wells were capable of being poisoned by soakage from the streets, alleys, and courts of their cities, saturated with the filth of centuries, and that every city in Europe, from the total neglect of every sanitary precaution, was a perfect hotbed for any epidemic disease which might be introduced. At about this period several contagious diseases seem to have been developed *de novo*.

When Europe recovered from the shock of this great calamity and began to reflect on the events which had transpired, it became evident that contagion had much to do with the spread

of the disease, and that cities might be protected by isolation. On the 17th January 1374, Bernabo Visconti of Milan issued the first regulations regarding a vigorous barricado against the plague. Every plague patient was to be taken out of the city into the field, there to die or to recover. Those who attended upon a plague patient were to remain apart for ten days before they again associated with anybody. The priests were to examine the diseased and point out to special commissioners the persons infected, under the punishment of the confiscation of their goods and of being burned alive. Whoever imported the plague, the State condemned his goods to confiscation. Finally, none except those who were appointed for that purpose were to attend plague patients, under penalty of death and confiscation. When the plague returned in 1383, Bernabo forbade the admission of people from infected districts. Disinfection was not altogether neglected in these days, for we find that Giovanni Visconti, in the year 1399, when the plague broke out in Italy for the sixteenth time, ordered that 'infected houses were to be ventilated for at least eight or ten days, and purified from noxious vapours by fires and fumigations, with balsamic and aromatic substances.' Straw, rags, and the like were to be burned, and the bedsteads which had been used, set out for four days in the rain or sunshine, so that by means of the one or the other the morbid vapour might be destroyed. No one was to venture to make use of beds or clothes out of infected houses, unless they had been previously washed and dried either at the fire or in the sun.' During the 15th c. the plague broke out seventeen times in different places in Europe, and in the year 1485 a special Council of Health, consisting of three nobles, was established at Venice to devise measures for preventing the entrance of the disease to the Italian cities. Quarantine Laws (q. v.) were framed, and the first lazarettos were established upon islands at some distance from the city, where all strangers coming from places where the existence of plague was suspected were detained. When any case of the disease appeared in the city, the sick and also their families were despatched to the old lazaretto, where they were supplied with provisions and medical attendance. When cured, they were detained for forty days longer in the new lazaretto, situated on another island. Such stringent measures could only be enforced by very extensive powers, so that, in 1504, the power of life and death over those who violated the quarantine regulations was conferred on the Council of Health; and from the year 1585 onwards no appeal was allowed from the sentence of the Council. The quarantine laws of the Venetians were gradually adopted by the other commercial nations of Europe; but epidemic disease, whether of men or cattle, can never be stamped out by quarantine or isolation alone, however stringent the regulations may be, and however efficiently they may be carried out. Insanitary conditions must be removed; air, water, and food must be freed from excremented pollution; for such conditions give to epidemics all their potency. For nearly 600 years after the first invasion of the Black Death, Europe trusted almost solely to her quarantine laws for the arrestment of contagious diseases; but, although these laws have been productive of an immense amount of good, they have signally failed in eradicating epidemics from our midst.

Various other epidemics, obviously depending upon insanitary conditions, ravaged Europe during the Middle Ages. In August 1485, after the fate of England had been decided by the battle of Bosworth, the Sweating Sickness (q. v.) appeared, and followed Henry's victorious army to the capital of the kingdom. 'Richmond's army was composed of wandering freebooters, "vile landsnechte," as they were called in Germany, who assembled under his banner at Havre; sharpshooters formed under Louis XI., who recklessly pillaged Normandy, and whom Charles VIII. gladly made over to Henry, in order to free his own territories from so great a scourge. This army may not have been worse than others of the same period, but covered up as they were for a whole week in dirty ships, they doubtless carried about with them all the material for germinating the seeds of a pestilential disorder which broke out soon after on the banks of the Severn, and in the camp at Litchfield' (Hecker). The last epidemic began at Shrewsbury in 1551, and it spread with such rapidity and severity that within a few days 960 of the inhabitants died. Kaye, or Caius, a physician of that time, describes the disease, and ascribes it chiefly to a poisoned condition of the atmosphere. 'Noxious exhalations from dung-pits, stagnant waters, swamps, impure canals, and the odour of foul rushes, which were in general use in the dwellings of England, together

with all kinds of offensive rubbish, seemed not a little to contribute to it; and it was remarked universally that wherever such offensive odours prevailed, the sweating sickness appeared more malignant. The mortality throughout the kingdom was so very great that one historian calls it a depopulation.

Notwithstanding the plagues and murderous epidemics of past times, no important additions were made to S. S. beyond the quarantine laws of the 14th c., and it was not till the first great invasion of cholera in 1832 that the public conscience was stirred up. Lamentable as were the fatal results of this and succeeding epidemics of cholera in this country, it must be admitted that no calamity which ever visited a country has been productive of such an amount of good. Official investigations into the sanitary condition of the labouring class of the population, published in 1842, revealed a condition of things of which the public had no conception. The co-relation of filth and disease was clearly established and universally acknowledged, and the consequence has been the reconstruction of the cities of Europe. It soon became evident that legislation was imperatively called for, and the first great and comprehensive measure, the groundwork of sanitary legislation in this country, was passed, viz., the Public Health Act of 1848. Since that date various Public Health Acts (q. v.) have been passed.

The first great impulse to S. S. in this country was due to the labours of Edwin Chadwick, Southwood Smith, Lyon Playfair, William Farr, and Dr. E. A. Parkes, who may be said to have laid the foundations of the science.

Dr. Parkes, in his last work on S. S., or *Public Health*, mentions the following as 'the points which are now specially engaging attention, and which have to be considered both in legislation and in the practical performance of the duties of medical officers of health.'

Condition of open lands, forests, and rivers. The drainage of land has a great effect upon public health, more especially as regards the following diseases; viz., ague, dysentery, enteric fever, cholera, diseases of the lungs, rheumatism, and catarrhal affections. Drainage Operations (q. v.) might, therefore, be undertaken by the State, more especially in wet, water-logged, and malarious districts. Irrigation (q. v.) is also, in many countries, a subject of importance as regards the public health, and the operation of sewage irrigation farms should be under State control. The regulation of forests ought also to be considered a State matter, as the climate of a country is influenced by them. In some cases the partial clearing of forests is advantageous; but it has frequently happened that indiscriminate clearances have been detrimental to the public health. In Germany and France there are laws which restrain public action in this respect. The regulations of rivers, such as embankments, narrowings, deepening, and removal of obstructions, are important as influencing the drainage of large areas, but more especially as regards the Pollution of Rivers (q. v.).

Conditions of Habitations: Considered under the following heads:—(1) Hygienic conditions of cities and towns, with populations over 2000 persons. Every town ought to have either a system of sewers or deep drainage of some kind, so as to facilitate the movement of the ground water, as well as to serve as channels for house water. The ground ought to be secured against every source of excremental pollution by the systematic removal of refuse, and by the paving of all streets and courts. Public sewers (q. v.) in connection with water-closets should be water-tight. 'Made-soil,' which is usually composed of cinder refuse, road-scrappings, &c., should be well drained, so that air and water may freely pass through it, and it should not be built upon before three or four years after being laid down. Gas-mains should also be perfectly tight, for an escape of gas may be sucked into houses, even from considerable distances. Covering the pathways of streets with paving stones, prevents the evolution of effluvia, and facilitates the cleansing of the surface. The best kind of own roadway for horse and carriage traffic is the wooden pavement laid with asphalt, in a particular way on a prepared basis, as it is durable and easily cleaned both by rain and by washing. Streets should be so formed as to admit of a free current of air on all parts of a town; and in no case should a street be less in width than one and a half times the height of a house. There should be open spaces at the back of the houses; and large open spaces should be provided at intervals. Wide, straight streets are useful both for ventilation and traffic, as well as for a complete system of drainage and the laying of pipes. Regarding

density of population, the general rule may be observed that 'whatever be the size of the houses, the amount of ground not occupied by them, in any given area, should be considerably in excess of the amount actually taken up by houses.' In houses, every room should be ventilated directly on the external air, and should be not less than 9 feet in height, in the smallest houses, and from ten to eleven feet in larger rooms. In the water-closets there should be cross-ventilation into the open air. In a town with sewers and water-closets, a daily supply of not less than twenty-five gallons per head should be provided; but if there are no water-closets, from fourteen to twenty gallons will suffice. The water should be pure, and free from any chance of contamination with excreta, or with refuse matter from habitations. In towns, shallow wells should be forbidden, as it is impossible to secure them from contamination by soakage. Reservoirs should contain from two to three months' supply, and the water should be filtered through sand of about three feet in depth. The greatest care should be taken in thoroughly guarding water-pipes and cisterns from contamination. In all towns the water-service should be at high pressure. A copious supply is also required for public baths, wash-houses, flooding and washing streets, and putting out fires. Dirty house water or slops should be removed by means of sinks and trapped pipes or sewers to an appropriate outfall, where it should be subjected to intermittent filtration and then carried into the nearest stream. The dry refuse of houses, such as cinders and ashes, should be frequently removed, and daily if possible. The solid and liquid excreta, which average respectively about two and a half ounces of solids and forty fluid ounces daily for each person, should not be allowed to soak into the earth or remain near dwellings. In towns of above 10,000 inhabitants either of three plans of removal may be adopted: (1) the dry plan, with frequent removal; (2) the water system; (3) the air or pneumatic system of Captain Liernur. (See article SEWAGE DISPOSAL OF). The cleansing of the surface area of towns is of great importance, as the mud and dirt of towns, and refuse of all kinds, soon decompose and give out effluvia injurious to health, especially in narrow courts and lanes, and in wet, hot weather. The supply of food, including the regulation of cowhouses and bakehouses, has also an important bearing on public health; and the duty of supervision rests on the sanitary authority. Food should be fresh and free from adulteration; slaughter-houses should not be allowed in densely-populated districts. In cowhouses there should be at least 1000 cubic feet of space for each animal, and cleanliness should be enforced. The condition of small cowhouses, and dairies attached to them, requires special attention, as both enteric fever and scarlatina are spread through the medium of milk. Meat so decomposed as to be discoloured and have a putrid smell, as also meat with abscesses and suppurations, should be condemned. The meat from animals dead from the following diseases is dangerous to health: cattle plague, anthrax, small-pox, splenic apoplexy, carbuncular diseases, hog cholera, typhus and scarlet fever. Cysticerci in pork, beef, and mutton give rise to tapeworm in man. Wheat, flour, and bread may be unwholesome from ergot, fungi, and acari, and may be adulterated with alum, or mixed with cheaper grains or mineral matter. Milk may be unwholesome from the presence of blood, pus, casts and fungi, and more especially from the *materies morbi* of specific diseases. The various adulterations of food are too numerous even to be mentioned in detail. The law permits mixtures to be sold in some cases, if the admixture is stated on a label. The regulation of trades is secured under the Mines, Factories, and Workshops Acts, the object of these Acts being, among other things (such as restriction of labour at certain ages), to provide that the common conditions of health are not violated. Another point is to prevent any of the processes being nuisances, or injurious to the health either of the workpeople or the inhabitants of the surrounding districts. The sale of alcohol, in its various forms, requires regulation if the public health is to be regarded. The arrest of the contagious and infectious diseases is of the greatest importance. The more important of these diseases are, among children, small-pox, scarlet fever, measles, whooping-cough, diphtheria, and enteric fever; among adults, enteric fever, typhus, small-pox, and relapsing fever. Syphilis and gonorrhoea should also be included. The general principles on which the prevention is based are, (1) the recognition of the places of origin or conditions of growth of the morbid agent; (2) the recognition of the means of spread of the agent; and (3)

the early removal of the agency from among the community, so that the risk of spreading may be lessened. When patients suffering from infectious diseases cannot be isolated in private houses, they may be removed by order of the sanitary authority to hospitals. Clothing and bedding should be disinfected in chambers in which a temperature of 240° F. can be reached, or by means of Chemical Disinfectants (q. v.). The disinfection of the excreta, or of discharges from the body, and of the air surrounding the sick, should also be attempted. Disinfection, whatever the mode may be, should be practised at once, and should commence at the bedside of the patient. The disposal of the dead is a matter of great importance as regards health. Mortuary chapels ought to be constructed in all towns and villages, to which all corpses should be removed from the homes of the poor within thirty-six hours after death. Cemeteries should be provided at convenient distances from towns, and they ought to have a dry soil, so that the ground water shall never rise high enough to meet the corpse. Owing to the contamination of air in our cemeteries, no houses should be nearer than 500 feet, and great care should be taken of the drainage to prevent water contamination. Disposal of the dead by cremation, and, in the case of seaboard towns, by burying the body in the sea, has been strongly urged by some as the most appropriate modes.

Hygienic Conditions of Villages.—The problem of rural sanitation is by no means an easy one; for, in many cases, the houses are old, dilapidated, and destitute of proper conveniences. The water supply is, generally, more or less polluted from soakage from the dirty house-water, from ashpits and dung-hills. All appliances are, in fact, often wanting. The wells may be guarded, however, by carrying off to a distance all the slop-water by drains of some kind, and by removal of the excreta from the vicinity of wells. This may be effected by a pail system with or without the use of dried earth or charcoal, according to circumstances. Conjoint action may be taken in the procuring, drying, and distributing the earth, and in the removal of the mixed earth and excreta.

Hygienic Conditions of Houses.—In certain cases the Local Authority has power over the interior of a house. Common lodging-houses are registered and inspected, and are subject to certain regulations. In the metropolitan lodging-houses, 240 cubic feet, and in Dublin and many other towns 300 cubic feet, are allowed. Cellar habitations must be in accordance with certain conditions of space, height, window area, &c. In England, proceedings may be taken to abate overcrowding of the inhabitants consisting of more than one family; but there is no legal amount as to air space. In Scotland, the General Improvement and Police Act of 1862 enacts that children under eight years of age shall have 150 cubic feet, and persons over that age 300. The minimum ought to be at least 400 cubic feet. Power may be obtained by the Artizans' Dwelling Act of 1875 to pull down houses that continue to be 'so engrained with disease,' that no expenditure of money can remedy them. The following are the chief causes of the unhealthiness of houses: Dampness, arising from a damp soil, water rising in walls, or coming from a leaking roof or blocked water-pipes. Excessive coldness of air from draughts, or from insufficient warming. Impurity of the air, arising from impure air being drawn from the ground or basement into the house, or other impurities outside the house; from the air in the house being contaminated by effluvia from closets and pipes; from products of combustion; from products of respiration and transpiration; and from uncleanness of persons, clothes, walls, floors, and furniture. Impurity of the water, arising from the water becoming impure on the premises, from uncleaned, uncovered cisterns; and from the absorption of foul air from pipes and drains by the surface of the water. Lead may also be taken up. Impurities from uncleanness of the house, arising from the absorption of organic impurities by walls and ceilings, or from the collection of such impurities in the chinks of floors or on the furniture. The great point is to have the house-air pure, so as in no way to injure or depress the functions of respiration.

Vital Statistics (q. v.).—The chief vital statistics bearing upon public health are the determination of the birth-rate; of the death-rate according to sex, age, and disease. The gross death-rate, as calculated on the mean population, is that which is commonly used to indicate the health of a town or district. This general death-rate is calculated on the population, as ascertained positively by the census every ten years, alterations being

made in the intervals by the known yearly rate of increase and decrease, and by approximative corrections for emigration. It is assumed that the health of no community is satisfactory if the general death-rate exceeds 23 per 1000 of population per annum; but the standard rate might be reasonably lowered to 22 or 21. To form a correct estimate of the public health it is necessary to ascertain the mortality according to age and disease. A general high death-rate may be owing entirely to a high infantile death-rate, while adults may be healthy. In our large cities the deaths of children under five years of age frequently constitute half the deaths at all ages, whereas in all England the infantile death-rate may be only one quarter or 25 per cent. of the total deaths, and in healthy districts and in good families it may be much lower than this. It is necessary also to determine the diseases causing the infantile death-rate, the child death-rate, and the adult or general death-rate. The birth-rate should also be considered in connection with the infantile and child death-rate. The relative proportion of the infectious or communicable diseases should be carefully noted, as also all those diseases depending upon preventable causes, or removable unhealthy conditions of atmosphere and mode of life. From vital statistics we learn that, as compared with former periods, the expectation of life is improving in the chief European countries, and that the mean age at death is also greater than formerly, and with each new advance in wise legislation the public health has improved. See *Epidemics of the Middle Ages*, by J. F. C. Hecker, M.D. (1864); *A Handbook of Hygiene*, by Dr. Wilson (1876); *Public Health*, by Dr. Parkes (1876); *Dictionary of Hygiene and Public Health*, by Dr. A. Wynter Blyth (1876); *Manual of Practical Hygiene*, by Dr. Parkes, edited by Dr. De Chaumont (1878). For current sanitary literature see *Sanitary Record*, London; *Sanitary Journal*, Glasgow; *Sanitarian*, New York.

San Jacin'to, Battle of, fought April 21, 1836, on the river S. J., and near the bay of the same name, was the last battle in the Texan War of Independence. In it the Texan forces under General Houston completely defeated the Mexican army under General Santa Anna. The latter was taken prisoner, but liberated on the condition that he should use his influence to secure the recognition of Texan independence.

San'jak (Turk. 'a standard') is the oldest name of an administrative or governmental division of a Turkish province. The ruler, who has to furnish the sultan with a definite number of troops, was called a S.-Beg, because he was entitled in war to carry a one horse-tail standard. In more recent times several sanjaks were amalgamated to form an *eyalet*, now a *viayet* or *pashalik*, but they still form subordinate administrative divisions, under the rule of *kaimakams* ('deputy-governors').—S.- or *Chyrka-Sherif* is the name given to the sacred flag of the Prophet, which is preserved in the Serai at Constantinople. It is the oriflamme of the Turkish Empire.

San Joaquin', a river of California, U.S., rises in the Sierra Nevada, and after receiving the surplus waters of the Tulare Slough, flows N.W., through the splendid valley of S. J. to the Sacramento. It is 350 miles long, and is navigable for large steamers up to Stockton.

San José, the capital of the Republic of Costa Rica, almost midway between the Carribean Sea and the Pacific, 15 miles N.W. of Cartago, the ancient capital, and about 50 miles E. of Punta Arenas ('sandy point'), its seaport on the Pacific. A railway is in course of construction from this port to Puerto Limon on the Carribean Sea, and the portion between Cartago and S. J. is completed. S. J. is the seat of a university, and is the centre of a great coffee-growing district. Estimated pop. (1877) 26,000 of whom a large number are Germans.

San José, a town of the State of California, U.S., in the Santa Clara valley, 50 miles S. of San Francisco by rail. It has 9 churches, 6 newspapers, and 7 public schools, in addition to the state normal school which is situated here. It is the centre of a rich agricultural district, and has considerable trade in wheat, wine, and preserved fruits. Pop. (1870) 9089.

San Juan', capital of the Argentine province of S. J. S. America, on a river of the same name, 660 miles N. W. of Buenos Ayres. It is frequently known as S. J. de la Frontera. Pop. 20,000. The western and northern portions of the province

are traversed by spurs of the Cordillera, and possess a fertile soil and delightful climate. Pop. of the province, 60,000.

San Juan Boundary Question, a dispute between Britain and the United States as to the ownership of the island of San Juan, in the Gulf of Georgia, S. of Vancouver's Island. It was simultaneously occupied by the British and Americans in 1859. The Americans claimed that their boundary, under the treaty of 1846, ran from the Lake of the Woods along 49° N. lat., and only deflected southward through the Canal de Haro and the Straits of Fuca so as to leave Vancouver's Island untouched. Britain, on the other hand, maintained that the boundary line passed through Rosario Straits to the S. of San Juan. The Americans rejected arbitration six different times, but in 1872 the matter was finally referred to the German Emperor, who decided in favour of the American claim.

San Juan del Norte, or **Grey Town**, the principal seaport of Nicaragua, Central America, on the Atlantic, at the mouth of the River San Juan, 181½ miles from the Pacific coast. See NICARAGUA.

San Juan' de Puerto Rico, the capital of the Spanish W. Indian Island of Puerto Rico, situated on a narrow peninsula off the N. coast, is connected with Caguas, an inland town 23 miles distant, by a good macadamised road. It has a good harbour, a cathedral, a theatre, and extensive fortifications. In 1876 there entered 102 British vessels of 16,605 tons, and cleared 102 of 23,807 tons, the value of exports being £526,345. Estimated pop. (1875) 27,000, some 2000 of whom perished in a nine months' visitation of small-pox (1876).

Sankar-chárya, a great Hindu teacher of the Vedanta (q. v.) school of philosophy. He was a native of Malabar, and is supposed to have flourished at the end of the 7th c. It was through his influence that Buddhism was extirpated from India.

Sánkhya ('synthetic enumeration'), the second, but perhaps the oldest, of the six Hindu schools of philosophy, said to have been founded by the sage Kapila. Its central principle is *prakriti*, 'the evolver or producer,' which in combination with the soul is the cause and creator of all things. As developed out of *prakriti* twenty-three entities are synthetically enumerated. The S. philosophy is thus dualistic in its nature, and leans towards atheism.

Sankt-Ingbert', a small town in the Bavarian Palatinate, 33 miles S.W. of Kaiserslautern by rail, and 7 miles N.E. of Saarbrück. It has great coal-mines and ironworks in its neighbourhood. Pop., with the S.-I. Ironworks (755) and the S.-I. Mine (1462), 2½ miles distant, (1875) 9220.

San Lu'car De Barrameda, a Spanish seaport in the province of Cadiz, on the left bank and near the mouth of the Guadalquivir. It carries on an active coast trade, and exports wine and fruits. Pop. 18,130.

San Lu'is, a province and town of the Argentine Republic. The town, commonly known as S. L. de la Punta, is situated 445 miles W.N.W. of Buenos Ayres, and has a pop. of about 8000; the pop. of the province (1869) was 53,294.

San Lu'is Potosí, a state in the republic of Mexico, bounded by New Leon, Tamaulipas, Vera Cruz, Queretaro, Guanajuato, and Zacatecas. Area, 27,500 sq. miles; estimated pop. (1877) 476,500. It is traversed by several mountain-ranges, which form plateaus in the N.W., and slope in the S.E. into low plains. The soil is fertile and the climate salubrious. Rich forests of trees exist in the mountains, and precious metals are found, though they are not now wrought. Sheep and cattle rearing are the only occupations of the people.—**S. L. P.**, the capital, is situated on a plateau 6350 feet high, 225 miles N.N.W. of Mexico. It is surrounded with gardens, and is well built. It has a cathedral, five churches, three monasteries, and an aqueduct, and carries on trade with Tampico in wines and woven fabrics. Its manufactures include shoes, hats, and hardware. Pop. (1874) 31,389.

San Marco in Lamis, a town of Southern Italy, in the province of Foggia, on the Gargano, 13 miles E. of San Severo. It has some trade in corn and wine. Pop. (1874) 14,540.

San Marino. See MARINO, SAN.

San Minia'to dei Tedeschi, a town in N. Italy, on the Florence and Leghorn railway, 25 miles W. of the former town, has a fine cathedral dating from the 10th c. Pop. (1874) 16,187.

Sannazaro, Giacompo, an Italian poet, born in Naples, July 28, 1458, lived much in France, and was a favourite of Frederico III. He died at Naples 27th April 1530. His principal work is *Arcadia*, a pastoral medley in verse and prose, which in the course of a century went through sixty editions. A Latin poem, *De Partu Virginis*, acquired for him the name of the Christian Virgil. S.'s other works are, *Sonetti e Canzoni*, *Eclógæ VI.*, *Elegiarum Libri III.*, *De Morit Christi ad Mortales Lamentatio*. See Crispo's *Vita di S.* (Nap. 1720).

San Nican'dro Gargan'ico, a town of S. Italy, province of Capitanata, on the Gargano, 26 miles N. of Foggia. It has some trade in wool and grain. Pop. (1874) 7895.

San Nicolás, or **São Nicolá'o**, one of the Cape Verd Islands (q. v.).

Sannyásí, properly a Hindu of the fourth order, who has renounced the world and lives by mendicancy. But the term is now applied to all sorts of religious beggars, especially to devotees of Siva, who correspond to the Mahommedan fakirs. They wander about the country, or are collected in convents. At the end of the last century they became a terror in Bengal, forming armed bands and ravaging the country.

San Re'mo, a town of N. Italy, province of Porto Maurizio, in a fertile district on the Mediterranean, 31 miles E.N.E. of Nice by rail. Sheltered by a semicircle of hills which attain to 4000 feet, and are nowhere more than 4 miles distant, and enjoying a mean temperature in summer of 73° F. and in winter of 40° F., it has become a favourite resort of invalids. The town is interesting from its antique style of building, and is surrounded by luxuriant lemon and orange orchards and palm-groves. Building speculation reached a climax here in 1876, when villas were let at 10,000 francs. Pop. (1874) 9017.

San Roque, a town of Spain, province of Cadiz, on the Bay of Gibraltar. The cheapness of living and salubrity of the climate attract many English visitors in summer. Fruit and vegetables are produced. Pop. 7619.

San Salvador. See SAO SALVADOR.

San Salvador, the smallest but most densely populated, and next to Costa Rica most advanced of the republics of Central America, is bounded W. by Guatemala, N. and E. by Honduras, and S. by the Pacific Ocean. Area, 9594 sq. miles; pop. (*Gotha Almanach*, 1877) 434,520. Lying along the Pacific for 150 miles, it is occupied by the W. slopes of the Cordillera, and separated from the table-land of Honduras by the valley of the Rio Lempa. A strip of level land, with an average breadth of 15 miles, stretches along the coast, and parallel with this and with the main mass of the Cordillera runs the central plateau of S. S., from 2500 to 3280 feet above the sea, and traversed by a volcanic chain, of which sixteen peaks are still active. In this range the highest summits are San Vincente (7875 feet), and San Miguel (7810 feet). The Rio Lempa (138 miles long) is the largest river. Others are the Rio de Paz, Jiboa, and Sirama or San Miguel. There are two considerable lakes in S. S.; the Lake of Guixar in the N.W. of the state, 80 miles in circumference, which feeds the Rio Lempa, and Lake Zlopango in the centre, 9 miles long by three broad, which has its outlet by the Jiboa. The coast is unbroken, save by the deep bay of Fonseca and that of Jiquilisco. The chief ports are La Union, Libertad, and Acajutla. The soil of S. S. is generally fertile, and in some parts extremely rich, while the climate, though tropical, is tolerably healthy except in the strip along the coast. The chief pursuit is agriculture, as the minerals of the country are now almost unwrought. The chief productions are maize, sugar, coffee, tobacco, indigo, and 'Peruvian balsam,' the latter produced in a coast tract, 30 miles in length from Libertad to Acajutla, known as *Costa de Balsamo*. The inhabitants of S. S., consisting of aboriginal and mixed races, with about 10,000 whites, are the most industrious in Central America. Its railways had a length in 1877 of 36½ miles, and its telegraphs in 1875 of 198 miles. The commerce is chiefly with the United States and Great Britain. The value of imports in 1874 was £430,112; of exports (coffee, hides, caoutchouc, flour, &c.), £679,221 (£1,061,481 in 1877). The President is elected for four years, and there are a Senate of twelve, and a House of Representatives of twenty-four members. The estimated revenue for 1876 amounted to £391,670, and the expenditure to £352,170.

The public debt, largely increased by war with Honduras (1872-73), was £872,645 in 1875.—**S. S.**, capital of the above, is situated on a plain 2100 feet above the sea, at the foot of a volcano of the same name, and connected with its port, La Libertad, by a good road 15 miles in length. It has a beautiful situation and fertile surroundings, but has been repeatedly destroyed by earthquakes, most recently in 1854, after which the surviving inhabitants built a town on a neighbouring site which was called Nueva S. S. The new capital was again partly destroyed by a series of earthquakes, and simultaneous eruptions of the neighbouring Tzalco volcano, which began March 4, and ended March 19, 1873. Pop. 20,000.

Sansanding', a town of Bambarra (q. v.), W. Africa, situated on the Juba, or Upper Niger, 25 miles N.E. of Segou. It has an active trade in salt, beans, and cotton cloth. Pop. 11,000.

Sansculottes ('without breeches') was the name given during the French Revolution by the aristocrats to the ragged democrats. As republicanism waxed fiercer the term lost its reproach; and at one time, to ensure safety, a profession of sansculottism was necessary.

San Sebastian', a seaport of Spain, and since 1854 the capital of the province of Guipuzcoa, on the Bay of Biscay, 381½ miles E.N.E. of Madrid by rail. It is built on a low peninsula, terminating in a conical rock 660 feet high, on the summit of which stands the fortified castle La Mota, and is flanked E. by the estuary of the Urumea, and W. by the small bay which forms the harbour. The town, which has been mostly rebuilt since the two sieges of 1813, has become one of the most frequented watering-places in Spain. It has a marine school, a commercial school, and an anchor factory. In 1871, its exports (consisting of flour, wine, and preserves) amounted to £72,656; and its imports to £428,664 (one-fourth cotton). In the same year there entered and cleared its port 186 vessels, of 48,378 tons. Pop. (1877) 17,902.

San Severo, a town in the province of Capitanata, S. Italy, 184 miles S. of Ancona and 17 N. of Foggia by rail, lies in a district rich in grain, wine, and tobacco. It was captured and sacked by the French in 1799. Cholera raged here furiously in 1865. Pop. (1876) 16,000.

Sanskrit. (1.) *Language.*—S. (derived from *sam* and *kri*, meaning 'put together, polished,' as opposed to Prakrit, 'the vernacular') is the classical language of the Hindus, and in philological interest the most important of all forms of human speech. It belongs to the Aryan or Indo-European family of languages, which also comprises the Zend, the Greek and Latin, the Celtic, the Teutonic, and the Slavic tongues. All these stand to one another in the relation of sistership, being descended from a common parent, 'who died in giving them birth.' This genealogical connection, now firmly established by the science of comparative philology, has only been ascertained since the knowledge of S. was introduced into Europe at the close of the last century. The peculiar characteristic of S. is that it preserves more abundant traces of the hypothetical primitive type than any other member of the Indo-European group. It is the elder sister, in whose lineaments the likeness of the common ancestor is most easily recognisable, and its own derivatives are to be found in the dialects spoken at the present day throughout the N. of India—Hindi (the language of Hindustan proper or the Upper Gangetic Valley), Bengali (spoken in Lower Bengal), and Mahrathi and Gujarathi (spoken in Bombay), all of which are lineally descended from S. in the same manner that Italian, French, and Spanish are descended from Latin. The languages spoken in the S. of the peninsula belong to the Dravidian stock (q. v.), but they contain many words of S. origin, and the character in which they are written has been corrupted from the Nagari (q. v.) alphabet of S. Pali (q. v.), the classical language of Buddhism, and itself an offshoot of S.

The S. language possesses a threefold attraction. Not only did its discovery enable us to unlock the secret chamber of comparative philology, but in itself it presents a study of absorbing interest both for the wealth of the literature that it embalms and also for the unrivalled exuberance of its grammatical forms. Though no longer a spoken language, its meaning has never been a lost secret to be recovered by successful decipherment, like the hieroglyphics of Egypt and the cuneiform inscriptions of Assyria. Its correct interpretation has been kept alive to

the present day by a continuous current of oral and written tradition, handed down by the Brahmans or Hindu priests, who had a personal interest in preserving the religious and legal doctrines by which they maintained their supremacy over the common people. But, fortunately, S. is not the only sacred language of the Vedas, or religious books. In that case the knowledge of it might readily have passed into oblivion, or lived on only as a superstitious jargon. It is also the repository of law, philosophy, poetry, and science. In the whole field of literature, history alone is wanting. Until the needs of British administration drew attention to the study of the vernaculars, S. was in fact the one written language of India. Considering the voluminous character of S. literature, which equals the remains of either Greece or Rome, it is curious to reflect that its very existence was unknown in Europe until the 18th c. When learned missionaries or members of the civil service reported that a language existed in India as ancient as Hebrew itself, and with a literature that might vie with that of Greece, their statements were at first received with derision. But the epoch was ready to welcome new discoveries; and as the 19th c. dawned, the study of S. by European scholars began, and the foundations of philology were securely laid. The first to introduce S. literature to the western world was Sir William Jones (q. v.), who founded the Asiatic Society at Calcutta in 1784. He was succeeded by Henry Colebrooke (q. v.), whose especial merit it was to collect the materials which subsequent students used. These two eminent Anglo-Indians chiefly concerned themselves with S. literature as a branch of Oriental study. It was reserved for Francis Bopp (q. v.) to fix definitely the position of the S. language in the Aryan family by his *Comparative Grammar* (Berl. 1833). In our own times a superficial acquaintance with the subject has been made the common property of all educated Englishmen through the luminous lectures of Professor Max Müller (q. v.), and the *Original S. Texts* of Dr. John Muir (q. v.). A Chair of S. has now a recognised place in every fully organised university.

Regarded as a language, S. claims attention from the excessive flexibility of its modulations. As opposed to agglutinative languages of the Turanian type, where each word is a root and remains constant even in compounds, S. represents the most highly developed form of the inflexional stage. As Greek to Latin, and as the Greek of Homer to the Greek of the New Testament, so is S. to the other members of the Indo-European family. The possible grammatical changes of every noun and every verb are only limited by the mathematical law of permutations; and each of these changes is classified in S. grammar, and has to be learned by the student. Again, these changes are all formed in accordance with a principle of euphonic orthography, which governs the construction of compounds of inordinate length. In grammar, as in metaphysics, logic, and prosody, the genius of the Hindu mind favours interminable niceties of distinction without apparent difference. And these niceties do not represent corruptions of recent growth, but are the fundamental characteristic of the primitive language.

(2.) *Literature.*—S. literature may be broadly divided into two classes—(1) the religious books of remote antiquity, represented by the Vedas; and (2) the later literature of law, poetry, philosophy, grammar, science, and medicine. This classification, which is based upon chronological evidence, roughly corresponds with the twofold classification made by the Hindus themselves into *sruti* or 'revelation,' and *smriti* or 'tradition.' The earliest of the Vedas (q. v.), consisting of *mantras* or hymns of prayer and praise addressed to the *devas* or 'shining ones,' is supposed to have been written between 1500 and 1200 B.C. The later Vedas, viz., the *bráhmans* or ritualistic precepts, and the *smriti-shástras* or esoteric doctrines, gradually led the way to the mythical stories of the Puranas (q. v.) and the *Tántras* (q. v.), upon which the debased polytheistic faith of modern Hinduism (q. v.) rests. Second only in authority to the Vedas come the *Dharmasástras* or law-books, of which the Code of Menu (q. v.) is the principal and best known. This code is supposed to have been compiled in about the 5th c. B.C. Upon it has been reared the entire superstructure of caste. Closely connected with both religion and law, though later in date, is the system of *Bráhmanical* philosophy, of which six several schools are enumerated: (1) Nyaya, (2) Vaiseshika, (3) Sankhya, (4) Yoga, (5) Mimansa, and (6) Vedanta. The historical interest of this system of philosophy depends upon its connection with the rise of Buddhism in India.

More attractive than all these to the Western taste is Sanskrit poetry, which affords a rich harvest alike in epic, dramatic, and lyric art. The two great epic poems, the *Rámáyana* (q. v.) and the *Mahábhárata* (q. v.), are supposed to have been written about the 3d c. B. C. The earliest S. drama, the *Mrichchhakatí*, or 'Clay Cart,' is assigned to the 1st c. B. C. The most popular lyric is the *Gitagovinda* of the poet Jayadeva, who probably lived in the 12th c. A. D. Among the vast remaining heap of S. L. it must suffice to indicate the grammar of Pánini (q. v.) and his successors, the astronomy of Aryabhata, and innumerable treatises on mathematics, music, logic, medicine, and architecture. See, besides the works of Benfey, Goldstücker, Burnouf, and Monier Williams, Lassen's *Indische Alterthamskunde* (4 vols. Bonn, 1847-61), Max Müller's *History of the Ancient Sanscrit Literature* (Lond. 1859), Dr. J. Muir's *Original Sanscrit Texts* (5 vols. 1858-70), Professor H. H. Wilson's *Collected Works* (vols. i.-xi. 1864-70), edited by Rost and Hall, and Philibert Soupe's *Études sur la Littérature Sanscrite* (Par. 1878). The principal manual lexicons are those by Benfey (Lond. 1866) and Monier Williams (1872); the only modern dictionary with any pretension to completeness is the great work of Böhtlingk and Roth (St. Petersburg. 1855-75).

San'ta Anna, a town in the republic of San Salvador, on the Pacific coast of Central America, 32 miles N.W. of San Salvador city. Pop. 12,000.

San'ta Anna Don Anto'nio Lo'pez de, a former president of Mexico, was born at Jalapa, February 21, 1798. He fought against his countrymen in the war of independence, but recognised Iturbide as Emperor in June 1822; soon after quarrelled with him, 'pronounced' for a republic in December, and by May 1823 had overthrown the Imperial Government. When Guadalupe Victoria was elected president, S. A. withdrew from public affairs for some years, but in 1828 he reappeared as the supporter of Guerrero in a new contest for the presidency, won great popularity by forcing the Spanish general Barradas to surrender with his whole army at Tampico, September 11, 1829, and in 1833 was himself elected president. On this occasion he came forward as the candidate of the 'liberal' party, then organised for the first time in Mexico, but soon threw over his party and headed a clerical reaction whose success brought about such internal disorders that the Texan colonists declared their independence. In the war that followed S. A. was taken prisoner at the battle of Jacinto, April 21-22, 1836, obtained his freedom in the following year, but lost the favour of his countrymen by negotiating a treaty during his captivity recognising the independence of Texas. His gallant defence of Vera Cruz against the French in 1839 transformed him for the second time into a popular hero, and in 1841 a military revolution made him Dictator, an office which he held till 1844, when he in turn fell before an uprising of the 'liberal' party led by General Herrera. Tried for treason (January 1845) he was sentenced to banishment for ten years, and took up his abode at Havana. When the war between Mexico and the United States broke out, S. A. returned secretly to his country, was again made president by 'a popular movement,' but the disastrous defeats inflicted on him by General Scott during 1847 compelled him to seek safety in flight (1848). In 1853 a revolutionary reaction once more invested him with the authority of Dictator, but within two years he was again a fugitive, again tried for treason, and his vast landed property confiscated. During the French invasion of Mexico he offered his services to General Bazaine, recognised the 'empire' of Maximilian, who made him a 'grand-marshal,' but did not invite him to return to Mexico, and on the collapse of Maximilian's government the aged adventurer proceeded to Vera Cruz with his customary evil designs, but was seized and condemned to death. President Juárez commuted the sentence into banishment for eight years. In 1874 he returned to Mexico, and died at Vera Cruz, June 20, 1876.

San'ta Cathari'na, a province in the S. of Brazil, bounded by the Atlantic and the provinces of Parana and Rio Grande do Sul. Its area is 18,924 sq. miles, and its pop. at the census of 1872 was 159,802. The coast is low, but the interior is mountainous, and is watered by numerous tributaries of the Upper Uruguay. Coal of excellent quality and lead ores are found in the province, and the crops principally cultivated are coffee, sugar, maize, and flax. In the financial year 1875-76 the imports amounted to 579,918 reis, the exports to 306,339.

San'ta Cruz, the capital of the Canaries (q. v.), is situated on the N.E. side of the island of Teneriffe. Its harbour, naturally good, has been much improved by the construction of two large moles, and is strongly fortified. The streets of the town are narrow, the houses poor, and the public buildings unimportant. The principal export is cochineal, of which 2,190,998 lbs. were exported from Teneriffe during the twelve months ending 30th June 1876, nearly all that quantity being shipped at S. C. Wine is also exported, but to a much less extent than formerly; and potatoes and onions are shipped in considerable quantities to the W. Indies. In 1876, 227 vessels of 98,978 tons entered and cleared the port. Pop. (according to the Minister of the Interior, 1877) 14,482. On 20th April 1657 Admiral Blake destroyed the Spanish fleet, though under the shelter of the batteries of S. C. On 24th July 1797 the place was attacked by Nelson, but he was beaten off.

San'ta Cruz de la Palma, the capital of Palma, one of the Canary Islands. See PALMA.

Santa Cruz Islands are situated in the S. Pacific between 9° 50'—11° S. lat., and 165° 40'—167° E. long. They were discovered in 1570 by the Spanish navigator Mendana, and in 1595 the Spaniards unsuccessfully attempted to found a settlement on them. The group consists of one large island, Santa Cruz, and a number of islets. The former is of volcanic origin, hilly, well-watered, and densely wooded. The inhabitants, who belong to the Melanesian race, are fierce and uncivilised, but not numerous. They have earned for themselves an evil notoriety by the murder of Bishop Patteson in 1871, and that of Commodore Goodenough in 1875.

San'ta Fe, a province and town of the Argentine Republic. 1. The province is bounded on the N. by the Gran Chaco, on the E. by the river Parana, on the S. by the province of Buenos Ayres, and on the W. by the provinces of Cordova and Santiago. Its area is 43,700 sq. miles, and its pop. about 100,000. In 1876 it possessed 39 colonies, or special settlements of foreign immigrants, who numbered 23,500, and cultivated large crops of wheat, besides rearing sheep and cattle in great numbers. The largest town in the province is Rosario (q. v.). 2. The town of S. F. is situated on the navigable river Salado, 12 miles above its confluence with the Parana, and has a considerable transit trade. Pop. 15,000.

San'ta Fe, the capital of the territory of New Mexico, U.S., stands at an altitude of 7044 feet, 210 miles S.W. of the railway terminus of Trinidad. It is the seat of a Catholic archbishop, and its cathedral is a cruciform Byzantine structure commenced in 1870, with a length of 270 feet. There are also 4 Catholic and 2 Protestant churches, the 17th c. Adobe Palace, 6 jobbing houses with an annual sale of \$2,500,000, 2 newspapers, &c. Pop. (1870) 4765.

Santalaceæ is a dicotyledonous order of herbs, shrubs, and trees, with entire exstipulate leaves; small or minute flowers with a 3-5 lobed perianth; stamens also 3-5, and opposite to the perianth lobes; fruit a one-seeded nut or drupe. The species number about 200, and are dispersed over the tropical and temperate regions of the globe, with a greater prominence in the eastern than in the western hemisphere. The most important genera are *Santalum* (see SANDAL-WOOD), *Leptomeria*, confined to Australia, where the berries of the pretty broom-like shrub (*L. Billardieri*) are used for preserves, and in the preparation of cooling acid beverages; and *Thesium*, a genus of about 70 species of slender perennial root-parasites, containing the single British representative of the order.

San'talin is the resinous principle of the colouring matter of *Pterocarpus santalinus* (see SANDAL-WOOD). It is prepared by digesting the rasped wood in alcohol and then precipitating by water. S. is soluble in alkalis. The wood is retained as an article of materia medica, for use as a colouring ingredient in the compound tincture of lavender.

San'ta Margheri'ta Di Rapall'o, a town of N. Italy, province of Genoa, on a small bay, 17½ miles E.S.E. of Genoa by rail. Its inhabitants are industrious, the women being employed in making the lace known as Genoese, and the men in coral-fishing. Pop. (1874) 7188.

San'ta Mari'a di Cap'ua Vet'ere, a town of S. Italy, province of Caserta, situated on the site of the ancient Capua,

3½ miles W. of Caserta by rail. Remains of the ancient amphitheatre, a triumphal arch, and catacombs still exist. Pop. (1874) 17,896.

San'ta Mar'ta, a Caribbean port of the United States of Colombia, 108 miles N.E. of Cartagena de las Indias (q. v.). It is fortified, and has an excellent harbour, which in 1876 was entered by 72 vessels of 39,151 tons, and cleared by 72 of 41,802 tons. Pop. 8000.

San'ta Mau'ra (the ancient *Leucadia* or *Neritus*), one of the Ionian islands on the W. coast of Greece, in the noumarchy of Corfu, is 21 miles long, and from 5 to 8 broad. Area, 108 miles; pop. (1870) 20,892, estimated (1878) 33,000. The surface is very mountainous and infertile, but vines are cultivated on terraces among the hills. The prevailing rock is limestone, and the consequent whiteness of the cliffs gave rise to the ancient name, and to the modern corruption Ducato, applied to the S.W. promontory, which is 2000 feet high. A well-known legend declares that Sappho threw herself from this rock in the despair of disappointed love, and in ancient times not a few followed her supposed example. S. M. was at one time united with the mainland, but a canal was cut by Corinthian colonists. At present there is a long shallow lagoon, through which, however, a canal has been cut. A large ship-canal has now (1878) been begun. The fort of S. M. stands on the mainland, opposite the nearest part of the island. There are in the island twenty-two schools, including a lyceum. Olive oil is here of excellent quality. A full crop yields about 3000 tons. In 1877, 368 tons were exported to England. Currants were introduced in 1859, and their cultivation is extending. About 2,000,000 lbs. are annually grown, but it is expected that 5,000,000 lbs. will soon be reached. Wine is also exported. Wheat, maize, barley, flax, cotton, and hemp are grown. There are extensive salt-pans, but this industry is at present paralysed. Value of exports (1877) £12,294; value of imports, which are very miscellaneous (1876), £8880; (1877), £12,394.—The capital, also called S. M., has a pop. (estim. 1878) at 5000.

Santander, a prosperous commercial town in the province of the same name on the N. coast of Spain, 316 miles N. of Madrid by rail. It is the seat of a bishop and important courts, and has 3 churches, 2 monasteries, and a theatre. It is elegantly built and the houses are mostly new. There are some mineral springs and a splendid bay with good sea-bathing. S. stands in a rich mining district, and in 1876 exported to England 47,000 tons of iron, to France 6000 tons of iron and zinc, and to Belgium 33,000 tons of zinc. The town also has several breweries and many manufactories of cloth, &c., besides being the chief emporium for wool from Castille and Leon. The value of its extensive exports of wheat and flour was in 1876 as follows—To England £101,461, to France £147,804, to Cuba £525,504. The total value of the exports in 1876 was £985,524, of which Britain took £147,277. The imports in 1876 valued £3,196,910, of which Britain sent £1,017,820. The depth and excellence of the harbour make S. a great seaport. In 1876 there entered 693 ships with a tonnage of 190,669 tons, of which 153, with tonnage of 88,859 tons, were British. In the same year there cleared 465 ships with a tonnage of 174,897 tons, of which 150, with a tonnage of 88,973 tons, were British. These figures are exclusive of a large coasting trade conducted entirely in Spanish bottoms. Pop. (1877), 39,011.

Santarem, a town of Portugal on the Tagus, 18 miles N.W. of Lisbon by rail, stands in a district rich in oranges and oil, has 13 churches, 12 monasteries, and a theological seminary. In the 11th and 12th centuries it was for sometime the capital of a Moorish kingdom, and several contests have taken place here in the present century. Pop. 7820.

Santee, a river of S. Carolina, U.S., formed by the confluence of the Wateree and Congaree. It is 150 miles long, and navigable throughout for steamers. It enters the Atlantic near Charleston.

Santerre, Antoine Joseph, born in Paris March 16, 1752, became a brewer in the Faubourg St.-Antoine, and by his wealth acquired great influence among the lower classes inhabiting that district. He received command of a battalion of the National Guard in 1789, and directed his men in the attack on the Bastille. In February, 1791, he headed the mob which attempted to destroy the chateau of Vincennes. On July 17th of the same year he figured in the Champ de Mars demonstration against the

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king, led the populace against the Tuileries, June 20, 1792, presided at a banquet given to the Marseillais, actively exerted himself in the insurrection of August 10, and was created Commander-General of the National Guard. In October he rose to the rank of field-marshal, and in July of the following year became general of division. But, marching against the Vendean Royalists with 20,000 men, he was miserably beaten at Coron, and recalled as an incapable. At Paris he was imprisoned as an Orleanist, but after Robespierre's fall he recovered his liberty. On the 18th of Brumaire Bonaparte heard that he was exciting the people in his quarter, and dared him on pain of death to create any disturbance. As a reward for remaining quiet, S. obtained the honorary rank of brigadier-general. He died in obscurity, February 6, 1809. See Carro, S., *sa Vie, publique et privée* (Par. 1847).

Santia'go, or **São Thia'go**, the largest of the Cape Verd Islands (q. v.). It has an area of 277 sq. miles, with a pop. (in 1871) of 35,804.

Santia'go de Chi'li, the capital of the Republic of Chili, is situated 90 miles E.S.E. of Valparaiso, on the small river Mapocho, in a plain which Darwin pronounces to be the bed of a former inland sea, and at a height of 1840 feet above the sea-level. The surrounding country is exceedingly fertile, the climate delightful, and the views of the not far distant Andes magnificent. The city, which is the seat of an archbishop, and the capital of a province of the same name, dates from 1541, is built in squares, and, with some recent exceptions, the houses are only one storey high, and built round an enclosed garden or meadow. This system, which owes its origin to the frequency of earthquakes, gives S. the appearance, when viewed from a height, of 'an immense park sprinkled with houses.' In the years 1872-75, \$8,080,908 was expended on the erection of private houses, and the streets are clean, well paved, lighted with gas, and traversed by tramways. The Alameda, or public promenade, is nearly 3½ miles long, and planted with four rows of poplars. Of the public buildings, the finest is that occupied by the Mint, President's Palace, and Ministers' offices. The educational institutions are important, and include a university, with a rector, five deans of faculties, and 674 students in 1874, high school (called the *Nacional Institut*), military academy, library, museum, and botanical garden. Several of the churches are very beautiful. By a fire during service in that of La Compañia, on 8th December 1863, 2000 persons, chiefly women, lost their lives. S. exports gold, silver, and lead, and is connected by railway with Valparaiso and the other Chilean towns as far S. as Talcahuano. Pop. (1875) 148,264, of whom 3747 were foreigners.

Santia'go de Compostell'a, a town of Spain, province of La Coruña, on the slopes of M. Pedroso, 26 miles N.N.E. of Carril by rail. It was formerly the capital of Galicia, and is still one of the most interesting towns in Spain from its numerous ancient buildings and its picturesque situation. It has fifteen churches, of which the finest is the huge cathedral of the 11th c., containing the tomb of Saint Jago (James), the patron saint of Spain. Joined to it are the archbishop's palace and a monastery, which, with the cathedral, cover two acres. Most of its former numerous monasteries are now in ruins. S. has two high schools, and a university founded in 1532. The vicinity is rich in wine, while S. produces linen, silk, thread, leather, hats, and paper. Pop. 22,750. S. was one of the most frequented places of pilgrimage in the Middle Ages. The town owes the name 'Compostella' to the custom by which each pilgrim to the shrine of Saint Jago received a certificate, so called, of having successfully completed his pilgrimage.

Santia'go de Cu'ba, formerly the capital of the island of Cuba, on a bay on the S. coast, at the mouth of a river of the same name, 150 miles S.E. of Puerto Principe. It has a spacious and safe harbour, which is sheltered by the surrounding hills, and is a well-built town, with a fine cathedral, but its climate is hot and unhealthy. S. is connected with the mines of El-Cobre, 8½ miles inland, by a railway. Its trade has declined greatly since the breaking out of the Cuban insurrection in 1868. In 1868 it exported 47,000 hogsheads of sugar, 12,847 puncheons of rum, and 8,094,240 lbs. of coffee; in 1876, 14,000 hogsheads of sugar, 5871 puncheons of rum, and 1,210,700 lbs. of coffee. Pop. 30,000.

Santipur, a town in the district of Nudda, Bengal, British India, on the left bank of the Bhagirutti, 56 miles N. of

Calcutta. It contained a large cloth factory in the commercial days of the E. India Company, and is still inhabited by many weavers. It is also celebrated for its Sanskrit pundits and an annual religious fair. Pop. (1872) 28,635.

Santley, Charles, an English baritone singer, is a native of Liverpool. He completed his musical education in Italy, and made his first success in English opera as Rhineberg in the original cast of *Lurline* at Covent Garden in 1860. The great range and beauty of his voice, the fluency of his execution, his sympathetic, unaffected style, and his robust and vigorous delivery, at once secured his triumph both as an operatic and concert singer. For several years he was attached to Her Majesty's (Italian) Opera, and by careful study became a singularly picturesque and effective actor. He appeared in 1875 and 1876 in the Carl Rosa English Opera Company, for which he wrote the English version of Isouard's *Jocunde*. Success in such varied parts as *Don Giovanni*, Mephistopheles in *Faust*, Danny Mann in the *Lily of Killarney*, and Vanderdecken in the *Flying Dutchman*, attests his versatility on the stage. Apart from opera, S. at present occupies the highest place in his profession. His *Elijah* in particular is unique for beauty of expression and dramatic fire. In the concert room, in simple or ornate songs alike, there is no greater favourite.

San'tonin, a crystalline neutral principle, obtained from the *Artemisia santonica*, is said to have been first introduced into medical practice in 1830 by Dr. Alms, and is used almost solely as an anthelmintic in cases of *lumbricoid*, or *round worms*. A very curious symptom caused by S., even when given in small doses, is zanthopsia, or 'yellow-seeing.' A deep yellow tint, as if the person were looking through yellow glass, is imparted to everything looked at. In some places the tint is replaced by green, red, or blue. The colour of the urine has first an orange tint, then it becomes yellow or saffron, and sometimes a purplish-red colour, resembling blood. The administration of S. should be followed by that of a brisk cathartic. The dose for an adult is 2 to 4 grains, and $\frac{1}{2}$ to $\frac{1}{4}$ a grain for a child two years old.

San'torin (anc. *Thera*), the southernmost island of the Cyclades, 32 miles S. of Naxos, has an area of 65 sq. miles and a pop. of about 15,000. Of late years an active volcano has broken out in the island. There was a violent eruption in April 1870, and in the same year the capital of the island, also called S., was destroyed by an earthquake. In 1866 a new volcanic island of considerable extent, known as *Aphroessa*, was thrown up in its neighbourhood. Remains of very ancient buildings have recently been excavated.

San'tos, the chief seaport of the Brazilian province of São Paulo (q. v.), is built on an island, and has an excellent harbour, with an arsenal and fortifications. The site of the town is low and swampy, and yellow fever is frequently epidemic. S. has a large export trade in coffee (44,587 tons in 1876), sugar, cotton (79,427 bales), rum, hides, &c., and enjoys extensive and increasing means of communication by railway with the producing districts of the interior. In 1874 there entered 228 vessels of 137,211 tons, and cleared 215 of 121,211 tons. Pop. 10,000.

São Francisco, a Brazilian river, rises in the Serra do Espinhaço, near the head-waters of the Paraná, and flows successively N., N.N.E., and S.E., in its lower course dividing the provinces of Bahia and Pernambuco, and Sergipe and Alagoas. Of its entire length of 1650 miles, 1100 miles are navigable by steamers, but 170 miles from its mouth navigation is interrupted by the falls of Paulo Affonso. These are seven in number, and the largest is 260 feet high. The Rio de las Velhas, the principal affluent of the S. F. in its upper course, is also navigable for a considerable distance.

Saône (anc. *Arar*; later *Sauconna*), the chief tributary of the Rhône, rises in the Faucelles Mountains, department of the Vosges, and flows in a generally S.S.W. direction through the departments of Haute-S., Côte d'Or, S.-et-Loire, passing the towns of Jussey, Gray, Auxonne, Sennecey, Verdun, Châlon, Macon, then due S., forming the boundary between the departments of Rhône and Ain, and finally falls into the Rhone at Lyon, after a course of 282 miles, of which 195 are navigable. From Châlon there is a brisk traffic by river-steamers. The S. is connected with the river-system of the Loire by the Canal du Centre, and with the Seine and Rhine by the Canal of Burgundy and the Rhone-Rhine Canal respectively.

Saône, Haute, a department in the E. of France, bounded N. by the Vosges, E. by Elsass, S. by Doubs and Jura, and W. by Côte d'Or and Haute-Marne. Area, 2062 sq. miles; pop. (1876) 304,052. It is mountainous in the N. and N.E., but the W. and S. are fertile and tolerably cultivated. The department belongs to the basin of the Rhone, and is watered by the Saône and its tributaries, of which the chief is the Vignon. It is traversed by the Paris à Mulhouse Railway. Corn, potatoes, fruits (especially cherries), hemp, and tobacco are cultivated. The extensive pasturages feed large flocks of sheep. Horses, cattle, swine, and bees are also reared. There are also valuable iron mines, and some gold, silver, copper, and manganese. The wine (of mediocre quality) and brandy made in the department amount annually to 7,000,000 gallons. The chief town is Vesoul.

Saône-et-Loire, a department in the S. E. of France, bounded N. by the Côte d'Or, E. by Jura and Ain, S. by Rhone and Loire, and W. by Allier and Nièvre. Area, 3302 sq. miles; pop. (1876) 614,309. It is crossed by several mountain-ranges, watered by the Loire and Saône and their affluents, and though in some parts stony and sandy, is on the whole very fertile, yielding abundance of corn, wine, and wood. It is traversed from N.E. to S.W. by the Canal du Centre, and from N. to S. by the Paris and Lyon Railway. Horses, asses, mules, cattle, sheep, and swine are reared in great numbers. The wines of the department, known as *vins de Mâconnais* and *vins de Châlonnais* are Burgundies of good quality. Its minerals are coal, iron, manganese, &c. It has also numerous mineral springs. Besides agriculture, the inhabitants are largely engaged in mining, and in the manufacture of cotton, silk, and thread goods, earthenware, firearms, steam-engines, &c. The chief town is Mâcon (q. v.).

São Paulo, a province and city of Brazil. The province is bounded by the Atlantic and the provinces of Rio de Janeiro, Minas Geraes, and Parana, and has an area of 90,541 sq. miles, with a pop. in 1872 of 837,354, of whom 156,612 were slaves. It is traversed by a number of mountain-ranges, and possesses great mineral wealth, including coal, iron, mercury, marble, and precious stones. Gold and silver are also found in it, but are not now worked. Cattle and horses are reared in great numbers, and the principal crops grown are sugar, coffee, tobacco, and rice. In the financial year 1875-76 the imports amounted to 5,096,578 reis, the exports to 17,240,562 reis. The city of S. P. is finely situated and well built, and of a railway to connect it with Rio de Janeiro, 142½ miles to the N.E., 108 miles had been opened for traffic in March 1877. S. P. has a college of law, with 11 professors and 340 students. Estimated pop. (1872) 25,000.

São Paulo de Loan'da, the capital of the Portuguese colony of Angola (q. v.), is situated at the mouth of the river Bengo, and has a fine harbour. The buildings, both public and private, are good, but the streets are unpaved and dirty. A considerable trade is carried on with Britain and Portugal, the exports (palm oil, indiarubber, coffee, wax, gum, &c.) amounting in 1876 to 801,950,348 milreis, and the imports to 1,233,800,677 milreis. A railway is projected to connect Loanda with Ambacca, the centre of the coffee district. The pop. at the last census (1870) was 12,000, of whom only 830 were whites, but in 1876 the native pop. was greatly reduced by famine and smallpox.

São Pe'dro do Ri'o Gran'de do Sul. See RIO GRANDE DO SUL.

São Salvador', Ambasse', or **Ban'za Con'go**, the principal town of Congo, on a plateau 1500 feet above the sea-level, and 120 miles inland from the mouth of the Congo river. In the 15th and 16th centuries, under Portuguese influence, it attained great prosperity, and had Christian kings, a cathedral, and Jesuits' College. With the removal of these and the decline of Portuguese power, the town has relapsed almost into its original condition. Its present pop. is estimated at 20,000.

Sap is the first product of the digestion of the food of plants: it contains the elements of vegetable growth in a dissolved condition. The absorption of nutriment from the soil is the function of the delicate root-hairs and papillæ of the Root (q. v.), the nutriment absorbed consisting chiefly of carbonic acid and nitrogenous compounds dissolved in water. This crude S. is approx-

rently transmitted through the long cells associated with the vascular tissue of the stem and branches to the leaves, passing from one cell to another by a process little understood, but known by the name of *endosmose*. In the leaves is conducted digestion or *assimilation*, a name given to a process which accomplishes the following results:—(1). The chemical decomposition of the oxygenated matter of the sap, the absorption of carbon dioxide, and the liberation of pure oxygen at the ordinary temperature of the air. (2). A counter-operation by which oxygen is absorbed from the atmosphere, and carbon dioxide is exhaled. (3). The transformation of the residue of the crude sap into organised substances, which enter into the composition of the plant. The transformation is effected in the chlorophyll cells of the leaves under the influence of light, and the assimilated or elaborated S. is re-transmitted through the branches and stem to the growing parts of the plant requiring the same, to be there used up (after undergoing a variety of changes included under the term *metastasis*), or to form deposits of reserve material lodged in various parts for future use. See VEGETABLE PHYSIOLOGY.

Sap, in military engineering, is a narrow trench leading from the most advanced parallel towards the besieged fortress. The construction of a S. is extremely dangerous, since the sappers are within easy range of fire of the besieged. Usually the operations are conducted during the night.

Sap'ajou, a term applied to many *Platyrrhine* or New World monkeys belonging to the family *Cebidae*. See CEBUS.

Saph'ir, **Moritz Gottlieb**, a celebrated German humorist, was born of Jewish parents at Pesth, September 8, 1794. Though at first destined for commerce, he underwent a course of study in the Talmud at Prague, and afterwards dedicated himself to literature, publishing his *Poetische Erstlinge* in 1821. He next went to Vienna, which he left for Berlin in 1825. Here in 1826, besides other humorous writings, he commenced the *Berliner Schnellpost*, and in 1827 also the *Berliner Kurier*, but was obliged in 1829, in consequence of the boldness of his writings, to leave Berlin. He next edited in Munich two similar newspapers. A satire on the king brought him under the ban of the government, and he fled to Paris, but was soon permitted to return, and in 1832 (in which year he became a Lutheran) he was appointed director of the theatre. In 1834 he returned to Vienna, where he established in 1837 the *Humoristen*, and in 1850 a *Humoristisch-Satirischen-Volkskalender*. He died at Vienna, September 4, 1858. S. wanted but moral earnestness to have become the Aristophanes of his nation. With great command of wit, a clear intellect, and a fine style, he has left behind no works of enduring worth. The best of his works are *Dumme Briefe* (Munich, 1834); *Humoristische Damenbibliothek* (6 vols. Vien. 1838-41; 10 vols. 1862 *et seq.*); *Fliegendes Album für ernste und heitere Deklamation* (Leips. 2 parts, 1846; 3d ed. 1858); *Konversationslexikon für Geist, Witz, und Humor* (6 vols. Dresd. 1852; 2d ed. 1862). The collected edition of his *Schriften* has been often published (9th ed. 10 vols., Brünn. 1877 *et seq.*).

Sapinda'ceæ is an extensive order of dicotyledonous trees or shrubs, with alternate or opposite leaves; small flowers, which are generally polygamous; sepals four to five, imbricate, rarely valvate, more or less connate; petals mostly three to five, or none; disc complete, or one-sided; stamens five to ten, generally eight, hypogenous; ovary generally three-celled; ovules one or two in each cell, on axile placentas; fruit various. The order consists of about 700 species, all of which, with the exception of some belonging to the sub-order *Acerineæ*, are non-European, and are for the most part natives of S. America, India, and tropical and S. Africa. *Acerineæ* differs chiefly from restricted S. in its opposite leaves, and its stamens being inserted on, not within, the disc (see MAPLE). In articles GUARANA, HORSE-CHESTNUT, LITCHI, SOAP-BERRY, some important members of this order are detailed, and of others may be mentioned *Schleichera trijuga* of dry forests in India, the wood of which is valuable when strength, hardness, and durability are essentials; *Pteroxylon utile* (see SNEEZE-WOOD), a useful timber-tree of S. Africa; *Cardiospermum Halicacabum*, used as an edible vegetable in the Moluccas, and the root as a laxative, diuretic, demulcent, &c.

Sapodill'a Plum, if completely ripe, is a delicious fruit, the produce of *Achras Sapota* (*Sapotaceæ*) (q. v.), a large evergreen tree, native of Central America and the W. Indies, and cultivated in other hot countries. The timber of the tree is hard, heavy, and very durable; the bark astringent and febrifugal; and the seeds aperient and diuretic. *A. Australis* of Australia furnishes a tolerably good fruit.

Saponifica'tion (Lat. *sapo*, 'soap,' and '*facio*, 'I make') is the term given to the chemical process whereby, by the action of alkalis, fats are resolved into glycerine and a salt of the fatty acid (*soap*). In an extended sense, S. applies to the resolution of all ethers and analogous substances into acids and alcohols.

Saponin, a substance soluble in water, and closely allied to the Glucosides (q. v.), is a constituent of a considerable number of plants, showing its presence by the readiness with which their juice makes a lather with water. In the sub-order *Sileneæ* of *Caryophyllaceæ*, S. is a prevailing feature; hence we have the genus *Saponaria*, with its English names of Soapwort (q. v.) and fuller's herb. In *Sapindaceæ* its utilised presence has originated the name Soapberry (q. v.) for species of *Sapindus*. Soap-nut and soap-pods are species of *Acacia* (q. v.). S. may be extracted in an amorphous state by boiling alcohol. As used in India for washing certain silk and wool fabrics the soapberry is much preferred to soap—imparting a gloss and dazzling whiteness without injuring the most sensitive colours.

Sapota'ceæ is an order of about 300 species of dicotyledonous trees and shrubs, frequently with milky juice; with alternate, entire, exstipulate coriaceous leaves; a 4-8 lobed calyx; a regular hypogenous corolla, having stamens inserted upon its tube, and staminodes often alternating; a 2 or more celled superior ovary containing one ovule in each cell; and a berry or drupe as fruit. They are chiefly natives of tropical America, Africa (a few extending to the Cape), and India. Many yield edible fruits, others supply oily matter, others a valuable milky juice, others very valuable timber, and others act medicinally as tonics, astringents, and febrifuges. In India, *Mimusops Indica* furnishes a hard, very tough wood, used for many purposes. Of *M. Elengi*, the flowers, fruit, seed, and bark are used respectively for decorations and perfumery, for food, for oil, and for medicinal qualities. The W. Indian *Lucuma mammosa* produces an egg-shaped fruit, with a thick pulp resembling quince marmalade—hence its name of 'marmalade tree'; and *L. Caimito*, of Peru, gives a softer and more delicately-flavoured pulp. The dried flowers of *Bassia latifolia* form an important article of food in many parts of India; the ripe and unripe fruit is eaten; an oil is expressed from the seeds, and the oilcake is used as an emetic. Trees belonging to seven genera of this order furnish Gutta-Percha (q. v.). For other valuable products see BALATA GUM; BASSIA; MONESIA BARK; SAPODILLA PLUM; SIDEROXYLON; and STAR APPLE.

Sappan' Wood, or **Sapanwood** of commerce, is the barked branch timber of *Casalpina* (q. v.) *Sappan*, a large prickly tree of S. India, Burma, and Bengal, with yellow flowers in terminal panicles, pinnate leaves with unequal-sided leaflets, and thick, woody, shining dark-brown pods. It yields a valuable red dye for calico goods, and is largely exported from Calcutta, Madras, Ceylon, and Siam.

Sapp'er, a private in the Royal Engineers. The sappers and miners in the British army were organised in 1812, and the corps became known as the Royal Engineers in 1859. Sappers (100 of whom go to the war strength of every company of engineers) are recruited from well-educated men who have been brought up to suitable trades, and on enlistment they go through a course of training in military engineering at Chatham. The number of sappers in 1877-78 was 4251. Their pay is 1s. 1½d. per day.

Sapp'hire is a jewel-stone belonging to the Corundum class which embraces the ruby, the Oriental amethyst, the Oriental topaz, and the emerald. These are, in common with the S. composed of almost pure alumina, and they differ from each other only in colour, which is due to the presence of minute proportions of iron oxide and other colouring matter. The S. is a beautiful transparent stone of various shades of blue colour; crystallises as a six-sided prism, and with its allies above enumerated is the hardest of all mineral substances, the diamond alone excepted. Crystals of S. frequently present a star-like

appearance when cut across, and they sometimes have a silky or *chatoyant* lustre. The S. is chiefly obtained in the valleys and watercourses of Ceylon and Pegu; but they are also found, mostly water-worn and fractured, generally throughout the deposits of alluvial gold in New South Wales. It is a very highly prized stone, one of good colour weighing 10 carats being worth 50 guineas, while higher prices have been realised for stones of exceptional colour. Artificial sapphires have been produced by M.M. Freymy and Feil, of Paris, by the intense heating of fusible aluminates in presence of silica, whereby silicates were formed and pure alumina separated in the form of fine crystals.

Sappho (Gr. *Sappho*, in her own dialect *Psappho*) was born in Lesbos, probably at Mitylene, where she chiefly lived. The date of her birth is not known, but it must have been shortly before 600 B.C. Her father's name, according to the best authorities, was Scamandronymus; her mother's, probably Cleis. Her husband was Cercolas. Two brothers and a daughter are mentioned in her poems. The events of her life are, with one exception, unknown. On the Parian marbles there is a reference to her flight from Mitylene to Sicily about 600 B.C. We know not when she died, though passages in her poems and the unanimous voice of antiquity tell us that she must have lived to a great age. Her leap from the Leucadian rock is a late invention. Only fragments of S.'s poetry have been preserved, and the loss is one of the greatest in Greek literature; for her sex, her antiquity, and the intrinsic value of what has survived, give a deep interest to her productions. Along with Alcæus (q. v.) she was the founder of lyric poetry; and she wrote, with great grace and tenderness, erotic odes and hymeneals. She is credited also with the invention of the pectis, and of several forms of metre, one of which is hence named the Sapphic. Her odes have been imitated by many classical poets, e.g., Horace. She seems to have presided over a female school of poetry and music at Mitylene. In fact, the position of women there was much more important and independent than anywhere else in Greece, except Sparta. Hence the Athenian comic poets misunderstood the frankness of some of her odes, and ridiculed her as a courtesan. Her character has since been much discussed. In Welcker's *S. von einem herrschenden Vorurtheil befreit* (Göttingen, 1816) she is defended. See also Mahaffy's *Social Life in Greece* (1874). The best editions of her *Fragments* are Neue's (1827), Schneidewin's (1839), and Bergk's (1866). They are also collected in Bishop Blomfield's *Museum Criticum*, vol. i., and there are translations in most modern languages.

Sapucaia Nut, the trade name for the seed of *Lecythis Zabucajo*, a large tree of the Brazilian forests. The quality of the kernel is much superior to that of the closely allied Brazil Nut (q. v.). Each 'nut' is about 2 inches long, and half as wide, covered with a longitudinally-furrowed corky shell, and they grow loosely packed in hard, woody fruits, shaped like urns, with a closely-fitting lid at the top, which ultimately drops off and allows the ripe seed to fall. Monkeys are particularly partial to this nut.

Sarabande (Sp. *Zarabanda*), a stately and antique Spanish dance for one performer in three-quarter time, the second beat in each bar being strongly accented. It was much used by the old masters as a movement in suites for the harpsichord.

Saracenic, Moorish, or Arabian Architecture was based upon the styles of the nations subdued by the Mohammedan conquerors in the 7th and 8th centuries, and varies accordingly in different countries, the Mosques (q. v.) in Spain following a Romanesque, as those in Turkey followed a Byzantine type. The addition, however, to all these styles of such features—suggested by Oriental fancy or the wants of Mohammedan worship—as minarets, arabesques, lattice-work, and gorgeous colouring, served to create a novel architecture, which attained its highest development in the Alhambra of Granada and Mosque of Cordova, with their numberless slender columns and horseshoe arches. See Owen Jones' *Plans and Details of the Alhambra* (Lond. 1842).

Saracens, a name variously derived from *Sarah*, the wife of Abraham (Du Cange), the Arabic *saraca*, 'to steal' (Hottinger), and the Arabic *sebrah*, 'an uncultivated track' (Forster), but whose true etymology seems to be the Arabic *Sharkeyn*, 'Eastern people,' whence also Saraka, a region or city of Arabia Felix, mentioned by Ptolemy and Stephanus Byzantinus. Menander,

Procopius, Pliny, and others designate as *Sarakēnoi* (Lat. *Saraceni*) either Arabs generally or Beduin Arabs dwelling between the Tigris and Euphrates. In course of time S. became the general title of all Arabs who had embraced Islam, and next in mediæval chronicles an appellation of Mohammedans, irrespective of race, against whom crusades were directed.

Saragosa (Sp. *Zaragoza*), capital of the province of the same name in Arragon, Spain, on the Ebro, 211½ miles N.E. of Madrid, and 227½ W.N.W. of Barcelona, by rail. It stands in a fertile and well-watered plain, among oil and mulberry trees. It has thirty-eight squares, twenty-one churches, five hospitals, one theatre, and twelve nunneries. The river is crossed by a fine old bridge (built 1437), and the town is surrounded by a wall. There are two cathedrals—the Metropolitan church of San Salvador, a Gothic building, and the Nuestra Señora del Pilar, or Cathedral of the Virgin. The university, founded in 1474, once had eighty professors and 1400 students. The Exchange, built in 1557, is a splendid building. The Torre Nueva, a leaning tower, is only second in fame to that of Pisa. There are many institutes, academies, learned societies, and charitable institutions. S. has manufactories of cloth, silk, linen, and some chemicals. The *Salduba* of the native Celtiberians, it was frequently visited by the Phœnicians. The Romans founded a colony here in 25 A. D., called *Casarea Augusta*, of which the modern name is a corruption. S. was conquered by the Moors in 712, and made a royal residence by them. In 1118 Alphonso I. took it after a long siege, and under him and his successors it greatly declined. In 1808 and 1809 it underwent two most formidable sieges by the French. It was taken by them in 1809 after a most brilliant defence by the citizens under Palafox (q. v.), during which they contested the possession of every house and street. Many valuable archives were then destroyed. Pop. (1877) 67,539.

Saransk', a town of European Russia, government of Pensa, on an affluent of the Sura, 69 miles N.N.E. of Pensa. It has seventeen churches, and is a thriving town with a great annual fair. Pop. (*St. Petersburg Calendar* for 1878) 9369.

Saratoga, Battle of, fought between the British under Burgoyne and the Americans under Gates, on the heights of Saratoga, 12 miles E. of Saratoga Springs (q. v.), on the 7th of October 1777. The result of this battle was that on the 17th the British, to the number of 5752, surrendered with the honours of war, on the condition of being allowed to embark for England, a condition which Congress did not permit to be carried out.

Saratoga Springs, the most fashionable watering-place of the United States, situated in the State of New York, 36 miles N. of Albany, and 186 miles from New York. Its mineral springs, twenty-eight in number, annually attract crowds of visitors, of whom its great hotels can accommodate from 10,000 to 15,000 at a time. Congress Park, a large and elaborately-laid-out pleasure-ground, was completed in 1876, and a handsome town-hall, which cost \$110,000, is used for concerts and entertainments. Saratoga has eight churches and four newspapers. Pop. (1870) 7516. About 4 miles from the town is Saratoga Lake, where the American University boat-races are held. The lake affords a straight course 3 miles in length, where fourteen boats can be rowed abreast.

Sara'tov, a government of Russia, on the W. side of the Volga, bounded N. by the governments of Pensa, Simbirsk, and Orenburg, E. and S. by Astrakhan, W. by Tambov, Voronezh, and the country of the Don Cossacks. Area, 32,614 sq. miles. Pop. (1870) 1,751,268. It is watered by the affluents of the Volga, and by the Choper and Medveditza, flowing to the Don, which is separated from the Volga by the monotonous wastes of the Volga Hills, occupying a large tract in the S. In the E. there are many lakes, the largest of which is the salt lake of Elton. Of the surface, one-seventh is cultivated land, one-ninth under wood, one-third meadow land. Agriculture and cattle-rearing are the chief occupations of the people. The principal crops are rye, wheat, oats, flax, hemp, and tobacco. The fisheries of the Volga are very productive. Among the inhabitants are a large number of German colonists, originally introduced by Catherine II. (1764-70), whose industry and skill have done much to improve the government.—S., the capital, lies on the right bank of the Volga, 219½ miles E. S. E. of Tambov by rail. It was built in 1591, and has broad

streets, but most of the houses are built of wood. It carries on manufactures of ropes, stockings, tobacco, soap, earthenware, and tiles, and has two iron foundries. Pop. (*St. Petersburg Calendar* for 1878) 85,220.

Sara'wak, an independent province of Borneo, extending for about 400 miles along the western coast from Tanjong Datu in the S. to Tanjong Kidurong in the N., and inland in a north-easterly direction as far as the headwaters of the Rejang river. Area, 28,000 sq. miles; pop. (as estimated by the Rajah's Government, 1876) 222,000, of whom 60,000 were Malays, 90,000 Sea Dyaks, 35,000 Land Dyaks, 30,000 Milanaus, and 7,000 Chinese. Covered for the most part by forests, and traversed by numerous streams and lofty mountain-ranges, S. is singularly rich in minerals, 4,000,000 tons of coal existing, according to an English expert, in a single seam, which might easily be worked. The climate is moist (182 inches of rain in 1876), and the temperature averages 85° F. The exports (sago, quicksilver, gutta-percha, indiarubber, rattans, &c.) amounted (1876) to \$1,433,139; the imports (cloth, tobacco, rice, brass ware, &c.) to \$1,317,665. The present Rajah, a son of the late Sir James Brooke (q. v.), is absolute head of the state, but is assisted by a legislative council of two Europeans and five Malay chiefs. He has a standing army of 200 Dyak Rangers, and the militia consists of some 25,000 men. There are three government schools, and a mission, with the Anglican Bishop of Labuan at its head; and the growing prosperity of S. offers a strong contrast to the anarchy and vice of Borneo proper, piracy and head-hunting having become things of the past, while slavery is being gradually abolished. Kuching, the capital, contains the Rajah's residence, a handsome court-house, a fort (enlarged 1877), and prison, and its estimated pop. was 20,000 in 1876. See G. L. Jacob's *The Rajah of S.* (2 vols. Lond. 1877).

Sarcina Ventric'uli. This alga was first discovered by Goodsir in 1842, among the matters vomited by a patient. It has also been found in the urine, in the fæces, in an abscess of the lung, in the fluid of the ventricles of the brain; in fact, in most parts of the body, and also in the lower animals, and, by Dr. Lowe, in stagnant water. S. V. is of a roundish, quadrangular form, about $\frac{1}{10}$ th to $\frac{1}{8}$ th of a line in diameter, the individuals being generally grouped in cubes of four, sixteen, or sixty-four in the cube, separated by rectangular striæ. The appearance of S. V., in vomited matter, is characteristic of an important form of dyspepsia. The amount of fluid matter vomited is always large, and the vomiting generally takes place in the morning, the discharge giving, almost invariably, immediate relief. The matter has a faint acid smell, like that of fermenting wort, and after standing a few hours it becomes covered with a yeast-like froth, and deposits a brown, flaky sediment. Both the froth and deposit contain S. V. in great abundance. The vomit may have an alkaline reaction, but the brown flocculi which contain the S. V. are always intensely acid. The S. V. is generally, but not invariably, accompanied with a great number of oval torulæ, and is symptomatic of organic disease by which the stomach is prevented from completely emptying itself. Sulphite of soda given in 20 to 60 grain doses relieves what probably is an almost incurable disorder, by the sulphurous acid being set free in the stomach and destroying the organisms.

Sarcine (from Gr. *sarx*, 'flesh'), (C₅H₄N₄O), a constituent base of the flesh of vertebrata, most easily prepared by precipitation from the mother liquor of creatine, which has been boiled with dilute cupric acetate. The cupric oxide present in the precipitate is got rid of by treatment in nitric acid mixed with nitrate of silver, when the nitrate of S. is obtained, which when boiled in an ammoniacal solution of silver nitrate gives a compound of S. and oxide of silver, which is decomposed by sulphureted hydrogen. S. dissolves readily in boiling water, forms crystallisable salts with acids, and crystalline compounds with metallic oxides and other bases.

Sarcolemma, the delicate tissue forming a protecting sheath for the fibres of which *Muscles* (q. v.) are composed.

Sarco'ma (Gr. 'a fleshy excrescence') is a term used by the older surgical writers to designate a fleshy or firm morbid tumour. For a considerable time the term fell into disuse, but it has recently been revived by modern pathologists, especially

the Germans, to designate that class of tumours whose structure presents some resemblance to the rudimentary forms of some natural tissue of the body, such as the adenoid tumours of the mammary and prostate gland, the fibro-plastic tumours of Lebert, and others, such as the myxoma and glioma of Virchow.

Sarcoph'agus (Gr. 'flesh-eater') is the antiquarian name of a coffin or tomb of stone. Such receptacles were at one time frequently made of Assian stone, which came from Assos in Troas, and which was believed to have the property of consuming the body, with the exception of the teeth, in forty days, whence the name S. The oldest known sarcophagi are Egyptian, and have been found in certain of the pyramids. The most famous of these was discovered in 1801, and is now in the British Museum. By the Phœnicians, Persians, and Romans sarcophagi were also used; but in the latter days of the Roman republic, just before the beginning of the Christian era, cremation to a great extent superseded interment. In more modern times stone coffins have not been uncommon for royalty and persons of high rank.

Sard, a deep-brownish red chalcidony, somewhat darker than carnelian, and of a blood-red colour by transmitted light. The *sardonix*, a beautiful and rare variety of onyx, consists of alternate layers of S. and white chalcidony.

Sardanapalus, according to Ctesias and following him Diodorus, was the last king of Assyria. The Greek legend represents him as leading a luxurious effeminate life, until, attacked by a large army under Arbaces, satrap of Media, and Belesys, the Chaldean priest, he suddenly developed into an heroic warrior. Twice he defeated the rebels, but was at length overcome and obliged to shut himself up in Nineveh. Two years he stood the siege, and then, finding resistance hopeless, burned himself, his treasures, and all his womenkind upon a great pile which he had erected. That a weak, effeminate, dissolute monarch should in a moment become transformed into a bold undaunted hero, capable of ending his existence in such a tragic manner, is in itself highly improbable; and that such a monarch existed is very doubtful, especially when the story is viewed in the light which modern research into the cuneiform inscriptions has cast upon the history of Assyria. There would appear, however, to be an element of fact in the Greek account, the name S. being a corruption of Assurdanipal, confounded with Assurbanipal, both of which names occur several times in the two dynasties of Assyria. In the second dynasty, which ended 625 B.C., the last king, Assur-emid-ilani, besieged in Nineveh by Cyaxares the Mede, burned himself in his palace rather than fall into the hands of his foes. In fate he corresponds with the warlike S., and he might easily have been confounded with his father Assurbanipal III., who was a brave and enlightened monarch, and who successfully upheld the dignity of the Assyrian kingdom, which had been consolidated by his predecessor Assur-akh-iddina or Esarhaddon.

Sardes, or **Sardis**, anciently one of the chief cities of Asia Minor and capital of Lydia, was situated in a fertile plain at the N. base of Mount Tmolus, on both banks of the river Pactolus, near its junction with the Hermus, and 60 miles E.N.E. of Smyrna. It reached its greatest prosperity under Croesus, the last king of Lydia. On the downfall of the native monarchy it became the residence of the Persian satraps of Western Asia, but after the battle of the Granicus its freedom was restored by Alexander the Great, on whose death it fell to Antigonos and subsequently to the Seleucidæ of Syria. Under the Romans it continued a rich and flourishing city, and though ruined by an earthquake in the reign of Tiberius, was rebuilt by his orders. It is spoken of by St. John as one of the seven churches of Asia. Captured by the Turks in the 11th c., it was almost entirely destroyed by Timur in the 13th c. Its only remains are magnificent ruins at the village of *Sart*.

Sardhana, a town in the district of Meerut, N. W. Provinces, British India, 12 miles N.E. of Meerut. Pop. (1872) 12,466. It is celebrated as the former residence of the Begum Sumru, who died in 1836. She founded here a Roman Catholic cathedral and St. John's College for the education of native priests. Her palace, a fine modern house, is well kept up.

Sardine is a small fish belonging to the same genus as the herring, and by Gunther it is regarded as a variety of pilchard (*Clupea pilchardus* var. *a sardina*) although other authorities set

It down as a distinct species. It is found in vast shoals on the northern coasts of the Mediterranean, and on the Atlantic coasts of Europe, deriving its name from the Mediterranean island Sardinia. The S. has been in repute from very remote times, and since the modern system of preserving the fish in oil in hermetically-sealed tins was adopted, it has become a favourite throughout the world. The oil-curing is thus effected: after careful washing, sprinkling with salt, and removal of heads and intestines, the sardines are spread out to dry. They are then dipped for a short time in a bath of boiling oil, and laid on a grating to permit the oil to drain off. They are next packed into the little oblong tin boxes used for them, the box filled up with hot olive oil of fine quality, and the lid soldered down. The soldered boxes are then exposed to the heat of a steam bath, which causes the sides to bulge out, but they again collapse on cooling. The value of the sardines exported from France averages half a million sterling yearly. The industry is now established in Cornwall, where the smaller and more delicate pilchards are similarly treated and sold as Cornish sardines; and, indeed, a considerable proportion of the French sardines are really sprats, vast shoals of which occur on the E. coast of Scotland, and might with advantage be cured as Scotch sardines.

Sardinia (Ital. *Sardegna*, Fr. *Sardaigne*, Gr. *Sardo*), after Sicily, the largest island in the Mediterranean, lies S. of Corsica, from which it is separated by the Boche di Bonifacio, 7 miles in width. It is 119 miles distant from Africa, and 140 from Italy. Its length from N. to S. is 174 miles; its breadth from E. to W. 70 miles. Area, 9463 sq. miles; pop. (1877) 658,479. S. is surrounded by a number of smaller islands, of which the more important are, on the N., Asinara, La Maddalena, Caprera (q. v.), Tavolara; on the S.W., San Antioco and San Pietro.

Surface, &c.—The island is very mountainous, the general direction of the ranges being from N. to S. The chief ranges are Monti del Gennargentu (*Janua argenti*), of which the highest peaks are Bruncu Spina, 6266 feet, and Siuscia, 6118 feet; and to the N., the Monti di Limbara, with a general elevation of over 4000 feet. From the centre there slopes to the W. coast an elevated table-land, in which is situated the volcanic Monte Ferru, rising in its peak Urtian to 3445 feet; while to the N.W. extend the Gocceano and Bosa, with a maximum height of 4036 feet. In the N.W. corner is a rich plain, terminated by the mountain group La Nurra, which is continued in the island Asinara. In the S.W. part of the island is an extensive plain, the Campidano, stretching from Cagliari to Oristano, and celebrated for its extraordinary fertility. The rivers of S. are unimportant, and many of them entirely disappear in summer. The principal are the Tirso, flowing S.W. into the Gulf of Oristano; the Dosa, flowing to the E. coast; and the Coghinias to the N.

Products, Trade, &c.—The valleys are remarkably fertile, and the mountain-slopes afford excellent pasture. The island in ancient times was so productive as to be termed the granary of Rome, but now the paucity and ignorance of the population, besides the want of roads and the deadly malaria (*Intemperie*) which prevails from July to October, hinder the progress of agriculture. Much of the soil is quite uncultivated, while one-fifth is covered with wood. The principal crops are wheat, barley, maize, and fruits, tobacco, cotton, flax, and madder. Wine is abundantly produced, chiefly of three kinds, *Vernaccia*, an acid and strong wine, *Malvasia* and *Muscato*, sweet wines. There are rich mines of lead, iron, manganese, nickel, cobalt, bismuth, lignite, and anthracite, chiefly in the district of Iglesias, which produced in the season of 1875-76 metals to the value of £435,639, and which are capable of yielding much greater returns when means of transport are improved, and the amelioration of the climate consequent on the better cultivation of the soil will allow them to be worked continuously. Along the coasts are valuable fisheries, chiefly of tunny, anchovies, and sardines. Salt and gunpowder are manufactured. Since the Franco-Prussian war there has been a considerable trade in cattle with Marseille, as many as 30,000 bullocks having been exported in the first half of 1873. In 1875, there were open in the island four lines of railways (Cagliari to Oristano 59 miles, Iglesias 33½ miles, Sassari to Porto Torres 12½ miles, to Orzieri *via* Ploaghe, 31 miles). In the same year the returns of British shipping at the four ports of S. were as follows:—In the direct trade in British vessels from and to Great Britain and British colonies at Cagliari, entered 10 vessels of 3789 tons, cargoes

£4850—cleared, 15 of 7752 tons, cargoes £86,955; at Carloforte, entered 8 of 3480 tons, cargoes £1043—cleared, 27 of 16,180 tons, cargoes £19,908; at Porto Torres, entered 2 of 426 tons, cargoes £5425—cleared, none; while in the indirect or carrying trade in British vessels from and to other countries, at Cagliari entered 16 of 10,708 tons, cargoes £2220—cleared, 11 of 6710 tons, cargoes £35,350; at Carloforte, entered 46 of 38,700 tons without cargoes—cleared, 30 of 27,160 tons, cargoes £40,880. The fourth port, Terranova, had no direct or indirect trade with Britain in 1875.

Race, Language, and History.—The inhabitants of S. are of Iberian origin, with an intermixture of Phoenician, Greek, Roman, and Spanish blood. They are still comparatively uninfluenced by civilisation, and with all the virtues exhibit many of the vices of a primitive race. They are proud, revengeful, and profoundly ignorant. About 1000 assassinations occur in the island annually, and of the pop. 87·98 per cent. in the country, and 84·05 in the towns, are unable to read. The language is of Romance origin. It differs, however, from all the Neo-Latin languages in forming its definite article (*su, sa*, in masc. and fem. singular, *sos, sas*, in plural), from *ipse* instead of *ille*; and that this difference was persistent as early as the 8th c. may be seen from a letter of 740 A.D., discovered and published in 1846 by Count Pietro Martini, then director of the library at Cagliari, which is earlier than the famous Oath of Strassburg by 102 years as the first known continuous specimen of a Neo-Latin dialect. S. was from about 500-480 B.C. ruled by the Carthaginians, who were succeeded by the Romans in 235 B.C. In 456 A.D. the island was captured by the Vandals, but was recovered by Justinian in 534. It was next occupied gradually by the Saracens, who were ejected by the Genoese and Pisans in 1025, when it became the possession of the latter. In 1297 it was granted by Pope Boniface VIII. to the King of Aragon, and it was governed from 1479 by Spanish viceroys. In 1714 Spain was obliged to cede it to Austria, which in 1720 exchanged it for Sicily to the Duke of Savoy, who in the same year assumed the title of King of S., which he exchanged in 1860 for that of King of Italy. See Marmora, *Voyage en Sardaigne ou Description Statistique, Physique et Politique, de cette Isle* (5 vols. Par. and Turin, 1839-60); Auguste Boullier, *La Dialecte et les Chants Populaires de la Sardaigne* (Par. 1864); and C. Corbetta, *Sardaigne e Corsica* (Milan, 1877).

Sardou, Victorien, a distinguished French dramatist, was born at Paris 7th September 1831. After studying medicine for some time, he devoted himself to history, and endured some years of poverty and distress as a teacher and writer in minor newspapers. His first drama, *La Taverna des Etudiants*, failed completely at the Odéon in 1854; and it was not until 1858, when Mlle. Déjazet recognised his talent and took him under her protection, that the career of success began which has since then been almost uninterrupted. His most noted dramas are *Les Pailles de Mouche* (1861), (adapted in England under the title of 'A Scrap of Paper'); *Nos Intimes* (1861), ('Friends and Foes' and 'Peril'); *Nos bons Villageois* (1865); *La Patrie* (1869), ('Fatherland'); *Fernande* (1870), (adapted under the same name); *Dora* ('Diplomacy'); and his latest success at the Vaudeville, *Les Bourgeois de Pont d'Arce* (1878). *La Papillonne* failed at the Comédie Française in 1862. His political satire *Rabagas* had an immense success in 1872, and in 1877 he was elected to the French Academy. Powerful invention and construction, firm characterisation and brilliance in dialogue, are S.'s most notable qualities as a dramatist.

Sargassum. See GULFWOOD.

Sargent is the name of more than one American family of talent and accomplishment. The first person of note bearing the name was Winthrop S., born at Gloucester, Mass., 1st May 1753. He served with distinction in the War of Independence, was appointed by Congress surveyor-general of the North-West Territory (1786), was adjutant-general of St. Clair's expedition (1791) against the Miami Indians, took part in Wayne's expedition (1794-95), and was governor of Mississippi Territory in 1790 and in 1801. He was a member of the American Academy of Arts and Sciences, and of the Philosophical Society, and assisted Dr. B. S. Smith in preparing his *Papers relative to certain American Antiquities* (1796). He died 3d June 1820. His grandson, Winthrop S., born at Philadelphia, September 23, 1825, was a lawyer by profession, but is best

known as a scholar, antiquarian, and litterateur. He edited from original MSS., with an introductory memoir, *The History of Braddock's Expedition against Fort Duquesne* (1855), *The Loyalist Poetry of the Revolution* (1857), and several reprints of curious Revolutionary tracts; he also wrote *The Life and Career of Major John André, Adjutant-General of the British Army in America* (Boston, 75 copies, 1861). He left incomplete at his death (at Paris, May 18, 1870) a *Catalogue Raisonné* of books relating to America. **Lucius Manlius S.**, born at Boston, Mass., 25th June 1786, studied at Harvard, and devoted himself to the advocacy of social reforms, particularly temperance, for which he lectured and wrote copiously. He died at West Roxbury, 2d June 1867. Among his chief writings are *Dealings with the Dead by a Sexton of the Old School* (1856), *Reminiscences of Samuel Dexter* (1858), and *The Irrepressible Conflict* (1861). See J. H. Sheppard's *Reminiscences of L. M. S.*—**Epes S.**, born at Gloucester, Mass., 27th September 1812, was educated at Harvard, took to journalism, and was successively on the editorial staff of the *Daily Advertiser*, the *Boston Atlas*, the *New York Mirror*, and the *New Monthly Magazine*. About 1847 he settled at Roxbury, near Boston, and for several years edited the *Boston Transcript*. S. is a very miscellaneous and prolific writer. Among his numerous works may be noted the plays, *The Bride of Genoa* and *Velasco*, produced with success in 1836 and 1837; the comedy *Change makes Change* (1841); a *Life of Henry Clay* (1842); *Fleetwood, or Stain of Birth* (1845), a novel; *The Marine's Library*, and *American Adventure by Land and Sea*; an edition of the *Modern Standard Drama* (7 vols. 1846-50); *Songs of the Sea, and other Poems* (1847), one of which, 'A Life on the Ocean Wave,' is as popular in Great Britain as in America; the *Select Works of Benjamin Franklin, with Memoir and Notes* (1852); *The Priestess* (1855), a tragedy; *Arctic Adventures by Sea and Land* (1857); a new volume of *Poems* (1858); *Original Dialogues* (1861); *Planchette, or the Despair of Science, an Account of Modern Spiritualism* (1869); *The Woman who Dared, a Poem* (1869); and a *School Manual of English Etymology* (1873).—**John Osborne S.**, brother of the preceding, born at Gloucester, Mass., in 1810, studied at Harvard, passed for the bar, and practised several years at Boston, sat in the Massachusetts Legislature 1835-36, but has mainly devoted himself to political journalism. He has written several pamphlets on legal and political questions, but his most important contribution to literature is his essay, *Improvements in Steam Navigation and the Arts of Naval Warfare* (1844), containing a biographical sketch of John Ericsson.

Sari, the capital of the province of Mazanderan, Persia, in a flat plain, 15 miles S. of the Caspian Sea, and 80 miles S.W. of Astrabad. The streets are well paved, and several are planted with orange and other trees. The chief buildings are the Jamah Masjid, the palace of Agha Mohammed; and the Gumbaz-i-Salm-i-Tur, a cylindrical tower, 100 feet in height and 30 in diameter. There are seven colleges, five public baths, four caravanserais, and fifteen *abambars*, or reservoirs, dug deep in the earth, and filled in winter with water. The trade is insignificant, and is chiefly in rice and sugar. Pop. about 20,000.

Sark (Fr. *Sercq*), one of the Channel Islands, 6½ miles E. of Guernsey, with an area of 1274 acres, and a pop. (1871) of 546. It presents to the sea cliffs of from 200 to 300 feet high, hollowed into picturesque gullies and caves. Great and Little S., the two portions of which it consists, are joined by a dangerous couple or neck, 8 yards long and 5 feet broad, at a height of 200 feet above the sea. S. is a bailiwick of Guernsey (q. v.). The inhabitants are mainly employed in fishing and lead-mining.

Sarma'tians, a collective name loosely applied to a number of non-Scythian or semi-Scythian tribes who inhabited Eastern Europe during the classic ages. They are mentioned by Herodotus and Hippocrates under the name *Sauromata* ('lizard-eyed'), and are described as the offspring of Scythians and Amazons, a legend which probably arose from the warlike habits of the Sarmatian women. In Strabo and Pliny they are very briefly mentioned, but Ptolemy divides them into the *European* and *Asiatic* S.; assigning to the former a territory extending from the Vistula and the Baltic to the Carpathians, the Black Sea, and the Tanais (Don); and to the latter the regions between the Tanais, the Caucasus, and the Caspian Sea. Two of the principal tribes of European S., the

Roxolani and the *Jazyges*, began to push westward in the 1st c. A.D., the former penetrating into Moesia, the latter into Hungary and the valley of the Theiss. In the barbarian invasions the S. are hopelessly intermingled with the Goths, Vandals, &c. The received theory represents them as consisting partly of Slavic and partly of Lithuanian tribes, and the root *S-rm* is considered to be identical with that of the words *Serbi*, *Servi*, &c.

Sar'no, a town of Southern Italy, province of Salerno, on a river of the same name, 15 miles N.W. of Salerno. It has a cathedral, a school for the priesthood, some paper manufactories and foundries. The neighbourhood produces fine silk. Pop. (1874) 15,382. Near S. was fought the famous battle in which Narses the Byzantine general finally overthrew the Ostrogothic monarchy in Italy.

Sar'pi, Pié'tro, commonly known as **Fra Paolo**, was born at Venice, August 14, 1552, early became distinguished in mathematical and metaphysical science. At the age of twenty-six he had become provincial in an order of Servites, and in 1588 was chosen procurator-general; but his rationalistic tendencies brought him under the accusation of the Inquisition, and S. was exiled from his native city. Chosen representative of Venice in a dispute with Paul V. regarding that Pope's secular powers, he overwhelmed the Papal party by his learning, eloquence, and subtlety. He was in consequence excommunicated, and his life was imperilled. Secluding himself within his monastery, he now devoted himself to the composition of his *Historia del Concilio Tridentino*. This was printed at London in 1619 by Antonio de Dominis, the Protestant ex-bishop of Spalatro, who placed on its title-page the pseudonym of Pietro Soave Polano (an anagram on Paolo Sarpi Veneto). The book—perhaps a more brilliant and certainly a more elaborate attack on the Papal policy than any Protestant other than Luther ever attempted—was quickly translated into Latin and other tongues, and called forth in reply Cardinal Pallavicini's account of the same council. His complete works were published at Helmstädt (2 vols. Verona, 1750; 8 vols. *ib.* 1761-68), and at Naples (24 vols. 1789-90). S. died at Venice, January 15, 1623. See Fontanini's *Storia Arcana della Vita di Fra Paolo* (Milan, 1805); Bianchi-Giovini's *Biografia di Fra Paolo* (2 vols. Zurich, 1836; Fr. trans. 2 vols. Brussels, 1863); T. A. Trollope's *Paul the Pope and Paul the Friar* (1861); and A. G. Campbell's *Life of S.* (1875).

Sarracénia is the principal genus of the small order *Sarraceniaceæ*, consisting of N. American marsh plants remarkable for the leaf-petiole being expanded into a pitcher-like organ, surmounted by the lamina shaped as a kind of lid. This pitcher is capable of holding a considerable amount of fluid, and in the older leaves is usually full of water. In some species—as *S. purpurea*, *S. flava*, and *S. rubra*—the water appears to be derived directly from the atmosphere, but the construction of other species, e.g., *S. variolaris*, suggests a secretion by the plant as the source.

Sarsaparill'a (Span. *sarza*, 'a bramble,' and *parilla*, 'a vine,' or Parillo, who is said to have first used it medicinally) consists of the roots, with portions of the rhizome or 'chumps' attached, of several species of *Smilax*, an extensive genus of monocotyledonous climbing shrubs with tuberous or fibrous root stocks. They are natives of the warm, temperate, and tropical regions of both hemispheres, and are remarkable for their medicinal properties. The varieties of the drug met with in commerce are numerous, and the different species of which they are the produce is not yet settled amongst botanists. The trade divide S. into two principal groups according to the amount of starch contained in the drug. In the starchy section we have the Caracas S., of a pale-brown colour and thick swollen contour; the Brazilian or Para S., in which the roots are slender and wavy, probably obtained from *S. papyracea*; the Honduras S., which has a somewhat acrid taste; and the Guatemala S., which differs from the Caracas by its brighter orange-brown colour. In the non-starchy group the most important are—Jamaica S., of a reddish-brown colour; Lima S., which closely resembles it in external appearance, but not in tint (both, however, are probably obtained from the same species, viz., *S. officinalis*); and Vera Cruz or Mexican S., the produce of *S. medica*. Two European species (*S. excelsa* and *S. aspera*) yield an inferior kind of S.

The roots of the medicinal species of *Smilax* contain mucilage, lignin, starch, volatile oil, resin, and a crystalline principle

called *Smilacin*. As a medicine, S. is used in decoction and infusion as a diaphoretic, tonic, and alterative, and is administered in scrofula, syphilis, and concomitant diseases. Several species of *Smilax* are known as China root, of which *S. China* is said to possess alterative and sudorific properties, and is used in the East for syphilis; and *S. pseudo-China*, or American China-root, is variously employed in the United States. The root of *Ripogonum parviflorum* is known as New Zealand S. from serving in that country as a substitute for real S. For a similar reason *Hemidesmus Indicus* (*Asclepiadaceæ*) is called Indian S. American or wild S. is *Aralia nudicaulis* (*Araliaceæ*), and is used like S. as a diaphoretic and alterative.

Sarthe, a N. W. department of France, bounded N. by Orne, S. by Maine-et-Loire and Indre-et-Loire, E. by Eure-et-Loir and Loir-et-Cher, W. by Mayenne. The surface is mostly level, broken here and there with low hills clothed with vines. There are also considerable forests. S. is well watered. The chief rivers are the Sarthe and Huisine, whose basins comprise the most fertile districts in the department. The climate is mild, but humid. Agriculture is rapidly progressing, and wheat, potatoes, clover, grasses, hemp, and fruit (walnuts, chestnuts, pears, and apples), are produced in large quantities. The wine is of mediocre quality. Cattle, sheep, and swine are reared in great numbers for the Paris market. The department has coal-pits, iron-works, and numerous other kinds of industrial works. Pop. (1876) 446,239. The chief town is Le Mans (q. v.).

Sar'ti, Giusepp'e, a versatile composer, whose works were in great repute during the 18th c., was born at Faenza, December 28, 1729. He was for ten years chapel-master at Copenhagen, after which he produced many operas in Italy with brilliant success, and from 1784 to 1801 he occupied a princely position as director of court music at St. Petersburg. S. died at Berlin, July 28, 1802. His operas, distinguished for grace, melody, and inventive power, number forty-three, the most famous, perhaps, being *Giulio Sabino*, produced at Venice in 1781. See FÉTIS, *Biog. Univ. des Musiciens* (new ed. 1878).

Sar'to, Andrea del, an Italian artist, born at Florence in 1488, began life as a goldsmith and chaser in metal, but early turning to painting, studied under Pietro di Cosimo, and acquired in his own time the proud title of 'Andrea senza errori,' or the Faultless. His real name was Andrea Vannuchi, and he was called *del S.* on account of his being the son 'of a tailor.' In 1518 he visited the court of François I., where he executed a number of pictures, some of which still adorn the Louvre. In Paris he was loaded with honours and gifts. Yet he was induced to return to Italy within a year by the importunities of his infamous wife, Lucrezia del Fede. Under the influence of Lucrezia, the fair model of his Madonnas, he embezzled the sums entrusted to him by the king for the purchase of works of art in Italy. To this perfidious creature Andrea sacrificed honour, fame, and friends, only to be shamelessly abandoned by her on his wretched deathbed, when stricken in 1530. Specimens of his art are in almost every large gallery, but fine examples are rare out of Naples. His easel pictures are generally less esteemed than his frescoes, of which the chief are the Virgin Mary series, including the 'Madonna del Sacco' in the Nunziata, and the scenes from the life of St. John in a cloister which formerly belonged to the Campagna dello Scalzo. Perhaps his noblest easel-picture is the so-called 'Disputa della SS. Trinita' in the Pitti Palace. See Biadi, *Notizie inedite della Vita d'Andrea del S.* (Flor. 1830), and Reumont, *Andrea del S.* (Leips. 1835).

Sar'torius, Georg, Freiherr von Walterhausen, a German historian, was born at Kassel, 25th August 1765, and died 24th August 1828. His most important work is *Geschichte des Hansatischen Bundes* (3 vols. Gött. 1802-8), to which his *Urkundliche Geschichte des Ursprungs der Deutschen Hanse bis zum 13. Jahrh.*, edited by Lappenberg (2 vols. Hamb. 1830), forms a valuable addition.—**Wolfgang von Walterhausen S.**, son of the preceding, and a distinguished geologist, was born at Göttingen, December 17, 1809. Subsequently to 1833, when he completed his university course, he made several journeys in the interests of science, and was, in 1847, appointed professor of geology and mineralogy in the university of his native town. In 1859 he travelled in Russia, and in 1864 went for the third time to Sicily, where also he resided 1869-70. He died at Göttingen,

October 16, 1876. His works are *Atlas des Etna* (1848-59); *Physisch-Geographische Skizze von Island* (1847); *Geolog. Atlas von Island* (1853); *Ueber die Vulkanischen Gesteine in Sicilien und Island* (1853); *Ueber die Klimate der Gegenwart und der Vorwelt* (1865), the last a prize essay published at Haarlem.

Sa'rum. See SALISBURY.

Sarza'na, a town of N. Italy, province of Genoa, 67½ miles E. S. E. of that city by rail. It has a noble Gothic cathedral, begun 1355, and to the E. the picturesque fortification of Sarjanella. Pop. (1874) 9533. S. was called *Sergiana* by the Romans, also *Luna Nova*, from its occupying the site of the ancient *Luna* or *Luno*, the most northern of the Etruscan cities.

Sash, in carpentry, the wooden framework of a window, composed of side *styles* joined at top and bottom by *rails*, with inner cross pieces or *bars* for holding the panes of glass. A *casement* S. opens on hinges like a door; a *sliding* S. moves vertically up and down, being attached to ropes or chains passed over pulleys, and counterbalanced at the ends.

Sash. Crimson sashes of silk are worn across the shoulder by officers, and crimson cotton sashes by sergeants in the British army. They were formerly worn round the waist. In the cavalry they are tied on the right side, and in the infantry on the left. In full dress a narrow S. of gold and crimson silk is worn by officers.

Sas'ine, a term of Scotch law denoting the act of giving legal possession of feudal (see FEU) property, or the legal writing by which that fact is proved. By the Titles to Land, 1858 (Scotland) Act, the ceremonial previously necessary to the validity of a deed of S. is, since the passing of the Act, unnecessary. Instead, the conveyance may be recorded in the Register of Sasines.

Saskatch'ewan, or **Nel'son**, one of the largest rivers in the Dominion of Canada, is formed by the junction of two branches, the North and South S., which rise near each other in a summit-glacier in the Rocky Mountains near Mount Hector, whence they flow E., gradually diverging, and then again converging, till they reach a point 550 miles E. of their source, where they unite. The S. then flows for 370 miles E. to Lake Winnipeg, forming on its way Cedar Lake and the Grand Rapids. From Lake Winnipeg it flows first N. then E. to Hudson's Bay. Its total length from the source of the southern branch is 1740 miles, and it drains an area of 500,000 sq. miles. The S. is navigable throughout most of its course, and steamers have ascended to within 300 miles of its source. The country has yet to be opened up, but contains many valuable minerals and much arable land. See the Earl of Southesk's *Saskatchewan and the Rocky Mountains* (Edin. 1875).

Sassa'fras is a genus of *Lauraceæ* (q. v.), natives of N. America and the E. Indies. *S. officinalis*, known specially as the S.-tree, is a large dioecious tree of dry open woods in Canada and the United States, and is remarkable for the diversity it presents in the size and shape of its deciduous leaves. The root, wood, and bark have stimulant and sudorific properties, which mainly depend on the presence of a volatile oil. In medicine various preparations of S. are used for rheumatism and skin affections, generally, however, in combination with more potent drugs. 'S.-tea,' with sugar and milk, forms the drink known as *saloop*. From the young shoots a kind of beer is made; the leaves are used as an admixture in sauces, and for other culinary purposes; the fruit yields a perfumer's oil, and the wood and bark furnish a yellow dye. Oriental S. is *S. Parthenoxylon*, partaking of many of the qualities of the above species. The name S. is also borne by various other trees, thus Orinoco S. is *Nectandra cymbarum* (see PICHURIM BEANS and GREENHEART); Australian S. is *Atherosperma moschata*; Cayenne S. is *Licaria guianensis*, which yields excellent timber; and Swamp S. is *Magnolia glauca* (q. v.).

Sassa'fras Nuts. See PICHURIM BEANS.

Sassan'idæ, a native dynasty which held the throne of Persia from 228 A. D. to 641. Its founder was Ardashir, who defeated Arduan, the last of the Arsacidæ (228), and its last monarch Yezdegerd III., who was finally defeated at Nehavend by the Arabs (641), and murdered when an exile in Khorasan (651). See PERSIA.

Sassa'ri, next to Cagliari, the most important town in the island of Sardinia, is situated in the N.W. part of the island, 12½ miles by rail from its seaport, Porto Torres, on the Gulf of Asinara. It is well built, has a handsome piazza, adorned with a statue of Azuni (1862), the eminent teacher of commercial law, and some fine public buildings, including a large cathedral, a castle (now a barrack), university (1776), with 80 students; town-hall, theatre, and hospital, and beautiful promenades. It has a considerable trade in grain, wine, and olive oil, fruits, wool, and tobacco. Pop. (1877) 33,711. In 1855 S. lost one-third of its inhabitants from cholera within twenty days.

Sasseram' (Sahsram), a town in the district of Shahabad, Bengal, British India, situated beneath the Kymur hills, 72 miles S.E. of Benares, and 60 S. of Arrah. Pop. (1872) 21,023. It was the birthplace of the Afghan Emperor Shere Shah, who expelled the Mogul Humayun, the father of Akbar, from Delhi in 1539. It contains the tomb of Shere Shah's father, and also of Shere Shah himself; the latter is a handsome structure, erected on an island in an artificial lake. There is still a large Mahomedan population at S. The exports are valued at £6000, the imports at £20,000.

Sa'tan. See DEVIL.

Sat'ellites (Lat. *satelles*, 'an attendant'), in astronomy, are the secondary bodies in the solar system, which revolve round the planets. Excepting Mercury and Venus, all the known planets have such attendant orbs. The earth has one, Mars two, Jupiter four, Saturn eight, Uranus four, and Neptune one at least. Some astronomers have suspected one to exist in the case of Venus, but no certain observations are recorded. Probably Uranus and Neptune have both a more numerous retinue of moons; but because of their great distance these are beyond our limits of vision. In the case of these last two planets the motion of the S. round their primaries is retrograde. The various S. are more particularly noticed under MOON and the particular articles upon the planets.

Sat'in (corruption of Chin. *sou-twan*), a familiar kind of silk stuff having a beautifully smooth shining surface, originally brought from China. The glossy surface is owing to the fact that only every fifth, seventh, eighth, or other thread is raised for one shot of the weft. Accordingly four-fifths, six-sevenths, or seven-eighths of the warp are seen on the face of the finished fabrics, which are accordingly known as '5-warp S.,' '7-warp S.,' and so on. Oriental satins were formerly esteemed as the best, but now French stuffs of Lyon *fabrique* surpass all others. Satins called *caffard* and *malicques* are frequently mentioned in inventories belonging to the 15th and 16th centuries; the former stuff was manufactured at Bruges, and the latter at Genoa.

The term *satinet* is applied to an inferior kind of S., and also to a glossy stuff made from cotton and wool.

Sat'in-wood, a name applied to several kinds of ornamental woods derived from different trees grown in tropical regions. It is of a light-yellow colour, hard, curled, and mottled or figured so as to display a satiny lustre when polished. It is employed as a veneering wood for furniture, picture-frames, and in inlaying. The S. brought from India is the product of *Chloroxylon Swietenia*, and that of the Bahama Islands and Guiana is derived from *Ferolia Guianensis*. It is imported in logs 10 feet long by 8 inches square, or thereby.

Sat'ire (Lat. *sátira*, old form *sátira*) is a species of poetry peculiar to the Romans, and in no wise to be confounded with the satyric drama of the Greeks (Gr. *satyros*, Lat. *satyrus*). The term *satira* (root *sat* 'enough') is the feminine of the adjective *satúr*, 'full,' and originally signified, with the substantive *lanx*, 'a dish,' either expressed or understood—a dish made up of a medley of ingredients. Especially it meant a kind of sausage. It was afterwards used to denote a law with many clauses. Finally, it was employed as a general term for a medley resembling farce, and like the Fescennine Verses (q. v.) consisted of sallies of sharp banter and uproarious buffoonery, improvised, on the occasion, without any pretension to regular plot or definite form. The introduction of the legitimate drama by Livius Andronicus (q. v.) and the influence of Greek models soon modified and improved the quality of Roman S. Ennius (q. v.) laid down for himself distinct rules for satiric composition. But the high merit of developing Roman S. and giving to it

new form and direction is due to Lucilius. Unlike the borrowed forms of Roman literature, it had a long and vigorous life. The genius of comedy soon disappeared. The epics of Ennius and Virgil were succeeded by feebleness. Catullus and Horace were Rome's only lyricists. But this native product of Roman genius, strong, keen, and Roman-like in Lucilius, attained unequalled perfection in Horace, whose satires reflect in happy combination the manners, humours, foibles, and vices of the Augustan age. But Horace looked on foibles and vices as things to be ridiculed and reproved, not as dangers to be dreaded and deplored. To him succeeded Persius (q. v.), who with the rigour and moroseness of a Stoic declaimed against the depravity and vices of mankind; while not long afterwards the spirit of S., as if catching fresh fire from the hell of Roman depravity, reappeared in Juvenal (q. v.) with unabated power and the despairing earnestness of righteous ire. Even in Martial (q. v.) its edge continued keen.

During the later centuries of the Roman Empire and the dark ages, S. like many other forms of literature slumbered in Europe. But in the Middle Ages it burst forth into newness of life in France, Italy, Germany, England, and Scotland. The Fablieri, among the *trouvères* of Northern France, are noted for the gaiety of their S. Rutebeuf (q. v.) was the prototype of Voltaire. Walter Map (q. v.) in his *Goliath-poems* is one of the wittiest satirists that England ever produced. Later on, Europe resounded with the fame of Ulrich von Hutten (q. v.), 'the champion of *humanism*,' Erasmus (q. v.), Rabelais (q. v.), Sir David Lyndsay (q. v.), and George Buchanan (q. v.)—all bitter and uncompromising denouncers of the vices of the clergy. The satires of these, however, consisted in the substance—the trenchant invective alone. They were not cast in the Roman mould. Vauquelin (q. v.) founded the school of modern French S. based on the ancient lines. Mottin, Sigogne, Berthelot, Regnier, and Théophile Viaud wrote satirical pieces characterised alike by elegance of diction and impurity of expression. In the 17th and 18th centuries Dryden (q. v.), Butler (q. v.), Dean Swift (q. v.), Andrew Marvel (q. v.), Dr. Edward Young (q. v.), Dr. Johnson (q. v.), Churchill (q. v.), Cowper (q. v.), Walcott (q. v.), alias Peter Pindar, Gifford (q. v.), Arbuthnot (q. v.), and Robert Burns (q. v.), made for themselves a reputation as satirists; while Boileau (q. v.), the 'Juvenal of France,' Voltaire, and many others showed that S. was congenial to the Gallic soil. In Germany the most famous names are those of Hagedorn, Rabener, Sturz, Stolberg, Kästner, Wieland (q. v.), Tieck (q. v.), and Goethe (q. v.). The present century can boast of the names of Beranger (q. v.), Byron (q. v.), James and Horace Smith (q. v.), and Hood (q. v.), in poetry; and Hook (q. v.), Jerrold (q. v.), Thackeray (q. v.), and Carlyle (q. v.) in prose. Among transatlantic names, Lowell (q. v.) and Holmes (q. v.) pre-eminently deserve mention. See Brown's *History of Roman Classical Literature* (Lond. 1853); Sellar's *Roman Poets of the Republic* (Edin. 1863); Thompson's *History of Roman Literature in the Encyclopædia Metropolitana*; Mommsen's *History of Rome*; Niebuhr's *Lectures on Roman History*; and James Hannay's *S. and Satirists* (Lond. 1854).

Sát'pura, a range of mountains in India, running E. and W. across the peninsula for about 600 miles, parallel to the Vindhya, with which it is by some authorities included. It forms the watershed which separates the Nerbudda basin from that of the Godavery, flowing S.E., and the Taptee, flowing W. The highest point is 4454 feet; the general elevation is about 2000.

Sa'traps (Pers. *khshathrapavan*), governors or viceroys of provinces in ancient Persia. Theoretically they were supreme only in civil matters, but on the decline of the Empire many assumed absolute power and independence.

Sat'suma Ware, a fine kind of pottery or semi-porcelain made in Japan, having a felspathic glaze of a light straw colour, the surface of which is covered with a net-work of fine cracks. Red and green colours and dulled gold are employed for decorating S. W., a favourite ornament being the chrysanthemum, and pheasants and other fowls are also frequently introduced. Fine old S. W. is highly esteemed by collectors.

Sat'urn (old form, *Saturnus*, 'god of sowing'), a mythical deified king of Latium, whose reign was the so-called Golden Age. He was god of the corn and fruits of the earth, and was worshipped along with Ops, the goddess of plenty. In his

honour the Italians celebrated annually in December the Saturnalia, a kind of rustic carnival or harvest-home. Latterly he was identified with the Greek god Kronos, the son of Uranus and Ge, the first rulers of the universe. Uranus having thrown some of his sons (the Titans) into Tartarus, Kronos dethroned him, but was himself afterwards displaced by his son Zeus. Kronos is often represented as an old man grasping a sickle. A legend says he emigrated to Italy and reigned there. Possibly this may in part account for his identification with the mythical Latian king.

Sattara, the chief town of the district of the same name, in the Bombay Presidency, British India, situated in the highlands of the Deccan, 115 miles S.E. of Bombay, and 55 S. of Poonah. Pop. (1872) 24,484. It lies in a hollow commanded by a very strong fort, which was captured by the British in 1818.—The district of S., which is bounded W. by the Western Ghats, has an area of 5378 sq. miles. Pop. (1872) 1,116,050. This tract was ethnologically the cradle of the Mahratta race; and the great Sivaji (q. v.) established himself at the fort of S. about 1660. Here his descendants maintained themselves, though with diminished powers, as the nominal leaders of the Mahratta confederacy until 1848. In that year the last Rajah died without issue; and his deathbed adoption was set aside by Lord Dalhousie, the Governor-General of India, in accordance with the then accepted doctrine of lapse. The chief crops are millets, rice, cotton, wheat, sugar-cane, and tobacco. The only manufacture is cotton-weaving. S. suffered severely during the famine of 1877, especially in loss of cattle.

Saturn, the sixth planet in order of distance from the sun, describes in 10,759²/₂₂ days, or a little less than thirty of our years, an orbit whose semi-major axis is 872,137,000 miles, whose eccentricity is .055996, and whose inclination to the plane of the ecliptic is 2° 29' 28". In absolute magnitude S. comes after Jupiter, having an equatorial diameter of 70,150 miles, and a volume 686⁷/₇ times that of the earth. Its mass is only 89⁷/₇ times that of the earth, on account of its inferior density. It rotates very rapidly upon its axis, the length of its day being, according to Professor Hall of Washington, 10 hours 15 minutes. The consequent oblate form is easily recognised with a good telescope. It has eight satellites, the two innermost of which and Hyperon (the seventh) are difficult to observe. The most striking feature, however, of this planet, is the system of rings, which lies nearly in the planet's equatorial plane, and is inclined to the ecliptic at an angle of 28° 10' 22". They were first seen by Galileo, through whose comparatively poor telescope they appeared like two attendant bodies, one on each side of the planet. Huyghens was the first to discover the real annular nature of the appendage; and the close scrutiny of subsequent observers has revealed that there are three distinct rings, two bright and the other dark. The dark ring, which is nearest the planet, has sometimes been seen divided. The distance between the inner edge of the dark ring and the surface of the planet is 10,322 miles; and the entire breadth of the system of rings is 37,570 miles. Regarding the stability of such a material system, Laplace showed that the mass of the ring must be so adjusted that its centre of inertia must *not* be coincident with the planet's centre of inertia—otherwise the equilibrium would be essentially unstable. Bond and Pierce, two American astronomers, took up the same question, and the latter demonstrated that the system, if solid, must be divided into a great number of concentric rings. The whole inquiry was finally settled in a masterly essay contributed by Professor Clerk Maxwell, which gained the Adams' Prize in 1857. In this he proved the physical impossibility of these rings being either continuously solid or continuously liquid; and demonstrated the permanent stability of a ring of discrete bodies. Saturn's rings are, therefore, most probably made up of swarms of meteorites or minute satellites, each revolving independently round the planet.

Saturnalia, an ancient festival celebrated by the Latins in honour of Saturn (q. v.) who taught them agriculture and the arts of civilised life. It fell towards the close of December when the toils of the husbandman were over, and the ingathering of the crops disposed the heart of the rustic to thankfulness and joy. Unrestrained merriment and jollity characterised the harvest home—the simple festival of the national god. Business was suspended, courts were closed, schools kept holiday, the distinctions of rank were reversed, slaves wore the badge of

freedom (*pilleus*), and, arrayed in the vestments of their masters, were served by them at table. All resounded with feasting and revelry and mirth, presents were sent from friend to friend, *Io S.* was shouted through the streets, and sacrifices were offered with uncovered head. No war could be begun, no malefactor punished, while the festival lasted.

During the Commonwealth the whole month of December was dedicated to Saturn, the 19th being set apart for his sacred rites. But when the month was lengthened by two days on the adoption of the Julian Calendar the S. fell on the 17th, a change which produced endless confusion. Augustus therefore ordained that the 17th, 18th, and 19th should be sacred to Saturn in all time coming. Gradually the number of days was extended to seven (*cf.* Mart, *Epigr.* xiv. 72, 2), during which three separate festivals were celebrated: 1st, the S. proper; 2d, the *Opalia*, in honour of Ops, Saturn's wife; 3d, the *Sigillaria*, in which little earthenware figures (*Sigilla*) were sold as toys for children.

Saturnian Verse, the name given to the primitive form of Roman national poetry. As applied to the compositions in rustic measures of the early Italian peoples, S. V. means nothing more than 'early,' 'old-fashioned.' But any notion which we can form of the early Roman literature must of necessity be incomplete. The fragments which remain evince genuine Roman strength. Livius Andronicus (q. v.) translated the *Odyssey* into S. V.—a work which was a school-book in the days of Horace (*see* Hor. *Epist.* II. i. 69–71). The few lines which we possess of his version prove conclusively the great irregularity of the S. V., or rather of the Saturnian metre. Cn. Naevius (q. v.), a writer of original power and undoubted genius, succeeded to Livius. The best known, and withal the most favourable specimen of his style, is to be found in his epitaph:—

'Mortales immortales fieri si foret fas,
Flerent divæ Camenæ Nævium poetam,
Itaque postquam est Orcino traditus thesauro,
Obliiti sunt Romæ loquior Latina lingua.'

S. V. is not a Greek measure as Bentley supposed. That it is found in the verses of Archilochus is accidental. Hermann's view that it is of Etruscan origin is of small account. It is purely a native measure, such as we find in the Norse legends, in the 'Cid,' in the early English ballads, and in the early poetry of all countries.

With regard to the laws of S. V. it is impossible to speak, for when we consider the inscriptionary tablets set up in the Capitol by the *Triumphatores*, the song of the Arval Brothers, and the poetical though semi-prosaic records of the achievements of early Roman heroes, we are constrained to admit that this must have been a metre—if metre it was—of endless variety.

Satyriasis is a symptom of certain forms of mental disease in which there is an ungovernable impulse to acts of venery.

Satyrs, in Greek mythology, personifications of the luxuriant fertility of the vital principle in nature. They attended upon Dionysus, and are represented as grotesque beings of human form, yet in some respects resembling goats, with tails, horses' ears, snub noses, and coarse bristly hair. They are frequently depicted dressed in skins, garlanded with wreaths, and carrying bottles of wine, and they appear in positions indicative of their voluptuous character—drinking wine, dancing with nymphs, sleeping after a debauch, &c. Though not named in Homer, they are often introduced by the poets since Hesiod, and by sculptors, especially Praxiteles. The Semitic *seirim* ('hairy ones') and the Egyptian god Mendes are kindred conceptions.

Sauces are prepared condiments, seasonings, or relishes for various kinds of food, made up of all kinds of spices, condiments, acid vegetable substances, fruits, oils and fats, anchovies, lobsters, oysters, &c. As may be imagined, the variety of preparations from these and other materials is endless. Certain S. in which strong spices prevail are valued for their stimulant heat, others having acid properties exert a solvent influence on animal food, and such as are fatty or contain butter are useful with food in which fat is deficient.

Saucisse (Fr. 'a sausage') or **Saucisson**, in fortification, a bundle of fagots, longer and stouter than fascines, used for supporting earthworks, &c.; also a tube of leather or pitched flax, filled with gunpowder, employed in military mining to explode a charge.

Sauer-Kraut (Ger. 'acid vegetables') is a favourite preparation of cabbages throughout Germany. It is prepared by

cleaning white cabbages, chopping them into small pieces, packing the pieces hard down into a cask, with layers of salt mixed with juniper berries and caraway fruits. The mass quickly begins to ferment, and when the fermentation is complete, the preparation is closely covered over and placed in a cool position for use. S.-K. is usually eaten with animal food, especially pork.

Saugor (*Sagar*), the chief town of the district of the same name, Central Provinces, British India, 109 miles N.W. of Jubbulpur, and 223 S.W. of Allahabad, on the borders of an artificial lake, 4 miles in circumference. It was ceded to the British by the Peishwah in 1818. The fort is a large building, in which the European residents held out for eight months when the Sepoys mutinied in 1857 and all the country was abandoned. There are several fine public buildings, including one of the best High Schools in India. The barracks contain a European regiment and two batteries of artillery. In 1875-76 the registered exports were valued at £47,000; the imports, which included wheat and other food-grains, cotton goods, salt, and sugar, at £166,000. Pop. (1872) 45,665.—S. *district*, which occupies a plateau in the N.W. of the Central Provinces, has an area of 4005 sq. miles; pop. (1872) 527,725. The staple crops are wheat and sugar-cane; the minerals, iron and sandstone.

Saugor (*Sagar*) **Island**, a long strip of land, covering about 220 square miles, at the left side of the mouth of the Hoogly river, in the district of the Twenty-four Pergunnahs, Bengal, British India. It is the scene of a great pilgrimage and fair in the month of May, said to be attended by 200,000 people. The chief ceremony consists of bathing in the sea. A lighthouse, commenced in 1808, stands on the seaward point.

Saul, the son of Kish, of the tribe of Benjamin, was the first of the kings of Israel. After the state of things described in the Book of Judges had continued for a certain time, the tribes of Israel began to realise that they could not maintain their existence as a nation unless they combined and elected a single chief 'to be their supreme judge in times of peace, and their commander in times of war.' A crisis came in the time of Samuel (q. v.) the prophet, when, after having been reduced to a condition of complete subjection by the Philistines on the S. (cf. 1 Sam. xiii. 6, 19, 20), they were threatened by the Ammonites on the E. (1 Sam. xi. 1). S. distinguished himself by leading the people victoriously against the Ammonites, and thinking that he was the man they wanted to lead them against the Philistines, they at once elected him king. After a long reign (forty years, Acts xiii. 21), S. was killed in a battle with the Philistines (1 Sam. xxxi.). His character is interesting and very human. In spite of the 'evil spirit' that often mastered him, there was something genuine both in the man and the king.

Saumarez, James, Baron de, born in St. Peter Port, Guernsey, March 11, 1757, entered the navy at the age of thirteen, served under Sir Peter Parker in the attack on Charles-town in 1776, and was made commander after the engagement between the English and French fleets on April 12, 1782. For his gallant capture of the French frigate *La Reunion*, in 1793, he obtained the honour of knighthood. He was present at the engagement off Cape St. Vincent, and received severe wounds at the battle of the Nile, in which he was second in command. In 1801 he was created a baronet and rear-admiral of the blue, and on July 10th of the same year he defeated off Cadiz a French and Spanish squadron of ten line-of-battle ships and four frigates with a fleet of half the size, causing the enemy a loss of three ships and 3000 men. For this victory he was presented with the freedom of the city of London, gained the Order of the Bath, was thanked by Parliament, and in 1803 was awarded a pension of £1200. In 1809, while in command of the Baltic fleet, he captured two large Russian flotillas. In 1814 S. became admiral, in 1821 he was named vice-admiral of Great Britain, and in 1831 he was raised to the peerage as Baron de S. of Saumarez, in Guernsey. He died in Guernsey, October 9, 1836. See Sir John Ross's *Memoirs of Admiral Lord de S.* (2 vols. 1838).

Saumur, a town of France, department of Maine-et-Loire, on the left bank of the Loire, 32 miles S.E. of Angers by rail. It is a great cavalry station, with large barracks and an important riding-school, has manufactures of rosaries, crucifixes, &c., and carries on a considerable trade in grain, dried fruits, vegetables, and brandy. A well-known white wine is made in the neighbourhood of S. Pop. (1872) 11,028. S. first appears in

history in the 4th c. Pippin built a church in it in the 8th c., but the oldest building now existing is the church of Saint-Pierre, which dates from the 12th c. It was a flourishing city and a stronghold of Protestantism until the revocation of the Edict of Nantes, which ruined its prosperity. During the Vendean rising S. was an important military position, and was the scene of a great victory gained by the insurgents under Laroche-Jaquelein, 10th June 1793.

Saunderson, Nicholas, LL.D., a celebrated mathematician, born in 1682 at Thurleston, Yorkshire. When only a year old he was made blind by an attack of smallpox, but nevertheless was highly educated both in classics and mathematics, the former being taught by word of mouth, the latter by means of a series of ingenious devices arranged for the purpose. For mathematics he had such a great natural aptitude that in 1707, at the age of twenty-five, he delivered a course of lectures on the Newtonian philosophy and Newton's theory of optics at Christ's College, Cambridge. In 1711 he succeeded Whiston as Lucasian professor of mathematics, which post he held until his death on the 19th April 1739. He possessed in an abnormal degree the fineness of sensibility usually peculiar to the blind, and his extraordinary power of grasping the most recondite conceptions of solid geometry remains to this day a psychological problem. His treatise on Algebra, much valued in its time, was published the year after his death, and another treatise on Fluxions in 1756.

Sauria, a name formerly used to denote the crocodiles, alligators, and lizards, in which well-developed scales occur, and in which true teeth are found.

Saurin, Jacques, belonged to a distinguished Protestant family in the S. of France. Born at Nîmes, January 6, 1677, he studied philosophy and theology at Geneva until the revocation of the Edict of Nantes, when he joined the English army, serving under Lord Galway, and afterwards in Piedmont. When the Duke of Savoy had made peace with France he completed his studies, and in 1701 he went to London, where he became pastor of the Walloon Church. In 1705 he removed to the Hague, where he died, 30th December 1730. S. acquired some distinction as a heretic, but has a fairer claim to remembrance as the most eloquent preacher of his time. His published writings comprise twelve volumes of sermons, six of which have been translated into English.

Sauroid Fishes, a name synonymous with *Ganoid* fishes, and applied to them on account of the perfect development of their scales. Examples are the Bony Pike or *Lepidosteus* of N. America, and the Sturgeons.

Sauropsida, one of the primary groups of *Vertebrate* animals represented by reptiles and birds. The two classes are closely connected by structural affinities. *Lungs* constitute the sole breathing organs of the group, no gills being developed. The exoskeleton consists of scales or feathers. The bodies of the vertebra are always well ossified. The skull is joined to the vertebral column by a single *condyle* or articulating process, whilst two such condyles occur in Mammalia (q. v.). The *lower jaw* of S. is compound, each half consisting of several pieces. The lower jaw is further articulated to the skull by means of a special bone, the *quadrate Bone* (q. v.), which in mammalia is represented by the *malleus* of the ear. The 'ankle-joint' of S. is 'situated not between the tibia and astragalus, as in all mammalia, but between the proximal and distal divisions of the tarsus' (Huxley). The *digestive system* of S. ends in a *cloaca*, a chamber common to the efferent ducts of the urinary, digestive, and generative systems. A four-chambered heart exists in some S. (crocodilia and birds), other S. possessing a three-chambered heart only. No complete *diaphragm* separates the thoracic from the abdominal cavity. The *Wolffian bodies* of the embryo S. are replaced by true *kidneys*, as in mammalia, and the *cerebral hemispheres* are never united by a *corpus callosum* or connecting band of nervous tissue. An *amnion* and *allantois* are developed in the embryo, but no *mammary glands* are developed in the S. In their *reproduction* the S. are invariably oviparous, or egg-producing. Some few are *ovo-viviparous*, i.e. retain the eggs within their bodies until the young are hatched. See ORNITHOLOGY and REPTILES.

Sau'sages are preparations of various kinds of meat, such as pork, chicken and ham, or beef chopped up small, mixed with

flour or bread-crumbs, spiced and filled into gut skins. They are cooked for use either by frying, stewing, or boiling. As S. are very highly spiced, and form a favourite food with the humbler classes, inferior and unsound pork, beef, horse-tongues, and hind-quarters of horses from the knackers' yards are used in their preparation, and cases of poisoning have been known to arise. S. bought in large towns, therefore, cannot be depended upon. During the Franco-Prussian War in 1870, a kind of pea-sausage (*Erbstwurf*) was much eaten by the German troops. It was composed of fat pork, pea-flour, and salt, and was easily cooked or made into soup; but it tended to produce flatulence and diarrhoea, and men quickly tired of it.

Saussure, Horace Benoît de, a Swiss naturalist and physicist, was born at Conches, near Geneva, February 17, 1740. At the early age of twenty-two he was appointed to the chair of physics and philosophy in Geneva University. Six years later he began his scientific travels, amassing most valuable observations on the structure and composition of rocks, on the motion of glaciers, and on various meteorological phenomena. He crossed the Alps fourteen times by eight different routes, ascended Mont Blanc in 1787—a feat previously performed only by two others (Balmat and Paccard) in 1786—and Monte Rosa in 1789. He also travelled through France and Italy, and visited England and Germany. Not only, however, was S. a great geologist and naturalist, he was one of the first physicists of his time. The instruments he used were improved or modified by himself, and a hygrometer still goes by his name. In 1786 he resigned his chair, and in 1798 was nominated professor of natural history in the central school of the department of Léman, formed at that time by the union of Geneva with France. S. died January 22, 1799. He was the author of various short but valuable essays on electricity, on water, on hygrometry, &c., besides many memoirs on allied subjects in the *Journal de Physique*, the *Journal de Paris*, and other scientific journals. His great work is his *Voyages dans les Alpes* (Neuch. and Gen. 1779-96; new ed. 1853). See Senebier, *Mémoire sur la Vie et les Ecrits de S.* (Gen. 1801).—His son, **Nicolas Théodore de S.**, was born at Geneva, October 14, 1767, and was professor of mineralogy and geology in the university of that city till his death, April 18, 1845. His work, *Récherches chimiques sur la Végetation* (1804), was an important contribution to the chemistry of plants, at that time quite a new field of investigation.

Sauternes is the name of a class of French white wines produced in the Gironde district. The grapes from which S. is made are allowed to become dead ripe before they are collected. The principal growths of S. are Barsacs, Sauternes, and Bommes, and the Château Yquem S. is one of the finest wines grown in France. Recently a sparkling S. has been introduced, prepared according to the champagne method.

Savage, James, LL.D., historian and politician, was born at Boston, Massachusetts, July 13, 1784. Graduating at Harvard in 1803, he commenced his law studies in 1807, and subsequently sat in both houses of the Massachusetts legislature, besides filling several municipal posts at Boston. He was for some years the president of the Massachusetts Historical Society, editing several volumes of their *Collections*, and publishing from the original manuscript Wynthrop's *History of New England* (1825-26). He also edited Paley's *Works* (5 vols. 1828), contributed various articles historical and political to the *North American Review* and the *New England Magazine*, and wrote a number of pamphlets. His most important work is a *Genealogical Dictionary of the First Settlers of New England, showing Three Generations of those who came before May, 1692* (4 vols. 1862-64), a work which, though deficient in plan and execution, is of great value, and displays much research. S. died at Boston, March 8, 1873.

Savage, Richard, born in London, January 10, 1698, was the illegitimate and disowned son of Anne, Countess of Macclesfield, and Richard S., Lord Rivers. Lady Mason, the Countess's mother, sent the boy to school at St. Alban's, and from school he went to the shoemaker's bench till the age of seventeen, bearing the name of Smith. On the discovery of his parentage, Steele, Mrs. Oldfield, and others encouraged him in his attempts as a playwright, and in 1723 he acted in his own *Sir Thomas Overbury*, and gained £200. The publication of a volume of *Miscellanies*, not all by his own hand, increased his reputation and his

means, but habits of dissipation ruined him, and in 1727 he was condemned to death for the murder of a man in a drunken brawl. At the entreaty of the Countess of Hertford, Queen Caroline pardoned him, and no sooner had he escaped from prison than he bitterly attacked his unnatural mother in a poem entitled *The Bastard*. Lord Tyrconnel, his relative, then received him into his house, and allowed him a pension of £200. In 1729 his *Wanderer*, a moral poem, was published. For several years he led a life of pleasure, until a quarrel with Lord Tyrconnel and the death of the queen deprived him of all means of continuing his vicious indulgences. Pope and others kept him for some time at Swansea on an allowance of £50 yearly; but, tired of such solitude, the wretched poet in 1743 started for London with a new play in his pocket. At Bristol he gave way to excesses; he was arrested for a debt of £8, died in jail (July 31), and was buried at the expense of the jailer. His *Collected Works* were published at London in 2 vols. 1775. See Johnson's *Life of S.* (Lond. 1744), in which the reader is taught to pity while condemning a poet who, amid gentler influences, might have left a name for something else than vice.

Savann'ah, or **Savanna's** (Span. *savana, sabana*, 'a sheet'), a tract of grassy plain-land, destitute of trees, yielding pasturage in the rainy season, and sometimes covered with a growth of under-shrubs. Savannas are found in the southern states of N. America, and in the interior of S. Africa.

Savann'ah, the boundary river between Georgia and S. Carolina, U.S., is formed by the junction of the Tugalo and Keowee, flows S.E. for 450 miles, and falls at Tybee Roads into the Atlantic. Its drainage area is 8000 sq. miles. It is navigable to the city of S. for vessels drawing 18 feet of water, and by small vessels to Augusta, 231 miles from its mouth. The tide ascends 45 miles, and at S. its mean rise and fall is 6½ inches. Improvements are now (1878) in progress to secure a channel of 22 feet depth from its mouth to S. city.

Savann'ah, the principal city of Georgia, and the second cotton-port of the U.S., is situated on the right bank of the S. river, 18 miles from its mouth and 90 miles S.W. of Charleston by rail. It is the terminus of three important railways, and its harbour has a depth of 26 feet at high and 19 feet at low water. The town is handsomely built. Its chief public buildings are the custom-house and post-office, exchange, police-barracks, theatre, and market. It has thirty churches, an infirmary, three hospitals, and several benevolent and social societies. Three daily and two weekly newspapers are published, one of the latter in German. The principal industrial establishments are a cotton factory, five cotton-presses, a paper-mill, a flour-mill, six iron and brass foundries, and five waggon and carriage factories. S. exported in 1877, 434,830 bales of cotton, 298,546 being to foreign ports; 20,533 casks of rice; 98,713 barrels of rosin and 17,977 of spirits; 469,708 cubic feet of timber, and 16,844 metric feet of lumber; while her imports included 2,286,422 lbs. of coffee, valued at \$405,601; 8,427,495 lbs. of salt, valued at \$15,287; guano to the value of \$22,595; molasses, \$22,044; and silver coin to the value of \$29,335. In the same year there entered the harbour 637 vessels of 496,416 tons, and cleared 611 of 487,091 tons; and of the entrances 54 of 51,297 tons were American, 264 of 160,877 tons were foreign, and 319 of 284,242 coastwise; and of the clearances 61 of 41,863 were American, 183 of 105,150 foreign, and 367 of 340,078 coastwise; of British vessels in the direct trade from and to Great Britain and the British Colonies there entered in the same year 85 of 64,648 tons, with cargoes valued at £12,710, and cleared 47 of 33,824 tons, with cargoes estimated at £992,502; while in the indirect or carrying trade in British vessels to and from other countries, there entered 38 vessels of 23,883 tons, and cleared 57 of 42,840 tons, with cargoes worth £336,106. Pop. (1876) estimated at 30,000.

Savary, Anne Jean Marie René, Duc de Rovigo, born at Marcq, near Vouziers, in France, April 26, 1774, was educated at the college of Metz, entered the army at the age of fifteen, and four years later was made a captain. He served under Pichegru on the Moselle, under Desaix in Egypt, and then became aide-de-camp to Bonaparte, who made him successively colonel, brigadier-general, and director of the secret police (1802). He discovered the conspiracy of Cadoudal, and superintended the execution of the Duc d'Enghien. At Austerlitz he

distinguished himself as a general of division; during the Prussian campaign of 1806 he commanded ten regiments of the imperial guard, and while protecting Warsaw against the Russians after the battle of Eylau he gained the splendid victory of Ostrolenka (February 16, 1807), for which he received a pension of 20,000 francs. For his services in the battles of Heilsberg and Friedland the emperor created him Duc de Kovigo. Sent in 1808 into Spain to supersede Murat, he negotiated the arrangement by which the Spanish king and his son were brought within the clutches of Napoleon at Bayonne. In 1810 he took the post of Fouché as minister of police. During the Hundred Days he was made a peer of France, but after Waterloo was confined in Malta for seven months by the British Government. Having made his escape he was landed at Smyrna, and returned to France in 1818. In 1819 he obtained his former rank, but without being called to active service. On December 1, 1831, Louis Philippe appointed him governor of Algiers. He died at Paris, June 2, 1833. S.'s *Memoires* (8 vols. 1828; Eng. trans. 4 vols. 1828) exhibit the blindest devotion to Napoleon, but are possessed of extreme interest.

Sa'vo, an important tributary of the Danube, formed by two streams, the one rising N. and the other S. of Mount Terglou in Carniola. They unite at Radmannsdorf, and the river then flows S.E. through Carniola, Styria, and Croatia, passing Laibach and Agram, and receiving on the right the Laibach, Kuipa, Unna, Urbas, Bósna, and Drina, the last the boundary river between Bosnia and Servia. For 220 miles, *i.e.*, from its receiving the Unna to its joining the Danube at Belgrade, the S. separates the Austrian military frontier from Bosnia and Servia. At its mouth it is 2132 feet wide. Its total length is 442 miles.

Saveloy (said to be a corruption of Savoy), a species of sausage made of chopped and seasoned meat, and sold in a cooked condition ready for eating.

Saviglia'no, a town of N. Italy, province of Cuneo, on the Macra, 10 miles E. of Saluzzo by rail, has several interesting churches, the principal that of Sant' Andrea of the 11th c. The surrounding district produces abundant wheat, maize, fruits, and silk. Pop. (1874) 16,150.

Savigny, Friedrich Karl von, one of the greatest juristic authors of the 19th c., belonged to a French Huguenot family that had settled in Germany. Born at Frankfurt, February 21, 1779, he studied at the University of Marburg, where he held the chair of civil law from 1801 to 1804. Here he produced his masterly exposition of the Roman law of possession, *Das Recht des Besitzes* (1803), and after some years of travel in France and Germany he was appointed professor of law in the University of Landshut (1808), and two years afterwards was called to Berlin. In 1811 he became a member of the Prussian academy of science, entered in council of state in 1817, was appointed minister of justice for the revision of the law in 1842; and in 1848 retired from public life. After a brilliant professional career of nearly forty years, S. died October 25, 1861. He is, if not exactly the first, by far the greatest of the founders of the historic school of jurisprudence—a school which has raised law from a superstition to a science. His chief works are *Vom Berufe unserer Zeit für Gesetzgebung und Rechtswissenschaft* (1815; Eng. trans. Lond. 1831), *Geschichte des Römischen Rechts im Mittelalter* (6 vols. 1826-31; partly trans. into Eng. by Cathcart, Edin. 1829), *System des heutigen Römischen Rechts* (8 vols. 1840-48), *Das Obligationenrecht* (1851-53), and *Vermischte Schriften* (5 vols. 1850). See Rudorff, *Erinnerung an S.* (Weim. 1862), and a Biography by Bethmann-Hollweg (1867).—**Karl Friedrich von S.**, son of the preceding, born 1816, served from 1836 in the diplomatic service of Prussia, and was an influential member of the Reichstage from 1868. He died 11th February 1875.

Sav'ile, Sir Henry, was born at Over Bradley, near Halifax, Yorkshire, November 30, 1549. He studied at Brasenose College, Oxford, and afterwards at Merton College, where he graduated in 1570, and was elected fellow. In 1578 he made a tour on the Continent, and on his return became Greek and mathematical tutor to Queen Elizabeth. In 1596 he was chosen provost of Eton, and in 1604 was knighted by James I. He was warden of Merton College from 1585 to his death, which took place February 19, 1622. His fortune he devoted to the

advancement of learning, founding in 1619 two professorships (in geometry and astronomy) at Oxford, known as the Savilian professorships. His chief works are *Rerum Anglicarum Scriptores post Bedam præcipui* (1596), a folio containing the works of William of Malmesbury, Henry of Huntingdon, Roger Hoveden, &c., *Commentarii de Militia Romana* (1598), and *Prælectiones tractatum in Elementa Euclidis* (1621). He also translated *Four Bookes of the Histories of Cornelius Tacitus* and *The Life of Agricola* (1581), published a magnificent edition of the complete works of St. Chrysostom in Greek (8 vols. 1613), and edited Bradwardin's *De Causa Dei* (1618).

Savin, a name given to *Juniperus Sabini*, a native of Central Italy and other parts of S. Europe, and of W. Asia. It differs from the Juniper (q. v.) in having leaves only half as long, more spreading, and of a different colour; the fruit also is smaller. The twigs and foliage have a strong odour, and an acid, bitter, resinous, and disagreeable taste. From them the oil of S. is distilled,—a volatile oil, either colourless or of a pale yellow tinge, upon which the medicinal properties of the plant depend. S. is administered as an emmenagogue, but being poisonous its use demands caution. An ointment of S. made with yellow wax and lard is employed as an irritant to keep up discharges from a blistered surface. S. has been cultivated in Britain for upwards of 300 years. *J. Virginiana*, the American S. or Red Cedar, is a large handsome tree supplying a fragrant timber esteemed for its strength and durability. It yields less volatile oil than the true S.

Savings' Banks, institutions for the deposit of small sums of money, and their accumulation at compound interest, with provision for repayment at short notice. These institutions, so valuable to the poorer classes of the community, are altogether the growth of the last hundred years. The S. B. founded at Hamburg in 1778, and another in Bern in 1787, were wanting in the popular and attractive features of those which subsequently sprang into existence in this country. Francis Masseres proposed in 1771 to invest the ratepayers of any parish with powers to receive and invest savings, and to grant deferred annuities; but a bill to this effect failed to pass through Parliament. The first practical attempts were on a small and tentative scale. A children's bank was started by Mrs. Priscilla Wakefield at Tottenham in 1798. The Rev. J. Smith of Andover, Bucks, along with two friends, agreed in 1799 to receive small sums from his parishioners during the summer, to be returned with one-third bounty at Christmas, a liberal offer which was of course eagerly embraced. The title of 'Father of S. B.' has been given, however, to the Rev. H. Duncan of Ruthwell, Dumfriesshire, who established a savings' bank in 1810 on so successful a basis that in four years it possessed an accumulated fund of £1160. Edinburgh, Bath, Southampton, and Exeter were among the first places to follow the good example, and in the course of a few years imitative institutions were spread all over the country. Acts to encourage the establishment of S. B. in England and Ireland were passed in the year 1817, and empowered the managers to pay the deposits (when they reached £50) into the Bank of England to the credit account of the Commissioners for the reduction of the National Debt, a rate of interest equal to 3d. per day, or £4, 11s. 3d., being given thereupon. The S. B. usually gave 4 per cent. interest to depositors, reserving the difference for expenses of management, and this high rate became an inducement to parties, for whom the institutions were not intended, to open large accounts as simple and productive investments. A new law was accordingly passed in 1824 limiting the amount of deposits to £50 in the first year, and £30 in each subsequent year; £200, including interest, being the largest amount which any deposit was to be permitted to accumulate to. An Act in 1828 required the rules of every savings' bank to be deposited with the clerk of the peace, submitted to a barrister appointed by the National Debt Commissioners, and laid before the justices of the peace. In 1833 power was given to S. B. to grant deferred annuities of small amounts, and in 1835 the statutes of 1828 and 1833 were extended to Scotland, which had previously been omitted from S. B. legislation. Although the rate of interest given by the Commissioners had been reduced in 1828 to 2½d. per day, or £3, 16s. 0½d. per annum, the amount paid in this way by them from 1817 to 1843 resulted in a national loss of over £2,000,000, which induced the further reduction to £3, 5s. in 1844, £3, 10d. being the highest

amount to be paid to depositors. In the same year the responsibilities of depositors on the one hand, and trustees, managers, and actuaries were more clearly defined. The institutions were for the most part conducted in the most honourable manner, considering the opportunities for fraud which existed, but some very disgraceful exceptions to this rule occurred, culminating in the Rochdale Fraud of 1849, when, upon the death of George Howarth, the actuary, a deficiency was discovered amounting to £71,717. The result was that the Government regulations as to book-keeping and audit were more rigidly enforced. S. B. on the old system (*i.e.*, apart from the Post-Office S. B. afterwards alluded to) are now established, with the approval of the barrister appointed by the National Debt Commissioners. The founders elect and duly register the names of the trustees and managers, who are not allowed to receive any remuneration, while the paid officers must give security for their intrusions. The treasurer is not allowed to retain more money than is necessary for current purposes. With these stipulations, and the efficient checks insisted on, the risk of fraud is reduced to a minimum. At the close of the year 1876, 466 'Old S. B.' were in existence in the United Kingdom. See J. Tidd Pratt's *History of S. B.* (1842), and Scratchley's *Practical Treatise on S. B.* (1860).

Although so long ago as 1806 Mr. Whitbread had mooted the scheme of a national Post-Office S. B., it is only within the last twenty years that the development of the system has assumed practical shape. In the year 1859, Mr. Sikes, of the Huddersfield Banking Company, read a paper on the subject at the meeting of the Social Science Congress at Bradford, and a plan based upon his proposals was carried through Parliament by Mr. Gladstone in 1861, and came into operation on the 17th of September of that year. 1629 Post-Office S. B. had been established in England before the 31st December 1861, and in 1862 the Act was extended to Scotland and Ireland. Deposits of 1s., or any number of shillings, are received to the limit of £30 in one year. No further deposit can be made after an account reaches £150, and the account continues to bear interest until it accumulates to £200, when interest ceases. Most people will be of Mr. Gladstone's opinion (expressed in a note to the writer of this article), that the Post-Office S. B. are 'at present unfairly weighted with these limits entirely out of a consideration for the Old S. B., to which the latter have no claim.' The rate of interest is £2, 10s. per annum, complete pounds only being taken into account. The number of Post-Office S. B. in the United Kingdom on 31st December 1876 was 5448. The regulations of these institutions will be found at length in the *British Postal Guide*, a quarterly publication.

The Old S. B. and the Post-Office S. B. have continued to work harmoniously together, and each system appears to offer special advantages on certain points. The rate of interest given by the old banks is usually (sometimes considerably) more than that given by the Post-Office banks, and is given on fractions as well as complete pounds. Withdrawal of deposits can be made at once from the old banks if the amount be small, while in the case of the Post-Office application must be made to the Postmaster-General, who sends an authority to the bank where the account lies. On the other hand, while most of the old banks are only open during certain days in the week, the Post-Office banks are open every day, and the security offered by them must be looked upon as practically more perfect.

A useful outcome of the S. B. system has been the establishment of *Penny Banks*, where a single penny can be deposited. These humble institutions, set in motion by parochial authorities, schools, &c., have been useful and successful in their work among the poorest sections of the community.

S. B. are established for the army in connection with every regimental pay department, for setting aside a portion of the soldier's pay at his discretion at a definite rate of interest, and for the sailors of the Royal Navy in connection with the Admiralty. For the receipt of the savings of seamen of the mercantile marine there is a central office in London, with branches at the chief outports. The statistics of these institutions are unimportant and somewhat misleading, as many soldiers and sailors invest their savings in the ordinary banks.

Statistics.—(1) *Old S. B.*—The following table shows the number of depositors and amounts deposited in each year, at

intervals of five years from the passing of the first Act regarding S. B. in 1817.

Year.	No. of Depositors.	Amount Deposited.
1817	9291*	£231,028
1822	204,584*	6,546,690
1827	395,000*	14,188,708
1832	440,861	14,416,885
1837	636,339	19,711,797
1842	857,086	25,406,642
1847	1,096,086	30,236,632
1852	1,209,934	31,912,413
1857	1,366,560	35,255,722
1862	1,558,189	40,809,578
1867	1,385,782	36,792,912
1872	1,463,560	40,000,462

* Partly estimated.

The number and amount of accounts open in the Old S. B. in the different parts of the United Kingdom on 20th November 1876 were as follows:—

	No. of Accounts.	Amount owing to Depositors.
England and Wales	1,153,119	£34,918,077
Scotland	260,810	5,697,649
Ireland	56,849	2,178,266
Islands	22,623	489,706
	1,493,401	£43,283,698

Under the provisions of 26 Vict. c. 14, 191 ordinary S. B. had closed up to 20th November 1876, and transferred accounts to Post-Office S. B. to the extent of £2,602,371.

(2) *Post-Office S. B.*—The number and amount of accounts open in the Post-Office S. B., on 31st December 1865, 1871, and 1876 is as follows:—

	No. of Post-Office Savings Banks.	No. of Accounts.	Amount owing to Depositors.
31st Dec. 1865	3321	611,384	£6,526,400
31st Dec. 1871	4335	1,301,492	17,025,004
31st Dec. 1876	5448	1,702,347	26,996,550

Foreign S. B.—The first savings bank in France was organised on the English model in 1818. In that country S. B. are under the surveillance of the State, and their funds are deposited in the *Caisse des Dépôts et Consignations*, the interest being paid by the public treasury. In 1870 the amount deposited in French S. B. was £28,800,000, which fell after the war to £20,600,000, but it has lately increased with extraordinary rapidity, being stated to be no less than £32,000,000 in 1876. The increase is partly attributed to the great development of school S. B. all over the country. Under powers granted by a legislative enactment passed in 1876, the old-established S. B. were making use of 300 post-offices for their operations. In Switzerland and Belgium S. B. have been very successful. In Switzerland in 1874 the deposits were estimated at £11,000,000; while in Belgium, where since 1870 S. B. have been established at the post-offices without any arrangements, however, for cross transactions, the progress has been most marked. In Austria, Germany, Italy, Sweden, and even in Russia, S. B. have become popular institutions. The Postal Receiving Houses of Berlin are now used for savings bank business. In Holland, on 1st May 1876, 1255 post-offices were placed at the disposal of the private S. B. In Italy a complete system of post-office S. B. on the English basis, with arrangements for cross transactions, was established in 1875. The number of such banks in February 1876 was 2144. Throughout Europe the deposits in 1874 were estimated at £236,000,000. The first savings bank in America was established at Philadelphia in 1816. The deposits in the United States, at the end of 1874, so far as could be ascertained from available statistics, were \$348,292,894, but the real amount was probably not less than \$1,000,000,000. The interest given in America is usually 6 per cent., but sometimes reaches 8 or 9 per cent. On July 1, 1877, the deposits in the New York S. B. amounted to \$181,267,019.

Savo'na, a seaport of N. Italy, province of Genoa, on the Riviera, 20 miles S.W. of the city of Genoa by rail. It is beautifully situated among lemon and orange gardens, has a cathe-

dral (1604) with some good pictures, and a theatre (1853) dedicated to the poet Chiabrera, who was a native of the place. A line of rail from the main station to the harbour was opened in April 1877. S. carries on an active trade in olives, fruits, grain, wood, and wines. In 1876 there entered the port 72 British vessels of 44,187 tons. In the same year the total import of coal amounted to 70,000 tons, and there were also some imports of iron for the local foundries. S. has also an extensive manufacture of pottery. It was the birthplace of Popes Sixtus IV. and Julius II. Pop. (1876) 26,024.

Savonarola, Girolamo, an illustrious Italian preacher and politician, born at Ferrara, September 21, 1452, was educated in his earlier years for the medical profession, but at the age of seventeen entered a Dominican monastery at Bologna, and after a course of theological studies was sent to Florence, there to deliver lectures to the novices, and to preach. But his voice was harsh, his manner was stiff, and his matter so little adapted to a common audience that hearers deserted him, and he retired in mortification from Florence. At Brescia he gave himself to the exposition of Scripture among the members of his own order, and one day having spoken at a Dominican chapter held at Reggio, he so impressed young Pico della Mirandola, that this gay courtier constrained Lorenzo de' Medici to recall the *frate* to Florence. In 1489 he returned to the convent of San Marco, and ere long his voice was once more raised in its pulpit. Already he was the mystic and the reformer; in his retirement he had been delivering strange political lectures on the Apocalypse; and in his first sermon in Florence he taught—(1) that the Church of God required renewal, and that immediately; (2) that all Italy should be chastised; (3) that this should come to pass soon. This was the fitting preface to his life's work. He was the patriot even before the priest. In Florence he found an epitome of Italy. There he saw genius rioting with sin, the noblest art and the foulest morals; a revival of learning, but the death of freedom; and he determined to make Florence a New Jerusalem, from which should go forth another gospel—the gospel of Italy's salvation. He became, therefore, the great rival of the despot Lorenzo de' Medici: the one strove to inflame the spirit of the Florentines, the other strove to enchain their senses. For a while S. appeared to conquer. The noblest men joined his sect of Weepers—*Piagnoni*; much of the most beautiful and most licentious in the new art and literature was brought to his feet and reduced to ashes; women and even children crowded the entrance to his chapel at midnight, when it was known he would preach on the following day. His burning enthusiasm might have produced a reformation had reason continued to regulate it; but he fell from the stern moralist into the political demagogue, and incurred the suspicion of his own supporters, by professing to work miracles, and claiming supernatural protection which a public trial did not substantiate. Once, at least, he saved the city from ruin—in the anarchy consequent on the banishment of Piero de' Medici. He organised the Great Council, and thus bridled the desires of those individuals bent on their own aggrandisement. He protected the citizens by establishing the right of appeal to the Signory. He also brought about a truce between all factions. He was the one man in Florence who could have accomplished this. But his own extravagant pretensions worked him more harm than the plotting of enemies. In 1495 he was summoned to Rome as a heretic, and failing to appear, was forbidden to preach. Two years after this a sentence of excommunication was passed on him. Still he continued to defy the powers of both Pope and Medici; but the partisans of the latter, the Arrabbiati, gained the ascendancy in 1498, and had him tried for misleading the citizens by false prophecies. He is said to have made a partial confession of guilt; but the authority for this assertion is not strong. More probably he had deceived himself as well as the populace. Judgment was given against him (by his enemies) as a seditious heretic. Rome approved the sentence, and on the 23d of May 1498, he and two disciples, Domenico da Pescia and Silvestro Maruffi, were executed and burned. The testimony of the earliest and the most recent historians shows S. to have been a man of the noblest aims and the most saintly life. There is no passage in history more interesting than that in which this eager, impassioned, uncouth priest is seen wrestling in a brilliant court with a brilliant prince, who is backed by such powers and such genius as gold never before gathered together.

It was the fiercest combat that ever the spirit and the flesh fought; and in spite of apocalyptic extravagancies that fatally misled S., the sympathies of men are with him and not with the lettered heathens of Florence. He wrote both in Latin and Italian, and his chief works are—*Compendium Logice* (Pisa, 1492); *De Divisione Omnium Scientiarum*; *Tractato circa el Reggimento e Governo della Città di Firenze*; *La Examina del Peccati d'ogni Peccatore* (Flor. 1495); *Trattati due diversi dell' Orazione* (1495); *De Simplicitate Vitæ Christianæ* (1495); *Della Vita Viduale* (1496); *Compendio di Revelatione* (1495-96); *Revelatio de Tribulationibus nostrorum Temporum* (Par. 1496); *Triumphus Crucis de Veritate Fidei* (Flor. 1497); *Solatium Itineris mei, Dialogus* (Venice, 1528). A collection of S.'s works, chiefly those of a philosophic and ascetic kind, was published at Lyon (6 vols. 1633-40). See the faithful narrative of S.'s friend, Burlamacchi's *Vita di G. S.* (Flor. 1764); Madden's *Life of S.* (2 vols. 1854); Rever's *I Piagnoni e gli Arrabbiati al Tempo de S.* (2 vols. Milan, 1843); Trollope's *History of the Commonwealth of Florence* (4th vol. 1865); and more especially Perrens' *Herbme Savonarole, sa vie, ses Predications, ses Ecrits* (Par. 2 vols. 1853; 3d ed. 1859), and Pasquale Villari's *Storia di S.* (Flor. 2 vols. 1859; Eng. trans. by Horner, 1863).

Savory (*Satureja*) is a genus of *Labiata*, of which two species—*S. montana* and *S. hortensis*—have long been appreciated as aromatic herbs. Both are natives of countries around the Mediterranean, and were in use amongst the Romans. The first, a perennial herb, commonly called Winter S., is cultivated in kitchen gardens for its tender tops, as a seasoning for soups and made dishes, and for boiling with pease, beans, &c.; but it is surpassed in agreeable fragrance by the second, an annual species, known as Summer S. Another Mediterranean species named *S. Thymbra* has a thyme-like flavour.

Savoy, one of the numerous forms of the cabbage (*Brassica oleracea*), to which the name *bullata major* has been given. Except in its wrinkled leaves, it resembles the common cabbage. It is chiefly used in winter after being mellowed by frost.

Savoy (Ital. *Savoja*, Fr. *Savoie*), the cradle of the Italian monarchy, is a mountainous region, occupied in the E. by the Graian, in the N.E. by the Pennine, in the W. by the Cottian Alps, and watered by the Isère, Arve, and Arcq. At the Peace of Villafranca, July 11, 1860, it was transferred by a 'plebiscite' to France, and now forms the departments of *Savoie Haute* (q. v.) and *Savoie Basse* (q. v.). The Savoyards, who are noted for their industry, thriftiness, and honesty, annually leave their native valleys in great numbers to earn a livelihood in richer lands, but never permanently emigrate.

S., originally belonging to Gaul, became part of the first kingdom of the Burgundians in 435, of the Frankish kingdom in 534, of the kingdom of Arles (the second kingdom of the Burgundians) in 879, and passed with it to Germany in 1038. The lords of S. were vassals of the empire. The founder of the House of S. was Count Humberto, who died in 1048. Under Amadeo I. (died 1072), Susa, Aosta, and Turin were acquired. In 1111 the possessions of the House were made an imperial county. Count Tommaso I. (died 1233) added to these the town of Chambéry and the country of Vaud. Amadeo III. (died 1253) became Duke of Chablais and Aosta. In 1416 S. itself was made a duchy of the empire by Sigismund, and its ruler, Amadeo VIII. (see AMADEUS), was chosen regent of Piedmont on the extinction of the native line. His son Luigi (died 1465) married Annas of Lusignan, daughter of Joannes II., King of Cyprus. In 1485 Queen Charlotte of Cyprus declared Carlo (died 1489) her heir, and ever since the rulers of S. have borne the titles of Kings of Cyprus and Jerusalem. The reign of Carlo III. (died 1553) was most disastrous. He lost the Valais and Geneva (1533), the country of Vaud (1536), and two years later the rest of his possessions was divided between the Emperor and the King of France. But in 1564 the duchy was restored to Filiberto Emanuele. In 1576 the Principality of Oneglia and the county of Tenda were acquired. But later on Carlo Emanuele I. (died 1630) was compelled to surrender Pignerol and other strongholds to the French. His sons were Vittorio Amadeo I. (died 1637), and Tommaso, founder of the line of Savoy-Carignan. In 1720, under Vittorio Amadeo (q. v.), the Dukes of S. became Kings of Sardinia, which continued to be the title of the house till March 1861, when

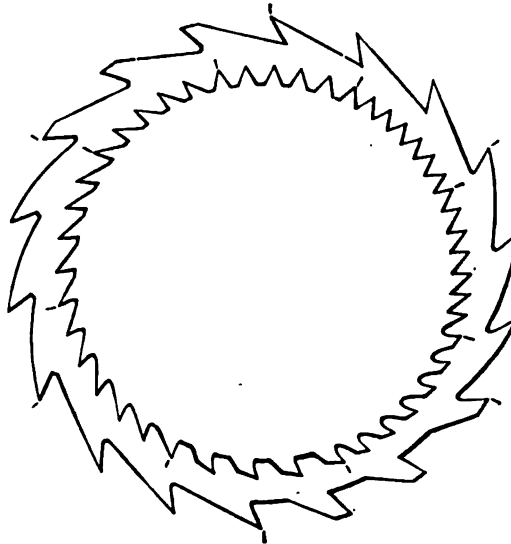
it was exchanged for the grander title of Kings of Italy. See Cibrario, *Storia dell' Monarchia de Savoia* (3 vols. 1840-47).

Savoy, The, a district off the Strand, London. The Palace of the S. was built in 1245 by Peter, Earl of S. and Richmond. It afterwards came into the possession of John of Gaunt, and in it King John of France was confined after his capture by the Black Prince at the battle of Poitiers (1356). It was burnt in Wat Tyler's Insurrection (1381), and was not rebuilt till the close of the reign of Henry VII., when it became an hospital 'to harbour 100 poor people' (1505). In the reign of Edward VI. this establishment was suppressed, but was revived in the reign of Mary. Under Elizabeth the S. became a parish, with the chapel of the palace as its parish church. The hospital existed until the reign of Anne, when it was finally suppressed, and the palace fell into ruins. All remains of it, except the chapel of the S., were swept away when Waterloo Bridge was commenced in 1811. The chapel was burnt down in 1864, but was restored at the expense of the Queen, and reopened in 1865.

Savoy Conference.—On the Restoration of Charles II., 1660, the Church of England was immediately restored to her former position. But as the moderate Puritans had no inconsiderable share in bringing the king back, they were at first treated with much courtesy. Charles repeatedly declared that he desired all good men and loyal subjects should be included in the National Church. Accordingly a conference was arranged in 1661, ostensibly to effect a compromise between the Puritans, now called Presbyterians, and the Church party. Twelve bishops and nine other clergymen were summoned to meet the same number of Presbyterian clergymen in the Savoy Palace, from which their meeting has got the name of the S. C. The leader on the one side was Sheldon, Bishop of London, and on the other, Richard Baxter. An attempt was made to revise the Book of Common Prayer, but it was left upon the whole more objectionable to the Presbyterians than before. After four months' argumentation the conference broke up, having done nothing but embittered the differences between the two parties: and next year the Act of Uniformity (q. v.) was passed. See Burnet's *Hist. of his Own Time*. Messrs. Macmillan & Co. are about to issue *The Memorials of the S.* (September 1878).

Saw, an instrument consisting of a blade, band, or disc of thin steel, with a serrated or indented edge, used for cutting wood. The S. is an implement of great antiquity—a kind being found among flint implements; and it is the most important and useful of all wood-working machinery. Saws may be divided into two classes,—hand-tools and machine-tools. The most common are the hand-saws, of which there are many varieties, according to the class of wood and the kind of work for which they are employed. The common hand-S., used for cutting pine and similar soft wood, is a long blade broader at one end than at the other, and having a wooden handle secured to the broad end. For ripping or longitudinal cutting it is made larger, with deeper-cut and finer-set teeth than for cross-cutting. The compass- or post-S. has a narrow blade tapering to a fine point, which is used for entering and cutting small holes. The tenon-S. has a very thin oblong blade, with fine small teeth, and its back is strengthened with a band of brass or iron. The bow-S. consists of a narrow steel ribbon attached at both ends to a frame of wood, and kept in position by tension applied to the frame, and the fret-S. is a ribbon similarly mounted in a metal frame. Two-handled saws are large heavy blades, with deep teeth variously cut and set, used for felling timber, for cross-cutting trunks, and other heavy work. Machine-saws are now adapted and extensively used for all the purposes to which hand saws can be applied. The machine-saws are comprehended under three different classes—circular-, reciprocating-, and band-saws, the last being of comparatively recent origin, but now much employed. The circular-S. is used chiefly in saw-mills for cutting up logs into boards and other forms. The teeth of the circular-S. are deep cut, and the S. itself is made to revolve with great rapidity and force, while the log is pushed forward against it by means of a travelling platform. The variety of teeth used in circular saws is illustrated in the accompanying figure, the outer and larger showing five different cuts, and eight kinds of teeth are represented on the smaller S. The reciprocating-S. works like a two-handled hand-S., but it is fixed and the wood is carried forward against its teeth. Usually a series of such saws are mounted in one frame, at such intervals from each other as are

required for the size of the boards or planks to be cut out of the log. Some reciprocating-saws for cutting frets and minute work



consist of ribbons, one of the ends of which are attached to a strong spring by which they are strained and kept in position. The band-S. consists essentially of two wheels, over which a thin endless ribbon-S. is placed like a belt, and is strained on them. The ribbon passes down through a flat sawing-table, upon which the material to be cut is laid. The ribbon-S. is capable of being adapted for very many purposes, and is rapidly coming into extensive use. Special forms of saws are employed for cutting the exceedingly thin slices of wood termed veneers.

Sawdust, or wood waste produced by sawing, has many uses in the arts. The chief of these is in the manufacture of oxalic acid, by the process of Messrs. Roberts, Dale, and Pritchard, patented in 1856. Jewellers use boxwood-S. for drying articles that have been washed, and the waste of cedar and mahogany is employed in the dressing of furs. The dust of hard ornamental woods, as rosewood and ebony, was utilised in France some years ago in forming, together with bullock's blood and other ingredients, a composition that was easily moulded, and was known as *bois durci*. S., impregnated with saline matters by steeping, is also useful for placing between the double walls in fire-proof safes. In times of scarcity, S. of beech or other non-resinous wood is eaten in Sweden and Norway. It is prepared for this purpose by repeatedly macerating and boiling it in water, and drying in an oven, and when ground it tastes and smells like corn-flour. S. has many other minor uses, as for stuffing, packing goods, cleaning floors; and it is mixed with tar to be used as fuel.

Sawfish (*Pristis antiquorum*), a species of fish allied to the shark and ray, and belonging to the order *Elasmobranchii* (q. v.). It is notable for the immense and peculiar development of the snout, which forms a flattened blade-like structure, armed at the sides with sharp and strong spines giving the snout the appearance of a coarse saw. The 'saw' may attain a length of from 2 to 3 feet, the fish itself measuring from 8 or 9 to 12 or even 18 feet. The mouth is placed on the under surface of the head, and the breathing apertures are large. The colour is a greyish-black above and white beneath. The animal seems to use its peculiar weapon to attack other fish; even whales are said to be sometimes killed by it. The S.-F. occurs in the Mediterranean Sea and in the Atlantic. An allied species is the *Pristiophorus cirratus*.

Sawfly, the general name applied to *Hymenopterous* insects belonging to the family *Tenthredinidae*, in which the head is broad, and the wings wide. The antennæ are usually short and simple, but may be clavate. The ovipositor or 'saw' is composed of two long plates or *lamellæ*. By the protrusion of this

organ, which is toothed on the upper surface, the insect is enabled to saw or incise the leaf fissures, and therein deposit its eggs. The eggs grow within the leaf. Of the S. the best known species belong to the genus *Nematus*. *N. grossularia*, or Gooseberry Fly, deposits its eggs in masses or strings on the surface of the leaves of the gooseberry shrub. *N. conjugatus* is another species which lays its eggs near the edges of leaves. The genus *Cephus*, of which the Corn S.-F. (*C. pygmaeus*) is a good example, destroys wheat by boring into the stems. Another genus is *Pristiphora*, allied to *Nematus*; and the Turnip Fly is the *Athalia Centifolia*, whose larvæ are named 'Niggers' on account of their black colour.

Saw-Mill, a mill where timber is sawn by reciprocating, rotary, and band-saws (see SAW), driven by steam, water, or wind; the term is also applied to the machinery itself. A S.-M. driven by water is said, on the authority of Ausonius, to have been erected on the River Roer, in Germany, as early as the 4th c. Nothing is known of the existence of saw-mills during the subsequent dark ages down to 1332, when they were certainly in operation near Augsburg. The Spaniards erected them in Madeira in 1420; Breslau had them seven years later, and Erfurt in 1490. During the next c. saw-mills were established in Norway, Holland, and other European countries, and to this period is assigned the introduction of a S.-M. having a gang of saws capable of cutting a log into many planks simultaneously. The first S.-M. erected in England in the 17th c. had to be abandoned in consequence of the violent opposition offered by the operatives, and not till the following century were they firmly established. Among the earliest were those of Leith in Scotland and Limehouse in England, both driven by wind. They have been greatly improved in America, where an immense timber-trade necessitates their extensive use. Special forms of the S.-M. have been invented for sawing shingles, clapboards, laths, &c., and also for cutting out mouldings, furniture-stock, veneers, &c. Jig, scroll, and belt saws are employed for work of this kind.

Sáwánt Wári, or **Sunder** ('the beautiful'), the capital of a native state of the same name, in political connection with the Bombay government, India, 28 miles W. by N. of Belgaum. Pop. (1872) 8017. It is said to well deserve its name of beautiful. The state of S. W. lies between the British district of Rutnagherry and the Portuguese settlement of Goa, and is cut off from the Indian Ocean by a narrow strip of land ceded to the British in 1812. Area, about 900 sq. miles; pop. (1872) 190,814, of whom 4000 are Roman Catholics; revenue, £30,000. The inhabitants, who are Mahrattas, furnish many recruits to the Bombay infantry. The country lies among the ridges of the W. Ghauts. The staple crop is rice; oil-seeds, fruit trees, and pepper are also grown, and coffee would flourish. The forests are very valuable. Much cotton is carried along a new road from the interior.

Saxe, a French form of the German *Sachsen* (q. v.).

Saxe, Marshal. See MORITZ, GRAF VON SACHSEN.

Saxifrage (Lat. *saxum*, 'rock,' and *frango*, 'I break,' from the species rooting into rocks and disintegrating them) is the genus of the natural order *Saxifragaceæ*, and consists of about 180 species, distributed through the N. and S. temperate and arctic zones; but absent in S. Africa, Australia, and the Pacific. Amongst the best known representatives are *S. umbrosa*—the London Pride—and its numerous allied species and varieties, of common cultivation in gardens; a large series of pretty alpine species (*S. oppositifolia*, the dactyloid series, &c.), and a group of the *S. aizoon* section, which have been introduced with success into rock-gardens; and of low land species *S. granulata*, with bulb-roots and pretty white flowers. *S. stellaris* has proved to be the highest flowering-plant of the British flora, attaining the summit of Ben Nevis, or 4406 feet.

The order *Saxifragaceæ*, as at present established, includes the plants formerly classed under *Grossulacææ* and *Philadelphaceæ*,



Saxifraga umbrosa.

thereby now embracing upwards of 700 species of trees, shrubs, and herbs. The most important or interesting genera are—*Astilbe*, *Cephalotus*, *Chrysophyllum* (q. v.), *Cunonia*, *Deutzia* (q. v.), *Escallonia*, *Hoteia*, *Hydrangea* (q. v.), *Parnassia* (see GRASS OF PARNASSUS), *Philadelphus*, *Ribes* (see GOOSEBERRY and CURRANT), *Weinmannia*. Burnet S. and Meadow S. are English names for umbelliferous plants of the genera, *Pimpinella* and *Silanus*.

Sax'o Grammaticus, the 'father of Danish history,' flourished in the latter half of the 12th c. Little is known of him save that he belonged to the noble house of Lange, that his father and grandfather served under Valdemar I., and that he lived at Roeskilde, where he died and was buried about 1204. The elegance and fluency of his Latinity, so rare in that age, won for him the surname of *Grammaticus* (i.e. 'the learned'). Encouraged by Absalon, Archbishop of Lund, he wrote his famous *Historia Danica*, which goes back even to the mythical Dan and Angul. The first nine books are, he says, written from old songs and stories, runic inscriptions, and Icelandic records. Though but fabulous history, they shed no little light on the life of the ancient Danes. From the tenth to the sixteenth and last book, i.e. from the 10th c. to 1186, S.'s work may be called history, but it is evident that he spared himself the trouble of consulting the archives of Lund and Roeskilde. In the reign of Valdemar I., however, in which his patron Absalon had been prominent, the details given may be held authentic. S.'s authority, long high, was first attacked in the 17th c. by Torfæus, but especially suffered from the critical analysis of Dahlmann in his *Forschungen auf dem Gebiete der Geschichte* (vol. i. Altona 1822), and from P. E. Müller's *Kritische Untersuchung der Sagen-geschichte Dänemarks und Norwegens* (Copenh. 1823), a masterpiece of historical criticism. The editio princeps of S.'s work is entitled *Danorum regum heroumque historie* (Par. 1514; later reprints, Basel 1534; Frankf. 1576; with a commentary by Stephanus (Sorö 1644, and Leips. 1771). The most valuable edition is that of P. E. Müller, completed by J. M. Velschow (2 parts in 3 vols. Copenh. 1839-58). Danish translations have been published by Vedel (*ib.* 1575 and 1610; new ed. by Wegener, *ib.* 1845-51), and by Grundvig (3 vols. *ib.* 1818-22).

Sax'on Architecture. See ROMANESQUE STYLE.

Sax'ons (Lat. *Saxones*, Ger. *Sachsen*, from *sahs* or *sachs*, 'a knife or short sword,' originally, perhaps, a stone weapon), a German tribe mentioned by Ptolemy as occupying the districts round the mouth of the Elbe. Towards the end of the 3d c. a 'Saxon confederacy' appears in N.W. Germany. In the reigns of the emperors Julian and Valentinian, along with the Franks they made inroads into Roman territory. It is clear that even in Britain they were well known before the traditional date of the invasion of the so-called 'Anglo-Saxons' (q. v.), while on the coast of Normandy and Brittany in the 5th c. they settled in such numbers as to gain for it the name of *littus Saxonium*. Those who remained in Germany, sometimes called the *Alt-Sachsen*, spread towards the S. and E., along the Elbe and the Weser, until they had overrun the region of the Harz, Thüringen, and most of the present Sachsen. Many of their earlier marauding and conquering expeditions were carried out in conjunction with the Franks, but after the 8th c. the former allies were almost perpetually at war. At last in 804 the Saxon leader Widukind was finally subdued by Karl the Great, but his descendants are supposed to have become 'dukes of the empire.' The sole literary relic of the Old-Saxon language is a poem of the 9th c. called the *Hliand* (i.e. 'Healer' or 'Saviour'); supposed to be a fragment of a larger work embracing the whole of Bible history, executed by an unknown poet at the instance of Karl the Great's son, Hludwig the Pious (see HELIAND). A collection of old Saxon laws was made during the reign of Karl the Great, under the title of *Lex Saxonum*.

Saxony (Ger. *Sachsen*), a kingdom of Germany, in respect of population the third, and in respect of area the fifth among the states of the empire. In outline it is roughly triangular, and it is bounded N. by the Prussian provinces of Sachsen and Schlesien, W. by Sachsen, Altenburg, Weimar, Reuss, and Bayern, and S. by Böhmen. Area, 5785 sq. miles; pop. (1875) 2,760,586.

General Aspect.—S. has only a natural boundary where it is separated from Böhmen by the range of the Erzgebirge and Lausitzergebirge, extending from S.W. to N.E. In the N. and

E. the country is a well-cultivated plain of great fertility. The prevailing rocks are gneiss and mica-schist, occasionally erupted with basalt, granite, and porphyry. The southern range, which is wild and precipitous on the Bohemian side, sinks more gradually towards the N., and is grooved by many a picturesque water-course. In the centre and S.W. are the most elevated parts of the range, the greatest height of which, the Keilberg (1240 metres), lies within the Bohemian frontier. In S. the highest points are the Fichtelberg (1213 metres), Eifenberg (1029 metres), and Eibenstock (1017 metres). The undulating W. part of the range, marked by clay and mica formations, is often spoken of independently as the Elster or Vogtländischen Gebirge. In the N.E. the Erzgebirge descend to the plateau of the Elbsandsteingebirge, and here the Meissener Hochland, known since the last century as the Saxon Switzerland (Sächs-Schweiz), extends N. for about 25 miles from the frontier to within some 10 miles of Dresden, and from the Falkenberg E. to the Schneeberg about the same distance. The Elbe winds through this romantic region of wild woody gorges and abrupt, castellated peaks. The soft sandstone of the plateau is deeply denuded in all directions by the torrents and streams which force a passage to the Elbe, and here and there the rock is worn and scarpd into strangely grotesque shapes. The finest of the singular peaks of the region is the Bastei, which rises precipitously 700 feet above the Elbe. One of the most striking of the ravines is the Uttewalder Grund, the sides of which in some places exclude the sun's rays. Besides the Bastei, the Königstein (864 feet above the sea), Lilienstein (1254 feet), and Nonnenstein (700 feet), are all remarkable on account of their curious structure, and of their interesting legends. Several of the fantastic peaks are crowned with Gothic castles, and of these Königstein is one of the few virgin strongholds in Europe. The great part of S. lies in the basin of the Elbe, which is navigable beyond the Bohemian frontier, and flows from S.E. to N.W. for a distance within the kingdom of 76 miles. On the right are its tributaries, the Wesenitz, Black Elster, and Spree, and on the left the Müglitz, Wilde-Weisseritz, Trubsch, Mulde, and White Elster. A small part in the extreme E. is watered by the Neisse, an affluent of the Oder. The climate is rigorous only among the southern hills. From 1866 to 1875 the mean annual temperature at Leipzig was 47.3° F., and at Dresden 48° F.

Natural Products.—S. is one of the most productive of the German states. Except along the mountain frontier, the only forest of great extent is the Hubertusburger Wald. The principal trees are pine, beech, oak, birch, and alder. The yield of timber and firewood yearly amounts to £450,000. The vine culture is only successful on the sunny right bank of the Elbe. The annual production of wheat amounts to 5,235,000 bushels, of rye to 10,276,000, of barley to 4,638,000, and of oats to 13,755,000 bushels. Other products are potatoes (37,415,000 bushels), cole-rape, buckwheat, maize, flax, vegetables, and some tobacco. S. among the German states is pre-eminent for cattle-rearing, and in 1873 had 647,074 head of horned cattle, 206,830 sheep, 301,091 swine, 115,667 horses, and 105,401 goats. There were also 64,283 bee-hives. Large game is almost confined to the mountains, and the fish in the Elbe has recently been much reduced in quantity. Mining is chiefly carried on in the Erzgebirge ('metal mountains'), so named on account of their valuable deposits of ore. The minerals include silver, gold, lead, zinc, iron, cobalt, bismuth, antimony, sulphur, arsenic, &c. In 1874 there were 311 metal-mines in operation, employing 7366 men, and the yield amounted in value to £268,813. There were 92 mines for real coal and 166 for lignite. The former employed 606 officials and 16,693 hands, the latter 154 officials and 3251 hands. The production of real coal amounted to 105,649,500 bushels (value £1,938,108), and of lignite 24,394,340 (value £106,781). As in Lower Silesia, the coal produced is almost entirely used in the working of local spinning-mills and weaving establishments. In the Sächs-Schweiz, on both banks of the Elbe, there were in 1875 as many as 391 quarries in operation, employing 3203 men, and producing sandstone to the value of £157,410. Other minerals are porphyry, kaolin, chalk, and various precious stones, including sapphire, amethyst, chalcodony, topaz, and agate.

Industries.—The textile industries received an immense impulse in the first half of the present century. During the ten years ending 1844 the number of cotton spindles increased from 375,000 to 500,000 (cotton cloth looms to 30,000), that of woollen

spindles from 44,000 to 140,000 (woollen looms to 8000), and that of cotton hosiery looms from 18,000 to 22,000. (See a valuable *Report on S. and the Zollverein*, by Baron Tauchnitz, British Consul-General, May 1873). The cotton industry is the most important, and its chief seat is Chemnitz. In the well-watered valleys of this region are also the principal woollen factories, many of them colossal establishments. The linen manufacture is still carried on to a great extent by means of hand-looms. Flax-spinning gives occupation in winter to many peasant households, while lace-making employs every woman and child in the Ober Erzgebirge, each village having at least one school for training in this speciality. The goods chiefly manufactured are mixed cottons, broadcloths, silks, muslins, orleans, furniture-damasks, cassinets, pattern stuffs, waistcoat pieces, and fine shirtings. The spinning of yarn is carried on in 250 mills with 850,000 spindles, but S. is a great market for English yarns. There are large bleaching and dyeing works; also extensive smelting works, rolling-mills, and engineering establishments. S. does not, however, produce more than one-fifth of its necessary supply of iron and iron wares. Other manufactures are paper (70 mills), pottery, and porcelain (at Meissen), pianofortes and other musical instruments (Dresden and Leipzig), tobacco (5,000,000 cigars), and beer (690 breweries). Leipzig (q. v.) is the centre of the German publishing trade, and next to Hamburg the most important commercial city in the empire. The three annual fairs held here bring to S. an immense amount of transit trade. The foreign manufactured goods imported into Leipzig in 1876 amounted to 409,301 cwts., while those of the Zollverein States amounted to 364,699 cwts. In 1875 S. had 19 steamers and 421 sailing-vessels on the Elbe, and 1260 miles of railway. The chief towns are Dresden (the capital), Leipzig, Chemnitz, Zwickau, Plauen, Freiberg, Glauchau, and Meerane.

Religion and Education.—Although the royal family belong to the Church of Rome, the great majority of the inhabitants (2,674,192) are Protestants. There are in all 2,664,341 Lutherans, 9851 Reformed, 73,349 Roman Catholics, 1876 German Catholics, 5360 Jews, 713 Anglicans, and 4077 adherents of various sects. Education is in a high state of efficiency, attendance at school having been enforced since 1835. In 1875 there were 2116 *Volkschulen* (40 Roman Catholic), with 441,393 pupils and 5015 teachers. In 1876 S. had 20 teachers' seminaries (with over 2000 students), 25 *Realschulen*, 13 gymnasia, and many technical schools and academies. The university of Leipzig, the most numerous attended in Germany, had, in 1877-78, 3036 students and 158 professors and teachers.

Constitution and Finance.—According to the constitution of 1831, modified by a law as late as 1874, the government is a monarchy, hereditary in the female on the extinction of the male line. The legislative power is vested in the king and a parliament, which consists of two chambers. A vote for the Lower House is the right of all men over twenty-five years who pay rates. The revenue and expenditure were each £6,819,044 in the budget for 1877. The former is derived in great part from domains and state railways, while the latter is chiefly the interest on the public debt, the principal of which amounted to £17,044,402. S. sends 4 members to the *Bunderrath* of the empire, and 23 to the *Reichstag*. It furnishes the 12th corps of 67,600 men to the imperial army.

History.—For the origin of the Saxon name and the early history of the people, see the article SAXONS. The last German people to maintain independence of the Frankish yoke, they were only subdued and Christianised by Karl the Great after a war of thirty years (772-804). The line of Widukind, the last chief of the Saxons, is said to have been continued in Ludolf, who was created first duke of S. by Hludwig 'the German' in 850. The son of Ludolf, Otto the Illustrious (880-912), acquired great fame in the wars with the piratical Northmen. On the extinction of the Karolings he was offered and declined the German crown, but his son, the Duke Heinrich (912-36), succeeded Konrad I. of Franconia, and founded the Saxon line of German kings, which terminated on the death of Heinrich II. in 1024 (see GERMANY). He founded the marks of Brandenburg (q. v.), Meissen, and Lausitz, as defences against the encroachments of the Slavic Serbs. Otto I., the first of the Saxon emperors, made over the dukedom of S. to Hermann Billung in 960. The House of Billung acquired Thüringen (q. v.), Anhalt, Slesvig, &c., until the wide tract of S. extended from the Unstrut to the Eider, and from

Pommern to the Rhine. In 1106 the family became extinct, and the duchy passed to Lothar of Supplinburg. Lothar became king of Germany in 1125, and conferred S. on his son-in-law, Duke Heinrich the Proud of Bavaria, who thus was made ruler of the greater part of Germany. His son, Heinrich the Lion, further enlarged the dominion, but when he was placed by Friedrich I. under the imperial ban (1180), the two duchies of S. and Bavaria were partitioned among Bernhard of Ascania, Philipp, Archbishop of Köln, Otto of Wittelsbach, and others. Bernhard, the youngest son of Albrecht the Bear, received the reduced duchy of S., which was further diminished by the erection of Anhalt into a separate principality in 1211. In 1260 the House of Ascania branched into two lines, and divided the duchy into two portions, Sachsen-Wittenberg and Sachsen-Lauenburg. The electoral dignity was confirmed to the latter by the Golden Bull (q. v.), and on the extinction of the Ascanian line in 1423, the Emperor Sigismund disposed by purchase of Sachsen-Wittenberg to Friedrich the Warlike, the powerful Markgraf of Meissen and Landgraf of Thüringen. Friedrich belonged to the House of Wettin, which had held the markgratdom from 1090, and from this time the name S. is applied only to the Wettin principality and to Lauenburg, which are within Lower S., and the inhabitants of which are not Saxons. Friedrich extended his possessions and welded them into a prosperous state, but the practice of dividing land equally among sons interfered with any scheme of development. Ernst (q. v.) and Albrecht, grandsons of Friedrich, after reigning together for twenty years, divided the dominion; the former, as the elder, receiving the electoral dignity with Thüringen, the latter receiving Meissen. The two lines thus founded, the Ernestine and Albertine, still survive, the latter, however, in the kingdom of S., the former in the duchies of Sachsen-Weimar-Eisenach (q. v.), Sachsen-Meiningen (q. v.), Sachsen-Altenburg (q. v.), and Sachsen-Koburg-Gotha (q. v.). Friedrich the Wise (1486-1525), son of Ernst, was the protector of Luther, and his brother, Johann the Constant (1525-32), was head of the Schmalkaldic League (q. v.). Johann Friedrich, son of the latter, lost after the defeat of Mühlberg (q. v.), in 1547, the electorship and most part of his lands to his cousin Moritz (q. v.) of the Albertine line. The younger line, after the reigns of the wise economist August I. (q. v.), and the two weak princes Christian I. and Christian II., was headed by Johann Georg I. (1611-56), the able ally of Gustavus in the Thirty Years' War, who at the Peace of Westphalia (1648) received Upper and Lower Lausitz. The power of S., never greater than under Johann, began to decline as that of Brandenburg continued to rise. In 1697, August II. the Strong, being chosen king of Poland after the death of Sobieski, involved S. in the war with Karl XII. of Sweden. His successor, August III., also king of Poland, put forth a claim to the dominions of Maria Theresa, but subsequently joined the empress, and in the Seven Years' War lost to S. 90,000 men and 70,000,000 thalers. Under Friedrich August (1768-1827) S. gradually recovered strength, and on the outbreak of the war with France joined the Prussian confederation of princes. The elector had an army of 22,000 at Jena, but was compelled by Napoleon to join the Confederation of the Rhine in 1806, and received the title of king. By the Treaty of Tilsit the King of S. obtained the grand duchy of Warsaw (see POLAND) and portions of Prussia and Austria, but after an ineffectual attempt to break off his French alliance, was taken prisoner at the battle of Leipzig in 1815, and was forced to surrender Upper and Lower Lausitz, as well as his freshly-acquired possessions. In the period of peace which followed, Anton (1827-36) granted the constitution of 1831. In 1854 King Johann ascended the throne, and with his minister Beust (q. v.) stubbornly opposed the Prussian leadership, inclining towards that of Austria. An army was sent to aid the Austrians in 1866, and after the crushing defeat of Sadowa, S. only escaped political annihilation by entering the N. German Confederation, dismissing Beust, and paying an indemnity of 10,000,000 thalers. The Saxon troops remained true to the Fatherland during the Franco-German War, and fought with distinction at Metz, Sedan, and Paris (1870-71). They were led by the crown-prince Albrecht, who succeeded to the crown on the death of his father Johann, 29th October 1873. See Weisse's *Geschichte der Kursachs. Staaten* (7 vols. Leip. 1802-12); Gretschel's *Geschichte des Sachs. Staats und Volks* (3 vols. Leip. 1841-54); Weber's *Archiv für Sachs. Geschichte* (Leip. 1862, et seq.), and Böttiger-Flathe's *Geschichte S.'s* (3 vols. Hamb. 1871).

Sax'ony, Prussian. See SACHSEN.

Say, Jean Baptiste, born at Lyon, January 5, 1767, was educated at Lyon and at Croydon, near London, and was early led to the study of political economy by reading *The Wealth of Nations*. He became connected with Mirabeau's paper, the *Courrier de Provence*, and afterwards acted as secretary to Clavière, the Girondist. In 1794 Andrieux and others made him editor of a periodical entitled *La Décade Philosophique*, of which, thanks to his energetic management, forty-two volumes were completed. In 1799 he was appointed a member of the tribunate, and in 1803 appeared his *Traité d'Economie Politique*. Bonaparte soon after this compelled him to withdraw from public life, and he established a cotton-mill at Auchy, retiring with a moderate fortune in 1812. A second edition of his *Traité*, the publication of which Napoleon prohibited, was eventually augmented by an *Épître des Principes Fondamentaux de l'Economie Politique*. After an excursion through Britain, he wrote *De l'Angleterre et des Anglais* (1812), *Catéchisme d'Economie Politique* (1817), and *Lettres à Malthus* (1820). In 1819 he was appointed to the new chair of *Economie Industrielle* in the *Conservatoire des Arts et Métiers*, and in 1830 he was elected Professor of Political Economy in the College of France. His lectures appeared as a *Cours Complet d'Economie Politique Pratique* (6 vols. 1828-30). S. died at Paris, November 16, 1832. A volume of *Mélanges et Correspondances* was published in 1833, and his works form vols. 9-12 of Guillin's *Collection des Economistes*.—**Horace Emile S.**, son of the preceding, was born at Noisy, near Paris, March 11, 1794. He was a merchant, and, after holding many high public offices, was appointed a minister in the *Conseil d'État*. His chief work is *Études sur l'Administration de la Ville de Paris* (1845). He died 26th July 1860.—**Jean Baptiste Leon S.**, son of Horace Emile, was born in 1826, attained an influential position in the management of the *Chemins de Fer du Nord*, devoted his leisure to the study of political economy, and was for some time joint-editor of the *Journal des Débats*. In 1871 he took his place as a member of the 'left centre' in the National Assembly, and in the same year was made Prefect of the Seine. He became Minister of Finance under Thiers in 1872, and again 1875-77. Since 1876 he has been a senator.

Say, Thomas, an American naturalist, was born at Philadelphia, July 27, 1787. He began life as a druggist, but subsequently devoted himself to natural history, and was zoologist to several American exploring expeditions between the years 1818 and 1823. In 1825 he joined Maclure and Owen in their socialistic experiment at New Harmony, Indiana, where he died, October 10, 1834. His *Complete Writings on the Conchology of the United States* were published at New York in 1858, and his *Complete Writings on the Entomology of the United States*, with a Memoir by George Ord, in 1859. See *Biographical Sketch of T. S.*, by Dr. Coates (Phil. 1835).

Sbirri (Ital.), a name formerly given in Italy, particularly in the States of the Church, to a body of secret police under military organisation, who were charged with the arrest of criminals and suspected persons. They were suppressed in 1809.

Scab, a disease of sheep caused by the presence in the skin of a minute *acarus* or mite. This parasite causes pustular irritation, and the 'scabs' which fall off may produce baldness. The parasite is liable to be transferred from diseased to healthy sheep, hence the necessity for isolating the affected subjects. The most approved remedies are mercurial ointment, turpentine and oil, tobacco-lotions, &c.

Scabbard, a sheath for a sword, dagger, knife, or bayonet. It is commonly made of black or brown leather, with a *clasp*, *ring* and *locket* of metal. The sword S. of the British cavalry is formed of polished steel. Old English and Norman sheaths were generally of wood covered with leather; and during the reigns of Henry VIII. and Elizabeth, dagger scabbards of steel or bronze, with elaborate decorations, were worn by the nobility.

Scabies. See ITCH.

Scabious, or **Scabiosa** (from *L. scabies*, 'scurf,' in allusion to the scaly pappus of the seeds), a genus of about 90 species of perennial herbs belonging to the natural order *Dipsacaceæ*. They have entire or pinnatifid leaves, hemispheric or depressed

flower-heads of various colours, with outer florets often large and rayed; hairy receptacle, or with scaly floral bracts, calyx teeth of persistent bristles, four stamens, and style filiform. *S. Succisa*, or Devil's-bit S.—so called on account of the abruptly truncate rootstock—and *S. (Knausia) arvensis*, are common plants of the N. temperate zone in the Old World, and are frequent in Britain.

Scad, or **Horse Mackerel** (*Trachurus*, or *Carangus trachurus*), a *Teleostean* fish allied to the Mackerel (q. v.), and belonging to the *Scomberidae* or Mackerel family. The S. is a common British fish, and attains a length of from 10 to 16 inches. Its colour is a dusky olive on the back, glossed with green on the side, and variegated with blue bands. The abdomen and sides of the head are silvery white. The lateral line has prominent scales, which give a square outline to the body behind. The flesh, which is somewhat coarse, is often eaten in a salted state by the poorer classes in the S.W. of Britain.

Scalfall, or **Scawfall**, the highest mountain in England, is situated in Cumberland, near the border of Westmoreland, 10 miles N.E. of Ravenglass. It has two peaks, 3208 and 3092 feet high respectively, and is one of the most conspicuous objects in the Lake district, in the centre of which it stands.

Scagliola (Ital. from *scaglia*, 'chips of marble'), a coloured plaster or stucco composed of fine calcined gypsum and glue or isinglass, and used to form columns, pilasters, &c., for internal decoration, in imitation of marbles and other ornamental stones. A bed of lath and ordinary plaster is first prepared, and on it the gypsum mixture is spread and 'floated' with wooden implements; the desired colours (if not already diffused through the S.) are then applied to the wet surface. To imitate certain marbles, chips and dust of marble, spar, granite, &c., are also pressed into the wet plaster. The S. dries hard, and is susceptible of a high polish.

Scala No'va, an important harbour of Asia Minor, vilayet of Aidin, on an inlet of the *Ægean*, 40 miles S. of Smyrna. It lies near the ancient Ephesus (q. v.), and has a considerable export trade. Pop. 10,000.

Scalar, a mathematical term invented by Sir W. R. Hamilton, including all quantities essentially non-directional. All numbers and the ordinary symbols of algebra and analysis which are subject to the same laws as these are scalars. See QUATERNIONS and VECTOR.

Scala'ria, a well-known genus of *Gastropodous* Mollusca, including the Wentletraps, of which the most famous species is the Precious Wentletrap or Royal Staircase (*S. pretiosa*), a good specimen of which, in the days of conchological pursuits, fetched as much as £50. This species is found in tropical seas. The common S. or Wentletrap (*S. communis*) is plentiful on the British coasts. The shells in S. are tubular, spiral and turreted in shape. The foot is short, and in the true Wentletraps the whorls or turns of the shell are distinct. In some of the *Scala'ria* there is a gland secreting a purple colour like that obtained from the famous purple whelk of Tyre.

Scale-Armour. See ARMOUR.

Scale, Musical, the succession of notes from a note in a given key to its octave. Guido d'Arezzo, the inventor of modern notation, used only six notes in his scale; but an arrangement of seven notes, taking the names of the first seven letters of the alphabet, was afterwards adopted. The scales in modern use are either in the major or the minor mode (see MUSIC). The intervals of a minor scale produce a plaintive effect, and the change from the major to the minor scale is often an effective musical device. Within the compass of an octave an arrangement of 72 notes would be required to give an idea of all the keys now used in music.

Scales, the *exoskeletal*, or skin appendages of vertebrate animals, found typically in *Fishes*, absent in *Amphibians* as a rule, but also occurring in *Reptiles*, and in a modified degree in some *Mammalia* (e.g. Armadillos and Pangolins). S. vary in their nature. Of the two layers of which the skin is composed, the outer or *epidermis* is rarely ossified, but it is this layer which forms the 'tortoise-shell' of commerce, obtained from the *Chelonia imbricata*. The under layer or *dermis*, on the other hand, is often ossified, and forms the bony plates of the armadillos, which

are covered by a thin epidermal layer. The S. of fishes are imbedded in the dermis, and represent structures formed by the latter layer, while the S. of reptiles also exhibit epidermic characters. The commonest variety of fish-scale is that seen in the salmon, herring, &c., in the form of a little thin circular plate of horn named a *cycloid* scale. The S. of the Perches, &c., have a hinder serrated margin, and are named *ctenoid*. Those of sharks and rays consist of a little plate of bone, with or without a spine, and are named *placoid* S.; whilst in the sturgeon, bony pike, &c., the S. are *ganoid*, formed of a hard enamel substance, and articulated by definite processes.

Scales of Notation. In arithmetic, numbers are represented by numerals placed side by side, and each numeral has a local as well as an intrinsic value. Thus in the number 666, each numeral, though intrinsically the same, differs in value according to its position—the first 6 representing six hundreds, the second, six tens, and the third, six units. This number, six hundred and sixty-six, belongs to the decimal scale, or the scale whose radix is 10. If we choose as our radix the numeral 7, the expression 666 represents a very different number. The last 6 represents (as before) six units; the second, six *sevens*; and the first, six *seven-times-sevens* or six forty-nines. The number 666 in septenary scale becomes, when transformed into decimal scale, $6 + 6 \times 7 + 6 \times 7 \times 7 = 6 + 42 + 294 = 342$. Similarly 123 in the quaternary scale becomes, when transformed, $27 (= 3 + 2 \times 4 + 1 \times 4^2)$ in the decimal scale. If it had been desired to express this number in the *senary* scale (with 6 as radix), then, instead of adding together 3, 8, and 16, we should require to add 3, 12, and 24, since 12 and 24 are the senary scale symbols for the ordinary 8 and 16. In making the addition, we must divide by six and carry accordingly. The first column gives, then, 13, and therefore the sum is 43. The most convenient method for transforming any given number in the decimal scale to its analogue in another scale is by a series of divisions, of which two examples will indicate the nature. Transform the number 27 into the binary and quinary scales

$$\begin{array}{r} 2 \overline{) 27} \\ \underline{2 \ 13} \quad - \quad 1 \\ 2 \ 6 \quad - \quad 1 \\ \underline{2 \ 3} \quad - \quad 0 \\ \quad \quad \quad 1 \quad - \quad 1 \end{array} \qquad \begin{array}{r} 5 \overline{) 27} \\ \underline{5 \ 5} \quad - \quad 2 \\ \quad \quad \quad 1 \quad - \quad 0 \end{array}$$

Taking the remainders in succession, the numbers stand 11011 and 102.

Scaliger, Julius Cesar, born at Padua, or Verona, April 23, 1484, was descended, according to his own account, from the princely Veronese family of Della Scala; but Tiraboschi makes him the son of a miniaturist at Venice. He studied medicine, and up to the age of forty-two practised as a physician in Venice and Padua. In 1525 he entered the service of the Bishop of Agen, and in 1529 he married Andiette de Roques-Lobesac, a young lady of rich and noble family. Although possessed of a prodigious memory and indomitable perseverance, he had little taste and less modesty; but was nevertheless an honest and truth-loving man. 'Never tell a lie' was his constant language to his children, and in his illustrious son the exhortation bore good fruit. S. wrote quantities of Latin poetry, commented on and translated many classics, and wrote controversial treatises, including a fierce attack on Erasmus—*J. C. Scaligeri adv. Desid. Erasmus Orationes Duae* (1531–36, reprinted Toulouse, 1621). His chief works are the first considerable modern Latin grammar, *De Causis Linguae Latinae Libri XIII.* (Lyon, 1540), and *Poeticus Libri VII.* (Lyon, 1561). He died at Agen, October 21, 1558.—**Joseph Justus S.**, tenth son of the preceding, born at Agen, August 4, 1540, studied Latin mainly under his father. Greek he learned under Turnebus at Paris; and such was his passion for the classics that he committed Homer to memory in twenty-one days, and read all the Greek poets within four months. In 1563 Louis Chastaigner de la Rochepezay, afterwards ambassador at Rome, enabled him to make a tour through Europe. The friendship of this fine nobleman, in whose house he lived off and on for thirty years, was maintained unbroken through all the vicissitudes of a stormy age. In 1578 he taught philosophy at Geneva for a short time; and in 1593 he succeeded Lipsius in the chair of literature at Leyden University, which he held till his death, 21st January, 1609. Towards the close of his career, S. was denounced and calumniated by the Jesuits in pamphlets of

unparalleled foulness. In the *Scaliger Hypobolimeus* (1607) of Scioppius, the slanderous gossip of all the Jesuit colleges in Italy and Germany was poured out on the veteran scholar, who was hated almost to the point of insanity for his immovable attachment to the Protestant faith. S. far excelled his father in learning, in intellectual vigour, and philosophical penetration. He was, in truth, the brightest light of the 16th c. in critical and rational scholarship. Gibbon and Niebuhr both recognised his great qualities. It was S. who proposed the readjustment of the Julian period (see CALENDAR). He was the first to maintain with any show of learning that the Greek letters are derived from the Phœnician. Besides editing numerous classical authors, he wrote *De Emendatione Temporum* (Par. 1583), the first sketch of a general history of mankind, and *Thesaurus Temporum* (Leyd. 1606), a work in which profound erudition boldly applied almost succeeds in restoring the first book of the *Chronicon* of Eusebius. In the 17th and 18th centuries his vast reputation declined. He was regarded as the type of a 'pedant,' though he was precisely the reverse, and it was not till the publication of Bernays' work that the injustice of the previous centuries was remedied, and S. restored to his rightful throne. After his death appeared *Pœmata Omnia* (Leyd. 1615), and a collection of *Epistola* (1627). Two volumes of *Scaligerana* were published, one containing S.'s conversations during 1674-93, collected by Vertunien (Grön. 1669), and the other those between 1603-6, collected by the brothers Vassau (Hague, 1666). Both were conjoined in an Amsterdam edition of 1695 (new ed. 1740). See Bernays' *Joseph Justus Scaliger* (Berl. 1855).

Scalp, the name given to the outer covering of the skull, composed of skin and of the expanded tendon of the occipito-frontal muscle, and of intermediate cellular tissue and blood-vessels. There are certain peculiarities in the surgical anatomy of the scalp, which render even slight injuries of importance. '(1.) The skin is intimately connected to the tendon of the occipito-frontalis muscle, instead of being separated from it by cellular tissue. (2.) The large vessels lie immediately beneath the skin, instead of under the fascia, as in other parts. (3.) The tendon of the occipito-frontalis is loosely united to the pericranium by very extensible cellular tissue, and is perforated by small arteries, which run from the larger vessels through the cellular tissue, to nourish the pericranium. Consequently (1) wounds of the skin almost always involve the tendon also; (2) bleeding from the large arteries is generally easily commanded, in consequence of their superficial position; (3) in diffuse inflammation of the S. the thickness of the part is often enormously increased by extravasated lymph, and such extravasations will very probably strangulate the vessels nourishing the pericranium.'—(Holmes' *Principles and Practice of Surgery*, p. 127.) The chief injuries of the S. are contusions and S.-wounds. The usual complications of S.-wounds are Erysipelas (q. v.), and suppuration within the cranium, both being attended with great danger to life. In simple *contusion* a slightly stimulating lotion may be applied, such as Lotio Ammon. Hydrochlor. gr. X to the ounce of water. Extravasation of blood, as the result of injury, may occur (1) external to the cranium; (2) between the bone and the dura mater; (3) in the arachnoid cavity; and (4) in the substance of the brain. Tumours of the S. are common, the most frequent being cutaneous cysts (often congenital), popularly known as *Wens* (q. v.), and vascular tumours.

Scaly Ant-eater. See PANGOLIN.

Scaman'der, a river of Troy, which rose in Mount Ida, and entered the sea E. of Cape Sigeum (Kum Kale). It is frequently mentioned in Homer, who says the gods called it Xanthus ('the yellow'). Herodotus relates that when the army of Xerxes crossed it on their way to Greece, its waters were not sufficient for their wants. Though its bed may have altered in several places, it is doubtless the same river as the modern *Menderes*.

Scamill'us (Lat. 'little bench,' dim. of *scammum*, 'bench,' from *scandere*, 'to ascend'), a plain block or sub-plinth placed below a column or statue to elevate it.

Scamm'ony is a resinous substance obtained from the roots of various species of *Convolvulus*, principally *C. scammonia*. The plants grow wild on the dry slopes of hill-sides throughout

Asia Minor. In the month of July annually the peasants who collect S. proceed to the hills, where they practise two methods of securing the resin. (1) They clear away earth, &c., from around the root and cut off the stem at its junction, when immediately a milky juice flows from the root, which is caught in shells, on which it soon dries and hardens, thus forming S. Formerly the material was imported on these shells, and so prepared it is the finest virgin or 'first drop' S. (2) The roots are dug up, sliced, pounded, and the juice squeezed out, thus yielding an impure article, which is further adulterated by those engaged in its preparation. Pure S. possesses a greenish-grey colour and a peculiar cheesy smell. The finest quality is imported from Aleppo, Smyrna S. being esteemed the lowest. It is used only medicinally, being a very powerful drastic purgative, and an anthelmintic, and is of great use in a torpid and inactive condition of the bowels. The dose for an adult is from ̄ to 15 grains, according to the purpose for which it is taken.

Scandalum Magna'tum consisted or consists in speaking derogatorily of any peer, judge, or high officer of the realm. The procedure formerly adopted in the case of such an offence has fallen into disuse, and punishment by action, information, or indictment is the course now followed.

Scan'derbeg (properly George Castriota), the great patriot of Albania, was the son of an Epirote chief, John Castriota, and was born in 1414. Along with three brothers he was delivered at the age of nine to the Sultan, Murad II., as hostages for the submission of Albania. His brothers are said to have been poisoned, but his beauty and intelligence attracted the attention of the Sultan, who made him embrace Islamism, and caused him to be instructed in the Turkish, Arabic, Slavic, and Italian languages, as well as in all manly exercises. In 1433 he distinguished himself in the wars in Asia, where he gained the name of *Iskander Beg* (Prince Alexander), and in 1443 he was sent into Europe with an army of 20,000 men to attack Servia. Meanwhile, on the death of his father (1442), Albania had been occupied by the Turks, and he now determined to free it from their rule. He purposely lost the first battle against the Hungarians, and with 300 companions fled from the field to Croia, the capital of Epirus, having first forced Murad's secretary (whom he immediately afterwards murdered) to draw out an order constituting him governor of the fortress. Admitted to Croia by means of this order, he at once massacred the Turkish garrison. The country rose to his standard, and in a month he expelled all the Turks except the garrison of Sfetigrad. Now began a long course of defensive war. In 1444, with 15,000 men he cut to pieces an army of 40,000 Turks. Murad made him an offer of reconciliation in 1445, but he rejected it, and between that date and 1448 defeated three great Ottoman armies one after the other. In 1449 Murad himself took the field, but was forced by ill-health to retire from before the walls of Croia, and died at Adrianople. S. married (1451) the daughter of a powerful Albanian chief. In 1453, after the fall of Constantinople, Mahomet II. made him an offer of peace, but it was refused, and a Turkish army was sent against him under the command of a renegade Epirote chief. He defeated this force, as well as another in 1456, which was conducted by his own nephew, Hamza. In 1461, after having won several more victories over the Turks, he at last concluded peace with Mohammed II., and crossed over to Italy to assist Ferdinand, King of Naples, against John of Anjou. In this he was entirely successful (1462), and returned loaded with titles and papal blessings. In 1463 he was prevailed on again to declare war against the Moslems. He gained no less than seven victories, and by an eighth and decisive struggle before Croia succeeded in driving the Turks out of the country. Shortly afterwards he was seized with a fever, and died at Alessio, 17th of January 1467. S. was a man of heroic courage and indomitable spirit, extremely temperate and even ascetic in his mode of life, and said to have been deeply religious. After his death the resistance of Albania declined, and it was entirely quelled in the course of about eleven years. See Barlesio, *De Vita et Moribus Georgii Castrioti* (Strassb. 1537); Paganel, *Histoire de S.* (Par. 1855); and a Life by Dr. Moore (New York, 1850).

Scandina'via, the common name of the great peninsula in the N. of Europe washed by the Atlantic Ocean and the North Sea on the W., and by the Baltic and the Gulf of Finland on the E. It comprises the kingdoms of Norway (q. v.) and Sweden

(q. v.), and the groups of islands lying in the seas between these and Germany. The 'Cimbric Chersonese' or the Danish mainland is sometimes included among the 'Scandinavian Kingdoms,' but belongs naturally and historically to Germany; took its name, moreover, from the Cimbric, and was inhabited at first by non-Scandinavian nations. Pliny (IV. 13) calls S. 'the most famous island of the *Sinus Codanus*, of unknown size.' The termination *avia* implies 'an island,' being identical with the Goth. *avi* (gen. *auþis*), the Old Norse *ey* (gen. *eyjar*), the O. H. Ger. *ouwa* (for *ouvia*) and *auwia*, and Old Eng. *ig*. The name 'S.,' which was originally applied only to a portion of the central coast of the peninsula, is a Latinized form of the same word as the Old Eng. 'Scedenigge,' the 'Sconeg' of Ælfred and 'Scania' of Saxo, the Dan. and Swed. 'Skaane' (q. v.), and Ger. 'Schönen.'

The *Scandinavian Languages*, forming one of the three groups of the Teutonic (q. v.) family, embrace the languages of the North Teutonic peoples, the Old Norse, of which the oldest idiom, transplanted to Iceland (q. v.) in the 9th c., still survives there, the Danish (q. v.), the Swedish (q. v.), and the popular dialect of Norway (q. v.). They are marked by two striking peculiarities—(1) the definite article (in Old Norse *inn* = *ille*, *in* = *illa*, *itt* = *illud*) follows its substantive, and coalesces with it; as in Old Norse *kani-inn*, 'the cock,' *gjöf-in*, 'the gift,' *fat-it*, 'the foot'; Dan. and Swed. *mann-en*, 'the man,' *bord-et*, 'the table'; (2) the reflex pronoun (in Old Norse *sik*, Swed. and Dan. *sig*, Lat. *se* = *seip*) coalesces with verbs, forming a reflexive suffix. Thus *at falla*, 'to fall down,' with *sik* added, produces the 'middle' verb *at fallask*. *Sik* worn down to *st* and added to the verb makes it passive, as at *kallast*, 'to be called.' Thus have arisen the Eng. words *bask* (Icel. *bua*, 'to prepare'), and *bask* (= *bak* - *sk*), from Icel. *baka*, 'to warm,' Eng. *bake*. The Old Norse was written in Runes (q. v.) till the adoption of the Roman Alphabet in 1057. Its rich poetry is mainly epic, on subjects drawn from the Northern Mythology (q. v.) and heroic age, and running in two streams—popular legend of gods and heroes, whose grandest reach is the Elder Edda (q. v.), and artistic scald-song, best from the 10th to the 13th c. End-rime was from 1150 sometimes used instead of the characteristic alliteration (*Drottmal*). Old Norse prose, cultivated in Iceland from the 12th c., contains many Scandinavian histories, of which the most famous is the *Heimskringla* of Snorri Sturluson (q. v.), and Sagas (q. v.), as the *Völsung* tale, the tale of King Lodbrok, and of Frithjof, as well as didactic works like the Younger Edda (q. v.). See Löffler, *Den Skandinaviske Heltö* (Copenh. 1860), and Grimm, *Geschichte der Teutonischen Sprachen* (new ed. Leip. 1868).

Scandinavian Mythology. See NORTHERN MYTHOLOGY.

Scansores, an order of birds represented by the parrots, woodpeckers, cuckoos, toucans, &c., popularly known as the order of 'Climbing Birds.' The toes are arranged two in front and two behind, and are adapted for climbing. The bill varies in form, being either hooked and arched as in parrots, or straight and long as in woodpeckers. The wings, as a rule, are short, and the flight feeble and imperfect. The S. are *monogamous*, one male mating with one female.

Scantling (Fr. *chantillon*, 'a sample or pattern'), in carpentry, the dimensions, in breadth and thickness, of any piece of timber; also a term applied to a piece of timber under 5 inches square, used for studs, braces, &c.; in masonry, the dimensions of a dressed stone.

Scaphoid Bone, one of the eight bones which form the *carpus* or 'wrist' in man. The S. is a boat-shaped bone (hence its name) in the first of the two rows of the carpal bones, and forms along with the *lunare* a convex surface for the lower cup-shaped end of the *Radius* (q. v.).

Scapple, in masonry, is to dress or tool a stone level without smoothing it.

Scapula, the *shoulder-blade* of vertebrates. It is represented in all classes of *Vertebrata*. The bone seems to consist in man of at least two elements, which are distinct in birds and reptiles. Thus the *coracoid process* of man's S. is represented as a distinct bone in birds and reptiles, and in lower vertebrates; but even in man's own class, the 'coracoid process' may exist as a distinct bone, as in the *Ornithorhynchus* (q. v.) and *Echidna* (q. v.). In man, the S. is a triangular flattened bone, lying on the back of the shoulder, and bearing the

glenoid cavity, which receives the head of the *humerus*, or bone of the upper arm. The concave surface of the S. is applied to the ribs, and across the *convex* or dorsal (outer) surface of the bone a ridge named the *spine* of the S. runs in an oblique manner. The space above this ridge is the *supra-spinous fossa*, that below being the *infra-spinous fossa*. The spine of the S. terminates at the outer side of the bone in the *acromion process*, whilst the *coracoid process* occurs in part of a deep notch in the upper and shortest border of the S. The *vertebral border* of the bone, or that next the spine, is the largest of its borders. The *neck* of the S. is a short bony process supporting a shallow cup, the *glenoid cavity*, in which the head of the *humerus* or upper arm bone rotates. The *development* of the S. takes place from seven centres of ossification. The bone itself articulates with the *Humerus* (q. v.) and *Clavicle* (q. v.), and very many important muscles are attached to it. In birds the S. is a long narrow bone, the coracoid element forming a separate bone, and constituting the chief support of the wing. In the dog, shrew, and mole, the S. is extremely narrow. In fishes the S. is usually small, the clavicle being developed to a much greater extent. The acromion process is wanting in the Giraffe (q. v.) and Hyrax (q. v.), whilst in birds and in the two-toed sloth the acromion and coracoid are articulated. The coracoid process is rudimentary in Ungulata (q. v.). It is divided and well developed in some bats. Several *glenoid surfaces* occur in the rays amongst fishes; and in one fish (the Ophid fish or *Lumpfish*) the coracoid attains an immense development.

Scapular, or **Scapulary** (from Lat. *scapula*, 'the shoulder'), is an article of dress worn by religious orders and devout persons in the Roman Catholic Church. It was substituted by St. Benedict (q. v.) for the heavy cowl formerly worn by monks. In form the S. is a vestment of woollen stuff, which passes over the head and rests on the shoulders, with a band hanging down both before and behind. A small S. is carried about by some of the faithful for purposes of devotion.

Scarabeus, or **Beetle-Stone**, is a stone signet or amulet carved into the form of a beetle, belonging to the group *Scarabæidae*, and bearing an intaglio device on a flat base. Scarabæi were among the earliest products of the art of engraving on stones, being executed in great numbers by the Egyptians, Phœnicians, and Etruscans. The insect most frequently figured by the former people was the 'sacred beetle,' *Ateuchus* (syn. *Scarabeus*) *sacer*, which was worshipped as an emblem of Phthah, the creative power, on account of its peculiar habit of forming little balls or pellets of dung as depositories for its eggs. It was also regarded as a symbol of Phrah, the sun. The S. of Egyptian origin has been found of different sizes from less than half an inch to upwards of a yard long. The smaller kinds are carved in steatite, limestone, or terra cotta, the last two materials being usually coated with a pale blue vitreous glaze; colossal sizes are cut in basalt, granite, &c. The S. of the Etruscans differed from the Egyptian in being always formed of *pierres fines*, as sard, onyx, &c., and in seldom exceeding an inch in length. Heroes, chariots of war, and such like warlike subjects are invariably cut in intaglio on Early Etruscan scarabæi, hence it is supposed they constituted rewards for military prowess among that people. The Greeks adopted the *scarabæoid* form for signet-rings and necklace pendants. Many of the talismans of the Alexandrian Gnostics also took the form of scarabæi, and like ornaments, of reputed prophylactic virtue, continued to be worn so late as the 16th c.

Scarabæidæ, or **Scarabæidæ**, otherwise named *Lamellicorn Beetles* of Latreille, are a large and important family of *Coleoptera* (q. v.) numbering about 700 genera and 6000 species. Many of these are veritable giants among beetles. The S. are recognised by their clubbed *antennæ* or *feelers*, the last joints of which are expanded to form a series of flattened leaves. The legs are strong and usually terminated by thick claws. The *larvæ* are large fleshy grubs, and have long four-jointed antennæ. The classification of this group is still undetermined. One proposed system divides the S. according to their food. Some of the more notable genera are *Scarabeus* itself, *Goliathus*, *Dynastes*, *Cetonia*, *Macrodactylus*, *Melolontha*, and *Geotrupes*.

Scaramouch (Fr. *escarmouche*, from Ital. *Scaramuccia*, 'a skirmish'), a character of the old Italian comedy, substituted about 1680 for the Spanish *capitan*, some of whose characteristics

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Scarlatt'i, Alessan'dro, founder of the famous Neapolitan school of music, was born at Trapani, in Sicily, in 1649. He was instructed by Carissimi at Rome, after which he studied at Bologna, Florence, and Vienna. The remainder of his life was spent in the most active cultivation of his art in Naples. He composed more quickly than his copyist could write, and left over a hundred operas, twice that number of masses, besides numerous cantatas, oratorios, and much chambermusic. Among the best of his dramatic works are *Teodora* (1694), *Laodicea e Berenice* (1701), and *Il Medo* (1708). A master of harmony, his modulations were ingenious and pleasing, and his style was rich, learned, and inventive. In addition to many other improvements in the art of music, he was the inventor of the obligato recitative and the ritornel. He treated the Overture (q. v.) in an entirely fresh and original manner. Durante, Hasse, and Logroscino were among his pupils. He died in 1728.—**Domenico S.**, son of the preceding, was born in Naples in 1681. In his youth he was attached to Handel, from whom he derived much instruction. He was a master of the harpsichord, and his forty-two *Pieces pour le Clavecin* were for many years considered the highest test of proficiency in a pianist. His compositions are marked by variety, grace, and charm of melody. He died in 1757.—**Giuseppe S.**, grandson of Alessandro S. (1708-76), was a successful composer of operas and works for the harpsichord. See Fétis, *Biogr. Univer. des Musiciens* (new ed. 1878).

Scarlet is a brilliant red colour slightly tinged with yellow. As a dye colour it is chiefly prepared from cochineal with a double chloride of tin and ammonium, called S. spirits.

Scarlet Runn'er. See KIDNEY BEAN.

Scarps, Anto'nio, an Italian anatomist and surgeon, was born at Motta, in Treviso, June 13, 1747. He studied at Padua and Bologna, and in 1772 became professor of anatomy at Modena, and surgeon to the hospital. Displeased at the reforms wrought by Duke Ercole III., he resigned his post in 1780, and sought solace in travel. In 1784 he accepted the chair of anatomy at Pavia. Here, as at Modena, he enriched his science by many valuable discoveries relating to nervous action, diseases of the eyes, aneurisms, &c. Failing eyesight induced him to resign in 1804; but at the request of Napoleon he resumed his duties, and continued to perform them till 1812. Subsequently, when Pavia was restored to Austria, he was made director of the medical faculty, a post which he soon resigned. He died at Pavia, October 31, 1832. The most important of S.'s numerous works are *De Structura Fenestra rotunda duris* (1772), *De Gangliis et Plexibus Nervorum* (1779), *Anatomicæ Disquisitiones de Auditû et Olfactû* (1789), *Tabula Neurologica* (1794), *De Anatomia et Pathologia Ossium* (1827), *Sulle principali Malattie degli Occhi* (1801; 5th ed. 1816), *Sull' Aneurisma* (1804; Eng. trans. 1808, 1819), *Sull' Ernie* (1809-10; 2d ed. 1820). His complete works were collected by Vanoni, and published at Florence (5 vols. 1836-39).

Scarpanto, or Karpath'o, an island in the Mediterranean, 40 miles N.E. of Crete, is 32 miles long, and from 4 to 8 miles broad. It is mountainous, the highest summit being 4000 feet high. It belongs to Turkey. Pop. 5000, who are mostly engaged in carpentry.

Scarr'on, Paul, born at Grenoble in 1610, was the son of a councillor of parliament. His youth was given up to excesses of all kinds, and at the age of twenty-seven he became a paralytic, through exposure to frost during an insane and indecent frolic. His body assumed the shape of a Z, and he could move only his hands, yet the laugh never left his lips, and the one thing impossible for him was to be serious. Writing by turns plays and amusing begging letters for pensions and benefices, he managed to live in comfort, and welcomed the gay world nightly at his supper table. In 1651 he married Françoise d'Aubigné, afterwards notable as Mme. de Maintenon (q. v.). She was then a girl of sixteen, glad to save herself from a convent by marrying a cripple with whom she had not a taste in common. Her influence on his life was for good, however, and at his table she introduced something like decorum. Of S.'s works (collected by Bruzer de la Martinière (10 vols. Par. 1739; new ed. 7 vols. 1786), the only two now read are his *Virgile Travesti* (1648-52), an intensely comical parody which gave rise to numberless continuations and imitations, and the *Roman Comique* (1651). Both have been trans-

lated into English. Within a few minutes of his death S. said to his tearful attendants, 'My good friends, I shall never make you weep so much for me as I have made you laugh.' His last words were characteristic, 'I could never before believe it so easy to laugh at death.' S. died October 16, 1660. See Segrais, *Mémoires Anecdotes*; Th. Gautier, *Les Grotesques*; and D'Avalon, *Scarroniana*.

Scar'us, a genus of Teleostean fishes, including those species which browse on coral-polypes, and which are named 'Parrot fishes.' They are allied to the *Labridæ* or Wrasses, and their jaws are incrustated with numerous minute teeth.

Scap Duck (*Nyroca marila*), a species of *Anatida* or ducks, allied to the Pochard (q. v.), and found in northern regions in summer, but migrating far S. in winter. The bird attains a size equal to that of the pochard. Its colour is black on the head, neck, and back, the hinder parts being white, whilst a rich green glosses the cheeks. The under parts are white. The female has brownish tints.

Scep'ticism (Gr. *skeptomai*, 'I doubt, or consider') is that negative species of philosophy which distrusts the power of consciousness to tell of ought beyond self, and consequently denies the possibility of a complete theory of existence. As soon as dogmatism had set its seal on the speculations of Socrates, Plato, and Aristotle, the sceptical school of Pyrrho arose in opposition, and proclaimed that man was surrounded by the incomprehensible. From Pyrrho's time to that of Hume great doubts have ever questioned the great dogmatists; and at the present day the physiologists have driven philosophy proper into an attitude that can only be called S.

Scep'tre (Lat. *scep'trum*, Gr. *skēptron*, from *skēptō*, 'I lean'), an ornamental staff carried by sovereigns from remote times as an emblem of supreme power and dignity. The Hebrew word translated S. in the Old Testament, signifies, in its original sense, a long plain staff, and probably it was first adopted as a badge of authority by the early nomad rulers. In ancient Greece the S. was borne by kings and princes, and as a badge of office by judges, heralds, priests, and magicians. Oriental monarchs inclined the S. as a mark of favour, and submission to them was expressed by kissing the S. Gold and jewel-stones have long been used in the construction of the S., which was early surmounted by a distinctive figure or emblem, as, for example, the eagle chosen by the Roman monarchs. The S. has varied much in form in different countries at different periods.

Schad'ow, Johann Gottfried, a German sculptor, was born at Berlin, 20th May 1764, and after studying at Rome was appointed, in 1788, secretary to the Academy of Art in Berlin, where he died 27th January 1850. He modelled the quadriga of the Brandenburg Gate, Berlin; and among his chief works are statues of Ziethen in Berlin, Friedrich the Great in Stettin, Blücher in Rostock, and Luther in Wittenberg.—**Budolf S.**, eldest son of the preceding, born 9th July 1786, was a student of Thorwaldsen and Canova, and subsequently a disciple of the Romantic school, under the influence of which he produced many finely-fancied mythological groups. He died 31st January 1822.—**Friedrich Wilhelm S.**, another son, was born 6th September 1789. After receiving his first lessons as a painter from Weitch, he went in 1810 to Rome, where he met Overbeck, Cornelius, and Veit, and became a convert to the Roman Catholic faith. He was made a professor in the Berlin Academy (1819), and director of the Düsseldorf Academy in place of Cornelius (1826). His fame attracted to the 'Düsseldorf school' such pupils as Lessing, Karl Sohn, Th. Hildebrandt, Kethel, and Hübner. He was a leader of the Romanticists, and among his principal works are 'The Four Evangelists,' 'Christ on the Mount of Olives,' 'The Ten Virgins,' and 'The Fountain of Life.' S., who showed little aptitude for 'high art,' was a master of subtle, conscientious methods, and a humble worshipper of nature. He wrote *Ueber den Einfluss des Christenthums auf die bildende Kunst* (18:2) and *Der Moderne*



Sceptre.

Vasari (1854). In 1843 he was made a Prussian peer, with the title Von S.-Godenhaus. He died 19th March 1862.

Schäfer, Johann Wilhelm, was born at Seehausen, near Bremen, September 17, 1809. He studied at Leipzig for four years, and became in 1831 assistant-teacher, and in 1834 professor in the chief school of his native town. Here he wrote his valuable works on the literature of Germany, of which the chief are *Handbuch der Geschichte der deutschen Literatur* (1842-44; 2d ed. 1855); *Tabellen zur Geschichte der deutschen Literatur* (1853; 2d ed. 1869); *Geschichte der deutschen Literatur des 18 Jahrh.* (3 vols. 1855-57; 2d ed. 1859); *Schiller* (1853); *Goethe's Leben* (2 vols. 1851; 2d ed. 1858); *Literarische Bilder* (1861; 2d ed. 1873); and *Zur deutschen Literaturgeschichte* (1864). He also edited Oeser's *Geschichte der deutschen Poesie* (1859; 3d ed. 1871).—His brother, **Arnold Dietrich S.**, was born at Seehausen, October 16, 1819, was made professor of history in Greifswald University in 1858, and since 1865 has occupied a similar position in Bonn 'Hochschule.' Among other historical works he has written *Demosthenes und seine Zeit* (3 vols. 1856-58), *Abriss der Quellenkunde der griech. Geschichte bis auf Polybius* (1867), *Geschichte des Siebenjährigen Krieges* (2 vols. 1867), and *Die Hansa und die Nord-deutschen Marine* (1869).

Schaff, Philip, LL.D., was born at Coir, Switzerland, January 1, 1819. He studied at Coir, Stuttgart, Tübingen, Halle, and Berlin, where he graduated B.D., and subsequently (1842-44) lectured in the university on exegesis and Church history. In 1844 he was called to America as professor in the theological hall of the German Reformed Church at Mercersburg, Pennsylvania. In 1863 he removed to New York, and in 1870 became professor of sacred literature in the Union Theological Seminary in that city. He is a member of various historical and literary societies in Europe and America, is an active promoter of the Evangelical Alliance, and president of the American Bible Revision Committee. His chief works are *The Principle of Protestantism* (1845), *Life of St. Augustine* (1853), *History of the Apostolic Church* (1853, Leips. 1854, Edinb. 1855), *Person of Christ, with a Reply to Strauss and Renan* (1865), *History of the Christian Church from A.D. 1-590* (3 vols. 1867, to be continued), *The Vatican Council* (1875), *History and Collection of the Creeds of Christendom* (3 vols. 1876), and *Bibliotheca Symbolica Ecclesie Universalis* (3 vols. 1877). S. is also editor of the Anglo-American reproduction of Lange's *Critical, Theological, and Homiletical Commentary on the Bible* (24 vols. 1864-78), and joint-editor of *The Philosophical and Theological Library*, begun in 1873.

Schaffhausen, the most northern and one of the smallest of the Swiss cantons, lies in three portions on the right bank of the Rhine, and is bounded N.E. and W. by the Grand Duchy of Baden, and on the S. is separated by the Rhine from the cantons of Zürich and Thurgau. Area, 113 sq. miles; pop. (1876) 38,925. The surface is hilly in the centre, and is occupied in the N. by the Randen range (rising to 3000 feet), and in the N.W. by the Klettgauberge. It is drained by the Rhine and its feeders, of which the Bache is the principal. The soil is uniformly fertile; 40,000 acres are arable, and yield abundantly corn and potatoes. Good wine is produced in the Klettgau district. 22,233 acres are occupied with wood, and 6225 acres are meadow pasture. There are manufactures of silks, files, cast-steel wares, and enamelled tiles. S. sends two members to the National Council, and is governed by a great council renewed by ballot every four years.—**S.**, the capital of the preceding Canton, on the right bank of the Rhine, is 60½ miles E. of Basel by rail. It has still the mediæval appearance of a Swabian imperial town, and has walls, many quaint old gabled houses, a college, and a citadel erected in 1564. Its cathedral (1104-1453) is a fine basilica; the Johanniskirche was founded in 1120. The library (Bürger-Bibliothek) contains more than 20,000 vols., and the MSS. of the famous Johann von Müller (q. v.), who was born here in 1752, and to whom a monument has been erected on the Vesenstaub. S. has manufactures of ironware and silks. Pop. (1870) 10,303.

Schall, Johann Adam von, a celebrated missionary, was born at Köln in 1591. He entered the Society of Jesus in 1611, and after several years' study was sent as a missionary to China in 1622. His great scientific reputation led to his being called

in 1631 to Pekin, where he was intrusted with the revision of the Chinese calendar, then in complete confusion. S. rose rapidly in the favour of the emperor, to the disgust of the court officials, and had the same good fortune under his successor, Shun-Tchi, the founder of the Manchu Tartar dynasty (1647), whom he even induced to sanction the erection of a great Catholic church at Pekin, and permit the free preaching of Christianity throughout the empire. The converts of S.'s mission numbered, it is said, 100,000. The tide turned, however, during the minority of Khang-Hi, when S. was twice imprisoned, and his assistants were banished to Tartary. He died in prison, August 15, 1669. Fourteen MS. vols., written in Chinese by S., are preserved in the Vatican Library. See Huc, *Le Christianisme en Chine*, vols. ii. and iii. (Par. 1857-58).

Schamyl. See SHAMYL.

Schamhorst, Gerhard Johann David von, a Prussian general, was born at Hämelsee, in Hanover, November 12, 1756. He entered the Hanoverian army in 1776, was made teacher in an artillery-school (1782), and served against France as chief of a battery in 1793. In 1801 he entered the Prussian service, and became director of the military academy of Berlin. Raised to the staff in 1804, and subsequently to the rank of a general, he was present at the battles of Auerstädt and Eylau. After the Peace of Tilsit in 1807, he was placed at the head of the administration of Prussian military affairs. Together with Gneisenau he skillfully evaded the provision in the Treaty of Paris (1808), limiting the Prussian army to 42,000 men, and by training fresh bodies of men in relays, raised the number actually to 271,000. He accompanied Blücher as chief of the staff in the campaign of 1813. On May 2, 1813, he was wounded at Grossgörschen, and died June 28 of the same year at Prague when on his way to Vienna to persuade Austria to join the allies against Napoleon. His chief works are—*Handbuch für Offiziere* (3 vols. 1797-1800; new ed. by Hoyer, 4 vols. 1817-20), *Taschenbuch für Offiziere* (1793; 4th ed. 1816), and *Militärischen Denkwürdigkeiten* (5 vols. 1797-1805). See Ranke's *Historisch-polit. Zeitschrift* (vol. i.), Boyen's *Beiträge zur Kenntniss des General S.* (Berl. 1833), the biographies by Schweder (1865) and Klippel (3 vols. 1869-71), and Lehmann's *Stein, S. und Schön* (Leip. 1877).

Schässburg (Magyar *Segesvár*), a town of Austria, in Siebenbürgen, on the Great Kokel, has woollen manufactures, and is the centre of a rich agricultural district. The older portion of the town dates from before 1280. Pop. (1870) 8204.

Schaumburg-Lipp'e. See LIPPE.

Scheele, Karl Wilhelm, a celebrated Swedish chemist, was born at Stralsund, December 19, 1742. He was apprenticed to an apothecary in Gothenburg, removed to Malmö in 1765, to Stockholm in 1767, and six years later settled at Upsala, where he became the friend of Linnæus and Bergmann. Here the greatest of his many discoveries were made, including nitrogen, oxygen (discovered previously by Priestley), and chlorine. Tartaric acid he had discovered in 1770 at Stockholm. In 1777 he bought an apothecary business at Köping, near Stockholm, where he continued to add to his fame as a chemist, and where he died, May 21, 1786. He investigated the properties of many organic acids, thoroughly separated the compounds of vanium and manganese, and analysed fluorspar, Prussian blue, and atmospheric air. His collected works were published by Hermsstadt (Berlin, 1792).

Scheele's Green, a pigment of a vivid light-green colour, is a cupric arsenite which is precipitated from a mixture of arsenious acid and sodium carbonate in water on adding cupric sulphate. Scheele first prepared it in 1778. It is soluble in dilute acid and caustic alkalis; with ammonia it assumes a blue colour. S. G. is used as an artist's pigment, and in colouring paperhangings, artificial flowers, and toys. *Swedish green* is a synonym of S. G.

Scheffer, Ary, a French painter of the Romantic school, was born at Dortrecht, Holland, 10th February 1795. His father was a German painter, his mother a native of Dortrecht, and he was educated at Lille. He exhibited in the Amsterdam salon when only twelve years of age, and after his father's death (in 1811) removed to Paris, where he entered the Atelier of Guern.

Facile and fanciful, he threw off many popular *genre* pieces, such as 'La Veuve du Soldat' and 'La Sœur de Charité,' but it was not till the rise of the Romantic school that he acquired his great fame as a delineator of tender sentiment in exquisitely pale, pure harmonies of colour. Among his best-known works are the Faust series (nine in number), 'Mignon,' 'Paolo et Rimini,' 'Gaston de Foix,' 'Dante et Beatrice,' and the 'Femmes Sulistes.' His later works are of a religious character, such as 'Le Christ Consolateur,' 'Le Christ au Jardin des Oliviers,' 'Les Bergers conduits par l'Ange,' and 'St. Augustine et Monique.' He painted portraits of Marie Amalie, wife of Louis Philippe, Lafayette, Beranger, Lamartine, Lord Dufferin, &c. Most of his works were widely circulated by engraving even during his lifetime. A republican, yet a close friend of royalty, S. was concerned in the Carbonari conspiracy of Bédouin in 1822, fought at the barricades in the 'glorious days' of July 1830, was deputed, along with Thiers, then *redacteur en chef* of the 'National,' to offer the crown to Louis Philippe, and conducted the dethroned sovereign and the royal party from the Tuileries in 1848. He died, 15th June 1858. S. has been called the poet-painter, and the epithet refers to a certain pensive, mystic feeling which appears in all his works. A statue of A. S. was erected at Dortrecht in 1862. See Mrs. Grote's *Memoirs of A. S.* (Lond. 1860).

Soheldt, The (Fr. *l'Escaut*, Lat. *Scaldis*), a river of France, Belgium, and Holland, rises in the department of Aisne, about 11 miles N.E. of St. Quentin, flows northwards past Cambrai, Valenciennes, and Condé, enters Belgium near St. Antoine, where it becomes navigable, passes, still in a northerly course, Tournay, Oudenarde, and Ghent, then turns to the N.E. and passes Dendermonde, Rupelmande, and Antwerp, after which it resumes its northern course, and after entering Holland is divided into its two mouths, the Easter and Wester S., by the islands of N. and S. Beveland and Walcheren. On its eastern estuary is Flushing, and on its western Bergen-op-Zoom. Its whole length is 248 miles, of which 74 are in France, 138 in Belgium, and 36 in Holland. At Antwerp it is 1690 feet wide and 46 feet deep. Its principal tributaries are the Lys, Dender, and Rupel, and it forms the centre of a system of canals extending throughout Belgium. A treaty signed in 1839 gave Holland the right to levy a toll of 2s. 6d. per ton on all vessels entering the S., but in 1863 this right was bought up by various trading powers for the sum of £750,000, of which Great Britain contributed £35,000.

Schelling, Friedrich Wilhelm Joseph, one of the most eminent metaphysicians of his time, was born at Leonberg in Württemberg, 27th January 1775. In his fifteenth year he began the study of philosophy in the theological seminary at Tübingen, and obtained the degree of Master of Arts when he was only seventeen, with a dissertation on the Mosaic account of the Fall, in which there are traces of that mythical theory which was afterwards adopted and applied by David Strauss, in the first edition of his *Leben Jesu*. On completing his university career, S. became first a private tutor at Leipzig, and afterwards a professor in the University of Jena, where he edited, along with Hegel, the *Kritische Journal für Philosophie*. After an interval of several years, he was elected president of the Academy at Munich (1807), in succession to Jacobi, and in 1841 became a professor at Berlin. He died at Ragatz, 20th August 1854.

S.'s philosophical views underwent so long a course of development, and passed through such different stages, that in order to understand their connection it is necessary to trace them in relation to the influences under which he himself from time to time came. In his early years he was converted from the system of Kant to that of Fichte, and became indeed, for a time, the expositor and commentator of the latter. Fichte, followed by S., had rejected the doctrine of Kant that there were elements in knowledge besides those contributed by the knowing subject, and that there was a raw material of sensation presented to mind by things in themselves. These Fichte declared to be meaningless abstractions; and constructed a theory of knowledge in which the Ego is entirely creative of its object, being impelled thereto by the moral necessity of realising itself in the practical sphere. In his book *Von der Weltseele* (1798), S. shows symptoms of dissatisfaction with this theory, and attempts to claim for nature a less secondary position than that of the mere product of an intelligence which is after all more or less individual; and in his *System des Transscendentalen Idealismus* (Tüb. 1800) he completely breaks

away from Fichte, asserting Nature to stand as high on the platform of logical reality as Intelligence, and finding an Absolute Existence underlying and embracing both within itself. We can here trace the influence of Spinoza, to whose metaphysics S. was at this time giving great attention. The difference between Spinoza's system and that of S. was that the latter was essentially a theory of knowledge, which was only logically transcended by an Absolute which was simply the pure indifference of Ideality and Reality, while the former was in effect a treatment of the Absolute as a possible *object* of knowledge, being thus dogmatic in the sense which Kant attached to that word. S., while he avoided dogmatism in recognising a theory of knowing as the foundation of all philosophy, failed to reach the highest development of German metaphysics in treating the Absolute as substance instead of as subject. (See the introduction to Hegel's *Phänomenologie des Geistes*.) His philosophy was now a system of objective Idealism, in which Nature and Mind were alike real as being logical aspects of the Absolute, but he had not got over the difficulty of finding a method for transcending the two former and rising to the latter. It is in the third period of his philosophical history that he first does so, in the conception of an 'Intellectual Intuition or Perception,' in which identity is assumed not between Thought and some particular sensuous existence as in ordinary perception, but between Thought and All Being in general. The influence of Jacobi is prominent here, and still more so that of Boehm. In the *Darstellung*, the essential identity of all forms of existence in the universes both of mind and of matter is worked out with great minuteness; subjectivity and objectivity being treated as the two poles of Absolute Impersonal Reason.

S.'s later works exhibit more or less the influence of his great rival Hegel, and contain a great deal of mysticism, the result of his failure to find a satisfactory formula for the expression of his theory of Absolute Knowledge. In his *Vorlesungen über die Methode des Akademischen Studiums*, there is a popular account not only of his metaphysics, but also of his views on ethics and religion, in relation to which he is best known as having first expounded that mythical theory which was applied to the historical criticism of Christianity by Strauss and the Hegelians of the Left.

S.'s collected works were published after his death at Stuttgart in 14 vols., edited by his sons. The best historical accounts of his systems are those in the large histories of later German philosophy by Michelet and Erdmann, in Professor Kuno Fischer's *Geschichte der Neueren Philosophie*, in C. Rosenkranz's *Vorlesungen gehalten im Sommer 1842 an der Universität zu Königsberg*, in Marheineke's *Kritik der Schellingischen Offenbarung's Philosophie*, and Von Hartmann's *S.'s Positive Philosophie als Einheit von Hegel und Schopenhauer*. There are some translations from S. in the *Journal of Speculative Philosophy*, published at St. Louis. His life has been written under the title *Aus S. Leben* (Leip. 1869). See also Fichte's and S.'s *Philosophischer Briefwechsel*, edited by K. F. A. Schelling and F. H. Fichte (Stuttg. 1856).

To the English student S.'s philosophy presents, perhaps, even more difficulties than that of Hegel. There is an element of mysticism which removes it further from the platform of empiricism than even the Abstract Dialectic of the latter. The easiest way of approaching it is, perhaps, after a preliminary study of Fichte, to read the *System des Transscendentalen Idealismus* and the *Vorlesungen über die Methode des Akademischen Studiums*, although these books, properly speaking, belong to different periods.

Of S.'s disciples it is only necessary to mention one or two of the most important, as his school was quickly absorbed into that of Hegel. Rixner, the author of the *Geschichte der Philosophie*, and Troxler were among the most prominent of his pure adherents, but certainly the most distinguished of those who received his ideas was Krause, who afterwards published a system of metaphysics in which the doctrine of Identity was developed into a theory of Pantheism. Franz von Baader (of whose system Professor Baumann has just published an interesting account in the *Philosophische Monatshefte* (B. xiv., Heft 6), carried out the mystical side of his Philosophy into a Theosophy which is more theological than metaphysical, but which has none the less on that account left a permanent impression upon the history of German thought. His collected works have been edited by Hoffman, and published at Leipzig in 16 vols. Lorenz Oken, Nees von Esenbeck, Karl Friedrich Bardach Carus, and Oersted, all became

well known in connection with the theory of natural philosophy, which they worked out into its speculative and experimental applications in the departments of physiology and physics. Eschenmayer and Gorres became prominent on account of their strenuous attempts to ground Apologetic Theology upon the system of Identity; while Steffens, in opposition to Gorres, who was an adherent of Roman Catholicism, became an advocate of the strictest Lutheranism.

S.'s disciples soon, however, ceased to exist as a school owing to internal dissensions. As a system his philosophy is now practically extinct in Germany.

Schenectady, one of the oldest cities in the state of New York, U.S., 17 miles W. of Albany by rail, on the Mohawk River and Erie Canal. It has 16 churches, good educational institutions, the chief of which is Union College, public halls, and a park. There are large locomotive works, foundries, knitting-mills, planing-mills, and carriage factories. S. has 6 newspapers (1 German). Pop. (1870) 11,026.

Schenk'el, Daniel, a celebrated German theologian, was born at Degerlin in Zurich, 21st December 1813. He studied theology at Basel and at Göttingen, and became a 'privat-docent' at Basel in 1838. In the following year he took part in the controversy concerning Strauss's call to Zürich with the pamphlet *Die Wissenschaft und die Kirche: Zur Verständigung über die Strauss'sche Angelegenheit*. He was successively appointed chief pastor of the cathedral at Schaffhausen (1841), professor of theology at Basel (1849), and in 1851 professor of theology, first university preacher, and director of the theological seminary at Heidelberg. S.'s writings during this period—24 *Predigten über Grund und Ziel unseres Glaubens* (2 vols. Zürich 1843-44), polemics against Gervinus on 'German Catholicism' (from 1846), and *Das Wesen des Protestantismus aus den Quellen des Reformationszeitalters beleuchtet* (3 vols. Schaffh. 1846-51; 2d and revised ed. 1862)—bear the stamp of his peculiar 'positive' theology, though their tendency is towards mediation between the opposite Protestant parties. In 1854 he keenly opposed the philosopher Kuno Fischer's call to Heidelberg, and from 1852 to 1859 he acted as co-editor of the *Allgemeine Kirchenzeitung*, the organ of the moderate unionist party. The hostilities between orthodox and liberal churchmen growing bitterer in Baden, S. gradually identified himself with the latter. The 'Oberkirchenrath' having issued in 1858 a new 'Kirchenbuch' of a strongly dogmatic spirit, it was successfully attacked by S.'s party. A liberal ministry and Oberkirchenrath succeeded the old (1859), and the Synod of 1861 granted a new church constitution on the 'Gemeinde Principle,' giving the laity great influence in church affairs. S.'s increasing sympathy with liberal views was apparent in his *Christliche Dogmatik* (2 vols. Wiesb. 1858-59), and his founding (1859) the *Allgemeine Kirchliche Zeitschrift*, a decidedly liberal organ, which led (1853) to the establishment of the 'Protestantenverein.' The most important work of S. is his *Charakterbild Jesu* (Wiesb. 1864; 4th and revised ed. 1873; Eng. trans. by W. H. Furness, 1866), an attempt to represent Jesus as the product of a development purely human, and to explain the story of his resurrection as due to visions of his disciples. This called forth numerous 'Protestadressen,' but the Baden government refused to remove S. from his professorship. Among S.'s other works are *Gespräche über Protestantismus und Katholicismus* (Heidelb. 1852, et seq.), *Unionsberuf des Evangelischen Protestantismus* (ib. 1855), *Die Reformatoren und die Reformation* (Wiesb. 1856), *Die Protestantische Freiheit in ihrem gegenwärtigen Kampfe mit der kirchlichen Reaction* (ib. 1865), *Christenthum und Kirche im Einklang mit der Culturentwicklung* (ib. 1867), and *Friedrich Schleiermacher* (1868). Since the decease (1872) of the *Allgemeine Kirchliche Zeitschrift* and the transference of the headquarters of the 'Protestantenverein' to Berlin, S. has almost retired from the struggle. He has recently edited a *Bibel Lexikon* (Leip. 1868-75), and a revision of his *Christliche Dogmatik* under the title of *Die Grundlehren des Christenthums aus dem Bewusstsein des Glaubens im Zusammenhang dargestellt* (Leip. 1877), displays the complete revolution in his religious views.

Scherz'o (Ital. 'a jest'), a sportive playful movement in a sonata or symphony. In Beethoven's symphonies it superseded the minuet, but before his time was used by Haydn, Bach, and others in quartettes and suites.

Scheveningen, a fishing town and watering place of Holland, province of S. Holland, on the North Sea, 3 miles N.W. of the Hague, with which it is connected by a tramway opened in 1894. It is defended from the sea by a range of sand-hills, and has a summer residence for the king and several excellent hotels. The industries are boat-building, rope-spinning, the making of sailcloth, and extensive fisheries. In 1876 it had 181 vessels with 1514 men engaged in the North Sea fisheries. In 1875 were produced 16,936,550 'steur' or smoked herrings valued at £29,688, and 36,979,350 salt herrings valued at £72,795. Pop. (1869) 7713.

Schie'dam, a town in South Holland, on the Schie, which is connected with the Maas by a canal, 3½ miles W. of Rotterdam by rail. S. is the great centre of the gin manufacture, and had, in 1871, 271 distilleries, producing annually 8,082,030 imperial gallons, one-third of which is exported. It had also 60 malthouses and 20 cooperages. Upwards of 30,000 swine, besides cattle, are fed from the refuse of the distilleries. In the stearine factory, in the same year, were used 2946 tons of tallow and palm-oil in the production of 1208 tons stearine, 638 tons of candles, 874 tons of oleine, and 81½ tons of glycerine. Pop. (1877) 21,880.

Schill'er, Johann Christoph Friedrich von, after Goethe the greatest of modern German poets, was born at Marbach, on the Neckar, November 10, 1759. Both his parents were people of high moral character, and pious and cheerful in their disposition. S. was educated first at the parish school of Lorch, and then, intending to enter the Church, he studied at the public school of Ludwigsburg. Circumstances having altered this intention, the boy enrolled himself in 1773 at the Stuttgart Karlschule with a view to the legal profession. In two years he changed law for medicine, and having completed the prescribed course, he was appointed in 1780 a regimental surgeon in the Württemberg army. Whilst holding this post he published *Die Räuber*, a work which, testifying as it did to the appearance of a great genius upon the field of letters, excited much interest. Several causes made his position at Stuttgart uncomfortable, and it was not made better by the appearance of *Die Räuber*. In October 1782 he left his post. The rest of his life was entirely devoted to literature. Within a year he published two dramas, *Die Verschwörung des Fiesco* and *Kabale und Liebe*, which were represented with great favour at the Mannheim theatre. In 1783 he removed to Mannheim as poet to the theatre. Here he published the *Thalia* (1785-94), a magazine devoted to the interests of the stage. It contained disquisitions, part of *Don Carlos*, *Infant von Spanien*, and many of his smaller poems. The *Philosophische Briefe*, an interesting record of the religious doubts and difficulties that agitated the author's mind, belong also to this period. After an eighteen months' stay at Mannheim he went to Leipzig in March 1785. Here he worked at *Don Carlos*, which was published in 1786. During the next few years he led a somewhat migratory life. He stayed some time at Dresden with Körner, who was subsequently his biographer. At Weimar, where he afterwards went, he was cordially received by Wieland and Herder. On a return visit he was introduced to Goethe, and a warm attachment immediately sprang up between these two great men. This attachment ripened into a friendship the most enduring, constant, and beautiful in modern literary history. Through the influence of his friend S. received in 1789 the appointment of professor of history at the University of Jena. His literary activity during these wandering years had been considerable. He wrote part of a novel, never afterwards finished, entitled the *Der Geisterseher*, and then, turning his attention to historical subjects, he produced the *Geschichte des Abfalls der Vereinigten Niederlande* (1788). Shortly after his appointment he married the Fräulein Lengefeld, and during the fifteen years of life that now remained to him settled down to steady literary toil. Continuing his historical studies, he produced in 1791 his *Geschichte des Dreissigjährigen Krieges*. The same year his health, never very good at the best, completely gave way. He was ordered to cease all literary activity for some time to come. A pension of a thousand crowns for three years, which the Duke of Holstein-Augustenburg and another German noble conferred on him, relieved him from the fear of want, and it seemed to be not merely his privilege but his duty to cease from work. Of one thing he certainly became

free; his connection with the university was thereafter merely nominal. But he only left one kind of toil to engage in another. Had he then ceased his literary labours the world would have been without the greatest of his works, for his most fruitful years of life were just those in which he was most weighed down by bodily suffering. He engaged in profound study of the philosophy of Kant, especially in its aesthetic and moral side; he discontinued the *Thalia*, and, assisted by Goethe, issued the *Horen* (1795-97), and a more popular magazine entitled the *Musen Almanach*. In this last were published from time to time the *Xenien*. These were a number of epigrams containing principles of criticism and severe hits at many literary men of the day. They were written both by Goethe and S. In 1800 the poet resolved to spend his winters in Weimar and his summers in Jena. Shortly before he left the latter place for the season *Wallenstein* was published. This was followed by *Maria Stuart* in 1800, *Die Jungfrau von Orlans* in 1801, the *Braut von Messina* in 1803, and *Wilhelm Tell* in 1804. This was his last work. Afflicted by physical pain, yet strong in the midst of weakness, he had diligently used his allotted span. While projecting great plans for the future, contemplating the production of some work that might perhaps surpass even *Wallenstein*, his course was cut short by death at Weimar, May 9, 1805.

The works of S. fall naturally and conveniently into three groups: (1) his dramas; (2) his briefer poems; (3) his prose works. As to the first of these, *Die Ränber* narrates the adventures of Karl Moor, a young man of noble birth who is driven from his home through the treachery of a brother; becomes captain of a band of banditti, and in his fall destroys with himself those whom he loved. The action is impetuous, the story and characters alike improbable, but a certain wild strength carries the reader away. The defects are forgotten or forgiven for the sake of striking beauties of thought and diction with which the piece abounds. In *Don Carlos* we have the first of a series of historical plays. The story with some variation is taken from Spanish history, but one of the noblest characters, the Marquis of Posa, is quite imaginary. *Wallenstein* is a drama founded on the last days of the hero of that name. This, the greatest of S.'s works, is a trilogy. The first part, 'The Camp,' gives a vivid picture of the dissolute yet brave and experienced army which the great general had collected. The second, 'The Piccolomini,' describes the beginning of the plot and counterplot of which the issues are given in the third part, entitled 'The Death of Wallenstein.' Here the wild passion of *Die Ränber* is succeeded by serene yet mighty strength. The complex feelings that stir men's minds in a great crisis are powerfully portrayed, whilst the picture of Wallenstein, a mind great even in its excesses, a mixed character, with great faults and great merits, charms and delights the reader. The love-scenes between Thekla the daughter of Wallenstein and Max Piccolomini have been blamed by some critics, but they are not really inconsistent with the plan of the work. In a mighty drama there ought to be place for the exhibition of all the great human passions, and the 'silver cord' that love winds among the intrigues of statecraft and war adds an indescribable charm to the whole. *Maria Stuart* and *Die Jungfrau von Orlans* are likewise, as their names imply, historical dramas. In the first the character of Mary is unduly exalted at the expense of that of Elizabeth, but in the second the heroine is painted such as history tells us she must have been. She is indeed represented as forgetting for a moment her divine mission in human love, but her character immediately reasserts itself, and she falls dying, but victorious. Of his last work, *Wilhelm Tell*, the plot is too well known to require re-statement. It is a noble subject nobly treated. Of the shorter poems of S., the lyrics are certainly inferior to those of Goethe or Heine. They do not strike one as expressing that perfect utterance of one single sentiment in which the lyric properly consists, yet they are finely and melodiously written. In the ballad style he was particularly successful, especially when, as in the 'Diver,' some brief and touching incident is to be related. *Das Lied von der Glocke* and *Die Götter Griechenlands* are perhaps his best. The first describes the casting of a bell, and touches on the various human emotions which its ringing will express. The second is a poet's wail over departed beauty. It is a poem touching and beautiful in the highest degree.

Of the prose works of S., the principal are his *Geschichte des Abfalls der Vereinigten Niederlande* and *Geschichte des Dreissig-jährigen Kriegs*. They are written in a clear and entertaining

style. Historical perspective is well observed, and while he has the noblest enthusiasm for freedom, justice, and progress, there is yet perfect impartiality preserved. The great characters who appear on the stage are described as only a great genius could describe them. The histories are not meant to enter into minute and exhaustive detail, but certainly as general histories of the period they surpass anything that has yet been written on the subject.

Although S. must be pronounced inferior to Goethe, yet we cannot wonder that his general popularity has been greater. He deals with subjects universally interesting—the struggle of a great nature with a hard fate and cruel fortune, a mind filled with a lofty enthusiasm for a great mission, or perhaps a heart divided against itself, anxious to do right, and yet induced to do wrong. His own character is reflected in all his writings. He loved what was good and true too ardently to look with indifference even on their representation. He could not contemplate the sins and sorrows of humanity with the artistic calmness of Goethe or the cynical scorn of Heine. A passion for all that is great and right breathes through his writings and inspires his readers. The nobleness of his character compels our respect. It is true he was destitute of humour, and compared to Goethe he is one-sided and seems even narrow, but it is so because he does not look around him, but ever onwards and upwards to what is eternally true and just and beautiful.

A voluminous literature has gathered round the name of S. The first collected edition of his writings appeared in 12 vols. at Stuttgart and Tübingen (1812-15); and supplemental collections were published by Boas, Döring, and Hoffmeister. Gödeke edited a complete critical edition, assisted by Elissen Ortivley, Vollmer, &c. (15 vols. Leips. 1867-77). S.'s correspondence with Goethe appeared in 1828 (fuller ed. 1856; Eng. trans. 1st vol. 1877), with Fichte in 1847, with Körner in 1847, with Wilhelm von Humboldt in 1830. Lives of the poet have been written by Thomas Carlyle (1825), Karoline and Wolzogen (1830; 4th ed. 1851), Hoffmeister (1838-42), Schwab (1840; new ed. 1859), Boas (1856), Pallese (1858-59; 5th ed. 1872), Gödeke (1859), Viehoff (Stuttg. 1874). Among the more interesting recent contributions to the subject are Philip Ulrich's *Charlotte von S. und ihre Freunde* (3 vols. 1860-65); *Geschäftsbriege S.'s*, edited by Gödeke (Leips. 1875), *S.'s Briefwechsel mit dem Herzog von Schleswig-Holstein Augustenburg*, edited by Max Müller (Berl. 1876, embodied in the *Chips from a German Workshop*, vol. iii.). A S. Fund was founded in Germany on his centenary (1859), and the capital, several thousand thalers, yields annually an income to some twenty needy authors. Of fifteen monuments erected to S., the latest was unveiled at Vienna, 9th May 1877.

Schinkel, Karl Friedrich, a German architect, was born at Neuruppen, 13th March 1781. In 1795 he went to Berlin, where he was taught drawing by Professor Gilly, on whose death he was entrusted with the continuation of his teacher's unfinished architectural plans. In 1803 S. travelled to Italy and Sicily, and in 1805 he returned through France to Berlin, deeply impregnated with the spirit of classic art. But political troubles interfered with all great building operations, and S. devoted himself to painting and to a study of the relations between architecture and landscape. When the court returned to Berlin, S. designed additions to the royal palace, and in 1810 he became assessor to the Board of Works. In 1811 he was made associate of the Academy of Arts, in 1819 superintendent of the technical department in the Ministry of Public Works, and next year professor in the Academy of Arts. He died October 9, 1841. His works are very numerous. In Berlin he designed the Royal Guard-House (1818), the Theatre (1819-21), the Schlossbrücke (1828), the Academy of Architecture (1835), the church of St. Nicholas (1830-37), the Old Museum (1834-38), much of the splendid Wilhelmstrasse, and many other monuments and public buildings not only in Berlin and Potsdam, but throughout the country. S. revived classical architecture in Germany, and his work has been much criticised by the devotees of Gothic art. His success as a painter and sculptor proves the manysidedness of his genius. His works are collected in the S. Museum at Berlin. His writings included a *Sammlung architektonischer Entwürfe* (1820-37), *Grundlagen der praktischen Baukunst* (1834), *Werke der höheren Baukunst* (1845). See Kugler's *Kleine Schriften* (vol. iii.), Waagen's

S. als Mensch und als Künstler (1844), Böttcher's *S. und sein Baukünstlerisches Verhältniss* (1857), Wolzogen's *S. als Architekt, Maler, und Naturphilosoph* (1864), and Grimm's *S. und die Anfänge moderner Kunst* (1867).

Schi'nus, a genus of trees and shrubs, natives of S. America. They have unequally pinnate leaves, with a long terminal leaflet; small white dioecious flowers, arranged in panicles, and a round succulent fruit. As with many other plants of the order *Anacardiaceae*, a resinous principle pervades the species of *S.* This, in the case of the leaves of *S. molle*, when they are torn and thrown into water, is discharged with such force as to cause the appearance of spontaneous motion by the recoil.

Schism (Gr. *schisma*—*schizō*, 'I split'), a division or separation in a church on a point of doctrine or discipline. Among the chief of the earlier schisms are the Ebionite (2d and 3d centuries), the Novatian (251 A.D.), Miletian (305), Donatian (311), Arian (first under Damasus, 355; second under Miletian, 361), Nestorian (428), and Monophysite (482). The **Greek S.**, begun in 858, arose out of the hierarchical rivalry and the conflicting claims of East and West, as represented by Pope Nicholas I. and Photius, Patriarch of Constantinople. The rupture was completed by mutual excommunication in 1054. (See GREEK CHURCH.) There were papal schisms concerning the election of the Pope in 963, 1159, 1164, and 1178; but of greater importance than any of these was the so-called **Western S.**, between the rival courts of Avignon and Rome. Urban VI., who was elected Pope April 1378, so exasperated most of his cardinals by his severity, that they elected a rival Pope—Clement VII. (September 1378). As most of the Italians were in favour of Urban, Clement betook himself to Avignon, and there was fighting in Italy between the supporters of the two. Urban was succeeded by Boniface IX. (1389), Innocent VII. (1404), Gregory XII. (1406), and Alexander V. (1409); and Clement by Benedict XIII. (1394). Notwithstanding various attempts at reconciliation on the part of the European princes, as well as of the cardinals, the S. continued till 1409, when both Popes were deposed by the Council of Pisa, and Alexander VI. elected. Benedict XIII., however, remained in S. till his death in 1424.

Schis'ma, a small musical interval, the approximate half of a Comma (q. v.).

Schist (Gr. *schistos*, 'split'), a somewhat indefinite term applied to various fissile foliated rocks of the Metamorphic series, the foliation or splitting being due not to mere stratification, as in shale, &c., but to the arrangement of the component minerals. *Mica-S.* consists of alternate layers of quartz and mica, often very argillaceous, and thus passing into *clay-slate*. When talc or chlorite takes the place of mica, the rock is known as *talcose-S.* or *chloritic-S.* In *hornblende-S.* there is little or no quartz present, but often a considerable admixture of felspar.

Schlag'intweit is the name of three brothers, **Hermann von** (born 1820), **Adolph** (born 1820), and **Robert von** (born 1837), sons of Joseph S., a celebrated oculist of Munich, who have distinguished themselves by their devotion to physical science, and especially by their important contributions to the science of geology. The results of their early researches in Switzerland attracted general attention when given to the world in *Untersuchungen über die Physikalische Geographie und die Geologie der Alpen* (Leips. 1854). Aided by the King of Prussia and the E. India Company, they made an important comprehensive survey of the Indian peninsula, the Himalayas, Tibet, Assam, Ladak, and Cashmere (1854-57), an account of which they published under the title *Results of a Scientific Mission to India and High Asia*, with an atlas of views and maps (4 vols. 1860-77, to be completed in 9 vols.). Independently of this work, Hermann issued *Asien im Indus und His Indus* (4 vols. 1860). In tracing the sources of the Sutlej and Ganges the brothers crossed the Hii Gamini, a pass 22,200 feet high, never previously reached by Europeans. Hermann and Robert returned safely to Europe in 1857, and were ennobled by the King of Bavaria in 1850. Adolph, who remained to complete the Himalayan maps with some geological and magnetic details, was prevented from returning through Bengal by the turbulent state of the Sepah, and while attempting to find his way back to Europe through Chinese Turkestan and Siberia, was murdered at Kashgar, 20th August, 1857. Robert, elected professor of

geography at Giessen, has also made extensive travels in America, the fruits of which are *Die Pacific Eisenbahn in Nordamerika* (1870), *Californien, Land und Leute* (1871), and *Die Mormonen oder die Heiligen vom jüngsten Tage* (1874).

—**Edward S.**, a brother of the preceding, was born in 1831, entered the Bavarian army, and fell fighting against the Prussians at Kissingen, 9th July, 1866.—**Emil S.**, a fifth brother, born 1835, studied law at Berlin, and later became an ardent student of oriental languages and history. He is the author of *Buddhism in Thibet* (Leip. 1863), *Die Könige von Tibet* (Munch. 1866), *Die Gottesurtheile der Indier* (1866).

Schlang'enbad, so called from the number of small harmless snakes in its neighbourhood, a celebrated watering-place in the Prussian district of Wiesbaden, 6 miles W. of Wiesbaden, and 5 miles S. of Schwalbach, in a deep valley 950 feet above the level of the sea. It has eight alkaline springs of a temperature of from 79° to 80° F., which are in great repute for beautifying the skin and allaying nervous disorders. The village is very small, but in the season there are generally from 1500 to 2000 visitors, principally females.

Schle'gel, August Wilhelm von, a German poet, literary historian, and dramatic critic, was born at Hannover, September 8th, 1767. He belonged to a family many of whose members were connected with literature, though he and his brother (mentioned below) are the only two who require special notice. As a child he was carefully trained by his mother. His public education was carried on at the Hannover Gymnasium, and at the University of Göttingen, where he studied theology and philology. After leaving Göttingen he acted for three years as tutor in Amsterdam and then removed to Jena, where he was appointed professor (1798), and honoured with the title of councillor (1800). Here he began his translation from Shakespeare (9 vols. Berl. 1797-1810, afterwards completed by Tieck; new ed. by Ulrici, 12 vols. 1867, et seq.), a work of the very highest merit. As professor he delivered lectures on æsthetics, and along with his brother edited the *Athenæum* (3 vols. Berl. 1796-1800), a critical journal of considerable influence on German literature. He also wrote at Jena his *Ehrenspforte für den Theaterpräsidenten von Kotschube* (a satirical reply to the *Hyperboreischer Esel* of that author), and a volume of poems (1800), and *Charakteristiken und Kritiken* (2 vols. 1801). In 1802 he delivered at Berlin, in which city he then resided, lectures on the *Literatur Kunst, und Geist des Zeitalters* (published in his brother's magazine, the *Europa*), and in 1803 he published *Ion*, a classical drama of little merit. He followed this by his *Spanisches Theater* (2 vols. Berl. 1803-9; new ed. 1845), and his *Blumensträusse der Ital., Span., und Portugiesischen Poesie* (Berl. 1804). Both volumes consist of faithful and excellent translations. In 1803 he became acquainted with Madame de Staël (whose famous work on Germany was directly 'inspired' by him), and remained the constant friend and companion of that lady till her death in 1819. During this time his chief work was his *Vorlesungen über Dramatische Kunst und Literatur*, delivered at Vienna in 1808, and published at Heidelberg (1809-11). His dissertation on the *Nachtungen Lied*, and two other volumes of poems (Heidelb. 1811; 2d ed. 1820), also belong to this period. In 1819 he accepted the offer of a professor's chair at the University of Bonn, where he applied himself with great zeal to Oriental subjects. This resulted in the publication of his *Indische Bibliothek* (3 vols. Bonn, 1820-30), editions of the Indian classics, the *Bhagavad-Gita* (1823), the *Râmâyana* (Bonn, 1829-39), and *Reflexions sur l'Etude des Langues Asiatiques* (Berl. 1832; dedicated to Sir James Mackintosh). He died at Bonn, May 12, 1845, leaving behind him 126 printed works and many writings in manuscript. S. is best known in German literature as one of the founders of the 'Romantic School,' a body of writers who aimed at reviving the modes of thought and feeling prevalent in the Middle Ages, and especially during the Hohenstaufen period of German history. S. helped forward the work mainly by criticism, for, though a man of vast learning, he was not an original creative genius. An excellent translator, he transferred so accurately the thought and even melody of many great poets from foreign languages to his own, that the spirit of the original was almost fully preserved. His critical tendencies led him to depreciate the French classical school and to value Shakespeare very highly. Indeed, he may be said to have been the first writer who instituted that unmeasured worship which the later German writers have paid to the great drama-

tist. S.'s chief work, *Vorlesungen über Dramatische Literatur*, has been translated into English by Black (Bonn, Lond. 1846). His *Sämmtliche Werke* appeared in 12 vols. (Leip. 1846-47), his *Œuvres, écrites en Française* in 3 vols. (1846), and his *Opuscula Latina* (Leip. 1848).—**Karl Wilhelm Friedrich von S.**, brother of the preceding, was born at Hannover, March 10, 1772. He was at first intended for a business life, but soon left commerce to study philology at Göttingen and Berlin, and to devote himself to learning and literature. His first work of importance, *Die Griechen und Römer* (Hamb. 1797), was followed by his *Geschichte der Poesie der Griechen und Römer* (Berl. 1798). He assisted Schleiermacher in the first volumes of his translation of Plato, was then joined with his brother in the editorship of the *Athenæum*, and in 1799 scandalised the German public by the publication of *Lucinde*, a romance directed against the institution of marriage. He did not complete the work, and his next publication was the tragedy of *Alarcos* (Berl. 1802). Subsequently he resided for several years in Paris, where he studied Sanskrit and the art and literature of Southern Europe, lectured on philosophy, and edited the *Europa* (2 vols. Frankf. 1803-5). To this period belong his *Sprache und Weisheit der Indier* (Heidelb. 1808), *Sammlung Romantischer Dichtungen des Mittelalters* (2 vols. Par. 1804), the romance *Lothar und Maller* (Berl. 1805), and a vol. of *Gedichte* (Berl. 1809). On his return to Germany he devoted himself to the study of the history, literature, and architecture of the Middle Ages, and this resulted in his secession to the Roman Catholic Church. His *Vorlesungen über die neuere Geschichte* (Vien. 1811) and *Geschichte der alten und neuern Literatur* (Vien. 1815) contain his views in favour of his adopted creed. His later works were the well-known *Philosophie des Lebens* (Vien. 1828) and *Philosophie der Geschichte* (Vien. 1829). He died at Dresden, June 12, 1829. As a writer his tendencies lie in the same direction as those of his brother, but they were more pronounced. He possessed a share of original genius, and his writings show that he was a man of an ardent and enthusiastic spirit, ready to follow what he believed to be the truth wherever it might lead him; but he was wanting in that which was his brother's chief excellence, the judicial calmness and breadth of view which are so essential to the true critic. His poems are marked by strong patriotic feeling. His *Sämmtliche Werke* appeared in 10 vols. (Vien. 1830; 2d ed. 15 vols. 1846).

Schleiermacher, Friedrich Daniel Ernst, the greatest German theologian of the 19th c., was born at Breslau, Nov. 21, 1768. After studying under the Moravian Brethren at Niesky (from 1783) and Barby (from 1785), he entered the University of Halle (1787), and sat at the feet of Semler and Eberhard. From this date till his appointment as 'Charité-prediger' at Berlin (1796) has been called his 'critico-rationalistic period.' After this he zealously applied himself to pastoral work and the study of Kant, Fichte, Schelling, and 'the holy outcast' Spinoza, and ere long he was drawn into the circle of a new school. He entered with ardour into the literary life of Berlin, associating chiefly with G. von Brinkmann, Scharnhorst, Alexander von Dohna, Henriette Herz, Dorothea Veit, and especially Friedrich von Schlegel, whose 'romantic' principles he embraced with enthusiasm. His first work, *Über die Religion: Reden an die Gebildeten unter ihrer Verächtern* (Berl. 1799; new ed. 1868), which with inspired eloquence maintained that true religion can never come into collision with human culture, if each be but kept to its own scope, was received in Romantic circles as the gospel of the new century. Yet it struck a deeper chord than any of the Romantic leaders save Novalis knew. His *Monologen, eine Neu-jahrgabe, dargebracht dem neuen Jahrhundert* (1800; new ed. 1871), asserting the dominion of personality and will over the world and fate, are the complement of the *Reden*. From 1802 he was court-preacher at Stolpe, where he wrote *Grundlinien einer Kritik der bisherigen Sittenlehre* (Berl. 1803, ended 1834), and in 1804 he was appointed professor and university preacher at Halle, where he wrote the dialogue *Die Weihnachtsfeier* (Halle, 1806; 6th ed. Berl. 1869), a representation of different conceptions of the person and work of Christ. Driven to Berlin in 1807, he busied himself with his translation of Plato (already begun with F. Schlegel in 1804; 5 vols. Berl. 1804-10; 2d ed. *ib.* 6 vols. 1817-28), and was appointed (1808) preacher at the

Trinity Church, and (1810) professor at the University. About this time ended the 'Romantic period' in S.'s career, and what is called his 'period of positive theology' began. To this period belongs his greatest work, *Der Christliche Glaube, nach den Grundsätzen der Evangelischen Kirche in Zusammenhange dargestellt* (2 vols. Berl. 1821-22; 5th ed. 1861). He refers religion to the 'consciousness of the most absolute dependence upon God, whom thought cannot conceive, and the will cannot approach,' maintaining against Pietism the right of free inquiry, and against Rationalism the inestimable importance of the person of Christ, in whom dependence on, and reconciliation with God, had its highest historical realisation. The opposition of the ecclesiastical theologians to S. was chiefly due to their judging his conception of God as tending to Pantheism. S. died at Berlin, February 12, 1834. A complete edition of his works appeared at Berlin (1836-56; I. *Zur Theologie*, 13 vols.; II. *Predigten*, 10 vols.; III. *Zur Philosophie*, 10 vols.), and a popular edition of the *Predigten über den Christlichen Hausstand* (*ib.* 1872-76). His *Pädagogische Schriften* were separately published by C. Platz (Langensalza, 1872; 2d ed. 1876). See S.'s *Selbstbiographie bis April 1794* (vol. i. of his *Gesammelte Werke*); Jonas and Dilthey, *Aus S.'s Leben: In Briefen* (4 vols. Berl. 1858-63); W. Gass, *Briefwechsel mit J. Chr. Gass* (*ib.* 1852); Auberlen, S.: *Ein Charakterbild* (Basel, 1859); Elias Maier, F. S.: *Lichtstrahlen aus seinen Briefen und Sämmtlichen Werken* (Leip. 1863); Schenkel, F. S., *Ein Lebens- und Charakterbild* (Elberfeld, 1868); Dilthey, *Leben S.'s* (Berl. 1870 *et seq.*).

Schlesien (Silesia), a former duchy of the crown of Bohemia, divided since 1742 into Prussian and Austrian S. In 1537 an agreement (*Erbverbrüderung*) was made between the Duke of Liegnitz, one of the princes of Silesia, and the Elector of Brandenburg, that if either of the reigning families should become extinct, its possessions should fall to the other. The line of Liegnitz died out in 1675, but the Emperor of Germany refused to acknowledge the validity of the contract of 1537, and joined that part of S. which belonged to the line of Liegnitz to Austria as a lapsed fief of Bohemia. In 1740, Friedrich the Great, reviving the claim of Brandenburg, marched into S. without declaring war, and seized the greater part, joining it to Prussia in 1742. It was finally ceded by Austria in 1763, after the First and Second Silesian Wars (1740-42, 1744-45,) and the Seven Years' War (1756-63). The part remaining to Austria was included in Moravia until 1849, when it became a separate crown-land of Austria. (1) **Preussisch-S.**, one of the richest provinces of Prussia, is surrounded N. by Posen, E. by Poland, S. by Austrian S., Moravia, and Bohemia, and W. by Saxony and Brandenburg. Area, 15,666 sq. miles; pop. (1875) 3,863,699. It is of elliptic shape, 250 miles long by 100 broad, and is the highest table-land of Germany, 'spread on the top of Europe, and sending rivers into all the seas.' Of the surface nearly one-seventh is occupied by mountains, three-sevenths are hilly or undulating, and three-sevenths level and fertile plain-land. It is highest in the S. and S.W., where it is separated from Bohemia by the Riesengebirge (q. v.), which extend in continuation of the Erzgebirge and Lausitzgebirge, and from which the surface slopes to the E. and N. From the Bohemian side of these mountains flow the Elbe and Morava; from the Silesian, the Oder and Vistula. S. is traversed by the Oder from S.E. to N.W., and is abundantly watered by the main stream and its affluents, the Glatzer-Neisse, Bober, Malapane, Bartsch, and Lausitzer-Neisse. Forests, principally of pine, from which timber and tar are produced, cover 3680 sq. miles. The principal crops are corn, flax, and hemp. Beetroot, sugar, madder, and tobacco are also raised and largely exported. In the region of Ober-S. are valuable mines of iron, lead, copper, zinc, and coal. In 1872 were produced 9,204,084 tons of coal, 400,670 tons of lignite, and 31,215 tons of iron ore; and in 1877 the iron-works of S. employed 10,294 men, the foundries 2331. The W. part, on the extensive spurs of the Riesengebirge, is one of the most important industrial districts of Prussia; manufactures of cottons, woollens, linens, paper, leather, and damasks, are actively carried on, facilitated by the great water-power. In 1872 S. had 1160 miles of railway. S. is divided into three districts—Breslau, Oppeln, and Liegnitz. Its inhabitants are intelligent, and education is in an advanced state. In the summer of 1877 S. had 35 Gymnasien, with 10,800 pupils, and 524 teachers; 9 Real-

School'men, The, is the name applied to a number of theological writers and philosophers who flourished during the later portions of the Middle Ages—from the eleventh century to the Reformation. Though differing widely from each other in many points, they all agreed in the following particulars: (1) They assumed as a starting-point that the creed of the Church with related dogmas was absolutely true. (2) They were all students of Aristotle as far as his writings were known to them. (3) They took as their special work the reconciliation of the dogmas of the Church with reason. Among the chief points of difference may be mentioned: (1) the question whether the understanding (*intellectus*) or will (*voluntas*) was the supreme principle (Aquinas holding the former opinion, Duns Scotus the latter); and (2) the celebrated controversy as to Nominalism and Realism. (See NOMINALISM.) The Nominalists held that individual objects alone existed, thus the name 'man' merely expressed the fact that there were a number of individual men; but the Realists held that there was a 'universal' or actual objective general idea of man from which as pattern all individuals were formed. The one considered universals to be mere names; the other held them to be the truest existence—they were, as they expressed it, *universalia ante res*. An intermediate theory was propounded by Abelard, and this, under the name of Conceptualism, has been received into modern philosophy. General notions have an existence, but only in the mind, for by a process of thought they are abstracted from individuals by considering the properties in which these agree. Many of the S. were men of genius, and their works exhibit great though perverted ingenuity. Their speculations have, however, little value for modern thought, and the neglect to which they have been condemned is justified by the fact that all their inquiries proceeded on suppositions which philosophy has for centuries refused to acknowledge as well founded. The principal S. were Roscellinus (the founder of Nominalism), Anselm of Canterbury (his great opponent), and Abelard. These belong to the early period of scholasticism. Later were Alexander of Hales, Bonaventura, Albertus Magnus, Thomas Aquinas, Duns Scotus, and William of Occam. See Hauréau, *De la Philosophie Scolastique* (2 vols. Par. 1850); W. Kaulich, *Geschichte der Scholast. Philosophie* (Prag. 1853), and Bishop Hampden, *The Scholastic Philosophy in its Relation to Christian Theology* (3d ed. Lond. 1838).

Schools, Christian and Charitable, were founded at Paris in the end of the 17th c. by Nicholas Barre (born at Amiens, 1621). Having devoted himself to the task of gathering street Arabs in order to educate them and train them to a Christian life, he got a number of ladies to assist him in 1678. This scheme having met with success, he got a number of male assistants in 1681. This was the foundation of one of the most flourishing lay orders in the Roman Catholic Church—the Brothers and Sisters of the C. and C. S. of the Holy Infant Jesus. The work of the order is the secular and religious education of the poor, the instruction given being entirely gratuitous. See Helyot's *Hist. des Ordres Chret.* (Par. 1714-19); Wetzer, *Kirchenlexikon* (Freib. 1854-60), and K. A. Schmidt, *Encyclopædie des gesammten Erziehungs- und Unterrichtswesens* (10 vols. Stuttg. 1859-75).

Schools, Public. See PUBLIC SCHOOLS and PUBLIC SCHOOL SYSTEM OF THE UNITED KINGDOM.

Schools of Design and Schools of Art. The first school of design in this country was established in the year 1837 for the purpose of supplying a remedy for the alleged artistic inferiority in British manufactures to those of continental countries. In accordance with the recommendation of a select committee of the House of Commons, a central institution was established at Somerset House, and a limited number of provincial schools were subsequently founded in the leading manufacturing towns. In 1852 the cost to government of the central school was £3474, and of 17 provincial schools, £6850. In this year was constituted the Department of Practical Art, which was merged in the Department of Science and Art in 1853. The central institution was removed to South Kensington, and the Department from this centre organised an elaborate and complete system of instruction in all branches of art connected with manufactures, encouraged teachers to qualify by granting them certificates on their passing certain stages and attaching thereto a money value,

and offered medals, scholarships, and prizes to students, for whose education grants of from 5s. to 30s. were made. In return the schools were required to make provision for the admission of artisans to classes on low terms, and to supply elementary instruction in drawing to children. In 1862 it was determined that payments by results should wholly regulate the allowances to S. of A. The operations of the Department have produced most gratifying results, and the evidence of leading manufacturers, taken before various committees of the House of Commons, bears witness to a great improvement in taste and elegance of design in native productions.

The objects of the grants voted by Parliament and administered by the Science and Art Department of the Committee of the Council on Education are, 'to promote instruction in drawing, painting, modelling, and designing for architecture, manufactures, and decoration, especially among the industrial classes.' A school of art is defined as a 'room or rooms devoted wholly to instruction in art, where examples of art are always accessible for study and inspection, and where instruction is given by a teacher holding an art teacher's certificate or certificates of the third grade.' The principal subjects of study and examination in S. of A. are painting from still life, anatomy, advanced perspective, architecture, design, drawing from the antique, drawing from life, ornamental modelling, modelling from the antique, and modelling from life. Sums from 10s. to £15 per head are given to these institutions according to the qualifications of successful students, the best works being sent up annually for examination at South Kensington, and entering into national competition. Sums varying from £50 to £100 are awarded to the head teachers of the sixty S. of A. in which the amount of work as tested by results is generally most satisfactory. Building grants not exceeding 2s. 6d. per superficial foot of internal area, to a maximum of 4000 feet, are made to projected S. of A. approved by the Committee of Council, and grants of 75 per cent. are made towards the purchase of approved art examples. In training schools 10s. is paid to the authorities for each exercise of the second grade successfully worked by a resident student in subjects in which he has not previously passed. Aid to art classes (for instruction in elementary drawing) is made from 10s. to 20s. per head for students who acquit themselves creditably in the annual examinations. Students must pay (except in special circumstances) at least 3s. 6d. for each sessional course of instruction in art. The department encourages drawing in elementary day-schools at which children are instructed by teachers holding art certificates of the second or third grade, the payments varying from 1s. to 5s. per child, according to results at the annual examinations. The National Art Training School at South Kensington is established for the purpose of training art masters and mistresses for the United Kingdom for the instruction of students. Its course comprises twenty-three stages of instruction, divided into the six groups of elementary drawing and colouring, painting, figure, modelling ornament, modelling figure, and technical instruction, these forming the subjects of third-grade certificates. The prizes awarded in the national competition consist of gold, silver, and bronze medals, books, the Princess of Wales' scholarships awarded to the two most successful female students of the year, and several money prizes given by various firms and companies for specified subjects of design, besides the Owen Jones Memorial prizes given by the Society of Arts. The works exhibited at the national competition in 1878 numbered about 1400, selected from 138,045 works sent out from 142 S. of A.

According to the twenty-fifth Report of the Science and Art Department, published in August 1878, the total number of S. of A. in operation throughout the kingdom in 1877 was 144, with 29,414 students who paid £35,346 in fees. There were 910 art classes with 29,579 students, and 3767 elementary schools where 549,010 children (of whom 403,208 were examined in March 1877) were taught drawing. The total number of persons taught drawing, painting, and modelling through the agency of the department was

In 1875	...	...	449,689
„ 1876	...	...	530,412
And „ 1877	...	...	610,620

In the five years 1873-77, the institutions in which instruction is given in drawing or higher art are nearly doubled, while the total amount given by the department in payment on results rose from £31,918 in 1873 to £49,960 in 1877.

See Report of 1st August 1860 of the Committee of the House of Commons on South Kensington Museum; Report of the Committee of 8th July 1864 on S. of A.; the Annual Reports of the Science and Art Department; and the Science and Art Directories.

Schoon'er, a fast-sailing, sharp-built vessel, usually of small size and with two masts of considerable length and rake. In a 'fore-and-aft S.' both masts are rigged with fore-and-aft sails; in a 'square topsail-rigged S.' the foremast has a square topsail and square topgallant-sail. The first S., said to have been built in Gloucester, Massachusetts, about 1713, was so named from the New England word *scoun*, 'to make ducks and drakes' (comp. Prov. Eng. *scun*, and Scot. *scan*).

Scho'penhauer, Johanna, a German novelist, born at Danzig in July 1770, wrote a large number of novels, of which the chief were *Gabriele* and *Die Tante*, accounts of travel through parts of Europe, and several works on art subjects. Her *Sämmtliche Werke* were published in 24 vols. (Leip. and Frankf. 1830-31). She died at Jena, 18th April 1838. Her novels, which are written in a lively style, show a wide if superficial acquaintance with human life. She will probably be best remembered as the mother of **Arthur S.**, one of the most eminent of modern German philosophers, who was born at Danzig, February 22, 1788. During the early part of his life he was engaged in business pursuits, but on the death of his father he willingly relinquished what was to him an uncongenial occupation, and proceeded in 1809 to the University of Göttingen, where he studied science, history, and philosophy. In 1813 he obtained the degree of doctor from the University of Jena. His thesis, a powerful and original essay, was entitled *Ueber Die vierfache Wurzel des Satzes vom zureichenden Grunde* (Rudolst. 1813; 15th ed. Leip. 1875). In 1819 his great work *Die Welt als Wille und Vorstellung*, appeared in four parts (2 vols. 4th ed. Leip. 1873). After its completion he travelled in Italy, and on his return acted as 'private lecturer' in the University of Berlin. Nobody attended his lectures, and when the cholera appeared in the capital in 1831, S. fled from it in abject terror. He died at Frankfurt-am-Main, September 21, 1860. Besides the works mentioned above, S. wrote *Ueber das Sehen und Die Farben* (Leip. 1816); *Ueber den Willen in der Natur* (1836; 3d ed. 1867); *Ueber die Freiheit des Willens* (1839); *Ueber das Fundament der Moral* (1841). The last two appeared together under the title *Die beiden Grundprobleme der Ethik* (2d ed. Leip. 1860), and two volumes of essays, entitled *Parerga und Paralipomena* (Berlin 1851; 3d ed. 1874). These last consist of a series of brilliant papers on apparitions, death, study, authorship, criticism, and fame, together with bitter attacks on university professors, and a host of caustic and ill-natured maxims. The centre point of S.'s theory is the prominence he gives to will, by which term he means 'not only conscious desire, but also unconscious instinct, and the forces which manifest themselves in inorganic nature.' Thus the world is 'one enormous will constantly rushing into life.' Through all things we see the 'will to live' ever active; all animals are constantly striving to protect their existence against foreign forces, and to perpetuate it. All the gradations through which nature mounts, from low to high, are just so many imperfect states of the objective expression of will. Between the will and the individual object stand the ideas, as that in which the will alone is immediately objective. Imperfectly expressed in numberless individuals, they exist eternally perfect apart from space and time. This continual struggle one against the other, when viewed from a moral standpoint, gives us a theory of Pessimism. Acquaintance with life causes us to relinquish this fruitless struggle—negates the will to live. Thus we have asceticism as a rule of living, and a Buddhist Nirvana, or state of unconsciousness, as the highest possible mental condition. The knowledge, moreover, that our will is part of the universal will, requires us to sympathise with all the unavoidable suffering exhibited in life, for that suffering is caused by the incessant striving and imperfect success of this 'will to live.' As is to be expected from these speculations, S. paints actual life in the blackest possible colours; 'wickedness,' he says, 'has the upper hand, and folly the casting-vote. Life is a business whose profits do not nearly cover its expenses. Everything works for the future, which proves as bankrupt as the present.'

S. was for long a disappointed man. Notwithstanding the

extraordinary merit of his works, and the clear powerful style in which they were written, they fell almost still-born from the press; his lectures were unattended, and he himself was unknown. Fame and pay, he bitterly complained, were reserved for men like Fichte, Schelling, and Hegel. 'These men,' he said, 'ought to be banished from the ranks of philosophers—they were mere charlatans.' 'Nonsense,' he added, 'had culminated in Hegel.' He pretended to be indifferent to the opinion of the world, but indeed he was keenly alive to it, for he was by no means an observer of the practical precepts of his own creed. When at last the tide turned, he could hardly conceal his joy, and the rapid change for the better in his character showed that under other circumstances this philosophical Timon might have been a very different man. Of late years his writings have attracted an ever-increasing circle of readers, and lectures are regularly delivered at the German universities on his philosophy. After all, his estimate of his own merits was the true one, for the world has emphatically decided that the voice of this misanthrope is well worth hearing. Besides the new editions of S.'s separate works, there have appeared *Aus A. S.'s handschriftlich, Nachlass* (Leip. 1864), and his *Sämmtliche Werke* (6 vols. Leip. 1873-74; 2d ed. 1877). S.'s Life has been written by W. Gwennner (2d ed. Brockhaus, Leip. 1878). For a popular and tolerably complete account in English, see *A. S., his Life and Philosophy*, by Helen Zimmern (Lond. 1876).

Schorl Rock, a rock composed of schorl or tourmaline and quartz. It is occasionally associated with mica, felspar, &c., in which circumstances it may be called *schorly granite*.

Schottische' (Ger., Fr. *Écossaise*), a popular slow dance in two-four time, Scotch only in name.

Schouw, Joachim Frederik, a famous Danish botanist, was born at Copenhagen, 7th February 1789. In 1808 he commenced the study of law. After a tour in Norway (1812) with the botanist Chr. Smith, he entered the state-service as a chancery clerk in 1813, became Professor of Botany at Copenhagen in 1820, and in 1841 director of the Botanic Garden. He died 28th April 1852. S.'s chief works are *Grundtræk til en almindelig Plantageographi* (Copenh. 1822; German, Berl. 1823); *Skildring af Veirigtets Tilstand i Danmark* (ib. 1826); *Bidrag til Klimatologi* (ib. 1827); *Europa: Physisk-geografisk Skildring* (ib. 1832; Ger. ib. 1833); *Tableau du climat et de la végétation d'Italie* (vol. i. ib. 1839); *Natur-Skildringer* (2 parts, ib. 1839-45; Ger. trans. by Zeise, Leip. 1851); *Prøver paa en Jordbeskrivelse* (ib. 1851; Ger. trans. by Seebald, Berl. 1851). S. was also an active Liberal politician. He was chosen in 1835 to represent the University in the Assembly of the Estates of Denmark, of which he was president at Roeskilde in 1835 and 1838, and at Viborg in 1836. He was also editor of the *Dansk Ugeskrift* (8 vols. Copenh. 1831-36; continuation, 8 vols. ib. 1842-46), and *Dansk Tidsskrift* (ib. 1847-52).

Schou'wen, an island of the Netherlands, forming part of the province of Zeeland, bounded N. by the S. branch of the Maas, and S. by the Ooster Scheldt. Area, 61½ sq. miles; pop. 16,000. S. produces abundant grain, flax, and madder, and is protected on all sides by dikes. There is considerable trade in salt, sea-fowls' eggs, and oysters. Zierikzee is the chief town, with a pop. (1877) of 7617.

Schu'bert, Franz Peter, an illustrious German musician and the greatest of song composers, was born at Vienna, January 31, 1797. He was trained in the Imperial choir, and was the favourite pupil of Salieri. His precocity nearly equalled that of Mozart—at the age of twelve he had composed songs, sonatas, masses, and overtures in profusion. His short life was spent in obscurity, and his was the not uncommon fate of genius; neglected during life, his fame only blossomed after his death (19th November 1828). Like Heine, he transformed his sorrows into songs, of which he wrote at least 575. His three great collections alone, *Müllerlieder* (1828), *Winterreise* (1826-27), and *Schwanengesang* (1828), manifest the most extraordinary and prodigal lyric power. He raised the *Lied* to a high and distinct branch of art, and treated it in a manner in which he has had many imitators but no rival. Before his time the voice was sovereign. He was the first to assert the equal rights of the pianoforte. His accompaniments, rich in harmony and perfect in expression, are equal in beauty

to the pure, longing, lovely melodies to which they are wed. Goethe's and Schiller's lyrics derive new meaning from his sympathetic imagination. There is a grand dramatic power in his *Erlkönig* and his *Wanderer* (both 1816). S. left in MS. 15 operas, 7 symphonies, including the beautiful symphony in C major, and many quartets, quintets, and trios. Song was the mission to which he was born, but his instrumental works are also full of creative genius, and of the utmost wealth of fancy and melodic power. See his Life by Dr Kreissle von Hellborn (Vienna, 1865), and Wilberforce's *F. S., a Musical Biography* (Lond. 1866).

Schu'mann, Robert, one of the most gifted of modern composers, and the ablest of musical critics, was born at Zwickau, Saxony, June 8, 1810. He studied law at the University of Leipzig, but finally chose music for his vocation in 1830. He was instructed in the piano-forte by Friedrich Wieck, and in composition by Heinrich Dorn, a much-loved master. The late works of Beethoven and the compositions of Schubert had a profound influence over him. In 1834 he started the *Neue Zeitschrift für Musik*, which he conducted for ten years in a broad, generous, and catholic spirit. He chastised Philistinism and quackery with scorpions, but was the warmest friend to earnest endeavour and real merit. In 1840 he married Clara Wieck, the daughter of his former teacher (born 1819), the most accomplished pianist of the day. His life till 1854 was a happy if a laborious one, spent in the affectionate pursuit of an art in which he lived and had his being. But in that year the dark shadow of mental gloom fell upon him and remained with him. He died at Bonn, July 29, 1856. S.'s works are of many-coloured variety, including symphonies, sonatas, cantatas, overtures, and songs. The *Symphony in B Major*, the musical illustrations of Manfred, the cantata *Das Paradies und die Peri*, the novelettes, arabesques, and intermezzi, would alone immortalise him. His style was that of a great romanticist. An enthusiastic and dreamy imagination carried him tragically over unknown paths, where he revelled in fantastic grace and an almost transcendental beauty. See the biographies of S. by Wasiliewski (Dresd. 1858) and Reissman (Berl. 1865). The second edition of his critical writings, *Gesammelte Schriften über Musik, &c.*, was published at Leipzig in 1875, and is partly translated in Fanny R. Ritter's *Music and Musicians, Essays and Criticisms* by Robert S. (Lond. 1877).

Schurz, Carl, an American politician, was born, 2d March 1829, at Liblar, near Köln, and educated at Bonn. He was involved along with Professor Kinkel in the revolutionary outbreaks in Germany in 1848-49; was imprisoned and escaped to Switzerland; but returned under an assumed name to Berlin, and assisted Kinkel to escape from Spandau in 1850. He then went to Paris and London, and in 1852 married and emigrated to America. Here he soon became prominent as leader of the German element in the Republican party. In 1858 he made his first speech in English, and attracted much attention by a series of lectures in New England in 1859-60. President Lincoln appointed him United States minister to Spain in 1861, but he resigned the same year and returned to America to take a prominent part in the war, rising to the rank of major-general on the Federal side. In 1866 he visited the Southern States as Special Commissioner, and published a masterly report on their condition. After editing successively the *Detroit Post* and the *Westliche Post* at St. Louis, he was elected United States senator for Missouri from 1869 to 1875. He was among the supporters of Horace Greeley for the Presidency in 1872, and in 1875 actively supported the candidature of President Hayes. Twelve of his principal English speeches were published at Philadelphia in one volume (1865).

Schuyler, Phillip, an American general and statesman, was born of a wealthy family at Albany, 20th November 1733. He held some minor military command under the colonial government of New York, and on the outbreak of the Revolutionary War was appointed major-general and placed in command of the northern department. The failure of an expedition against Canada, and the insinuations it called forth, led him in 1777 to demand a court of inquiry, which entirely acquitted him of blame. But the events which preceded the battle of Saratoga in 1777 again raised complaints against him, and before the battle was fought he was superseded by General Gates, though he remained with the army. Another court of inquiry again freed

him from all blame, but he resigned his military commands. From 1778 to 1781 he was a member of Congress, and in 1789 he was appointed United States senator for New York. He died at Albany, November 18, 1804. See his *Life and Times*, by B. J. Lossing (2 vols. 1860-62; new ed. 1872).

Schuyllkill ('hidden stream'), a river of Pennsylvania, U.S., which flows S.E., passes Pittsville, and joins the Delaware at Philadelphia. The S. is navigable for freight-boats throughout most of its course of 125 miles, provides part of the water-supply for Philadelphia, and at its mouth affords extensive wharfrage.

Schwab, Gustav, a modern German poet, born at Stuttgart, June 19, 1792, studied at Tübingen (1809-14), travelled through N. Germany, associating at Berlin with Fouqué and Franz Horn, and in 1817 became professor of ancient literature in the Upper Gymnasium at Stuttgart, in 1837 pastor at Somaringen, and in 1842 at St. Leonhardskirche in Stuttgart. Here he died November 4, 1850. His poems, first appearing in periodicals and almanacs, were collected in 2 vols. at Stuttgart (1828-29), and a *Neue Auswahl* was published in 1838 (4th ed. 1851). Among his other works are *Die Schwäb. Alb.* (ib. 1823), *Der Bodensee, ein Handbuch für Reisende und Freunde der Natur, Geschichte und Poesie* (ib. 1827; 2d ed. 1839), *Deutsche Volksbücher* (2 vols. ib. 1836; 4th ed. 1858), *Die Schönsten Sagen des Classischen Alterthums* (3 vols. ib. 1838-40; 4th ed. 1857), and *Schiller's Leben* (ib. 1840; 2d ed. 1841-44). Excellent anthologies are his *Fünf Bücher Deutsche Lieder und Gedichte* (Leip. 1835; 4th ed. 1857), and *Deutsche Prosa von Mäskem bis auf unsere Tage* (2 vols. Stuttg. 1843; 2d ed. 3 vols. 1860). His ballads and romances are by far his best poems; in them he approaches nearer to Umland than any other poet of the Swabian school. See S.'s biography by Klüpfel (3d ed. 1861).

Schwaben (Lat. *Suabia*, Eng. *Swabia*), a former province of South-Western Germany, bounded N. by Franconia and the Palatinate, E. by Bavaria, and W. and S. by the Rhine. Successively conquered by the Alemanni and Suevi, it was raised to a duchy of the Empire by Konrad I. (917), and in 1080 was bestowed by Heinrich IV. on his son-in-law Friedrich, the founder of the House of Hohenstaufen (q. v.). In the struggle for independence which followed on the extinction of that dynasty in 1268, numerous leagues and coalitions were formed, amongst them the Schlägelsbund (1367), Schwäbischer Bund (1376), Marbacher Bund (1405), and Grosser Schwäbischer Bund (1488-1533). From 1512 to 1806 S. was one of the six circles into which the empire was divided, and its territory at present belongs to Baden, Würtemberg, and Bavaria. The title *Schwäbische Dichter*, formerly applied to the Minnesänger of the 13th c., has in more recent times been borne by a school of poetry, founded by Umland (q. v.), and numbering among its members Schwab, Kerner, Pforzer, Mayer, Mönke, &c. See Pfister, *Pragmatische Geschichte von S.* (5 vols. Heilbronn, 1802-27).

Schwan'thaler, Ludwig Michael von, a distinguished German sculptor, was born at Munich, 26th August 1802. The son of Franz S., the court sculptor, his artistic education began at the age of sixteen, and on the death of his father in 1821 he completed several important royal commissions. After a brief visit to Rome, where he became acquainted with Thorvaldsen, he settled at Munich and there passed the remainder of his busy life, with the exception of two years (1832-33) spent at Rome in the preparation of designs for the Walhalla (see RATISBON). The favoured sculptor of King Ludwig, S. is identified with Munich as Rauch is with Berlin. He was prolific to a fault, and the city may indeed be said to be populous with his work. His most elaborate compositions, the pediments of the Walhalla, are singularly graceful and refined, and show a thorough knowledge of the masterpieces of antiquity. He modelled the colossal statue of Bavaria, 54 feet high, the 24 statuettes of the Munich Pinakothek, a bas-relief frieze 300 feet long for the Barbarossa Hall, the 12 statues of the ancestors of Wittelsbach, the 'Battle of Arminius' for the Walhalla, and statues of Goethe, Richter, Mozart, &c. S. was one of the leaders of the 'Romantic' movement in art, and the founder of the school whose chief disciples are Schaller, Widmann, Zambusch, and Brugger. He died 15th November 1848. See Trautmann, *S.'s Reliquien* (Mun. 1858).

Schwarz, Christian Friedrich, a celebrated modern missionary, was born at Sonnenburg in Prussia, October 26, 1762. After three years study at Halle, in 1749 he was ordained at Copenhagen, and next year joined the Danish mission at Tranquebar. In 1766 he transferred his services to the English Society for Promoting Christian Knowledge, removing in the same year to Trichinopoly, and in 1778 to Tanjore. Here he laboured with much devotion and success. His personal influence and the respect in which he was held by the natives are evinced by his being the only ambassador whom Hyder Ali would admit to his presence, and by his being able to persuade the suspicious and reluctant native farmers to bring food to the starving inhabitants of Tanjore on his personal pledge of payment. He died at Tanjore, February 13, 1798. Since 1787 he had been tutor and guardian of the son and heir of the Rajah of Tanjore, who erected a monument to his memory in the mission church there, while the E. India Company also placed a monument to him in St. Mary's Church, Madras. He aided Schultz in translating the Bible into Tamil. See his *Life and Correspondence* by Dr. H. Pearson (3d ed. 1839).

Schwarzburg, House of, one of the oldest German families, begins its authenticated history with Sizzo IV., Graf von S. und Käfernberg (died 1160), who bequeathed S. to his eldest son, Heinrich I., and Käfernberg to his younger son, Günther II. The death of the former in 1184 united the dominions of both under Günther, with whose two sons, Heinrich III. and Günther III., they were again divided. In 1349 Günther XIX., younger son of Heinrich IX., was elected Emperor, but died in the same year. Günther XXXVIII., who died 1553, was the latest common ancestor of the now flourishing line of the house of S., his eldest son, Johann Günther, founding the line of S.-Sondershausen (q. v.), and Albrecht that of S.-Rudolstadt (q. v.).

Schwarzburg-Eudolstadt, a German principality lying on the N. side of the Thuringer-wald, surrounded by Prussian territory and the Saxon duchies, and consisting of the Upper lordship (284 sq. miles; pop. (1875) 60,162), and the Lower lordship (80 sq. miles; pop. (1875) 16,154). The surface is covered with spurs of the Thuringer-wald and watered by the Schwarz, the Saale, and the Ilm. The soil is fertile, and produces abundantly corn, potatoes, tobacco, hops, fruits and vegetables. Wine is produced in the Saale valley. Forty per cent. of the surface is covered with wood, the half of which is State property. The chief minerals are copper, cobalt, porcelain-earth, slate, marble, peat, lignite, and salt. Porcelain and glass are manufactured. The form of government is a constitutional and hereditary monarchy. The constitution dates from 1854 (modified November 16, 1870). The Diet consists of 4 deputies of the highest assessed inhabitants, and 12 deputies elected by the people. The budget for the years 1876-78 states the revenue at £89,703, and the expenditure at £88,856.

Schwarzburg-Sondershausen, a German principality in Thuringia, almost surrounded by Sachsen-Preussisches, and consisting, like S.-Rudolstadt, of an Upper lordship (area 132 sq. miles; pop. (1875) 31,321), and a Lower lordship (area 201 sq. miles; pop. (1875) 36,159). Of the surface, watered by the Helbe and Wipper, 29 per cent. is under wood, of which 65 per cent. is the property of the state. The crops raised are the same as those in S.-Rudolstadt. The chief minerals are manganese, iron ores, and lignite. The principal industries are tanning, linen, cotton, glass, porcelain manufacture, and brewing. The government is similar to that of S.-Rudolstadt. The budget (1876-79) states the annual revenue at £108,237, and expenditure £107,567.

Schwarzenberg, a German princely house, founded by Erkingen von Seinsheim (originally *Savonshheim*), who in 1406 got the office of Hereditary Master of the Hounds in the Duchy of Franconia, and was in 1417 made baron by the Emperor Sigismund. He bought the lordship of S. in Franconia in 1420, and in 1429 received a seat and vote in the Franconian *Grafenkollegium*. He died in 1437, and his two sons founded the Bavarian and Franconian branches, the former of which became extinct in 1646. The representatives of the Franconian, made 'counts of the empire' in 1599, then became leaders of the house, and in 1674 were raised to the dignity of 'princes of the empire.' The most eminent scions of the family have been—1. **Johann Freiherr zu S.**, belonging to the Bavarian branch.

Born in 1463, he became a field-officer under Maximilian I., but relinquishing military life was appointed chamberlain to the Bishops of Bamberg. He drew up the *Bamberger Halsgerichthordnung* in 1507, and translated Cicero's *De Officiis*. He laboured much for the spread of morality and classical culture, and helped to pave the way for the Reformation. He died in 1528. See Herrmann's *Joh. Freiherr zu S.* (Leip. 1841).—2. **Adam Graf zu S.**, belonging to the Franconian branch, born 20th August 1587, served for some time in the imperial army, and was made premier by Georg Wilhelm of Brandenburg. He zealously supported Austria and opposed Gustavus Adolphus during the Thirty Years' War. On the Great Elector's accession S. was thrown into Spandau prison, where, after four days' confinement, he died, 17th March 1641.—3. **Karl Philipp Fürst von S.**, was born at Vienna, 15th April 1771, and served in the Austrian army against the Turks (1789). By 1799 he had attained the rank of field-marshal-lieutenant, as which he fought at Hohenlinden. In 1805 he commanded a division under Mack at Ulm and Austerlitz. In 1808 he went to St. Petersburg as ambassador, but next year was present at Wagram and skilfully conducted the retreat. He negotiated the marriage between Napoleon and Maria Louisa, and in 1812 Napoleon gave him an auxiliary command of 30,000 Austrians during the invasion of Russia. Created, however, field-marshal and generalissimo of the Allies (1813), he helped to crush the French Emperor at Kulm and Leipzig; and after the battle of Waterloo he led the army of the Upper Rhine to Paris. S. died at Leipzig, 15th October 1820. See Prokesch-Osten, *Denkwürdigkeiten aus dem Leben des Fürsten S.* (Vien. 1823).—4. **Felix Ludwig Johann Friedrich Fürst S.**, nephew of the preceding, was born 2d October 1800, entered the army in 1818, went as diplomatic attaché in 1824 to St. Petersburg, and subsequently to London, Madrid, Lisbon, Paris, Berlin, the Hague, and Turin. In 1846 he was ambassador at Naples, but having been insulted by the mob left in 1848. He took part in the war with Italy, and conducted the subsequent negotiations. After the Revolution of October he entered Vienna at the head of the troops, and was made minister president. By his activity he crushed the Hungarians and facilitated the political unity of Austria. He died 5th April 1852. See Berger's *Leben* (Leip. 1852).

Schwarzwald. See BLACK FOREST.

Schwedt, a town of Prussia, province of Brandenburg, on the left bank of the Oder, 31 miles above Stettin, and 60 miles N.E. of Berlin by rail. It was formerly the residence of the Markgrafs of Brandenburg-S., has a castle of 1580, and manufactures soap, tobacco, cloth, &c. Near it is the château of Monplaisir. Pop. (1875) 9592.

Schwegler, Albert, a member of the Tübingen school of German theology, was born at Michelbach in Würtemberg, February 10, 1819. After studying at Tübingen (1836-40), he became in 1842 parish vicar at Bebenhausen, but resigned his charge in 1843, when he became a *privat-docent* in philosophy and classical philology at Tübingen. He received in 1848 the extra-professorship of Roman Literature and Antiquities, and still later that of Ancient History. He died January 5, 1857. *Die Geschichte der Philosophie*, his best-known work (Stuttg. 1848; new ed. 1857), has been translated into English by Professor J. H. Seelye of Amherst (New York, 1856) and J. H. Stirling (6th ed., Lond. 1877). His other works are *Der Montanismus und die Christliche Kirche des 2. Jahrh.* (Tüb. 1841), *Das Nachapostolische Zeitalter* (ib. 2 vols. 1846), *Röm. Geschichte* (3 vols. Stuttg. 1853-58), and *Geschichte der Griechischen Philosophie* (Tüb. 1859). He also published editions of the *Clementine Homilies* (Stuttg. 1847); Aristotle's *Metaphysics*, with translation and commentary (4 vols. Tüb. 1847, et seq.); and Eusebius' *Ecclesiastical History* (2 vols. Stuttg. 1852).

Schweidnitz, a town of Prussia, province of Schlesien, 42 miles S.W. of Breslau by rail, was formerly capital of a principality of that name. During the Seven Years' War it sustained four sieges, two by the Prussians and two by the Austrians. It has manufactures of wool, leather, gloves, farm implements, and beer. Pop. (1875) 19,892.

Schweinfurt, a town of Bavaria, on the Main, 34 miles W. of Bamberg by rail. It has a townhouse of 1570, a Gothic church of the 13th c., and a gymnasium founded by Gustavus

Adolphus, who also constructed the fortifications which still in part surround the town. The manufactures are sugar, tobacco, paperhangings, saltpetre, potash, ultramarine, S. Green (q. v.), plumbago, and cotton. There are also breweries, markets for cattle and horses, and the neighbourhood produces wine. Pop. (1875) 11,250. S. is the Roman *Trajectus Suevorum*, or *Suevo-furtum*. S. became a free city in 1112, and in 1814 it was united to Bavaria. A medallion (since 1867) marks the house where the poet Rückert (q. v.) was born.

Schwein'fürt Green (Ger. *Wienergrün*), aceto-arsenite of copper, is a velvety green pigment, more brilliant, lighter, and less affected by damp than Scheele's Green (q. v.), as a substitute for which it is employed. It was discovered at Schweinfürt in 1814, and is prepared by fusing arsenious acid and acetate of copper. It is used in Paris for tinting fabrics for artificial flower-making, is known in commerce as *Paris Green*, *English Green*, *Emerald Green*, &c.

Schwein'furch, Georg August, a distinguished African explorer, was born at Riga, 30th December 1836. He studied natural science, especially botany, at Heidelberg, at Munich, and at Berlin, where he took his degree as Doctor of Philosophy. He was entrusted to arrange and describe the collection of plants made by the young Freiherr von Barnim on his fatal journey with Dr. Hartmann in the Nile valley in 1860. In 1863 he himself botanised in the Nile delta, passed along the shores of the Red Sea, skirted the highlands of Abyssinia, and after reaching Khartum returned to Europe in 1866. Having submitted to the Royal Academy of Science of Berlin a plan for the botanical exploration of the equatorial regions lying W. of the Nile, he received a grant from the Humboldt Institution and set out for Egypt in 1868. During three years he was absent in Central Africa, and before he returned his name had already become famous. Joining the party of an intelligent ivory-trader at Khartum, he passed up the Nile to the point where it suddenly takes its last great southerly bend, then striking out of the beaten track he explored for the first time the basin of the Gazelle, the great western affluent of the Nile, and visited the country of the Bongos (q. v.), Dinkas (q. v.), Dyooras (q. v.), and Niam-Niams, and the unknown kingdom of Monbuttoo. In the latter country he discovered the great westerly-flowing Welle, identified by Stanley (1876) as the Aruwini, which has a breadth of 2000 yards at its confluence with the Congo. This river, according to Stanley (*Through the Dark Continent*, 1878), will be of immense importance in the commercial development of Africa. The work in which S. gave to the world the results of his travels, *Im Herzen von Afrika* (2 vols. 1873; Eng. 1873; Fr. 1875), is alike remarkable as a contribution to the Nile problem, a complete scientific account of vast and newly-discovered regions, and as a fresh, fascinating, highly skilful narrative. The most thoroughly equipped of all African explorers, S. is an enthusiastic scientist, a master of botany, and an accomplished draughtsman, and unites with rare powers of observation and endurance the keen, adventurous spirit of the traveller. As an instance of his wonderful patience and perseverance, for the last six months of his journey, when deprived of mechanical means of computing distance, he had recourse to counting his footsteps. In this way he recorded a million and a half strides, and to the practice ascribes 'some of the most reliable results of the survey of my route.' S. by his discovery of the Akkas put an end to all doubt as to the existence of a dwarf race in Central Africa (see GIANTS AND DWARFS). His other works are *Plante quadam Niloticæ* (1862); *Beitrag zur Flora Ethiopiens* (1867); *Reliquia Kotschyanae* (1868), and *Artes Africanae* (1875). In the service of the Khedive he established a geographical society in Cairo, 1875, and, along with Dr. Güssfeldt, travelled in the deserts between the Nile and Red Sea. In 1876 a brother of S. founded in his honour a S. Institute at Riga, with a capital of £1600.

Schwer'in, a town of Germany, capital of the grand-duchy of Mecklenburg-S., prettily situated on the Schwerinsee (14 miles long by $3\frac{1}{2}$ broad) and several smaller lakes, 47 miles S.E. of Lübeck by rail. It has a fine castle, erected 1845-58, a Gothic cathedral (begun in 1248, completed in the 15th c.), an arsenal (1844), a theatre (1832-35), a picture-gallery (800 pictures), and several higher schools. The chief industries are iron-smelting, and the manufacture of tobacco, chocolate, and carriages. S. was an ancient Wendish settlement, and from 1170

to 1624 was a bishop's see. Pop. (1875), with garrison (346), 27,989. See *Beschreibung von S.* (Wismar 1857).—**Schwerin an der Warthe** (Polish *Skwierzyn*), a town of Prussia, in Posen, on the river Warthe, 61 miles W. by N. of Posen, has a trade in horses, and manufactures brandy. Pop. (1875) 6580.

Schwer'in, Kurt Christoph, Graf von, a distinguished general of Friedrich the Great, was born in Swedish Pommern, October 16, 1684. After studying at Leyden, Griefswald, and Rostock, he entered the Dutch service as ensign in 1700. In 1704 he fought under Marlborough and Prince Eugene, became captain in 1705, and next year entered the service of the Grand Duke von Mecklenburg. In 1711 he was despatched on a secret mission to Karl XII. at Bender, and in 1719 settled favourably for the Duke his quarrel with the nobility, after defeating their army at Waltmühlen. In 1720 he entered the service of Prussia, acted as governor of Peitz, and in 1740 was ennobled by Friedrich II., appointed field-marshal, and raised to the command of the right wing in the first Silesian War. He contributed greatly to the victory at Mollwitz in 1741, and on the conclusion of the peace was appointed governor of the forts Neisse and Brieg. On the outbreak of the second Silesian War he invaded Bohemia, and directed the siege of Prag, which fell September 16, 1744. In 1756, on the outbreak of the Seven Years' War, he took the command of the third Prussian army, and prevented the junction of Generals Piccolomini and Browne, but fell in the storming of the Austrian camp before Prag, May 6, 1757. S. was the most popular general in the Seven Years' War. A marble monument was erected by the king to his memory in the Wilhelmsplatz in Berlin, and his name is still commemorated in the popular songs of Germany. See *Leben des Grafen von S.* (Berl. 1790).

Schwyz, one of the mountain cantons of Switzerland, bordering N. on the Lake of Lucerne, and S. on that of Zürich. Area 350 sq. miles; pop. (1876) 49,216 (of whom 98 per cent. are Roman Catholics). The highest point in the canton—and the only one which rises above the snow-line—is the Rieselstock, 9200 feet high. S. also contains the beautiful group of the Righi (q. v.); and other peaks are those of the Rossberg (5141 feet), the Great Mythe (6243), and the Little Mythe (5954). The inhabitants are chiefly engaged in rearing cattle, in cultivating fruit, and in making cotton, silk, and straw wares. Only a very small extent of country is cultivable, and a great portion is under wood. S. was one of the three original Swiss cantons; since 1848 its government has been thoroughly democratic, consisting of a council of 81 members, whose enactments must be ratified by the people at large.—S., capital of the above canton, nestles at the feet of the Great Mythe and Little Mythe, has a good parish church (1774), and a pop. (1876) of 6163.

Sciacc'a (the *Therma Selinuntina* of Pliny), a walled city on the S. coast of Sicily, 38 miles W.N.W. of Girgenti. The chief edifices are a cathedral founded by Roger I.'s daughter Julietta, the ruined castles of the Luna and Perollo families, the modern palazzo of the Marchesa San Giacomo, and such quaint mediæval buildings as the Case Triolo and Casa Starepiato. The trade of S. is almost nil, but fishing and the manufacture of pottery are carried on to some extent. Pop. (1874) 19,209. The volcanic Monte San Calogero (1279 feet), 3 miles to the E., abounds like the intervening valley in hot sulphur springs, which attract many patients; and off the coast a valuable coral reef discovered in 1875 employs several hundreds of coral-fishers.

Sciæn'idæ, a family of *Telostean* fishes, of the *Acanthopteros* section of the order. It includes the *Maigre* (*Sciæna aquila*) of the Mediterranean Sea, an occasional visitant to the British coasts, the *Pogonius* or *Drumfish* (q. v.), and other forms. The S. are allied to the perches. They have a single row of teeth in each jaw. The air-bladder is often provided with appendages, the body is compressed, and the dorsal fin is either single or double.

Sciatic'a is the term applied to neuralgia of the great sciatic nerve. The pain of S. is referred to the course of the sciatic nerve or its branches, and may be confined to the gluteal region or upper part of the thigh, spreading into neighbouring parts, and running down the back of the thigh to the leg and soles of the feet. Sometimes only isolated parts are affected, as the knee-joint, the calf of the leg, or the sole of the foot. S. generally

lasts for two or three months, and is apt to recur. It is often associated with general debility, and sometimes there is a previous history of gout, rheumatism, or syphilis. S. is very obstinate as regards treatment; but the most reliable medicines are aconite, strychnia, phosphorus, and iron.

Science is knowledge systematised. By generalisation from known facts, it aims at the establishment of broad principles from which these facts are immediate deductions, and by which they are linked together in one consistent whole. Such is S. generally. The various facts of experience, however, which fall within the range of scientific discussion, naturally group themselves into several categories which are collectively known as 'the sciences.' For example, there is mathematics, the S. of number and magnitude, which of all sciences is the most complete in itself, being based on a few principles, axiomatic in their simplicity, universal in their comprehensiveness. There is natural philosophy, embracing the special departments of physics, chemistry, geology, and astronomy, and treating of all phenomena of inanimate nature. The great generalisation which here holds is the conservation of energy, a principle which is to a certain extent applicable to phenomena of life and mind. As we pass to these higher subjects, the principle of the transformation of energy merges into that of evolution, whose laws are but now beginning to be understood. Perhaps the most natural classification of the sciences is that here indicated, namely, the grouping of them according as they discuss energy, life, or mind. To give a more elaborate classification has been attempted, but with small success; and even in such a general arrangement it is impossible to draw hard and fast lines of separation. See BIOLOGY, GEOLOGY, PHYSICS, PSYCHOLOGY, &c., for more details regarding the nature of the several categories in which the sciences are grouped. With metaphysics S. has nothing in common. It builds upon facts of experience, postulating the existence of matter and energy.

Scilla. See SQUILL.

Scilly Isles, a group of about eighty islands, islets, and rocks, scattered over an area of 10 sq. leagues, 25 miles W.S.W. of Lancel's End, and 36 of Penzance, the nearest port. Only five are inhabited—St. Mary's, Trescow, St. Agnes, St. Martin's, and Bryher—and these with Sampson have an area of 3560 acres, and a pop. (1871) of 2090; 2627 in 1851, a decrease due to emigration. Rising steeply from the sea, and lashed by the full fury of Atlantic winds and waves (the latter sometimes exceeding a force of 6000 lbs. per sq. foot, and towering to a height of over 100 feet), these islands have been a terror to mariners from the day when Sir Cloudesley Shovel perished off them with four of his vessels (1707) to the loss of the German mail-steamer *Schiller* (1875) with 312 lives. Their formation is granitic, the soil a fertile peat, and so mild is the climate that semi-tropical trees and plants (palms, flowering alocs, cacti, rare ferns, &c.) flourish unchecked by winter cold. Early crops of potatoes and asparagus are harvested in May, and the rearing and export of these for the London market form with fishing and pilotage the staple industries of the Scillioles. Each of the inhabited islands has a modern church, but the Abbey of Trescow lies in ruins, and the old church of St. Mary's is now only used as a mortuary chapel. Other lions of the S. I. are the residence of the Lord Proprietor, with exquisite gardens of 15 acres, adorned by the figureheads of wrecked vessels, Oliver's Tower, and King Charles's Castle, all on Trescow; on St. Mary's, Star Castle (1593), the Logan Stone of 45 tons, and the Rock Basins of Peninnis Head, variously ascribed to Druids or the action of the weather; the lighthouses of St. Agnes and of the Bishop's Rock. Hugh Town, the capital, on St. Mary's, has a good harbour, which was entered (1877) by 209 vessels of 14,716 tons, and cleared by 194 of 13,499, the imports amounting (1876) to £2104.

The Greeks probably included both the S. I. and the western part of Cornwall under the name *Casiterides* (Sansk. *kastira*, 'tin'), as there are hardly any traces of tin-workings in the islands themselves. Æthelstan wrested them from the Danes in 928, and Henry I. granted them to Tavistock Abbey, with whose other possessions they passed to the Crown at the dissolution of the monasteries. Leased by Elizabeth to the Godolphins, they furnished an asylum to Prince Charles (1646), were captured by Blake for the Parliament (1651), and in 1830 passed by purchase to Mr. Augustus Smith, the 'King of Scilly' (died

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August 31, 1872). Under the latter's beneficent but despotic rule, the islands emerged from their former rude and thriftless condition to a state of prosperity, where taxes, licences, and pauperism are things unknown. He encouraged horticulture, founded schools with compulsory attendance, established a regular service of steamers, and brought the islands into closer communication with the mainland by a submarine cable. See M'Mullen's *S. I.* (Lond. 1869).

Scimitar (Pers. *chimicher*), an Oriental sword, the blade of which is single-edged, short, curved, and broadest at the point end. It is a favourite weapon of the Persians and Turks.

Scinde (Sansk. *Sindh* = Ind), a province of British India, on the N.W. frontier, forming an appendage to the Bombay Presidency, from which it is divided by the Runn of Cutch and the peninsula of Gujerat. It occupies the lower basin and the delta of the Indus, being separated on the W. by mountains and the river Hubb from Beluchistan, and bounded on the E. by the Thur or great Indian desert in Rajputana. The total area, excluding the dependent state of Khyrpore (q. v.), is 46,600 sq. miles, and the pop. (1872) 2,192,415. It is divided, for administrative purposes, into five districts or collectorates, the whole being under the charge of a commissioner, who resides at Kurrachi, the seaport and largest town in the province. Hyderabad, the former native capital, and Shikarpur, the centre of trade with Afghanistan, are the next most important towns.

Soil, Products, Trade, &c.—The greater part of S. forms a level sandy plain formed by the alluvial action of the Indus, but the N.W. portion is broken up with hills. The average temperature of the summer months is 95° F.; of the winter, 60°. The thermometer often rises to 110°, and sometimes falls below freezing point. Little or no rain falls; sometimes two or three years pass without a shower, and the annual average is only 5 inches. Agriculture, therefore, is entirely dependent upon irrigation from the Indus and subsidiary canals. The chief food crops are jowari and bajri, two sorts of millet; rice and wheat are also grown, as well as cotton, oil-seeds, and tobacco. In 1876-77, out of 3,000,000 cultivated acres, 917,000 were under millets, 511,000 under rice, 354,000 under wheat, and 74,000 under cotton. Wild animals include the lion and the wild ass; the chief domestic animal is the camel; buffaloes are largely bred in the swamps, and sheep and goats in the hilly tracts; the horses are small but hardy. The trade of S. almost entirely centres at the port of Kurrachi (q. v.). The exports are cotton, wool, and grain. Cotton was first exported in 1861, ten years later the quantity despatched was 70,000 bales, and 12,000 cwts. unpressed. The wool comes chiefly from Beluchistan; the first consignment was in 1853, and in 1870 the export was valued at £300,000. In 1876-77 the total exports, foreign and coast-wise, were valued at nearly £2,750,000 sterling, including grain, £485,000, cotton £390,000, wool £719,000; the imports were valued at more than £2,500,000, chiefly European piece-goods, native piece-goods, and treasure. The manufactures are inconsiderable, the chief being carpets at Shikarpur, and gold and silver embroidery at Hyderabad. A railway from Kurrachi to Kotri, 106 miles, was opened in 1861, and is now in process of extension to the Punjab. Steam navigation on the Indus, which dates from 1835, is under the same management as the railway. The total revenue of the province in 1870 amounted to £622,188, of which the land tax brought in two-thirds. This tax was formerly paid in kind, at the rate of one-third of the gross produce. There is now a fixed rate, payable in money, which varies with the facilities for irrigation; the average land tax and water charge is 4s. 6d. per acre. Education has of late years made much progress. In 1870 there was a total of 436 Government and private schools, attended by 14,397 pupils; the expenditure was £13,887. Vaccination is also being extended, and is readily welcomed by the Mahomedans. The police force numbers altogether 3885 officers and men. There are 900 British and 2000 native infantry, besides three regiments of S. horse, stationed at Kurrachi, Hyderabad, and Jacobabad.

Race and Language.—The great majority of the population, 78 per cent., are Mahomedans, who may be divided into two classes—the Scindis proper, who are probably the original Hindu inhabitants converted to Islam, and the subsequent invaders from Beluchistan and Afghanistan. The Hindus, who form only 18 per cent., are chiefly engaged in trade. They are said to have mostly come from the Punjab, and are not very strict in

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their religious observances. The language spoken is Scindi, a most heterogeneous compound of Sanskrit and Arabic origin, which has no literature, and uses either the Hindi or Arabic alphabet.

History.—The Hindu kingdom of S., which included the Punjab and whose capital was Alor, near the modern Rohri, was conquered by the Mahomedans in 713 A.D., 300 years before the invasion of Hindustan proper. It was at first a dependency of the Arabian califs, and five independent dynasties are counted before the Talpur family, who are of Beluchi origin, established themselves in 1783. It was with this family, whose dynastic title was Amir (*Mir*), that the British came into collision in connection with the Afghan war and the free passage of the Indus. In 1839 it was found necessary to occupy the fort of Kurrachi, and to force a passage up the river for the conveyance of military stores contrary to a previous treaty. Sir James Outram was appointed Resident at Hyderabad; but in 1842 Sir C. Napier was sent with supreme political and military authority to enforce demands which involved the surrender of the independence of the country. Both these officers expressed their disapproval of the orders of the government which they had to carry out. The Amirs were divided among themselves; and in February 1842 their Beluchi army attacked the Residency, which Outram was compelled to evacuate. Two days later, Sir C. Napier won the decisive victory of Meeanee (q. v.), with only 2800 men of all arms against a warlike enemy of 28,000 strongly posted. The Amirs surrendered Hyderabad with a treasure of £1,000,000 sterling, and also gave themselves up. After another battle at Dubba, S. was declared a conquered country, and permanently annexed to the British possessions in India. Sir Bartle Frere was Commissioner of S. from 1851 to 1859, a period which includes the Mutiny, when the Sepoys mutinied at Kurrachi, but the outbreak was promptly repressed. The descendants of the dispossessed Amirs still reside at Hyderabad. It has recently been proposed to separate S. from Bombay, and form it into a new province, together with the frontier districts of the Punjab. See *Gazetteer of Sindh*, by A. W. Hughes (Lond. Bell & Sons, 1874); and Burton's *S. Revisited* (Lond. 1877).

Scindiah (Sindia), the hereditary title of the great Mahratta dynasty which rules at Gwalior (q. v.) in Central India. The founder, **Ranojee S.**, of Sudra descent, was originally a slipper-bearer to the Peishwa, or hereditary prime minister of the Mahrattas. He died in 1754.—His grandson, **Junkojee S.**, was captured and beheaded by the Afghans after the battle of Paniput in 1761, by which the Mahratta designs of universal empire in India were finally crushed.—**Mahadojee S.**, a younger son of the founder of the family, succeeded, and became the leading member of the Mahratta confederacy. Till his death in 1794 he was supreme in Hindustan. His army was officered and drilled by Frenchmen; the Mogul Emperor, Shah Alum (q. v.), was merely a puppet in his hands: he contended not unsuccessfully against the British, and established a predominant influence at the Peishwah's court at Poonah.—He was succeeded by his grand-nephew, **Dowlut Rao S.**, who was entirely defeated by Sir Arthur Wellesley in the Deccan, and by Lord Lake in Hindustan in 1803. During the fourth Mahratta war of 1817, he was compelled to give an unwilling co-operation to the British. After his death in 1827 the state became disorganised, and order was only restored by a British army in 1843 after two pitched battles.—The present chief, **Babajee Rao S.**, was adopted at that time. He was loyal during the Mutiny of 1857, though the Gwalior contingent joined the rebels at Delhi. He inherits the military instincts of his predecessors, and himself manœuvres an army of 22,000 men. He also conducts the civil administration. His revenue is nearly one million sterling. In 1875 he attracted attention by arresting with his own hand a supposititious Nana Sahib. In 1877 he was appointed G. C. B. and general in the British army. But despite these honours he does not attempt to conceal his dissatisfaction at the continued occupation of his fortress of Gwalior by a British garrison. In September 1878 he was invested with the Star of India.

Scink or **Skink** (*Scincus*), a genus of *Lacertilia*, or Lizards, forming the type of a distinct family—that of the *Scincidae*. The head is conical, the eyelids are well developed, and the nostrils open in a large scale situated on the nose. Limbs are usually present, although in some members of this family they may be rudimentary. The *S. officinalis* is the Common S., and is found in N. Africa and some parts of Asia. It attains a length of 6 or

7 inches, and is of a reddish grey colour, banded with darker patches, while below, the colour is silvery white. The S. inhabits the sand, in which it burrows, when disturbed, with great agility. The specific term *officinalis* is derived from the repute in which this lizard was formerly held by the early practitioners of the medical art.

Scintillation of the stars is the twinkling or tremulous motion which stars appear to possess. The planets, except when near the horizon, do not so twinkle; and it is by their steady light that they are at once recognised. These considerations, together with the undoubted fact that stars twinkle more at some times than at others, suggest the causes of S. to be the excessive minuteness of the apparent diameter of a star and the disturbing influence of the air. The feeble pencil of rays coming from a star is so refracted and broken up by the air through which it travels that it reaches the eye in a more or less discontinuous manner. The quieter and more homogeneous the atmosphere is, the less evident the twinkling; and the nearer the star to the horizon the greater the scintillation, since the rays have to travel through a thicker stratum of the air. Violent twinkling on a clear still night, therefore, indicates an unsettled state in the higher regions of the air, which will probably ere long find its way into the lower regions; and observation has established such a connection between the weather and the S. of the stars.

Sci'o, or **Khi'o** (anc. Gr. *Chios*; Turk. *Sabisadan*), a Turkish island of the *Ægean*, to the S. of the Gulf of Smyrna, 5 miles from the mainland. It has an extreme length of 32 and breadth of 18 miles, an area of about 400 sq. miles, and a male pop. (official *Salmamé* for 1877) of 18,599. The surface is mountainous, especially in the N., attaining in Mount Elias (anc. *Pelinaus*) an elevation of 4156 feet. Wood and water are scarce, but the soil is of great fertility, yielding in abundance figs, oranges, citrons, pomegranates, and vines, from which an excellent wine is made. Of four harbours, the best is Delphino, on the S. coast, which carries on a considerable export trade in fruits, cotton, wool, silk, leather, raki, and gum-mastic; and in 1873 there cleared 3027 sailing vessels of 92,398 tons, besides 352 steamers of 266,780 tons. On the eastern coast is Castro, the capital (pop. 13,000), with a castle, four mosques, two lighthouses, and a harbour choked up with sand. A political memoir by Prince Gortschakoff gives S. 450 vessels, 586 churches, and 9 convents, the most important of which, Nea-Moni, possesses one-sixth of the island. The birthplace of Ion, Theopompus, Theocritus, and, according to one tradition, Homer ('the blind old man of Sci'o's rocky isle'), S. with the other Ionian States was subject to Persia (494–479 B.C.), and was next a member of the Athenian League, till an attempted revolt (412) led to its devastation. For service in the Syrian and Mithridatic wars it received the Roman franchise; it was captured by the Genoese (1346) and by the Turks (1566); and on the outbreak of the Greek insurrection (1822) was the scene of frightful cruelties on the part of the Turks, which reduced the population from 130,000 to 16,000. See 'The Vilayet of the White Archipelago' in the *Geographical Magazine* for August 1878.

Scioppius (Latinised form of Kaspar Schoppe), a celebrated German philologist, was born at Neumark, 27th May 1576. He studied at Heidelberg, Altdorf, and Ingoldstadt, and had already published *Poemata Varia* (Heid. 1593), and *Verisimilium Libri IV.* (Nurn. 1596), when in 1597 he visited first Rome, then Bohemia, Poland, and Holland, returning to Rome in 1598, when he abjured the Protestant faith. Here he was greatly favoured by the Pope, was made a count, and got a pension of 600 crowns. In 1607 he commenced his long series of invectives with an attack on Scaliger, followed by numerous pamphlets against the Protestants, whom he proposed to 'exterminate.' He next assailed James I. of England, for which, three years after, he was beaten by the servants of the English ambassador at Madrid. From 1618 to 1630 he lived chiefly at Milan, planning a reform of Latin grammar which proved impracticable. His next attacks were directed against the Jesuits, whom he suspected of frustrating his claims at the Diet of Ratisbon. In 1636 S. retired to Padua, where he continued to study industriously in seclusion. He published a defence of himself and some political tracts against Machiavelli. He died at Padua 19th November 1649. His numerous lampoons exhibit a profound knowledge of at least the lower side of human nature; his learning

was undoubtedly great, and his mastery of Latin style not inferior to that of Scaliger. Among his writings may be mentioned *Suspectarum Lectionum Libri V.* (Nürnb. 1597), *Commentatio de Arte Critica* (Nürnb. 1597), *Observationes Linguae Latinae* (Frank. 1609), *Grammatica Philosophica, sive Institutiones Grammaticae* (Mil. 1628), *Paradoxa Literaria* (Mil. 1628), and *De Scholarum et Studiosorum Ratione* (Pad. 1636).

Scipio, Publius Cornelius, surnamed **Africanus Major**, one of the most renowned of ancient Romans, was the son of Publius Cornelius S., and was born at Rome in 234 B.C. In 218, when only seventeen, S. was with his father at the battle of Ticinus, and is said to have saved his life. He fought as a *tribunus militum* at Cannæ (216), and after the battle rallied some of the fugitives. He had gained great popularity, when in 212 he was chosen *curule aedile*. A tribune, indeed, objected that he was too young. 'If I have votes enough, I shall have years enough,' was the answer. In 211 his father fell in Spain, and next year the Senate increased the forces there and placed them under a proconsul. For this hazardous office S. was the only candidate, and the people, reassured by his confidence, elected him unanimously. He arrived in Spain during that summer. The peninsula had been wholly subdued by the Carthaginians, who had three armies there under the two Hasdrubals and Mago. Disunion among them, however, aided S. He at once boldly attacked New Carthage, their chief stronghold and arsenal, and carried it by storm in one day. S. found here, besides supplies, many hostages, by his leniency towards whom he won over the native Spanish. In 209 he brilliantly defeated Hasdrubal at Bæcula. Next year Mago was beaten by the proprætor Silanus, and withdrawing to southern Spain, he united with Hasdrubal, son of Gisco. They long declined battle, but in 207 were decisively crushed by S. at Ilipa. The Carthaginians fled to Gades, the native chiefs declared for Rome, and Spain lay at S.'s feet. Bent on the final overthrow of Hannibal, he now visited Africa to gain the alliance of Massinissa king of Numidia, where he met Hasdrubal on friendly terms. Returning to Spain, he rigorously crushed a native rebellion, and soon after, though dangerously ill, quelled a legion which had mutinied. Then, Gades having surrendered, he resigned his command and returned (206) to Rome. In 205, though only thirty, he was elected consul and received the province of Sicily, with leave to invade Africa, but with no forces; yet he got an army together, composed largely of volunteers, and sailed for Africa in 204. Massinissa joined him, while Syphax, another Numidian king, supported Carthage. S. burned the Carthaginian camp in 203 and shortly after routed an army under Hasdrubal. Hannibal now arrived and sought peace, but S.'s terms were too severe, and the armies met for a supreme struggle at Zama, 19th October 202. The victory fell to S., and in 201 his humbled foe signed a peace. S. returned to Rome in triumph. He received the surname Africanus, and the people wished to give him a dictatorship and other honours, which he wisely declined. In 194 he was again consul. In 193 he crossed to Africa and met Hannibal. In 190 he served under his brother in the war against Antiochus. S.'s foes now grew active. Cato, Gracchus, and others accused him of extravagance and treachery. He was tried on the anniversary of Zama. Reminding the people of that event, he rushed to the capitol to return thanks for it, and the people followed. Next day he left Rome, which he never entered again, and died (183) in voluntary exile at his country seat at Liternum in Campania. S. was the greatest Roman commander before Julius Cæsar. Not to be compared with his illustrious adversary in originality, resource, subtlety, and daring, he displayed an indomitable resolution, an imperious will, an exalted faith in his country's destinies, and in the favour of the gods towards himself that enabled him to use with irresistible effect the soldiery of Rome, and to utterly vanquish the most brilliant military genius of antiquity. His Grecian culture shed a halo of refinement round his image, and we are tempted to forget in the hero and scholar the insolent rebel against the majesty of law.—**Publius Cornelius S. Æmilianus**, surnamed **Africanus Minor**, son of L. Æmilius Paullus, and adopted by Publius Scipio, son of the preceding, was born at Rome, 185 B.C. He fought at Pydna in 168. While in Greece he acquired a life-long love of Greek literature and art, and began his friendship with Polybius. In 151 he served in Spain with great personal bravery, and in 149 went to Africa as a military tribune and shared in the third

Punic War. His genius was the secret of every Roman success. When he returned to Rome in 148 all went wrong, and he was unanimously recalled to complete the ruin of Carthage (147-46). On his return home he was awarded a splendid triumph. In spite of his Grecian tastes he maintained simplicity of life, and when censor in 142 got many enemies by his efforts to suppress luxury. In 139 he was even tried, but was acquitted. In 134 he was re-elected consul and despatched to subdue Spain, which he accomplished by the capture of Numantia (133). At this time his brother-in-law Tiberius Gracchus was heading the popular movement for reform. S. was a moderate conservative; he recognised the existence of social and agrarian evils, but one or two faint efforts at reform had convinced him that a revolution would be necessary to cure the evils of the state, and S. shrunk from a revolution. His popularity declined, and one day, when Papirius Carbo accused him in the Forum, the people responded with shouts of 'Down with the tyrant!' Next morning he was found dead in his room. Mommsen (*Röm. Gesch.*) says of him: 'The history of Rome presents various men of greater genius than Scipio Æmilianus, but none equalling him in moral purity, in the utter absence of political selfishness, in generous love of his country, and none, perhaps, to whom destiny has assigned a more tragic part.'

Scire Facias, in English law, is a writ to enforce the execution of judgments, patents, or matters of record; or to vacate, quash, or annul them.

Scirpus is a genus of leafy or leafless, usually tall, marsh or water plants, with creeping rootstocks, belonging to the natural order *Cyperaceæ*. The spikelets are several, in terminal or lateral cymes, heads, or clusters; the glumes imbricate all round the rachis; the flowers hermaphrodite; the perianth of six or fewer short bristles; the stamens three; the style two to three cleft, not swollen at the base, deciduous; and the fruit compressed or three-angled. S. consists of upwards of fifty species, met with in all climates. The Bulrush (q. v.) is the most useful representative of the genus.

Scit'rides. See SQUIRREL.

Sclerobasic Coral (from Gr. *sklēros*, 'hard,' and *basis*, a 'base'), the name given to corals, of which the Red coral (*Corallium rubrum*), the Isis or Mare's-tail coral, the Gorgonias, &c., are good examples, and in which the living polypes are situated on the *outside* of the coral substance. These polypes, as a rule, belong to the order *Alyconaria* (q. v.) of the *Calenterate* group, and have eight fringed tentacles. The S. C. varies in composition. It may be hard and limy, as in Red coral, or horny as in Gorgonias, or partly limy and partly horny as in Isis. Although the S. C. is situated within the animal tissues which form it, it is in reality placed *external* to the bodies of the animals which coat it. The S. C. is formed by the *bases* or lower portions of the polypes, and is not secreted by their internal parts as in the opposite or *sclerodermic* coral. The latter is secreted within the bodies of the polypes; it exists outside the living parts, and exhibits distinct cups or *calyses* in which the soft parts are protected. These cups are wanting in the S. C. The *Sclerodermic forms* are the reef-building corals.

Scleroder'mi (from Gr. *sklēros*, 'hard,' and *derma*, 'hide,' or 'skin'), a family of *Teleostean* fishes included in the sub-order *Plectognathi* (q. v.). The snout is conical, and the mouth is toothed in front of the snout. The body is invested in an armour of hard scales. To this group belong the *Ostracions* and *Balistes*—the Trunk and File fishes.

Scleroder'mio Coral. See SCLEROBASIC CORAL.

Scleros'toma (from Gr. *sklēros*, 'hard,' and *stoma*, 'mouth'), a parasitic genus of Worms (*Scolecida*), of which one species, *S. syngamus*, causes the disease known as the 'gapes' in poultry. The symptoms of this disorder consist in the bird gaping, sneezing, gasping for breath, and otherwise indicating that some obstruction of the air-passage is present. Other species of this genus occur in horses and pigs. *S. armatum* occur in the intestines, arteries, and in other situations in the horse. *S. tetrachantum* occurs in the cœcum and colon of the horse, and *S. dentatum* is found in the cœcum and colon of the pig. Cobbold says that the females of the S. of the fowl measure $\frac{1}{8}$ ths of an inch in length, the males measuring $\frac{1}{4}$ th inch.

The young are supposed to pass the primary stages of development within an insect-host. For the successful removal of these worms from fowls it is necessary to pass a feather denuded of web save at its tip into the windpipe, and by twisting it round to extract the worms. The feather may be dipped in a weak solution of tobacco, whilst by some the simple application of turpentine to the throat of the bird is considered to be a sufficient remedy. An opening into the windpipe is necessary when the disease has proceeded to an extreme extent. All observers agree in strongly recommending the thorough destruction of the parasites after removal. If they are merely thrown on the ground, the eggs may become distributed far and wide, and may thus cause fresh infection.

Sclerotium (from Gr. *sklēros*, 'hard') is a spurious genus of *Fungi*, the strange forms referred to it consisting (as implied by the name) of a mass of cells compacted into irregular tuberous bodies. They are either entirely free, or more or less imbedded in the substances on which they grow. They are found on decaying agarics, on herbaceous stems, rotten wood, amongst moss or dung, on putrefying roots or fruit, or even on decomposed animal matter.

Scole'cida, an important division of the animal kingdom, including those animals known as parasitic worms, but which are removed by their structure from the true worms or *Annelida* (q. v.). The exact zoological position of the S. is still a matter of dispute. By many zoologists they are placed as one of the two divisions of the sub-kingdom *Echinozoa* (q. v.) or *Annuloida*; while others regard the S. as more properly forming a section of the lower *Annulosa* under the heading *Vermes* or worms. The characters of the S. are derived from the usual absence of lime in their integument, and from the possession of a *water-vascular system*. The nervous system consists of one or two ganglia, closely situated together. In this heterogeneous group are included the *Platyelmia* or flat worms; the *Nematelmia*, or round worms; and the *Kotifera* (q. v.) or wheel animalcules. The *Platyelmia* (q. v.) includes the *Tenida* (tapeworms); *Trematoda* (q. v.) (Flukes) and *Imbellaria*. The *Nematelmia* (q. v.) are represented by the *Nematoda*; *Gardiacea* (see *Gordius*); and *Acanthocephala* or 'thorn-headed' worms.

Scolex. See TAPEWORM.

Scolopa'cidae, the Snipe family, a large group of *Grallatorial* or Wading birds, including a large number of subdivisions. The characters of this important group are (1) a long, slender, and compressed bill, grooved to the tip; (2) nostrils placed in a groove at its base, and closed by membrane; (3) the shortness or absence of the hinder toe. The wings are long and pointed. The chief sub-families regarded by most naturalists as being included in this group are the *Limosina*, *Totantina*, *Tringina* (see SANDPIPER), *Scolopacinae* (see SNIPES), and *Phalaropodinae*.

Scolopen'dra. See CENTIPEDE.

Scolopen'drium. See HART'S TONGUE.

Scoly'tus, a genus of beetles, the type of a family *Scolytidae*, often known as the 'wood-borers.' The body is long, cylindrical, and truncated at either extremity. The colour is black or brown. These beetles excavate mines under the bark of trees, and generally attack trees of advanced age. *S. destructor* ravages old elm-trees. Other genera are *Xyloterus*, *Tomicus*, and *Hylurgus*. *T. monographus* is famous for its power of drilling holes in malt-liquor casks in India. The eggs are deposited in the bark of the trees. The affected bark should be taken off the trees, and the larvæ exposed to the attack of birds.

Scombereso'cidae, a group of *Teleostean* fishes represented by the Saury Pike (*Scomberesox*) and other genera, and forming a division of the *Plectognathi* (q. v.). They are recognised by the premaxillary and maxillary bones united at the sides of the mouth.

Scomber'idae, the Mackerel family, a group of *Teleostean* fishes, in which the body is of ovate and compressed shape, and the scales usually minute or invisible. The fins are well-developed, and the *pectorals* are usually long, narrow, and pointed. There are usually two dorsal fins, the first being spinous and long; the tail fin is generally forked. In this large group are included the John Dory (*Zeus faber*), the Boar-fish (*Capros aper*),

the Opah-fish (*Lampris*), the Scad (q. v.), the Centrolophus or Black-fish, the Pilot-fish (q. v.), the Sword-fish (q. v.), the Mackerel (q. v.) the Tunny, &c. All the S. are marine in habits. Many are excellent food fishes; e.g., the mackerel and tunny. The majority inhabit warm seas.

Stone (pron. *Scorn*), a village of Perthshire, Scotland, on the Tay, is 2 miles by rail N. of Perth. It is called *regalis civitas* as early as the beginning of the 10th c. An abbey was founded here by Alexander I. (1115), in place of an older monastery, and here too was kept the stone, said to have been brought from Iona in 834, on which the Scottish kings were crowned till Edward I. carried it to Westminster. S., however, was used as the place of coronation by Robert the Bruce and many of the Stuarts till Charles II., who was crowned here in 1651. The ancient abbey was destroyed in 1559. The neighbouring palace of S. is a residence of the Earls of Mansfield. Pop. (1871) of parish, 1914.

Scop'as, a Greek architect and sculptor of the late Attic school, was born at Paros towards the close of the 5th c. B.C. He designed the temple of Athena at Tegea, and produced some of the sculptures on it. He also shared in the building of the temple of Artemis at Ephesus, and was the sculptor of several friezes on the Mausoleum. In sculpture proper his greatest work was the group in which Neptune, Thetis, and the Nereids conduct Achilles to Leuce. In Pliny's time this group stood in Rome, where also was his splendid representation of the destruction of Niobe's children. Some portions of this latter are now in the Florence Gallery. S. also produced a Pythean Apollo, a Dionysus, and several Venuses. Like Praxiteles (q. v.), with whom he is associated in the foundation of the later Attic school, he had much greater freedom and a keener appreciation of beauty than the earlier school, but his art was extremely sensuous, and contained the germs of decay.

Score, in music (Ger. *partitur*, Ital. *partizione*, Fr. *partition*), a copy of a composition in which each part is separately shown. Printers of music call two or more lines of music united by a brace a S., and from this practice of marking or scoring the word is derived. Every musician, or at least every composer, ought to be able to read a S. at sight. In part-songs and vocal compositions generally the S. may be written on two staves; but where counterpoint is introduced and the parts frequently cross, a fuller S. is required. A complete vocal and instrumental S. allows one staff for each part, excepting the violoncello and double bass and the parts for two wind instruments, for which one staff is sometimes sufficient, the tails of the notes for one instrument being turned upwards, and those for the other downwards. Modern composers have adopted different plans of grouping instruments in writing their scores, but the following gives an idea of the order which usually prevails:—

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|----------------------------------|---|
| 1. Wood wind-instruments. | 5. Stringed instruments (excepting bass). |
| 2. Soft-toned brass instruments. | 6. Voices. |
| 3. Loud brass instruments. | 7. Bass stringed instruments. |
| 4. Instruments of percussion. | 8. Organ or pianoforte. |

Scores'by, William, D.D., F.R.S., an Arctic explorer, was born at Cropton, Yorkshire, October 5, 1789. His father, Captain Wm. S. (born 1760, died 1829), was a most successful whale-fisher, and the inventor of the round top-gallant crow's-nest. While studying at Edinburgh University young S. frequently accompanied his father to the northern whale-fisheries, and became chief mate when only sixteen years of age. In 1806 he reached the highest latitude which had then been attained, 81° 30'. In 1811 he became captain, and made numerous voyages to the northern seas, a valuable and interesting record of which he published in his *Account of the Arctic Regions* (2 vols. 1820). In 1822, in the ship *Baffin*, he explored the eastern coast of Greenland, a completely new field of discovery, and gave his results in his *Journal of a Voyage to the Northern Whale Fishery* (1823). He then determined to enter the Church, and with this end in view passed through a complete course of divinity at Queen's College, Cambridge. In 1829 he was presented to the vicarage of Bradford, Yorkshire. His scientific career, however, did not cease, for he continued to devote great attention to magnetic phenomena, and undertook voyages to the United States (1847) and to Australia (1855-56) in prosecution of his researches. These he submitted in reports to the British Association; and published besides a valuable work entitled *Magnetical Investigations*.

tions (2 vols. 1839-48), which contains most of his individual labours in this direction. He was also the author of *Discourses to Seamen, Sabbaths in the Arctic Regions, &c.*, and of a Life of his father (1851). He died at Torquay, March 21, 1857. See *Life of William S.*, by his nephew, R. E. Scoresby-Jackson (Lond. 1861).

Scor'iss, volcanic ashes varying in colour from reddish-brown to black. In appearance they resemble the ordinary slags of iron furnaces, having been formed by cooling in much the same circumstances.

Scor'pion (*Scorpio*), a genus of *Arachnida* forming the type of the family *Scorpionida*, and order *Pedipalpi* (*Arthrogastra*). The legs number four pairs (as in all *Arachnida*), but the *maxillary palpi*, or appendages of the lesser jaws, are very long, and are converted into *chela* or nipping-claws, which closely resemble limbs. The abdomen and post-abdomen are segmented, and the *telson*, or last joint of the tail, bears a poison-gland and sting. The tail consists of twelve segments, and the limbs are borne by the chest alone, the thorax being united with the head, and thus forming a single segment. No true antennæ or feelers are developed, but the mandibles or larger jaws may represent these appendages. The breathing organs exist in the form of lung sacs or pulmonary vesicles in the sides of the body, and to which air is admitted by apertures named *stigmata*. There are four pairs of these sacs in the S. The S. inhabits warm climates; its sting is dangerous under some circumstances, but not necessarily fatal. The European species (*Scorpio Europæus*) may attain a length of from three to five inches; its colour is dark brown.

The *Book-S.* is the name given to certain little *Arachnidans* removed in zoological position from the true S., and belonging to the family *Cheliferida*. The *Chelifer Wideni* is a common species inhabiting old books, and feeding on flies and other insects. *Fossil scorpions* first appear in rocks of the Carboniferous age.

Scor'pion-Fish, or **Sea Scorpion**, the name given to Teleostean fishes belonging to the *Triglida* or Gurnards. The red S.-F. (*Scorpana scrota*) is found on the British coasts, and in the Mediterranean Seas, where the spotted S.-F. (*S. porcus*) also occurs. The average length is from 12 to 18 inches.

Scorzon'era is an extensive genus of the *Chicoracea* tribe of *Compositæ*, of which the *S. hispanica* has long been cultivated as an esculent under the names of S. or Viper's grass. It is a native of Mid. and S. Europe and the East; is a yellow-flowered perennial, and is botanically allied to the Salsify (q.v.). The root, which in shape resembles a carrot, but is smaller and dark coloured while internally it is pure white, has been strongly recommended for its antibilious properties. The taste is sweet and agreeable, with a nut-like flavour. It is prepared by boiling and then peeling, and is usually eaten in the same way as asparagus. *S. delciosa*, a purple-flowered species, native of Sicily, is perhaps superior to the above, and *S. tuberosa* of the Volga district yields an edible root. Various Chinese, Persian, Siberian, Turkish, and N. African species might also be utilised.

Scot, Reginald, born in the first half of the 16th c., was educated at Oxford, and passed the greater portion of his life on his paternal estate of Scotshall in Kent. In 1574 he published *A Perfite Platforme of a Hoppe Garden*, and in 1584 appeared his attack upon the popular superstitions of the day entitled *The Discoverie of Witchcraft*. For the scepticism expressed in this book S. was subjected to much persecution, and James I., one of the authors who most bitterly assailed him, ordered all copies of the *Discoverie* to be burnt. S. died in 1599. In 1665 there was printed a third edition of the *Discoverie*, *whereunto is added a Discourse of the Nature and Substance of Devils and Spirits*.

Scot'er (*Oidemia*), a genus of ducks represented by the Black S. (*O. nigra*), and by the Velvet S. (*O. fusca*). The common or black S. attains the size of a common duck. Its flesh is oily, but is largely used during Lent in Roman Catholic countries. The Velvet S. occurs in Orkney chiefly, while the black S. is found in S. Europe in winter. The latter bird is black, the female being of a dark-brown hue. The bill is short and broad, and bears a knob at the base of the upper mandible. The tail is short and acute, and the *lamina* or horny plates of the bill are well developed. The S. is also named the 'Surf duck.'

Scot'ia (Gr. *Skotia*, 'shadow or darkness'), a deep, hollow moulding, part of which is always in shade, generally used in bases. See **MOULDINGS**.

Scot'land, the country forming the northern and smaller portion of the island of Great Britain, extends from lat. 54° 38' to 58° 40' N. and from long. 1° 46' to 6° 14' W. It is bounded N. by the Pentland Firth, E. by the N. Sea, W. by the Atlantic, and S. by the Irish Sea, the Solway Firth, and by England, from which it is separated partly by the Tweed, partly by the Cheviots. Of an oblong and extremely irregular shape, the mainland is 285 miles in length from the Mull of Galloway, the most southerly, to Dunnet Head, the most northerly point. Its breadth varies greatly; from Buchan Ness in the E. to Ardnarmurchan in Argyllshire the distance is 160 miles; but from Dornoch Firth to Loch Broom, in the S. of Sutherlandshire, is only 24 miles. The E. coast is indented by deep wide inlets, chief of which are the Firth of Forth, Firth of Tay, Moray Firth, with its lesser reaches, Cromarty and Dornoch Firths, and Loch Beaulay. The word *firth* (Dan. and Nor. *fjord*), common on the E. coast, is a trace of the Scandinavian element which extends along the seaboard from the Forth northwards. Like that of Norway, the W. coast of S. is fretted by long, narrow arms of the sea, called lochs (comp. Irish *loughs*), and is fringed by island groups. Among the inlets are Loch Assynt in Sutherlandshire, Lochs Broom, Ewe, Torridon, and Aish in Ross-shire; Hourn, Nevis, and Moidart in Inverness-shire; Sunart, Linnhe, Fyne, and Long in Argyllshire. The larger islands in the W. are the Hebrides (q. v.), Skye (q. v.), Mull (q. v.), Jura (q. v.), and Islay (q. v.); Arran and Bute lie within the Firth of Clyde, and are sheltered from the Atlantic by the long peninsula of Cantire. The S. seaboard is indented by the Solway Firth, Wigton Bay, and Luce Bay, and runs out in two bold promontories, Burrow Head and the Mull of Galloway. Other notable headlands besides those mentioned are the Butt of Lewis, the N. point of the Hebrides; Cape Wrath, the most north-westerly, and Duncauby Head, the most north-easterly points of the mainland; Tarbet Ness, between the Dornoch and Moray Firths; Fife Ness; and St. Abb's Head in Berwickshire. Separated from Caithness in the extreme N. by the Pentland Firth, are the Orkney and Shetland Islands (q. v.). Including the large inlets, S. has a coastline of 2500 miles, or 1 mile of seaboard to 11 sq. miles of area, a proportion only equalled among European states by Greece. The areas and population of the thirty-two counties into which S. is divided are as follows, according to the census of 31st April 1871:—

Counties.	Area in Statute Acres.	Population.	Persons to the sq. mile.	Chief towns.
Aberdeen	1,260,625	244,603	124.18	Aberdeen
Argyle	8,083,126	75,679	23.25	Inveraray
Ayr	735,262	200,809	174.79	Ayr
Banff	439,219	62,023	90.38	Banff
Berwick	297,161	36,486	78.58	Greenlaw
Bute	143,997	16,977	75.46	Rothesay
Caithness	455,708	39,992	56.17	Wick
Clackmannan	31,876	23,747	476.78	Clackmannan
Dumbarion	172,677	58,857	218.14	Dumbarion
Dumfries	705,946	74,808	67.82	Dumfries
Edinburgh	234,926	328,379	894.59	Edinburgh
Elgin or Moray	340,000	43,612	82.09	Elgin
Fife	328,427	160,735	313.21	Cupar
Forfar	560,440	237,567	266.93	Forfar
Haddington	179,142	37,771	134.94	Haddington
Inverness	2,723,501	87,531	20.57	Inverness
Kincardine	248,284	34,630	80.27	Stonehaven
Kinross	49,812	7,198	92.48	Kinross
Kirkcudbright	610,343	41,859	43.89	Kirkcudbright
Lanark	568,868	765,339	861.04	Lanark
Linlithgow	81,114	40,695	323.22	Linlithgow
Nairn	137,900	10,225	47.60	Nairn
Orkney and Shetland	598,726	62,882	67.22	Kirkwall
Peebles	227,869	12,330	34.63	Peebles
Perth	1,664,690	127,768	49.12	Perth
Renfrew	162,428	216,947	854.82	Renfrew
Ross and Cromarty	2,016,375	80,955	25.70	Dingwall
Roxburgh	428,494	53,974	80.62	Roxburgh
Selkirk	166,524	14,005	51.83	Selkirk
Stirling	298,579	98,218	210.53	Stirling
Sutherland	1,207,188	24,317	12.89	Dornoch
Wigtown	327,906	38,830	75.79	Wigtown.
	19,496,132	3,360,028	110.30	

The average pop. to the sq. mile is thus 110.30, while that of

England is 389, and that of Ireland 166. Edinburgh is the capital of S., and Glasgow, with a pop. (1877) of 555,933, is its chief commercial city. The pop. of S. had increased to 3,593,929, according to the Registrar-General's returns for 1878.

Physical Aspect.—For the most part mountainous, S. has many extensive level tracks of great fertility. It is divided roughly into the Highlands and Lowlands. Peculiarly the 'land of the mountain and the flood,' the first is a wild region of grand metamorphic ridges and peaks, of lonely glens and upland lakes, and of far-stretching tracts of heath and moor. The pastoral Lowlands are not, as the name might imply, entirely level, but are diversified by hill and dale and fertile holme, by grassy fells, highly-cultivated plains, and umbrageous 'dens.' Where the Highlands and Lowlands meet, in many parts of Perthshire as well as in the far-famed Loch Katrine district, the richest natural effects result from the blending of the savage majesty of the one with the soft, sylvan beauty of the other. Loch Lomond clasps the two regions together; its N. end is girdled by rugged heather hills, while its S. extremity, studded with fairy islets, is essentially Lowland. The distinction between Highlands and Lowlands by no means corresponds to that between N. and S.; the island of Arran, though wholly S. of Berwick-on-Tweed, is yet in the Highlands, while Caithness, the most northerly county, is for the most part lowland country. Thus, too, the whole W. coast, from the Mull of Cantire to Cape Wrath, is in the Highlands, the mountains not only reaching to the sea, but overspreading the islands; whereas the E. coast to the N. of Aberdeen as far as Tarbet Ness is low and sandy. From Aberdeen S. as far as Arbroath, the seaward offsets of the Grampians form a high, rocky shore. The Grampians (q. v.) may be said to divide the two sections of S., but the Highlands include those districts into which the great mountain-chain sends its spurs. Ben Nevis (q. v.), the highest mountain in the British Isles, has an altitude of 4406 feet. Another Grampian summit, well-known through its rock crystals, is Cairngorm, 4083 feet, the corner-stone, so to speak, of the counties of Aberdeen, Inverness, and Banff. The wildest and highest part of the Grampian ranges is near the head-waters of the Dee, where Ben Muichdhuì rises to 4295 feet. Other celebrated summits are Braeriach, 4265 feet, Cairntoul, 4245, and Lochnagar, 3770, in Aberdeen; Ben Lawers, 3984, Ben More, 3843, and Schiehallion, 3547, in Perth; Ben Cruachan, 3693, in Argyll, and Ben Lomond, 3192, in Stirling. The Grampians bound Perthshire on the N., and on its S. border is the low range of the Sidlaw Hills, and the Ochils, prolonged in the Campsie Fells, in Stirlingshire. The Lammemoors and Pentland Hills confine the Forth basin on the S.; the Moorfoot Hills are a continuation of the former, and Tinto (2308 feet), in Lanarkshire, an outlying peak of the latter. In the 'south country' are the Eildon Hills, the Moffat Hills, the Lowthers, and the Cheviots (q. v.). The Highlands are divided equally into two by Glenmore ('great glen'), a deep gorge about 100 miles long, traversed by the Caledonian Canal, which consists of the long narrow Lochs Ness and Lochy, connected by artificial cuttings with each other and with Moray Firth, and with the Atlantic through Loch Linnhe. To the S. of the Grampians lies Strathmore, *i.e.* 'the great valley,' the greatest in S., stretching for 100 miles through the counties of Perth, Forfar, and Kincardine, with a breadth of from 5 to 10 miles. Lesser plains are the Howe of the Mearns (Kincardine), the Carse of Stirling, immediately S. of the Ochils, and Carse of Gowrie in Perthshire. Even the largest rivers of S. are navigable only for a short distance; the Clyde (q. v.) only to Glasgow, the Forth (q. v.) to Stirling, and the Tay (q. v.) to Perth. The last mentioned is the longest in S., with a course of 126 miles. Other notable streams are the Tweed, Spey, Dee, Don, Deveron, Findhorn, N. and S. Esk, and Nith. Of the numerous lakes of S., the largest and finest is Loch Lomond (q. v.), the most romantic, Loch Katrine (q. v.), the grandest, Loch Maree (q. v.), while Loch Awe (q. v.) blends sublimity and beauty in exquisite harmony.

Geology.—As on the eastern shores of N. America, the so-called Laurentian or fundamental gneiss appears on the W. coast of S. as the basis of the stratified rocks. It overspreads the whole extent of the outer Hebrides and the western parts of Sutherlandshire, and occurs in patches elsewhere in the W., in all cases maintaining a steady N.E. dip. Cambrian rocks are represented by a considerable series of unfossiliferous red and purple sandstones and conglomerates, well displayed in the W. of Ross-shire. The whole area of central S. as far S. as the

Forth or Clyde is occupied by an immense mass of highly metamorphosed strata, still dipping towards the N.E. Fossils are exceedingly rare, having as yet been detected only at Durness. At Easdale, Ballachulish, &c., rocks of this formation exhibit the perfect cleavage of fine slates. The granite of Aberdeenshire, &c., is synchronous with rocks of this period. Southwards from a line joining Girvan and Dunbar is a wide stretch of Middle Silurian strata. It consists chiefly of a series of greywackes and dark shales, the latter yielding very numerous graptolites, which have afforded Mr. Lapworth a basis for the correlation and classification of the order. True Upper Silurian strata occur in various limited areas, notably in the neighbourhood of Lesmahagow. The Lower Old Red Sandstone forms a triangle, having a broad base on the coast of Forfarshire, and its apex near Helensburgh, on the Clyde. In Roxburgh, Berwickshire, and the adjacent counties, a considerable area is occupied by the Upper Old Red, which, however, is more typically developed and richer in organic remains in Orkney and Caithness, and on the southern shores of the Moray Firth. The great coal-producing district has its limits at St. Andrews and Dunbar on the E. coast, and at Ardrossan and Dumbarton on the W., the most valuable portion being the field of Lanarkshire. Here the manufacture of paraffin, and other products of the distillation of shale, has now become an industry of great importance. The Reptiliferous sandstones of Elgin are probably of Triassic age, while patches of Jurassic and Cretaceous rocks are dotted over both sides of northern S. Leaf-beds, &c., of the Miocene period, were discovered by the Duke of Argyll in Mull, while glacial clays, with interesting fossils of an Arctic type, occur in the estuaries of the Forth and Clyde. Permian rocks occur in Dumfriesshire.

Climate and Agriculture.—The climate is very variable, but owing to its seaward exposure neither cold nor heat is so extreme as in similar continental latitudes. As registered at Castle Newe, in Aberdeenshire, 912 feet above the sea, and 35 miles inland, for a period of 34 years ending 1866, the mean temperature in January is 33.597, and in August 58.401. The mean annual rainfall is 35 inches. The winds are more variable than in England, and more violent, especially about the equinoxes. Westerly winds prevail during autumn and early winter, but E. and N.E. winds are felt severely in spring. While three-fourths of England are under cultivation, only one-fourth of S. is arable, but this is due to inferiority of climate and soil, for the Scotch have acquired the highest reputation as agriculturalists. In 1878 the arable land in S. was 3,537,000 acres, while 252,000 acres have been reclaimed (partly for pasture) since 1869. Of the acreage under corn crops (1878) as much as 41.8 per cent. was in wheat in England, as against 207 in Wales, and only 5.4 in S.; but S. had 73.8 per cent. in oats, while England had only 19.7, and Wales 47.8. After three unusually bad harvests, that of 1878 was exceptionally good (with excellent grain and hay crops), amounting in value to not less than 5 millions sterling. In 1878 there were 1,400,967 acres under corn crops, 687,319 under grass crops, 1,153,515 in permanent pasture, and 1,431,524 in clover, sainfoin, and grasses in rotation. S. had, in 1878, 1,095,387 cattle, 7,036,396 sheep, 140,189 pigs, and 191,416 horses. The sheep and cattle are chiefly reared in the Highlands, and after changing hands at the Falkirk trysts and other fairs are fattened on the turnips and grain of the Lowlands, and are consumed in the towns or sent to English markets.

Industries, &c.—Glasgow and Paisley are the principal seats of the cotton trade (105 factories with 36,104 hands in 1876). Dundee and other Forfar towns are noted for their jute and coarse linens (84 factories, 30,893 hands). Tweeds, tartans, and carpets are extensively manufactured at Galashiels, Hawick, Selkirk, Jedburgh, Bannockburn, Kilmarnock, and Aberdeen, floor-cloth at Kirkcaldy, and damasks and fine linens at Dunfermline. In 1876 there were 257 factories for woollens with 27,728 hands, 43 for worsted with 10,255, 159 for flax with 45,816, 12 for hemp with 1831, 4 for silks with 740, and 8 for hosiery with 1110. These textile industries thus employed 44,269 males and 110,650 females. In the counties of Lanark and Ayr, and at Carron in Stirlingshire, are some of the largest iron-works in the kingdom. In 1877, 982,000 tons of pig-iron were produced, and the average number of furnaces in blast was 117. The yield of coal in 1877 from 420 pits amounted to 18,665,552 tons, while the production of lead ore was 3207 tons, of silver (at Ayr, Stirling), 10,720 oz., and of copper ore, 680 tons. There are large

slate quarries in the counties of Aberdeen, Argyle, Perth, and Peebles. Marble is found in Argyle, Sutherland, and the Hebrides; granite in the Grampians; and sandstone throughout the country. Scotch pebbles are a specialty, and pearls are fished in the Teith, Forth, and Tay. The Clyde ports are world-famed for the construction of steam vessels. Shipbuilding is also carried on to some extent at Aberdeen, Dundee, Grangemouth, &c. The total number of registered sailing vessels (1877) was 2542 (885,442 tons), and of steam vessels 902 (451,635 tons). S. has valuable river and deep-sea fisheries (herring, haddock, cod, ling, &c.). In 1877 the total quantity of herrings cured was 847,718 barrels, while 561,985 barrels were exported. There were 14,623 fishing-boats (value £1,178,000) and 45,890 men and boys employed in 1877. In 1877 the exports of S. amounted to £15,163,608, the imports to £36,772,897, and the customs to £1,782,583. In 1877 there were 2726 miles of railway lines, and the total paid-up capital was £82,717,408. In 1876 the number of Scotch emigrants was 10,097—the total that left Scotch ports, 12,769.

Religion and Education.—For an account of the prevailing religion, see the section of this article devoted to Ecclesiastical History, FREE CHURCH OF SCOTLAND, and UNITED PRESBYTERIANS. In 1878 there were 320,000 Roman Catholics, 73,200 Episcopalians, comprising many of the nobility. The parish school system under which S. became celebrated for the general diffusion of education gave place in 1872 to a national system under school-boards, similar to that established in England by the Act of 1871. (See PUBLIC SCHOOL SYSTEM OF THE UNITED KINGDOM.) S. has four universities, at St. Andrews (founded 1410), Glasgow (1450), at Aberdeen (1494), at Edinburgh (1552). Besides the university medical degree, licenses are issued by the Royal College of Physicians, Edinburgh (incorporated 1681), the Royal College of Surgeons, Edinburgh (1505), and the Faculty of Physicians and Surgeons of Glasgow (1592). Academies of art exist at Edinburgh and Glasgow.

Law.—The law of S. differs from that of England, resting largely on the Roman or Civil law. Its chief features are the subject of special notice throughout this work. The highest tribunal in the country is called the Court of Session (q. v.), but from its decisions there lies an appeal to the House of Lords. It is popularly known as the 'Parliament House,' a name which preserves a memory of the time when S. was a separate kingdom and possessed a Parliament of its own. Previous to the Act 36 and 37 Vict. c. 63 (1873), no 'law-agent' could conduct a case before this Court unless he were qualified as a W.S. ('Writer to the Signet') or S.S.C. ('Solicitor to the Supreme Court'). Hence legal business in the highest Scotch courts was exclusively carried on by a distinct class of law-agents or solicitors resident in Edinburgh, whom provincial law-agents, commonly termed procurators, required to engage for this purpose. By the Act of 1873, however, one body of 'law agents' was instituted for all Scotland, the then existing Edinburgh and provincial practitioners being entitled to have their names placed upon the new register of such agents. Inferior courts known as sheriff-courts (see SHERIFF) are established in every county. The barristers who act as Counsel of Agents in the Supreme Court are called Advocates (see ADVOCATES, FACULTY OF).

Civil History of S.—The early history of the Scottish nation is of a semi-mythical nature which almost precludes a faithful record. At the time (A.D. 80) when the Romans under Julius Agricola vainly attempted to subjugate the northern part of Great Britain, there can be no doubt that the dominating tribe was that of the Picts (q. v.); the Scots, properly so called, came first from Ireland, about the beginning of the 6th c. under the leadership of Fergus MacErc, and established the Dalriadic kingdom (see DALRIADA) in Argyle and the adjacent Western Islands, but although they brought with them a divine religion and the agencies of culture, they did not finally establish their ascendancy until the middle of the 9th c., when Kenneth MacAlpine united the sovereignty of the two races in his own person (A.D. 843). The century that elapsed from Kenneth to Constantine II. is chiefly marked by the ravages and conquests of the Norsemen, and the extension of the Scottish power S. of the Forth, but it lies deeply in shadow, in spite of the profound and critical labours of Skene (q. v.). The 11th c. is the true dawn of Scottish history. After the fall of Macbeth (q. v.) there is at least a certain amount of continuity

in the historic record. The reign of Malcolm (q. v.) Ceanmohr witnessed the beginning of a silent but all-important revolution. Hitherto S. had been a purely Celtic kingdom, in language, laws, religion, and race. By Malcolm's marriage with an English princess, Margaret (q. v.), sister of Eadgar (q. v.) the Ætheling, a Teutonic element was introduced which was immensely strengthened by one of the political effects of the Norman Conquest, viz., the immigration of those Englishmen into S. who could not brook a Norman master. From the time of Malcolm English became the language of the court, and gradually spread over the S. and E. of the country. In spite of race, the happy accident of Malcolm's marriage delivered Scotland from the fatal supremacy of *Celticism*, and thus, in spite of long-continued national animosities, the union of two nations at last became both easy and natural. The Anglicising of S. went on vigorously under Malcolm's sons, all of whom, but notably David I. (q. v.), inherited the religious spirit and civilising instincts of their sainted mother. The great events of the first half of the 12th c. were the renewal of the efforts of the Norsemen, and their conquest of the Orkneys, the unavailing insurrections of the Celtic clans in the N. against the English policy of the kings, and the complete subjugation of the Celts of Galloway. William (q. v.) the Lyon, grandson of David I., is a notable figure in Scottish history. His capture at Alnwick (1174), his imprisonment at Falaise, his restoration to freedom on signing the Convention which acknowledged the ancient claim of England to the overlordship of S., and the renunciation of the claim by Richard I. on the eve of the Third Crusade, are to Scottish schoolboys perhaps the most familiar incidents of the 12th c. The reign of Alexander III. (q. v.) was long remembered as one of great prosperity and renown. During the dark days that followed it was looked back to as a kind of 'golden age.' The Norsemen now made their last descent, which ended in their utter defeat at Largs (A.D. 1263); and in 1281 the king's only daughter Margaret married the Norwegian heir to the throne, Eric, but died after two years, leaving an only daughter of her own name, who became heir to the Scottish throne. The death of Alexander (1286) and of the Maiden of Norway (1290) closed, however, the direct line of William the Lyon, and opened the Scottish throne to the ambition of rival nobles. The claims of four, John Balliol, grandson of his daughter Margaret; Robert Bruce, son of Isabella; John Hastings, son of Ada and Florence, Count of Holland, whose pretensions were but small, were referred to Edward I. of England, who, in a council held at Norham (A.D. 1291), decided in favour of the first-named, though the actual judgment was not given till a year later. John Balliol (q. v.) proved a failure, and, after wearing the crown for a few years, was dethroned by Edward, and died in retirement in Picardy. S. now fell entirely under English rule, until its marvellous resurrection under the auspices of William Wallace (q. v.). The revolt which he headed was signalled by the brilliant success at Stirling and the crushing defeat at Falkirk. After Wallace's execution (1305), Edward again attempted a union of the two kingdoms, but the policy of 'independence' was immediately taken up by Robert Bruce (q. v.), grandson of the original claimant of the throne; its triumph was completed by the glorious victory of Bannockburn, which freed S. for ever from the violent dominion of a foreign power. Edward II. was forced to come to terms. After his death a lasting peace was confirmed by the Treaty of Northampton, and Robert I. recognised as King of Scots. In his reign the succession to the crown was definitely settled, and the Third Estate was recognised as a necessary part of the national assembly. When he died in 1329, his only son and successor, David II. (q. v.), was eight years old. David was the first anointed king of S. The 14th c. is chiefly occupied with struggles on the part of Scotland to fortify its liberties, and on the part of England to reassert its claims of lordship. Happily for the former country, the great war that broke out between England and France made it impossible for Edward III. to devote himself to the subjugation of the Scots; and not even the defeat, capture, and long imprisonment of the son of Bruce could restore the earlier vassalage. The reign of David is the beginning of those French alliances which in the long run did no good to Scotland. The most notable battles of the century were those of Dupplin, Halidon Hill, Neville's Cross, and Otterburn. The successor of David Bruce, Robert II. (q. v.), was the first of the famous and unfortunate house of Stewart (q. v.). His reign was marked

by almost constant Border strife, and the slopes of the Cheviots occasionally re-echoed the war-shouts of a Douglas and a Percy. The physical and mental weakness of Robert III. rendered a lieutenant necessary in the person of his son David, Duke of Rothesay, but the supreme power was virtually in the hands of his brothers, the Duke of Albany and the Earl of Buchan, by the former of whom the heir-apparent was imprisoned and starved to death in Falkland Castle, when Albany became governor. Scott's *Fair Maid of Perth* has given us a vivid picture of this time, and every one remembers the deadly battle between the clans Chattan and Kay, which took place in 1396 on the North Inch of Perth. In 1400 Henry IV. of England made an ineffectual invasion, with the idea of reasserting the English supremacy. The 15th c. opens with the defeat and capture of Douglas at Homildon (1402), and three years later James, Earl of Carrick, heir to the Scottish throne, was captured by the English while on his way to France; his father died in the following year, and Albany remained Regent until his death in 1419. By far the most important incident of Albany's regency was the defeat, at the 'sair field o' Harlaw' (1411), of the last great effort of the Celt to regain ascendancy in Scottish politics. The return of James I. (q. v.) in 1424, after a captivity of nineteen years, was marked by a vigorous and effective exercise of kingly justice, especially in the Highlands, which were a prey to anarchy, savagery, and every form of brutal license; but his efforts were prematurely interrupted by his murder at Perth, in 1436, by a band of disaffected nobles. The great misfortune of Scotland in the 15th c. was a succession of royal minorities. James II. (q. v.) was only six years old at his father's death, and during the young king's minority there was a constant dispute for his guardianship between the chancellors Crichton and Livingstone, respective governors of Edinburgh and Stirling castles. The House of Douglas increased in power and arrogance, notwithstanding the murder, in Edinburgh Castle, of the earl and his brother, until James II. attained his majority. Shortly after, the murder of the then Earl of Douglas in Stirling Castle, by the king's own hand, gave rise to a civil war, which ended in the ruin of this great house. When the Wars of the Roses broke out, King James espoused the Lancastrian cause; but his attention being diverted to a meditated recovery of his lost Scottish fortresses, he was killed by the bursting of a cannon whilst besieging Roxburgh (A.D. 1460). James III. (q. v.) was eight years old when his father was killed. The influence of French art becomes visible in the architecture of this period, but the peaceful and timid character of the monarch invited the barons to engage in turbulent enterprises against each other, to form leagues of mutual defence against the Crown, and finally drove them to revolt. The death of James at the field of Sauchieburn (1488) was the culmination of their assault on the royal authority and the national prosperity. It is interesting to note that in this miserable struggle the 'merchants, burghes, and unlanded men' were on the side of the king; but the Scottish 'democracy' was still in its infancy, and could give him no effectual help. James IV.'s (q. v.) reign was one of the best in Scottish history, though it is chiefly remembered by the fatal disaster of Flodden. He set his nobles to keep their territories in order, chastised the pirates of the Western Isles, fostered trade, was the first patron of printing in Scotland, built famous ships, and encouraged boroughs to transfer their allegiance from the nobles to himself. Even the dismal day of Flodden—one of the worst outcomes of the 'French alliance'—was not without its compensations. Like the Wars of the Roses in the sister-country, it gave a death-blow to Feudalism. James V. (q. v.) was an infant at the time of his father's death, and when his mother married the Earl of Angus within a year, his cousin the Duke of Albany was made regent. He was unpopular, and on his departure for France in the king's twelfth year, it was arranged, through English influence, that James should be elected to reign (A.D. 1524). He chose as his guardian the Earl of Angus, who proved such a tyrant that the young king fled from him by stealth, and revenged himself by destroying the Douglas family. The borderers were brought into subjection in this reign. War broke out with England, partly connected with the old claim of supremacy, and partly with the Reformation schemes of Henry VIII. It ended with the defeat of the Scottish army at Solway Moss, and the king died of grief soon after hearing of the birth of his only daughter Mary (q. v.) (A.D. 1542). The regent was the Earl of Arran,

and his objection to English attempts on the Scottish crown led to an invasion in 1544 which met with slight resistance; a second, shortly after, was, like the first, chiefly devoted to pillage, and a third ended with the terrible defeat at Pinkie, 10th September 1547, after which the English were, by French assistance, driven out. The young queen was married in 1558 to François, Dauphin of France, who became king in the following year. The Reformation in Scotland may be said to date from the murder (A.D. 1545) of Cardinal Beaton, in revenge for the burning of George Wishart. In 1557 the First Covenant was signed, and religious uproars followed, in which John Knox came to the front. The insurgents effected a treaty at Berwick with Elizabeth of England in 1560, shortly after which the queen-regent died, upon which the Estates formally approved the Geneva Confession of Faith. In the following year Mary returned a widow, and was a second time married (20th July 1565), to her cousin Henry Stewart, Lord Darnley (q. v.), although her half-brother, the Earl of Murray (q. v.), tried forcibly to hinder it. The murder of David Rizzio (q. v.), her secretary, finally disgusted Mary with her husband, who was murdered at Kirk o' Field, 9th February 1567. The subsequent events of her romantic and tragic career are world-known: her abduction by Bothwell, her marriage to the suspected murderer of her late husband, her surrender at Carberry, imprisonment in Lochleven, escape, defeat at Langside, and fatal refuge in England, where she found a prison instead of a shelter, till she was finally put to death at Fotheringhay, 8th February 1587. The Regent Murray was murdered at Linlithgow in 1570, and was succeeded by Lennox, who died from wounds received in a scuffle with the Queen's party during the parliament of Stirling (A.D. 1571); the Earl of Mar followed as governor and restored Episcopacy, but lived little more than a year, and the Earl of Morton became Regent, 24th November 1572. On the same day died John Knox. The new ruler gained possession of Edinburgh Castle with English aid, and became nearly absolute; but in March 1578 James VI. assumed the government, and shortly after Morton was brought to trial and beheaded for the murder of Darnley. The young king was taken prisoner by the nobles under the Earl of Gowrie, in the Raid of Ruthven, 22d August 1581, and forced to acknowledge their acts, but escaped a year later, and revenged himself summarily. In May 1590 he was married to Anne, daughter of Frederick II., King of Denmark, and two years later Episcopacy was again abolished, and Presbyterianism established under the General Assembly. Religious riots ensued, in which James gained his point. The Gowrie Plot occurred in August 1600, and yet remains a mystery. On the death of Elizabeth of England, the King of Scotland became her heir through his descent from Margaret, daughter of Henry VII. and wife of James IV., and his right being confirmed by the English Parliament, he entered London, 6th May 1603, since which time the two crowns have been united. With this union the separate history of Scotland comes to a close.

Ecclesiastical History of S. Christianity was introduced into Britain during the time of the Roman occupation; and the Church thus founded was a part of the Church of the Empire. Towards the end of the Roman occupation, Ninian (q. v.), a Christian missionary, is said to have introduced it among the Picts on the northern side of the Solway Firth, and, in fact, to have converted the whole of the southern Picts as far as the Grampians. From the time when the Romans left Britain (410) till about the middle of the 6th c. is a legendary period of Scottish Church history which has been filled up by Fordun (q. v.) and Hector Boëce (q. v.) with narratives which, according to modern critics, are entirely unhistorical. Thus there seems to be no historical ground for supposing that St. Palladius (q. v.), who is brought by Fordun to Scotland (431), was ever in Scotland at all. St. Servanus, who, according to the same authority, was found by Palladius on his arrival in Scotia, lived in the 7th c. And the Culdees, who, according to Hector Boëce, were the monks or presbyters who governed the Church in Scotland between the year 203, when the Scots were converted by Pope Victor I. and the coming of Palladius, are really never heard of till the beginning of the 8th c. But at the same time there are traces of a connection having existed during the 5th c. between the southern Picts and the Church in Ireland, in churches dedicated to Irish saints of the time.

Towards the end of the 5th c. a colony of Scots from Dalriada (the N.E. part of Ulster) settled in the W. of Scotland, where,

although for a time they prospered and spread, they kept their footing with difficulty till the arrival in 560 of Columba (q. v.), who saved them from their enemies, the northern Picts, by converting them to Christianity. According to Bede, the nation of the southern Picts had been converted by St. Ninian. Be that as it may, they were in a state of paganism in the middle of the 6th c., and till Christianity was introduced among them by Columba (584). The Columban Church, in short, spread over the whole of Scotland N. of the Forth. There it was met by the Church of St. Cuthbert (q. v.), whose abbey at Lindisfarne was to the N. of England and Lothian what Columba's monastery in Iona was to the N. of Scotland—the centre of ecclesiastical government and religious enterprise. Of the district of Strathclyde the local apostle was St. Kentigern (q. v.), the contemporary of Columba. Being essentially a mission from the Church in Ireland, the Columban resembled in every respect the Irish Church of this period. It was a monastic church, in which there was neither territorial Episcopacy nor Presbyterian parity. The bishops were superior to the presbyters, and had the exclusive right of discharging the ordinary episcopal functions; but at the same time, being under a monastic rule, they were subject to the abbot, who might happen to be only a presbyter.

During the next period of Scottish Church history—the 7th and 8th centuries—the important question is the controversy between the native Church and the Roman Church regarding the observance of Easter, the shape of the tonsure, &c. When the purely Christian festival of Easter (q. v.) was substituted in the early Church for the Jewish Passover (q. v.), great difficulty was experienced in adjusting the day of the week, or solar time, to the day of the month, or lunar time. The system adopted in the Western Church was to celebrate Easter on the Sunday between the fourteenth and the twentieth day of the moon first after the vernal equinox, calculated on a cycle of eighty-four years. But a change was made in 457, and in 525 the cycle of nineteen years was finally adopted: Easter to fall on the Sunday between the fifteenth and twenty-first day of the moon. Now this change took place at the time when the Church in Ireland was completely isolated, so that she held by the former system, and regarded the latter as an unwarrantable innovation. In 710 the king of the Picts issued a decree that the Catholic mode should be observed throughout his dominions; and as the Columban monks refused to comply with this decree, the whole of them were expelled from the kingdom (717).

At the time when the Columban Church was coming into collision with the Church of Rome in this manner, two influences were at work modifying the constitution of the Church itself. One of these was the introduction from the Church of Rome of a hierarchy of secular clergy, with bishops exercising jurisdiction over the monasteries, instead of being in subjection to the abbot, as in the Columban Church. The other was the rise of the so-called Culdees (q. v.) or anchorites (the name representing the Lat. *Deicola*, which was applied to Anchorites (q. v.), as specially God-worshippers), who are first heard of in Scotland after the expulsion of the Columban monks. When in the 9th c. they were brought under canonical rule, along with the secular clergy, the name of Culdees came to be almost synonymous with secular Canons (q. v.). An attempt was made by Kenneth mac Alpin, King of the Picts, to restore the Columban Church in his dominions; and for this purpose he founded an abbey at Dunkeld, and made the abbot the first Bishop of Fortrenn (*i.e.* the kingdom of the southern Picts), whose seat was transferred to Abernethy in 865. The seat of the bishop of the Scottish Church (a title which first occurs in the time of King Giric, 878–889), or Bishop of Alban, was transferred to St. Andrews about 908. After the battle of Carham (1018), when Lothian was ceded to Malcolm II., the churches in that district fell under the jurisdiction of the Bishop of St. Andrews as sole Bishop of Scotland.

An important influence was exercised on the Scottish Church by Margaret, the English queen of Malcolm Canmore (married 1069). The policy of Margaret, which was continued by the successors of Malcolm, was (1) to substitute a diocesan episcopacy for the old monastic jurisdiction; (2) to introduce religious orders; and (3) to absorb the Culdees into the Roman system by converting them from secular into regular canons. King Alexander (1107–1124) created two new bishoprics—Moray and Dunkeld; and his brother David, while yet Earl of Cumbria, reconstituted the bishopric of Glasgow (about 1115). When he

became king (David I.), he created three new bishoprics—Aberdeen, Ross, and Caithness; and towards the close of his reign other two—Dunblane and Brechin. Alexander and David also founded a large number of monasteries for the regular canons of St. Augustine and for Benedictine monks. And even more direct measures were taken for the extermination of the Culdees. Their revenues and right were bestowed upon the regular canons; and such was the pressure brought to bear upon them that this last remnant of the old Celtic Church was absorbed into the order of regular canons in the course of the 13th c.

The C. of S. was now completely assimilated to the Catholic Church in the rest of Europe. And previous to the Reformation the corruptions of the Church had grown to a greater height in Scotland than in any other nation within the pale of the Western Church. In the second quarter of the 16th c. several persons were put to death for heresy, that is, preaching against the errors of the Church: Patrick Hamilton (1528), George Wishart (1546), Adam Wallace (1550), and Walter Mill (1558). But the death of these men, with the exception of the last, did not produce any widespread excitement. The truth is, that the causes of the Reformation were of a more practical nature than anything connected with a corruption of doctrine or abuses in matters purely religious. First, there was the collision between the higher ecclesiastics and the nobility. For a time the latter had seen their property and power taken from them to enrich the clergy; and when a set of teachers arose who taught that the clergy had no right to the position and wealth they had assumed, the nobles were very willing to be convinced. By the poorer classes, the tithes and other dues exacted by the Church were felt to be a burden. In 1557 the first Covenant was signed—a document by which the leaders of the Protestant party—the Lords of the Congregation, as they were now called—bound themselves to co-operate with each other in maintaining and establishing the Word of God, and in enmity to the antichrists of the time. The *carus belli* was the burning of Walter Mill. The Lords of the Congregation laid a remonstrance before the Regent, who received it in such a conciliatory manner as to allay the excitement for a time. An ecclesiastical council, too, met in 1559, to consider certain suggestions for reform made by a body of gentlemen well affected to the Established Church. But such internal reforms came too slowly or too late. The Queen Regent at this time assumed an attitude of distinct hostility to the Reformers, and her persecutions helped to produce an outbreak of popular zeal in their favour at Perth. The symbols of idolatry were attacked by the mobs, and many of the religious houses destroyed. The Reformers now issued manifestoes expressing defiance of the Queen Regent, who attempted to crush the opposition to her authority by means of French troops. Distrusting her strength, however, she made promises, on the faith of which the Congregation dispersed from Perth, where they had organised a defence. These promises were almost immediately broken, and the consequence was a fresh accession of strength to the Reformers, who now took possession of St. Andrews. They were not only able to hold their own there against the royal army, but they marched on Edinburgh, and took it (June 29). They were unable to retain this position, but a treaty with England was made (January 1560); assistance, in the shape of an English fleet and army, sent to Scotland; and the French army withdrawn in March. The Estates being convened in August, a Confession of Faith embodying the principles of the Geneva Church was approved of; all previous Acts on religious matters repealed; the authority of the Pope abjured; the celebration of the Mass declared illegal; and (on the 25th) Calvinistic Protestantism established as the national religion. The first General Assembly of the Protestant C. of S. was held on the 20th December 1560.

But the victory of the Reformers was yet far from being complete. Under the influence of Mary a Catholic reaction began, and a dispute arose among the Protestants themselves. The clergy had adopted, besides the Confession of Faith, a Book of Discipline, which the laymen were unwilling to subscribe, because it proposed that, while the tithes went to the support of the ministers and the poor, the revenues of bishops, abbey, and cathedrals should go to the endowment of colleges and schools. This was not what Knox's coadjutors had worked for. The deposition of Mary was favourable to the Reformation. The Regent took a solemn oath to maintain the Reformation and abolish Popery. The General Assembly prepared a scheme providing

effectually for the security of the Protestant cause, which was confirmed by Parliament in 1567; and from this time the Protestant religion was firmly established, and the Reformation complete.

But after the death of Knox (1572) a new conflict began—between Presbyterianism and Episcopacy. The Regent Morton favoured the latter, because he hoped by means of the bishops to exercise a power over the Church which would contribute to the stability of the government; and the nobility favoured it because they hoped by means of the bishops to retain part of the plunder of the Church. Accordingly, by the Convention of Leith (1572) it was enacted that the titles of archbishop and bishop should be retained till the majority of the king. But as the bishops were to be chosen by the ministers, and subject to the authority of the General Assembly in spiritual matters, the anomaly was presented for a time of Episcopacy and Presbyterianism co-existing in the C. of S. On the accession of James (1578), the Second Book of Discipline, which is still the law of the Church, was at once drawn up and sanctioned by Parliament; and in 1580 an Act was passed abolishing Episcopacy. The National Covenant of Scotland, also enacted at this time, was intended as a test of orthodoxy in regard to prelacy. The outrage on the king called the Raid of Ruthven produced a great reaction, so much so that in 1584 three Acts of Parliament were passed in favour of Episcopacy. Yet in 1592 the Presbyterian party had so far regained their influence that they carried a measure through Parliament which has been called the great charter of the C. of S. It repealed the Act of 1584 giving the king power to commission bishops to regulate all ecclesiastical matters in their dioceses; it gave to the General Assembly the right of meeting once every year; and it defined the rights of patrons and church courts in regard to vacant charges.

On the accession of James to the throne of England (1603), he virtually suppressed the General Assembly by proroguing it repeatedly as soon as it had met; and at length, in 1606, a Parliament which met at Perth reinstated the bishops in their former dignities, erecting seventeen sees. In 1618 the General Assembly met at Perth, presided over by the Archbishop of St. Andrews, supported by the prelates and nobility, and passed five acts enforcing all those forms of worship which were most distasteful to the Presbyterians. Charles I. on his accession (1625) resolved to carry out his father's two great designs regarding the C. of S., viz., the restoration of Episcopacy, and the recovery of the Church lands and tithes. A liturgy and book of canons were now prepared by the Scottish bishops. To the former all public worship was ordered by royal proclamation to be conformed. By the latter Presbyterianism was completely subverted, and Episcopacy put in its place. When the attempt was made (July 23, 1637) to introduce the new services into public worship there was a riot in Edinburgh, and all Scotland was roused almost to insurrection. A covenant was prepared, based on that of 1580, which was signed by a great majority of the people. The king wished to carry matters with a high hand, but his Commissioner, finding the Covenanters too strong, offered to make great concessions. These concessions, however, were not thought sufficient by the General Assembly convened at Glasgow (November 1638), and when the Commissioner dissolved the Assembly the members proceeded to assert their independence of the crown, repealed all the Acts of Assembly since 1606, and deposed all the bishops.

When the Scottish army met that of Charles at Kelso, a treaty was signed (June 18, 1639), ratifying the promises made to the Assembly of 1638. In August the General Assembly again met and renewed the National Covenant, which was signed by the Royal Commissioner. The result of the Civil War, begun in 1640, was that, instead of Episcopacy being imposed on the C. of S., Presbyterianism was like to have been imposed on the Church of England. The Solemn League and Covenant (q. v.) was signed in 1643 by the people of Scotland all to a mere handful, and the Confession of Faith prepared by the Assembly of Divines (q. v.) at Westminster was ratified by the General Assembly (Edinburgh, August 4, 1647), and became henceforth the Standard of the C. of S. In July 1653 the Assembly was dissolved by Cromwell, and did not sit for five years; but otherwise the C. of S. had peace of the Commonwealth. On the Restoration of 1660 Presbyterianism was overthrown. In 1662 it was again established, and an Act passed requiring all ministers to be ordained since 1649 to obtain presentations from the

patrons, and receive collation and admission from the bishops; by the application of which Act about 400 ministers were induced to resign their livings. On the Revolution (1688) Presbyterianism was again established. An act was passed in the Scottish Parliament (1690) by which the Westminster Confession of Faith and the Presbyterian Church government, which has remained the constitution of the C. of S. to the present day, were ratified and established, and lay patronage abolished. The king, however, desired that the episcopal clergy should be received into the Church on equal terms with the Presbyterians, and when the General Assembly demurred to this, authority for doing so was granted by an Act of Parliament, passed June 1693. This act was offensive to the high Presbyterians in its provisions, but most of all because it was considered to be an unwarrantable attempt on the part of the state to interfere in church affairs.

From the time of Queen Anne the burning question in the C. of S. has been Patronage (q. v.), the cause of almost all the dissent that has since arisen. The Act of 1690, which abolished patronage, was solemnly ratified by the Treaty of Union (1707), but in 1712 an Act of Parliament was passed restoring to all patrons their former rights. This Act was opposed by the Church, and was partly the cause of the Secession of 1733, as it was of the Relief Secession of 175 (see UNITED PRESBYTERIANS). During the rest of the 18th c. the C. of S. was completely under the domination of Moderatism; but about the beginning of the 19th c. the patronage question again began to be agitated. The Anti-Patronage Society was founded in 1825, and the Veto Act (q. v.) passed in 1834. The contest, which was carried on during the next ten years, culminated in the Disruption of 1843, and the formation of the Free Church (q. v.). Immediately after the Disruption an Act of Parliament (Lord Aberdeen's) was passed defining the rights of congregations and Presbyteries in the appointment of ministers; but in 1874 this Act, as well as that of 1712, was superseded by another, by which the right of electing ministers was vested in communicants and adherents.

The doctrine of the C. of S., as settled at the Reformation, was Calvinism, and this was fully defined in the Confession of Faith which was adopted in 1643 as the Standard of the Church. After the Revolution two parties arose, subsequently known as Moderates and Evangelicals. The latter were distinguished by their attachment to popular interests and liberties, and by their opposition to all the opinions identified with Arminianism; the former by their steady and uniform support of lay patronage, and their opposition to the doctrinal views of the Evangelicals, on the ground that these tended to Antinomianism. These two parties, with their twofold distinction, do not cover all the Church at the present day. There is a third and growing Broad Church party, holding opinions which show a considerable departure from the teaching of the Confession of Faith. It is not merely that individuals, such as M'Leod, Wallace, Tulloch, Story, Service, &c., have expressed themselves in favour of greater latitude of opinion and greater freedom in subscription to creeds, but the moral inability of the Church to shut the mouths of such men is a proof that the Confession of Faith is a dead letter within her borders, and that her ecclesiastical courts dare not honestly appeal to its decisions on doctrine. It may safely be affirmed that the prosecution of a good man for mere heresy is now regarded by the public conscience as an act of barbarous fanaticism, to be reprobated and denounced by all right-thinking men. Even in the severer sects that have cut themselves off from the C. of S. this holds true (witness the cases of the Rev. Fergus Ferguson and Prof. Robertson Smith); but in a Church claiming not only on *historic* but also on *actual* grounds to be distinctively 'National,' the assertion of the 'principle of comprehension' (within the limits prescribed by the acceptance of Christianity as a 'Divine Revelation') appears to be a sovereign duty no less than a logical necessity. See Reeves, *Adamnan's Life of St. Columba* (1857); *Lives of St. Ninian and St. Kentigern* (1874); *Culdees of the British Islands* (1864); Robertson, *Scottish Abbeys and Cathedrals* (*Quarterly Review*, 1849); *Statuta Eccl. Scot.* (1866); Stuart, *Charters of the Priory of the Isle of May* (1868), and *Book of Deer* (1869); Skene, *Celtic Scotland*, vol. ii. (1877); Burton, *History of Scotland* (1867); Grub, *Ecclesiastical History of Scotland*; Knox, *History of the Reformation*; Burnet, *History of the Reformation*, and *History of his own Time*; M'Crie, *Lives of Knox and Melville*; Spotswood, *History of the C. of S.*; Hetherington, *History of the C. of S.*; Peterkin, *Book of the Universal Kirk of Scotland*, &c.

Scott, David, a Scottish painter, was born at Edinburgh, October 19, 1806. The son of a landscape engraver, he showed a precocious talent for art, and served an apprenticeship under his father. Turning from the laborious art of the engraver to painting, he at once showed the bold, original cast of his mind by the treatment of ambitious subjects on the grandest scale. His first offering to the British Institution, 'Lot and his Daughters fleeing from the Cities of the Plain,' was rejected on account of its size. But neither hostile criticism nor the lack of patronage could dull in S. the enthusiasm of conscious power, or divert his choice of lofty themes. The 'Monograms of Man,' the illustrations of Coleridge's *Ancient Mariner*, and 'Sarpedon carried by Sleep and Death,' are all marked by grandeur of conception and weird suggestiveness. Two years spent in Italy and France (1832-34) rather tended to confirm the peculiarities of his style and ideal, which appear in all their strength in 'Discord, or the Household Gods Destroyed,' a work painted in Rome as if in defiance of the schools. Among his later productions are 'Ariel and Caliban,' 'The Alchemist,' 'Philoctetes,' 'Queen Elizabeth in the Globe Theatre,' 'Silenus Praising Wine,' 'Richard III.,' 'Jane Shore found Dead in the Street,' 'Peter the Hermit,' and above all 'Vasco da Gama encountering the Spirit of the Cape'—a work of transcendent genius. S. was one of the unsuccessful candidates for the commission to decorate the Houses of Parliament, and the disappointment had a serious effect on his health, at all times delicate. He died 5th March 1849. Gifted with a vivid imagination, S. is perhaps more a delineator than a colourist, and the defects of his execution are least perceptible in engravings such as those of the *Ancient Mariner*, and in the series, 40 in number, of the *Pilgrim's Progress*. Each of his works is a unique pictorial creation, in which the daring originality and splendour of thought withdraws attention from the frequent thinness of colour and weakness in drawing. His happiest efforts are distinguished by dramatic vivacity or elegiac sadness, while the design and sentiment of all his works are in truest harmony. S. contributed several essays on 'The Characteristics of the Great Masters' to *Blackwood's Magazine*. See a *Memoir* (1850) by his brother, William Bell S., who was born about 1810, and who is also a distinguished painter, etcher, engraver, archaeologist, and poet. He became head-master of the Government School of Design at Newcastle, and his principal literary works are *Hades, and Other Poems* (1839); *The Year of the World, a Philosophical Poem* (1846); *Antiquarian Gleanings in the North of England* (1849-51); *Chorea Sancti Vita* (1851); *Poems* (1854); *Half-Hour Lectures on Art* (1861); *Albert Dürer, his Life and Works* (1869), and *Poems* (1875). After a generation of neglect, his poems are now admitted by W. M. Rossetti and others to a high place in modern literature. He presented three large volumes of his etched and engraved works to the British Museum in June 1878.

Scott, Michael, a celebrated wizard of the 13th c., probably born in Fifeshire, died about 1291. Accounts concerning him give much that is chronologically impossible, and nothing that can be accepted with certainty. He is probably that Michael Scott, or Michael the Scot, who lived and wrote at the court of the Emperor Friedrich II. He must have been a learned and ingenious man, fond of dabbling in the occult sciences, and thereby gaining notoriety as a worker of miracles. Dante and Boccaccio mention him. He is supposed to be buried in Melrose Abbey.

Scott, Sir George Gilbert, B.A., F.S.A., was born in 1811 at Gawcott, Buckinghamshire, of which village his father was perpetual curate. Placed in his seventeenth year with an architect, Mr. Edmeston, he commenced practice on his own account in partnership with a fellow-student, Mr. W. B. Moffatt, and in 1841 designed the work that first brought him prominently into notice, the Martyrs' Memorial, Oxford. A year later he gained the competition for rebuilding the great Nikolaikirche at Hamburg; in 1848 was chosen to design a cathedral for St. John's, Newfoundland, and in 1854 undertook the restoration of Doncaster parish church, while as architect to the Dean and Chapter of Westminster since 1849, he erected the gatehouse and restored the chapterhouse of the Abbey. He was elected A.R.A. (1855), R.A. (1861), and President of the Institute of British Architects (1873); amongst his works during this period being the Foreign Office (in the execution of which design he was unfortunately hampered by Government), the chapels of

Exeter College, Oxford, and St. John's College, Cambridge, Glasgow University buildings, the Albert Memorial, Hyde Park (which gained him the honour of knighthood, 1872), and the Albert Chapel, Windsor, besides the restoration of cathedrals and churches through England's length and breadth. According to a list in the *Builder* (6th April, 1878), S. built or restored, since 1847, 26 cathedrals, 9 abbey and 2 priory churches, 1 minster, 474 churches, 26 schools, 5 almshouses, 23 parsonages, 57 monumental works, 10 college chapels and 16 colleges, 27 public buildings, 42 mansions, &c. He died at Courtfield House, S. Kensington, 27th March 1878, being at the time engaged on the restoration of the cathedral of St. Alban's, and the erection of St. Mary's Cathedral, Edinburgh. S. was the author of a *Plea for the Faithful Restoration of our Ancient Churches* (1850), *Gleanings from Westminster Abbey* (1862), three courses of Lectures delivered at the Royal Academy (1868-73; 3d. ed. in the press, 1878), &c. The foremost reviver of Gothic architecture, S., in the earlier part of his career, was rather a reproducer of ancient than a creator of independent work, adhering almost servilely to Decorated models; but latterly he diverged to an older and more Continental type of Gothic. It is, however, with restoration that his name will be most closely identified alike by admirers and opponents, the former of whom maintain that his work was always conservative, the latter that he obliterated the truth and value of many of our grandest historic monuments. That in some rare instances he carried restoration beyond its legitimate limits must be conceded, but that to him a future generation will owe the preservation of buildings that otherwise might have shared the fate of Tintern is indisputable.

Scott, Sir Walter, born at Edinburgh, August 15, 1771, was a younger son of Walter Scott, a Writer to the Signet, allied distantly to the Buccleuch family through the Scotts of Harden. When eighteen months old, young Walter lost the use of his right leg in an attack of fever, and though the careful nursing of several years restored to him the free use of his limb, it remained somewhat shrunken and caused a halt in his gait. He was sent for country air to his grandfather's farm of Sandyknowe in Roxburghshire, and afterwards to Bath. In 1779 he returned to Edinburgh, and after a meagre course of private tuition attended the High School, whence in 1783 he passed to the University. Old Dr. Adam of the High School used to say that although many in his class understood Latin better, Scott was behind few in enjoying an author's meaning. However little S.'s enthusiasm for learning at school, it was less at college; he earned the name of *The Greek Blackhead*; and Professor Dalzell, after reading an impudent essay of his instituting a comparison between Homer and Ariosto in favour of the latter, pronounced on him the sentence that dunce he was, and dunce he would remain. It was probably this severe criticism which gave him the soubriquet of Duns Scotus; but the Professor lived to retract his prophecy. Although the classic tongues had few charms for S., he early acquired a fair knowledge of French, Italian, Spanish, and what was rare in his day, German. Already he was known in the debating clubs as a youth of prodigious memory, brimming with miscellaneous information. 'My memory of events,' he says, 'was like one of the large, old-fashioned, stone cannons of the Turks—very difficult to load well and discharge, but making a powerful effect when by good chance any object did come within range of its shot.' After spending six years in his father's law office, reading ballads and books on knight-errantry more than legal treatises, he was called to the bar in July 1792. In 1796 appeared his first literary effort, a translation of Burger's *Lenore* and *Wild Huntsman*; and in the following year, after a hasty courtship, he married Charlotte Margaret Carpenter, daughter of Mme. Charpentier, a French refugee. In 1798 he got £25 from an Edinburgh bookseller for translating Goethe's *Goets von Berlichingen*; next year he wrote *Glenfinlas, The Eve of St. John*, and *The Gray Brother*. In 1802 appeared the first of many a raid into the southern counties, *The Minstrelsy of the Scottish Border*, of which the following year saw a new edition, completed by a third volume containing poems by himself and friends. Next came his annotated edition of *Sir Tristrem* (1804), and *The Lay of the Last Minstrel*, which in 1805 made him the most popular poet of Europe. *Marmion* (1808), in the description of the battle of Flodden, shows the highest flight of S.'s genius in verse; *The Lady of the Lake* (1810) is the most delightful and universally popular of all his poems; but his

subsequent productions—*The Vision of Don Roderick* (1811), *Rokeby* (1812), *The Bridal of Triermain* (1813), *The Lord of the Isles* (1815), *Harold the Dauntless* (1817), *Halidon Hill* (1822), *Auchincrane* (1830), *The Doom of Devorgoil* (1830)—did not attain the same success. In these world-read metrical tales the scenery is always fresh, and the characters are vigorously marked. S. catches the ring and the gallop of the old ballads, and 'seems the brother-in-arms of Froissart.' He is active—not reflective, and may be best described as a perfect contrast to Wordsworth, who could never describe a battle, and in whose instrument there is no trumpet-stop. Rich as are his effects, S. has little of the distinctively poetical about him. Stripped of rhyme and metre, the quality of his verse would be that of his prose. Landor, indeed, goes the length of saying that Scott never wrote but one line of true poetry—that descriptive of the dog and his dead master on Helvellyn—

'When the wind waved his garment, how oft didst thou start'

Such criticism is mere insolent perversity. Many of Scott's lyrics contain lines as good as this; and not a few (e.g. *Jock of Hazeledean*, *County Guy*, *Bonnie Dundee*) are perfect in rhythm, diction, and sentiment; but the highest rank among poets cannot be claimed for him. The true field for his genius was opened in 1814 by the anonymous *Waverley*. The first volume of this novel had long lain in a drawer in the form of condemned MS. Wincing at the failure of his latest poems, Scott determined to try a historical romance in prose, and dashed off the second and third volumes between June 4th and July 1st. Notwithstanding the rapturous reception of his work, Scott wrote, 'I shall not own *Waverley*; my chief reason is, that it would prevent me the pleasure of writing again.' This policy of concealment he carried through with many subsequent novels, sometimes blankly denying that he was their author. Meantime he had begun to build himself the 'Castle of Despair' on the Tweed. His poems had brought him large sums, and he held the office of sheriff-depute of Selkirkshire, which brought him £300 a year. He subsequently earned £800 a year as a clerk of session; and he was a secret partner in Ballantyne's flourishing printing business. His ambition was not so much to attain importance in the literary world, as to obtain a proud position among the county gentlemen of Roxburghshire. In 1811 he bought a small farm on the Tweed for £4000 and called it Abbotsford. As he grew famous and rich, the farmhouse gave place to an ever-increasing Gothic mansion, and all purchasable land around was added to the estate, often at exorbitant prices. A lavish expenditure now became necessary, for Abbotsford received all the great world that crossed the Border. While his dreams were thus being realised in stone and lime, Scott never relaxed his toil. Visitors wondered how he accomplished his work, for daily after eleven o'clock he was ready to spend his time in the hunting field or elsewhere. He seldom breakfasted before accomplishing one chapter at least of some novel. Thus were produced *Guy Mannering* (1815), *The Antiquary*, *The Black Dwarf*, *Old Mortality* (1816), *Rob Roy* (1817), *The Heart of Mid-Lothian* (1818), *The Bride of Lammermoor*, *A Legend of Montrose*, *Ivanhoe* (1819), *The Monastery*, *The Abbot* (1820), *Kenilworth*, *The Pirate* (1821), *The Fortunes of Nigel*, *Feveril of the Peak* (1822), *Quentin Durward*, *St. Ronan's Well* (1823), *Redgauntlet* (1824), *The Betrothed*, and *The Talisman* (1825). In 1820 George IV. made S. a baronet. Meanwhile the great author, in his eagerness to embellish Abbotsford, had obtained large advances from his printers and publishers. But in 1826 Constable & Co., the publishers, suspended payment, and immediately it appeared that Ballantyne was hopelessly involved with them. S.'s partnership was revealed as existing since 1805, and his liabilities amounted altogether to £150,000. 'Time and I against any two,' he repeated, in reply to all condolence. He meant to pay every debt to the last farthing, and resumed the pen in the midst of his trouble. *Woodstock* was in print before the crisis occurred, and its first edition was sold to Longman's & Co. for more than £9000. *The Life of Napoleon* was published in the same year, realising £18,000. Thus the retrieval of S.'s fortune began nobly. The Great Unknown's tattered disguise was thrown off at a dinner given for the benefit of the Edinburgh Theatrical Fund, February 22, 1827. His miscellaneous work up to this time included editions of Strutt's *Queenhoo Hall* (1808), Carleton's *Memoirs of the War of the Spanish Succession* (1808), *Memoirs of the Earl of Mounmouth* (1808), Dryden (18 vols.

1808), and Swift (19 vols. 1814), *Original Memoirs written during the Great Civil Wars* (10 vols.), *The State Papers and Letters of Sir Ralph Sadler* (1809), *The Somers Tracts* (13 vols. 1809-15), *Paul's Letters to his Kinsfolk* (1815), *Border Antiquities of Scotland* (2 vols. 1818), *Lives of British Novelists* (2 vols. 1825), *Letters of Malachi Malagrowther* (1826). His remaining writings are—*Miscellaneous Prose Works* (6 vols. 1827), *Chronicles of the Canongate* (1828), *Tales of a Grandfather* (1827-29), *The Fair Maid of Perth* (1828), *Anne of Geerstein* (1829), *History of Scotland* (for Lardner's *Encyclopædia*, 1829-30), *Letters on Demonology* (1830), *Count Robert of Paris and Castle Dangerous* (1831). In 1821 an annotated edition of the *Waverley Novels* was prepared, and met with great success. In 1830 S. resigned his clerkship. He was offered the rank of Privy Councillor and a pension, but declined both. In April 1831 he was seized with apopleptic paralysis, and in October he set sail for Italy in a Government frigate. Returning from Italy by the Rhine, he received a second stroke of paralysis at Nimeguen on the 9th of June 1832, and thenceforth his desire to return to Abbotsford brooked no delay. Abbotsford he reached on the 11th of July, and there he died on the 21st of September. He was buried on the 26th in Dryburgh Abbey. A monument erected to his memory in Princes Street, Edinburgh (1840), is one of the most splendid ornaments of the city.

Burns and S. are Scotland's greatest sons. The first was destitute of that which sometimes detracted from the other—a shrewd business talent which enabled its possessor to look at things through the world's eyes. The one took nature as he found it, and glorified it; the other revived the past, and drew pictures of the Middle Ages with Rembrandt's effects of light and darkness. Genius prompted almost every poem of Burns; much of S.'s work was accomplished by the combination of a far-reaching memory and a mechanically inventive imagination. S. worked hurriedly for gold; slower, he would have been surer of posterity's applause. The opinion of his latest eminent critic—Fitzjames Stephen—is that S.'s claims on immortality are precarious. The faults of his hasty style can never be overlooked; yet it may be affirmed that as long as the love of chivalry and the sense of the picturesque are cherished—as long, at least, as Scotland cares to analyze the national characteristics that have given her a name—so long will Scott be loved and read. It would be vain to attempt an estimate of the circulation of S.'s novels. It may be suggestive enough to state that in France alone, during the author's life, 1,400,000 volumes of his works were sold. See the *Life of Sir W. S.* by his son-in-law, Lockhart (7 vols. 1837-39; new ed. 10 vols. 1869). The *New York Herald* of June 3, 1878, published the first instalment of selections from S.'s letters to Ballantyne, a collection of which is expected to be published in 1878. A *S. Dictionary*, giving in alphabetical order an analysis of plots, characters, &c., by Mary Rogers, is in the press (New York, 1878).

Scott, Thomas, D.D., the Biblical commentator, was born at Baytoft, near Spilsby, Lancashire, February 16, 1747. By hard private study he qualified himself for the ministry of the Church of England, and was ordained in 1772. In 1780 he became curate of Olney, where he made the acquaintance of Cowper. In 1785 he was appointed chaplain of the Lock Hospital, and in 1801 vicar of Aston Sandford, Buckinghamshire, where he died April 16, 1821. He was a strong Calvinist, and wrote, among other works, a *Vindication of the Divine Inspiration of the Scriptures*, a reply to Tom Paine. His reputation, however, rests upon his popular *Family Bible with Notes* (1796), which has been frequently reprinted both in England and the United States.

Scott, Winfield, an American general, born near Petersburg, Virginia, June 13, 1786. He was early admitted to the bar, but in 1808 became captain of artillery, and was promoted to the rank of lieutenant-colonel at the beginning of the war with Britain in 1812. After being held prisoner for about a month, he led the assault on Fort George, 27th May, commanded the rearguard in the retreat from Stoney Creek in June, and made the descent on Burlington and York in September. In 1814 he captured Fort Erie, and, with Jacob Brown, won the victories of Chippewa and Bridgewater or Landy's Lane. He issued *General Army Regulations* (1818) and a *System of Infantry and Rifle Tactics* (1826). In 1841, after quelling several Indian risings and settling the Canadian frontier troubles (1837-38), he

was made general-in-chief, and commanded in the brilliant Mexican campaign of 1846-48, which ended in the cession of Texas, New Mexico, and Upper California. He was the Whig candidate for the presidency in 1852, but was defeated by Franklin Pierce. Two years later he was made lieutenant-general, and on the outbreak of the war of the Secession in 1861 he retired from active service. Dreading the consequences of the impending struggle, he suggested that freedom should be allowed 'the wayward sisters to part in peace.' He published an *Autobiography* in 1864, and died at West Point, May 29, 1866.

Scottish Language and Literature. The 'Scottish language' properly means the Gaelic dialect of Celtic used by the Scots after their settlement in North Britain among the Picts; and down to the 15th c. the phrase *lingua Scotica* never denoted anything else. During the 15th c. the recognition of its Irish origin led to its being also called *lingua Hibernica*, or in the vernacular, 'Yrishe' or 'Ersch' (mod. 'Erse'). Long before this, however, the name 'Scottish' had been applied to the whole people of Scotland, both Teutonic and Celtic; and as the former became more and more the dominant race, the term 'Scottish' came in time to be applied to the Anglic dialect of the Lowlands. This transference of name was all the more easily made that the lapse of years and the effects of political strife had thoroughly alienated the Angles of Lothian from their brethren of Durham and York. The first native writer who called the dialect of the Lowlands 'Scottish' was Gawin Douglas in the year 1516, though it had been so designated as early as 1498 by Don Pedro de Ayala, the Spanish pro-notary at the court of James IV., in a letter to his sovereigns, Ferdinand and Isabella. Before the close of the 16th c. this use or abuse of the term had become universal in the Lowlands, and has ever since been recognised in England. (For an account of the S. L. and L. in its primary and proper sense, see **Gaelic Language and Literature**.) This article is strictly confined to a notice of that Anglic dialect commonly designated 'Lowland Scotch' and of the literature which it contains. To understand its origin it is necessary to remember that till the middle of the 10th c. the kingdom of Scotland embraced no territory S. of the Forth. Strathclyde (q. v.) was a Cymric principality, and the Earldom of Lothian (q. v.) was part of the English kingdom of Northumbria (q. v.). This earldom, which included the whole S. E. of the present kingdom of Scotland from Liddesdale to Stirling, passed by grant to the Scottish kings in 975, who held it on the same tenure as the Northumbrian eorls; and thus the Anglic dialect obtained a footing within the boundaries of the Scottish kingdom. In the article **SCOTLAND** it has already been pointed out that in the 11th c. a powerful impetus was given to the spread of English by Margaret, sister of Eadgar the Ætheling, and wife of Malcolm Ceanmohr. Her own dialect would of course be Wessex or Southern English, but the neighbourhood of Lothian and the long exile of Malcolm in Northumbria would irresistibly determine the form of English that would be adopted in Scotland. The insecure and fluctuating rule of the Norsemen along the N. E. coast, from Calthness to the Firth of Tay, during the 9th and 10th centuries, is sufficient to account for those local peculiarities of diction which lend a curious flavour to the sub-dialects of Buchan and Forfar, but in no way diminish their right to be considered the legitimate offspring of an English mother. In fact, the majority of these peculiarities are more attributable to Celtic than to Scandinavian influences.

Of the earlier history of the Anglic dialect north of the Tweed we are wholly ignorant. How it grew and spread, what obstacles it encountered, and in what ways it was modified, we can only conjecture. This arises from the paucity, one might almost say the total absence, of literary monuments. The inscription upon the Ruthwell Cross in Dumfriesshire (7th c.), and some words interspersed in the Latin charters and laws of David, William the Lion, and his successors, constitute the entire remains of this speech between the 7th and the 14th centuries. These, however, are sufficient to prove that it approximated in its grammatical forms to the Scandinavian and Frisian rather than to the Saxon of Wessex. The same remark holds good of the whole Anglic dialect of Northumbria.

Between the 11th and the 14th centuries the Anglic tongue steadily extended itself in Scotland at the expense of the Celtic dialects of the S. W. and the N., but it does not appear to have

become the recognised vernacular of the entire Lowland community till at least the reign of Alexander III. A curious and hitherto unnoticed passage in *Blind Harry* (Bk. vi.), in which Wallace is mockingly saluted in bad Gaelic by an English soldier of the Lanark garrison, might almost warrant the inference that Celtic was still prevalent in Strathclyde in the days of the hero. The great struggle for Independence (1297-1314), which created the Scottish nation, was carried on by the Scoto-Anglic and Scoto-Norman population, the Celtic clans ranking mainly on the English side; and this fact in all probability finally secured the supremacy of the Teutonic speech. No sooner was the long-deferred unity or nationality of Scotland attained than an Anglic literature sprang into existence, which at one time promised to rival if not to surpass that of the south in the splendour and strength of its poetry.

From the 14th c. onward, says Dr. J. A. H. Murray, 'Scotland presents a full series of writers in the Northern dialect, which as spoken and written in this country may be conveniently divided into THREE periods. The first or EARLY period, during which the literary use of this dialect was common to Scotland with England north of the Humber, extends from the date of the earliest specimens to the middle or last quarter of the 15th c. The second or MIDDLE period, during which the literary use of the northern dialect was confined to Scotland (the midland dialect having supplanted it in England), extends from the close of the 15th c. to the time of the Union. The third or MODERN period, during which the northern dialect has ceased to be the language of general literature in Scotland also, though surviving as the speech of the people and the language of popular poetry, extends from the union of the kingdoms to the present day.'

The language of the first of these periods differs in no essential respect from that which was current in England as far S. as the Trent. A comparison of the literary remains of both districts proves (1) that they used to a large extent the same words and the same forms of words; e.g., *mirk, byggin, gar, stane, ald, cald, worang, hysg, &c.*; (2) the same grammatical inflections, as seen (a) in irregular plurals, e.g., *childer, kye, schone*; (b) in the use of the indefinite articles as a numeral; (c) in the identity of their demonstratives, and of their verbal forms, e.g., *thow cumis, clerkes sayis, we that lynes, falland*, in the use of the preposition *tyl for to, &c.*; (3) the same orthography, e.g., in the guttural *gh* (changed in later 'Scotch' into *ch*), in the change of the old English *kw* into *gw, gu, quh, and qwh*. The most famous names in the vernacular literature of this first period are Barbour (q. v.), Wynthoun (q. v.), King James I. (q. v.), Henryson (q. v.), and Blind Harry (q. v.). Barbour is by far the greatest of metrical chroniclers, a class of poets who sought to win the ear of an audience by stirring narrative rather than by imaginative sentiment, and who were a genuine product of the Middle Ages. In his noble rhyme, Barbour narrated the heroic struggle of the Bruce with a vivid minuteness of detail that has engraven itself indelibly on the national memory. Wynthoun was a humbler artist, who undertook to recite in verse the history of Scotland, and thought it necessary to start from the creation of Adam. In the *Kingis Ouhair* of James the Anglic poetry of Scotland underwent its earliest literary change. The simple unadorned semi-prosaic style of the chronicles gave place to a delicacy and refinement of imaginative feeling, a richness and elegance of diction, and a certain artistic ambition in the choice of verse. The great influence of Chaucer on the Scottish poets of the next period was perhaps due to the prince whose long captivity in England was brightened by the charms of love and the delights of literature. Henryson was the finest poetic genius of the 15th c., and not even Chaucer himself has surpassed the author of the *Testament of Cresseid* in melody of verse or tenderness of sentiment. Blind Harry is the rudest of minstrels, yet his fierce and prejudiced verse shows us, only too well, the pernicious effect of those desperate attempts on the part of the English kings to overthrow the liberties of a proud and obdurate nation. The only relic of prose literature in this period is the *Craft of Deyng*, but for linguistic purposes the old Scottish laws are of great value. Latin authors like Fordun (q. v.) and his continuator do not come within the scope of this article.

The second period of the Anglic literature of Scotland is that in which it becomes distinctively national. The genius of Chaucer had raised the E. Midland dialect of English to the rank of a classic or standard for his countrymen. As a consequence of this, the northern dialect gradually 'ceased to be

employed for literary purposes' in England, and 'sank into the position of a local and rustic patois,' while in Scotland it grew and flourished as the language of the court, literature, and law. The differences between it and the dialect of the first period are chiefly these: (1) the spelling of many words is changed, chiefly through Gaelic influence—e.g., the diphthongs, *ai*, *ei*, *oi*, begin to be regarded as simple long *a*, *e*, *o*, and to lose their fine diphthongal force, to which is largely due the mean accent of the modern Scotch; (2) the introduction of French words which followed the French alliance—e.g., *gigot*, *ashet*, *tasse*, *fulzie*, *glaur*, *porte*, *gein*, *grosel* (mod. *grozel*), *dour*, *douce*, *caussey*, *dule*, *fascis*; (3) the influence of the revival of learning which for a time flooded the written language with Latin terms—*amene*, *preclair*, *celcal*, *humile*, *superne*, *elerne*, *matutine*, *sempitern*, *fructuous*, *mellifuate*, *auriate*, *pulchritude*, *celtitude*, &c., but which, not finding a reception among the people, soon died out. It is, however, to be noted that in the latter part of this second period the natural growth of the Anglic dialect in Scotland received a check through the influence of the Reformation movement. Mr. Murray points out that 'there was no translation of the Scriptures into the northern dialect; for the first forty years of the Reformation movement these and other books used by the adherents of the new faith had to be obtained from England.' As early as the time of Lyndsay we see traces of southern English showing themselves; and it becomes more and more marked in the reign of Mary—Knox himself using, with the greatest licence, the English forms of spelling.

The literature of the second period is in some departments peculiarly rich. Dunbar (q. v.), Douglas (q. v.), and Lyndsay (q. v.), with whom it opens, are names that would lend lustre to any age. When their bright lamps began to shine in the northern sky, England had not even a farthing rushlight to make its darkness visible. The author of the *Sevin Dydly Synnis*, and *The Thrissill and the Rois*, and *The Goldyn Targe*, well deserved to be called the 'darling of the Scottish muses;' while the diffuse loveliness of Douglas bears witness to the power of the Chaucerian charm. Lyndsay is chiefly memorable for his fierce and life-long battle with the priests, which secured for his satiric verse a popularity that lasted far on into the 18th c. Among the lesser lights of the time were the Earl of Glencairn, Henry Balnave (q. v.), John Davidson, Sir Richard Maitland (q. v.), Bannatyne (see BANNATYNE CLUB), Alexander Scott, Alexander Hume, and Robert Semple. Prose is powerfully represented by the *Traduction* of Bellenden (q. v.), the *Complaynt of Scotland*, and *The History of the Reformation in Scotland*, by Knox (q. v.). The names of Buchanan (q. v.) and Melville (q. v.) can never be forgotten, though their literary genius found expression almost wholly in Latin.

With the accession of James to the English throne, the Anglic dialect of Scotland enters upon its third and final phase. This may be described as a period of gradual but unceasing decay. One genuine characteristic disappeared after another, till by the middle of the 18th c. the language had become, from a linguistic point of view, a mere jargon. The union of the crowns, still more the union of the Parliaments, was fatal to its organic preservation. During the 17th c. it maintained, though with ever-diminishing tenacity, its hold upon the law courts, the schools, and the churches, but after the Revolution its fate was sealed. Southern English took possession of the schools, and in spite of the temporary reaction that followed the union of the Parliaments, steadily extended its authority, till it embraced nearly every kind of literature. As a spoken tongue 'Scotch' was still in force, but the accessions which it constantly received from its southern sister completely destroyed its dialectic integrity. When we analyse the examples furnished by the literature of the 18th and 19th centuries, we find that they present an incoherent medley of dissimilar forms from which no principle can be extracted. Yet, strange as it may seem, in this forlorn and ruined shape the Anglic dialect of Scotland has been the vehicle of some of the rarest literature the world has seen. Ramsay (q. v.) and Ferguson (q. v.) are not unlikely to fade into something like oblivion, but the verse of Burns (q. v.) is as sure of immortality as anything that has come from the heart of man. He and other gifted spirits, such as the Baroness Nairne (q. v.), Hogg (q. v.), Tannahill (q. v.), Cunningham (q. v.), Motherwell (q. v.), with numerous humble but genuine lyricists, have sung so copiously and sweetly of the land which gave them birth; its scenery in all its aspects; its people in all

their ways, that Scotchmen may almost be forgiven if a certain pride mingles with their patriotism.

Prose is brilliantly represented by Scott (q. v.), Galt (q. v.), and later writers, but in general it forms only a part of their composition. The use of 'Scotch' in fiction or verse may last for some time longer, but the dialect is destined to perish as a living speech, and must therefore in due time disappear from literature. It may perhaps share the fate of Latin, and be most carefully studied after it is dead. See David Irving's *History of Scottish Poetry* (1861), and Dr James A. H. Murray's Historical Introduction to his *Essay on The Dialect of the Southern Counties of Scotland*, published (1873) in the *Transactions of the Philological Society*.

Scottish Music. The music of Scotland, so nationally characteristic, so full of sweetness, delicacy, and simplicity, can claim a well-authenticated antiquity. Giraldus Cambrensis, who wrote in the reign of Henry II. of England and William the Lion of Scotland, mentions that the Scotch then used the harp, the tabour, and the bagpipe; but probably the flute and violin were also employed south of the Grampians, as ancient representatives of these instruments were found at Melrose Abbey, &c. The country maintained a privileged class of minstrels, who were welcome guests alike in court and cottage, and who sang old lays and legends to the accompaniment of the harp. Such was Blind Harry (q. v.), who chanted his heroic strains before nobles and high princes. James I. of Scotland was not only a proficient on the harp and a variety of instruments, but an adept at composition; and all the Stuart kings, with the exception of James II., seem to have been patrons or cultivators of music. From the Lord High Treasurer's accounts we find that in the beginning of the 16th c. a considerable band of instrumentalists was attached to the court. The only ancient Scotch music which survives has come down to us through various MS., such as that of Sir W. Mure, supposed to date about 1620, and the more important Skene MS. in the Advocates' Library, which was written by Sir John Skene about 1630. Some of the melodies in these collections bear signs of great age, the few notes and pure diatonic intervals used pointing to a time when the musical scale and instruments were in an infant state, and resembling somewhat the ecclesiastical cantfermo. The iteration of the concords, particularly the third on the accented part of the bar to the exclusion of the fourth and seventh, and the close of the tune with a leap from the key-note to the fifth above, are common characteristics. The annihilation of choral establishments, exclusion of organs, and severely simple style of psalmody introduced at the Reformation, helped to check musical progress in Scotland, but an Act passed in 1579 required the teaching of music and singing in all the large burghs, so that in the 17th c. music formed a branch of ordinary education in Scotland. The music of the country, exclusive of pibrochs and dance music, is, however, almost entirely lyrical. The Jacobite enthusiasm of 1745 found vent in a flood of spirited songs, and the melodies wedded to the words of Burns, Hogg, Tannahill, and a host of minor poets, are dear to Scotchmen all the world over. But with such strongly-marked national characteristics, S. M. has found no native composer to develop its riches instrumentally. Mendelssohn recognised the splendid resources of Scottish song, and in his beautiful Scotch Symphony has seized as no other master has done the very essence and spirit of the music of the country.

A peculiarity of modern Scotch melodies is that known to musicians as 'Scotch snap,' consisting of the frequent use of a short before a long note, as in the notes marked * in the following illustration:—



William Daunay's *Ancient Scottish Melodies* (1838) contains a history of S. M. by W. D., and a critical analysis by Finlay Dunn. Among the best and most complete editions of Scotch songs are George Thomson's *Select Collection of Original Scottish Airs*, &c. (6 vols. 1817-1841), and G. F. Graham's *Songs of Scotland, with Historical, Biographical, and Critical Notices* (3 vols. 1848). The most distinguished vocal exponent of S. M. was John Wilson, who published an edition of the songs of Scotland, as sung by him in his entertainments, in 1842.

Scotus and Scotista. - See DUNS SCOTUS.

Scotus Eriгена. See ERIGENA.

Scrap Metal is a general term for old and worn-out articles of metal, as well as the fragments and parings produced in their manufacture. S. M. is re-melted to be worked over again.

Scream'er (*Palmæda*), a genus of *Grallatorial* or Wading Birds, having a cylindrical horn on the head, oval nostrils, toes covered with quadrate scales, and the third and fourth wing-quills best developed. The *P. cornuta*, the horned S. of tropical America, attains the size of a turkey, and is of a blackish-brown hue. The Chaja or Crested S. (*Chaja chavaria*) has a hooked bill, and belongs to a different genus from the horned S. The latter occurs in Paraguay and Brazil, its colour being a bluish-grey interspersed with black.

Screens, in churches, are partitions of wood, metal, or more rarely stone, enclosing the choir, separating side chapels, or dividing the chancel from the nave, in the last case being usually surmounted by the Rood (q. v.). The upper part consists of open work, the lower is solid, and the whole is frequently richly carved and painted with figures of saints, a circumstance which led to the destruction of numbers of S. by the iconoclasts of the 16th and 17th centuries. With the Gothic revival many S. have been restored or re-erected, though not without protests from the Low-Church party, as in the case of Christ Church Cathedral, Dublin (1878). In medieval halls, S., extending across the lower end, formed a lobby, with a gallery above, as in the halls of the Oxford and Cambridge colleges.

Screw, in ordinary language, is a cylinder surrounded by a spiral ridge or grooves every part of which forms with the axis a constant angle. As a mechanism, however, the S. is a kinematical combination for transforming circular into rectilinear motion, or *vice versa*. It consists of two elements, the *nut* and what is ordinarily termed the S. To the spiral ridge on the exterior of the S. there is a corresponding groove on the interior of the nut, and any relatively rotatory motion of these is necessarily accompanied by a relatively translatory motion. Hence, if either be fixed the other can be made to advance or recede by rotating it round the common axis. For one complete rotation there is translation through a distance equal to the interval between the threads. The smaller the interval the finer the S., and the smaller the distance traversed during one rotation. The S. is, consequently, an invaluable mechanism for fine adjustments, such as are required in good telescopes, microscopes, micrometers, dividing engines, &c. In the S.-press and S.-jack it is used for the application of great pressure, in the gimlet we have it as a borer, and in the ordinary S.-nail we see it employed for fastening separate pieces of material together. In a modified form it effects the propulsion of ships. See SCREW PROPELLER.

Screw Pine (*Pandanus*), the type and principal genus of *Pandanacea* (q. v.), is so called from the leaves having a uniform spiral arrangement around the axis, while the fruit may have suggested *pine*, or the tufts or crowns of leaves at the end of the branches of the *pine-apple*. The number of species is placed by Dr. I. B. Balfour, the latest authority, at about ninety, a large proportion of which abound in the vicinity of the sea in the Mascaren Islands and the islands of the Indian Archipelago. Most of the species are large bushes, but some form much-branched trees. The genus is distinguished by its male and female flowers being always on separate plants, and by the male inflorescence being a compound spadix made up of a number of short catkin-like spikes, each of which bears an immense number of little naked flowers, and the female a globular or oblong head consisting of very numerous closely packed ovaries, each containing a single ovule. The fruits are wedge-shaped clusters of drupes congregated frequently into large cone-like heads. The long, narrow, tough and leathery leaves bear recurved spines along their midrib and margins. A special characteristic of the *Pandani* is their power of sending forth from all parts of the stem aerial roots provided on their tips with cup-like spongioles which act as preservatives from injury until the soil is penetrated. When firmly rooted these roots serve as props or stays to the plant. The fruit of some species is used for food, and the flowers of the wide-spread *P. odoratissimus* are boiled and eaten with meat in India, where also perfumeries in the form of oil,

attar, and scented water, obtained from the powerfully fragrant flowers of this species, are in high esteem. In the Mauritius the strong bags used for packing sugar are made from the split leaves of *P. utilis*. Of the remaining genus *Freyxinetia* the fleshy bracts of *F. Banksii*, the S. P. of New Zealand, are eaten by the natives, and furnish also a luscious jelly.

Screw-Propeller, is a modified form of screw, adapted for propelling a vessel through the water. The idea of utilising a screw for such purposes of navigation is as old as the days of Hooke (1680); and in 1794 Lyttleton patented an 'aquatic propeller' which consisted of a screw revolving in a frame placed at the head, stern, or side of a vessel. Bramah in 1784, and Shorter in 1799, also took out patents; but these led to no useful result. Colonel John Stevens, of Hoboken, New Jersey, seems to have been the first that successfully propelled a vessel by a screw set at the stern. In 1804 he constructed a boat with twin screws; and in 1806 built a second and larger boat, called the *Phenix*, which was provided with a single screw, and which made a successful passage to Albany in 1807. In 1836, English patents were obtained by Francis Pettit Smith, a farmer of Rodney, and Captain John Ericsson. The improvement introduced by the former was setting the screw in an open space in the dead-wood at the stern, whereas previously the screw had simply projected from behind. Ericsson's screw consisted of several blades, the twist of which was determined theoretically. Further, he was the first to couple the engine directly to the shaft of the propeller; and to him, indeed, not only are many improvements due, but also the practical introduction of the propeller in steam navigation. His first vessel, the *Francis B. Ogden*, was tried in April 1837, and in the succeeding May it towed the *Toronto*, an American packet of 700 tons burden, to sea, making 4½ knots an hour against wind and tide. His second vessel, built in 1837 by the Lairds of Birkenhead, was built for Captain Stockton of the United States Navy, and was subsequently purchased by the Delaware and Raritan Canal Company. The British Admiralty took up the question about 1840, and for experimental purposes constructed the *Rattler*. One result of these practical inquiries was the diminution in length of the screw, which was cut down from 5 feet 9 inches to 1 foot 3 inches. As early as 1838, James Lowe had shown that the length should not exceed one-sixth of the *pitch*, where the pitch is the distance the screw would advance during one revolution, provided there were no loss of energy. Much of the energy of rotation of the screw, however, is wasted through friction, and consequently the real *rate* or actual advance is less than the pitch by an amount which is technically known as the *slip*. The slip varies with the twist, the velocity of rotation, and the depth of immersion, of the propeller; and to diminish it as far as possible is one of the great problems of steam navigation. The theory of the S.-P. is simply a particular case of the theory of screws in general, complicated by considerations of the nature of the materials which are in use. As a screw advances in its nut, or as a gimlet perforates a piece of wood, in exactly the same way does a propeller move through water, though possibly at the same time there is an auxiliary action due to the creation of a partial vacuum in front of the screw. It is at once evident, then, that reversal of the direction of rotation of the propeller is accompanied by reversal of direction of motion of the ship; and the direct effect of reversal when a vessel is going forward is to retard the motion and bring the ship to a standstill. From the inquiries by a committee of the British Association (1878), it would appear that while a vessel is thus being stopped by a reversed screw, it is quite beyond the control of the helm; and that consequently, when a collision is imminent, it is usually much safer to steer the vessel aside, since the screw-steamer can be turned in a distance not greatly exceeding the distance which it would advance before it could be brought to a standstill even with the screw reversed full speed. This would not be the case, of course, were the action of the helm at all sure during reversal. The comparative merits of the screw and paddle form an interesting inquiry. For vessels of war the superiority of the screw is incontestable, since its chances of being injured by the enemy's shot are very small on account of its position, and because it allows a clear broadside for the guns. The rolling of the vessel does not much affect the efficiency of the screw, and though the paddles have the advantage during pitching, the balance in stormy weather is in favour of the screw.

In smooth water and for short voyages, paddles are the best; and the motion of the paddle-steamer is more agreeable to passengers than that of the screw-steamer. The centre of mass of the latter is lower, and the rolling consequently greater, while the rotation of the screw and shaft gives rise to an unpleasant continuous vibration. In the British navy the screw is universally employed, and in the merchant service, the large sea-going vessels are equipped with a screw, at least as an auxiliary. Frequently, when a vessel is sailing before a good wind, it outruns the screw, which consequently retards its progress. To obviate this difficulty various plans are adopted. The screw may be disconnected from the shaft and permitted to rotate freely; or it may be lifted quite out of the water. Maudsley's feathering screw, the blades of which can be set flush with the keel and thus offer little further resistance, is intended to do away with this disadvantage. It is of necessity two-bladed, and rests naturally in an upright position.

Screw-Wrench is a wrench whose movable jaw is opened and closed by a screw-mechanism. It is intended for grasping the flat sides of the heads of large screws, so as to unscrew them. The movable jaws form planes, which remain always parallel whether advancing towards or receding from each other.

Scribe, Augustin Eugène, a prolific French author, was born at Paris, December 25th, 1791, educated for the law, and began his career as a playwright at the age of twenty with *Les Derviches*, a light comedy which failed. In 1816, along with Delestre-Poirson, he produced *Une Nuit de la Garde Nationale*, which proved a brilliant success, and was followed by *Le Nouveau Fourcaugnac* and *Le Solliciteur*. Henceforth he had two pieces, and sometimes three, acted in Paris simultaneously. For the Gymnase he wrote in ten years (1821-31) 150 plays, while he also contributed to the Française, Vaudeville, and Variétés theatres. Among his best are *Les Premiers Amours*, *Le Mariage Enfantin*, *La Reine de seize Ans*, and *Le Diplomate*. He employed many distinguished men to fill up his sketches, and drove the trade of literature so successfully as to leave the largest fortune ever acquired by a French man of letters. In 1838 he entered the French Academy. He died February 20, 1861. A catalogue of his works filled thirty-six columns of *La France Littéraire*. An edition of his writings appeared in 2 vols. (1833-37), another in 26 vols. (1855-58), while a third in 50 vols. is (1878) in course of publication. See Legouvé, *Eugène S.*, *Conférences des Matinées Littéraires* (1874).

Scribes (Heb. *sopherim*, 'those occupied with books,' from *sopher*, 'a book'), in the early times of Jewish history, were officers who acted as public writers, secretaries to the king, &c. (cf. Ju. v. 14; 2 Kgs. xii. 10, xxv. 19, &c.) 1. From the Captivity till the death of Simon the Just (B.C. 458-300), the S. were those who copied the Law for themselves or others, those skilled in the Law, or interpreters of Scripture (cf. Ezra vii. 6, 12; Neh. viii. 1, &c.; Jer. viii. 8). 2. The successors of these, who were the S. proper, were the Tanaim (Aram. 'Repeaters' or 'Teachers of the Law:' B.C. 200 to A.D. 220), also called the Sages, the Wise, and afterwards Rabbis. 3. The Amoraim (Aram. 'Recorders,' 'Expositors,' A.D. 220 to about 500), were those Doctors of the Law, who, after the redaction of the Mishna (q. v.), were the authorised recorders and expositors of the Halacha (q. v.). 4. The Saboraim (Aram. 'Deciders,' A.D. 500-657) were the Doctors of the Law who determined what was law from the controversies of the Amoraim contained in the Talmud. 5. The last Doctors of the Law in Rabbinic succession were the Gaonim (A.D. 657-1038), a title which properly belonged only to the Presidents of the two colleges of Sora and Pumbedita. The work of these colleges was to explain difficult points in the Talmud, answer questions sent in from the different Jewish communities, and enact new laws.

Scrib'ing, in carpentry, the operation of fitting the edge of a board to any surface; as, for instance, the skirting-board of a room to the inequalities of the floor.

Scrip, the certificate of joint-stock shares, issued on the signing of a contract of co-partnery, valid until the company is established with the authority of opening regular books for the enrolment of shareholders and the transfer of stock. The sale of S. does not transfer responsibility from the original purchaser.

Scrivener, Frederick Henry Ambrose, LL.D., born at Bermondsey, 29th September 1813, passed from St. Olave's Grammar School, Southwark, to Trinity College, Cambridge, where he gained a scholarship (1834), graduating B.A. (1835), and M.A. (1838). After holding an under-mastership at Sherborne, and the curacy of Sandford Orchard, he became in 1846 head-master of Falmouth School and incumbent of Penwerris, and in 1861 was presented to the rectory of Gerrans, Cornwall. A member of the Company of Revision of the New Testament since 1870, he received in 1872 a pension from Government, and from the University of St. Andrews the honorary degree of LL.D. His masterly contributions to Biblical criticism include editions of the Greek Testament (1860); the *Codex Beza* (1864), and the *Cambridge Paragraph Bible* (1873); a *Plain Introduction to the Criticism of the New Testament* (1861; 2d ed. 1874); a *Full Collation of the Codex Sinaiticus with the Received Text of the New Testament* (1863), and *Six Lectures on the Text of the New Testament, and the Ancient MSS. which contain it* (1874).

Scrof'ula. See TUBERCULOSIS.

Scroll, a convolute ornament based on natural forms, and introduced in decoration in various ways. It occurs, primitively simple, in Egyptian paintings, and, with florid elaboration, in the arabesques of the Renaissance. Volute (q. v.) is sometimes used synonymously with S.

Scrophulariaceæ, Scrophularin'œæ, or the Figwort Family, is a large natural order of monopetalous dicotyledons, consisting of about 180 genera and 1800 species of herbs, undershrubs, or shrubs, and a few trees. It has representatives in all climates. The order is distinguished by the following characters:—leaves opposite or alternate, without stipules; flowers irregular, either axillary or in terminal racemes or panicles; corolla of 4-5 lobes; perfect stamens 2-4; ovary superior, 2-celled, with numerous ovules in each cell. S. are generally acrid and bitter; some are purgative, emetic, or poisonous. The most important medicinal species is *Digitalis purpurea*—the Foxglove (q. v.). Plants of the tribe *Euphrasia* are Root-Parasites (q. v.). Many garden ornaments are furnished by this order, such as the genera *Antirrhinum* (see SNAPDRAGON), *Calceolaria* (q. v.), *Linaria* (see TOADFLAX), *Mimulus* (q. v.), *Verbascum*, *Veronica* (see SPREDWELL), &c.

Scru'ple (Lat. *scrupulum*, 'a small pebble') was among the Romans the lowest weight, being the twenty-fourth part of an ounce. In Troy weight it has the same value, being the third part of a drachm, and equivalent to 20 grains.

Scudéry, Madeleine de, born at Havre, June 15, 1607, began her literary life with one or two novels in part written by her brother. She became one of the great attractions of the Hôtel Rambouillet, and for a time was reckoned a tenth muse. Now she is reckoned the Muse of Dulness. Some people still read her romance of *Artamène* (10 vols. 1650) because of its sketches of her contemporaries under assumed names. But her other works, *Ibrahim, ou l'Illustre Bassa* (1641), *Cillic* (1656), *Histoire Romaine* (1656), *Les Femmes Illustres* (1665), and all the rest, each extending to eight or ten volumes, are now entirely forgotten. She died at Paris, 2d June, 1701. See *L'Esprit de Mademoiselle de S.* (Par. 1766).

Scu'do (Lat. *scutum*, 'a shield;' comp. Fr. *écu*, Old Fr. *escu*, 'a crown,' also from the Lat. *scutum*), a coin and money of account used in Italy before the introduction of the decimal coinage. Its value was about 4s. sterling, corresponding very nearly to the American dollar or the British crown. Each of the old Italian states had its own S. That of Genoa was valued at 5s. 3d., while that of Modena was only 3s. 4d. It is now superseded by the lira, five of which were equivalent to the S. *nuovo* of the kingdom of Italy. In Malta the S. was also once current; its value was about 1s. 6d.

Scull (Icel. *skol*, 'to plash'), a light short oar, a pair of which are plied by one rower. Besides the operation implied, the term *sculling* signifies the act of propelling a boat by working an oar from side to side of the stern without raising the blade from the water.

Sculp'ture (from Lat. *sculpo*, 'I carve'), the art of carving, in the round or in relief, in stone, wood, metal, or gems. In the higher sense S. is the counterpart of painting; the one is

its pure state dealing with form, and actually reproducing in tangible material its rounded surfaces, the other calling colour to the aid of drawing and simulating inequalities of surface by the art of perspective. For an account of S. in metal and wood see CHASING, ENGRAVING, and CARVING. The cutting of precious stones is dealt with in the articles CAMEO, GEM, and INTAGLIO. S. and religion are early associated; the Israelites, for instance, are exhorted to abandon the worship of graven images. The artist-devotee, in his efforts to symbolise divinity, usually grafted on the human form the incongruous attributes of brute strength and intelligence. The Egyptians are the first people who elevated S. almost to a pure art. The oldest statues in existence are now believed to be those of the Sheik Ra-em-ké, of Schafrá, of Ra-hotep, and of Nefer-t, his sister or wife, discovered at Sakkarab by Mariette Bey, who ascribes the two last to the third dynasty (B.C. 4449). They are all more natural and expressive than later Egyptian sculptures. The two last are of limestone, while the second is diorite and the first of cedar-wood, coated with flesh-tinted stucco. The eyeballs are pieces of opaque quartz, having bits of rock-crystal to represent the pupils. According to M. Lenormant the Egyptians are the only people who began by following nature and ended by sinking into slavish conventionality. The S. generally accepted as typical of Egypt (q. v.) belongs to a much later period and has little artistic value. Assyrian S. is more barbarous than that of Egypt, but is freer from the deadening effect of stereotyped ideals. Its colossal, human-headed bulls and winged lions, its bas-reliefs of battles, hunting scenes, and court episodes form a narrative surpassing in vigour if not in minuteness that of the sculptured and painted walls of the Pharaohs. The Assyrians failed in their treatment of the human figure; their masterpiece is the famous Wounded Lionesses. The sculptured remains of the Etrurians, chiefly in bronze, stone, and terra-cotta, point to a close connection with the Greeks, and their chief faults are exaggerated attitude, with an unnatural position of the hands and meagreness of detail (see ETRURIA). In Greece S. attained its utmost perfection in more dramatic expression and the suggestion of freer movement, in scientific grouping of figures and a higher idealisation of style. The Dædalides, or early sculptors (so called after Dædalus of Athens), wrought in wood, but the later artists used Parian marble (see PAROS), besides gold and ivory. During the glorious age of Phidias (q. v.) the Greeks combined different marbles in polythitic S., and employed wood and metal for the draperies, &c. These devices have been condemned by most modern critics. The greatest works of Phidias were the sculptures of the Parthenon (see ELGIN MARBLES), the statue of Minerva, and the Olympian Jupiter at Elis. His favourite pupils were the rivals Alcámenes of Athens and Agoracritus of Paros. The host of artists who sprang up after Phidias are conspicuous enough in literary history, but are almost unknown by their works. Polyclitus, famed for his ideals of youthful beauty, was opposed by Myron, a master of manly form and sculptor of the ideal Hercules. The 'beautiful style,' in which grandeur was forsaken for grace, found its highest expression in the works of Scopas (q. v.), Lysippus (q. v.), and Praxiteles (q. v.). The last and greatest of these was the first who ventured to carve an undraped Venus. Others of this period were Chares, who cast the Colossus of Rhodes, Alesander and his three sons, the authors of the Laocoon (q. v.), and Glycon, to whom is inscribed the Farnese Hercules at Naples. The Romans carried off most of the great Greek sculptures to Rome. Fond as they were of art, the Romans themselves produced no great artist, and after the age of Hadrian, S. gradually declined to a formal repetition of outlines. The so-called Romanesque and Byzantine styles are feeble imitations of the Classical, which had long lost its meaning. Before the Renaissance, unknown mediæval carvers had covered the façades of Lombard churches with fanciful, dramatic groups of men and animals. Later, a race of northern Gothic sculptors adorned the porches and façades of churches with a maze of magical invention, unrivalled in its natural loveliness. But the Renaissance only affected S. when Niccolò Pisano combined the liberal study of Græco-Roman art with a genuine love of nature. Pisano's masterpiece in S., a 'Deposition from the Cross,' dates about 1233-37. Giovanni Pisano fused his father's manner with the Gothic style. Andrea da Pontedera, called Andrea Pisano, under the influence of Giotto, inclined S. to picturesque effects; his greatest pupil was the many-sided Orcagna. The four great Tuscan masters were

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Della Quercia, Brunelleschi (q. v.), Ghiberti (q. v.), and Donatello (q. v.). The gates of the Florentine Baptistry by Ghiberti are the supreme achievement of Tuscan bronze-casting. Scarcely inferior names, all Tuscan, are Lucca della Robbia, Agostino di Gucci, an exquisite master in terra cotta, Antonio Kossellino, Metteo Civitali, Mino da Fiesole, Benedetto da Majano. The Renaissance had entered on its new pagan phase, when Michael Angelo (q. v.) elevated the mixed motives of contemporary S. into marvellous ideals of vehement emotion and Dantesque dignity. Cellini's reputation as a sculptor rests chiefly on his 'Perseus.' S. died out in Italy about the end of the 16th c., and the names of Bernini, Algardi, and Canova (q. v.) mark the chief attempts at revival. Canova, refined but affected, was the master of Thorwaldsen (q. v.), Bartolini, Dupré, Neia, &c. In Germany the 15th c. saw the quaintly beautiful work of the Nürnberg artists, Vischer (q. v.), Schönhofer, and Kraff; in recent times the greatest German sculptors were Rauch (q. v.), Rietschel (q. v.), Schwanthaler (q. v.), and Bandel (q. v.). In France alone the Renaissance spirit survived, and the fame of the school has been maintained by Puget, Girardon, Houdon, author of the busts of Molière and Rousseau, Rude, who carved the 'Departure' bas-reliefs for the Arc-de-Triomphe, Marochetti (q. v.), and Barye, the great animal sculptor. Strictly speaking, S., as an independent art, had no existence in England till the appearance of Flaxman (q. v.). His chief followers have been Westmacott (q. v.), Chantrey (q. v.), Ramsay (q. v.), Gibson (q. v.), Foley (q. v.), and, in our own day, Landseer (q. v.), Woolner (q. v.), Boehm, Stevens, Leighton (q. v.), and Brodie (q. v.). America has been singularly prolific of gifted sculptors, among whom are Greenough, Hiram Powers (q. v.), Crawford, Henry Brown, Palmer, Thomas Ball, and Quincy Ward. See Overbeck's *Griech. Künstler* (2 vols. Leip. 1857-58), Cicognari's *Scultura del suo Risorgimento in Italia* (9 vols. Prato 1823); Viollet-le-Duc's *Dictionary of Architecture* (1866, vol. iii., art. 'Sculpture'), Symonds' *Renaissance in Italy* (Lond. 1877).

Scur'vy, or Scorbutus, is a disease which essentially consists in a depraved condition of the blood, caused by abstinence from a proper vegetable diet. It has proved very fatal both by land and sea, but it is pre-eminently a sailor's disease. Dr. Guy says—'S. alone has sufficed to place a well-manned vessel at the mercy of the winds and waves. Witness Anson's own ship, the *Centurion*, in 1742, when the crew were so weakened by it that had the ship been compelled to keep the sea a few days longer it could not have been brought to anchor at Juan Fernandez, but must have gone adrift in the Pacific, the survivors perishing miserably, as happened to a Spanish vessel under similar circumstances. Or take the figures that express the mortality in Anson's fleet. Out of 961 men, 626 deaths in nine months, or very nearly two out of three! And this was no rare or exceptional occurrence, for such things had happened in earlier, and did happen in later times. Thus Sir Richard Hawkins, the great navigator of the age of Elizabeth and her successors, said that in the course of twenty years "he had known of 10,000 seamen having perished by S. alone." Even so late as 1780, Sir Gilbert Blane found that a fleet manned with between 7000 and 8000 seamen had in one year lost one in every seven.' At the present time S. can hardly be said to exist in our army or navy; but it is still to be found to a considerable extent in the merchant service, partly owing to the carelessness of captains and owners of ships, and partly from the bad quality of the lime-juice supplied.

The important discovery that lime-juice prevents S. was probably due to John Woodfall. At what period the truth dawned upon men's minds we do not know, but certainly as early as 1617 John Woodfall, master in surgery, knew that lemon-juice was the best of all remedies for S., and commended it accordingly; but, strange to say, this important fact was forgotten or overlooked for more than a hundred years. About 1770, Lind revived and diffused a knowledge of it; but nearly another quarter of a century was to elapse before our navy was supplied with it. This important step was taken in 1796. Dr. Wynter Blyth says, 'The practical ways of keeping men free from S., whether on land or sea, is to see that, where they can be obtained, fruits and fresh vegetables be used at each meal. In war it is better to utilise any plant that is not injurious rather than have no vegetables at all. . . . Each soldier or sailor should drink an ounce daily of lemon-juice, which should be swallowed

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as soon as distributed. . . . Vinegar should be an essential part of the rations, and it is a good plan to issue little packets of the citrates or tartrates of potash, with instructions for use.' Notwithstanding the well-known prophylactic qualities of lime-juice, the most serious consequences frequently arise from culpable neglect. In 1875 two British vessels arrived at San Francisco, the crews being decimated by S.; and the comparative failure of the recent Arctic Expedition under Sir George Nares was, in great measure, due to neglect regarding the lime-juice issue.

Dr. Garrod views S. as essentially due to the want of potash salts in the blood, through the food being deficient in them. The symptoms come on gradually, with weakness, anxiety, a sallow muddy complexion, a foul breath, and the appearance of blotches on the legs called 'the purples.' The gums become swollen and spongy, bleed on being touched, and resemble that seen when a patient is salivated. Wandering pains are felt all over the body, and the temperature is lower than normal. As the disease advances the teeth rot from the sockets, and hæmorrhage takes place from the mouth, nose, stomach, and intestines. The last stage is attended with great debility, and the petechiæ, developing into ulcers or ecchymoses, form on the lower extremities.

Scurvy-grass (*Cochlearia*) is a genus of cruciferous perennial herbs with entire or pinnate leaves, small white flowers with short-clawed petals; short, equal, spreading sepals; pods oblong or globose, with turgid reticular valves, and often imperfect septum; tubercled seeds in two rows. It is a littoral plant with smooth, fleshy, clasping stem-leaves, and cordate-orbicular or ovate radical leaves, which are esteemed a valuable antiscorbutic, hence the name. *C. officinalis*, one of the 'Saline Plants' (q. v.), also thrives on mountains, a form of it being found in Scotland at a height of 4000 feet.

Scu'tage. See ESCUAGE.

Scu'tari (anc. *Scodra*, Slav. *Skadar*, Turk. *Ishkodra*), capital of a vilayet of the same name in Northern Albania, on the river Bojana, near where it issues from Lake S., and 17 miles from the Adriatic. S. is the seat of a Greek bishop, and has a castle occupied by a Turkish pasha. The chief industries are the manufacture of weapons, weaving, and the exportation of fish, taken from the adjacent lake, which is 20 miles long. S. also trades in leather, oil, maize, wheat, wool, timber, wax, and fruits. There is considerable transit trade. The surrounding country is fertile. In 1876 there entered 4 steamers and 104 sailing-vessels, with a tonnage of 3751, and cargoes valued at £126,103; there cleared 1 steamer and 93 sailing-ships, with a tonnage of 2901, and cargoes valued at £64,399. Pop. 40,000. By the Treaty of Berlin (July 1878) the Turks are permitted to raise fortifications around S., but on the rest of the Bojana neither they nor the Montenegrins may do so.

Scu'tari (Turk. *Uesküdar*), a town of Asiatic Turkey, on the Bosphorus, opposite Constantinople. It slopes gradually up from the shores of the Bosphorus, and to the S. and S.W. are extensive cemeteries shaded by cypresses, where the Turks of Stamboul prefer to be buried, that their graves may not be desecrated in the day when the Giaour again rules in the city of the Cæsars. S. with its twelve mosques and extensive ruins has a striking appearance from the sea. There is also a summer palace of the Sultan's, and a barrack for the guards, as well as numerous khans for the many caravans which start here. Some manufactures of silk and cotton are carried on. The barracks were used as a British hospital during the Crimean War, and here it was that Florence Nightingale (q. v.) toiled. S. is on the site of the ancient Chrysopolis. Pop. 50,000.

Scutche'on is the shield or metallic plate attached to the key-hole of doors, and through which the key passes. The term is also applied to a knight's shield—properly Escutcheon (q. v.).

Scutch'ing. See FLAX-DRESSING and COTTON-SPINNING.

Scyll'a and Charyb'dis, a rock and whirlpool in the straits of Messina, frequently referred to in ancient writings. S. is a rock on the Italian coast about 200 feet high. It is occupied now by a castle. The situation of C. is more uncertain. All ancient writers agree in representing it as a whirlpool, but no whirlpool exists opposite S. Either they intended the whirlpool of Garofalo, 10 miles down the straits, or else some of

the currents common in the neighbourhood of S. At anyrate, they described S. and C. as directly opposite each other, and the difficulty of navigating between them became proverbial in antiquity. Homer represents S. as a monster—above a virgin, below a beast—with twelve feet, six mouths, &c. C. was a voracious monster opposite. The myths were varied in later times.

Scythe (Icel. *sigd*, 'a sickle'), an implement having a long curved blade of steel, fixed nearly at right angles to a long, crooked handle. It is used in mowing and Reaping (q. v.). Two S.-like weapons of war, called the *bill* or *war S.*, and the *glaiue* or S. knife, were in use from the 13th to the 16th c. The S. blade, slightly straightened, was simply fixed to a wooden handle, and in a line with it. The *bill* has its point curving from the cutting edge, the *glaiue* to it.

Scyth'ia, a term of vague import, and more ethnographic than geographic. The Scythæ, or *Scoloti* as they called themselves, are mentioned in early Greek writers, especially Herodotus, as a nomadic people drinking mare's milk (*galactophagi*, *hippemolgi*), and living in a country where gold was found. Their habitat was N. of the Euxine, between the Don and the Caspian. In one direction they penetrated towards the Danube. They also entered Asia Minor (628), but were expelled by Caxares. In Ptolemy's time travellers had found many Scythian tribes in Asia, and he applied the name S. to the whole of W. and Central Asia. The identification of the Scythians with some modern people was long a variously-solved problem. The weight of evidence now strongly favours the view that they were the Turcoman or Tartar race.

Sea is the general name for the continuous mass of salt water which covers the greater part of the earth's surface. Over this large expanse, especially in the equatorial regions, evaporation is constantly taking place, and the moisture-laden atmosphere, cooled by radiation, or by indraught of a cold current, or by translation to a cooler region, precipitates this vapour as dew, rain, snow, or hail. The S. is the great store from which the solar heat draws up the vapours which subsequently descend to water the earth, and it is the great reservoir to which these waters ultimately return by means of the various river courses and channels. The various aspects of this grand cycle of operations are noticed under the special articles CLIMATE, RAIN, RIVER; while the great movements of the deep are discussed under CURRENTS, TIDES, and WAVES. Here it is proposed, after glancing at the nature of S.-water, its density, temperature, depth, &c., to consider briefly its action as a geological agent.

The saltness of the S. is familiar to all. The saline substances which it holds in solution are brought to it mainly through the dissolving action of the rivers and streams, which ultimately mingle their land-travelled waters with the ocean. This saltness is wonderfully uniform throughout, a result due to the interdependence of density and saltness, so that the equilibrium, once destroyed, is speedily restored through consequent circulation. The chief cause of this salinity is the presence in solution of chloride of sodium or common salt, as much as 2.7 per cent by mass being this compound. The density of S.-water is 1.027 at 60° F., the density of distilled water being unity. Besides increasing the density, the presence of saline substances has the effect of lowering the freezing point of S.-water to 28° 4 F. Temperature readings show a decrease of temperature with increase of depth. In the Atlantic and Pacific a stratum of cold water, at a temperature of 35° F., lies along the bottom. This stratum Sir Wyville Thomson regards as derived mainly from the Antarctic seas, except perhaps in the North Atlantic, where there is an indraught from the Arctic Ocean. This steady diminution of temperature as one descends is an important factor in the distribution of life in the ocean, and one of the results of the late *Challenger* expedition is the proof that life exists at all depths. Deeper than 100 fathoms the ordinary surface disturbances on the S. are hardly perceptible; so that the destructive action of the S. must cease at that depth, and be very feeble at depths much less than this. Along the shore, however, the wearing action of the waves is very evident. The angular masses severed from the parent cliff by frost and wind are gradually rounded by friction till all trace of splinter has vanished. The spheroidal boulders, pebbles, and gravel which strew the beach, and the sand of the beach itself, bear

witness to the disintegrating action of the S. More important, however, is the ocean as a conservative agent. The gravel, sand, and mud which are borne down by rivers, gradually sink to the bottom, and accumulating there become consolidated through time, and form the basis of a new continent; while far out in the great depths the calcareous ooze is gradually increasing by the constant accessions of the Globigerina shells, which pour like rain through several miles of salt water till they reach the bottom. And thus the S., though it acts by denudation along its shores, is more than making up for this by depositing along its rugged bottom the matter which the rivers and streams of the earth have brought in suspension to it. See Sir Wyville Thomson's *The Depths of the S.* (1873), and Huxley's *Physiography*.

Law Affecting Sea and Sea-shore.—It is a question which has been much discussed whether the sea is open to all, or whether it may not be appropriated by particular nations. In the United Kingdom, while it has been admitted that the ocean cannot be appropriated, it is held that the sea within three miles of the shore is British dominion. But the point is obscure; and in the trial of the captain of the German *Franconia* for the manslaughter of one of the passengers of the *Strathclyde*, in a collision which took place off Dover, 17th February 1875, a contrary decision was come to by the supreme court. The shores of the United Kingdom are *inter regalia*; that is, they are held by the Crown for behoof of the people. This lordship comprehends the right to free navigation, to fishing, to taking wrecks, to forbid passage to enemies, &c. The *shore* is the space between high and low water-mark. It has been decided in England that land gained from the sea by sudden recess goes to the Crown, but that which is gained gradually goes to the neighbouring proprietor. (See ALLUVION.) Wilful injury to a seabank is felony by statute.

Sea-Devil. See ANGLER-FISH and LOPHIUS.

Sea-Dragon, a name given to various Teleostean fishes, such as the *Pegasus draco* belonging to the *Lophobranchii* (q. v.); and to the Dragonets (*Callionymus*), allied to the Gobies. They occur in the seas of the E. Archipelago. The Pegasus is a fish whose wide breast and large pectoral fins have suggested the name S.-D. *P. natans* is another species, with smaller fins.

Sea-Grape (*Ephedra*) is one of the three genera of the gymnospermous order *Gnetaceæ*, the other two being *Gnetum* and *Welwitschia*. The various species are shrubs destitute of foliage leaves, with long, slender, cylindrical, green-barked branches; at the joints of the stem are two opposite minute leaves, which grow together into a bidentate sheath, and from their axils spring the lateral branches.

Sea-ham Harbour, a seaport of Durham, founded in 1828, is 6 miles S. of Sunderland, and forms the terminus of three railways. The chief buildings are the Perpendicular church of St. John (1841), a Congregational chapel (1856), a Catholic church (1870), the Londonderry Literary Institute, in Grecian Doric style (1855), a Gothic infirmary (1849), and the Harbour and Colliery Office. The harbour consists of a tidal basin, one dry and two wet docks. S. H. depends for its prosperity mainly on the coal trade. Bottle-works employ 200 hands, and there are also anchor and chain works, an iron foundry, and chemical works. Pop. (1871) 9031.

Sea-Horse. See HIPPOCAMPUS and LOPHOBRANCHIA.

Sea-Kale (*Crambe maritima*), a cruciferous perennial, with strong, deeply-penetrating roots, native of the sandy and shingly sea-coasts of Europe (including Britain) and W. Asia. The leaves are broad, wavy, and toothed, and are covered with a glaucous bloom; the white flowers have a strong, honey-like smell; and the one-seeded pods are roundly ovoid, about $\frac{1}{2}$ in. long. S.-K. in a wild state was apparently known to the Romans as an esculent, and used by them in long sea voyages. It has been cultivated in England about 200 years, but was not brought into general notice until 1767, and was introduced from England to the Continent as a table vegetable. It has now become common in gardens, the blanched young shoots and leaf-stalks being the part eaten. See CRAMBE.

Seal, the name given generally to animals belonging to the section *Pinnipedia* or *Pinnigrada*, of the order *Carnivora*, class *Mammalia*. The Walrus (q. v.) is also included in this section, in which the limbs are converted into swimming paddles.

There are two groups or families of seals—the *Phocidæ*, or seals proper, which have no outer ear, and the *Otaridæ* or eared seals, which include the sea-lions, sea-bears, sea-elephants, and other forms. The *Phocidæ* have the hind limbs stretched out behind and in the long axis of the body, so that, along with the hinder extremity of the body they serve as an efficient propelling organ. On land the seals are awkward in their gait. They support themselves on their paddle-like fore-limbs, and waddle along in an ungainly fashion. In the water they are exceptionally agile and active, swimming and diving, and securing the fishes on which they prey with the utmost ease and grace. They have five toes in each foot, and external nails on the paddles. Incisor teeth, canines, and molars are developed, and the dentition resembles that of carnivora generally. The greater part of the fore-limb is buried in the integument, so that only the distal part of the limb is used as the paddle. The orifices of the ears can be closed, like the nostrils, at the will of the animal. The skin is provided with a thick layer of blubber or fat, and there is an upper and under fur. The common S. has six incisor teeth above and four below; two canines in each jaw; and ten molars and premolars above and below. Seals as a rule are intelligent inoffensive animals. In aquaria they become exceedingly tame, and recognise their keeper. When whistled upon they attend the signal, and allow themselves to be petted at will. The *Phocidæ* inhabit the seas of Arctic and temperate climates. The Greenlanders find in them a store of useful materials, and utilise the skin, fat, bones, and intestines. A valuable oil is obtained from the blubber, and ships, specially intended for the S.-fishing, sail regularly to the Arctic seas from various European and American ports. Dundee and Hull are notably the British ports whence the S.-fishers sail; in America, the Alaska Company have, since 1870, leased St. Paul and St. George, the largest of the Aleutian islands.

The Common S. (*Phoca vitulina*) is familiar on many British coasts, and is a dreaded foe of the salmon, herring, and other fishes. Its average length is about 4 feet. The fur is a greyish brown, mottled with black. The Harp S., or Saddleback S. (*Phoca Greenlandica*), occurs in the Arctic Ocean, and has a wide distribution. On the back there is a black or tawny mark, resembling a harp in shape, the body fur being grey. This S. forms the chief object of pursuit by the S.-fishers. Its average length is 5 feet, and a full-grown specimen weighs from 200 to 230 lbs. or more. The *P. barbata*, or Great S., is found in S. Greenland, and measures from 8 to 10 feet in length. The Grey S. (*Halicharys griseus*) measures between 8 and 9 feet in length, and occurs on the coasts of Iceland and Norway. Another well-known S. is the *P. fatida*, so named because of the disagreeable odour emitted by the skin of old males. The *P. Caspica* is a native of the Caspian Sea. Other seals belonging to genera differing from the genus *Phoca* are the Monk S. (*Menorhynchus monachus*) of the Mediterranean Sea; the Crested S. (*Cystophora cristata*) of Greenland seas, in which the nose of the males has a curious distensible sac. This latter species may attain a length of 10 or 12 feet. The Sea-Elephant is the *Morunga proboscidea* of the Antarctic seas, an animal measuring from 20 to 30 feet in length, the males having a proboscis-like nose. The Leopard S. (*Leptonyx Weddellii*) has leopard-like markings on the fur. They occur off the S. Orkney Islands and on the coast of E. Polynesia. The S.-fisheries begin in March, and April is usually the busiest month. One tun of S.-oil is estimated to represent the blubber of 100 seals; the skins selling at about 5s. each. In 1870, nine Dundee vessels obtained 90,450 seals.

The *Otaridæ*, or Eared seals, have a small outer ear, and in their structural relationship present a much nearer affinity to the Bears than the ordinary seals do. The neck of the *Otaridæ* is much better defined than that of the common S., and they are able to move about on land with greater ease, owing to the greater freedom of the fore limbs. In their distribution the Eared seals are found in the Southern Seas, and do not occur in the Atlantic save in its most southern parts. The best-known forms are the Sea-Bear (*Otaria ursina*) and the Sea-Lion (*O. jubata*). Two of the latter have bred in captivity at the Brighton Aquarium. These seals attain a length of from 10 to 15 feet. They live in colonies, and the males engage in desperate fights for the possession of the females, each of the old males having a retinue of female seals attached to him. It is disputed whether all the *Otaridæ* possess the famous *under* fur which forms the valued 'sealskin.' Some observers deny that the sea-lions have it, and

allege that its absence in these animals constitutes the point of difference from their neighbours the fur seals. The Otariidæ include the sea-bear already mentioned, found almost entirely at the Prybilor Islands in Behring's Sea. This is a true fur-S. In the *O. stelleri* or sea-lion found in the islands of St. Paul and St. George, and on the E. coast of Kamtchatka to the Kurile Isles, the under fur is scanty and useless as a commercial article, but a superior leather is made from the skin. *O. jubata* is another of the sea-lions with little or no under fur; whilst *O. Falklandica* has a rich under-fur. In the New Zealand seas there is a species named *O. Hookeri*; and on the E. coast of Australia occurs the 'Cowled S.' (*Neophoca lobata*). In 1877 there were imported into the United Kingdom 763,757 skins, valued at £246,533.

Seal-Engraving. The engraving of seals, when they are cut in hard agate stones, is performed with the same implements and by like processes used in cutting cameos and intaglios in similar stones. (See GEMS, ANCIENT.) The larger official and other seals which are cut in steel, &c., are prepared after the manner of dies. See DIE-SINKING.

Sealing-Wax, a preparation used for securing folded papers and envelopes, for sealing legal and other documents, and for attaching the impression of a seal to many articles where certification by such means is required. Ordinary red S.-W. is made of a pure bleached lac, 4 parts, to which when cautiously melted are added about 14 parts of Venice turpentine and 3 parts of vermilion. When thoroughly incorporated the mixture is cast into moulds of the size in which the sticks are required, or it is rolled out on a marble slab. In inferior qualities a proportion of common resin and red lead is used, and black and other colours are produced by substituting appropriate pigments. Bottle wax is made of a mixture of resin and bees-wax with Venetian red, red lead, or other colouring matter.

Sea-Lion. See SEAL.

Sealkote (*Sialkot*), the chief town of the district of the same name in the Punjab, British India, 72 miles N.E. of Lahore. Pop. (1868) 25,327. It is a very ancient city, commanding the Jammu valley. The fort has existed for 1000 years, and gave shelter to the European residents during the Mutiny of 1857. There are several Hindu, Sikh, and Mahomedan shrines. The trade is considerable, and there are manufactures of paper and cloth. The cantonments lie N. of the town.—The *district* of S., which lies at the foot of the Himalayas between the rivers Chenaub and Ravi, has an area of 1955 sq. miles; pop. (1868) 1,005,004. It is well watered by rivers and canals; the crops are wheat, barley, rice, and sugar-cane. In 1860 a Belfast Flax Company was unsuccessfully started. There are manufactures of cotton, iron, and leather. The total annual value is estimated at £360,000. The exports are wheat, sugar, and cotton; the imports, piece-goods and salt.

Seamen, Law Regarding. The Act 17 and 18 Vict. c. 104 amends and consolidates the laws affecting seamen and shipping. It provides penalties against any act or omission of duty on the part of any one, by which the safety of the vessel is endangered, or by which 'the life or limb' of any one on board is imperilled. It provides that a seaman's right to wages and provisions shall commence either at the time when he begins to work, or at the time specified in his agreement for beginning, whichever happens first. No seaman can, by the Act, forfeit his lien over the ship for his wages; and any stipulation for abandonment of his wages, or share of salvage, is declared illegal. It is also declared that no seaman or apprentice shall be entitled to wages for any period during which he unlawfully refuses or neglects to work when required. Provisions are also made for regular periodical payment of a seaman's wages, and for their being sued for summarily, in case of non-payment.

Sea-Mouse, the name applied to species of the genus *Aphrodite*, a genus of *Errantia* or marine worms. In this genus the body is oval, and is covered by a series of *elytra* or shield-like plates, beneath which the *branchiæ* or gills are included. The bristles or *seba* fringing the body are long, and emit iridescent hues of great brilliancy. *A. aculeata*, *A. hystrix*, and *A. borealis* are British species.

Sea-Pike. See GARFISH.

Search of Encumbrances, a term of Scotch law denoting the process by which the existence of any burden affecting real

estate in that country may be ascertained. The Scotch system of registration of deeds of mortgages, called in Scotland *heritable bonds*, enables any one, on payment of a small fee, to discover if any burden exists upon any particular real estate.

Search-Warrant is the written authority which may be granted by any magistrate to search the premises of any one suspected of secreting stolen goods, and for taking possession of these if found. No S.-W. will be issued without reasonable ground of suspicion being averred by the oath of a respectable witness.

Sea-Serpent, a marine monster, real or imaginary, which has been the subject of more copious description and discussion than any creature whose existence is beyond doubt. Those who wish to read what can be said from a 'scientific' point of view on behalf of this formidable mystery should consult the essay on the 'Sea Serpents of Science' in Dr. Andrew Wilson's *Linnæus Time Studies* (Lond. 1878).

Sea-Sickness is a distinctive variety of vomiting, preceded by vertigo and headache, with a peculiar feeling of sinking and distress in the region of the stomach, depending on the exposure of a susceptible person to the motion of rolling water in a vessel or boat. The vomiting is usually accompanied with a convulsive heaving of the stomach, a profuse cold sweat, and an indescribable feeling of prostration which renders the patient almost indifferent to life. The susceptibility to S.-S. varies in different persons. Infants and aged persons possess a comparative immunity; while women, as a general rule, suffer more than men. Some people, however, never suffer from it; others only on their first voyage; and others on every voyage they undertake. In the great majority of cases, S.-S. continues for only a few days; but some suffer almost continuously throughout the voyage. According to Dr. Althaus, persons with a strong heart and a slow pulse generally suffer little from S.-S.; while irritable people, with a quick pulse and a tendency to palpitation, are more liable to be affected. He says—'As a rule, the French and Italians, being of a more irritable temper, suffer most from the disorder, the Germans less, and the English least.' Dr. Chapman considers that the motion of the vessel causes an accumulation of an undue amount of 'blood in the nervous centres along the back, and especially in those segments of the spinal cord related to the stomach, and the muscles concerned in vomiting.' He proposes the cure of S.-S. by lessening the amount of blood in the whole of the nervous centres along the back, this being accomplished by lowering the temperature of the spinal region by the local application of ice, contained in spinal ice-bags. He also recommends the swallowing of small lumps of ice, which, 'brought into contact with the peripheral ends of the nerves of the stomach, will act on the same principle as it does when applied to the spinal region.'

Those susceptible to S.-S. should maintain the horizontal position as long as possible, and as nearly as possible in the centre of the ship's movements; and the compression of the stomach by means of a broad belt will sometimes afford relief. The more useful remedies, in cases of S.-S., are camphor, tincture of capsicum, chloroform, and creosote. A few drops of chloroform on a lump of white sugar very frequently gives relief, and dilute hydrocyanic acid may be administered in a similar manner. Sometimes there is great reduction of strength from want of alimentation, owing to the incessant vomiting, and in such cases arrowroot and beef tea in small quantities should be frequently administered. See Dr. Chapman, *S.-S., its Nature and Treatment* (Lond. 1864).

Seaside Grape (*Coccoloba uvifera*) is a small tree belonging to the natural order *Polygonacea*, and has obtained its name from the perianth which surrounds the ripe fruit becoming pulpy and of a violet colour. The fruit has an agreeable sub-acid flavour. The hard and handsome wood yields a red dye, and by evaporating a decoction of the leaves, wood, and bark, the astringent drug known as Jamaica kino is obtained.

Sea-Slug, a general name applied to certain *Gasteropodous* Molluscs, and also to the Sea-Cucumber or *Holothuria* (q. v.).

Sea-soning is anything added to food to increase its relish. The 'tastiness' of food has a considerable influence on the digestive action of the stomach, and thus indirectly increases its nutritive value.

Sea'sons, the name given to the four portions into which the year naturally divides, and which are distinguished from one another by certain characteristics of temperature, moisture, vegetation, &c. The great cause of the annual variation of climate which is marked by the sequence of the S., as indeed of all variations of climate, is the influence of the sun. Every diurnal rotation of the earth as it presents in succession each part of its surface to the sun is accompanied at any given place by a periodic variation in temperature. An annual periodicity also exists as the earth in its revolution is now nearer to, now farther from, the central orb; but this variation is slight compared with the variations which constitute the seasons, and which are directly due to the inclination of the earth's axis to the ecliptic or plane in which the earth revolves round the sun. Were the earth's axis perpendicular to the ecliptic, the line of separation between light and darkness upon the earth's surface would be a great circle passing through the poles, day and night would be equal at every locality all the year round, and the altitude of the sun at noon would be constant for any given place. The inclination of the axis, however, and its constancy of direction, permit the circle of separation between light and darkness to pass through the poles only twice during the year. These occasions are known as the equinoxes, and occur about the 21st of March and the 21st of September. Between March and September the earth is so situated that its N. pole is directed in towards the sun. At all places in the northern hemisphere, then, the day is longer than the night, and at the region surrounding the N. pole there is no night—the sun never sets. Exactly the converse holds at the S. pole, where there is no day. Between September and March, however, the conditions are reversed—the southern hemisphere enjoys its summer, the northern hemisphere endures its winter. When it is summer in the N. it is winter in the S., and spring in the N. corresponds in time with autumn in the S. Consequently, Great Britain and New Zealand are always complementary in their S. Though there are four S. specified by name—spring, summer, autumn, winter—it is impossible to say where the one ends and the other begins. Each insensibly passes into the next. It is customary, however, to allocate to each three definite months—thus, in the northern hemisphere, spring has February, March, April; summer has May, June, July; autumn has August, September, October; and winter has November, December, January.

Sea-Squirts. See ASCIDIAN.

Sea-Urchin. See ECHINUS.

Sea-weed and Sea-Wrack. See ALGÆ, FUCACÆ, and WRACK.

Sea-Wolf (*Anarrhichas lupus*), a species of Teleostean fishes allied to the Blennies. It may attain a length of from 4 to 7 or 8 feet. The colour is a brownish grey above, with brown stripes, and white below. In its habits this fish is fierce and predatory. It has a formidable array of teeth, and is said to attack the fishermen on being taken in their nets. The S.-W. occurs on the British coasts, in the Mediterranean Sea, and in southern waters.

Sea-Surgeon, a Teleostean fish—the *Acanthurus chirurgus* of naturalists—found in the Atlantic Ocean and Caribbean Sea, and deriving its name from the lancet-shaped spine on each side of the body, and at its tail-extremity. The length is from 12 to 18 inches. The colour is a brown of varying shades.

Sebaceous Glands, the name given to the minute sacs lodged in the lower layer of the *dermis*, or true skin. Each consists of a sac-like extremity from which a little duct leads, opening either on the surface of the skin or into the *follicles* of the hairs. The S. G. are most numerous in the face and scalp, but they exist in large numbers in the skin surrounding the nose, mouth, anus, ears, &c. None occur in the palms of the hands and soles of the feet. The sac-like extremity consists of from five to twenty little divisions. The largest S. G. are those of the eyelids, otherwise named *Meibomian glands*. The function of these glands is that of secreting *sebaceous matter*, a secretion of use in keeping the skin moist, and which also contributes to the nourishment of the hairs.

Sebastian, St., according to the acts of his martyrdom, was born at Narbonne in the end of the 2d c., and educated at Milan. Although a Christian, he entered the Roman army, but it was with the object of doing all he could for the Christians, who were suffering persecution at the time under the Emperor

Diocletian. He rose to high favour under the Emperor, and the Pope gave him the title of 'Defender of the Church.' At length he declared the fact of his being a Christian, and the Emperor, after trying in vain to induce him to renounce his religion, condemned him to be put to death. His body, which had been transfixed with arrows till life was apparently extinct, was carried to the house of a Christian lady, where he recovered. In spite of the entreaties of his friends S. again appeared in public, and professed his adherence to Christianity; and he was now beaten to death with clubs, on the 20th January, 288. His body, which had been flung into one of the sewers of the city, was discovered by an apparition, and carried to the catacomb which still bears his name. See the Bollandist *Acta Sanctorum*.

Sebastia'ni, Francois Horace Bastien, Comte, born at Porta d'Ampugnano, Corsica, November 10, 1772, was the son of a tailor. Educated for the church, he entered the French army at the age of seventeen, and in 1799 was promoted to the rank of brigadier by Moreau on the field of Verona. He contributed to the victory of Marengo in 1800, and after the peace of Amiens undertook a mission to the East. In 1805 he fought against Austria, entered Vienna at the head of Murat's vanguard, received wounds at Austerlitz, and became a general of division. In May, 1806, he did much to strengthen the hands of Selim III. against the British fleet, which he forced to run the blockade through the Dardanelles. At the head of the 4th corps he joined in the invasion of Spain (1809), and took Ocaña, Granada, and Malaga, conquering also at Baza. In the Russian campaign of 1812 he commanded the vanguard of the army, and was one of the first to enter Moscow. In 1813 he was wounded at Leipzig, and during the campaign of 1814 he behaved with intrepid bravery. After the battle of Waterloo he was one of the commissioners sent by France to negotiate with the allied sovereigns. Under Louis Philippe he held the portfolio of naval affairs, and afterwards that for foreign affairs; and he likewise became ambassador to Naples in 1833, and to London in 1835. In 1840 he was made a marshal of France. S. died at Paris, July 20, 1851.

Sebastopol (Gr. *Sebastopolis*, 'august city'), a town of Russia, government of Taurida, on the S.E. coast of the Crimea, 352 miles by rail from Lezovo. It stands on the S. side of a splendid bay which runs from E. to W. for 4½ miles, with an average breadth of half a mile. The different inlets in this bay are called the Quarantine, Artillery, South, and Dockyard Harbours. The town of S. stands between the Artillery and South Harbours. The upper part is inhabited by the wealthy, the lower by the industrial classes. S., which occupies the site of a Tartar village called Akhtiar, was founded in 1783 by Catharine, and during the reign of Nicholas it was strongly fortified under the direction of Colonel Upton, an English civil engineer. It was intended to be the headquarters of a great Black Sea fleet, and was supplied with arsenals, magazines, barracks, and forts, chief among the latter being Forts St. Nicholas and St. Michael. During the Crimean War it was besieged by the French and English allies for eleven months, from 9th October 1854, and after a brilliant defence by General Todleben, was successfully stormed 8th September 1855. The great harbour fortifications which existed at the time of the siege were begun in 1834, but the corresponding land defences were only then in course of construction, and the work of strengthening the entrenchments was carried on simultaneously with the siege. After it had fallen, S. was dismantled and almost deserted. It long remained in this condition, but after gradual restoration it was declared a commercial port in 1875, and is now (1878) the second corn-granary in S. Russia. Some wine is also exported. The railway to Lozovo was opened in January 1875. The progress of S. has since been rapid. Much of the town has been rebuilt; the fortifications have been laid out as boulevards; and waterworks have been constructed. The Russian Memorial Church (1856-70) is the finest religious building in S. Russia, with a pavement of granite from the ruined docks, grey marble walls, and a memorial chapel containing some 200 portraits of the chief actors in the war. The exports in 1873 valued 27,114 roubles; the imports, 599,679 roubles. Pop. (1853) 40,000; (1856) 6000; (1876) 13,259. By the principal clause of the Treaty of Paris (1856), Russia was debarred from maintaining a naval force and arsenal in the Black Sea, but in November 1870 Prince Gortschakoff issued a circular repudiating these conditions.

Seben'ico, a town of Austria, in the crown-land of Dalmatia, 40 miles S.E. of Zara, connected with the sea by a narrow canal, 3 miles long. It is surrounded by walls and guarded by forts, and has a cathedral in the Italian-Gothic style, built in the 15th c. It trades in rosoglio and wine. Pop. (1869) 6132.

Sebes'ten, **Sebes'tan**, or **Sepis'tan**, are names applied to *Cordia Myxa* (*Boraginaceæ*), a medium-sized tree, cultivated in India, and extending through the Eastern Archipelago to Queensland. The young fruit is used as a vegetable and a pickle; when ripe the viscid pulp and nut-flavoured kernel are also eaten. The wood is used for a variety of purposes, the bark is made into rope, and the leaves serve as plates.

Secchi, **Angelo**, an Italian astronomer and meteorologist, was born at Reggio, June 29, 1818, and entered the order of the Jesuits in 1833. After holding for some years the chair of physics in Georgetown College, Washington, he returned to Italy, and in 1850 became professor of physics in the Collegio Romano at Rome. When the papal states were finally taken out of the hands of the Church, S. was offered the chair of astronomy in the new Roman University, which he accepted, but was ultimately compelled to resign in obedience to the command of the chief of the Jesuits; and even the efforts of the king to effect a compromise, so as to give S. ample opportunity for the carrying out of his astronomical researches, were unsuccessful. He devoted himself chiefly to the study of the sun's surface, and materially added to our knowledge of its constitution by his spectroscopic observations. S. was one of the observers of the total eclipses of 1860 and 1870; and in 1867 received the great French prize of 100,000 francs for his labours. He died February 26, 1878. His chief work, *Le Soleil* (Par. 1870; Ger. 1872), details the latest solar discoveries. His numerous memoirs upon subjects in the various branches of physics and meteorology attest his scientific grasp of mind and his rare industry. In 1878 there appeared a German translation of his work on the Fixed Stars, and his *Meteorologia Romana*, published by the Italian Government.

Secession Church. See UNITED PRESBYTERIANS.

Sec'ond, in horology and angular measurement, is the sixtieth part of a minute. The corresponding interval of time was called by the Romans *scrupulum secundum*, the scrupulum being equivalent to the minute.

Sec'ondary Rocks, a general term applied to all the stratified rocks between the top of the Permian Formation and the base of the Eocene, and including, therefore, the Trias, Lias, Oolitic, and Cretaceous Formations. It is synonymous with the term Mesozoic. The Secondary Period as a whole is remarkable for the predominance of cycads and allied plants; for the great abundance of reptiles; for the first appearance of birds, whose footprints are found in Triassic strata in Connecticut, and of which the first indubitable species, *Archæopteryx macrura*, occurs in the lithographic slate of Solenhofen; and, lastly, for the dawn of mammalian life, in the shape of the Triassic genera *Dromotherium* and *Microlestes*.

Sec'onding (in the army). A military officer accepting civil employment under the crown, and retaining his rank while losing his pay, is said to be seconded. At the end of ten years he must either return to regimental duty, permanently retire, or, if not entitled to retire, resign his commission.

Sec'ond Sight, a power ascribed by Highland belief to certain persons of foreseeing coming events, is fully described in the last 29 pages of a scarce book by John Aubrey, entitled *Miscellanies, viz., Voices, Marvels, Knockings, &c.* (Lond. 1696). Aubrey's somewhat conflicting information, drawn from an anonymous 'learned friend in Scotland,' from a minister living near Inverness, and from a gentleman's son in Strathspey, a student in divinity, comes to this:—Many instances of S. S. can be given by the confession of such as are skilled in that faculty. It relates solely to things future, which are to happen either shortly thereafter or within three or four years, these things being only sad and dismal events, as 'murthers, drownings, weddings (?), burials, combates, manslaughterers.' Such sights the seers, but none but themselves, behold visibly, seeing a gibbet or rope if a man's fatal end be hanging, or if drowning,

then water up to his neck. The S. S. is a burden very troublesome to its possessors, but as to whether these are necessarily ungodly, authorities differ. So also as to whether it comes by succession, by compact with the devil, or by converse with those demmons called fairies, but 'when a woman hath it herself and is married to a man that hath it also, if in the very act of delivery the child be baptized, the same is free from it; if not, he hath it all his life.' Also it can be transmitted by a second-sighted person setting his foot on the foot of another who hath not the gift, while in the Isle of Sky any one that pleases may get it taught him for a pound or two of tobacco. The student adds that 'they generally term this S. S. in Irish *Taishitaraughk*, and such as have it *Taishatrin*, from *Taish*, which is properly a shadowy substance, or such naughty a thing as can only, or scarcely rather, be discerned by the eye but not caught by the hands; for which they assigned it to *bagies* or ghosts, so that *Taishtar* is as much as one that converses with ghosts or spirits, or, as they commonly call them, the *fairies* or *fairy-folks*. Others call these men *Phissichin*, from *Phu*, which is properly foresight or foreknowledge.' Such was the belief concerning S. S. in the Highlands two centuries ago, and that it lingered long after Aubrey's day is testified by Martin's *Description of the Western Islands of Scotland* (1716; reprinted in Pinkerton's *Voyages*, vol. iii.), by Macleod of Hamir's *Theophilus Insulanus* (1763), and by the *Journey to the Hebrides* (1775) of Dr. Samuel Johnson, who himself 'came away at last only willing to believe.' Nay, in the present years of grace there are many persons living in the Highlands, more still in the Western Isles, who by their own account can see quite as far into futurity as any of their grand-sires. Instances of S. S. also occur among savage races, as when Mason Brown was met on the Coppermine River by the very Indians he was in search of, who told him their medicine-man had seen him coming and heard him talk; or when Captain J. Carver received from a Cree medicine-man a faithful prediction of the arrival next day at noon of a canoe with news. See Brenton's *Myths of the New World*.

Sec'ret (Lat. *secretæ*, scil. *oratio*, 'the secret prayer') is the prayer in the Mass (q. v.) which follows immediately after the oblation of the bread and wine, and which is recited by the priest in an inaudible voice.

Sec'ret, Discipline of the (Lat. *Arcani disciplina*), was the practice which prevailed in the early Church—from the beginning of the 3d c. to the 6th—of keeping secret from the uninitiated certain doctrines and rites of the Christian religion. The pagan practice with regard to their mysteries—e.g., the Eleusinian—is well known; and if it be considered that the early Christians were all converts from paganism, who would see nothing wrong in the principle of having mysteries, but only in having unholy ones, it is not difficult to see the reason for the origin of the practice in the Church. It is a fact, at any rate, that the terms used in the pagan mysteries were applied to the Christian institutions, particularly Baptism and the Lord's Supper. The mysteries, or the things which were kept secret from outsiders generally, and even from the Catechumens (q. v.), were the following:—1. The manner of administering Baptism, and 2. Confirmation. 3. The manner of celebrating the Eucharist (q. v.). 4. The ordination of priests. 5. The public liturgy or solemn prayers of the Church. 6. The doctrine of the Trinity, the Creed, and the Lord's Prayer were kept back from the catechumens till immediately before their baptism. See Bingham's *Origines Eccl.* (2d ed. 1726), Zezschwitz in Herzog's *Real-Encyclopædie* (new ed. Leip. 1877).

Sec'retary Bird (*Gypogerranus sacerclarius*), a species of *Raptorial* bird, found in S. Africa, and nearly allied to the Harrier (q. v.). It derives its popular name from the long feathers, which project like quill pens on each side of the head. The legs and tail are also long. The three front toes are short, the hinder toe rudimentary and elevated. The tarsi and toes are scaly, and the third, fourth, and fifth wing-quills are the longest. The S. B. is a destroyer of venomous snakes, and is accordingly encouraged and protected in S. Africa. The snakes appear to be killed by means of the strong feet and wings. The average length of the bird is about 3 feet, and the plumage is of a dull grey hue, the projecting head-feathers being black, and the central feathers of the tail grey. The S. B. is frequently domesticated in S. Africa.

Secretary of Embassy, the principal assistant of an ambassador. He receives his commission direct from the Crown, has high diplomatic privileges, and acts as *chargé-d'affaires ad interim* during the absence of his chief. In the case of an Envoy Extraordinary and Plenipotentiary, the secretary has the title of Secretary of Legation. The salaries attached to the office range from £500 to £1000.

Secretary of State, one of the highest officers of the Crown. The king's 'chief secretary,' or 'principal secretary,' in early English history had private access to the king, and prepared the business for the Privy Council, of which he was not, however, a member, in a room adjoining the council chamber. He had custody of the king's signet, and the assistance in his duties of four clerks. An additional principal secretary was appointed by Henry VIII., and since the reign of Elizabeth Secretaries of State by virtue of their office have been members of the Privy Council. For many years the number of Secretaries of State was restricted to two. A S. of S. for Scotland was temporarily (1708-42) appointed by Queen Anne, and one for America (1768-82) by George III. At this time the other two secretaries were called the Secretary for the Northern Department and the Secretary for the Southern Department, the northern and southern countries of Europe coming respectively into the spheres of their operations. The affairs of the colonies and of Ireland were administered by the elder of the two secretaries. In 1782 the secretaryship for America was abolished and the two Secretaries of State took the titles of S. of S. for the Home and for the Foreign Departments, colonial business falling to the share of the former. The Secretary of War was appointed in 1794 and the business of the colonies was transferred to his office in 1801. After the lapse of half a century these branches were separated, and a Secretary of State for India was appointed in 1858.

There are therefore at present five Secretaries of State, namely, those for the Home, Foreign, Colonial, War, and Indian Departments. They are always members of the Cabinet and of the Privy Council, and deliver up the seals of their office on a change of ministry. Though a separate sphere of work is assigned to them, they are all supposed to be capable of performing the duties of any of the others. Each has the management of the executive business of his department, subject to a reference to the Cabinet on affairs of importance, and is assisted by two under-secretaries, one permanent and the other connected with the administration. Not more than four may sit in the House of Commons, and as a rule three Secretaries of State are in one House of Parliament and two in the other. The salary of a S. of S. is £5000 a year, and of the Parliamentary Under S. of S. £1500. The S. of S. for the Home Department has charge of the privy signet office, where grants, letters, &c., to be signed with the privy signet are made out. He is responsible for the internal administration of justice so far as concerns the royal prerogative, the maintenance of peace in the country, the supervision of prisons, police, and sanitary affairs, and has the appointment of many judicial officers. He is the medium of communication between the Viceroy of Ireland and the Cabinet, and is responsible for the internal administration of Ireland. The Secretary for the Foreign Affairs conducts all correspondence with foreign states, negotiates treaties, appoints ambassadors, &c. The Secretary for the Colonies performs for these countries similar functions to those of the Home Secretary for the United Kingdom. The Secretary for War, assisted by the Commander-in-Chief, has the whole control of the army. The Secretary for India governs the affairs of our Eastern Empire with the assistance of a council of fifteen members.

The Chief Secretary for Ireland is not a S. of S., but is merely the chief secretary of the Viceroy. He is resident in Dublin during the Parliamentary recess, and has the assistance of an under-secretary.

Secret Bill of Sale. Frauds were frequently committed on creditors by this means; but 17 and 18 Vict. c. 36 enacts that no bill of sale shall be valid unless it, or a copy with other particulars specified, be filed within twenty-one days after date with the clerk of judgments, in the Queen's Bench division.

Secretion, the term applied to the function of separating and of elaborating from the blood a product of use in the living economy. The Liver (q. v.) is thus said to *secrete* or manufacture

bile; the Pancreas (q. v.) secretes *pancreatic juice*; the Salivary Glands (q. v.) secrete *saliva*; the Sebaceous Glands (q. v.) form *sebaceous matter*, and so on. The conditions of S. are three in number: (1) a due supply of healthy blood; (2) a *membrane* on which blood-vessels may ramify, and from which an *outlet or duct* may pass; and (3) special *secreting cells*, the latter being the active organs which are specially engaged in the work of separating the necessary products from the blood, and of elaborating them so as to form the characteristic S. True and typical secretions, such as bile, milk, &c., do not exist as such in the blood, but require to be *elaborated* in the glands devoted to their manufacture. In its actual details the work of S. is accomplished either by a membrane or by a gland. The structure of both of these is essentially the same. The *conditions* required to effect S. include physical, chemical, and vital phenomena. Thus fluids may undergo *filtration* and *diffusion* through membranes, whilst the chemical part of the work of S. consists in the separation from the blood of certain materials, and in the recombination of other matters to form a new compound. The *cells* of the secreting membranes or glands are the essentially active parts of these structures, and the intricate operations in which these cells engage may be regarded as a part of their vital constitution and as evidence of their inherited vitality. The circumstances influencing S., favourably or unfavourably, are in the main those which affect the quality and circulation of blood through glands. Thus a rapid circulation, causing a large quantity of blood to traverse the secreting surfaces, will favourably affect the quantity of the S., and *vice versa*. Then, lastly, the *nervous system* possesses a very striking but in many respects ill-understood influence on S. Indirectly, the nervous system acts on S. by influencing the quantity of blood sent to a gland, but the work of S. may also be affected directly by impressions passing from nerve-centres to a gland.

Secretions, Vegetable. The nutrient substances taken up by plants are, in a raw state, by no means adapted to take part in the construction of any vegetable structures; they must, on the contrary, undergo important transformations, and become changed into organic compounds suitable for nutrition. The process of *assimilation* (see SAP) seems to depend mainly on the following forces:—(1) The evaporation of water contained in the nutrient sap. (2) The decomposition of carbon dioxide and the fixation of carbon. (3) The formation of albuminoids, which are essential for the production of Protoplasm (q. v.), and Chlorophyl (q. v.). (4) The formation of the substances from which Cellulose (q. v.) is produced, viz., Starch (q. v.), the different kinds of Sugar (q. v.), Oil (q. v.), and Inuline (q. v.). The mode of formation of albuminoids is still unknown, so also is that of cellulose. The products of assimilation, when transferred to other cells and when brought into actual use, undergo a variety of changes which are included under the name *metatasis*. Many products of metatasis are of no further use in the construction of cells, but remain stored up and inactive at the spots where they are produced. These comprise the volatile oils, resin, caoutchouc, camphor, gum-like substances, tannin, pigments, acids, alkaloids, wax, pectin, &c.

Secret Writing-Ink. See SYMPATHETIC INK.

Secrole, the W. suburb of the city of Benares, in the N.W. Provinces, British India, which contains the civil establishments and military cantonments as well as the bungalows or villas of the European residents.

Section, in architecture, is the contour of a given structure on a vertical plane intersecting it through any part. The *Mass* is a projection upon a horizontal plane.

Section, in geology, a cutting or face of rock, exhibiting the edges of the various strata. It may be *natural*, as in the face of a cliff; or *artificial*, as in the case of a mine or railway cutting. A *theoretical* section is a drawing intended to represent a vertical or horizontal succession of strata, not directly visible, but as calculated from observations in the neighbourhood.

Sector, in geometry, is the portion of a circle included between two radii and the intercepted arc. It is also the name of a mathematical instrument, employed for laying down plans, measuring angles, &c., and composed of two graduated legs, jointed together like a carpenter's foot-rule. There are various scales, which are ruled so as to converge to the centre of the

hinge, and which are intended for different purposes. Thus, in the more elaborate instruments, there are, beside the simply graduated scale of lines, scales of sines, of tangents, of chords, of rhombs, &c. The most ordinary use to which a S. is applied is for finding a fourth proportional to three given lines.

Sec'ular Clergy. See CLERGY.

Sec'ularism is the creed of those who deny the popular opinion of mankind that the universe was created at a particular time by a Personal Deity, with the doctrines founded thereon; holding the opinion, which is as old as Epicurus (B.C. 310), that the universe is eternal and self-existent. Secularists maintain that the belief in the existence of a personal being who created the universe was produced by the combination of two elements. First, the conception of a deity was formed out of various elements: the fear of death, which raised a hope that death is not the end of existence, but that a separate entity, the soul, has eternal life, so that there may well be a personal, spiritual deity; the sight of the sufferings of men in this world, and the frequent miscarriage of justice, which tend to make men believe in a deity of infinite wisdom, power, and goodness, who, in a future life, will rectify all the inequalities of this life; and the desire for the amelioration of the human race, the only hope of which was supposed to lie in the guidance of a benevolent deity. When men were thus prepared to accept any evidence of the existence of a deity, any one who said, and may have believed, that he had a supernatural revelation to that effect, would obtain a number of disciples. Many such revelations have undoubtedly been believed in by bodies of men, the converts to each believing that all revelations were false but their own. Further, Secularists reject the great argument for the existence of a God from final causes, as being contrary both to experience and the law of causality itself: to experience, because to account for the existing order of matter it presupposes a self-existent order in mind, whereas there is no experience of order in mind which does not arise from order in matter; to the law of causality, because the condition of the universe at any time is the necessary result of every preceding state; and since, according to the received results of modern science, matter and energy are each constant in amount, at the furthest term of the series to which we choose to go back the matter and the energy were the same as now; in other words, matter has been eternal, and therefore had no need of a cause.

Along with the belief in a Personal God, S. has rejected some of the most prominent doctrines of Christianity. 1. Finding the narratives of the Book of Genesis to be untenable, it rejects the doctrine of the Fall (q. v.), and the whole 'Scheme of Salvation'—including 'Redemption through the blood of Christ,' 'Justification by Faith,' &c.—depending on it. 2. According to Secularists, an investigation of the origin of the canon and the teaching of historical criticism lead to the conclusion that the Bible must be regarded as a human composition, and not a divinely-inspired and infallible authority. 3. The teaching of science and a comparison of religions leads to the rejection of the legends, myths, and miracles both of the Old Testament and the New. 5. To the conclusion that Jesus Christ must be regarded merely as a man of exalted moral character, around whom, when dead, the stories of the 'apocryphal and canonical gospels crystallised according to the tendencies of the time.' 6. On the question of a future life S. does not pronounce certainly or dogmatically, but leaves it 'in solemn hope.'

Such is the negative side of S., but it has a positive side as well. 1. Secularists believe in one Deity who manifests himself in energy, is unchangeable, and has no known beginning or ending; who governs according to fixed laws, and whose will, a revelation of which is always being made more and more complete, is written in his works; and obedience to whose will is the whole duty and the religion of man, which brings him happiness, while disobedience brings inevitable, merciless punishment, but always according to law. 2. It holds that man, instead of grovelling downwards from a primitive state of innocence and excellence to a state of degradation, from which only a small proportion of individuals are redeemed, is steadily advancing in civilisation and enlightenment, learning by experience, and throwing up safeguards of law and morality. 3. S. teaches men, instead of trusting to the atonement of another's sufferings, to live a true, pure, and noble life; and, instead of balancing the profit and loss of the enjoyment of the present life against the reward of a future life (and very far from saying, as ignorant detractors

would have it, 'let us eat and drink, for to-morrow we die'), to act rightly because it is noble to act so. 4. S. pleads for the prompt administration of justice now, knowing nothing of a judgment to come. 5. It substitutes benevolence and philanthropy for asceticism.

Secundra or **Sekunder**, a village in the district of Agra, N.W. Provinces, British India, 7 miles from Agra, named after the Pathan Emperor, Secundra Lodi. It is celebrated for the magnificent tomb of Akbar the Great, still in good preservation. The building is surrounded by a garden, and consists of a series of sandstone terraces, supporting a marble mausoleum. The architecture appears to be a combination of the Saracenic and Hindu styles. Close by is the tomb of Munni Begum, the Portuguese wife of Akbar. This building was for many years the headquarters of the Church Missionary Society, and afforded shelter to 300 orphans in the famine of 1838. See *Travels of a Hindu* (Lond. 1869); Fergusson's *History of Indian Architecture* (Lond. 1876).

Secundrabad' ('Alexander town'), a British military cantonment in the dominions of the Nizam of Hyderabad, India, 6 miles N. of Hyderabad, and 449 S.E. of Bombay. It is built along an artificial lake, 3 miles long by 2 broad, called the Husain Sagur. Three miles W. is a range of hills, covered with tombs of Mussulman saints. Pop. 40,000. S. is the headquarters of the 'Hyderabad Subsidiary Force,' which in 1874 numbered 6012 men of all arms, of whom 2547 were Europeans. In the same year, a branch line to S. from the Bombay-Madras railway at Gulbarga was opened.

Sedalia, a town of Missouri, U. S., in a high prairie country, within 3 miles of a tributary of the Missouri, and 40 miles S. of the main stream. It is the point of intersection of three railway lines, and is by rail 189 miles W. of St. Louis, and 100 E. of Kansas City. It has large railway works, flour-mills, iron-foundries, woollen-mills, &c., 2 daily newspapers, and a street-railway (since 1876). There are rich coal-mines in the vicinity. S. was only founded in 1860, and in 1870 had a pop. of 4560, and in 1877 of 10,000.

Sedan, an important town and fortress of France, department of Ardennes, on the Maas, 163½ miles E.N.E. of Paris by rail. Its fine cloth factories (founded by Colbert in 1646) employ 10,000 workmen, and it is also noted for the production of arms, leather, ironwares, &c. Near it are extensive iron and coal mines. It was the birthplace of Marshal Turenne. In the Franco-German War, the division of the French army under Marshal MacMahon, while advancing to the relief of Metz, was driven, after four days' incessant fighting, to seek refuge in S., and the day following (2d September 1870) saw the capitulation of a marshal of France with 90,000 men. Napoleon III. had already surrendered in person to the King of Prussia. Pop. (1876) 15,872.

Sedan Chair, an upright close box or chair for one person, carried by two men harnessed to poles or shafts. It was formerly very common in all European cities, but disappeared early in the present century. As a rival to the 'cab,' it survived longest in cities like Edinburgh, having streets ill-adapted for horse traffic. One form of S. was known in England in 1581. It only became fashionable in London, however, after the return of Prince Charles from Spain, and in 1634 Sir Sanders Dunscombe secured the royal privilege of exposing sedans for public hire. They were very conspicuous objects during the reigns of Anne and the early Georges, and the wealthy kept them for private use. The S. is said to take its name from the town of Sedan; in France, however, it is called *chaise à porteurs*. See PALANQUIN.

Sedatives are medicines which depress the action of the heart and of the vascular system. The principal *cardiac* S. are antimony and its preparations, *veratrum viride*, *veratrum album*, *veratria*, aconite leaves and root, prussic acid, cyanide of potassium, and vegetable acids. *Spinal* S. are bromide of ammonium and potassium, and physostigmata. *Stomachic* S. are carbolic acid, creosote, nitrate of silver, carbonate of bismuth, oxalate of cerium and zinc, and bicarbonate of potash. *Sedative* S. are medicines which depress the action of the nervous and vascular systems without inducing any previous or subsequent excitement, and are used chiefly in great excitability, neuralgic pain, spasmodic affections, and irritable cough, such as belladonna, hyoscyamus, and the preparations of opium.

Sedga. See CAREX.

Sedgwick, Adam, LL.D., F.R.S., one of the fathers of geology, was born at Dent, Yorkshire, in January 1786. He entered Trinity College, Cambridge, and graduated in 1808 as fifth wrangler. In 1810 he was elected Fellow in his college, of which at his death he was senior member. In 1818 he succeeded Hailstone as Woodwardian professor of geology at Cambridge, was elected a Fellow of the Royal Society the succeeding year, aided in founding the Cambridge Philosophical Society about the same time, and subsequently became a Fellow of the Geological Society of London, of which he was President in the years 1829-31. In 1827 he made a geological tour in Scotland; and two years later accompanied Murchison through Germany, Austria, and Switzerland. With Murchison he subsequently was involved in a bitter controversy regarding the use of the terms Cambrian and Silurian. To the end of his long life he occupied a leading position amongst geologists, devoting his great energies to the elucidation of Palæozoic formations, and by his lectures, which he delivered during fifty years, forming a band of enthusiastic disciples. He was an active member of the British Association, and a keen opponent of the Evolution theories advanced by Darwin, Spencer, Lyell, and others. A Liberal in politics, he took a hearty interest in all questions of University reform, and published a valuable essay, entitled *Discourse on the Studies of the University of Cambridge* (1834; 5th ed. 1850). S. died at Cambridge, January 25, 1873. His numerous reviews, lectures, memoirs, &c., are scattered through the various scientific publications of the day; some, however, including the essay above mentioned and a *Synopsis of the Classification of the Palæozoic Rocks* (1855), are published separately. See Geikie's *Memoirs of Sir R. J. Murchison* (1874) for a brief sketch of S.'s life and labours.

Sedgwick, Theodore, an American statesman and judge, was born at Hartford, Connecticut, in May, 1746. He entered the bar in 1766, and began legal practice at Great Barrington, Massachusetts, acting for several years as a member of the Massachusetts legislature. In 1776 he served as aide-de-camp to General Thomas in the expedition against Canada; and after the declaration of independence took a leading part in politics, sitting as member of Congress from 1789 to 1796, and again from 1799 to 1801, when he discharged the duties of Speaker. In 1802 he became judge of the Supreme Court of Massachusetts, a post which he retained till his death at Boston, January 24, 1813. An accomplished statesman and jurist, and a keen federalist, he was a strong opponent of slavery.—**Theodore S.**, eldest son of the preceding, was born at Sheffield, Massachusetts, December 31, 1781. He followed his father's profession, and as member of the Massachusetts legislature in 1827 introduced and carried a bill for the construction of a railroad from Boston to Albany through the Green Mountains. He was a most effective speaker, and was an earnest advocate of free trade, temperance, and anti-slavery. He died at Pittsfield, Massachusetts, November 7, 1839. He is author of *Hints to my Countrymen* (1826), and *Public and Private Economy, illustrated by Observations made in Europe in 1836-37* (3 vols. 1836-39, 2d ed. 1856).—His wife, **Susan Ridley S.**, a daughter of William Livingstone, governor of New Jersey, was born about 1789 and married in 1808. She is the author of *The Morals of Pleasure* (1829), *The Young Emigrants* (1830), *Allen Prescott* (2 vols. 1835), *Alida* (1844), and *Walter Thornley* (1859).—Their son, **Theodore S.**, born at Albany, January 27, 1811, followed the profession of his father and grandfather, entering the bar in 1833. Appointed secretary of the United States legation at Paris, on his return to New York he began legal practice. In 1858 he became district attorney for the southern district of New York. He died at the family seat at Stockbridge, December 8, 1859. His chief publications are a *Treatise on the Measure of Damages* (1847; 5th ed. 1869), a *Treatise on the Rules which govern the Interpretation and Application of Common and Statutory Law* (1857), a *Memoir of Governor William Livingstone* (1833), and *The Life and Works of William Leggett* (2 vols. 1840).—**Catherine Maria S.**, daughter of Judge Theodore, was born at Stockbridge, December 28, 1789. After her father's death in 1813, she undertook the management of a private school for young ladies, which she continued for fifty years. She died near Roxbury, Massachusetts, July 31, 1867. She wrote a number of popular works of fiction,

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among others *A New England Tale* (1822), *Redwood* (2 vols. 1824), *The Traveller* (1825), *Hope Leslie* (2 vols. 1827), *The Linwoods* (1835), *Live and Let Live* (1837), *Means and Ends* (1838), *Letters from Abroad to Kindred at Home*, a record of her visit to Europe in 1839 (1841), *Wilton Harvey and other Tales* (1845), *Facts and Fancies* (1848), *Married or Single?* (1857), and *Letters to my Pupils* (1862). She contributed the *Story of Le Bours to Sands' Tales of Glauber Spa* (1832), and wrote much for various magazines and periodicals. See Mary E. Dewey's *Memoir* (1871).

Seditious is the crime of inciting any one to break the law, or to disturb the peace of society. The punishment is fine and imprisonment, in proportion to circumstance. Any public meeting under circumstances to cause fear of disturbance may be held seditious. A meeting called 'to adopt preparatory measures for holding a national convention' was held, in the case of *Rex v. Fursey*, to be illegal. See MEETINGS, SEDITIOUS; RIOTS.

Sedley, Sir Charles, born at Aylesford, Kent, in 1639, educated at Oxford, became a court wit after the Restoration. He was a great favourite with Charles II., his recommendations being that he had no morals, did not ask favours, and had a knack for turning loose thoughts into dulcet verse. As he grew older, serious business obtained attention from him, and in Parliament he uniformly opposed the unconstitutional policy of James II. That monarch dishonoured S.'s daughter by making her a countess; and S. was in consequence of this disgrace one of the chief promoters of the Revolution. He died August 20, 1701. His amatory poems—translations from the classics, parliamentary speeches, and plays—the best are *The Mulberry Garden* (1668), *Antony and Cleopatra* (1677)—may be found in his collected works (2 vols. 1722).

Seduction, in law, is the inducing of a woman to sexual intercourse by deceit. It is only criminal when the deceit is practised by a third party, in which case S. is by statute a misdemeanour, punishable by imprisonment for a term not exceeding two years. When force is used the crime is *Rape* (q. v.) or *Abduction* (see ABDUCTION OF WOMEN). Unless a woman has promise of marriage, she can obtain no damages from her seducer on account of S.; but, by a fiction of law—the supposed consequent *loss of service*—any one under whose protection the injured woman has been during pregnancy, may maintain an action against the seducer; against whom, in Scotland, the woman may have ground of action at her own instance; but a good deal of difficulty is usually found in enforcing the claim.

Sedum (*L. sales*, from the squatting habit of the species) is a genus of erect or prostrate succulent herbs, with opposite, alternate, or whorled leaves; flowers mostly cymose; 4-5 lobed calyx; 4-5 free petals; 8-10 stamens, alternately opposite the petals; 4-5 carpels; and many ovules. This genus of *Crasulaceæ* (q. v.) number about 120 species, natives of N. temperate and cold regions, but rare in America. The best-known species is *S. acris*, a dwarf golden-yellow flowered plant growing in tufts or cushions on rocks, walls, and sandy ground, especially near the sea. It is called 'biting stone-crop' and 'wall-pepper' on account of its acrid taste, and is vesicant, emetic, and cathartic. *S. Telephium* ('the Orpine') and *S. Rhodiola* ('Rose-root') are the most striking British species. A number have come into vogue for the new fashion of carpet-gardening, and for rock gardens. S. is remarkable for vitality under the most adverse circumstances—hence its name of 'live-long.'

See (Lat. *sedes*, scil. *apostolica*, 'Apostolic seat') originally meant, as well as *cathedra*, the throne of a bishop, believed by Episcopalians to sit in the seat of an Apostle. Then both names were applied to the church in which the throne was placed. In modern times S. generally means the cathedral town of a Diocese (q. v.), or the district over which the bishop has jurisdiction, and popularly is synonymous with diocese itself.

Seed (Old Eng. *seed*, from *sedan*, 'to sow'; comp. Lat. *satus*, from *sero*). The S. of a plant is its mature *Ovule* (q. v.). As the ovules are in the great majority of flowering plants contained in one or more cavities of that portion of the Pistil (q. v.) termed the Ovary (q. v.), so likewise are the seeds similarly enclosed—the transformed ovary of the flower being called in the fruit the *pericarp*. All plants that come under this arrangement are termed *Angiospermia*, i. e., having S. in

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a S.-vessel. In *Conifera*, *Cycadææ*, and *Gnetaceæ*, on the other hand, the S. is without any real pericarp—and such constitute the *Gymnospermia*, or naked-seeded plants. The shell of the individual S. usually consists of two separable coats; the outer being named the *testa*, and the inner the *tegmen* or *endopleura*. The *testa* may be hard and crustaceous, woody or bony, or thin and membranous, dry or rarely succulent. It is sometimes expanded into *wings*, or bears a tuft of hair, cotton, or wool, called a *coma*. The *funicle* is the stalk by which the S. is attached to the Placenta (q. v.). It is occasionally enlarged into a membranous, pulpy, or fleshy appendage, sometimes spreading over a considerable part of the S., or nearly enclosing it, called an *aril* (as in the mace of a nutmeg). The *astrophiole* or *caruncle* is a similar appendage proceeding from the *testa* by the side of or near the *funicle* (as in castor-oil plant). The *hilum* is the scar left on the S. where it separates from the *funicle*. The *micropyle* is a mark indicating the position of the foramen of the ovule. The ripe S. contains an *embryo* or young plant, either filling or nearly filling the cavity, or more or less immersed in a mealy, oily, fleshy, or horn-like substance, called *albumen* or *perisperm* or *endosperm*. The embryo lies unattached within the S., its position varying in different plants. It consists of the *radicle* or base of the future root; one or two *cotyledons*, or future S. leaves, and the *plumule* or future stem-bud. In some seeds, especially when there is no albumen, these several parts are very conspicuous, in others they are difficult to distinguish until the S. begins to *germinate*. Chiefly upon the fact whether the embryo has one or two cotyledons are founded the two great classes of *Monocotyledons* (q. v.) and *Dicotyledons* (q. v.). The relative position of the different parts of the embryo gives a marked character to the S. The most common arrangement is that found in *Crucifera*, where the embryo is *pleuro-rhizal*, the cotyledons lying flat one upon another, and the radicle upon the line which separates them. In the *notorhizal* embryo, the radicle lies upon the back of one of the cotyledons, which again lie flat upon one another. The embryo is *orthoplastic* when the radicle lies in the hollow channel of the folded cotyledons. In these three arrangements the cotyledons are spoken of respectively as *accumbent*, *incumbent*, and *conduplicate*. In the *spiral* embryo the cotyledons are laid flat upon one another and coiled spirally.

The germination of many seeds takes place as soon as they escape from the fruit, and obtain favourable conditions of moisture and warmth; in others, on the contrary, a period of rest seems to be necessary in order for them to attain perfect ripeness. During the process of germination certain changes take place in the contents of the seed, by which they are rendered fit for the nourishment of the embryo. One of the most remarkable of these is the conversion of starch into dextrine or grape-sugar, *i.e.*, an insoluble into a soluble substance. It is attended by the absorption of water, the formation of carbon dioxide, and heat is produced, as evidenced in malting. The *seedling* derives its earliest nutriment from the S., and especially from the cotyledons, or when there is albumen, from it also through the medium of the cotyledons. The radicle first emerges from the S. and after it the plumule. The range of temperature essential for the germination of the S. is diverse in different species; in some cases it may be carried on even at freezing point. Seeds when buried deep in the soil evidently sometimes lie dormant for a long period, and only vegetate when air is admitted by the process of subsoil ploughing or other operations (see MUMMY WHEAT). Darkness is favourable for germination. In some seeds the vital power is destroyed by keeping (under ordinary conditions) during the space of a few weeks or even a few days after they are fully ripe, whilst others will retain their vitality for many years, especially such as contain starch. Fresh seeds, however, in general germinate more quickly and easily than old ones. Out of 368 species sown at Geneva by A. de Candolle, 17 only grew after the S. was fifteen years old, and out of representatives of 288 genera whose seeds were similarly experimented upon under the auspices of the British Association, it was found that the majority had lost their vitality altogether after being kept ten years. Wheat grain left by the *Folaris* in N. lat. 81° 16', and after an exposure of five years to a temperature of 72° to 104° of frost brought back by the *Discovery*, germinated in 1877 and 1878 to the extent of 20 per cent.

S.-producing power is very variable. Each average plant of such common British weeds as the chenopodium, the red poppy,

the shepherd's purse, and the chickweed, may be fairly estimated to yield 20,000, 6000, 15,000, and 3000 seeds respectively, whilst the S. of the water-pest (*Anacharis*) and the sweet flag (*Acorus*) is unknown in Britain—their increase being secured by other means. Winds, water, animals, and man—in his commercial, manufacturing, agricultural, and emigrant phases—are active agents in the dissemination of seeds, whereby new formed land in time obtains its vegetable clothing, and the plants of one country are transported to and thrive in distant territories.

To transmit seeds from foreign countries, they should be made up in dry papers and exposed to free ventilation in a cool place; or they may be mixed with moderately dry ordinary soil and put into tight-corked earthenware (blackening) bottles.

Seeland. See SJÆLLAND.

Seeley, John Robert, an historical and theological writer, and the son of a well-known publisher, was born in London in 1834. He was educated at the City of London School, and graduated B.A. at Christ's College, Cambridge, in 1857, when he was bracketed Senior Classic, and obtained the Senior Chancellor's medal. In the following year he was elected a fellow of his college, where he lectured for some two and a half years, and after holding the appointment of classical assistant to his old school, was chosen professor of Latin in University College, London, in 1863. On the recommendation of Mr. Gladstone he was appointed in 1869 to succeed Charles Kingsley in the chair of modern history at Cambridge. His principal work, *Ecc Homo, or the Life and Work of Jesus Christ*, was published anonymously in 1866, and had reached a 13th edition in 1876. So far as it is argumentative, it attempts to eliminate the divine element, and to emphasise and elevate the humanity of Christ; but though vulnerable as a dogmatic thesis, it has obtained a permanent place in literature as a masterly piece of portraiture, radiant in colour and touched with the tenderness of love. *Ecc Homo* startled the orthodox world by the earnest tone of its dissidence, and called forth numerous replies, chief of which was that of Mr. Gladstone. Among S.'s acknowledged works are *Classical Studies as an Introduction to the Moral Sciences* (1864), *An English Primer* (together with the Rev. E. A. Abbot, 1869), *Lectures and Essays* (1870), and an edition of *Livy*, with an introduction, historical examination, and notes (Clarendon Press Series), of which the first vol. appeared in 1871.

Seer (*Ser*, derived from the Sansk. *setaka*), the standard measure of weight in India. It varies in different parts of the country. The standard S., which contains 80 tolas, each the weight of a sicca rupee, is equal to 2 lbs., 0 oz., 14 drs. *voirdupois*; and 40 *seers* make up the *maund*, which is thus equal to about 82 lbs., or nearly 28 lbs. to the ton. In Bombay, the bazar or local S. weighs as little as 13 oz.; while the Government of India have attempted, but in vain, to introduce an imperial S. of 2205 lbs., exactly equivalent to the metrical kilogramme. The S. is universally used to estimate the price of grain; and variations in the market rates are expressed, not by quoting the amount of money required to purchase a given quantity, but the varying number of *seers* that can be obtained for the rupee. Thus, taking the rupee = 2s., and the S. at 2 lbs., 36 *seers* of rice for a rupee means that rice is selling at 1d. for 3 lbs. The S. also forms the standard liquid measure, being in this case equal to about 1 pint 2 gills.

See'ta or **Sita** (*Sata*, 'furrow'), a popular goddess of Hindu mythology, and the wife of the hero Rama, an incarnation of Vishnu. She got her name from having first appeared in front of her supposed father's ploughshare.

Segg'ar, or **Sagg'er**, a vessel of fire-clay, usually cylindrical in form, for enclosing and protecting earthenware while being baked in the kiln. A pile of seggars in the kiln constitutes a *bung*.

Segment, in geometry, is the part of a circle cut off by a straight line, or of a sphere cut off by a plane.

Seg'no (Ital. *sign*), a sign ♩ placed in musical compositions over a note, pointing out the place from which a portion of the piece is to be repeated.

Se'go, capital of the state of Bambarra (q. v.), Western Africa, lies on both sides of the Joliba, or Upper Niger, which is here as broad as the Thames at Westminster. The

town is surrounded by mud walls, and the houses, including the king's palace, are of clay. The streets are narrow but clean. The inhabitants are Negroes and Moors, the latter being the ruling class. S. has considerable trade, both by land and water. Pop. 30,000.

Segovia (Lat. *Segovia*; Gr. *Segubia*), a town of Spain, capital of the province of S., Old Castile, 42 miles N.W. of Madrid, on a steep acclivity on the left bank of the river Eresma, 3280 feet above the sea-level. It was an important town in the days of the Romans. The great aqueduct, the finest Roman relic in Spain, which passes over part of it, was probably erected by Trajan. It is built of granite blocks, in two tiers of 15 arches, 2720 feet long, and 105 feet high in the middle. There is also a Roman amphitheatre. Under the Moorish rule S. had great cloth manufactures. In the Middle Ages it was frequently the residence of the kings of Castile and Leon, and Charles I. of England lodged in the alcazar on the 13th September 1632. This alcazar, originally Moorish, was rebuilt in the middle of the 16th c., but was destroyed by fire in 1862. The cathedral of S., begun in 1522, is a splendid florid Gothic erection, with a tower 330 feet in height. S. has besides, 24 churches and 21 monasteries. It has still some cloth manufactures, and the products of its wool-scouring industry are famous. Pop. 10,400.

Ségur, a French family of great antiquity and distinction. It suffered much during the Huguenot Wars. Among its most notable members are—(1) **Philippe Henri, Marquis de S.**, born January 20, 1724, served with the French army in Germany, distinguishing himself at the battles of Rocoux (1746), and Laffeld (1747). In 1780 he was appointed minister of war by Louis XVI., who three years later made him a marshal. He lost much of his property during the Reign of Terror, and died October 8, 1801.—(2) **Louis Philippe, Comte de S.**, son of the preceding, born at Paris, December 10, 1753, in 1782 joined Rochambeau's army in America, and in 1784 was appointed French ambassador to the court of Catharine II., with whom he became a favourite. Some plays he wrote for her have been published under the title of *Théâtre de l'Hermitage* (1798). His other writings are:—*Histoire des Principaux Evénements du Règne de Frédéric Guillaume II.* (1800, 5 vols.), *Décade Historique, ou Tableau Historique de l'Europe de 1786 à 1796* (1801, 3 vols.), *Mémoires, Souvenirs, et Anecdotes* (1824, 3 vols.), and several histories, of which the most noted is the *Histoire de France* (1824–30, 9 vols.). His collected works occupy 33 vols. (Par. 1824–30). He followed Napoleon during the Hundred Days, and unsuccessfully endeavoured to become the companion of his master in exile. He died August 27, 1830. See his *Vie et sa Temps* by Taillandier (Par. 1875).—(3) **Philippe Paul, Comte de S.**, son of the preceding, born at Paris, November 4, 1780, was a general of the first Empire, and was dismissed after the second restoration. In 1830 the Academy appointed him to one of its vacancies on account of his *Histoire de Napoléon et de la Grand Armée pendant l'Année 1812* (2 vols. 1824), and *Histoire de Russie, Histoire de Charles III.* (2 vols. 1834; 2d ed. 1842), and *Histoire et Mémoires* (7 vols. 1873). In 1831 he became a peer, but after the Revolution of 1848 he retired from public life. He died at Paris, February 25, 1873. His *Mélanges* appeared in 1874.

Segura, a river of the S.E. of Spain, rises in the Sierra Seca, and flows eastward through the fertile and populous valley of Murcia to the Mediterranean, passing the towns of Murcia and Orihuela. Its length is 180 miles. It is not navigable.

Seidlitz Powders are composed of 2 drms. of Rochelle salts and 40 grains of the bicarbonate of soda reduced to powder, and mixed, and enclosed in a blue paper. 37 grains of tartaric acid are enclosed in a white paper. When they are taken, the powders are dissolved separately, the solutions added, and the whole drunk whilst effervescing. S. P. are refrigerant and laxative rather than purgative, and they should be taken on an empty stomach, as before breakfast. One powder is the usual dose, but two are often necessary.

Seine (Lat. *Sequana*), a river of northern France, rises in the department of Côte-d'Or, at the foot of Mount Tasselot, at an elevation of 1460 feet above the sea-level. It flows generally in a N.W. direction, through the departments of Aube, S. et Marne, S. et Oise, Eure, and S. Inférieure, until it reaches the English Channel at Havre, 253 miles in a direct line from its source,

but 473 miles if we include its windings. Its basin has an area of 26,350 square miles. The principal towns on its course are Chatillon, Troyes (below which, 345 miles from the sea, it becomes navigable), Corbeil, Paris, St. Denis, St. Germain, Poissy, Mantes, Elbeuf, Rouen, Quillebeuf, Honfleur, and Harfleur. Between the two latter its estuary is nearly 6 miles wide. Its principal tributaries are, on the right the Aube, Marne, and Oise, and on the left the Yonne and Eure. It is connected by canals with the Loire, Sône, Scheldt, and Rhine, and a lateral canal between Havre and Tuncarville, 16 miles long is projected (1878). On account of the high tariff and the difficulties of navigation only 150,000 tons of goods are brought to Paris annually by the S., while 900,000 tons are transported by the Havre and Paris railway. The S. is subject to a remarkable bore, and its course is impeded by shifting shoals, while fogs are frequent during part of the year. As many as 20 English steamers went aground in the river in 1877.

Seine, a department of north-eastern France, part of the former province of Ile-de-France, the smallest but most populous in the republic. It is entirely surrounded by S. et Oise, its area being only 183 square miles, of which Paris (q. v.) occupies 35 sq. miles. Its pop. (1876) was 2,410,849, that of Paris alone being 1,988,806. The river S. flows through the department in a north-westerly direction for a distance of 37 miles. The surface of S. is undulating, and at Vincennes, Meudon, St. Cloud, as well as in the Bois de Boulogne, and generally to the southward of Paris, is richly and beautifully wooded. Mont Valérien rises 446 feet above the sea-level, and the heights of Montmartre and Chaumont within Paris are also considerable. The naturally calcareous and barren soil has been elaborately fertilised, and now yields great quantities of vegetables and fruits, and there are rich quarries of gypsum and building-stone. Besides Paris, the principal towns are St. Denis, Vincennes, Charenton, and Sceaux.

Seine-et-Marne, a department of north-eastern France, bounded on the W. by Seine-et-Oise, on the N. by Oise and Aisne, on the E. by Marne and Aube, and on the S. by Yonne and Loiret. The Marne flows through the N., and the Seine through the S. Area 2208 sq. miles, pop. (1876) 347,323. Its surface is undulating, and its soil fertile, being particularly suited to cereal crops (wheat 6,135,000 bushels in 1876), vegetables, and fruits. It produces a great quantity of indifferent wine, but the *Chasselas de Fontainebleau* is famous as a table grape. Woods cover a great proportion of the surface, among them being the famous forest of Fontainebleau. The principal towns are Melun, Meaux, Coulommiers, Provins, and Fontainebleau.

Seine-et-Oise, a department in the N. of France, completely surrounding the department named Seine, which contains Paris. Area, 2164 sq. miles; pop. (31st December 1876) 561,990. The country consists of plain, with low hill-ranges, and towards the N. is partially covered with forests. Though not naturally very fertile it is intersected by numerous tributaries of the Seine, and is in a high state of cultivation. Much grain and wine are produced (wheat, 5,831,000 bushels in 1876). Chalk and building-stone are found among the hills. Paper is manufactured at Essoles, and porcelain at Sévres. St. Cloud, where Napoleon's palace was built, is of great historical interest. But the chief town is Versailles (q. v.).

Seine-Inférieure, a department of France, in Normandy, bounded on the N. by the English Channel, and on the S. by the Seine. Area, 2329 sq. miles; pop. (1876) 798,414. The country is a fertile plain, the only hills being those of Caux, whose highest point is scarcely 900 feet high. The country is almost all arable or wooded, and contains many cattle. There are many fruit-trees, and hence great manufactures of cider, of which, in 1877, 29,047,568 gallons were produced. The product of wheat in 1877 amounted to 5,867,000 bushels. About half the population is engaged in manufactures, whereof the chief are weaving, spinning, and various kinds of metal-working and machine-making. The department is one of the most thickly peopled in France. The capital, Rouen, is connected with Havre, Dieppe, and Paris by rail.

Seir-fish (*Cybinus guttatum*), a Teleostean fish, belonging to the Mackerel family (*Scomberidae*), and occurring in E. Indian seas. It resembles the salmon. The tail is keeled laterally, and the flesh is nutritious and palatable.

Seistan, a considerable tract of country, lying on the frontier between Afghanistan and Persia, which has long formed a subject of contention between the two countries. It consists chiefly of the basin of the river Helmund (q. v.), and is a desert plateau more than 2000 feet above the sea. The soil, mostly stiff clay, with quicksands here and there, is covered with coarse grass and tamarisk bushes. There are evident traces of former cultivation and prosperity, and S. is the classic land of early Persian romance, having been the cradle of Rostum. It was devastated by Timur in 1383. The frontier line was demarcated by a diplomatic expedition from India in 1872, led by General Goldsmid. For the most part, he made the Helmund to be the boundary line between the rival powers; but both banks of that river in its upper channel were assigned to Afghanistan.—**Lake S.** or **Hamboon** is a large and very shallow lake, 85 miles in length and from 20 to 40 in breadth. It is girdled by groves of tamarisks and other trees, receives the waters of the Helmund and other streams, has no outlet, and overflows its boundaries and fertilises a wide area of land. Its waters are unpleasant to the taste.

Sejanus, Ælius, the son of a Roman knight, was born in Etruria, and in 14 A.D. was made an officer in the Prætorian band. After visiting Pannonia S. returned to Rome, and proceeded to intrigue for supreme power. He persuaded Tiberius to allow the legions to be gathered together under his command on the Viminal (23), and thus he overawed the civil powers. He sought in every way popularity with the army; he poisoned Drusus, the heir-apparent, with the view of marrying his wife Livia; and gradually induced the Emperor to give him a larger and larger share in the conduct of affairs. Tiberius at length retired to Capræ, but here S.'s influence over him grew weaker, and he met the favourite with a duplicity equal to his own. One day (31) Macro arrived with a letter authorising him to supersede S. in the command of the guard. S. was arrested; the Senate at once condemned him to death; not a friend interposed a word for him; he was immediately executed, and his corpse was thrown into the Tiber.

Selborne, Roundell Palmer, Baron, born at Mixbury, Oxfordshire, November 27, 1812, was educated at Rugby and Winchester, and gained an open scholarship at Trinity College, Oxford (1830). He took a first class in classics (1834), carried off five university prizes and scholarships, and obtained a Magdalen fellowship. Called to the bar (1837), he achieved a great reputation as a Chancery barrister, was made Q.C. (1849), and sat as a Liberal Conservative for Plymouth from 1847 to 1857, and for Richmond from 1861 to 1872, being appointed Solicitor-General and knighted (1861). He was Attorney-General (1864-66), acted as counsel to the British Government at the Alabama Congress (1872), and in the same year became Lord Chancellor under the title Baron S. of Selborne, Hampshire, retiring from office in February 1874. In 1877 he was elected Lord Rector of the University of St. Andrews. He edited the *Book of Praise, from the best English Hymn-writers* (1862), published *Notes on some Passages in the Liturgical History of the Church of England* (1878) and various pamphlets, and contributed a 'Chapter of Antiquities' to F. B. Buckland's edition of White's *Selborne* (1876).

Selby, a market-town in the West Riding of Yorkshire, on the Ouse, 20 miles E. of Leeds by rail. The stately abbey church (partly restored by the late Sir G. G. Scott, 1873) exhibits a variety of styles from Norman to Perpendicular, and has lost its S. transept from the fall in 1690 of the central tower (meanly rebuilt 1702). The abbey holds the unique position of being the one great Benedictine monastery in the North of England which has survived as a parochial church. Other edifices are the First Pointed church of St. James (1868), with a spire of 165 feet, a Second Pointed Catholic church (1859), the town-hall (1825), assembly-rooms (1841), and a modern Gothic market-cross. Goole has absorbed most of the river trade, but stone is still exported, and the industries include malting, flax-scutching, the manufacture of ropes and shoe-thread, iron and brass founding, brewing, tanning, &c. S. publishes two weekly newspapers. Pop. (1871) 6193. At S., the traditional birthplace of Henry I. (1068), the Conqueror founded in 1069 a Benedictine abbey, of which, besides the church, only the barn remains; and in the Great Rebellion, the town, after being captured by the

Royalists, was recovered by Fairfax (1644). See Morrell's *History of S.* (Lond. 1867).

Sel'den, John, born at Salvington, Sussex, September 16, 1584, after three years' study at Hart Hall, Oxford, proceeded to Clifford's Inn, London, and thence to the Inner Temple. Finding himself, however, ill-fitted for distinction at the bar, he turned his attention to constitutional history, in 1606 compiling his *Analecton Anglo-Britannicon*, and following it up with *Jani Anglorum Facies Altera* (1610), and the masterly *Titles of Honour* (1614). His *Treatise of Tythes* (1618) brought him into collision with the clergy, as impugning their divine right to tythes, and in 1621 he suffered a brief imprisonment for defending the privileges of Parliament against the crown. Elected member for Lancaster (1623), S. was again lodged in the Tower (1630) for opposition to the royal policy, remaining there four years, and as member for the University of Oxford (1640) he espoused the popular cause, helping to draw up the articles of Laud's impeachment, sitting as lay member in the Westminster Assembly (1643), receiving a commissionership of the Admiralty (1644), and being appointed a university visitor (1647). At the same time he disapproved of Charles' execution, and refused Cromwell's request that he would answer the *Eikon Basilike*. He died in the house of Elizabeth, Dowager-Countess of Kent, November 30, 1654, having constantly set forth his self-adopted motto, *Perri pantos ten Eleutherian* ('Freedom above all'). Such as Erasmus to the Reformation was S. to the English Revolution, a keen-eyed, moderate politician, who could detect and strive to redress the faults of a system without necessarily involving in condemnation the entire system itself. Amongst S.'s other works were *De Diis Syriis Syntagmata Duo* (1617), *Marmora Arundelliana* (1629), *De Jure Naturarum et Gentium juxta Disciplinam Hebræorum* (1640), and *De Anno Civili et Calendario Judaico* (1646). More famous than these is the posthumous *Table-Talk* published by S.'s secretary Milward in 1689 (ed. by S. W. Singer, Lond. 1847; 3d ed. 1860), of which Coleridge somewhat hyperbolically remarked that it contained 'more weighty bullion sense than any uninspired writing.' A complete edition of his works was edited by D. Wilkins (3 vols. Lond. 1726), and his *Life* was written by J. Aikin (1812) and G. Johnson (1835).

Sel d'Or (Fr. 'salt of gold'), a double hyposulphite of gold and sodium, used in 'toning' photographic prints and intensifying the Daguerreotype image. See GOLD and PHOTOGRAPHY.

Selene (Lat. *Luna*), usually said to be the daughter of Hyperion and Theia, was the goddess of the moon, and sister of Helios, god of the sun. Her other name 'Mene,' containing the same root as the Lat. 'mensis,' and the Eng. 'moon,' means the 'measurer,' i.e. of time. S. is represented as a beautiful woman, clad in a flowing robe with a coronet on her head and large wings. She loved Endymion, and lulled him to sleep that she might kiss him. See DIANA.

Selenite (Gr. *selēnē*, 'the moon'), includes all the transparent foliated varieties of gypsum, originally so named from their frequent moon-like lustre. See GYPSUM.

Selenium (Se = 79.5), a rare element closely allied to sulphur, occurring in nature chiefly as selenides of metals associated with the corresponding sulphides. The iron pyrites of Fahlun in Sweden is remarkable for the presence of S., and is the source from which the element was first obtained by Berzelius in 1817. Like sulphur, it is capable of existing in three allotropic conditions: the red amorphous variety obtained by sublimation or precipitation from solution; the black vitreous variety; and the crystalline form deposited from solution in bisulphide of carbon. It forms two acids, *selenious* (SeO₃) and *selenic* (SeO₄) acids, the latter of which is not known in the anhydrous state. The seleniates closely resemble the corresponding sulphates; but when heated with hydrochloric acid they decompose, evolving chlorine and producing selenious acid. Selenious acid results from the combustion of S. in oxygen. Two chlorides are known, the dichloride (Se₂Cl₂), corresponding to the dichloride of sulphur, and the tetrachloride (SeCl₄), which has no analogue in the sulphur compounds. Two sulphides are also known, the bisulphide (SeS₂) and tersulphide (SeS₃), the former of which appears as a yellow precipitate when sulphuretted hydrogen is passed into solution of selenious acid.

Seleucia, the name of several cities founded by Seleucus Nicator. The chief were (1) **S.** on the Tigris. It was situated about 40 miles N. E. of Babylon, soon overshadowed the more ancient city, rose to great commercial eminence, and at one time even counted 600,000 inhabitants. It was for long the eastern capital of the Seleucids. Taken by the Parthians 140 B. C., and sacked by Trajan 116 A. D., in a few years its glory utterly vanished, and by the 4th c. its site had become a howling wilderness.—(2) **S. Pieria**, 4 miles N. of the mouth of the Orontes, in Syria, was the seaport of Antioch, which it rivalled in splendour. It declined under the Roman dominion and is now a heap of ruins.—(3) **S. Tracheotis**, in Cilicia, was the birthplace of Athenæus and Xenarchus the peripatetic. Friedrich I. Barbarossa died here.

Seleucids, the name of the dynasty of kings to which fell that division of Alexander the Great's empire which included Syria, a large part of Asia Minor, and the eastern provinces.—**Seleucus I.**, surnamed *Nicator* ('the conqueror'), born about 358 B. C., was the son of Antiochus, a general of Philip of Macedon, and accompanied Alexander on his Asiatic expedition. After Alexander's death he at first espoused the cause of Perdiccas, but afterwards conspired against that general, and headed his assassins at Pelusium. In the second partition of the empire he obtained Babylonia, and received from Antigonus the satrapy of Susiana; but subsequently quarrelling with Antigonus, he fled to Egypt, there leaguuing against him with Ptolemy, Lysimachus, and Cassander. In 312 he regained power in Babylonia; and from this date the era of the S. commences. In 306 he assumed the title of king; in 302 he again joined his former allies in resisting Antigonus; in 301, after the victory of Issos, he obtained the greater part of his dominions in Asia Minor. In 288 he went to war with his father-in-law, Demetrius Poliorcetes, and in two years subdued him. He next invaded Thrace, routing and killing its king, Lysimachus, at Corupedion in 281. The result of these campaigns was the acquisition of the remaining portion of Asia Minor. Seleucus was assassinated by Ptolemy Ceraunus, 280 B. C. He was an able administrator, and the justest of Alexander's successors. Of the many large Greek colonies he planted in his empire, there may be mentioned Antioch in Syria, Beroea, Edessa, Pella, and Seleucia on the Tigris.—After the reigns of Antiochus I. and Antiochus II., **Seleucus II.**, surnamed *Callinicus*, son of Antiochus II., became king in 246. Ptolemy Evergetes soon deposed him, but after a prolonged contest concluded a peace of ten years with Seleucus, and retired. The reign of Seleucus was so much disturbed by war, in which he always himself took an active part, that he was called *Callinicus*, or 'distinguished conqueror.' After a reign of twenty years, often imperilled by his brother Antiochus, he died of a fall from his horse in 226.—**Seleucus III.**, surnamed *Ceraunus*, son of the preceding, ascended the throne in 226. He was on his way to attack the King of Pergamos, in Asia Minor, when one of his generals poisoned him (223). He was succeeded by his brother, Antiochus III.—**Seleucus IV.**, *Philopator*, succeeded his father, Antiochus III., in 186. The principal event of his reign was an attack on the king of Pergamos, held in check by the Romans. He was poisoned by his minister Heliodorus (175), and left the throne to Antiochus IV., his brother. For more than 200 years (from the time of Seleucus I.) this dynasty was one of the most prosperous in the world. Until 114 it maintained Antioch as the undisputed capital of Syria; but at this time Ptolemy Physcon, by his intrigues, succeeded in undermining the kingdom, and Antiochus Cyzicenus was established in a new sovereignty at Damascus. In chronology the Era of the S. was adopted by all the Greek colonies bordering on the Levant, was followed by the Jews till the 15th c., and is still in use among certain Arabians. The Jews term it the Era of Contracts, and in Maccabees it is called the Era of Kings.

Selim I., Sultan of the Ottoman Empire, was born in 1467, and on the 25th April 1512, with the help of the Janissaries, de-throned his father, Bajazet II. (q. v.), who four weeks later died of poison. Having secured his throne by the murder of two brothers, five nephews, and a host of lesser rivals, S. warred with Shah Ismail of Persia (1514), and defeated him on the plain of Tchaldaran; but the victory was dearly bought, and the Janissaries' murmurs forced him to retrace his steps, and rest satisfied with the conquest of Diarbekr and Kurdistan (1515). However, in 1516 he turned his arms against the Mameluke

Sultan of Egypt, Kansû-ghori, and by the victory of Majabik became master of Syria. Breaking off negotiations with Tuman-Bey, Kansû's successor, he suddenly advanced on Cairo, captured it after winning a battle in the neighbourhood, and reduced all Egypt to an Ottoman paahalic. This conquest, coupled with the abdication of the last of the Abbaside Khalifs, led S. to assume the title of Imâm, or representative of Mohammed, and Mecca thenceforth acknowledged him and his successors as heads of Islam. Returning to Turkey, he busied himself with the arts, the construction of a navy, the chastisement of the Janissaries, and the amelioration of the nations he had subdued, and had just prepared an expedition against Persia and Rhodes, when he died 22d September 1520. See Sir Edward Creasy's *History of the Ottoman Turks* (new ed. 1877).—**S. III.**, Sultan of Turkey, was born 24th December 1761. On the death of his father Mustapha III. in 1774, his uncle Abd-ul-Hamid succeeded, S. meanwhile occupying himself with the study of European methods of government and organisation. He succeeded Abd-ul-Hamid in 1789, but the time was not favourable for attempting the reforms which he contemplated. Until 1800, wars with Russia and Austria, and insurrections in Syria, Egypt, and Bulgaria kept his hands full. In 1802, S. set about carrying his theories into practice. He enlarged his council of state, restricted the power of the Grand Vizier, and introduced European methods of organisation into parts of the army. The Servian insurrection, however, and a war with England and Russia in 1807, greatly embarrassed him. Finally the Janissaries revolted, and on the 29th May 1807 S. was deposed. An attempt to replace him on the throne was the signal for his murder, July 28, 1808. S. was an enlightened and well-meaning ruler, but lacked the force of mind necessary to contend successfully with the difficulties of his situation.

Selim'no (Turk. *Islimje* and *Islivni*), a walled town of European Turkey, province of Eastern Roumelia, at the foot of the Balkans, 69 miles N. N. W. of Adrianople, has 30 mosques, a Greek church, and a synagogue. There are some manufactures of cloth, &c., and some wine is produced. A great annual fair is held here. Pop. 24,000.

Seljuks, or **Seljuk Turks**, a branch of the Mongol race, who first appear in the 10th c. A. D. as tributaries of the Khan of Kirghiz, but who about 970, headed by a chieftain of the name of Seljuk, established their independence, embraced Islam, and under Israel, Seljuk's son, made themselves masters of Bokhara. Forced by Mahmud of Ghizni to cross the Oxus and settle in the waste districts of Khorassan, they soon began to overrun Persia, and Masud, the successor of the Ghiznide conqueror, vainly endeavoured to arrest their progress. Toghril Beg, the grandson of Seljuk, whom they elected for their sovereign, made Nishapur his capital, but in 1055 was invited to Bagdad, to defend the Khalif against his Bouide protectors. He followed the summons, and shortly after his entry into Bagdad was himself solemnly proclaimed sultan, the Arabian Empire of Islam passing under his successors Alp Arslan (1063-72) and Malek Shah (1072-92) entirely to the Seljuk race. Malek's dominion, indeed, extended from the Chinese frontier to the Georgian mountains and the groves of Arabia Felix. However, upon his death this immense territory was partitioned amongst a number of Seljuk chieftains, and thus arose the shortlived sultanates of Iran (1093-1194), Iconium or Rum (1075-1299), Aleppo (1079-1114), Damascus (1076-1155), &c., whose fall was due partly to the assaults of crusaders, partly to the daggers of the Assassins (q. v.), and partly to intestine feuds. Ere the close of the 13th c. the last of them, the sultanate of Rum, had fallen into the hands of Tartar invaders, and on its ruins arose the present Ottoman Empire. See R. D. Osborn's *Islam under the Khalifs of Bagdad* (Lond. 1878).

Selkirk, the capital of the county of S., on a rising-ground on the right bank of the Ettrick, 40 miles S. S. E. of Edinburgh by rail. The chief features of the place are the town-hall, with a fine spire, and the county buildings (1870). There are monuments to Sir Walter Scott and Mungo Park, a native of the county. S. is now famous for its manufacture of tweeds, tartans, blankets, plaids, shawls, and hosiery. Pop. (1871) 4640. It unites with Galashiels and Hawick in returning a member to Parliament. S. derives its name from the 'kirk' or chapel built for the Scottish kings when hunting in the forest of Ettrick. Here a monastery was founded by David I. in 1173. The town

Inflection is substantially the same in all, and is chiefly internal; that is to say, a simple modification of the vowels within the verbal stem, conjoined sometimes with the addition of a preformative consonant, serves to add intensity, repetition, causality, passivity, or reflexion to the verbal idea. Compound words, except in the case of proper names, are quite foreign to the Semitic genius, and in the antique Hebrew are almost unknown. The noun has few inflections, and only possesses what can be called declension in the Arabic, where it is obviously inessential. The syntax is of such a simple character as to offer a marked contrast to the elaborate style of the Western languages. Conjunctions are few, a mere connecting particle often serving to co-ordinate where we would subordinate. There is nothing which properly corresponds to the *period* of Latin or Greek, for the prose style merely consists in building up simple sentences, without any attempt to express the subtle degrees of logical connection between them to which the Aryan dialects lend themselves so easily. In poetry, metre and rhyme are replaced by parallelism, a species of thought-rhythm, in which two simple propositions are balanced against one another in any logical relation. The S. L. are emphatically the languages of the concrete and actual, and have no inherent capacity, such as we see in those of the Aryan family, for dealing with the abstract and ideal; while metaphysics in our sense of the word is impossible. In them everything is painted from its external appearance, so that even moods of the mind are denoted by words which describe a physical condition; e.g., pride by *lifting up of the head*, patience by *length of breath*, impatience by *shortness of breath*, anger by *hard breathing*, or *heat*, or *effervescence*. They are thus specially distinguished by the manner in which the primitive union of the sensation and the idea has preserved itself, without either element causing the other to be forgotten. The purest type of the S. L. is undoubtedly the Biblical Hebrew. The very richness of the Arabic, and its comparative adaptation to alien modes of thought, is necessarily accompanied by great looseness and a considerable influx of foreign ingredients; while the Aramaic, occupying a middle position between these two in respect of development, wants the classic simplicity and delicate mobility of the one, without having reached the cosmopolitan variety of the other. That the alphabets of the civilised world were of Semitic origin was long regarded as an indisputable truth. Like more important matters, however, it is now seriously questioned. None deny that the Phœnician Symbols are the sources of the Greek and Latin letters, and of all their modern progeny, but many scholars are of opinion that the Phœnician alphabet is a mere survival from the more primitive picture-alphabets known as hieroglyphics. See Rénan's *Histoire Générale des Langues Sémitiques* (4th ed. Par. 1864); Gesenius's *Geschichte der Hebräischen Sprache und Schrift* (Leip. 1815, § 1); Hävernick's *Introduction to the Old Testament* (vol. i. chap. 2); Bleek's *Introduction* (vol. i. chap. 3), De Wette's *Einleitung* (Div. ii. chap. 1), and Keil's *Einleitung* (§§ 8-13).

Sem'itone, in music (lit. 'half a tone'), is one of the smaller intervals in the scale, as from B to C (see MUSIC). A chromatic S. is when a note is altered by a sharp or flat.

Sem'ler, Johann Salomo, one of the earliest German rationalists, was born at Saalfeld, 18th December 1725, studied at Halle, where he was appointed professor of theology in 1751, and died 14th March 1791. His writings are numerous. Though no longer read they have a place in the history of theological criticism. We may note his *De Daemoniacis* (1760); *Apparatus ad liberalem Veteris Testamenti Interpretationem* (1773); *Abhandlung von der Untersuchung des Kanons* (1771-75), and *Commentationes Historicae de antiquo Christianorum Statu* (1771-72). See his *Lebensbeschreibung von ihm selbst verfasst* (Halle, 1781-82); Wolff, *Ueber S.'s letzte Lebensstage* (Halle, 1791); Schmid, *Theologie S.'s* (Nordl. 1858).

Sem'lin, a town of Austria, on the Danube opposite Belgrade. It is the centre of a great transit trade between Austria and the former provinces of Turkey—these provinces receiving mostly glass, porcelain, and jewellery, and exporting yarns, cotton, skins, honey, &c. S. contains a lazaretto, and is an important quarantine station. There are seven churches—five Roman Catholic—and a theatre, but the town is composed largely of mud huts. Pop. (1870) 10,000. chiefly Servians.

Semm'ering, a mountain of Styria, in Austria, 44 miles W. of Vienna, and 4416 feet high. The S. Pass (3066 feet high) is crossed by the railway from Vienna to Trieste, which is carried through fifteen tunnels and over fifteen viaducts, and which cost £1,500,000. The highest point of the line is 2894 feet. It was the first mountain-railway (opened 1854), and is still one of the most remarkable.

Semnopithe'cus, a genus of *Catarrhine* or Old World Apes, occurring in the E. Indies, to which the *S. Entellus*, or Sacred Monkey of India, belongs. The tail is prehensile; the canine teeth are well developed, and the molars are tuberculate.

Semoli'na and **Sem'ola** are names for particles of the grain of hard wheat which do not grind into flour in milling, or are sometimes designedly prepared by the adjustment of the millstones. These hard wheats of S. Europe have a nearly transparent grain, which, when bitten through, breaks short and shows a very white flour within. The flour is much richer in gluten than that of soft wheats, consequently the bread, puddings, &c., made from S. are good flesh-forming food. See MANNA CROUP.

Sem'pach, a small town in the Swiss canton of Lucerne, occurring in the E. end of the lake of S., and 8 miles N.W. of Lucerne. Near the town a decisive victory was gained by the Swiss Eidgenossen ('confederates'), July 8th, 1386, over the Austrians under Duke Leopold, who was slain in the battle at a spot now marked by a chapel, 1½ miles from S. A high mass is still celebrated on the anniversary. Pop. (1870) 1109.

Sempervi'vum. See HOUSE-LEEK.

Sen'ate (Lat. *senatus*, 'an assembly of elders,' from *senex*), a name applied rhetorically to any legislative and deliberative body, but in several modern democracies denoting distinctively the 'upper house.' The Roman S. was a hereditary and not an elective body. The S. of the United States consists of two delegates nominated by the House of Representatives of each state. The French S. is composed of 500 members, 225 being elected by the departments and colonies and 75 by the National Assembly. In some of the Swiss cantons there is a second house known as the S.

Senat'us Academ'icus, one of the governing bodies of the Scotch universities, composed of the principal and professors. The principal presides, or in his absence the senior professor, and has a casting as well as a deliberative vote upon all questions which may come up. The S. A. controls the university property and revenues, regulates discipline, and confers degrees.

Sen'eca, M. Annæus, a Latin rhetorician, was born at Corduba (*Cordova*) in Spain, probably about 61 B.C. The wars between Pompey and Caesar kept him at home for a time, so that he had not the privilege of listening to Cicero. He was certainly in Rome during the early years of the power of Augustus. S. was a friend of M. Porcius Latro, one of Ovid's masters, and had heard Ovid declaiming before Arellius Fuscus (*Contr.* x. p. 172). After his sojourn in Rome he returned to Spain and married Helvia, by whom he had three sons, L. Annæus S., L. Annæus Mela, and Marcus Novatus. He lived till the close of the reign of Tiberius, but the exact date of his death is unknown. Whether or not he died at Rome is uncertain, but that he died in Italy is undoubted. S. was a man of wonderful memory. His principal work is *Controversiarum Lib. Decem*, a series of commonplace rhetorical exercises written in his old age. The first, second, seventh, eighth, and tenth books only are extant; even these are imperfect. A few fragments of the other books have survived. The *Suasoriarum Liber*, probably incomplete, is, like the former, surcharged with the puerilities of the rhetoricians. The most noteworthy editions of the works of S. are those of Ven. 1490-92 fol.; Basel, 1515-29 fol., and 1537-57 fol., by Erasmus, in all of which the writings of the father are mixed with those of the son; Nic. Faber (Par. 1587-98 fol.); Andr. Schott (Par. 1607-13 fol.); J. Fr. Gronovius (*Leyden*, 1649); first critical edit. by Conr. Bursian (Leip. 1857); and that of A. Kiessling (Leip. 1872).—**L. Annæus S.**, son of the preceding, was born at Corduba towards the close of the 1st c. B.C. While still young he was brought to Rome, where he entered on the study of rhetoric and philosophy. His first teacher was Sotion the Pythagorean, but he afterwards became a follower of Attalus

the Stoic. After travelling in Greece and Egypt he became a successful pleader; but the jealousy of Caligula, who affected to despise his talents, drove him from the bar. At what time he obtained the quaestorship is uncertain. In the reign of Claudius he was banished to Corsica (A.D. 41) in consequence of an alleged illicit connection with Julia, daughter of Germanicus. S. remained eight years in exile, during which he cultivated the philosophy of the Stoics and wrote several treatises. In one of these—the *Consolatio ad Polybium*—his excessive adulation of the Emperor and his whining appeals for pardon are ignoble. Recalled in 49 A.D., at the instance of Agrippina, who had married her uncle, the Emperor Claudius, S. was then raised to the praetorship and appointed tutor to Nero (q. v.), the son of Agrippina by a former husband. The philosopher was most unfortunate in his pupil; yet he successfully adapted himself to the situation. Though he could not restrain the depraved passions of the imperial miscreant, he profited largely by his extravagant bounty. The immense wealth he thus acquired, estimated at 300,000 sesteria (£2,412,870 sterling), was one of the main causes of his ruin. Nero envied him a fortune which S. offered to refund, asking only a small annuity. Nero, while declining the proffered gift, tried to take off S. by poison. The attempt failed. Shortly thereafter, one Antonius Natalis, an accomplice of Piso, implicated S. in a conspiracy against the emperor's life. The philosopher was sentenced to die by his own hand. He elected to be bled to death. His wife Paullina wished to die with him, but this favour Nero would not concede. As S. was attenuated by age and spare diet his blood flowed but slowly; he was therefore taken at his own request to a warm bath. Finally he was removed to a vapour-stove, where he was speedily suffocated (65 A.D.).

The following are the works of S.:—1. *De Ira*; 2. *De Consolatione ad Helviam Matrem Liber*; 3. *De Consolatione ad Polybium*; 4. *De Consolatione ad Marciam*; 5. *De Providentia Liber*; 6. *De Animi Tranquillitate*; 7. *De Constantia Sapientis*; 8. *De Clementia ad Neronem Cæsarem Libri Duo*; 9. *De Brevitate Vitæ ad Paulinum Liber*; 10. *De Vita Beata ad Gallionem*; 11. *De Otio aut Secessu Sapientis*; 12. *De Beneficiis Libri Septem*; 13. *Epistola ad Lucetium*; 14. *Apocolocyntosis*; 15. *Questionum Naturalium Libri Septem*. Wanting in speculative reach, S. yet shows no ordinary mental vigour, and a wide and varied knowledge of human life. His style is antithetical; his language clear and strong; his treatment of a subject invariably attractive. It remains still to notice the tragedies ascribed to S. by Quintilian, and generally included in editions of his works. Whilst some would attribute these to his father, and others to another S., there seems to be great difficulty in assigning them to any other than the S. of our article. They are, it is true, in many places turgid and bombastic, and were certainly never meant for the stage; but like the other works of S., they abound in moral sentiments, and are not destitute of merit. Considered as a drama, the *Octavia*, which many critics violently condemn, mainly on the ground that they believe it to belong to a later age, is perhaps the best. The influence of the tragedies of S. on the French dramatists has been very marked. Racine especially has been much indebted to them. The *Editio princeps* of S. is that of Naples (1475, fol.). Among several competing French translations, that of Lagrange is considered the best. Of the English translations of S., or of separate treatises, no one demands special notice. The best edition of the prose works are those of Fickert (3 vols. Leip. 1842-45), and Haase (3 vols. Leip. 1852-53; new ed. 1871); of the *Tragedies* those of F. II. Bothe (Leip. 1819, 2 vols. 8vo., and 1834); R. Perper and G. Richter (Leip. 1867).

Seneca Lake, in New York, U.S., is 35 miles long, and is navigated by steamers. Its surplus waters flow into Lake Ontario, and at the outlet stands the rising town of Seneca Falls. The lake takes its name from the Seneca Indians.

Senecio (Lat. *senex*, 'an old man,' from the abundant hoary pappus) is the name of a vast genus of *Compositæ*—one of the largest among phænogamous plants, and certainly the most widely spread. It is, however, most varied in temperate and cool or mountain regions. No species is common to the New and the Old World, except in the far north. S. embraces annual and perennial herbs, undershrubs, and shrubs almost passing into trees. The essential character of the genus is an involucre

of one-seriate bracts of equal length, with often a few smaller at the base. The leaves are extremely variable in outline and clothing. The genus *Cineraria* is now considered a section of S., and to it belong the beautiful greenhouse ornaments obtained by horticultural skill from *S. populifolius*, *S. Tussilaginis*, &c. Nine species of S. appertain to the British flora. A few possess medicinal properties, e.g., a variety of *S. aureus* known as 'life root' and 'squaw weed' in N. America. See GROUNDSEL and RAGWORT.

Senefte, a village in Hainault, Belgium, 17½ miles N.E. of Mons by rail, was the scene of the defeat of 60,000 Dutch, Spanish, and Imperialist troops under William of Orange by 30,000 Frenchmen under the great Condé, August 11, 1674. Both armies lost about 10,000 men.

Senega, or **Sen'eka**, popularly termed *snake-root*, is the root of *Polygala Senega*, a small herbaceous perennial, indigenous to the middle and Southern States of America. 'This root is several inches long, very much contorted, of a peculiar feeble odour, and a taste at first sweetish but afterwards acrid. It is distinguished by a keel-like line, shorter than the root, and presenting the appearance as if a string were drawn tightly under the bark from end to end.' S. is a stimulant to the mucous membrane of the lungs, and is valuable in cases of chronic bronchitis.

Senegal, a large river of Western Africa, rises in a mountainous region in 11° N. lat., 11° 20' W. long., and flows successively N., N.W., and W.S.W., falling into the Atlantic after a course of 1000 miles. Its mouth is obstructed by a sand-bar, covered with only 9 feet of water, and its channel is in various places broken by cataracts and rapids. With these exceptions it is navigable by flat-bottomed craft for 740 miles. In its lower course the river forms numerous islands, which are periodically overflowed, and thus rendered very fertile. The name S. is also given to the French possessions in Senegambia.

Senegambia, an extensive region of Western Africa, deriving its name from its two principal streams, the Senegal and Gambia. It borders on the Atlantic from 10° 20' to 18° N. lat., and is bounded N. by the Sahara, E. by the Sudan, and S. by Sierra Leone. Area, about 400,000 sq. miles; pop. estimated at 12,000,000. High S., the district to the N. of the Senegal, partakes of the nature of the Sahara, into which it merges, and is inhabited by Moors. Middle S., between the Senegal and Gambia rivers, is an extremely unhealthy though usually fertile region, and has a Negro population. Low S., from the Gambia southwards, possesses a coast deeply indented by arms of the sea, fringed by islands and watered by several rivers, of which the Rio Grande and Nuñez, both navigable streams, are the chief. The coast region of Middle and Low S. is low and flat, and the country rises towards the interior by a succession of terraces to the Kong Mountains, forming in its upper portion a plateau about 2500 feet high. In the hilly districts iron is very abundant, and gold is also found. The vegetation, especially of the river basins, is luxuriant, and among its characteristic features is the gigantic baobab (see ADANSONIA). Gum, wax, bark, indiarubber, ivory, and hides are the chief natural productions of S.; but cotton, cocoa, and indigo are beginning to be cultivated. The French possess 96,530 sq. miles of S., extending from its northern limit to 13° 30' N. lat.; the British have some settlements on the Gambia river (see GAMBIA); and the Portuguese exercise a nominal sway over 35,880 sq. miles of territory, lying between the last-mentioned settlements and Sierra Leone.

Seneschal (through the French from a German compound meaning 'aged servant'), a Frankish title of dignity, corresponding to the Eng. Steward, or High Steward. Originally lieutenants of the dukes and other great feudatories, the seneschals, on the recovery by the kings of their rights of suzerainty, continued as royal judges and deputies; but gradually their functions were superseded by the authority of the crown.

Se'nior, William Nassau, born at Uffington, Berkshire, 26th September 1790, passed from Eton to Magdalen College, Oxford, and took a first class in classics (1811). Called to the bar in 1818, he twice held the chair of political economy at Oxford (1825-30 and 1847-62), was appointed a poor-law commissioner (1832), as such having a large share in the Poor-Law

of 1834, and was a Master in Chancery (1835-53), examiner in political economy at the London University, and a commissioner of national education. S. travelled much, the fruits of his travels being Journals kept in Turkey and Greece (1859), in Ireland (1868), and in France and Italy (1871). His social position, too, gaining him entrance to the best literary and political circles of Parisian society, a natural aptitude enabled him to reproduce the opinions of many leading French statesmen and authors in his note-books, selections from which have been edited by his daughter, Mrs. Simpson, under the title *Conversations with Thiers, Guizot, and other Distinguished Persons during the Second Empire* (2 vols. Lond. 1878), and form a work of the greatest political value. S. died at Kensington, 4th June 1864. Amongst his other works were a *Treatise on Political Economy*, reprinted from the *Encyclopædia Metropolitana* (1853), *Biographical Sketches* (1863), *Essays on Fiction* (1864), and *Historical and Philosophical Essays* (2 vols. 1865), collected from the *Edinburgh* and other periodicals.

Senlis (Lat. *Civitas Sylvanectensium*, 'the town of the dwellers in the woods'), a town of France, department of Oise, 33 miles N.E. of Paris by rail, is picturesquely situated on a small hill on the river Nonette. It has a small but beautiful Gothic cathedral, and a chateau of the time of St. Louis, as well as several Roman remains. The inhabitants are principally employed in weaving, spinning, and lace-making. Pop. (1876) 6545.

Senn's. This important drug is simply the dried leaflets of various species of the large leguminous genus *Cassia* (q. v.). The medicinal species are shrubs, undershrubs, or herbs, with pinnate, non-glandular leaves of unequal-based leaves, flowers in axillary racemes, pods flat, broad, arcuate, and dehiscent. They are natives of tropical Africa—three species extending to N.W. India, and two reaching also to the dry belt of S. India. Tinnevely, E. Indian, Somali or Aden S. is obtained from *C. angustifolia* of Vahl (*C. elongata* of Lemaire), a bushy herbaceous plant with five to eight pairs of narrow ovate-lanceolate leaflets. Alexandrian S. is in part the produce of *C. acutifolia* of Delile, and in part that of *C. obovata* of Colladon, the first an undershrub with lanceolate acute leaflets, indigenous or spontaneous in N. and tropical Africa and S.W. Asia, and the latter a diffuse procumbent perennial herb with glabrous, obovate, obtuse leaflets in three to seven pairs, native of tropical Africa and India. Tripoli S. is the yield of *S. Æthiopica* of Guibourt. *C. holoserica*, occurring in Abyssinia, Nubia, Arabia, and Scinde, furnishes a portion of both African and Indian S.; indeed, it generally happens that there is a mixture in the imports of S., not only of the leaves of different valuable species, but of stalks and pods, and designed or worthless substitutes, such as *Solenostemma Argel*, *Tephrosia Apollinea*, *Globularia Alypum*, and *Colutea arborescens*. In addition to the kinds of S. included in the British Pharmacopœia, that of the United States has an officinal *C. Marilandica*, or American S. It is used as a purgative, but is only about half as powerful as Alexandrian S. The pulp, which fills the long pods (12 to 24 inches) of *C. Fistula*, a common forest tree of India, is largely used as a laxative in Europe, and enters extensively into native medicine. It has been introduced into tropical America. In S. America the pulp of *C. Brasiliana* answers a like purpose. Several of the Australian desert cassias of the *C. artemisioides* group will probably prove to possess medicinal properties, as the odour of their foliage assimilates to that of S. The most important preparations of S. are a confection, an infusion, a syrup, and a tincture. It is considered an 'admirable cathartic, stimulating the peristaltic action, and affecting chiefly the small intestines. Its action, however, is frequently attended with nausea and griping, but less so if combined with a saline purgative,' and a little ginger, coriander, or anise corrects the griping property. *Colutea arborescens*, a native of the Mediterranean region, has large membranous inflated pods and S.-like leaves, possessing purgative properties—hence the shrub is called Bladder-S., and its leaves are sometimes mixed with S. proper.

Sennaar, a region of Upper Nubia, lying between the Athara river and White Nile, and intersected by the Bahr-el-Azrek, or Blue Nile. Formerly an independent Negro state, it was forced to acknowledge the authority of Mehemet Ali in 1820, and has ever since been in vassalage to Egypt. Its capital, also called S., had once a large and flourishing trade, but is now a mean place

of 4000 inhabitants, while the trade of the region is centred in Khartum (q. v.).

Sennacherib, a king of Assyria (q. v.), son and successor of Sargon, reigned from 705-681 B.C. He engaged in a great war against Phœnicia, Egypt, and Judea. During this expedition his army was in some mysterious way utterly destroyed. The defeat is described in 2 Kings xviii. and xix. as occurring apparently at Libnah; it is referred to in Josephus' *Antiquities* (x. 1), while Herodotus (ii. 141), probably reporting the Egyptian version, places the scene of the disaster at Pelusium on the Egyptian border, ignores Judea and Hezekiah altogether, and transforms the 'angel of the Lord' who smote the Assyrians into 'a number of field mice,' who, 'pouring in upon their (the Egyptians) enemies, devoured their quivers and their bows, and moreover the handles of their shields;' but it is not noticed in the Assyrian inscriptions, which describe only the victories of S. and the splendid palaces he erected. He died at Nineveh by the hands of his two sons, while he was praying in the temple of Nisroch. See George Smith's *Assyrian Explorations and Discoveries* (6th ed. Lond. 1877). Dr. Zeinhardt Hornig (1878) published the two most important inscriptions of S. known as the Taylor Prism and the Bellini Cylinder with a new translation, a commentary on the yet uninterpreted passages, a glossary, and the original cuneiform text.

Sens (Lat. *Civitas Senonum*, 'the town of the Senones'), a town in the department of Yonne, France, on the river Yonne, 70 miles S.E. of Paris by the Lyon railway. It is the seat of an archbishop, has a fine Gothic cathedral (completed 1184), a public library, important archives, a handsome theatre, an orphanage and hospitals, and has been the seat of several ecclesiastical councils. The neighbourhood abounds in Roman remains. S. has manufactures of small articles of hardware and of boots, and is the centre of a great corn, wine, wool, and timber trade. Pop. (1876) 12,309.

Sensation (in physiology), the term applied to the effects produced on the nerve-centres by impressions derived from without or within. In order that S. may be received and acted upon, three conditions are required. There must exist, 1. a *sense organ* at the external surface of the organism, for the reception of *impressions*; 2. a *special or sensory nerve* is required for the conveyance of the impression to, 3. the *nerve-centre*, where the impression becomes transformed into a *sensation*. S. may be divided into *common* and *special*. The former comprises those sensations which may be referred to the body as a whole; e.g., faintness, discomfort, itching, &c. *Special* sensations are the result of the action of certain organs adapted to receive impressions of one kind and no other. Thus the eye, ear, nose, and tongue may be called the seats of *special* sensations, since in each case the impression made gives rise in the brain to a *special* sensation, while each organ of special sense can appreciate one kind of impression alone. The eye is only sensitive to light-waves, and the ear similarly receives impressions of sound alone. Common sensations afford no information regarding ourselves, while special sensations supply us with a knowledge not only of ourselves, but of the external world. The *sensorium* or *brain* is the true seat of S. When we speak of seeing with the eye or hearing with the ear, our words are physiologically incorrect, inasmuch as the organs of sense are the mere 'gateways of knowledge,' and simply receive and transmit in appropriate form to the brain the impressions which in the brain give rise to corresponding sensations. We truly see and hear with the brain only.

Among the *internal* causes which affect S. may be mentioned the important effects of defective, increased, or abnormal circulation of blood through the brain, and the action of certain poisons which produce peculiar subjective sensations by the irritation of various parts of the sensorium. *External causes*, such as electrical stimulus, violence, and unusual sounds, also produce varying and peculiar effects in our sensory apparatus. All sensations, however, are liable to modification by training or neglect.

S. (in metaphysics) is a special form of feeling, as perception is a special form of knowledge, and is the recognition in consciousness of affections of the Ego by the Non-Ego. If a man smell a rose, he is conscious of an agreeable scent—is conscious of a S. If he attribute the scent as a quality to something external, he adds perception to S. There is a

every perception a subjective before an objective element. The relation of perception proper and S. proper towards each other has been shown by Kant to be such that they co-exist in the inverse ratio of each other. And thus it is that sensations upon which minimum attention is bestowed, while maximum attention is given to their concomitant acts of perception, are the best remembered. What has been seen is better remembered than what has been tasted. Sensations are popularly supposed to be given us by means of the five senses, but psychology reduces all five to a sense of touch. Everything made known by S. and perception must come into actual connection with an organ of sense. When we say that we perceive the sun, we speak of the result of a process of reasoning: what we really perceive is only a certain combination of rays of light, and what we have a S. of is only the impingement of these rays on the organ of vision.

Senses, the name given to the organs by which in higher animals a knowledge of the outer world is acquired. They are merely specialised parts of the nervous system, adapted for the reception and transmission to the brain of impressions of a special kind. Man's S. are regarded by physiologists as six in number; viz., Touch, Taste, Smell, Hearing, Sight, and the Muscular Sense, or Sense of Weight. All the S. are but modifications of touch, material contact of the sense-organ with the impressions it is destined to receive, being necessary for the exercise of each. Thus taste and smell each implies direct contact of the sense-organ with the particles of the matter to be tasted and smelt. There must be material contact of the light-waves with the retina of the eye before the sense of sight is produced; and the vibrations of the tympanum of the ear represent the direct effect of sound-waves in producing the impression of sound.

Sensibility, the term used to indicate the degree or acuteness of sensation in various organs or tissues. It is well illustrated by E. H. Weber's experiments, in which the points of a pair of compasses sheathed in cork were used to test the varying S. of different parts of the body. In these experiments the tip of the tongue perceived the two points of the compass when they were separated to the extent of $\frac{1}{4}$ th of an inch only. The next most sensitive surface was the under or palmar surface of the tip of the forefinger, where two points were felt when the points were separated to the extent of $\frac{1}{8}$ th of an inch. The under surface of the second joint of the fingers felt the two points when they were separated to $\frac{1}{4}$ th of an inch; the mucous membrane of the under lip $\frac{1}{4}$ th of an inch; the tip of the nose $\frac{1}{4}$ th of an inch; the middle of the tongue $\frac{1}{4}$ th of an inch; palm of hand $\frac{1}{4}$ ths of an inch; centre of hard palate $\frac{1}{2}$ of an inch; dorsal surface of first joint of fingers $\frac{1}{4}$ th of an inch, and back of hand $1\frac{1}{4}$ inches; back of neck 2 inches; middle of thigh $2\frac{1}{4}$ inches.

Sensitive Plant, a name given to several plants from the motion displayed by their leaves under mechanical and other stimuli. The common S. P. of hothouses is a tropical American annual named *Mimosa pudica*. Its bi-pinnate leaves are united to the stem by an articulation, as also are the four or six pinnae to the primary petiole, and the separate leaflets to their petiole. If the leaves are gently stroked by the hand, a general collapse of the leaflets takes place, and the leaf is bodily dejected. If the small cushions at the joints be touched with a point, the effect of the irritation is shown by the systematic closing of the leaflets, followed by the converging and drooping of the pinnae and succeeded by the declination of the petiole. It is necessary, however, for this phenomenon to occur, that the temperature of the surrounding air be about 70-90° F. The S. P. closes its leaves spontaneously in the evening. The sensitiveness serves as a protection against the foliage being devoured by insect larvæ.

Sensorium, or **Sensory Ganglia**, a general name given to the brain, or to any series of nerve-centres, in which impressions derived from the outer world become localised, transformed into sensations, and thereafter transferred by reflex action (see NERVE) to other parts of the body. The term S. has sometimes been specially applied to indicate the series of organs in the brain, connected with the receipt of special impressions derived from the organs of sense. Thus, the *olfactory lobes*, *optic lobes*, *auditory ganglia*, &c., form parts of the typical S. in this latter sense. Dr. Carpenter's theory of the S. con-

sists in his recognition of the sensory ganglia as constituting the real S. He maintains that by means of these ganglia the mind becomes conscious of impressions made on the organs or parts with which they are directly connected by their special nerves. The older physiologists held the theory of a *S. commune*, which extended throughout the entire nervous system. Professor Cleland of Glasgow thinks the only tenable theory yet brought forward is that which maintains, 'that while consciousness is dependent on the encephalon (or brain), the S. extends thence, so far as there is, at any moment, unbroken continuity of nerves in the active or impressed condition.'

Sensory Impressions. See SENSATION and SENSORIUM.

Sentences, the verbal expression of thought or propositions, consist, according to grammarians, of two parts, the subject and the predicate, *i.e.*, the thing thought of and what is thought of it. A Simple sentence contains but one subject or nominative, and but one predicate or verb, as 'Time flies'; but both subject and predicate may be enlarged by the addition of any number of modificatory words, so long as these do not form an independent sentence. Thus to the nominative may be tacked on an adjective, participle, appositional noun, &c.; to a verb an adverb, or, where it is transitive, an object, *e.g.*, 'Winged time flies quickly,' or 'William the Conqueror invaded England.' A Complex sentence also has but one main subject and predicate, but contains two finite verbs, that part of it in which the main subject and predicate occurs being called the principal, the other the subordinate clause, as 'I know (principal) that he is dead (subordinate)'. Subordinate clauses, again, are variously termed nominal, adjectival, or adverbial, according as they represent a noun, adjective, or adverb, *e.g.* 'That he is dead is certain' = 'his death is certain' (nominal); 'The man that is wise prospers' = 'the wise man prospers' (adjectival); and 'He came as the sun rose' = 'he came at sunrise' (adverbial). Lastly, Compound S. contain two or more co-ordinate assertions, any one of which might have been made by itself, as 'Man dies, but God is immortal.'

Sentinel, **Sentry** (It. *sentinella*, from *sentire*, 'to hear' or 'perceive'), a soldier on guard. Sentries are placed before as depôts and guards, at tents and quarters of commanding officers, and at special places as required. At night a password must be given before the sentry allows any person to pass. In war, picket sentries are usually double, and only one person is allowed to approach at a time. Mounted sentries in outposts are called vedettes.

Senza Sordino, a direction in music denoting in the case of a violin that it is to be played without the mute. In pianoforte music *senza sordini* denotes that the dampers are to be removed, which is done by pressure of one of the pedals.

Sepal. See CALYX.

Separate Estate, is the legal term denoting the property of a married woman, which she holds independently of her husband. As the legal doctrine is that a woman cannot hold property independently of her husband, the difficulty of her doing so can only be overcome by her divesting herself of her estate previous to marriage, and vesting it in trustees for her behoof. Such a deed is called a *Contract of Marriage* (see CONTRACT). It usually contains stipulations relative to life-rents, children's interests, &c.

Separation of Married Persons. For relative English law, see JUDICIAL SEPARATION, DIVORCE. In Scotland, in case of cruelty or desertion on the part of a husband, the Court of Session may, on the wife's petition, grant decree of separation, and find the husband liable to support her during its subsistence. Neither in England nor in Scotland are husband and wife entitled to live apart unless by common consent, or by decree of a court of law. See CONJUGAL RIGHTS, SUIT FOR RESTITUTION OF.

Sepia, a genus of ten-armed *Dibranchiate* cuttlefishes, of which the *S. officinalis* of the Mediterranean Sea and elsewhere is the best-known example. The *S. officinalis* is occasionally captured on British coasts. The eggs are aggregated in masses, looking like grapes, and are hence popularly known as 'sea-grapes.' The colour is a whitish brown, with dark-brown stripes on the back.

Sépia is India Ink (q. v.) browned by the action of an alkali, and is much used by draughtsmen and artists. India or China ink is of two kinds—(1) the dried pigment of the *S. officinalis*, or Mediterranean cuttle-fish, prepared chiefly in Italy and Turkey; (2) a mixture of fine lamp-black with glue or size and a little camphor, the genuine qualities of which are imported from Japan and China. Both of these kinds are used generally in Asia as writing inks, and both are practically indelible.

Sépoï (a corruption of *sipáhi*, 'an archer,' the 'spáhi' of Ottoman and Algerian armies), a word used to denote the native soldier, whether Hindu or Mahomedan, in the Indian army. For an interesting sketch of the early history of this army, see Sir John Kaye's *History of the Sepoy War* (vol. i.). In 1875, the native army in British India numbered 123,862 officers and men, of whom 63,000 belonged to the Bengal establishment, 34,000 to Madras, and 26,000 to Bombay.

Septaria are flattened calcareous nodules, which have been formed round some organic remain as nucleus in a clayey deposit, such as London clay or Kimmeridge clay. Formed, probably, when wet, the nodule has split from the centre outwards into radial fissures as it dried; and into these fissures carbonate of lime, sulphate of baryta, or a similar mineral, has subsequently found its way. Hence a transverse section of such a nodule presents a reticulated radial appearance. For this reason S. are sometimes cut and polished for ornamental purposes; but their chief use is to be ground down, after burning, into hydraulic lime.

Septem'ber, the seventh month of the Roman calendar (hence its name) and the ninth of the Gregorian, has 30 days. On the 21st the sun enters Libra, and autumn begins (to the astronomer). This is also the date of the autumnal Equinox (q. v.). Michaelmas falls on the 29th of this month. Partridge-shooting begins on the 1st. In S. the English harvest is usually finished; hence the Old English name *haerfest-mónáth*, 'harvest-month.' Its other name, *hálig-mónáth*, 'holy month,' was a survival from heathen times, S. being a month in which gifts were offered to the gods.

Septem'brists or **Septem'brisers** (Fr. *Septembriseurs*), a name applied to the perpetrators of the massacres in the Paris prisons, which lasted from 3 o'clock on Sunday the 2d September 1792 until the evening of the following Thursday, a hundred hours in all, with scarcely any intermission. They were caused by the frenzy into which the people were thrown by the successes of the invaders on the frontier and the insurrection in La Vendée, heightened by wild rumours of plots on the part of the aristocrats confined in the prisons to burst out, take the king from the Temple, and restore him to power. Matters were brought to a crisis by a premature rumour that Verdun had fallen into the hands of the Prussians. Thirty non-juring priests were being removed from the Hôtel de Ville to the prison of the Abbaye. At its gates the carriages conveying them were seized by the mob, and all, with the exception of one, were massacred. This was the beginning of the work of slaughter, which spread from the Abbaye to the Conciergerie, the Châtelet, the St. Firmin, La Force, the Salpêtrière, and Bicêtre, where the forgers of assignats were confined. In the courtyard of each a sort of tribunal was established, before which the prisoners were brought one by one. If, in the few minutes allowed for defence, they succeeded in freeing themselves from all suspicion of Royalism, they were dismissed with a cry of '*Vive la Nation!*' If, as was generally the case, they could not do so, they were thrust out at the gates, where a savage multitude was in waiting, armed with sabres, axes, and pikes to cut them down. The authorities made some feeble attempts to restrain the carnage. Roland protested, and Pétion harangued, but without more than momentary effect. Billaud-Varennes, on the other hand, encouraged the populace, promising a reward to every one who had 'worked' in the prisons, and the Hôtel de Ville registers showed that nearly £700 had actually been paid 'to workers employed in preserving the salubrity of the air in the prisons, and persons who presided over these dangerous operations.' The numbers massacred have been estimated by Royalist horror at from 6000 to 12,000, but the actual number, according to the lists drawn up by Advocate Maton, was 1089. Of all the victims, the most distinguished was the beautiful Princesse de Lamballe, the favourite of Marie Antoinette, who was

murdered with ghastly indignities. The hero of Thackeray's *Chronicle of the Drum* describes her death, telling how 'he drummed for a gallant procession that marched with her head on a pike.' It is still a disputed point whether the massacres are to be ascribed to the direct influence of Marat, but it is probable that they were rather a spontaneous outburst of popular frenzy, though that incomparable scoundrel doubtless approved and encouraged them. See the various authorities quoted in Carlyle's *French Revolution*, vol. 2, chap. iv., headed 'September in Paris.'

Septicæ'mia. See PYÆMIA.

Sép'timole, in music, seven notes grouped together to be played in the time of four or six according to the measure.

Septuagesima (Lat. 'seventieth') is the Sunday coming next after the last in Epiphany (q. v.), properly the sixty-third day before Easter. The name, like Sexagesima and Quinquagesima, the two following Sundays, is doubtless formed after the analogy of Quadragesima (q. v.).

Septu'agint (Lat. 'seventy'), the Greek translation of the Hebrew Scriptures, was so called either because it was approved and sanctioned by the Sanhedrim (q. v.), or because, according to tradition, seventy-two men were employed on the translation. The stories which have passed current regarding the origin of the S. are derived chiefly from a letter which professes to have been written by Aristeas, a Greek at the court of Ptolemy Philadelphus. This letter, however, the story of which was further embellished by Philo, Josephus, and the Christian Fathers, Justin Martyr, Irenæus, &c., is now believed to be a forgery written not long before the time of Christ. Still it probably indicates what was the tradition of the time regarding the origin of the S. Hence it is thought probable by scholars that the translation was actually begun under Ptolemy Philadelphus (B.C. 284-247), and pushed forward by Demetrius Phalereus, as the pseudo Aristeas represents, since this is confirmed by the independent testimony of Aristobolus, a Jewish philosopher in Egypt in the beginning of the 2d c. B.C. But Demetrius was keeper of the Alexandrian Library only under Ptolemy Lagus, having been removed by his son and successor, P. Philadelphus, and therefore it is supposed that it must have been in the last year of the reign of P. Lagus, during which it is known that he assumed his son into co-regency with him; *i. e.*, B.C. 285-84.

Internal evidence does not confirm the story of Aristeas that the translation was made by Palestinian Jews, but rather indicates that it was made by Alexandrian Jews from a text of their own. This appears from the S. agreeing much more with the Samaritan than with the Hebrew Pentateuch, and from its showing a very intimate acquaintance with Egypt and Egyptian institutions. Moreover, scribes with an adequate knowledge both of Greek as well as Hebrew could not have been found at the time in Palestine, but only in Egypt. All that was translated at first was the Pentateuch. The other canonical books were also translated in Egypt, which appears to have been done before the time when the preface to Ecclesiasticus was written (B.C. 130). Several of the books—Jeremiah, Job, Proverbs—show important variations from the canonical Hebrew text. Esther and Daniel have important apocryphal additions; (E. Vulg. x. 4-xvi. 24; D. Vulg. iii. 24-90, xiii., xiv.). At first the S. was regarded by the Jews as an authentic and even inspired version of their Scriptures. But when, after the 1st c. A. D., controversies arose between them and the Christians, and the latter appealed to it, the Jews discovered that it differed from their own canonical Scriptures, and it gradually became odious to them. In the Christian Church it was held to be equally inspired with the Hebrew text; and up to the end of the 4th c. all the Latin translations of the Old Testament had been made from it. It was in order to place Christians on a level with the Jews that Origen undertook a comparison of the S. with the Hebrew text in his famous Hexapla (q. v.). The chief MSS. are the *Codex Alexandrinus* (British Museum), *Codex Vaticanus* (Rome), and *Codex Sinaiticus* (St. Petersburg), none of which are later than the 6th c. The best edition of the S. is that of Tischendorf (5th ed. Leip. 1875). See Frankel's *Historisch-Kritische Studien zu der S.* (Leip. 1841).

Sepulch'ral Mound. See BARROW and CAIRN.

Sequestra'tion is, in law, the setting aside from both parties to an action, or suit, the subject of controversy. It is also a

kind of execution for debt, in the case of a beneficed clergyman; the profits of the benefice being paid over to the debtor until his claim be satisfied. The profits of a benefice may also be sequestrated during a vacancy, and received by the churchwardens appointed by the bishop for the benefit of the next incumbent. S., in Scotch law, is the equivalent term to *Adjudication* (q. v.) in *Bankruptcy* (q. v.).

Se'quin (Ital. *sachino*, from *secco*, 'a mint'), the name of a gold coin first struck at Venice towards the end of the 13th c. In size it resembled a ducat, and in value was equivalent to 9s. 4d. sterling. Florence, Genoa, the Papal States, and other places, issued similar coins.

Seraglio (Ital., a corrupt form of the Pers. *serdi*, 'a palace'), the palace of the Sultan, occupying a point of land between the Golden Horn and the Sea of Marmora, and forming the eastern portion of the city of Constantinople. It is surrounded by walls nearly 3 miles in circuit, and contains government buildings (divan, treasury, hall of justice, arsenal, mint, &c.), mosques, gardens, baths, as well as the Sultan's *harem* (Arab. 'sacred place'), which occupies its inner enclosure, and consists of a group of houses and gardens, each occupied by one of the Sultan's wives. The court of the harem is guarded by the black eunuchs, under their chief, the *kislar aga*. The gate of the outer court forms a sort of pavilion, from which the Turkish government takes its name of 'the Sublime Porte.' The S. was destroyed by fire in 1878. With the exception of the harem, the S. may be visited by strangers. It has accommodation for 20,000 persons, though it never contains that number.

Seraing', a thriving town of Belgium, province of Liège, on the right bank of the Maas, 6 miles S. W. of Liège by rail. It is connected by a suspension-bridge with Jemappes on the opposite side of the river. S. is famous for its extensive machine-factories and smelting-furnaces, established here in 1816 by an Englishman named John Cockerill, and which have belonged, since 1840, to a joint-stock company called *La John Cockerill Société*. They give employment to 9000 men, and produce annually 100 locomotives, 70 ships' engines, 1500 other engines, and cast-iron articles to the weight of 6000 tons. In 1877 this company did business to the amount of £1,378,000. Pop. (1877) 24,315.

Sera'jevo. See BOSNA-SERAI.

Serajunge (*Serajganj*), a town in the district of Pubna, Bengal, British India, on the right bank of the Brahmaputra river (or Jamuna as it is here called), 153 miles N. E. of Calcutta. Pop. (1872) 18,375. The houses are 6 miles from the low water channel of the river, separated by a sandy plain, and the river landing-places shift every flood-season. S. was founded about the beginning of the century, and is now the chief river-mart in Bengal, having risen with the growth of the jute trade. It collects jute, rice, oilseeds, tobacco, &c., from all the neighbouring districts for despatch to Calcutta, and distributes piece-goods, salt, sugar, iron, hardware, &c. The trade is entirely water-borne. The steamers of the E. Bengal Railway Company carry away about 50,000 tons of jute annually, and native boats nearly twice as much. The branch of the Bank of Bengal requires £400,000 a year in coin to adjust the balance of trade. There are as yet no jute presses, but the S. Jute Company employs 1200 hands in weaving gunny, or jute cloth for bags, which is exported to the value of £120,000 a year. In 1876-77 the total value of the export and import trade was more than 3½ millions sterling.

Serampore', a town in the district of Hoogly, Bengal, British India, on the right bank of the Hoogly river, opposite the cantonments of Barrackpore, 18 miles N. of Calcutta. Pop. (1872) 24,440. It was originally a Danish settlement, but was purchased by the British in 1845. The Baptist missionaries, Carey, Marshman, and Ward, established themselves here at the end of the last century. It is a peculiarly neat and clean town, and being now connected by rail with Calcutta (or rather with Howrah), is a favourite resort and country residence. It is well known as the place of issue for many years of *The Friend of India* newspaper, and for the manufacture of excellent paper.

Serape'um (Gr. *Serapeion*), the house, temple, or grave of Serapis (q. v.). Of these there were several. The two most famous were—(1) The splendid S. at Alexandria, which contained

the Alexandrian Library (q. v.), and which was destroyed by fire in 391 A.D. (2) The vast collection of temples to various gods at Memphis, which went under the general name of S., and which contained among other things the long subterranean galleries where the mummies of the sacred bulls had been deposited for more than 1000 years. They were brought to light by the excavations of M. Mariette in 1850, and many interesting relics are now in the Louvre. See Mariette's *S. de Memphis* (Par. 1856).

Ser'aphim, according to Isaiah vi. 2-6, were creatures with hands, feet, six wings, and a human voice. The traditional view, which originated with Dionysius the Areopagite (q. v.), is that they are an order of angels, being the chief of the nine choirs. With this corresponds the derivation of the name from *saraph*, 'to be high,' as if the S. were princes. But recent Assyrian discoveries have enabled us better to understand Oriental symbolism, and a little attention will satisfy any one that it is in the New Testament that angels are first represented as properly winged creatures. The wings in Isaiah were purely symbolical. The S. were God's messengers between heaven and earth. In short, the Cherubim (q. v.) and the S. originally symbolised, the former storm-clouds, which concealed the Deity, or winds, and the latter the lightning (cf. Ps. civ. 3, 4). Curiously it is *fire* from God's altar that one of the S. brings to Isaiah, fitting him thus to be a messenger for Jehovah. With this corresponds the derivation from *saraph*, to burn, making the S. 'the burning' or 'shining ones.'

Ser'aphine, a keyed musical instrument which preceded the harmonium. The sounds, which were unpleasant in tone, were produced by free reeds.

Ser'apis, or **Sara'pis**, the Greek name of a deity whose worship was introduced into Egypt from Sinope in the reign of Ptolemy I. His previous history is unknown. While some derive the name from *serpens*, which would point to an Aryan origin, Plew considers S. was a Babylonian deity. When the image reached Alexandria it was examined by Manetho, who identified the god with Osiris (q. v.) and Apis (q. v.) combined, and hence the name S. His worship soon spread throughout Egypt. He appears to have been a sort of Pluto, or god of Hades. Latterly his character changed, and he was sometimes identified with the sun-god. Still the worship of S. steadily extended in Asia Minor and Greece, his temples and images multiplied, and in 146 A.D. Antoninus Pius introduced the *cult* into Rome. Perhaps his popularity depended on the secret rites with which his worship was accompanied. These, however, were so licentious that the Roman Senate soon prohibited them. The worship of S. continued in Egypt, survived the establishment of Christianity, and the image of the god was not destroyed till 398 A.D. See Plutarch, *De Irid.*; Tacitus, *Hist.* iv. 82, *et seq.*; Wilkinson's *Manners and Customs of the Ancient Egyptians*, vol. iv.; Plew, *De Sarapide* (Königsberg, 1868).

Seraskier (Pers. *seri-asker*, 'leader of the army'), the Turkish title for all generals of high rank, but especially for the Minister of War. Hence the name *Seraskierate* for the War Office at Constantinople.

Serenade (Ital. *serenata*), originally a piece of music performed in the open air at night when the weather is 'serene' (hence the name). It is often a song with the accompaniment of a guitar. Even yet, Spanish lovers salute their mistresses in this fine fashion. The term *serenata* is also applied to a pastoral composition partaking of the symphony form.

Ser'es (anc. *Siris*, or *Sirra*; Mid. Ages, *Serrha*), a town of European Turkey, in the vilayet of Saloniki, on a tributary of the Strymon or Karassu, 45 miles N. E. of Saloniki, lies in a wide and fertile plain containing upwards of 300 villages, is the seat of a kaimakam and a Greek archbishop, and is the most important trading town in the interior of Macedonia. S. has a castle, numerous mosques, Greek churches, baths, benevolent institutions, manufactures woollen and cotton goods, gourd-shaped water-flasks, and exports cotton, rice, tobacco, and grain. Pop. 30,000.

Sereth', a tributary of the Lower Danube, rises in the Bukovina, on the N. slope of the plateau between the Carpathian Mountains and the Transylvanian highlands, flows first N. then E. through the Bukovina, and S. S. E. through Moldavia, finally reaching the Danube at Galatz after a course of 410 miles.

Serf. See SLAVERY.

Serge, a rough variety of twilled cloth made with hard spun worsted yarn.

Sergeants (from Lat. *serviens*), non-commissioned officers in the army above the rank of corporal. Their duties are to aid the commissioned officers in maintaining discipline and order, and in instructing the soldiers. Staff S. include the S. employed in various military departments, the serjeant-majors of regiments, quartermaster sergeant, sergeant instructors of musketry, armourer sergeants, &c. The other S. in regiments are called regimental sergeant. The serjeant-major is the highest non-commissioned officer in a regiment, and a colour-sergeant is the senior of the four S. which go to each company. The pay of a sergeant is from 2s. 1d. to 5s. 1½ per day.

Sergeants-at-Arms are legal functionaries whose duties are to attend the royal person, to arrest offenders of a certain rank, and to attend on the Lord High Steward of England during trials for treason. Two of them attend on the Houses of Parliament. They are in the old books called *Virgatiaries*, because they carried silver rods gilt with gold. In place of these they now carry maces.

Sergeanty, Grand, under the English feudal system, a tenure by which the tenant was bound to pay to his king some special honorary service in person, *e.g.*, to bear his sword or banner, to act at the coronation as his champion or cup-bearer. By *Petty Sergeanty* the owner has to present the king with some such implement of war as a spear, dagger, &c. The former tenure was preserved by 12 Car. II., and the latter survives in the case of the estates of Blenheim and Strathfieldsaye, presented by the nation—their holders, the Dukes of Marlborough and Wellington, having yearly to give the king a small banner.

Sergijevskij Possad', a market-town in the Russian government of Moscow, 42 miles N.N.E. of the city of Moscow, is noted as the seat of the very rich Trinity monastery named *Troisa Laura*, whose possessions, before the abolition of serfdom, included 100,000 'souls,' for whom it received an enormous commutation. Pop. of S., with the surrounding district (*St. Petersb. Cal.*, 1878) 27,471.

Sergipe, a Brazilian province, included between the province of Bahia and Alagoas and the Atlantic. Area, 12,035 sq. miles; pop. (1872) 161,307. It consists of two regions, of which the eastern and smaller is low, moist, and fertile, and produces sugar, cotton, and tobacco; the western is mountainous, devoted to cattle-raising, and possessed of considerable mineral wealth. In the financial year 1875-76 the imports amounted to 35,297 reis, the exports to 1,483,419 reis. The capital is S. d'el Rei; pop. 9000.

Seringapatam' (Srirangapatna), a town in the district and state of Mysore, India, at the W. or upper end of an island in the Cauvery, 75 miles S.W. of Bangalore and 10 N.E. of Mysore. Pop. (1871) 10,594. S. was the capital of Mysore from 1610 until 1811, when the troops were moved to Bangalore, on account of its unhealthiness. It had been most strongly fortified by Hyder Ali and Tippoo Sultan, the latter of whom was killed when the town was captured by storm by General Harris in 1799. The fortifications are still standing, but the spot is now almost desolate. The inhabitants mostly live at the trading suburb of Ganjam. The whole island, 3 miles long by 1 broad, was ceded to the British, and is now leased to the State of Mysore for £5000 a year. The buildings include an ancient Hindu temple, a mosque, a summer palace, adorned with restored paintings representing the defeat of the British by Hyder in 1780, and a mausoleum where both Hyder and Tippoo lie buried. A religious gathering or fair, held annually on the island, is attended by pilgrims from all parts of India.

Seringham (Srirangam), an island formed by the branching of the Cauvery river, almost opposite the town of Trichinopoly in S. India, about 80 miles in a direct line from the Coromandel or E. coast. It is 20 miles long by 2 wide at the broadest, and was an important military position during the wars against the Frenchman Dupleix (1749-63). At its lower end is an *anicut* or weir, 1080 feet long and 40 broad, constructed for irrigation purposes by a Hindu prince 1600 years ago. In the same neighbourhood are the irrigation works of Sir A. Cotton. The town of S., at the upper end of the island, is beautifully situated

within four walls. Pop. (1871) 11,271. It is celebrated for a square pagoda, covering an area of 4 sq. miles, and composed of seven separate enclosures, which is the most frequented and wealthy shrine of Vishnu in S. India.

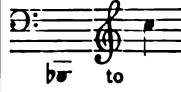
Serinuggur' or Srinagar'. See CASHMERE.

Serjeant-at-Law'. Counsellors at the English bar are divided into barristers (see BARRISTER) and serjeants, the latter having precedence, but no other privilege. A S.-at-L. is created by patent from the crown.

Serous Membranes and Serum, a class of secreting membranes well represented by the *Pleura* (q. v.), *Peritoneum* (q. v.), *Pericardium* (q. v.) of man and the higher animals. The S. M. form shut or closed sacs, and thus consist each of two layers—one layer, the *visceral*, lying next the organs invested by the membrane; the other, or *parietal* layer, being the external or outer part of the membrane. Between these two layers a cavity is enclosed. The *endothelium*, a delicate lining of cells found on the inner surfaces of S. M., consists of a single layer of *polygonal* cells. These cells are flattened, and are developed from the *mesoblast*, or middle of the three layers of which the embryo at first consists. The endothelial cells are *nucleated*, and occasionally may develop *cilia*. In the peritoneum, certain of the endothelial cells exhibit small orifices or *stomata*, comparable in some respects to the openings of the same name found on the under surface of leaves. The stomata are the beginnings of *Lymphatic Vessels* (q. v.). S. M. may be divided into those which line visceral cavities (*pleura, &c.*), and those which line joints—the latter are *Synovial Membranes* (q. v.).

The S. M. secrete a fluid named *serum* which is almost identical with the *serum plasma* or fluid of the *Blood* (q. v.). Its colour is a pale yellow; and it coagulates on the application of heat. Chemical analysis shows serum to contain water and solids—the latter consisting of fibrin, albumen, extractives and inorganic salts.

Diseases of S. M.—In inflammation of a serous membrane, the fluid effused is not only greater in quantity than natural, but is also greatly altered in quality, containing a considerable quantity of albumen, sometimes a portion of fibrine; and, at other times, pure *liquor sanguinis* may be effused. In general, the serous membrane only shares in a dropsical condition common to other structures, as the areolar or cellular tissue. The more prominent diseases of the S. M. are described in the articles PERICARDITIS, PERITONITIS, and PLEURISY.

Serpent (Ital. *serpente*), a keyed wind-instrument made of wood, covered with leather, curved like a serpent, and fitted with a mouthpiece like a trombone. Its compass is from  and from certain notes being more powerful than others it is difficult to play. The ophicleide is a more manageable instrument of the same kind.

Serpentaria. See ARISTOLOCHIA.

Serpent-Charming, an art practised in Eastern countries from remote ages, and mentioned both in the Old Testament and by classical writers. In Hindostan and Egypt serpent charmers are to this day largely employed to clear houses and gardens of ophidian vermin. They assert that they have a mastery over serpents due to certain constitutional peculiarities and to their use of spells, and in the exhibitions of their art they cause snakes to twine round their bodies, and to perform various movements to the sound of music. Professor Richard Owen has succeeded in proving this 'art' to be merely a rude jugglery by which trained serpents, supposed by onlookers to be discovered and charmed in their presence by the conjuror, are produced by sleight of hand from concealment about his own person. See an article by Professor Owen in *Blackwood* for February 1872.

Serpentine, or **Ophite**, a silicate of magnesia, forming immense rock-masses in various parts of the world, and also frequently occurring in beds and veins. Its composition is represented by the formula $2(\text{MgO}, \text{SiO}_2) + (\text{MgO}, 2\text{H}_2\text{O})$; its hardness is about 3 and its specific gravity varies from 2.5 to 2.6. In colour it may vary from a uniform green or grey to a dark brownish-red, and it is often beautifully veined, striped, or mottled. It is a disputed point whether S. results from the alteration of a volcanic rock, or is due to metamorphic action upon a magnesian limestone. S., though soft enough to be

easily cut or turned, yet admits of a high polish, and is much used for the manufacture of various ornamental articles. The best specimens are obtained at the Lizard Point in Cornwall, and at Portsoy in Banff. Among the varieties of *S.* may be mentioned *noble S.* of a translucent green colour, *marmolite* or *foliated S.*, and *picrolite* or fibrous *S.*

Serpents (*Ophidia*), an order of *Reptilia* (q. v.), characterised by the absence of limbs, the development of scales as an exoskeleton, the want of a sternum or breastbone, the movable nature of the *os quadratum* or *quadrate bone*, and the union through ligament alone of halves of the lower jaw. There is no ossification of the *dermis* as in *Crocodylia*. The length of the body is a marked feature of *S.* The number of vertebrae varies greatly, more than 400 occurring in some of the great pythons. No *sacrum* exists, and there is no distinction between or division of the spine into cervical, dorsal, and lumbar vertebrae. A notable feature is the large number of ribs; almost all the vertebrae, with the exception of the atlas or first, bearing these. The ribs articulate with the transverse processes of the vertebrae, and are not attached inferiorly to any breastbone, but are imbedded in cartilages which are in turn connected with the great scales or *scuta* that cover the ventral surface of the body. The premaxillae are represented usually by a single small bone, which rarely has teeth, and is joined to the maxillae by fibrous tissue only. The floor of the skull is flat, while in front it diminishes greatly in height. The *hyoid* is very rudimentary, and is represented by two cartilaginous filaments, unconnected in any way with the skull. In the pythons a pair of rudimentary hind limbs exists, and traces of a pelvis are also found. Locomotion is effected by the muscular contractions of the body, the animals moving literally on the ends of their ribs. Teeth are borne by the premaxillary bones, by the maxillaries, palatine, and pterygoid bones, and by the dentary part of the mandible. One of the most singular developments of teeth in *S.*, and indeed in the entire animal kingdom, occurs in a little African snake—*Rachiodon*. In this snake, the ordinary teeth are very small, but the lower or inferior spines of some eight or nine vertebrae of the neck are long, and their enamelled tips project into the interior of the gullet, so that when the snake swallows an egg, the brittle morsel passes entire into the gullet, and is broken only when fairly on its way to the stomach. The teeth of *S.* are not implanted in sockets, but become ossified to the surfaces of the bones which bear them. They are replaced when worn away or injured by new teeth developed at the bases of the former ones. The most interesting modification of the teeth of *S.*, however, is in the development of certain of these organs to form the well-known *poison-fangs*. In the typically poisonous serpent (e.g., the rattlesnake) the upper jaw bears two largely developed teeth termed *fangs*. Each fang has a very deep groove running down its anterior aspect, and the margins of this groove are opposed so as to convert it into a canal—hence the fangs are said to be *canaliculated*. This canal opens by a wide aperture above into the poison-gland, so that by the compression, muscular and friable, of the gland, the poison flows down the canal and is ejected, through the lower minute aperture, into the wound made by the fang. The *poison-gland* itself is merely an extraordinary development of one of the *salivary* or *buccal* glands. It does not exist in all *S.*, and when developed lies in front of and below the eye. The poison of different *S.* varies in intensity and virulence, but appears to take effect on the blood. One theory is that snake-poison acts by preventing oxygenation of the red blood-corpuscles. No specific remedy is yet known for snake-bite. The most effective treatment is at once to tie a ligature tightly round the limb, above the wound, and to excise the part freely, and then to suck the blood repeatedly, and cauterise the parts deeply before removing the ligature. If a finger be the seat of a bite, it should be cut off at once. In sucking a poisoned wound, the danger consists in there being a crack or wound in the mouth by which the poison may be absorbed. In cases of serpent bites Professor Halford recommends the injection of ammonia into one of the large veins as near the bite as possible. Professor Fyner, however, states that in wounds produced by *S.* bites in India, when these wounds fairly penetrate the skin, the injection of ammonia into the veins rather hastens death than otherwise, and he regards the plan as positively hurtful. In 1876, 19,432 persons were killed by snakes in India, and 61,229 cattle.

The digestive system of *S.* presents nothing worthy of special remark, save that the intestine ends in a *cloaca* opening transversely. There is no urinary bladder, and the heart (as in all reptilia save the *Crocodylia*) is three-chambered. The lungs are long and cellular, but, as a rule, only one is fully developed. The tongue is bifid at its tip, and is remarkably extensible. The eye exhibits certain notable peculiarities. No true eyelids are developed, and hence the peculiar stony gaze of these reptiles; but the eye is surrounded by scales, attached to which is the transparent *antocular membrane* regarded by some authorities as the united and modified eyelids. Inside the *antocular membrane* a double fold of the *conjunctiva* of the eye is found; and the membrane is periodically shed or cast off with the serpent's skin, the animal being blind until the membrane is renewed. The pupil of the eye is round, but may be vertical, as in the boas and venomous *S.*

S. have been variously classified. In Dr. Gray's arrangement, they are divided into the *Viperine* and *Colubrine* snakes. The former are known by the absence of true teeth in the upper jaw, and by the invariable presence of two canaliculated fangs. In the *Colubrina* there are solid teeth, with or without fangs. The *Viperina* include the Rattlesnakes (*Crotalidae*) and Vipers (*Viperidae*). The *Colubrina* are divided into the (1) *Venenosa* (e.g., cobra, *Hydrophida*, &c.), in which solid teeth lie behind the fangs; (2) *Suspecta*, in which solid teeth lie in front of the fangs; and (3) *Innocua* (*Boa*, *Python*, *Coluber*, &c.), in which fangs are wanting, and solid teeth are found only in the upper jaw. The head in *Viperine S.* is broad and triangular, and a distinct neck appears, whilst in the *Colubrines* the head gradually tapers off into the neck. *Fossil S.* are of relatively recent occurrence. The oldest occur in the London clay, where the *Palaophis soliapicus* is found, and no member of the group is older than the Tertiary period.

Serpents, Fascination by, a kind of mesmeric influence exercised by the rattlesnake, tree-snake, and other reptiles over their prey. Birds, squirrels, even antelopes, unable to resist the fascinator's glance, make no attempt at flight, or will absolutely draw nearer to the serpent's fangs, unless aroused by some sudden cry, or by the intervention of an obstacle. See Ellis, *Three Visits to Madagascar* (Lond. 1858).

Serpukov, a town of Russia, government of Moscow, on the Nara, a feeder of the Oka, 57½ miles S.S.W. of Moscow, by rail. It is now the second town in the government, and has large linen and hemp-weaving, tanning, silk-spinning, and tile-making, besides important trade in corn, fish, wood, and cattle. Pop. (*St. Petersburg. Cal.* for 1878) 16,720.

Serpula, a genus of *Tubicola* (q. v.), or tube-dwelling worms, forming a hard white limy shell, common on rocks and stones at low water-mark. The familiar species is *S. contortuplicata*, the tubes of which are often wonderfully convoluted. From the mouth of the tubes the head of the worm protrudes, furnished with gills and tentacles of a bright red colour. One of the tentacles is conically shaped, so as to close the mouth when the animal has withdrawn into its shell.

Serra'no y Domini'ques, Francis'co, Duque de la Torre, a marshal and statesman of Spain, was born at San Fernando, near Cadiz, November 10, 1810. Entering the army in 1825, he rose rapidly, becoming a general of division before he was thirty. He began his political career in 1841 as a deputy in the Cortes for Malaga. In 1843 he joined Narvaez in effecting the overthrow of Espartero. In 1845 he became a senator, and soon obtained a marked influence over Queen Isabella. In 1847, on the accession of Narvaez to power, he was sent to Granada as Captain-General. He now turned liberal, was banished in 1854 for participation in the insurrection at Saragossa, but returned the same year as a supporter of Espartero and O'Donnell. In the subsequent rupture between these two he sided with the latter. In 1857 he went as ambassador to Paris; and as Captain-General of Cuba in 1860-62 reannexed St. Domingo to Spain, an act which secured him a dukedom. In 1866 he was president of the senate, and strongly opposed Narvaez for the illegal prorogation of the Cortes. At the revolution of September 1868 he joined Prim and Topete, and shortly after became president of the council of ministers at Madrid, and commander-in-chief of the army. On June 16, 1869, he was elected Regent by a large majority; and this

post he held till Prince Amadeo of Italy was prevailed upon to accept the crown (January 2, 1871). S. then became Premier, but resigned in July of the same year; and in April of 1872 he entered the field against the Carlists, with whom he concluded the convention of Amorevieta. On the abdication of King Amadeo, and the proclamation of a republic in February 1873, S. fled to France, but soon returned, and after the *coup d'état* of General Pavia in January 1874, became chief of the executive. He again entered the field against the Carlists, compelling them to abandon their trenches before Bilbao on May 1. In December he once more took command of the Army of the North; but withdrew to Biarritz on the proclamation of Alfonso XII. as king by Martinez Campos (December 28, 1874). He returned to Madrid, however, in the course of a month; but has not since taken any active share in the administration of Spain.

Sertorius, a Roman general, born at Nursia in the Sabine country, in the 2d c. B.C. He fought first in Gaul, distinguishing himself at the battles of the Rhone (105 B.C.) and of Aquæ Sextiæ (102 B.C.). In 97 he was a tribune of the soldiers in Spain, and in 91 he returned to Gaul as quaestor. Although no admirer of Marius, he opposed on principle the aristocratic policy of Sulla, and gave an active support to the Marian party. After Sulla had gone to the East to fight Mithridates, Cinna attempted to rally the routed Marians, and called S. to his side. He answered the call, entered the city with Marius and Cinna, but had no part in the hideous butcheries that followed. He was for a time powerless to stop the torrents of blood that deluged Rome, but after the death of Marius 'he called together the Marian bandits, under pretext of giving them their pay, surrounded them with his trusty Celtic troops, and caused them to be cut down *en masse*' (Mommsen). The return of Sulla, and the crushing defeat in Italy of the popular party compelled S. to carry the war elsewhere. In 82 he left for Spain. Here he attempted to form a new state with the advantages of Rome, but without the personal and racial favouritism which was ruining her. His first efforts had no success. Unable to resist the forces of Sulla, he embarked at New Carthage, and sailed about for some time, half determining to withdraw to the Canary Islands, and live 'free from tyranny and ceaseless wars.' However, after some adventures in Mauritania, he returned to Spain, and soon gathered a powerful army. He won the hearts of the native Spaniards and of the *hybrida* or children of Romans by Spanish wives. Metellus Pius, who was sent against him in 79, was quite unable to do anything. Spain seemed permanently cut off from Rome, and S. the creator of a new state. For the children of Spaniards of quality an academy was erected at Osca (Huesca), in which they received the higher instruction usual in Rome, learned to speak Latin and Greek and to wear the toga. It was the first genuine effort to Romanise a province by assimilation instead of extirpation. In 77 Pompey was despatched with reinforcements. A great battle was fought on the Sucro (Xucar) in 75, but was indecisive, and S. would probably have continued more than a match for open foes. But dissensions arose in his own camp. Many of his officers were proscribed Marians, who, though siding with him politically, were strangers to his pure motives, and filled his camp with petty bickerings. Perpenna especially, a Roman of high birth, desired the chief power. S., meanwhile, had been getting more suspicious, the fickle Spaniards had been wavering, the conspirators took courage and assassinated him at a banquet in 72. 'So ended,' says Mommsen, 'one of the greatest men, if not the very greatest man, that Rome had hitherto produced—a man who, under more fortunate circumstances, would perhaps have become the regenerator of his country—by the treason of the wretched band of emigrants whom he was condemned to lead against his native land. History loves not the Coriolani; nor has she made any exception even in the case of this the most magnanimous, most gifted, most deserving to be regretted of them all.'

Sertularia, or **Sea-Fir**, a well-known genus of Zoophytes (q. v.) or *Hydrozoa*, in which the little *polyrites* or individual animals are contained within horny cups or *hydrothecæ*. The name 'sea-firs' is given to the S. from the fact that in outward appearance, and as they grow rooted to stones and shells, they exactly mimic the aspect of miniature fir-trees. The S. are typical of the order *Sertularida*; and *S. fusca*, *S. cupressina*, and *S. or Diphysia pinnata* are common species.

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Serum. See BLOOD.

Serval (*Leopardus serval*), a species of Felidæ or cats, allied to the Leopard (q. v.), and found in S. Africa, Abyssinia, Algeria, and Senegambia. It is also named the 'tiger-cat,' and 'bush-cat.' The fur is of a yellow colour, with black spots, the under parts being white. The tail is thick and somewhat bushy. The average length is 2½ or 3 feet. The S. is easily tamed.

Servant. See MASTER AND SERVANT, APPRENTICE.

Serveto-y-Reves, Miguel, better known by the Latin form of his name, **Michael Servetus**, was born at Tudela, in Navarre, probably in 1511, of an honourable family from Villanova, in Aragon. He was sent to Toulouse to study law, but was fonder of theology and astrology. The result of his studies was that he became sceptical both of the Roman Catholic and the Protestant theology, being especially dissatisfied with the doctrine of the Trinity. Accordingly he published (Basel 1531) *De Trinitatis Erroribus, Libri Septem*, with its sequel, *Dialogorum de Trinitate, Libri Duo* (Hagenau 1532), and wrote a number of letters on the subject to Calvin, who had been a fellow-student with him at Paris. After this he studied medicine at Paris, and finally settled at Vienne in the practice of that profession. After a period of about twenty years, during which he outwardly conformed to the Romish Church, he printed secretly his *Christianismi Restitutio* at Vienne (1553), in which he promulgated certain Pantheistic theories, and declared that the two grand hindrances to the spread of Christianity were the doctrines of the Trinity and of Infant Baptism. S. had sent a copy of this work to Calvin at Geneva, and through Trie, a French refugee there, who obtained documentary evidence from Calvin, it became known that he was the author of it. He was arrested and was to have been tried by the archbishop's court, but having made his escape, he was only burned in effigy. He fled to Geneva, relying, it is supposed, on the support of the Libertine party, which was defying Calvin at the time. As soon as the latter knew of his presence in the city, he caused his arrest. He was tried before the Senate, a scribe of Calvin's making the accusation, and Calvin and the other preachers controverting his opinions, and having been condemned, he was burned, October 27, 1553. See Rilliet, *Relation du Procès Crim. contre M. Servet, &c.* (Gen. 1844); Tollin, *Charakterbild Michaeli Servet's* (Berl. 1876), and *Lehrsystem Michael Servet's* (2 vols. 1878); Willis, *Life of S.* (Lond. 1877).

Serbia, an independent principality of the Balkan peninsula, in shape resembles a rude triangle, with the Save and Danube dividing it from Hungary for its base, and the sides partially defined by the Drina on the W. severing it from Bosnia, and the Danube and Timok on the E. parting it from Rumania and Bulgaria. The new south-western and south-eastern frontier, fixed by the Berlin Congress (July 1878), starting from KopaoNIK near Novi Bazar, runs in a S.E. direction past Mitrovitza and Pristina to Vranja, there bends N.E. towards Pirot, and finally with a N.W. course follows the crest of the Balkans till it joins the original frontier a little to the E. of Nissa. Area, including the 4236 sq. miles of annexed Bulgarian territory, 18,816 sq. miles; pop., with the 264,000 inhabitants of that territory, 1,642,068. Valley plains, shut in by amphitheatres of hills, form the most frequent geographical configuration, but the Matschwa Plain in the N.W. is the only one of any considerable extent, and none of the hills exceed 3300 feet in height, though their detached cones often present a wilder aspect than many loftier but more connected ranges. The Servian Morava, rising in the W., and Bulgarian Morava, in the S., unite to form the Great Morava, which, flowing northwards, enters the Danube near Semendria, and divides the country into two unequal portions. Of these, the western and larger one is watered by the Dobratsha and Kolubara, affluents of the Save; the eastern by the Pek, Milawa, and Timok, tributaries of the Danube. The natural capabilities of S. have hitherto been turned to scant account, nearly eight-ninths of the entire area lying uncultivated, and but one eighteenth being under crops, one-sixteenth in pasture. The vast primeval forests of oak, beech, ash, and birch have often been recklessly wasted, as a peasant fells a tree for the most trivial purposes; so that where in 1835 the author of *Lothen* found a forest stretching for more than 100 miles, timber has now become an absolute scarcity. So rich, however, is the soil, that S. produces

grain beyond its own requirements, and in 1872 the value of wheat exported reached £37,690, of other cereals £7807. Each cottage has its plum orchard, and from the fruit a mild alcohol (*stivovilza*) is distilled, the export of which amounted to £29,300; while vineyards yield an inferior native wine. The breeding, however, of stock, especially pigs, is the great national industry. In 1872 there were exported 472,700 swine, 42,355 cattle, 53,620 sheep, and 14,862 goats, with a value of £865,811, besides skins (£144,984), tallow, wool, and butter (£51,905), animal produce thus making up £1,062,700 out of the total value (£1,234,805) of exports, which further included dried prunes (£50,371) and gall-nuts (£26,495). In 1875 the exports included 1,915,730 qrs. of cereals, 367,439 pigs, 24,519 cattle, and 1,103,726 sheep and goat skins; while amongst the imports (£1,298,255 in 1874) are flour, horses, tobacco, dried fish, and colonial goods. Minerals also are imported, for though S. has no lack of coal, copper, and iron beneath its surface, no mines were worked till 1873, and then by two English companies. Beyond some trifling cotton, woollen, leather, and tobacco industries, S. has no manufactures, the Moslem Servians having taken with them their skill as armourers and general craftsmen when they withdrew with the Turkish garrisons. In 1874 there were 51 post-offices and 884 miles of telegraph lines, but S. suffers greatly from having no railways and few good roads, though its communication with the outer world has been so far improved that in 1874 a line was opened from Salonica to Mitrovitza, near the southern frontier, and another in June 1878 from Temesvar to Orsova, on the Hungarian bank of the Danube.

Races, Religions, and Education.—In the total pop. (1866) of 1,216,346 persons there were 127,545 Rumanians, 24,637 Gypsies, 2589 Germans, and 3256 other foreigners. The state Church is the Orthodox Greek, acknowledging the primacy of the Patriarch of Constantinople, and governed by one archbishop and three suffragan bishops, and there were in 1866 but 3409 Roman Catholics, 352 Protestants, 1560 Spanish-speaking Jews, and 4967 Mohammedans, but by the recent annexation the number of the last must now amount to some 80,000. Toleration and religious equality are stipulated in Article 35 of the Berlin Treaty. Education is well provided for, and in 1874 there were 517 public schools with 650 teachers and 23,278 pupils, and 16 higher schools with 112 teachers and 1759 pupils; while Belgrade University had 19 professors and 207 students.

Army, Constitution, and Revenue.—The standing army, of 150 officers and 4072 privates, comprises four battalions of infantry, two squadrons of cavalry, three regiments of artillery, &c.; the militia is divided into two bans, the first of which (98,990 men in 1875) has three weeks' yearly drill, while the second (51,600 men) is only called out in case of invasion. All Servians between twenty and fifty must join the militia after two years spent in the standing army. The cavalry is the weakest, the artillery the strongest branch of the service, the latter in the late war comprising fifty batteries, each of six rifled guns, well manned and officered. S. is essentially a territorial democracy. After the Knes or Prince comes the Senate, composed of 17 life members nominated by him; but no laws can be made or taxes imposed without the sanction of the Skuptchina or Parliament, which, meeting once in three years, is composed of 134 deputies—33 of the Prince's nomination and 101 elected by the universal manhood suffrage of the nation. An extraordinary Skuptchina, four times larger than the ordinary Parliament, may also be legally convoked to elect or depose a prince, so that S. has strong guarantees for its national liberties. The principality is divided into 18 departments (each governed by a *Naichalnik* or prefect), 60 sub-departments, and 1049 communes, which last present a curious survival of the ancient village community. The total public revenue of the year 1875-76 was given in the budget estimates at £705,134, the expenditure at £696,137. No public debt existed prior to 1876, when the war demanded a small internal loan, and a foreign one of £1,000,000, contracted in Paris under Russian guarantees in July 1877. Belgrade, the capital, had a pop. in 1874 of 27,603, and there were fifty other places with more than 2000 inhabitants.

History.—About 620 A.D., in the reign of Heraclius, the Servians entered the Balkan peninsula from beyond the Carpathians, not on Heraclius' invitation to aid him against the Avars, but as allies of that formidable Tartar race. Nor until 678, when they had embraced Christianity, did they acknowledge the Byzan-

tine suzerainty, and even then their connection with the empire was of the slenderest. From an aggregation of independent clans, Némenia, Grand Zupan of S. (1162), welded a nation, and founded a dynasty whose daughters wedded the royal houses of East and West. Out of it sprang Stefan Nemanja, first king of S. (1222), and Stefan Dushan, 'Emperor of all Serbs and Greeks' (1336), whose realm, stretching from sea to sea, included Slavonia, Dalmatia, Albania, Macedonia, and Bulgaria. On the march to Constantinople, to offer himself as candidate for the vacant imperial throne, he died at Devoli (1355), and dying, wept 'to see the gate stand open by which the enemy should enter.' The Moslem foe did enter; the field of Kossovo (1389) cost the lives of both Amurath the Ottoman and Lazar the Serbian czar; but Amurath's successor, Bajazet, beguiled young Stefan, Lazar's son, and S. became first tributary, then wholly subject, to the Porte, its nobles adopting their conquerors' faith, or taking refuge in Christian countries. Four hundred years the land had lain in darkness, broken only by the heroic defence of Belgrade and the passing successes of Prince Eugene (1717-39), when at last, the ten years' insurrection (1804-13) of Czerny (q. v.) having ended in failure, Milosch (q. v.) took up the desperate game, tore from the Turks a fragment of their conquests, and formed therefrom a state, tributary indeed, but with a native Knes, Skuptchina, and Church. Bred in a Turkish school, he ruled like a Turkish pasha, and was banished but recalled, as also was his son and successor Michel. The latter's reign witnessed the wanton bombardment of Belgrade (1862) and consequent withdrawal of the Turkish garrison (1867); he organised and armed the Servian militia, establishing an arsenal at Kraguevatz; and his assassination by Karageorgevitch conspirators (May 29, 1868) was a grievous check to the growth of the principality. The new constitution granted by Milan (q. v.) in 1869 stirred hopes—which Russian emissaries took care to fan—of a great Servian kingdom on the Danube. With the Herzegovinian rising (1875) the Omladina, a part political, part literary brotherhood, renewed its talk of union of the Slavonic provinces under Austrian or Russian supremacy, and on June 30, 1876, war was proclaimed with Turkey, 'to free the Slavonic Christians from their bondage.' But, for all their good opening on the Drina, in spite of the Russian volunteers who flocked to their standard, though Tcherniaeff proclaimed Prince Milan king, the Servians soon found themselves beaten at every point, and were glad to accept first a truce (November 1, 1876) and next a peace (March 6, 1877), restoring the *status quo* before the war. Within nine months Russia itself had marched on Turkey. 'God's will' declared itself that S. should anew defend the 'Holy Cause,' so on December 15, 1877, the Servian troops, 140,000 strong, re-crossed the frontier. Once more the 'Holy Cause' gained little from Servian arms, but S. from the Berlin Congress gained independence. See Ranke's *Serbische Revolution* (2d ed. Berl. 1844; Eng. trans. Lond. 1853); Denton's *S. and the Servians* (Lond. 1862); Forsyth's *Slavonic Provinces* (Lond. 1876); Reinach's *La Serbie et le Monténégro* (Par. 1876); Lindenmayer's *Serbien* (Vien. 1876); Mackenzie and Irby's *Slavonic Provinces of Turkey* (2 vols. Lond. 1877); and Gambier's *S.* (Lond. 1878).

Language and Literature.—Servian, or (to adopt the generic term) Illyrian, forms with Russian and Bulgarian the S.E. Slavonic branch of the Wendic family of languages, and is spoken over a far wider area than Servia proper, falling according to Vuk Stephanovic into three main dialects—the first that of Herzegovina, Bosnia, Montenegro, Dalmatia, Croatia, and Upper Servia; the second, of the Resava, Upper Morava, and Tsrna Rjeka districts; the third, of Syrmia, Slavonia, and Servia between the Save, Danube, and Morava. Again, the Illyrian race is divided politically into independent states and subjects of Austria, as theologically into Orthodox Greeks and Roman Catholics, the latter of whom employ the Latin, the former the Cyrillic alphabet. The melodious character of Servian, due to the predominance of vowel endings, bears witness to Greek and Italian influences, nor are traces of the Turkish domination wanting in the spoken tongue, which, thanks to the efforts of Dositei Obradovic (1739-1811) and Vuk Stephanovic Karadshic (1787-1864), has now superseded Old Slavonic as the literary dialect. Vuk was the first to publish a good Servian Grammar (1814; Ger. trans. with introduction by J. Grimm, Berl. 1824) and Dictionary (1819;

21 ed. 1852). See Miklosich, *Vergleichende Grammatik der Slavischen Sprachen* (4 vols. Vien. 1852-76).

Servian literature falls into three periods, the first extending from the earliest time to the extinction of Servian nationality by the battle of Kosovo (1389), the second from 1389 to the revival of letters in the 18th c., and the third from 1750 to our own day. To the first belong the chronicle in verse of Pop Dukljanin (*circa* 1162), which consists of over 1100 lines, and has been edited by Sakcinski (Agram, 1851); a Life of St. Simeon, and Domitian's *History of St. Simeon and Sabbas* (1264); the *Rodoslov* (ed. by Danicic, Agr. 1866), or Lives of Servian Czars and Archbishops, compiled by Archbishop Daniel (died 1338); and the famous code of laws of Czar Stefan Dushan (1336-56). With Servian freedom died also the Servian written literature, but to the four centuries of Turkish domination belong the unrhymed trochaic ballads, familiar to English readers through Sir John Bowring's translations (Lond. 1827), and first collected by the Franciscan Miosic (Ven. 1756). Whether handling the fiery cycles of Knes Lazar and the legendary Kravec, or simple idylls and pastorals, these nameless outpourings of a downtrodden race rank high above the so-called Ragusan Classics—the erotics of Lucic (1480-1521), the *Jegjupka* of Cubranovic (1500-59), or even Gundulic's *Osman* (1621). Nor have they yet been matched by any of the productions of the modern school of Servian poets, Musici (died 1837), Milutinovic, Jovanovic, &c. Their epics, lyrics, and dramas, if often graceful, are always imitative, based upon German models; and the only works of abiding interest beyond the petty Servian world are the patriotic history of Raic (1726-1801), and the linguistic and antiquarian writings of Obradovic and Karadshic. A collection of Servian national songs from Herzegovina has been published by Karadshic's widow (Vienna, 1866) and from Bosnia by Petranovic (Serajevo, 1867); a South Slavonic Anthology by Krizek (Prague, 1863), and an Anthology of Servian and Croatian poetry by A. Senoa (Agram, 1876). See 'The Literature of the Servians and Croats,' in the *Westminster Review* (April 1878).

Service is the name given to *Pyrus* (*Sorbus domestica*), a tree native of S. Europe and W. Asia. It has pinnate leaves resembling those of the Rowan (q. v.), but the 'pome' is considerably larger, and when ripe (in October) of a rusty brown tinged with yellow and red. Like that of its ally, the Medlar (q. v.), this fruit is eaten in a state of incipient decay, but the tree is rarely planted in England, and is now, for fruit yield, neglected on the Continent. The wood, however, is hard and heavy, and is much esteemed by millwrights for rollers, screws for wine-presses, &c. The 'wild S.' or *P. torminalis*, which has ovate leaves with triangular lobes, is a small tree locally indigenous in England, extending through Europe to N. Africa. Its small greenish-brown dotted fruit occasionally comes to market, but is not much appreciated, and is only serviceable when half-rotten. See PYRUS and ROSACEÆ.

Service of an Heir. The legal procedure of Scotch law by which an heir completes his title to an estate of land is so termed.

Servitude is a term of Roman law imported into that of Scotland denoting a right possessed by some one over a subject belonging to another. The analogous term of English law is Easement (q. v.). Servitudes are *predial* or *personal*. The former are subdivided into *urban* and *rural*. The *urban* is the right which the owner of one subject has in virtue of his ownership over the subject of another. For example, see LIGHT, *Law Regarding*. The *rural* S. is over land or water. Example, see FEAL AND DIVOT. Personal servitudes are the various kinds of *usufruct*, or *Liferent* (q. v.). See also COURTESY, TERCE.

Servius Tullius, in Roman legend, was the sixth king of ancient Rome. Prodiges which happened before his birth and afterwards were interpreted by the Etruscan queen Tanaquil as having an important bearing on the fortunes of the royal house. By her aid he secured the throne on the death of Tarquinius, and ruled peacefully from 578-534 B.C. The chief work which the legend ascribes to S. T. is the creation of the *Comitia Centuriata*. It was originally a purely military reform. As it imposed duties rather than conferred rights, it was probably not a change demanded by the plebeians. The Roman territory was divided into thirty tribes, and the people into five *classes* ('summonings'), according to wealth. These classes were fur-

ther subdivided into centuries. Eighteen centuries of the first class formed the *Equites* or cavalry; half the remainder (forty-two centuries), along with half of each other class, formed *Pedites* or infantry of various kinds, differing in equipment. The other half in each class consisted of men above forty-six years of age—the limit of military service. Mommsen is strongly of opinion that the so-called Servian institution did not acquire a *political* character till a later period. He urges that the regulation 'by which every one who had passed his sixtieth year was excluded from the centuries, becomes absolutely absurd, if they were intended from the first to form a representation of the bourgeois community similar to and parallel with the curies.'

Sesamoid Bones, the name given to certain rounded bodies, at first cartilaginous and then bony, found in the tendons of muscles. The *Patella* (q. v.) or knee-cap is a sesamoid bone. Another is developed in the upper joint of the thumb, and at the corresponding joint of the great toe. S. B. are said to occur most frequently in males, and in persons of robust and muscular build.

Sesamum, a genus of annual herbs belonging to the order *Sesamaceæ* or *Pedaliaceæ*, of which *S. Indicum*—a native of S. Asia extending to Japan—has with several varieties been long cultivated in India, Africa, &c., even as far N. as 42°, chiefly for the sake of its seeds. These yield half their weight of a fixed oil, in colour resembling almond oil, but possessed of drying properties. It is from the black-seeded variety of the plant that the principal supply is obtained. In India S. oil is the basis of all those used in perfumery; it is also a good substitute as a table oil for that of the olive, and the finer qualities of it are used to adulterate almond oil. The soot obtained by burning it is an ingredient of China-ink. Both the seed and the oil are extensively imported into Europe, appearing in commerce under the name of Teel or Sesame seed, and Gingelly oil. In Greece, Egypt, and other Oriental countries, the seeds are used in confections, and in the United States the leaves—which contain a quantity of mucilage—serve to make a demulcent drink for catarrh, &c.

Sesostria, the Greek name of the conqueror **Rameses II.**, the third king of the 19th Egyptian dynasty, called 'the Great,' to distinguish him from Rameses, the first king of the same dynasty. S. was called by Diodorus *Sesostis*, and it appears from Manetho that he was also named *Sethosis*. This, Bunsen maintains, should be read, as in Pliny, *Se-sothis*, i.e., 'Son of Sothis,' or Seti, whose actions are also attributed to S. See Herod. ii. 102-111; Bunsen, *Ægyptens Stelle in der Weltgeschichte* (5 vols. Gotha, 1844-45); Brugsch, *Histoire de l'Égypte* (vol. i. Leips. 1859).

Sesquialtera, an organ-stop sounding high harmonics to strengthen the ground tones. It is composed of several ranks of pipes.

Sessa (the ancient *Suessa Aurunca*), a town of S. Italy, province of Caserta, situated on the crater of an extinct volcano, on the road from Gaeta to Capua, 16 miles N.W. of the latter. It contains the ruins of an amphitheatre, and ancient medals and bronzes have been found. Pop. (1877) 21,443.

Session, Court of. See COURT OF SESSION.

Sessions, Special, or Quarter, are meetings held by Justices of the Peace for an especial purpose, by notice specifying the time, place, and object of the meeting. To make valid an order made by a S. S., reasonable notice must be given to each magistrate entitled to be present.

Sesterthus, an ancient Roman coin, either of bronze or silver, and equal to one-fourth of a Denarius (q. v.). It originally was worth two and a half *asses* (see AS), hence the name (*semis-tertius*, two and a half); but when the denarius was made equivalent to sixteen *asses*, the S. was correspondingly modified, so that it was worth four *asses*. After the time of Augustus, the S. was worth nearly twopence sterling; but with the decline of the Empire its value diminished. The *sestertium* (= 1000 *sestertii*) was a money of account, but not a 'coin.'

Sesri Ponente, a seaport of N. Italy, province of Genoa, 5 miles S.E. of that city by rail. Near it is Mont Gazzo, which supplies a celebrated yellow alabaster. The town contains many superb villas, as it is a favourite summer resort of the Genoese. S. has 16 silk factories, a large machine factory, and considerable shipbuilding. Pop. (1874) 9488.

Seta'ria. See MILLET.

Seth'ites were one of the minor Gnostic (q. v.) sects of the 2d c., who, like the Cainites, held the idea that in the Demiurge's world the Sophia ever preserved a spiritual seed, of whom Seth was the great representative, as was Cain, according to the latter.

Setons are made by pinching up a large fold of skin and passing a skein of silk thread underneath it through the cellular tissue above the deep fascia. For this purpose, a broad flat needle with a very large eye is used, and the skein of silk is loosely knotted, and should be moved a little each day backwards and forwards as soon as suppuration has commenced. When the object is to empty an abscess or a cyst, one or two threads run through with a common needle will suffice. S. are used as counter-irritants, as a drain on the system at large, and to excite inflammation and adhesion; but S. are but rarely used in the surgery of the present day.

Setter, a kind of dog, so named from its habit of 'setting' or crouching when observant of game. As now bred, it may not 'set,' but may simply rest and 'point.' The soles of the feet are hairy. The various breeds of S. are the English, Irish, and Russian S. Most bear evidence of the admixture of the blood of the spaniel with that of the pointer. The Russian and English breeds produce a valuable cross, which takes readily to the water, and is very active and intelligent.

Settlement in its general legal sense is a disposition of property for certain purposes by the owner, who relative to the disposition is called the settler or grantor. A S. may be either by deed or by will, but the term is usually only applied to a S. by Deed (q. v.). The most important kinds of S. are those relating to marriage. See CONTRACT. Regarding S. of paupers see POOR LAWS.

Setu'bal (Fr. *St. Yves*, Dutch, *St. Ubes*), a seaport of Portugal, province of Estremadura, on the N. side of the Bay of S., at the mouth of the Sado, 13½ miles by rail S.E. of Barreiro, opposite Lisbon. The harbour is defended by five forts. S. exports wine and is the chief seat of the Portuguese salt-trade. In 1874, the export of salt amounted to 33,000,000 imperial gallons. In 1875, S. possessed 43 vessels of 2166 tons. Pop. (1864) 13,134.

Seven was regarded as a sacred number among most of the nations of antiquity, the cause of which is to be traced to the influence of the *seven* planets of astrology and star-worship. There were seven degrees in the mysteries of Mithras, seven primitive colours, seven critical days in medicine, seven strings to Apollo's lyre, seven pipes to Pan's flute, and seven gods in the Scandinavian mythology, &c. That seven was also regarded as sacred by the Hebrews is abundantly manifest from their Scriptures. The creation was completed in seven days (Gen. 1.); Noah took clean animals into the Ark by sevens (vii. 2, 3), and waited seven days before sending out the dove (viii. 8-12). The ears of corn and the kine in Pharaoh's dream came up by seven (xli.), and there were seven branches on the golden candlestick (Exod. xxv. 37). The blood of propitiation was to be sprinkled seven times (Lev. xvi. 14), seven Sabbaths were to intervene between the offering of the first-fruits and Pentecost, the day of Atonement was the seventh of the tenth month, the Passover and Feast of Tabernacles each lasted seven days (Lev. xxiii.), and, in fact, the whole circle of festivals was regulated by the number seven (see SABBATH). The number continued to have the same influence among Christians. The Apocalypse is full of it—for stars, angels, churches, lamps, eyes, seals, vials, &c. It enters into the systems of many of the heresies of the early Church. The Schoolmen made the Cardinal Virtues (q. v.) seven; opposite to which were seven deadly sins. And the Catholic Church made seven the number of her sacraments.

Seven Sleepers were seven Christians of Ephesus, who, according to a legend recorded by Gregory of Tours in his *De Gloria Martyrum*, when fleeing from persecution in the time of the Emperor Decius (249-51), took refuge in a cave near that city. They were discovered by their pursuers, and the entrance of the cave was walled up. But instead of starving to death, as was expected, they fell into a deep sleep, in which they continued till the reign of Theodosius, when they awoke (447) to find Christianity no longer persecuted, but the accepted religion of the people, and themselves received in triumph by the Ephesians.

Seven Wise Masters, a cycle of Eastern fables, also known as the *Book of Sindbad the Wise*, whose oldest existing source is the eighth chapter of a collection of Sanskrit stories, the *Suka Saptati*. From India it found its way to Persia, Arabia, and Syria, and thence was introduced into Europe by the Crusaders of the 11th c. A certain Jean, monk of the Abbey of Haute Seille, in the diocese of Nancy, compiled two Latin versions of the story, the first entitled *Historia Calumniæ Novercalis, quæ Septem Sapientum Dicitur* (1184; printed at Antwerp, 1490), the second, a shorter, *Johannis de Alta Silva Dolopathos seu de Rege et Septem Sapientibus* (1212; ed. by Oesterley, Strassb. 1873). From these, again, proceeded *Les Romans de Dolopathos* (Par. 1856) of the 13th c. trouvère Heliers, the anonymous *Romans des Sept Sages* (Tub. 1836), and numerous English, German, Spanish, and Italian versions. Dolopathos, in the Western form of the story, is a king of Sicily, whose son Lucinien is falsely charged by the queen, his stepmother, with having sought to do her violence. Bound by a promise to his tutor Virgil, then absent on a journey, not to open his lips till the latter's return, Lucinien is about to be burnt, when one of the seven sages of Rome arrives and gains him a day's respite by promising to tell a story showing the falseness of womankind. The same thing happens on six successive days, and on the seventh comes Virgil, who clears his pupil and convicts the queen. One of the stories thus narrated furnished Shakespeare with the plot of his *Merchant of Venice*, and another reappears in the *Knight of the Swan*. See Comparetti's *Ricerche Intorno al Libro di Sindbad* (Milan, 1869).

Seven Wise Men, the collective titles of certain Greek sages who flourished in the 7th and 6th centuries B.C., and whom Plato enumerates (*Protag.* 28) as follows:—Thales, Pittacus, Bias, Solon, Cleobulus, Chilon, and Myson, while others for the last substitute the Corinthian 'tyrant' Periander, the Scythian Anacharsis, Epimenides of Crete, &c. The aphorisms ascribed to them are given in Orelli's *Opuscula Græcorum Veterum, Sententiosa et Moralia* (Leip. 1819). See Bohren, *De Septem Sapientibus* (Bonn, 1867).

Seven Wonders of the World, as given by Philon of Byzantium in his *Peri tôn hepta Thaumaton* (best ed. by Orelli, Leips. 1816), were the Hanging Gardens (q. v.) of Babylon, the Pyramids (q. v.), Phidias' statue of Zeus Olympios, the Wall of Babylon, the Colossus (q. v.) of Rhodes, the Temple of Artemis at Ephesus (q. v.), and the Mausoleum (q. v.) at Halicarnassus.

Seven Years' War (also called **Third Silesian War**), the war carried on from 1756 to 1763 by Friedrich II. of Prussia, in alliance with England, against Austria, Russia, France, Sweden, Saxony, and most of the smaller German states. Friedrich, learning that a great coalition was formed against him, anticipated his enemies (August 1756) by occupying Saxony. Passing thence into Bohemia, he defeated the Austrians at Lowositz (October 1), and on the 15th the Saxon army capitulated. The year following he could bring but 200,000 men, with 40,000 auxiliaries from Hanover, Brunswick, Hessen, and Sachsen-Gotha, against the 430,000 of his enemies. The victory of Prag was soon lost in the reverses of Kollin, Hastenbeck, Kloster-Seven, and Grossjägerndorf, but at length Rossbach and Leuthen turned the tide in Friedrich's favour: 1758 brought the victories of Krefeld and Zorndorf, and the severe defeat of Hochkirch. The year 1759 was unfortunate for the Prussians. Prince Ferdinand of Brunswick indeed gained the victory at Minden (August 1), but the ruin of Prussia seemed certain after the defeat of Kunersdorf (August 12), and in January 1760 Friedrich was forced to leave Daun in possession of Saxony. In the latter year the Prussians were again defeated at Landshut, but gained the victories of Liegnitz and Torgau. 1761 was uneventful, and on the death of the Empress Elizabeth (5th May 1762), Peter III. formed an alliance with Friedrich. Sweden on the 22d May signed a peace at Hamburg, and in 1763 the Peace of Paris between France and England (10th February) and the Treaty of Hubertsburg (15th February) closed the war, leaving things exactly as before it began, save that Prussia had now learned her own strength, and had risen from a petty kingdom to the rank of a great power. See the histories of this war by Archenholz (9th ed. 1867), Schäfer (2 vols. Berl. 1867-70), and Ranke (Leips. 1875).

Severalty. In English law, when an estate is held by one person exclusively, it is said to be held in S.

Severn (Lat. *Sabrina*), next to the Thames, the largest English river, rises on the E. side of Plinlimmon, in Montgomeryshire, 1500 feet above the sea-level. To Llanidloes, a distance of 12 miles, it retains its ancient British name of *Hafren*. It flows N.E. through Montgomeryshire past Newtown and Welshpool, turns S.E. through Shropshire past Shrewsbury and Bridgenorth, enters Worcestershire at Bewdley, flows S. past Stourport and Worcester, enters Gloucestershire at Tewkesbury, and after a S.W. course, passing Gloucester falls into the Bristol Channel, dividing by its estuary Monmouthshire from Gloucestershire and Somersetshire. Its basin has an area of about 6000 sq. miles; its total length is about 200 miles, and it is navigable for barges as far as Welshpool, a distance of 180 miles. The effect of the great tidal bore or eagre running up the Bristol Channel is perceptible 120 miles up the S. Its principal tributaries are, on the right, the Teme and the Wye, and on the left the Terme and the Upper and Lower Avon, while a system of canals places it in connection with other large rivers. A railway bridge in 22 spans, 3581 feet long, by which a junction is effected between the Great Western and Midland Railways, is now (1878) in course of construction across the S. at Purton Passage, near Sharpness.

Severus, Alexander. See ALEXANDER SEVERUS.

Severus, Lucius Septimius, a Roman Emperor, born near Leptis Magna, on the coast of Africa, April 4, 146 A.D. After holding the highest offices under Marcus Aurelius and Commodus, he obtained command of the legions in Gaul, and when in 193 news came of the murder of Pertinax, he was proclaimed emperor, and immediately marched on Rome. Julianus, to whom the prætorian guard had sold the imperial purple, was deposed and executed. Meanwhile the Roman legions in Asia had proclaimed their general, Pescennius Niger, emperor. S. overthrew him at Issus in 194. After a successful campaign against the Parthians he returned to Rome, but was soon engaged in a struggle with another rival, Clodius Albinus, whom he conquered at Lugdunum in 197. New campaigns in the E. were ended by the capture of Ctesiphon, the Parthian capital. S. then spent several years (202-208) at Rome, gratifying the people by his magnificence, and distributing large donations to the troops. In 208, he hastened to Britain to quell a rebellion there; but after an undecisive campaign, and just as he was planning a new attack upon the Caledonians, he died at Eboracum (York), February 4, 211.

The Wall of S. is the name given to a rampart erected by the Romans as the northern boundary of their British possessions. It stretched from the Solway to the Tyne, and was built of stone by the Emperor S. in 208, about 60 yards in front of Hadrian's earthen rampart. The total length of the wall was 63½ miles, its height probably about 18 feet, and its thickness from 6 to 10. The forts along it were erected at intervals of about 4 miles. The works appear to have been very substantially constructed. Most of the ditch and many parts of the wall can still be traced. S. W., called *Gual Sever* by the Britons, was subsequently known as the *Picts' Wall*, but is now called the *Roman Wall*. See *The Roman Wall, &c.*, by Bruce (Lond. 1853).

Sévigné, Marie de Rabutin-Chantal, Marquise de, born at Paris, February 6, 1626, was the daughter of Baron de Chantal and Marie de Coulanges. An orphan at the age of six, she was left to the care of her maternal uncle, who intrusted her education to Menage and Chapelain. She made her debut in society as a linguist, a beauty, a wit, and an heiress. In 1644 she married the Marquis de S., a man who squandered much of her fortune upon mistresses. It was said of this unfortunately matched couple, that he respected without loving her, and that she loved without respecting him. The Marquis was killed in a duel in 1651, and his wife devoted herself to the education of her son and daughter. Many were the suitors who surrounded the beautiful widow; but widow she remained—one of the brightest and purest among the celebrated women of her day. In 1669 the daughter whom she idolised married the Marquis de Grignan, who soon after removed from Paris to become lieutenant-general in Provence. The mother's tenderness for her child now poured itself out in the celebrated letters which even before the writer's death were talked of as models of

graceful, piquant, epistolary style. While on a visit to her daughter in Provence, she was attacked by smallpox, and died at Grignan (Drôme), April 18, 1696. Her letters were first printed in the incomplete edition of 1726 (2 vols. The Hague). The best edition is that of Regnier (12 vols. 1862-64). An English translation of the letters was published in London (9 vols. 1811). See Walckenaër's *Mémoires touchant la Vie et les Écrits de Mme. de S.* (Par. 5 vols. 1842-52); *Madame de S. and her Contemporaries* (Lond. 2 vols. 1841); and J. Babou's *Les Amoureux de Mme. de S.* (Par. 1862).

Seville (Span. *Sevilla*), a famous city of Spain, capital of the province of S., on the left bank of the Guadalquivir, 80 miles from its mouth, and 353½ miles S.S.W. of Madrid by rail. The river is crossed by a fine iron bridge connecting S. with Triana (the gipsy quarter), one of its seven suburbs. The city proper, which is surrounded by old Moorish walls, 5 miles in circumference, with 66 towers and 15 gates, contains a labyrinth of narrow crooked streets. The houses are mostly built in the Moorish style, and are seldom more than two stories high, with flat roofs, and an inner square court surrounded with colonnades and adorned with flowers and fountains. The windows generally look into this court: 'to the street there is most frequently only a balcony. S. has many fine promenades, of which the most frequented are the Alameda Vieja, El Paseo de Christina and Las Delicias. Of its 111 squares, the largest are Plaza de San Francisco, Plaza de la Encarnacion, Plaza del Duque, and the Quemadero—the scene of the *autos-da-fe*; while of its 477 streets, the chief are Calle de la Sierpe and Calle Francos. Most of the more notable public edifices are at the S. extremity near the river, and within a short distance from each other. Here are the Cathedral (Santa Maria de la Sede), the Giralda, the Alcazar, the Lonja, and (outside the wall), the royal Fabrica de Tabacos. The Cathedral (1401-1519), on the site of the grand mosque of the Moors, is one of the most imposing Gothic edifices in Europe. It is 431 feet long, 315 feet wide, 145 feet high under the transept dome, has seven aisles, 93 windows, several of which are beautifully painted, and an organ with 5400 pipes. It contains the Biblioteca Columbiana of 20,000 vols., bequeathed by Ferdinand Columbus, and is rich in paintings by Murillo, Campaña, the Herreras, and other masters of the school of S. The Giralda is a square Moorish steeple, consisting of three towers with galleries and balconies, 350 feet high, the ascent of which is by a spiral inclined plane. On the top is a bronze statue of Faith, 14 feet high, and weighing 2800 lbs., which yet turns like a weathercock. The Alcazar was the ancient Moorish palace. Some parts of its interior are as fine as the Alhambra. The Lonja, or Exchange, is a square building, each side 100 feet long, in which all the American archives are preserved. The Fabrica de Tabacos, or tobacco-factory, in which 5000 women are employed, was erected in 1757, at a cost of £390,000. Other buildings are the Torre del Oro, a twelve-sided tower on the river, so called from its having received the cargoes of the American treasure-ships; the palace San Telmo, built by Ferdinand Columbus, now belonging to the Duke of Montpensier; Casa del Ayuntamiento (town-house), a fine old Moorish structure; the Casa de Pilatos, or palace of the Dukes of Alcalá; the Museo, rich in paintings by Murillo, Zurbaran, Torrigiano, Roelas, and the elder Herrera; and the great amphitheatre, capable of accommodating, as a Plaza de Toros, 18,000 people. One of the greatest monuments of antiquity is the Caños de Carmona, an aqueduct on 410 high arches, which conveys water from Alcalá de Guadaira. It was built by the Romans and repaired by the Moors. S. has a University, founded 1504, with a library of 20,000 volumes, now attended by 1000 students; 12 picture-galleries (including the Museo), 2 theatres, several upper schools and learned societies. The city is visited by large numbers of strangers during the Santa Semana ('holy week'), which commences about the middle of April. S. was formerly the emporium of commerce between Spain and her American possessions. It declined, however, as Cadiz rose into importance, but it is still a place of considerable trade, and has a great export of oranges, and large manufactures of tobacco, hardwares, porcelain, and silk. The total value of the imports in 1876 was £1,052,392 (from Great Britain and British colonies, £492,686); and of exports £673,429 (to Great Britain and British colonies, £410,360). In the same year 511 vessels of 115,327 tons arrived at the port, of which 116 of 24,419 tons were British. Pop.

(1877) 118,888. S. was the *Hispalis* of the Romans, in whose time it was a place of great commercial importance. Under the Vandals and Visigoths it became the capital of S. Spain. Within its walls were held the Concilia Hispalensia, 590 and 619. In the 8th c. it fell into the hands of the Moors, by whom it was called *Ischbilis*, and made capital of a califate. It now became the most flourishing city in the peninsula, having a pop. of 400,000. In 1248 it was taken, after a siege of 18 months, by Ferdinand III. of Castile, and has ever since remained in the hands of the Christians. See Wackernagel, *Sevilla* (Bas. 1854).

Sèvres, a town of France, department of Seine-et-Oise, on the left bank of the Seine, 6 miles S.W. of Paris by rail. Its famous manufactory of porcelain, established in 1755, employs 200 workmen. The museum was destroyed in 1870, but a new manufactory was inaugurated in 1876, containing two museums, one for the works of artists of S., the other for specimens of pottery of all ages and nations. In 1875 a school of mosaic work was also established. Pop. (1876) 6512.

Sèvres, Deux, a department of Western France, so called from the two rivers, *Sèvre Niortaise* and *Sèvre Nantaise*, which flow through it, the former into the sea, the latter into the Loire. It is bounded N. by Maine-et-Loire, E. by Vienne, S. by Charente-Inférieure and Charente, and W. by Vendée. Area, 2310 sq. miles; pop. (1876) 336,665. The soil is fertile, but agriculture is backward. In 1876 the yield of wheat was 4,290,000 bushels. S. has iron and coal mines, marble and freestone quarries, and manufactures coarse linen and woollen stuffs. Its breed of mules is famous in the Alps and the Pyrenees. The chief towns are Niort (the capital), St. Maixent, Parthenay, Thouars, and Melle.

Sewage is the matter which passes through the drains, conduits, or sewers leading away from human habitations singly, or from houses collected into villages, towns, and cities. It is made up of excreted matter, solid and liquid, the water necessary to carry such away, and the waste water of domestic operations; but to these are added the liquid waste products of manufacturing operations, and generally much of the surface drainage water of the area in which the conveying sewers are situated. While human beings live in a nomadic or rural state, the treatment of excreta and other waste materials presents little difficulty; but as soon as communities form, the removal of S. becomes a question of the most vital concern; and in proportion to the population both the necessity and the difficulty of adequately disposing of such matter are increased. There can be no doubt that the pestilence and plagues which at frequent intervals devastated ancient and mediæval cities were almost invariably caused, and always intensified, by the entire absence of any system for treating or removing excreta and other decaying organic matter; and even yet, notwithstanding the assiduous regard paid to sanitary science in most well-governed towns, many diseases are directly traceable to the noxious influence of decomposing S. matter. The dense packing of human beings in modern towns, and the concentration of manufactures in such centres, have enormously increased the magnitude and importance of the S. question; and it is not too much to say that the efficient and economical treatment of towns' S. is the greatest and most urgent social problem of our times.

The question presents itself in a twofold aspect: (1) the necessity for the prompt and complete removal of S. from the neighbourhood of human dwellings, and its disposal in a way the least offensive and injurious to health; (2) the desirability of saving, for agricultural purposes, the rich and essential fertilising agents which S. contains. To the sanitary officer the former is the question of greatest moment, to the agriculturist the latter; while the mass of the population has an equal interest in both. In almost every scheme propounded for dealing with S., cognisance is taken of both these points, and thus the problem becomes more difficult of solution.

The composition of S. as it passes outwards, varies greatly, as regards amount and condition of organic matter it contains, and the season of the year—hot or cold—affects very considerably the activity of chemical action. But at all times sewer gases are given off which are foetid and offensive to smell, containing sulphuretted hydrogen, light carburetted hydrogen, free nitrogen, and carbonic acid. The precise influence of such gases on the health, of course, varies with the amount of dilution they undergo before being breathed, and the result of observa-

tions under many conditions are rather conflicting. While air contaminated with sewer gases aggravates all diseases, especially those of a febrile nature, there is good ground for believing that choleraic diarrhoea and typhoid fever are directly communicated by emanations from sewers. To prevent such sewer gases from penetrating into houses by means of the drains and pipes, and to keep the S. from saturating the surrounding soil, and from contaminating any water supply, are objects of prime importance. To accomplish these, the pipes leading from dwellings into main drains and sewers require to be trapped, and the sewers themselves ventilated, drain pipes and tubes made of glazed earthenware or other non-absorbent material must be carefully fitted, and the main sewers made either of pipes of large diameter or of hard bricks bedded in Portland cement. Sewers are properly built in cross section; they should have a uniform gradient, and be as far as possible built free of curves, so that the S. matter may be carried forward without any tendency to silt or deposit at particular spots. It is also essential that there be ready access to the sewers, as well as to the smaller drains leading into them.

The entrance of sewer gas into houses is provided against by external ventilation of the pipes and by trapping the pipes either by a syphon arrangement, a midfeather, or a flap-trap. The syphon, which is used in connection with water-closets, consists simply of a deep bend on the exit tube, which bend is at all times filled with water. The midfeather is a modified kind of syphon, consisting of a trough having an inlet and discharge pipe at the same level on opposite sides, but between them a partition passes down into the water with which the trough is always filled up to the level of the two pipes. Such traps are usually put upon sinks. The flap-trap consists simply of a hinged valve which opens outwards to allow the escape of S., &c., but which closes against the resurgence of water or the inward pressure of gases. Modified forms of these varieties are numerous; but the general principle of all traps is based on one or other of these forms. The accompanying fig. 1 represents in

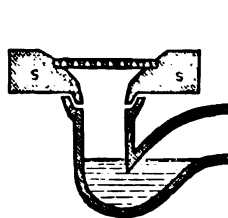


Fig. 1.

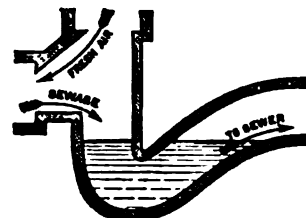


Fig. 2.

section an approved form of syphon trap, designed for use in wash-houses, asphalted courts, &c. Figs. 2 and 3 are vertical sections of ventilating drain-traps, in which the S. is made to fall into the trap over a sharp edge, whereby solid excreta is broken up, well mixed with liquid, and is washed away. In fig. 4 is shown a system of drains, with their trapping and ventilation, and the connection with a common sewer, as adapted for a dwelling through and under which the house drain passes. In this plan a ventilating syphon trap, on the principle patented by Mr. W. P. Buchan of Glasgow, is placed between the house and the sewer, whereby sewer gas is effectually locked off from the house, and at the same time a current of fresh air is allowed to enter the drain by the grating A, which, passing through the drain pipe, dilutes the gas it may contain, and escapes again into the open air above the roof at F.

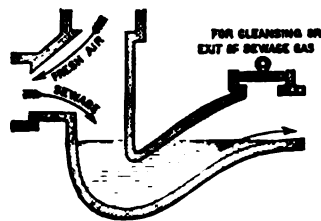


Fig. 3.

There are two systems by which excremented matter is dealt with for removal: (1) by water carriage, and (2) the dry method. Water-borne S. is disposed of in the following several ways:—
1. Running it into the sea, or into a tidal river, under conditions that will prevent its return, or into open streams; 2. Irrigation; 3. Intermittent filtration; 4. Purification by precipitation—(a) by lime; (b) by sulphate of alumina; (c) by the A B C system.

And under the dry method the following are the principal plans in operation:—1. Pan closets; 2. Earth closets; 3. Goux system; 4. Stanford's system; 5. Liernur's pneumatic system.

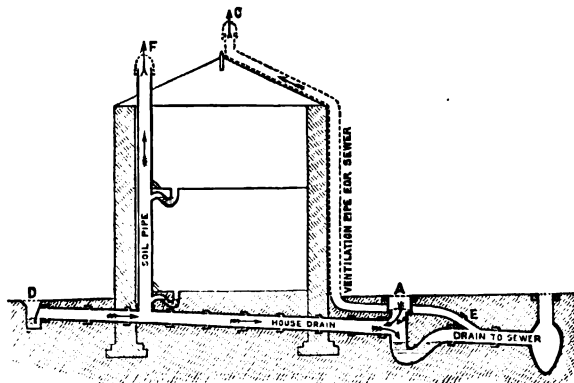


Fig. 4

The adoption of one or other of these methods in various towns has been determined partly by the circumstances of geographical position, and partly by the domestic sanitary arrangements already existing. The water-carriage method is alone practicable in towns like Edinburgh and Glasgow, where water-closets are almost universally used; and whether the S. passes into an inland stream or the sea depends on the position of the town. The practice, however, of discharging S. into inland streams is universally condemned, and measures are being taken to stop and prevent it in all large towns. In the city of Glasgow the S. at present passes direct into the Kelvin and Clyde, making these waterways no better than huge open sewers. The S. of London is carried by two great culverts on each side of the Thames to Barking and Crossness, where with each receding tide it is carried away into the open sea. A S. farm exists at Barking, to which a proportion of the S. is applied. The irrigation method is employed to a large extent in the disposal of Edinburgh S., enormous crops of rank grass being grown on the sandy soil of Craigenfinny Meadows, lying between the city and the Frith of Forth, over which the S. passes without causing any local nuisance. The same method is most completely worked at Croydon, and probably the Beddington Manor estate there is the most successful of the S. farms; it disposes of the S. of a population of 60,000 persons, at an outlay which is now reduced to little over £1,000 per annum.

The irrigation method has, however, not answered the great expectations of those who regarded it as the perfect solution of the S. problem. Systems of purification by chemical treatment are in operation in various English towns, including among others, Birmingham, Bradford, and Leeds; but the result is not satisfactory, either from a sanitary or economical point of view. The so-called A B C process, a name derived from the initials of the three materials employed in it—Alum, Blood, and Clay—has received the greatest amount of attention, and a thorough trial. The materials actually used at Leeds for the treatment of from 12 to 14 million gallons of S. were alum 3 tons, charcoal 3 tons, clay 6 tons, and lime 12 tons, but the manure obtained thereby has been found practically unsaleable. See *Report of the River Pollution Commission* (1870). The Society of Arts Conference on Health of Towns and S. in their report also say:—'With regard to the various processes based upon subsidence, precipitation, or filtration, it is evident that by some of them a sufficiently purified effluent can be produced for discharge without injurious result into watercourses and rivers of sufficient magnitude for its considerable dilution; and that for many towns, where land is not readily obtained at a moderate price, those particular processes afford the most suitable means of disposing of water-carried S. It appears, further, that the sludge, in a manurial point of view, is of low and uncertain commercial value; that the cost of its conversion into a valuable manure will preclude the attainment of any adequate return in the outlay and working expenses connected therewith, and that means must therefore be used for getting rid of it without reference to possible profit.'

Of the various dry methods of removing excreta, the pail-and-tub system is in extensive use in Manchester, the charcoal system has been fully tested at Oldham, the Goux plan has been in operation at Halifax, the earth closet is fully described under that heading, and Captain Liernur's plan is carried out in various Dutch towns. The following is an outline of the Manchester system. At present in the city there are comparatively few water-closets. There are 42,000 privies, and these are gradually being altered into pan-closets. Already 24,000 have been thus converted, and Dr. Leigh, the medical officer of health, expects that in three years the whole will have been altered. The system of conversion is the following:—The privy is removed and the ground upon which it stood, and which is necessarily saturated with filth, is dug up to the depth of several feet, and carted away, and the space filled in with clean furnace ashes. Upon this the privy, with compartment for cinders, is built, and the whole roofed over. The cost of each privy is £4, 4s., when erected by the workmen belonging to the corporation, who charge the owner of the property the net outlay. The pails are constructed of galvanised iron, and are made, and, when necessary, repaired at the corporation depot in Water Street. Attached to each closet is a cinder-sifter, and the fine cinders and ashes mix with the excreta, and make it more manageable than it would be in its pure state. Separate tubs are used for the coarse cinders and general refuse of the houses. Dr. Leigh calculates that when all the privies are converted, 6,000,000 gallons of urine annually will be kept out of the sewers, and consequently out of the Irwell, that were formerly allowed to flow into it. The old-system privies are emptied during the night, but the pan-closets are removed during the day—vans specially constructed for the purpose being used. They have five compartments, one of which is open and uncovered, and this receives the dry refuse; the other four are covered and enclosed with closely-fitting doors. When the loaded vans reach the yard, they are first weighed, afterwards they are taken on to the first floor of a two-storey building, where the dry refuse from the open part of each van is unloaded, and shovelled into sieves worked by steam-power. By this arrangement the fine dust, widely diffusing itself in its descent, falls on the floor below, covering the contents of the pails, which are, at the same time, being emptied on to gratings fixed in the floor. At one end the bars are set much more closely together than at the other, and serve to convey the liquid portion of the contents of the pails by means of troughs to a tank, from which it is afterwards removed to an apparatus called a concretor. The solid portion of the excreta falls through the wide barred portion of the grating into suitable receptacles. The rough portion of the dry refuse, after being separated from the fine, is carried along an endless band of wooden bars to the mortar mills, the boiler, or to one of the various furnaces, of which there are several in the yard. The dry refuse is of such a heterogeneous character as to require varied modes of treatment. The cinders are separated and used for fuel for the boilers and furnaces (no coal whatever being allowed in the yard); the remaining portion of the rubbish is taken to the carbonisers (of which there are eight), and the material, often of an obnoxious description, is therein carbonised, and converted into a harmless and useful substance. In another part of the yard is a second set of furnaces, called destructors, which are used for the purpose of destroying rubbish which formerly had been deposited in large heaps in every suburb of the city. These destructors not only consume the objectionable material, but furnish heat to the concretors, large cylinders laid horizontally, and revolving by steam-power, in which the liquid of the pails (chiefly urine) is evaporated to one-tenth of its bulk, and afterwards formed into a valuable manure by being mixed with two-thirds of its weight of charcoal from the carbonisers. The spent fuel is carted to the mortar-mills, and there ground up with broken earthenware and glass, fine ashes, and lime, to form a most excellent mortar, which contains one-third of its weight in lime, and sells readily at 4s. 6d. a ton: 400 tons of manure are made weekly, and sold at 12s. 6d. per ton. The carboniser, the destructor, and the concretor have all been invented and patented by Mr. Alfred Fryer, of the firm of Manlove, Alliot, & Co., engineers, Nottingham. Some of the above details are taken from a paper in the *British Architect* for 29th September 1876.

The charcoal or carbon system is worked under a patent obtained by Mr. E. C. C. Stanford, of Glasgow, and consists in

submitting the excremental matter to destructive distillation, whereby a kind of animal charcoal and ammonia are evolved.

The Goux system, as it is called, is adopted at Halifax for the dry closets. The tubs are of wood, about sixteen inches high and 20 inches wide at the top. They are lined with a mixture of street sweepings, fine ashes, shoddy, tow, and sawdust, or any absorbent material that can be procured at little or no cost. A little is put at the bottom, then a mould of 15 inches diameter, and provided with a handle at the top, is inserted, and around this the absorbent material is packed, after which the mould is withdrawn and replaced by a thin sheet-iron cylinder. It is stated that a man can pack 80 tubs in an hour. The centre cylinder is not removed until the tub is put in position. On removing the tubs, when full, a little charcoal, soot, or gypsum, is placed on the top, but there are no covers to the pans.

The distinctive feature of the Liernur or pneumatic process is that the night-soil, with or without a limited quantity of water, is drawn by means of a vacuum to a central dépôt, where it is evaporated to dryness in vacuo, forming a 'poudrette,' which possesses a high manurial value, and may truthfully be called native guano. 'As may be imagined,' say Messrs. Robert Rawlinson & Clare, in a report on the system presented to the Local Government Board in July 1876, 'when the nature of the arrangements and complications are considered, the pneumatic system gets out of order, the slightest crack in any pipe or pipe-joint will reduce the force of the partial vacuum, and even when all the apparatus remains sound, the closet pans may not be emptied; and, in fact, neither the pipes nor the pans ever are entirely emptied. The power of air and water to remove solids through pipes is proportional to their relative weight and velocity, and air is to water, by weight, about as 800 to 1.'

The Society of Arts Conference on Health and S., dealing with the dry systems at their meetings in May 1877, reported: 'That the pail system, under proper regulations for early and frequent removal, is greatly superior to all privies, cesspools, ash-pits, and middens, and possesses manifold advantages in regard to health and cleanliness, whilst its results in economy and facility of utilisation often compare favourably with those of water-carried S.;' but that, 'for use within the house, no system has been found in practice to take the place of the water-closet.'

Seward, William Henry, an American statesman, born May 16, 1801, at Florida, Orange county, New York. Educated at Union College, Schenectady, he began business as a lawyer at Auburn, New York, in 1823, and in 1825 made his first political appearance in a 4th of July oration. It was, however, in connection with a great agitation against Freemasonry in 1830 that he first came prominently into the political arena. He was elected in that year to the New York Senate, and in 1838 was chosen governor of New York. He now began to appear as an Abolitionist, and was a prominent member of the 'Black Republican' party. Elected in 1849 to the U.S. Senate, he soon became the acknowledged leader of the party, and in the presidential election of 1860 was the leading Republican candidate, though Abraham Lincoln was ultimately elected. Under Lincoln he became Secretary of State, and conducted the diplomacy of the U.S. during the whole civil war with great ability and success. At the time of Lincoln's assassination, a man named Paine attempted to assassinate S. also, but only succeeded in dangerously wounding him, and at the same time stabbing his son who was also in the room. S. continued in office under President Johnson, and until the accession of President Grant in 1869. He had visited Europe in 1833 and 1859, in 1871 undertook a tour round the world, and on his return died at Auburn, October 10, 1872. He published *Speeches, State Papers, &c.* (4 vols. New York, 1853-62), and a *Life of J. Q. Adams* (New York, 1849). See *Autobiography of W. H. S. from 1801 to 1834; with a Memoir of his Life, and Selections from his Letters from 1831 to 1846* by F. W. Seward (Lond. 1877).

Sewing-Machine. The various forms of this now well-known and almost universally used machine are all of quite recent introduction, being the invention of men who, for the most part, are still (1878) alive. Although really practical and efficient sewing-machines are thus the invention of our own day, many attempts to produce apparatus capable of imitating hand-sewing and similar effects were made at earlier periods; but none of these was successful except within very narrow limits. The early inventors set themselves chiefly to imitate by mechanical

means the ordinary process of hand-sewing with all its disadvantages of a limited and ever-varying length of thread, slowness of operation, and constant friction on the thread. The invention of the double-pointed needle with an eye in the centre, in the year 1755, marked a distinct advance towards the invention of the S.-M., and it was itself used in a form of machine for producing the 'shoemaker's stitch.' In the eye of the double-pointed needle the sewing-thread was fastened, and by a pair of grippers or mechanical fingers the needle was pushed and pulled alternately from the opposite sides of two folds of the material to be sewed. Another form of apparatus which was at one period in use in print and dye works consisted of two fluted rollers between which the edges of cloth to be united were passed, whereby they were so crimped or folded together, that they were easily 'spitted' on a long straight needle, held stationary between the wheels, and thus a kind of running or basting stitch of an insecure nature was produced. In 1853 Barthelemy Thimonnier, a Frenchman, obtained in his native country a patent for a form of S.-M. which was for some time successfully worked, and which was in effect the parent of the single-thread machines now in use. In Thimonnier's apparatus, which was constructed largely of wood, the thread-carrier was placed under the table whereon the fabric to be sewed was laid. The needle was in the form of a crotchet hook, and having a descending and ascending motion, it passed through the cloth, brought up a loop of thread, which was caught and retained by a nipple till the hooked needle brought up a second loop. The second loop passed through loop No. 1, which thereupon was released and drawn tight, a chain stitch was thus formed, and the cloth being moved forward the length of a stitch, the process was repeated and continued. The apparatus was for some time in considerable use in France, being adapted for embroidering as well as sewing, and when worked without any cloth it formed an ordinary crochet chain or looped cord. The invention of the eye-pointed needle by Newton & Archibald, patented in 1841, and applied by them to the stitching and tambouring of the back of gloves, formed the most important step in the progress of developing the S.-M., and in no essential principle did their machine differ from the single-thread machines now in use. In 1844 an invention by John Fisher was patented jointly with James Gibbons, in which a shuttle and needle were used for producing a lock-stitch, and by a different combination the patent covered the production of what subsequently was known as the Grover & Baker, or knotted stitch. Their machine was specially intended for stitching and ornamenting lace, but it was also described as useful for uniting fabrics. It will be thus seen that although the S.-M. is usually spoken of as being entirely American in its origin, all its essential features were covered by English patents before Elias Howe's invention was patented in America by himself, and in England by William Thomas in 1846. There is no doubt, however, that Howe, after several years' labour and study, worked out the idea of his S.-M. without any guidance from or knowledge of what had been previously accomplished; and he moreover secured such effective combination of parts as made the Howe machine in reality the acknowledged parent of all the forms since introduced. Mr. Howe's patience and tenacity of purpose did indeed as much for the success of the S.-M. as his inventive skill. His patent-right for Great Britain was sold for £250 to Mr. Thomas, in whose employment Mr. Howe worked for about two years. On returning to America in 1849, Howe found that his patent-right notwithstanding, several individuals had made, exhibited, and used sewing-machines, although not a single machine had yet been made in America under his patent. He had therefore to face the task of vindicating his rights, and at the same time to introduce to the public his machine. It was not till the end of 1850 that the manufacture of his machine actually began, and it was 1854 before a decision in his favour against J. M. Singer was obtained, in which the judge declared that 'for all the benefit conferred upon the public by the introduction of a S.-M. the public are indebted to Mr. Howe.'

The modifications, improvements, and additions made to the S.-M. since its introduction are innumerable. It has now been adapted to produce almost all kinds of stitching which can be done by the hand; and every variety of work required on garments. The leading classes of machines are—

- 1st, Single-thread machines.
- 2d, Machines with two or more threads.
- 3d, Overhead or glove-stitch machines.

Single-thread Machines.—The stitch made by the ordinary form of single-thread machine is precisely what is known as the crotchet-stitch, and when the thread is broken at any point the whole work readily undoes. Ordinary single-thread machines, unless for limited applications, such as glove embroidery, are passing out of general use. It is different, however, with the Willcox & Gibb's single-thread machine, in which a revolving double-hook or looper is employed which gives each loop a twist and produces thereby the twisted chain-stitch, combining a solid fastening with great elasticity and smoothness. The Willcox & Gibb machine is very simple in construction, light to work, fast and noiseless, and altogether well adapted for family use.

Two-thread Machines.—Of these machines two subdivisions may be recognised—the lock-stitch, and the knotted or double chain-stitch, commonly called the Grover & Baker machines. Of these, the lock-stitch machines are by far the most common, and for general purposes are in almost universal use. For producing the lock-stitch there are two forms of apparatus—1st, the reciprocating shuttle which carries a thread through the loop made by the needle; and, 2d, the lenticular spool or thread-case over which the loop is passed by a revolving hook. Of the first kind—shuttle-machines—the Howe, the Singer, the Wanzler, and others are familiar forms; the second, or spool and hook appliance, is a peculiarity of the Wheeler & Wilson alone. In the various shuttle-machines the driving-gear and other details are different, but, as now perfected, the essential combinations and action of the whole are similar. The principal points for consideration are the tension of the upper thread, the motion of the eye-pointed needle, the action of the presser foot and the feed motion, and the driving of the shuttle on the shuttle race, with the adjustment of the tension of the shuttle thread. The upper or needle thread tension is secured in most machines by passing the thread round a circular disc or pulley, to the revolution of which any required amount of friction may be applied by the adjustment of a spring pressing against it. The needle was originally fixed at the end of a vibrating arm, and, describing the arc of a circle, it required to be curved. Singer first introduced the straight needle carried by a slide, and it now is in general use. The presser foot keeps the material firmly pressed against the surface plate by a spring pressure, which can be varied to suit the nature of the work. Next to the invention of the eye-pointed needle the designing of an efficient feed-motion was the most important improvement made in the S.-M. Singer introduced what is called the wheel-feed, but the plan now adopted is one of the many ingenious and beautiful mechanical devices introduced by Mr. A. B. Wilson of Wheeler & Wilson. It is called the four-motion feed, and consists of a serrated plate to which a forward, down, backward, and up motion is communicated, the forward and backward motion being varied according to the length of stitch. The tension of the thread in the shuttle is maintained by a small nipping spring which presses against the thread, Howe's original plan having been to secure friction by passing the thread through several holes in the side of the shuttle. In the Wheeler & Wilson machine the use of the shuttle is entirely avoided, and the lock-stitch is formed by carrying the loop from the upper thread over and around the under thread, which is contained within a small lenticular spool, which fits snugly but free in a recess in the side of the revolving hook. This exceedingly ingenious device, together with the four-motion feed above alluded to, place Mr. A. B. Wilson, their inventor, in the front rank of improvers of the S.-M. The Wheeler & Wilson machine as a whole works with great ease and smoothness, and as the machine can be noiselessly worked at a high speed, it is a great favourite for general domestic and light manufacturing uses. The ordinary Grover & Baker machine makes a knotted or double loop chain stitch of a complex character. For general purposes it is not now in great favour, owing to the ridged nature of the seam it makes, and to the considerable waste of thread the peculiar nature of the stitch involves. On the other hand, the machine is rapid and smooth in action, it takes both upper and under thread direct from the spools, and for ornamental purposes its stitch is very useful and effective. Special machines have been devised for working button-holes, and by attachments to the ordinary machines button-hole stitching can be secured.

Overhead S.-M.—In overhead stitching two edges are sewed together by the thread passing over and binding in their outer extremities, a style of sewing generally seen in gloves and in-

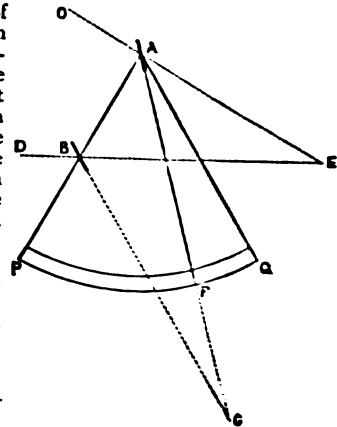
variably used for sacks. In order to effect the sewing of sacks with this stitch by machinery, many attempts have been made, and some of them have attained a degree of practical success. In Laing's overhead machine, invented and manufactured in Dundee, a helical needle is employed, which in its mode of rotation passes from end to end of the sack seam, drawing the thread through with it. Other forms of overhead machine, it is understood, are at present being experimented on; but the difficulties to overcome in this style of sewing are very serious.

Sexagesima (Lat. 'sixtieth') is the Sunday which represents the sixtieth day before Easter (a. v.), although it is actually the fifty-sixth, and is named by analogy from Quinquagesima (q. v.), the first Sunday in Lent (q. v.).

Sexagesimal Arithmetic, a method of computation used by the ancient astronomers for facilitating calculations, such as division and extraction of roots. Numbers were grouped in sixties instead of in tens as in the modern decimal system. To this day the method is employed in angular and time measurements.

Sex'tant, an instrument for measuring the angular distance between two given objects. The name is derived from

the form of the instrument, which is a sector of a circle bounded by an arc of 60°. The principle of the S. may be thus stated: If an object is seen by reflection from two mirrors which are perpendicular to the same plane, the angle between the object and its image is double the inclination of the mirrors. Let A, B, be the two mirrors perpendicular to the plane of the paper, O the object, and E the eye. OABE is the path of the reflected ray, and the image will be seen in the direction of D. Produce the directions of A and B till they meet at C. Produce A B to P.



By the law of reflection $\angle BAC = \angle EAC$ and $\angle PBC = \angle EBC$. Hence by Euclid I. 32

$$\begin{aligned} BEA + BAE &= PBE \\ &= 2 PBC \\ &= 2 (BCA + BAC) \\ &= 2 BCA + BAE \end{aligned}$$

and therefore

$$BEA = 2 BCA$$

In the S., the mirror A is attached to a movable limb AR, which can be set in any position between AQ and AP (see cut). The other mirror is fixed upon the limb AP, and is parallel to AQ. When AR is coincident with AQ, the index points to zero, and the mirrors are parallel. Further, $\angle BCA = \angle RAQ$; so that the angle subtended by the arc RQ is half the angle OED. Hence if D be a second object, and the image of O be made by moving AR to overlap it, the angle between these objects is twice the angle RAQ. The S. is usually employed for finding the altitude of a heavenly body, the image of which is brought into coincidence with the horizon viewed directly. To save trouble, the graduated limb is divided into 120 parts, so that the real angle between the objects is read off at once. The extremity R is provided with a vernier, and is furnished with clamps for fixing it in any required position. A complete instrument is also supplied with adjusting screws for setting A and B perpendicular to the plane of the S., and for fixing B in its true position parallel to AQ. Darkened glasses for shading either mirror, so that the sunlight is sufficiently diminished, are also sometimes necessary. The first instrument made upon this principle was Hadley's Quadrant. Sir Isaac Newton, however, had previously described a very similar instrument; so that to him the first idea of employing the laws of reflection for accurately measuring angles is undoubtedly due.

Sex'ton, is a corruption of *Sacristan*, one to whom the sacred vestments, &c., belonging to a church are intrusted. The duties

of the S. in the Church of England, who corresponds to the Scotch Beadle, are to keep the church clean, open it for divine service, wait upon the clergyman, act as grave-digger, &c.

Sex'tuplet or **Sextolet**, in music, six notes grouped together to be played in the time of four; in fact, a double triplet.

Sexual Selection, a biological theory, first enunciated by Mr. Darwin as part of his hypothesis of Descent of Natural Selection. In this theory the propagation of the characters and variations of animals and plants is said to be largely due to the selection by the females, as mates of the best-favoured and most brilliantly coloured males, and to the battles of males for the females. Of this theory Darwin says:—'This form of selection depends, not on a struggle for existence in relation to other organic beings, or to external conditions, but on a struggle between the individuals of one sex, generally the males, for the possession of the other sex. The result is not death to the unsuccessful competitor, but few or no offspring. S. S. is therefore less vigorous than natural selection. S. S., by always allowing the victor to breed, might surely give indomitable courage, length to the spur, and strength to the wing to strike in the spurred leg, in nearly the same manner as does the brutal cockfighter by the careful selection of his best cocks.' The theory is combated by Mr. Wallace in his *Tropical Nature* (1878).

Seychelles' Cocoa-Nut, or **Double Cocoa-Nut** (*Lodoïcia Seychellarum*), is a remarkable palm found only on two or three small rocky islands of the Seychelles group. The fruit takes several years to come to maturity, when it attains a gigantic size, weighing often 40 to 50 lbs., and consists of a thick fibrous rind enclosing one or more nuts divided half-way down into two lobes. The unripe fruit is eaten, and the hard black shell of the nut is carved into ornaments and Fakirs' drinking-cups. The leaves when young yield a beautiful material for basket and plaited work; hats, fans, &c., are made from them; when full grown they are used for partitions and roofs of houses. See PALMS.

Seychelles' Islands, an archipelago of about 30 small islands belonging to Great Britain, situated in the Indian Ocean between 30° 40'—5° 35' S. lat., and 55° 15'—56° E. long. The largest island is Mahé, which has an area of 60 sq. miles, and on it is Port Victoria, the principal settlement. The islands are girt by coral reefs, but are of granitic formation and mountainous, reaching a height of 3000 feet in Mahé, and 2500 feet in the smaller island of Silhouette. Flat, sandy beaches, studded with lagoons, intervene between the mountains and the sea. The climate is healthy, and hurricanes are rare. In some of the islands the soil has been almost entirely washed away by the rains, but as a rule they are fertile, and are capable of yielding large crops of all kinds of tropical produce. Cocoa-nut oil and fibre are the chief products, but cloves, vanilla, coffee, cotton, and tobacco are also exported. The cultivation of the sugar-cane has ceased of late years. In 1875 the total value of the imports was £32,373, and of the exports, £28,934. The French were the first to settle the S. I. in 1756, but in 1778 they destroyed all the spice-bearing plants to prevent them from falling into the hands of the British, who, however, took possession of the group in 1794. In 1815 it was ceded to Britain along with Mauritius, of which island it now forms a dependency. Pop. (1871) 11,082. See *Account of the Seychelles*, by Sir Edward Belcher; *Report on the Seychelles*, by J. Horne (1875).

Seymour, **The House of**, derives its surname from St. Maur in Normandy, and in the 13th c. became possessed of Penhow, Woundy, &c., in the county of Monmouth. A Sir John S. helped to suppress the rising of Lord Audley and the Cornish rebels (1497), for service in the French wars was created a knight-banneret (1513), and dying January 21, 1536, left six children. Of these Jane, third wife of Henry VIII. and mother of Edward VI., died October 23, 1537, and Thomas, Lord S. of Sudeley, Lord-Admiral of England, and second husband of Queen Catherine Parr, was brought to the block (March 20, 1549) by his eldest brother Edward. The latter, raised to the peerage as Viscount Beauchamp (1536), and created Earl of Hertford (1537), was appointed by Henry VIII. one of his executors and head of the Council of Regency to Edward VI. (q. v.), but by that council was straightway chosen Protector, with the title of Duke of Somerset, February 16, 1547. He carried on the sweeping religious changes of Cromwell, defeated the Scots

at Pinkie, but by his brother's execution alienated the populace, and by popular concessions the nobility, so that he fell an easy prey to Northumberland (q. v.), being sent to the Tower (October 1549), temporarily released, but again arrested and beheaded, January 22, 1552. Elizabeth in 1558 restored the titles Baron Beauchamp and Earl of Hertford to his eldest son by a second marriage, Edward S., who fell, however, into great disfavour with the queen through his union with Catherine, Lady Jane Grey's sister, and lay for nine years in the Tower. So, too, his grandson, Sir William S., awoke the jealousy of James I. by seeking to wed the Lady Arabella Stuart, and had to flee the country; but having played a gallant part in the Great Rebellion, he obtained a reversal of his ancestor's attainder, and on 13th September 1660 became second Duke of Somerset, only to die in five weeks' time. Charles, the fifth duke, commonly known as the 'Proud Duke of Somerset,' married the heiress of the house of Percy (q. v.), and died in 1743, having held high offices in the courts of Charles II., William III., and Anne; and his sole surviving son Algernon dying in 1750 without male issue, the dukedom reverted to Sir Edward S., eldest descendant of the Protector Somerset by his first marriage. Sir Edward's great-grandson, Edward Adolphus (born September 20, 1804), the twelfth and present duke, inherited the title in 1855, and having no male issue living, will be succeeded by his brother Archibald-Henry-Algernon (b. December 30, 1810), or failing him by his second brother Algernon-Percy (b. December 22, 1813).

Seymour, **Horatio**, an American politician, born at Pompey, Onondaga county, New York, May 31st, 1810. He was admitted to the bar in 1832, and in 1841 began his political career as a member of the State Assembly on the Democratic side. He was elected Governor of the State in 1853, and in 1854 vetoed a prohibitory liquor law, on which account he lost the Governorship in 1855, but was re-elected in 1862. In 1868 he was nominated for the Presidency, but was defeated, and has not since taken much part in politics.

Seyne, La, a town of France, department of Var, on the Mediterranean, 3 miles S.W. of Toulon. It has a large harbour and handsome wharves. Pop. (1876) 8152.

Sforza, the name of a powerful Italian family of the 15th and 16th centuries, which sprang from Giacomozzo Attendolo, a peasant of the Romagna (born June 10, 1369), who as a *Condottiere* gained the surname S. ('the vanquisher,' lit. 'the forcer'), and played a prominent part in Naples under Joanna II., gaining great possessions, and becoming Grand Constable of Naples. He was drowned in the river Pescara, January 4, 1424.—His natural son, **Francesco Alessandro S.**, born at San Miniato, July 23, 1401, inherited the command of his father's mercenaries, and served as a *Condottiere* in several states, especially Venice and Milan. He married Bianca, illegitimate daughter of Filippo Maria Visconti, and after the death of the latter (1447) seized (1450) the duchy of Milan, which he ruled with prudence till his death (March 4, 1466). See P. Urquhart, *Life and Times of Francesco S.* (2 vols. Edin. 1852).—His cruel and dissolute son and successor, **Galeazzo Maria S.** (born at Fermo, January 14, 1444), was slain by conspirators, December 26, 1476.—**Giovanni Galeazzo Maria S.** (born in 1458), son and successor of the latter, was driven from the throne and probably poisoned (1494) by his father's brother, **Lodovico Maria S.**, surnamed **Il Moro** ('the Moor'), who, to confirm his usurpation, induced Charles VIII. of France to attack Naples (1494), to which the French house of Anjou laid claim. Soon foreseeing this policy fatal to his family, he joined (1495) the league against France, and was deposed (1499) by Louis XII., who claimed his lands as a descendant of a *legitimate* daughter of the Visconti family. In 1500 Lodovico returned with an army of Swiss, who betrayed him to the French, by whom he was kept in confinement till his death at Loches in Touraine, May 17, 1508.—His son, **Massimiliano S.** (born 1491), with the help of Swiss soldiers, gained possession of Milan in 1512, but after a defeat at Marignano (1515) was forced to resign it to François I., receiving a yearly pension. He died at Paris in June 1530.—**Francesco Maria S.** (born in 1492), brother of the preceding, became Duke of Milan in 1524, and in 1529 was acknowledged as such by the Emperor Karl V. The last of his line, he died at Milan, 24th October 1535, and Karl V. took possession of Milan as a lapsed

Ed. See Ratti, *Memorie della Famiglia S.* (2 vols., Rome, 1794-95), and Sismondi, *Histoire des Républiques Italiennes du Moyen-Age* (10 vols., Par. 1840).

Sforza'to (Ital. 'forced') in music. When a note is to be placed with greater emphasis than others, the sign *sf.* is placed above or below it.

Sgraffi'to (Ital. 'scratched'), a species of ornamentation in plaster wherein a design is scratched with a bodkin through a thin white coat, exposing a dark-coloured substratum, which serves as a shadow. After being used as a means of decorating pottery, S. was employed for mural decoration and carried to great perfection in Italy in 15th and 16th centuries. Old examples of it exist at Padua, Mantua, Pisa, and many other Italian towns. S. has been revived of late years in Italy, Germany, and England for the decoration of buildings. At the South Kensington Museum in London the method pursued is as follows:—On a rendered surface of Portland cement a coat of dark-red plaster $\frac{1}{4}$ inch thick is laid, and while still moist it is covered with a thin layer of light-coloured plaster 'floated' on evenly. The intended design is then traced with a style on the wet plaster, which is cut accordingly with a knife.

Shabb'athai Zewi, a Jew, born at Smyrna, 1641, was a convert to the fantasies of Isaac Luria, a great student of the Cabbala, who declared that he held intercourse with the prophet Elijah, and that he was the Messiah, the son of Joseph. The notion of two Messiahs occurs in the Talmud: a 'son of David,' and a 'son of Joseph,' the latter being the forerunner of the former, and destined to suffer death in the struggle with the enemies of the kingdom of God. S. Z. himself came forward first as a prophet, and then gave himself out for the Messiah, and, notwithstanding that he was repudiated by the Rabbis, gained a large number of followers among his co-religionists. Although S. Z. was converted to Mohammedanism (1667), the sect survived, and still acknowledged him as the Messiah. This they were enabled to do by justifying his apostasy, which they did on the ground that 'the form of religion which he proclaimed stood as far above Judaism as it did above Christianity and Mohammedanism, was destined to absorb all the three, and consequently was indifferent to each one's particular usages.' One of the principal tenets of the sect was that the Talmud was full of errors and promoted immorality. From the great veneration they paid to the Cabbala, and especially the book Zohar, they received the name of Cabbalists or Zoharites. They acknowledged a Trinity in the Godhead, regarding Adam as an incarnation of the divine nature and the second Person, and their Messiah as the third. There are said to be some remnants of the sect still lingering in Poland and Turkey. See Franck, *La Kabbale* (Par. 1843), and Worman's *Historic Studies*, in Dickinson's *Homiletic Monthly*, July and August 1878.

Shad (*Alosa*), a genus of *Teleostean* fishes, belonging to the Herring family (*Clupeidae*). It is found in the river-estuaries of Britain, France, and other parts of Europe, as well as of America and Canada. The common or Alice S. (*Alosa vulgaris*), and Twaite S. (*A. furca*), are the two best-known species. The S. inhabits the sea, but haunts the estuaries of rivers, which it ascends for the purpose of spawning in spring. It resembles the herring in shape. The common S. may measure even 2 feet in length, and is named in Scotland the 'Herring King;' it is more abundant in the Severn than in any British river. The Twaite S., common in the Thames, attains a length of from 12 to 15 inches, and may not be captured after June in the Thames.

Shadd'ock (*Citrus decumana*) is a tree of 12 to 18 feet high, with large, wing-stalked leaves, a native of China, whence it was introduced by Captain Shaddock into the W. Indies. It is also grown in the orange districts of S. Europe. The fruit is of a handsome light-yellow colour; the rind thick, white, and spongy within, and very bitter; the pulp watery and sub-acid. S. is brought to table more as an ornament than for use, but both pulp and rind are made into preserves. In certain varieties the fruit sometimes attains a weight of 20 lbs. These large fruits are known as Pompelmooses (q. v.), and the small kinds are the Forbidden Fruit (q. v.) of the fruit market.

Shad'ow of a body is the portion of space from which that body cuts off the light of a luminous source. If the luminous source were a mere point, the S. would be sharply defined.

Practically, however, this is impossible. Our luminous sources are usually of definite dimensions, and since each point of the source casts a S. of the body, the S. which is really seen is made up of a numerous number of shadows. Where these component shadows overlap, the compound S. is darkest, while towards its borders it passes by insensible gradations from this darkest tint to light. The central portion of such a S. is called the *umbra*, the lighter portion the *penumbra*.

Shadwell, Thomas, an English dramatist, belonged to a good Staffordshire family, and was born at Stanton Hall, Norfolk, in 1640. Educated at Caius College, Cambridge, he studied law in the Middle Temple, and after some foreign travel, settled in London as an author. His first effort for the stage was a tragic-comedy, entitled *The Royal Shepherdess* (1669). Of his subsequent productions, the chief are the comedies of *The Sullen Lovers* and *The Humourists* (1669-70), *The Miser* (1671) from Molière, the tragedies of *Psyche* (1675) and *The Libertine* (1676), and the comedies of *Epsom Wells* (1678), *The Lancashire Witches* (1682), *Bury Fair* (1689), and *The Scourers* (1690). S. became Poet Laureate in 1688, and died November 19, 1692. He was a reckless, inartistic, licentious writer, whose talent never found adequate expression through his pen. 'His plays,' says Robert Bell, 'sealed up by their indecencies from the present generation, exhibit fertility of invention and considerable capacity of observation.' The Earl of Rochester said of S.: 'If he had burnt all he wrote and printed all he spoke, he would have had more wit and humour than any other poet.' Unhappily for his memory, he provoked the enmity of Dryden, who in his *Mac Flecknoe* has inflicted on S. everlasting punishment.

Shafarik, Paul Joseph, a great Slavic philologist, born 13th May 1795 at Kobelyarovo in N. Hungary, was educated at Kásmark Lyceum (1810-15) and the University of Jena (1815-17). In 1819 he was appointed director and professor of *Humaniora* at the Servian gymnasium at Neusatz. He resigned the directorship in 1825, holding the other post till 1833, when he removed to Prag. Here in 1848 he became librarian of the Public and University Libraries. He died at Vienna, 26th June 1861. His chief works are *Geschichte der Slav. Sprache und Literatur nach allen Mundarten* (Ofen 1826); *Ueber die Abkunft der Sklaven* (1828); *Serb. Lesekörner* (Pest. 1833); *Slovanské Starostnosti* (Prag 1837; Ger. trans. 2 vols. Leip. 1842-44); *Die ältesten Denkmäler der böhmischen Sprache* (1840); *Slovansky Narodbyis* (1842; 3d ed. 1850); *Denkmäler der glagolitischen Literatur* (1853); *Glagolitische Fragmente* (1856); *Ueber Ursprung und Heimat des Glagolitismus* (1858).

Shaftesbury, a decayed market town of Dorsetshire, England, stands on a hill, 22 miles W.S.W. of Salisbury, and 3 S.W. of Stempley station. Out of twelve churches but three remain—St. Peter's, a Norman structure; Holy Trinity (rebuilt 1842); and St. James' (rebuilt 1867), other buildings being the town-hall, market-house (270 feet in length), literary institute (1852), the Westminster Schools (1871), and Westminster Cottage Hospital (1874). Glovemaking, the chief industry, employed 156 women in 1871. S. returns one member to Parliament, and publishes one weekly newspaper. Pop. (1871) 2472. At S. (the *Caer Palladur* of the Britons) Eadward the Martyr was buried (979), and here Cnut died (1035).

Shaftesbury, Anthony Ashley Cooper, First Earl of, was born at Wimborne St. Giles, in Dorsetshire, 22d July 1621, and left an orphan by the death of the knight his father (1620), himself defended his property from an uncle's greed. In his seventeenth year he went up to Exeter College, Oxford; in his eighteenth married; and in his nineteenth sat for Tewkesbury in the Short Parliament. When the Civil War broke out he was with the king at Nottingham, 'as a spectator, not having as yet adhered to the Parliament;' but in 1643 he accepted the governorship of Weymouth, and raised a regiment for the royal service. Presently, 'following the dictates of a good conscience' (i.e., foreseeing the king's defeat), he took himself over to the Parliament, fought for it valiantly in the south-western counties till the Self-Denying Ordinance cut short his career of arms (1654), and after some quiet years of country life became a Parliamentary Commissioner (1652), a Wiltshire member in Barebones Parliament (1653), and one of the thirty composing Cromwell's council. From pique or policy he broke with the Protector (1655), reviled his memory in Richard's Parlia-

ment, and next to Monk was the chief promoter of the Restoration. As Baron Ashley and Chancellor of the Exchequer (1661) he made the court the field of his ambition, toleration his passport to popularity; and, Clarendon's intolerance got rid of (1667), he leagued himself with Catholic Clifford and Arlington in the Cabal. The Deist champion of the Presbyterians, the temperate sharer in his king's debaucheries, the clean-handed judge who sat in judgment on regicides, his old allies, and winked at the closing of the Exchequer, at last he purchased toleration by consenting to war with Holland (1670), and for this same consent was made Lord Chancellor and Earl of Shaftesbury (1672). From Arlington he learnt how the Treaty of Dover contained a secret clause, known but to two in the Cabal, by which Charles bound himself to re-establish Popery, Louis to back him with men and subsidies; and the change in his policy was swift and absolute—from Declarations of Indulgence to Test Acts, from war with Holland to intrigues with the Prince of Orange, from a seat in the Cabal to the leadership of the 'Country Party.' Deprived of the Seals in 1673, he worked the cries 'No Popery' and 'Liberty,' successfully opposed the passive-obedience principles of Danby's Bill (1676), but for his daring protest against a prorogation of fifteen months endured a year's imprisonment in the Tower (1677-78). The frenzy of the Popish Plot brought S. back to power; as President of the Council (1679) he carried the Habeas Corpus Act, and in the Lower House a bill excluding James; but by the recognition of Monmouth's pretensions divided his party and earned his own dismissal. The 'Meal-Tub Plot' was swamped by a reaction, 'abhorrrers' outnumbered the 'petitioners,' the Duke's presentment as a recusant miscarried, as also did the desperate Divorce Bill, and on 2d July 1681 S. was again committed to the Tower. A Middlesex grand-jury ignored his bill of indictment; but hopelessly committed against the Court, and failing to rouse his 'City boys' to insurrection, he fled disguised to Amsterdam, where, two months later, the 'fiery spirit' quitted the 'puny body fretted to decay,' 21st January 1683. All know the 'Achitophel' of Dryden's satire, the 'abhorred statesman' of whom Macaulay says that 'every part of his life reflected infamy on the other;' let them remember also that this was he whom Locke esteemed and loved, whom even Dryden acknowledged incorruptible, whose perfect charity Lady Russell bore witness to—'the great faulty human being in whom the faults are indissolubly blended with the greatness,' and to whose Habeas Corpus we owe the keystone of our liberties. See his *Life*, with its fragment of *Autobiography*, by W. D. Christie (2 vols. Lond. and New York, 1871).—**Anthony Ashley Cooper, Third Earl of Shaftesbury**, and grandson of the above, was born in London, 26th February 1671, and sent to Winchester at the age of twelve. Having made the grand tour (1686-89), he sat for Poole in Parliament (1694-98), succeeded his father in the title (1699), and in the Upper House was a staunch adherent of William III. On Anne's accession he withdrew from politics, and visiting Italy in search of health, died at Naples, 15th February 1713. The 'moral realist,' who like most prophets has had least renown in his own country, was author of an *Inquiry Concerning Virtue* (1699), *Letter on Enthusiasm* (1703), *Moralists; a Philosophical Rhapsody* (1709), *Essay upon the Freedom of Wit and Humour* (1709), and *Advice to an Author* (1710), all but the first collected in *Characteristics of Men, Manners, Opinions, and Times* (3 vols. 1711; ed. by the Rev. W. M. Hatch, vol. i. Lond. 1870). In an elaborate and tedious style he here maintains that everything is for the best, that ridicule is the touchstone of truth, and that man possesses a 'moral sense,' though whence derived he does not profess to ask. See Gierzycki's *Philosophie S.'s* (Leip. 1876).—**Anthony Ashley Cooper, Seventh Earl of Shaftesbury**, 28th April, 1801, and passed from Harrow to Christ Church College, Oxford. He took a first class in classics (1822), and four years later entered Parliament as a Tory, sitting for Woodstock (1826-30), for Dorsetshire (1831-46), and for Bath as a Liberal Conservative (1847-51). Under Wellington he was Commissioner of the Board of Control (1828-30), under Peel a Lord of the Admiralty (1834-35) and an Ecclesiastical Commissioner (1841-47). He succeeded to the earldom (1851), and since 1856 has been Lord-Lieutenant of Dorsetshire. His honours fade, however, before the honour of having spent his talents—rank, wealth, and eloquence—on bettering the condition of the poor. In the teeth of strong opposition he carried the Ten Hours' Bill for shortening the daily toil of children in mines and factories,

at the cost of a seat supported Peel in his free-trade policy, and with voice, and pen, and purse has forwarded a hundred educational and philanthropic schemes. An Evangelical, he is President of the Bible Society, the Pastoral Aid Society, and that for the Conversion of the Jews; and to him was ascribed the exclusive creation of Low-Church bishops during the premiership of Palmerston, his connexion by his marriage (1830) with Earl Cowper's daughter. She died 15th October 1872, having borne him four daughters and six sons, the eldest of whom, Anthony Lord Ashley (born 27th June 1831), has issue.

• **Shag.** See CORMORANT.

Shagreen (Fr. *chagrin*; Turk. *sagri*, the crupper skin of a mule or ass), a kind of parchment covered with raised granulations prepared in the East from the skins of horses and wild asses. It comes chiefly from Astrakhan. A strip of skin from the neck to the crupper only is used, and after being steeped cleaned, and scraped, the small seeds of a species of *chenopodium* are embedded by pressure into the grain side of the soft skin. When the skin is dry the seeds are shaken off, and the pits or depressions left by them are almost obliterated by shaving the skin. It is then placed in boiling water, which swells the former depressions, and causes them to rise above the surface. After steeping in lye, the skin is dyed, green being a prevailing colour. S. was formerly much used for covering spectacle, fan, and bijouterie cases.

Shah (Pers. 'king'), the abbreviation of the full title *S.-in-S.* ('king of kings') of the sovereigns of Persia and Afghanistan. The title of a king's son is *Shahzada*.

Shahabad, a district in Bengal, British India, which lies S. of the Ganges and borders on the N.W. Provinces. Area, 4385 sq. miles; pop. (1872) 1,723,974. Away from the river forest-clad hills rise abruptly to the plateau of Central India. The inhabitants are largely Rajputs, who formerly enlisted in the Bengal native army and rose against the British in 1857. Arrah, the chief town of the district, was the scene of an heroic defence and final relief by Major Vincent Eyre. The stronghold of the Rajput ringleader at Jugdespore was razed to the ground. Other places are Sasseram and the hill fort of Rohtasgurb. In S. district are the head-works of the Sone Canal (q. v.). In 1876-77 the registered exports, chiefly sugar, indigo, food-grains, and oil-seeds, were valued at £329,000; the imports, which included cotton goods and salt, at £414,000. The district is traversed throughout its entire length by the E. Indian Railway.

Shah Alum ('king of the universe'), the last of the Mogul emperors of Delhi who exercised even a nominal independence, reigned from 1759 to 1806. For twelve years he was an exile, chiefly at Allahabad, where on 12th August 1765 he granted to the E. India Company the Dewanny of Bengal, Behar, and Orissa. In 1771 he put himself under the power of the Mahrattas, but in 1788 a Mahomedan rebel, Ghulam Kadir, seized Delhi and with his own dagger struck out the emperor's eyes. The Mahratta chief Scindiah avenged this crime; and Lord Lake in 1803, after defeating the Mahrattas outside Delhi, placed S. A. in a position of comparative affluence during the three last years of his long and miserable life.

Shah Jehan ('king of the world'), the fifth Mogul emperor of Delhi, was the son of Jehangir and father of Aurang-zib, reigned from 1628-58. Though the third son, he was at first his father's favourite. He led the army which finally crushed the Rajputs in 1614, but afterwards rebelled against Jehangir, and maintained himself for a time in independence in Bengal. On his father's death in 1628, he established himself on the throne by putting to death all of the line of Baber, except his own children. The Mogul Empire now reached its zenith. The Deccan was subdued, and also the Mahomedan kingdom of Golconda; Afghanistan was for a time in his possession, and neither the Mahratta nor Sikh power had yet arisen. The Portuguese were exterminated at Hooghly. The Mogul architecture was also at its height. Delhi was rebuilt, and renamed Jehanabad; the peacock throne worth £6,500,000 sterling was constructed; and the world-renowned Taj Mehal was erected at Agra as the mausoleum of the empress, Mumtaz Mehal. But the unfilial conduct of S.-J. was revenged upon

himself. His third son Aurangzib had determined to be his successor. Taking advantage of a sudden illness of his father, he defeated his three brothers and threw S.-J. into prison at Agra (1658), where he died in December 1666. He left a treasure of £24,000,000 in coin, besides wrought gold and silver, and jewels.

Shahjehānpore, the chief town of the district of the same name, in the N.W. Provinces, British India, on the Gurrāh river, a tributary of the Ganges, 102 miles N.W. of Lucknow by rail, and 43 S.E. of Bareilly. It is a large town, with considerable trade, and contains several stately old mosques and a fort. In 1857, the sepoy regiment stationed here mutinied. The gaol was opened, and the treasury plundered; some of the Europeans were killed, and the rest escaped to be destroyed yet more miserably at Mohumdee, in Oudh. Pop. (1872) 72,136.—The district of S., which lies between the foot of the Himalayas and the Ganges, has an area of 1723 sq. miles; pop. (1872) 949,579. The crops are rice, maize, wheat, cotton, and sugar-cane. This tract was formerly part of Rohilcund, and was ceded to the British in 1801.

Shake (*trillo*, Ital.), a musical embellishment consisting of the rapid alternation *ad libitum* of two notes, a tone or a semitone apart. It is an effective device much used by instrumental and vocal soloists, chiefly towards the close of a theme. The S. often begins slowly, increasing in rapidity as it proceeds, thus—

When preceded by an appoggiatura it usually ends with a turn. A succession of shakes is called a chain (*catena*).

Shakers, (1) the popular name of the oldest communistic religious sect in America, which formally designates itself 'the Millennial Church or United Society of Believers, commonly called S.' Its founder, Ann Lee, a blacksmith's daughter, was born at Manchester, England, 29th February 1736. A religious agitation having broken out in the Quaker body to which Ann belonged, she placed herself at the head of the movement, with pretensions to divine authority. Being imprisoned in 1773 for obstructing the thoroughfare, she received a vision telling her to go to America, whither she sailed with eight followers in 1774, settling at Watervliet, 7 miles N.W. of Albany, in 1775. She gained few converts till 1780, when she reaped a rich crop during a revival among the Baptists. Her death occurred at Watervliet, 8th September 1784, and she was succeeded by Elder James Whittaker, under whose *regime* the first chapel was built (1785). In 1792 the first society of S. was constituted at New Lebanon. The sect spread with some rapidity, and by 1830 comprised eighteen societies, distributed over seven states. No new societies have been founded since 1830, though their membership has been pretty well maintained. In 1874, 18 societies comprised 58 families or separate communities containing 695 adult males, 1189 adult females, 192 boys, and 339 girls, in all 2418 souls. Their farms amounted to 49,335 acres, and as much more land owned by them was let to the 'Gentiles.'

The chief doctrines of the S. creed are:—I. God is a dual person. II. Christ is a spirit. Jesus represents his male, Ann Lee his female element. III. The religious history of man is divided into four cycles, the last commencing with Ann Lee. IV. The Society is the true church of the last dispensation. V. Its members have the five great principles of the Pentecostal Church—viz., community of goods, a life of celibacy, non-resistance, separate government, and power over physical disease. VI. They reject the Trinity, the resurrection of the body, and the Atonement. VII. They are spiritualists. The S. are chiefly engaged in agriculture; their homes are spotlessly clean, though they will not admit anything beautiful. Men and women are on a footing of absolute equality; every one is compelled to share in some manual labour. The strictest celibacy is maintained. The sexes occupy different parts of the houses, and at the meals, which are taken in silence, sit on opposite sides of the table. Their religious service consists largely of singing some of their grotesque hymns, and of the peculiar shuffling dance which

gained for them their name. They are governed by elders and ministers who appoint their own successors. They are divided into two orders—a church order and a novitiate order, which newcomers must pass through.

The S. draw their converts from all classes—clergymen, lawyers, doctors, farmers, students, mechanics, sea-captains, soldiers, and merchants, but most largely from clergymen of the Baptist, Methodist, Presbyterian, and Adventist persuasions. Revivals are their chief sources of recruitment. Fred. W. Evans (Brother Frederick) calls them 'the hotbeds of Shakerism.' The S. have many quaint customs. They do not shake hands, wear a plain dress, 'have no scandal, no tea-parties, no gossip.' A monthly magazine is issued called *Shaker and Shakeress*. See *The Kentucky Revival*, &c., by M'Nemar, Turtle Hill, Ohio (1807), *Testimony of Christ's Second Appearing*, Albany (1856), *S.'s Compendium of the Origin, History, &c., with Biographies of Ann Lee, &c.*, by F. W. Evans (1859), *Selection of Hymns and Poems for the Use of Believers*, Watervliet, Ohio (1833), *New America*, by Hepworth Dixon (Lond. 1867), and a very complete and interesting account in *The Communistic Societies of the United States*, by Charles Nordoff (Lond. 1875).—(2) S. is also the popular name of a small Society calling themselves Bible Christians, founded in 1869 by Mrs. Girling, wife of a farmer in Suffolk, England. She started a 'family' in London in 1871, on the basis of celibacy and community of goods, and in eighteen months moved to New Forest Lodge, near Lymington; but the only wealthy member having been transferred to a lunatic asylum, the 'family' got into debt and were ejected, 15th December 1874. After this they lived in a barn, and then in a field till August 1878, when they were again ejected. They indulge much in dancing, and live huddled together in a hovel. Their numbers have fallen from 130 to 80, including 38 women, 23 men, and 19 children.

Shakespeare, William, was born at Stratford-upon-Avon in the year 1564. It has been the fashion to quote the saying of George Steevens, that all we know of his life is that he married and had children in Stratford, 'went to London, where he commenced actor, and wrote poems and plays; returned to Stratford, made his will, died, and was buried.' This famous dictum represented unfairly even the knowledge which had been acquired in the end of last century, when Steevens wrote. Within the present century it has been entirely falsified by the labours of a host of scholars and antiquaries, who have provided us with a solid framework of unquestionable facts on which to arrange our conceptions of the most important life in the history of culture. In many cases, too, the facts afford a touchstone, enabling us confidently to accept or reject the traditions which at one time formed the staple matter of Shakespearian biography.

Facts.—The Shakespeares were an old Warwickshire family of the middle class. Dr. Ingleby enumerates nearly 70 different ways in which the name is spelt in legal and other documents. The poet himself, in four out of the six signatures which we possess, spells it 'Shakspere,' while the remaining two are doubtful; but his contemporaries so invariably adopt the longer spelling that it has as a rule been preferred, the more so as he himself sanctions it by permitting it to stand upon the title-pages of the only two of his works (*Venus and Adonis* and *Lucrece*) which are known to have been published under his own supervision. John S., the poet's father, was almost certainly the son of a Richard S., who resided at Snitterfield, a village near Stratford, where he rented some land from Robert Arden or Ardern, a yeoman of Willmecote, whose daughter, Mary, John S. afterwards married. The Ardens had been prosperous yeomen in the parish of Aston Cantlow since 1438. Robert Arden died in 1556, leaving to his daughter Mary a portion of his land, including the farm of Asbyes, and the reversion of a considerably more valuable property. Probably in the next year Mary married John S., who had settled in Henley Street, Stratford, as early as 1552. In 1556 he acquired copyhold property in Greenhill Street and Henley Street, and in the same year he is mentioned in a legal document as a *glouer*. His daughter Jane was baptized September 15, 1558, and on December 2, 1562, his daughter Margaret, who died in the next year. In these years John S. had passed through various grades of municipal dignity, being successively ale-taster, one of the four constables, and one of the four 'affectors,' appointed to determine fines for offences punished arbitrarily. On the 26th of April 1564 his son WILLIAM was baptized. Next year

(1565) John S. became an Alderman, and in 1568-69 he attained the summit of municipal distinction in Stratford, becoming High Bailiff. In 1571-72 he was Chief Alderman, and in 1575 he purchased the Henley Street property. From this point his fortunes seem to have gone down hill. From 1577 to 1586 his attendance at the corporation meetings was very irregular, and in the latter year he was deprived of his alderman's gown. In a document of 1579 he is described as a *yeoman*. The following are the dates of the births of his remaining children as gathered from the register of baptism:—Gilbert 1566; a second daughter, Jone, in 1569 (the death of the first Jone is not recorded); Anna 1571 (died 1579); Richard 1573 (died 1612); Edmund 1580. In 1578 John S. mortgages for £40 his wife's farm of Asbyes, and in this and the next year he appears as unable to pay certain minor municipal taxes. He is returned in 1586 as having nothing upon which a writ of *distringas* can be executed, and three writs of personal seizure are issued against him. In the next year he produces a writ of *habeas corpus*, thus proving that he had been imprisoned. Even so late as 1592 he appears in a list of nine persons who 'coom not to church for feare of proccesse for debtt.' After this date, however, as we shall see, incidentally, his circumstances seem to have improved again, probably through the assistance of his son William.

The first absolutely authentic event in the life of William S. is his marriage with Anna Hathaway, daughter of Richard Hathaway, a substantial yeoman of Shottery, near Stratford, and a family friend of the Shakespeares. The marriage bond is still extant, dated November 28, 1582, at which date S. was only eighteen, while his wife was nearly eight years older. Their daughter Susanna was baptized on the 26th May 1583, and their twin children Hamnet and Judith on the 2d February 1585. Then occurs a hiatus of no less than seven years, during which no indubitable reference to S. can be found. The certificate of 1589 in the Ellesmere papers, in which he appears as a sharer in the Blackfriars Theatre, London, is now regarded as a fabrication, and it is only by the most ingenious manipulation of facts, dates, and probabilities that Spenser's line in the 'Teares of the Muses' (1591), 'Our pleasant Willy, ah! is dead of late,' can be taken as referring to S. In 1592, however, we find an unquestionable allusion which exhibits S. as a dramatist in London well enough known to be hated and envied. Robert Greene the dramatist died on the 3d September 1592, and immediately after his death his friend Henry Chettle published his 'Groatsworth of Wit bought with a Million of Repentance,' in which Greene speaks of a rival playwright as 'an upstart crow beautifull with our feathers, that with his *Tygers heart, wrapt in a player's hyde*, supposes hee is as well able to bombast out a blank verse as the best of you; and being an absolute *Johannes fac totum*, is, in his owne conceyt, the onely Shake-scene in a cuntry.' That this diatribe alludes to S. it would be absurd to doubt; nor is the application dubious of the passage in Chettle's 'Kind-Hart's Dreame,' published a few months afterwards, in which he apologises for his friend's virulence against his rival 'because myselfe have seene his demeanor no lesse civill than he exelent in the qualitie he professes: besides, divers of worship have reported his uprightnes of dealing, which argues his honesty, and his facetious grace in writting, which aprooves his art.' In 1593 *Venus and Adonis* was published, with a dedication to Henry Wriothesly, Earl of Southampton, in which it is described by S. as 'the first heir of his invention.' In 1594 appeared *The Contention of York and Lancaster* (now 2 *Henry VI.*), as well as *Lucrece*, which also was dedicated to Southampton, and was in the same year alluded to with praise by Drayton in his 'Matilda,' and by an anonymous poet in a book called 'Willobie his Avisa.' In 1595 *The True Tragedy of Richard, Duke of York* (now 3 *Henry VI.*) was published. *Lucrece* is praised in a book called 'Polimanteia' of this year, in which, too, was published Spenser's 'Colin Clout's come Home Again,' containing a verse which may possibly allude to S. Two interesting documents in which S.'s name occurs are dated 1596, but unfortunately both are now looked upon as spurious. On August 11, 1596, Hamnet, his only son, was buried at Stratford. In this year, too, John S., the poet's father, applied to the Herald's College for a grant of arms, which was conceded in the following year. In 1597 were published a pirated copy of *Romeo and Juliet*, as well as *Richard II.* and *Richard III.*; and in this year S. bought New Place, one of the best houses in Stratford, of William Underhill, for £60; while we also find John S. and his wife engaging in a Chancery suit anent the mort-

gage on the farm of Asbyes. The year 1598 is peculiarly rich in facts and allusions. 1 *Henry IV.* and *Love's Labour's Lost* (the first play with S.'s name attached) were published. S. is mentioned in a Stratford return of grain and malt as holding 10 quarters: he sells a load of stone to the Stratford corporation for 10d.: he is assessed 13s. 4d. on property of £5 value in the parish of St. Helen's, Bishopsgate. A letter is extant, dated January, in which Abraham Sturley of Stratford recommends a correspondent in London to encourage S. to buy some land at Shottery; and in another letter, dated November, the same Sturley again alludes to S. On October 25th Richard Quiney, whose son Thomas afterwards married Judith S., wrote to S. requesting a loan of £30. He is known to have been one of the principal actors in Ben Jonson's 'Every Man in his Humour,' produced at the Globe in this year. But 1598 is above all notable as the date of publication of Francis Meres' 'Palladis Tamia' ('Wits Treasury'), in which the author alludes in terms of eulphuistic eulogy to 'mellifluous and honey-tongued S.,' mentioning 'his *Venus and Adonis*, his *Lucrece*, his *Sugred Sonnets* among his private friends,' as well as 'his *Gentlemen of Verona*, his *Errors*, his *Love Labours Lost*, his *Love Labours Wonne* [which has been by different critics identified with *The Taming of the Shrew*, *All's Well that Ends Well*, and *Much Ado*], his *Midsummer Night's Dreame*, his *Merchant of Venice*, and 'Richard II., Richard III., Henry IV., King John, Titus Andronicus, and his *Romeo and Juliet*.' In this year, too, were published Richard Barnefield's 'Poems in Divers Humours,' containing a eulogium of S. *The Passionate Pilgrim* (with S.'s name, but only partly his) and a perfect *Romeo and Juliet* were published in 1599, to which year also belongs the publication of Weever's 'Epigrams,' with a laudatory allusion to S. In 1600 were published 2 *Henry IV.*, two editions of the *Midsummer Night's Dreame*, two editions of the *Merchant of Venice*, *Much Ado About Nothing*, *Titus Andronicus*, and an imperfect copy of *Henry V.*, S.'s name being attached to all but the last two. Extracts from S. occur in two poetical anthologies published in this year. The poet's father died at Stratford in 1601. In 1602 an imperfect *Merry Wives of Windsor* was published, and *Othello* was acted before Queen Elizabeth. S. made large purchases of property in this year, buying 107 acres of arable land in the parish of Old Stratford for £320, a cottage in Dead Lane near New Place, and other land and house property to the value of £60. An imperfect *Hamlet* was published in 1603, and two allusions are made to S. in contemporary verse, one of them by Chettle, chiding him for not having written an elegy on Queen Elizabeth. On May 7th a warrant was issued constituting the former Lord Chamberlain's players, S. being one of them, 'the King's players.' In this year he took a leading part in Jonson's 'Sejanus.' *Hamlet* in its perfect form was published in 1604, and in the same year S. brought an action against Philip Rogers in the court of Stratford for £1, 15s. 10d. due to him for malt. S.'s largest pecuniary transaction of which we have record occurred in 1605, when he paid £440 for the unexpired term of a moiety of a lease of the tithes of Stratford, Old Stratford, Bishopston, and Welcombe, granted in 1544 for ninety-two years. It is inferred from a document of 1606 that S. was not at that date resident in Stratford. In the next year (1607) his eldest daughter, Susanna, married Mr. John Hall, a physician of Stratford, and his youngest brother, Edmund, an actor in London, died. To this year belongs the eulogium addressed to S. by John Davies in his 'Scourge of Folly.' Two editions of *King Lear* were published in 1608, in which year S.'s mother died at Stratford. Two more or less apocryphal documents in the Ellesmere collection bear this date, the one purporting to be a letter of the Earl of Southampton showing that S. had left the stage, the other a valuation of the Blackfriars Theatre, in which his property in the building and wardrobe is stated at £1433, 6s. 8d. In 1609 were published the *Sonnets*, *Pericles*, and two editions of *Troilus and Cressida* (bearing S.'s name, as do all the plays mentioned since 1600). In this year S. sues at Stratford a certain Thomas Horneby for a debt due by John Addenbrooke, for whom Horneby had become bail. To 1610 belongs another of the dubious Ellesmere documents, in which S. is appointed, along with three others, to preside over the children of the Queen's Revels. In 1611 we find him subscribing towards the expenses of a Stratford road-bill in Parliament. Two years afterwards he buys for £140 a house in Blackfriars, London. In the same year (1613) the Globe Theatre was burnt down during the first performance of

Henry VIII., and S. was engaged in a Chancery suit with reference to his Stratford tithes. In 1614 a project for the enclosure of some common lands near Stratford was warmly opposed by S., and in this year we find the last mention of his being in London. Eulogies by Thomas Freeman, and by the anonymous author of a poem called 'The Ghost of Richard the Third,' belong to the same date. On the 10th of February 1616, S.'s youngest daughter Judith married Thomas Quiney, a vintner of Stratford. On the 25th of March S. executed his will, leaving the bulk of his property to his daughter Susanna and her heirs, money bequests to a considerable amount to his daughter Judith, remembrances in money, plate, &c., to his sister Jone Hart, his 'fellows,' Hemynges, Burbage, and Cundell, and other acquaintances, and to his wife his 'second best bed, with the furniture.' On the 23d of April he died, and was buried two days afterwards in the old church at Stratford.

Traditions and Conjectures.—The sources of Shakespearean tradition can be numbered on the five fingers. Davenant (1605–1668), a Restoration dramatist whose general credibility may be judged from the fact that he claimed S. as his father on the strength of an old jest-book witticism; Aubrey (1626–1700), an antiquarian gossip; Betterton (1635–1710), a great actor but a poor sifter of evidence; Rowe (1673–1718), a third-rate dramatist of the Grub Street era: to one or other of these four can be traced almost all the well-worn traditions with which we have now to deal; and as the authority of each is about equally good or bad, it is useless here to refer every rumour to its first retailer. It is not improbable that the date of S.'s death (April 23) was also that of his birth. His father is variously represented as a wool-merchant and a butcher. We have seen that he is described in contemporary documents as a glover and a yeoman. The truth may be that he was by trade a glover, but acquiring land with his wife, became a butcher and wool-merchant, as is every farmer who kills his own meat and shears his own sheep. It is only natural to suppose that S. assisted his father, which may explain the tradition that he was apprenticed to a butcher, and that when he killed a calf he would 'doe it in a high stile and make a speech.' That S. attended the Free Grammar-School of Stratford cannot be doubted, and it is also not improbable that he was removed from it earlier than he would otherwise have been on account of pecuniary embarrassments at home. Ben Jonson's statement as to his 'small Latin and lesse Greeke,' has been interpreted as meaning that he was devoid of scholastic culture; but it is almost indisputable that however meagre might be S.'s learning in comparison with Ben's, it was not in itself contemptible. It is even said that he became a country schoolmaster; and it is conjectured, from a contemporary allusion to playwrights who had deserted their original trade of *Noverint*, that he was at one time apprenticed to a lawyer. At eighteen, as we know, he married. From many circumstances—the age of his wife, the short time which elapsed between the marriage ceremony and the birth of the first child, the fact of his migrating, apparently alone, to London, and only visiting his home at intervals of not less than a year, the trifling bequest made to his wife in his will, and other minor indications—it has been inferred that S. was entrapped by youthful passion into an ill-considered and ill-assorted union, and that his domestic life was unhappy. For such a theory there is no real ground. To say that Anne Hathaway was not intellectually a fit mate for him is a sheer nullity in criticism. Nothing in the life or character of S. requires us to believe, or even to imagine, that he wanted an 'intellectual' mate. The undeniable fact that among the yeoman class of Elizabethan England, as in some Lutheran countries at the present day, the formal betrothal or troth-plight was considered as the really essential element of marriage, to be followed by the legal formalities at convenience, takes away from the union the appearance of a tardy reparation for an error inconsistent with mutual respect. Mr. Knight, too, has pointed out that the jointure secured to the widow by law amply provided for her, so that the inference drawn from the will also falls to the ground. On the other side of the case, we may mention the tolerably authenticated tradition that at her death in 1623, Anne earnestly desired to be buried beside her husband, a wish which would surely not have occurred to her had their domestic life been one of contention or estrangement. The date of S.'s settlement in London has never been ascertained. It must have taken place from three to six years after his marriage—i.e., between 1585 and

1588. We need not retail the famous deer-stealing legend, which has formed the subject of so much idle controversy, and which is first mentioned in a scurrilous ballad of no value. The declining fortunes of his father had probably more to do with S.'s departure than the persecutions of Sir Thomas Lucy. Whether the visit to Stratford of Burbage's company of players in 1587 formed the final motive with S. for adopting the stage as a profession, it is impossible to say. In any case he is said to have commenced as a 'servitor'—perhaps what we would call a 'super;' or lower still, if we can believe the not impossible tradition that he held horses at the playhouse door, and afterwards, finding his business growing on his hands, organised a company of boys for the purpose, who were known as 'S.'s boys.' It is clear that he advanced rapidly from a 'servitor' to a player, then to an adaptor of plays, and then to a sharer in the theatres (the 'Globe' summer theatre, and the 'Blackfriars' winter theatre). This is not the place to discuss the chronology of his works, but it may be accepted as certain that his authorship commenced as early as 1590, though perhaps he may not have written any complete original play until two or three years later. As a player he was never very distinguished, taking inferior parts not only to Burbage and Kempe, but to several others in the company. The traditions which tell that the Ghost in *Hamlet* was 'the top of his performance,' and that he was successful as Adam in *As You Like It*, are not of a nature to excite scepticism. After 1595 we find his fame and fortune alike growing with great rapidity. Of the eulogistic contemporary allusions we have already spoken, as well as of the cautious and prudent investments in which the solid results of his popularity were embarked. After 1595, if not from the commencement of his London career, he longed for the quiet life of an English country gentleman, and with the calm power and self-containment which are never wanting in the very greatest minds, he worked towards and attained this deliberately-chosen goal of his earthly hopes. Fanciful interpretations of his sonnets have led to conjectures of stormy and passionate episodes in his earlier London life, but these are too unsubstantial to deserve more than passing mention. Nor do the scandalous Joe-Miller tales of Manningham and Davenant require notice, though the former has the merit of being contemporary. More important are the traditions which exhibit S. as the favourite dramatist of Elizabeth and James. Ben Jonson's allusion to 'those flights upon the banks of Thames' which 'so did take Eliza and our James,' places the matter beyond dispute, and gives a probability to the traditions: that the *Merry Wives* was written at the request of Elizabeth to show Falstaff in love; that an impromptu compliment introduced by S. in playing the part of a king in some play before Elizabeth greatly delighted the Queen; and that James on one occasion addressed an autograph letter of compliment to the poet. The date at which S. returned to Stratford and took up his residence in New Place, is as doubtful as the date of his migration to London, but it may safely be placed between 1606 and 1610. Here he remained until his death, leading outwardly the life of a plain country gentleman, except in those marvellous hours in his study when he was penning the calmest and loftiest of his works. It is almost certain that he still possessed a pecuniary interest in the theatres at which his plays were represented—an interest which perhaps descended to his wife at his death. Tradition speaks of him as a public-spirited citizen, and a good, companionable, and even jovial neighbour. The jests and so-called 'epigrams' which have been fathered upon him are for the most part palpably spurious, yet the fact that they should have been attributed to him at all is significant. The most important tradition of this period is that connected with his death, which asserts that 'S., Drayton, and Ben Jonson had a merrie meeting, and it seemes drank too hard, for S. died of a feavour there contracted.' Perhaps the fact of the 'merrie meeting' may be genuine, however little weight we may attach to the inference. The tradition that he 'died a Papist' has not a scrap of intrinsic probability or extrinsic corroboration. His wife and his two daughters survived him. Anne S. died in 1623; Susannah Hall in 1649, leaving a daughter, Elizabeth, who, after being twice married, died childless in 1670; and Judith Quiney died childless in 1662. With Elizabeth Hall (Lady Barnard) perished the last lineal descendant of the poet.

Biographers and critics have expended much ingenuity in dividing the life of S. into separate periods of intellectual and

artistic development. Each new critic has a new classification of the plays, and a new mode of mapping out the mental growth of the poet. These fancies are pleasant, and even useful, though any projection of such a 'round and perfect' mind can only represent it conventionally, as Mercator's chart represents the globe. They are so numerous, and so much dependent on the vexed question of the chronology of the plays, which it is impossible here to discuss, that we can only refer the reader to some of their original sources. The monumental 'Life of S.,' by Halliwell-Phillipps (Lond. 1848), remains the great storehouse of data and documents, though it might with advantage be revised so as to embody the results of more recent investigations. Charles Knight's 'S., a Biography' (Lond. 1843), ranging further for its materials, forms a rich collection of antiquarian information of all sorts bearing upon S.'s life. Excellent lives of the poet are also prefixed to many of the editions of his works enumerated below, especially to those of Collier, Singer, Dyce, Staunton, and Grant-White. Neil's 'S., a Critical Biography' (Lond. 1861), is an accurate and handy compendium of facts. Wise's 'S.: his Birthplace and its Neighbourhood' (Lond. 1861), and Smith's 'Rural Life of S.' (Lond. 1870), will also be found useful. Among the foremost members of the 'second Victorian school of Shakespeareans,' to whom chiefly we are indebted for theories of S.'s mental growth and development, the most prominent are Messrs. Dowden, Furnivall, and Fleay, whose works, along with that of Gervinus in Germany, will be referred to afterwards. Professor Ward in his 'History of English Dramatic Literature' (Lond. 1875) gives a short life of S., as well as a valuable sketch of the history of Shakespearean criticism. Among other meritorious works bearing upon the biography may be mentioned Drake's 'S. and his Times' (Lond. 1817); Skottowe's 'Life of S.' (Lond. 1824), specially valuable for the sources of his plays; Guizot's 'S. and his Times' (Lond. 1841), instructive though antiquated, having been written as early as 1821; Delius's 'Der Mythos von W. S.' (Bonn, 1851); Ingleby's 'Complete View of the S. Controversy' (Lond. 1861); Grant-White's 'Life and Genius of S.' (Boston, U.S. 1865); French's 'Shakspeareana Genealogica' (Lond. 1869); Ingleby's 'S.: the Man and the Book' (Lond. 1877), a collection of interesting details; the same author's 'Centurie of Prayse' (Lond. 1874), an exhaustive list of contemporary allusions.

Bibliography.—During S.'s lifetime, as we have seen, eighteen of his plays had been printed in quarto form, some having even gone through several editions. Of these quartos, none is known to have been published with S.'s consent, and many are mere garbled versions, from stolen manuscripts or shorthand notes taken in the theatre. The first authorised edition was that known as 'the first folio,' published by John Heminge and Henry Condell in 1623. This is the date of Anne Hathaway's death, and it has been conjectured that an interest held by her in the stage-right of the plays may have prevented their publication earlier. The full title is 'Mr. William Shakespeare's Comedies, Histories, and Tragedies. Published according to the True Originall Copies.' The volume contains eighteen plays which had not before been printed, viz., *The Tempest*, *The Two Gentlemen of Verona*, *Measure for Measure*, the *Comedy of Errors*, *As You Like It*, *The Taming of the Shrew*, *All's Well that Ends Well*, *Twelfth Night*, *The Winter's Tale*, *King John*, *1 Henry VI.*, *Henry VIII.*, *Macbeth*, *Timon*, *Cymbeline*, *Coriolanus*, *Julius Caesar*, *Antony and Cleopatra*. *Pericles* was omitted, and *Othello*, which had been published in quarto in 1622, was included, thus making 36 plays in all. The editors professed to print from the poet's MSS., but it is evident that several of the plays were merely printed from the quartos. Still this edition, corrupt as it is, has on the whole the greatest authority of all the old editions. Only a few copies are now extant—the last which came into the market was bought by the Baroness Burdett-Coutts for £714—but it has been reproduced in photographic facsimile by Staunton (1866), and in a reduced form by Messrs. Chatto & Windus (1876); while there is also a useful literatim reprint by Booth (1863). A second folio edition in 1632 was only a careless reprint of the first. The third (1664) contained *Pericles* and six other plays, of which only the *Two Noble Kinsmen* and *Edward III.* seem to have any claim to be regarded as even in part the work of S.

* All books mentioned in the remainder of this article are to be understood as published in London, unless the contrary is stated.

The fourth (1685) was a reproduction of the third. The first critical edition was that of Rowe (1709), in which some of the more glaring errors of the folios were corrected, while there was a praiseworthy abstention from purely conjectural emendation. The same cannot be said of Pope's edition (1725). Pope claims to have 'discharged the dull duty of an editor with a religious abhorrence of all innovation, and without any indulgence to his private sense and conjecture.' This, it has been well said, is a very fair description of what he did *not* do, as he gave the rein to every conjectural whim that occurred to him. Theobald, whose edition appeared in 1733, was a much more industrious and conscientious editor than Pope, and did something to free S. both from the errors of his Elizabethan printer and the 'improvements' of his Augustan editor. Sir Thomas Hanmer (Oxf. 1744) and Warburton (1747) edited after the fashion of Pope, though in some respects they improved upon him. Johnson's edition appeared in 1765. In it the acumen of the great critic was plainly visible, though, owing to his lack of sympathy with the subject, not to mention his want of the necessary Elizabethan erudition, it was largely thrown away. What Johnson lacked was in some measure supplied by Steevens, who, after publishing a reprint of twenty of the quarto plays, collaborated with Johnson in an edition published in 1773. Capell's edition (1768) contained some valuable matters hidden under the veil of an involved and difficult style. Malone, the last of the 18th c. editors, was on the whole the best—learned, laborious, conscientious, and not devoid of sympathy with his subject. His edition of 1790 forms the basis of Reed's (1803 and 1813) and of Boswell's great 'Variorum' (1821), in which his labours are combined with those of Johnson and Steevens. This, it may be said, closes the record of 18th c. Shakespearean editing, though Singer's Chiswick Press edition of 1826 was little more than an abridgment of the 'Variorum.' With the Victorian period a new era of study commenced. Editors came to their work with a wider Elizabethan erudition, deeper philological theories, juster views of the duties they undertook, and, above all, a better appreciation of the poet's genius and spirit. Theoretically, all have agreed in the principle of adherence to the first folio text wherever it is at all defensible, but the variations in practice have been considerable. The strongest partisans of the folio text are Knight (1838-43), Grant-White (Boston, U.S. 1857-60), and Clarke and Wright (Cambridge 1863-66). In the Cambridge text the adherence to the folio readings is perhaps too strict, but the fault is a good one, and the single-volume 'Globe' edition (1864, and frequently republished), in which it is reproduced, is perhaps the best popular issue; though the 'Leopold' edition (1877), which gives the plays in approximate chronological order, with the text of Professor Delius (Elberfeld, 1854), is also to be recommended. Collier, in his edition of 1841, is an enthusiast for the first folio, but his belief in the MS. annotations in a copy of the second folio discovered by him in 1849, led him to the opposite extreme of wild emendation in his edition of 1852. The MS. annotations are now generally considered to be of recent date, and of little value; though they found warm defenders in a controversy of unusual virulence. Among the remaining editions of most note are those of Hudson (Boston, U.S. 1851-57), Singer and Lloyd (1856), Dyce (1857, 2d ed. 1866-68), and Mary Cowden Clarke (1860). About two-thirds of Halliwell-Phillipps' great folio edition, begun in 1853, have now been issued; and an elaborate *Variorum* edition, under the care of Mr. Furness, is also in course of publication in the United States (Philadelphia, 1871). Several 'family' editions have been published, that by Bowdler (1818) having attained sufficient currency to render the term 'Bowdlerised' a cant word for expurgated literature in general. Many separate plays have of recent years been issued for school use. Hunter's editions (1869-73) are among the best, but the more recent Clarendon Press series (edited by Messrs. Clarke and Wright), and the series published by Messrs. Collins of Glasgow (edited by Mr. Neil and others), also form admirable introductions to Shakespearean study.

Study and Criticism.—The S. Memorial Library at Birmingham now contains over 6000 volumes, and is still admittedly incomplete. This fact may help us to form some conception of the extent to which Shakespearean study has been prosecuted in Germany and America as well as in England. The great mass of this literature dates from the present century. We can-

not see the mountain near at hand, says Emerson, speaking of S.; and it was not until nearly two centuries after his death that the world at large became alive to his true greatness. Among his contemporaries he was popular and no more. Despite Jonson's splendid eulogies, there is little doubt that Ben considered himself the better poet of the two. His 'mellifluousness' is the quality chiefly dwelt upon in contemporary allusions; and it is to be noted that the two greatest men of his time—Bacon and Raleigh—do not even mention his name. In the succeeding generation Milton nobly characterises him as the 'dear son of Memory, great heir of Fame,' but the line (*L'Allegro*) in which he describes him as 'warbling his native wood-notes wild,' seems to show that he looked upon him as nothing more than an untutored genius. Fuller's allusion to the wit-combats between S. and Ben Jonson proves that he heartily admired, if he did not adequately appreciate, the colossal genius of the former; and Charles I. is known to have been a student of S., a copy of the second folio with his autograph being preserved in the Royal Library at Windsor. Driven from the stage during the Puritan ascendancy, his plays were revived in garbled and almost unrecognisable forms by Dryden, Davenant, and Betterton after the Restoration. *The Tempest* became a sort of pantomime under the title of *The Enchanted Island*. *The Taming of the Shrew* was rechristened *Saunty the Scot*. Mr. Pepys considered the *Midsummer Night's Dream* 'the most insipid and ridiculous play that ever he saw.' Rymer dubbed *Othello* 'a senseless trifling tale,' and Nahum Tate rewrote an obscure old tragedy called *Leir* without knowing who was its author. Dryden alone seems now and then to have had a glimpse of true insight into the poet's greatness. The history of 18th c. editions and editors affords an index to the estimation in which S. was held in that supremely self-satisfied age. He was a barbarous genius to be patronised, corrected, and trimmed to fit the Procrustes-bed of 'cultivated taste.' Johnson preferred some lines of Congreve to anything in S., and gravely remarks that 'he has speeches, perhaps sometimes scenes, which have all the delicacy of Rowe without his effeminacy.' Goldsmith censures his 'antiquated dialect, obsolete humour, and overcharged characters;' and Collins gives the palm to Fletcher, as compared with S., for the portrayal of female character. Still he was popular on the stage, where Booth, Wilks, Cibber, Macklin, and above all Garrick (q. v.), gained their greatest triumphs in characters from his dramas. The critical labours, too, of Johnson, Steevens, Capell, and Malone only formed part of a general Shakespearean revival, of which Farmer's 'Essay on the Learning of S.' (Cambridge, 1767), and Mrs. Montagu's 'Essay on the Genius of S.' (1769)—the latter an answer to Voltaire's criticisms—may be regarded as the precursors. The Ireland forgeries, an imposture which culminated in the production at Drury Lane of the 'solemn mockery' of 'Vortigern' (1799), and which finally collapsed with the publication of the 'Confessions of W. H. Ireland' (1805), gave an indirect impetus to Shakespearean study. A new revival was, however, at hand. In 1811 Coleridge gave his lectures on S. in London (see his 'Seven Lectures on S. and Milton,' with a preface by Collier, 1856). In them he propounded the theory, now so universally recognised if not always acted upon, that we must come to the study of S. as disciples, not as critics—reverently, not self-sufficiently. Some of his comments are even yet unsurpassed for delicacy and depth of insight. Charles Lamb, in his 'Essays on the Tragedies of S.' (1808), and Hazlitt in his 'Characters of S.'s Plays' (1817), and his 'Lectures on the Dramatic Literature of the Age of Elizabeth' (1820), advanced the cause of a more reverent criticism, as did De Quincey in his 'Britannica' paper (see vol. xv. of his 'Works,' Edinb. 1863). This new æsthetic theory struck the keynote for the textual criticism and archæological study of the first Victorian school of Shakespearians, whose labours have been described above. The 'S. Society,' founded in 1841, published during the ten or twelve years of its existence many very valuable reprints of literature bearing upon the elucidation of the poet's text. To this period of study belong such books as Courtenay's 'Commentaries on the Historical Plays' (1840); Mary Cowden Clarke's 'Concordance to S.' (1845; 2d ed. 1860); Collier's 'S.'s Library' (1843; 2d ed. 1875)—along with which may be mentioned Steevens' reprint of 'Six Old Plays,' on which S. founded some of his dramas (1779); W. Sidney Walker's valuable 'S.'s Versification Explained' (1854); the same author's 'Examination of the Text

of S.' (1860). Perhaps the most notable æsthetic work of the period is Mrs. Jameson's profoundly sympathetic 'Characteristics of S.'s Women' (1846), along with which may be mentioned Bucknill's 'Psychology of S.' (1859); 'Medical Knowledge of S.' (1860), and 'Mad Folk of S.' (1867). Here, too, may be noted the strange 'Philosophy of the Plays of S. unfolded' (1857; with a preface by Nathaniel Hawthorne), in which an American lady, Miss Delia Bacon, strives to prove that S.'s works were in reality written by Bacon, Raleigh, and other distinguished Elizabethans, who merely borrowed the name of S., an obscure player, so as to avoid the difficulties in which they would have been involved had they been known as the authors of the plays. This is only a specimen of the thousand 'curiosities of literature' which have grown up around the name of S. The splendid expositions of S.'s genius in Carlyle's 'Heroes and Hero-Worship,' and in Emerson's 'Representative Men,' are too well known to require more than a passing mention. One of the most luminous of the minor essays on S. is that in Lowell's 'Among my Books' (1870). Within the last twenty years—we might almost say within the last ten—a new school of Shakespearean scholars has grown up, whose æsthetic tenets are chiefly founded upon German suggestions, while their textual criticism is largely concerned with the application of 'metrical tests' to decide the genuineness of plays and passages of plays, as well as their chronological order. Messrs. Spedding, Fleay, and Ingram may be called the joint-discoverers and appliers of this new form of criticism, which is best expounded in Fleay's 'S. Manual' (1877), and his 'Introduction to Shakespearean Study' (1877); in Dowden's 'S. Primer' (1877), an admirably compendious introduction to a study of the poet; and in Furnivall's excellent Introduction to the 'Leopold S.' To the æsthetic works of this period belong Dowden's 'S., his Mind and Art' (1876), H. Brown's 'Sonnets of S. solved' (1870), Simpson's 'Philosophy of S.'s Sonnets' (1868), Massey's 'Secret Drama of the Sonnets' (1872), Ingleby's 'The Soule Arrayed' (1872), Hudson's 'S., his Life, Art, and Characters' (Boston, U.S. 1872), Swinburne's 'Three Stages of S.' (in the 'Fortnightly Review,' 1875 and 1876). Among more strictly scientific works, on the other hand, may be mentioned Craik's 'English of S.' (5th ed. 1877), Abbot's 'Shakespearean Grammar' (1876), Ellis's 'Early English Pronunciation' (1869), Stokes' 'Chronological Order of S.'s Plays' (1878), Ingleby's 'S. Hermeneutics' (1875), Mrs. Furness's 'Concordance to the Minor Poems' (Philadelphia 1872). In 1873 the 'New S. Society' was founded, Mr. F. J. Furnivall being appointed its director. Under its auspices many diligent workers are engaged in applying the new tests, collecting, editing, and reproducing 'allusion books,' arranging parallel text editions, and doing active and useful work of all kinds in the great field to which they have devoted themselves. A new Memorial Theatre, Museum, and Library are at present in course of erection at Stratford-on-Avon, and it is expected that the Theatre, at least, will be opened in 1879 on the traditional anniversary of the poet's birth.

Up to the middle of last century S. may be said to have been unknown on the Continent. There are slight traces of him in France before Voltaire 'introduced' him to his countrymen, but they are very slight indeed. Voltaire's views on S. are well known. He characterised him as a *grand fou, a sauvage ivre, sans la moindre étincelle de bon goût*, but graciously admitted that he had now and then *des morceaux admirables*—a judgment which was almost literally endorsed by Chateaubriand. A translation by De la Place was published in Paris (1745-48), and upon this Ducis founded his famous adaptation of *Hamlet* (1769), whose general spirit may be judged from the fact that *Hamlet*, left alive at the end, concludes the drama with the reflection, *Mes malheurs sont combés: mais ma vertu me reste!* A new prose translation by Pierre Letourneur was published in Paris between 1776 and 1782, and of this translation a new edition was published in 1821, with an introduction by Guizot. More recently S. has attracted the attention of many leading French critics, who have attacked or defended him according as they leaned towards classicism or romanticism. See the cautious estimate of Villemain in his 'Mélanges Historiques et Littéraires' (Par. 1827); the brilliant and imaginative essay of Ph. Charles, 'Études sur W. S., Marie Stuart, et l'Arétin' (Par. 1851); Mézières' valuable 'S., ses Œuvres et ses Critiques' (Par. 1860); Lacroix's 'Histoire de l'influence de S. sur le Théâtre Français' (Bruxelles 1856); and Raymond's 'Corneille, S., et Goethe'

(Par. 1864). A complete translation by F. V. Hugo (Par. 1859-64) was introduced by a singular, striking, if somewhat fantastic rhapsody by Victor Hugo himself, entitled 'William S.' (Par. 1864; translated by Baillet, 1864). Lastly, M. Taine has drawn a highly-coloured and excessively French portrait of S. in his 'History of English Literature' (Edin. 1873-74), in which he speaks of him as 'a nature poetical, immoral, inspired, superior to reason, by the sudden revelations of its seer's madness,' and remarks that 'the "sweet abandonment of love" was the great occupation of his life.'

In German literature, on the other hand, S. has been naturalised as no other writer ever has been in the literature of a foreign country. He was to some extent known even before the time of Lessing (see Cohn's 'S. in Germany,' 1865), but that great critic was really the first to recognise and proclaim his true value. In the 'Literaturbriefe' (1759 and onwards) he, along with Moses Mendelssohn, powerfully upheld S. and the romantic drama against the prevailing French taste of the age, whose critical dictator was Gottsched. In the 'Hamburgische Dramaturgie' (1767-69) Lessing, aided by Schröder on the stage, still further expounded the new doctrines, which were taken up by Herder in an essay on S. (1772); while in the previous year we find Goethe, at a students' celebration at Strassburg, uttering an eloquent panegyric upon the newly-discovered genius. Meanwhile Wieland had translated twenty-two of the dramas (1762-66), and his translation was completed by Eschenburg (1775). Goethe wrote his 'Götz' (1773) 'in the Shakespearean manner,' and struck the keynote of modern Shakespearean criticism in his analysis of *Hamlet* in 'Wilhelm Meister' (1795), though he afterwards modified his views in his essay, 'S. und kein Ende' (1813). Schiller throughout his whole career was profoundly influenced by S., and the minor poets of the 'Sturm- und-Drang' period—Lenz, Klinger, &c.—idolised, copied, and caricatured S. to an extravagant degree. With A. W. Schlegel and F. L. Tieck, however, lies the true credit of having introduced S. to the great German public. Their translation, commenced as early as 1797 and continued slowly until it was published in its complete form at Berlin between 1825 and 1833, is so admirable in every point that it remains the standard German rendering in spite of many able attempts by such men as the Vosses, Simrock, Freiligrath, Bodenstedt, Heyse, Böttger, and Döring to supersede it. (See Bernays' 'Zur Entstehungsgeschichte des Schlegel'schen S.,' Leip. 1872.) Schlegel's 'Lectures on Dramatic Art and Literature,' delivered at Vienna in 1808 (translated by Black, 2d ed. 1846), so much resemble those of Coleridge in the general tone of Coleridge that the latter has been accused of plagiarism, though the accusation has been thoroughly refuted. The chief merit which they had in common was that of regarding S.'s dramas as masterly not only in matter but also in form, and shaking off entirely the trammels of the French quasi-Aristotelian prejudices. Tieck also published some suggestive, though unequal, criticisms. (See Delius' 'Die Tieck'sche S.-kritik beleuchtet' (Bonn 1846). Since then the range of Shakespearean study has widened and deepened in Germany, until a few years ago her scholars were able justly to claim that they had done more for the elucidation of our great poet than we had ourselves, though now, perhaps, such a claim could scarcely be maintained. Ulrici, in his 'S.'s Dramatic Art' (1846; 3d ed. translated by L. D. Schmitz, 1876), seeks to find a central ethical idea in each drama. A less transcendental æsthetic is applied by Gervinus, whose 'S. Commentaries' (1849, Miss Bannett's translation, with introduction by Fuornivall, 2d ed. 1877), are elaborate, and, from his own point of view, exhaustive. The fault of this school of criticism is a strained desire to bring S. as a whole into harmony with some particular ethical or æsthetic theory. 'Il devient,' says Mézières, 'panthéiste avec les uns [Rosencranz and Fischer] spiritualiste avec les autres [Ulrici], politique avec un troisième [Gervinus], et avec tous philosophe.' Kreyssig, perhaps more than any other critic of his class, avoids this error. In his 'Vorlesungen über S.' (2d ed. Berl. 1874) he expressly disclaims all wish on S.'s æsthetisirende Geistesgymnastik zu trüben, and yet is eminently suggestive and thorough. See also his 'S. Fragen' (Berl. 1877), as well as Hebler's 'Aufsätze über S.' (2d ed. Bern 1874), and Tschischwitz's 'S.-Forschungen' (Halle 1868). The idolatry of S. in a certain school has called forth an able counter-criticism in Rümelin's 'S.-Studien' (Stuttg. 1866), and Benedix's 'Die Shakespearemanie' (Stuttg.

1873). The *Deutsche S.-Gesellschaft*, which has its headquarters at Weimar, is doing work very similar to that of our own S. Society. Its 'Jahrbuch,' first published in Berlin in 1865, is now under the editorship of Dr. Karl Elze, whose 'Essays on S.' have been translated by L. D. Schmitz (1874), and who has recently published another collection of essays entitled 'William S.' (Halle 1876). Professor Hertzberg is also doing valuable work under the auspices of the Society. To Delius' admirable edition of S.'s works (English text with German notes) we have already referred. His 'Abhandlungen zu S.' (Elberfeld 1878) are also to be noted. In 'Die Quellen des S.' (Bonn 1873), Professor Simrock treats the sources of S.'s plots, &c., from the point of view of a comparative mythologist; and, among the most valuable of recent German contributions to Shakespearean study, we must note Dr. Schmidt's 'S.-Lexicon' (Berl. 1874-76).

Shale, the rock resulting from stratified and hardened mud and clay. It consists in great part of alumina and silica, often highly coloured by oxide of iron; this produces a reddish-brown colour; bituminous shales are black, while the ordinary varieties are usually grey. It is of very common occurrence in various geological formations, typically so in the Carboniferous, where it is known to the colliers as 'bind' or 'blaes'; it very generally contains remains of lepidodendroid plants, ferns, &c., and is frequently so highly charged with carbonaceous matter as to pass by insensible gradations into coal. The Torbanehill mineral, which occurred near Bathgate, in Linlithgowshire, but is now exhausted, so shared in its character the appearance both of coal and slate, that a long and famous lawsuit was needed to decide the question. Immense quantities of S. are now raised in the coalfields of Scotland, and also in certain English localities, for the production of paraffin, &c., the yield varying in good samples from 20 to 50, and in exceptional cases even 70, gallons of crude oil per ton. Certain shales in the Liassic formation can be made to yield similar products, and in all probability many of the anthracite shales of the Silurian system will soon be in like manner utilised. Alum can also be profitably obtained from many shales, but although a few large works have already sprung up for its manufacture, the process is still capable of very great extension. Some of the softer shales are often ground down separately or along with clay in the manufacture of bricks, drain-pipes, &c., and the finer qualities of slate-pencil consist of sticks of soft grey S. In the United Kingdom, in 1874, 362,747 tons of S. were produced, chiefly oil-S. See PARAFFIN.

Shalloon, a kind of worsted stuff, originally manufactured at Chalons, in France, of which the name is a corruption.

Shall'op (Fr. *shaloupe*), a broad, open, schooner-rigged boat, with two masts.

Shall'ot (Fr. *eschalotte*, from Lat. *Ascalonitis*), the *Allium Ascalonicum* of botanists, is a native of Palestine; particularly, it is said, the coast districts about Askalon. The bulbs are compound, separating like garlic into 'cloves.' These are used in the same way as onions in soups and stews; in a raw state are cut small as a sauce, and also make an excellent pickle.

Shamanism, the name applied to the religion of the Turanian races inhabiting Siberia and N.E. Europe, whose cultus and mythology are wholly influenced by a belief in magic, and consequently animistic in their character. All the spirits to whom they offer homage, chief among them Ukko the Heaven-God, are nature-beings, less eminent for moral gifts than magic powers, whose dreaded force, however, may be averted or even turned to advantage by means of the spells of 'shamans' or sorcerers. Concerning the title *shaman*, Max Müller observes in *Chips from a German Workshop*, vol. i. p. 190:—'The only trace of the influence of Buddhism among the Kudic races, the Fins, Lapps, &c., is found in the name of their priests, *Shaman* being supposed to be a corruption of *Sramana*, a name applied to Buddha and to Buddhist priests in general.' And concerning the Shamans themselves Castrén says that they 'are practised in all sorts of conjuring-tricks, by which they know how to dazzle the simple crowd, and inspire greater trust in themselves.' One of their commonest tricks, described by him in *Reiseberichte*, p. 173, resembles closely the performance of the Davenport Brothers. The shaman sits bound in the midst of a darkened chamber,

when suddenly bears growl and serpents hiss, and lo! the door opens, and the wizard, unbound, enters from without. See Tylor's *Primitive Culture* (2 vols. Lond. 1871).

Sham'li, a town in the district of Mozuffernuggur, N.W. Provinces, British India, on the E. Jumna Canal, 24 miles W. of Mozuffernuggur. There is some trade and manufacture, but the people suffer from malaria caused by bad drainage. Pop. (1872) 9177. During the mutiny of 1857 S. was captured by the mutineers, and 113 of its brave native defenders were killed.

Shamm'ai was the colleague of Hillel I. (q. v.) during part of his presidency of the Jewish Sanhedrim (B.C. 30—A.D. 10). Of his personal history very little is known. He is said to have been of a stern, forbidding temper; in which respect, as well as in his decisions on many rabbinical questions, he was the antithesis of his colleague. The disciples of the two—the school of Hillel and the school of S.—formed two irreconcilable parties, whose mutual antipathy showed itself not merely in words but sometimes in blows and bloodshed.

Sham'oy, or **Shamm'y**. See CHAMOIS.

Sha'mo. See GOBI.

Sham'rock (Ir. Gael. *seamarog*, compounded of *seamar*, 'trefoil,' and *og*, 'little,' *Prior* is the national badge of Ireland—worn by many Irish on St. Patrick's Day. In the Dublin and Covent Garden markets both the black nonsuch (*Medicago lupulina*) and the white clover (*Trifolium repens*) are sold and accepted as the emblem. According to Dr. Moore of Glasnevin, the first of these has for many years been recognised in Ireland as the true S.

Shamyl or **Schamyl** (Eng. 'Samuel'), was born at Himri in Northern Daghestan, in 1797. He was a member of a family of high descent, and soon became a leader among the Circassians. Perceiving that the tribes, if disunited, would inevitably succumb to the aggressive force of Russia, he zealously seconded the efforts of Kasi Mollah, a Mohammedan reformer, to produce unity among them. In 1832, when Himri was besieged by the Russians, he fought with great gallantry, and after the fall of the place, he miraculously escaped, though pierced by two balls. In 1834, Kasi Mollah having been slain, S. was chosen chief. He at once set about organising the tribes, and defeated the Russians in 1837. In 1839, however, they captured the fortress of Akulgo, into which he had thrown himself, and lest he should escape, put to the sword every being in the place. Yet the hero managed to escape, and recommenced the war with greater zeal and daring than ever. By 1844 he had established a regular government, with Dargo as capital. He contrived to keep his enemy at bay till 1852. In that year Bariatinsky succeeded in detaching several tribes from S., and cowed others by systematic devastation. After a brief respite during the Crimean war, S. was again hard pressed in 1858, when the Russians destroyed upwards of 100 villages. In 1859 his last fortress fell, and after wandering for some months among the mountains, he was captured at Gounib. Taken to St. Petersburg, he received a pension, and was chivalrously treated by the Czar. He died at Medina when returning from Mecca in March 1871.

Shanghai, the chief commercial city in China, in the province of Kiang-su, on the left bank of the Wusung, 14 miles from the Yang-tse-kiang, is built on a level tract of alluvial soil, intersected by navigable water channels. It stretches for 2 miles along the river, and is surrounded by a wall 3 miles long, outside of which are populous suburbs. The houses are built of brick and the streets are narrow, dirty, and overcrowded. S. contains numerous temples, chief among which are the *Ching-hwang*, or temple of the city gods, and the temples of the god of war and the god of riches. It has a Roman Catholic cathedral and several mission churches. To the N. of the town is the foreign settlement, consisting of three quarters—the French, English, and American or Hongkew. These colonies occupy territorial concessions, and are self-governing. The French municipality is called the 'Conseil de l'Administration Municipale Française,' the English and American joint executive is the 'Council for the Foreign Community of S.' There are also consular courts, an English Imperial court, and a mixed court. The working of these courts has been a subject of much perplexity. By the 'China and Japan Order in Council,

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1878,' published on 23d August of that year, a supreme British court for all China has been established. S. was opened to foreign traders in 1842. In 1853 the Taeping rebels seized it, and held it till 1855. They laid waste the surrounding country and much hindered the commercial progress of S. Although tranquillity has long since been restored, much of the neighbourhood is still scantily peopled. The foreign quarter, now inhabited by large numbers of Chinese, has many fine residences, warehouses, factories, dockyards, &c. But the Chinese still manifest much opposition to engineering works. The mouth of the Wusung is obstructed by a bar, and the Wusung Railway, 9½ miles long, was opened by an English company as far as Kangwan, in June 1876. The working of the line, interfered with by native officials for a time, was resumed in December 1876, and the number of passengers during that month amounted to 17,527, of whom 15,873 were third class. A Polytechnic Institute and Museum have been opened to educate the natives. The numerous canals will long prevent the extension of railways, while in regard to steamships the Chinese are becoming our serious rivals. A native company under government protection conducts the local traffic in the Yang-tse-kiang, and a large native iron foundry has been started at Hongkow. S. has some manufactures of silks, glass, paper, coarse cotton goods, and gold, silver, and ivory wares, but is chiefly important for commerce. The district itself does not consume much, but it forms a centre for communication with all N. China, above 7000 junks being employed in transit traffic. In 1876 S. imported foreign goods to the value of £12,556,134, as follows:—Of opium (chiefly Malwa), £4,848,738; cotton piece-goods, £4,706,856; woollen piece-goods, £1,096,606; iron, £154,462; lead, £175,399; timber, £228,627; coal (121,029 tons), £175,000; also much ginseng, isinglass, seaweed, &c. In addition to the above, £1,435,246 worth of foreign goods were imported indirectly from Hong-Kong and other ports. As £463,736 were re-exported to foreign countries, and £9,735,544 to other ports of China, the net value of the imports of foreign goods to S. was £3,792,110. Great Britain sent nearly half the gross quantity, viz., £6,063,974. Of native produce (chiefly silk, tea, cotton, straw-bags, bamboos, bean-cake, buttons, chinaware, fans, fish, flower-seeds, fruit, fungus, ginseng, grass-cloth, hats, hemp, hides, deer-horns, matting, oil, opium, paper, rhubarb, rice, skins, sugar, tallow, tobacco, &c.), S. imported from other Chinese ports £11,191,873, and from Hong-Kong £299,629; and re-exported to other Chinese ports, £3,765,762; to foreign countries and Hong-Kong, £4,991,154 (of which £2,981,419 went to Great Britain). Thus the net imports of native produce at S. amounted to £2,734,586. The exports of native produce from S. was to foreign countries, £7,500,717; to Hong-Kong, £240,506; to other Chinese ports, £3,167,528; total, £10,908,751. Adding to this the value of the re-exports of native produce as given above, the gross value of the export trade was £19,665,667. The chief exports (besides re-exports) were silk, tea, raw cotton, nankeens, earthenware, wheat, vegetables, &c. During 1876 there entered 1407 steamers of 1,158,219 tons (of which 517 of 463,469 tons were British), and 549 sailing ships of 144,062 tons (of which 204 of 81,560 tons were British); and there cleared 1395 steamers of 1,143,625 tons (of which 512 of 455,326 tons were British); and 572 sailing ships of 156,624 tons (of which 210 of 87,250 tons were British). Of the other vessels that entered the port in 1876, 504 of 348,234 tons were American, 461 of 223,202 Chinese, 94 of 54,258 German, 39 of 57,462 French, and 47 of 51,456 Japanese. In 1876 the foreign settlements contained 160 firms and 1951 whites, besides 151,000 Chinese (including boat population). Total pop. of S. (1876) 278,000.

Shank'lin Sand, a name commonly applied to the Lower Greensand of geologists. It occupies a position between the Wealden strata and the Gault, and is typically represented in the Isle of Wight and on the coast of Kent. Its greatest thickness is about 800 feet, made up of calcareous sandstones, sands, and clays. The latter are in many cases used as fuller's earth. The fossils are numerous and chiefly marine, though remains of reptiles, such as *Iguanodon mantelli*, are occasionally found.

Shann'on (the *Senos* of Ptolemy; Irish Gael. the 'Old River,' probably meaning that from time immemorial people had lived on its banks or fished in its waters), the largest river of Ireland, rises at the S. base of Cuilcagh Mountain in the county of Cavan,

at a height of 280 feet above the sea, flows first S.W. and then S. through Loughs Allen, Forbes, Ree, and Derg to near Limerick, where it turns W. and joins the Atlantic by an estuary 43 miles long, and 7 miles wide at its entrance. Its total length is 220 miles, and its drainage area is 6946 sq. miles. It receives from the W. the Boyle, Suck, and Fergus; from the E. and S. the Inny, Brosna, Mulkear, and Maigue. The navigation of the river was formerly much impeded by shallows and sandbanks, but upwards of £500,000 having been spent upon improvements by the commissioners who were appointed in 1837, navigation is now clear from the upper extremity of Lough Allen to Limerick, a distance of 143 miles, forming, with the Boyle and Strokestown branches, a river and canal communication of 158 miles, for large vessels 129 miles. The S. is connected with Dublin by the Grand Canal from S. harbour near Banagher, and by the Royal Canal, which joins it at Tarmonbarry, near Longford.

Shan-se, a province in the N. of China (q. v.), W. of Pe-chi-li. Area, 65,969 sq. miles; pop. (1852) 20,166,072. The surface is mountainous, and coal, iron, and copper are found. Though the land is fertile, the supply of water is irregular, and from 1875 to 1878 this province, along with Shen-se, Ho-nan, and part of Pe-chi-li, has been desolated by famine. Five million persons have perished in S. alone, and in the district of Tae-yuen, the capital of S., the population, according to the Roman Catholic bishop, has been reduced from 1,000,000 to 160,000.

Shap'insahay, one of the Orkney Islands (q. v.) off the coast of Pomona, about 5 miles N. of Kirkwall, is of irregular shape. Its extreme length is 6 miles, its breadth 4½; pop. (1871) 949. The island is flat and well cultivated.

Sha'ri ('river'), a large Central African river which enters Lake Tchad (q. v.) at its southern extremity after a course probably exceeding 600 miles in length. Previous to dividing into the several mouths by which it enters the lake, the breadth of the S. is fully 600 yards.

Shark, the name given to the larger fishes belonging to the division *Selachii* of the order *Elasmobranchii* (q. v.). Included in this group is the Dog-Fish (q. v.), which resembles the S. in most points of structure. The body of the S. is long and tapering. The tail is unequally lobed. The mouth is placed on the under surface of the head, thus compelling the animal to turn on its back in order to bite freely. The nostrils are on the under surface of the snout, and the gill-openings or branchial slits are numerous—five being common. The dorsal fins number one or two; the ventral fins, as in all elasmobranchiate fishes, occurring towards the rear of the body. The gills are in the form of pockets, lined by a vascular membrane, thus differing from the ordinary comb-like gills of common fishes; the *operculum* or gill-cover in the latter being wanting. Water passes into the gills by the mouth, and is ejected by the gill-slits, but it may also pass into the gills by two apertures named *spiracles*, on the head, which open into the mouth-cavity, as in the skates and rays. The scales of the S. are *placoid*. The eggs are contained in capsules or cases of horny matter resembling seaweed. These egg-cases are popularly named 'Mermaids' Purses,' and are frequently met with on the sea-coasts. As far as development is concerned, the S. is notable for a structure which in some degree resembles the Placenta (q. v.) of higher animals. This *placenta*, however, though aiding in the development of the young, is not strictly homologous with the structure of that name occurring in Mammalia (q. v.). The skeleton of the S. is cartilaginous; its rudimentary nature contrasting with the high organisation of the brain and other soft parts.

Of sharks a large number of genera and species exist. One of the best known is the White S. (*Carcharias vulgaris*), found in the Mediterranean and other seas, and sometimes attaining a length of 25 or 30 feet. It is a ferocious creature; its teeth are similar and have notched edges, and its liver affords oil. It is captured by means of a strong line and hook. The Blue S. (*Squalus glaucus*) also occurs in the Mediterranean Sea, and is found occasionally on the S. coasts of Britain. Its average length is 7 or 8 feet; it is destructive to food-fishes, and is frequently captured in fishermen's nets. The Fox-S. or Thresher, also named the Sea-Ape (*Alopias vulpes*), attains a length of from 10 to 12 or 15 feet. It is notable for the great development of the upper lobe of the tail. The Fox-S. is sometimes captured off the British coasts, but is more frequently met with

in the Atlantic Ocean. One of the most singular members of this group is the Hammerheaded S. (*Zygana malleus*), the head of which is lengthened laterally to form two prominent processes on which the eyes are placed. The hammerhead is common in the Mediterranean, but is also found in the S. coasts of Britain. The Porbeagle S. (*Isurus cornubicus*) and the Beaumaris S. (*I. Momensis*) are two notable British species of S., the former measuring from 4 to 6 feet. The huge Basking S. (*Selache* or *Cetorhinus maximus*) attains an occasional length of from 35 to 40 feet. It is common round both the northern and southern coasts of Britain, and despite its huge proportions does not appear to be of a ferocious disposition. The Greenland S. (*Scymna borealis*) attains a length of from 12 to 14 feet, and is said to attack whales and allied mammals of the N. Seas. The Spinous S. (*Echinorhinus spinosus*) derives its name from the fact that its placoid scales are provided with spines. It attains a length of 7 or 8 feet, and is northern in its distribution. The fishery for S. is prosecuted chiefly on the N. coasts of Europe. The liver is valued for its oil, but the flesh of several species is not unpalatable.

Sharp (♯), a musical sign, which, when used as a prefix, raises a note one semitone above its normal position on the scale. The sign for double S., raising a note two semitones, is x.

Sharp, William, a line engraver, was born in London, January 29, 1749. He served an apprenticeship to a bright engraver, and after much rough humble work, acquired some skill as a writing engraver. On the publication of the *Novelist's Library* he gained a high reputation by his treatment of Stothard's graceful drawings, but his full power was only shown later in his execution of large plates, such as Guido's 'Doctors of the Church Disputing,' West's 'King Lear in the Storm,' Carlo Dolci's 'Virgin and Child,' and Copley's 'Siege of Gibraltar' and 'The Parting of Charles I. from his Family.' He was elected an honorary member of the Imperial Academy of Vienna, and of the Royal Academy of Munich in 1814, and died at Chiswick, July 25, 1824. S. was one of the ablest of English engravers, his style being at once manly and nervous.

Sharpe, James, was the son of the sheriff-clerk of Banffshire, and was born in Banff Castle, May 1618. By the mother's side he was connected with the Earls of Rothes. He studied at Marischal College, Aberdeen. When the Solemn League and Covenant was framed, he brought odium upon himself by discountenancing it, and retired for some time to England, where he made the acquaintance of some of the great English divines, such as Saunderson and Taylor. At the commencement of the civil wars he returned home, and shortly afterwards was appointed professor of philosophy at St. Andrews. In 1648 he became minister of Crail, and resigned his chair. At this time he had the reputation of being a warm Presbyterian. Cromwell rather admired his abilities and tact. S. was secretly but actively engaged in the schemes of Monk for Charles's restoration, and was sent to Breda to seek that monarch's adhesion to the Presbyterian form of worship. He came back with a letter from the King expressing a resolution to preserve the government of the Church of Scotland as 'settled by law.' To Charles (and perhaps by this time to S.) the phrase meant Episcopacy; to the Scotch ministers it meant Presbyterianism. In 1661 he was consecrated Archbishop of St. Andrews, and was credited with a full share of those cruel and oppressive measures by which the government sought to destroy the national form of religion. His life was first attempted by a fanatical preacher named Mitchell (July 19, 1668), and finally taken by a band of persecuted Presbyterian desperadoes at Magus Moor, near St. Andrews, 3d May 1679, under circumstances that might awaken sympathy even among those who detest his policy and do not admire his character. See *A True and Impartial Account of the Most Reverend Father in God, Dr. James Sharp, Archbishop of St. Andrews* (1719), and Burton's *History of Scotland*.

Sharpshooters were soldiers skilled in the use of the musket or rifle who in warfare acted independently of the mass of troops, their special function being to shoot down particular individuals. The name fell into disuse after the formation of corps of riflemen and the improvement of army organisation.

Shat-el-Arab. See EUPHRATES.

Shave-Grass. See EQUISETUM.

Shawl (Pers. and Hind. *shāl*), an outer garment for covering the shoulders, worn particularly by women, and also by men in the East; the plaid, a kind of S, likewise forms a part of the distinctive costume of the Scottish Highlanders. Shawls are made of wool, silk, cotton, or other textile material. The only shawls produced in the valley of Kashmir and in the Punjab with the soft inner wool (*pashmina*), of the Tibet goat have acknowledged pre-eminence; in fact, for texture, beauty of design, and harmony of colour, no finer fabric is produced at the loom. The wool retains colours of the most brilliant and delicate hue. The Indian loom is vertical and very rude, and it carries many skewers or spindles wound with the various dyed wools necessary for the pattern; no shuttle is employed. Figured Kashmir shawls are of two kinds—1. those in which the pattern is woven with the ground at the loom, and 2. those wherein the foundation of plain pashmina cloth is alone loom-woven, the pattern being afterwards wrought in by elaborate needlework. The former, 'Thikar' or 'Kāni Kār,' are more valuable than the latter, 'Amli Kār,' £300 not being an uncommon price in Kashmir for one of the first quality weighing 7 lbs. Export duties, cost of carriage, and risk of damage in transit greatly enhance the sum demanded for such a S. by an English or French broker. The loom-woven shawls are seldom executed in one piece, but in several strips which are darned together with marvellous neatness. For both kinds of Kashmir shawls borders having a silk warp are separately woven and sewn on. Amritsir is the great emporium of the Indian S. trade. In 1851 the total yearly value of the exports was about £85,000, and it increased annually till 1862, in which year nearly £300,000 were reached. Since then European competition with imitation Indian shawls has led to a decline in the exports.

The first attempt in Europe to manufacture shawls in the Indian style was made at Norwich in 1784; the earliest were woven in pieces and joined together, but in 1805, with improved appliances, shawls were executed in one piece. In Paisley and Edinburgh the manufacture was established in 1802. The products of the former place have gained considerable celebrity for beauty and cheapness; and while the trade still languishes there, in Edinburgh it has been extinct for thirty years. Paris began the manufacture early in this century, and the invention of the Jacquard loom soon after greatly advanced it. Increased economy in the production was effected about 1834 by the introduction of a process called *epouliné*. The imitation Indian S. industry finds its greatest development and perfection at the present time in Lyon and Vienna, where imported Thibet goat wool, and also the finest Electoral wool-fleeces, are used; but in these places, as elsewhere, the industry is decaying. The manufacture of common plain and chequered woollen shawls of large and small sizes is briskly carried on in Scotland, at Tillicoultry, Alva, Alloa, and other towns on the Forth, and also at Paisley. Huddersfield, Rochdale, Chipping-Norton, and other English towns are also important seats for the production of figured shawls, plaids, and mauds in wool and mohair. In America, Massachusetts has won considerable reputation for the lightness and softness of its all-wool plaid shawls—formerly known as the Bay State S., after the mill which originated it—of which there is an immense production. Silk shawls embrace the crapes, in imitation of Chinese work, made at Norwich and Lyon, and the grenadines, chenilles, &c., chiefly of French manufacture.

She'a. See **BASSIA**.

Shearing-Machine, the name given to a machine used in the manufacture of woollen cloth, for shortening the nap and smoothing the surface, and also to one employed in cutting iron plates, bars, &c.

Shears (from the Old Eng. *scēran*, 'to cut'), an instrument resembling scissors of a large and heavy make, having two bevelled cutting edges, and loops or wooden handles varying much in shape. S. take the form best adapted for the use they are to be put to, whether for cutting cloth, grass-borders or hedges, metal plates or pipes, or clipping sheep.

Shearwater (*Puffinus*), a genus of *Natatorial* birds allied to the Petrel (q. v.), and represented by the Greater S. (*P. major* or *cinerus*), and the Manx S. (*P. anglorum*). The wings are long and pointed, and the hinder toe is rudimentary. The bill is long, and the upper mandible is curved or hooked at its tip. The Greater S., also named the Cinereous S., attains a length of 17 or 18 inches, and is of a sooty brown hue above and grey below.

It occurs on the S. W. coasts of Britain: the Manx S., found on the N. coasts, has a wider distribution than the other species. The Manx S. is of smaller size, and is greenish black above and white below. The name S. is also applied to the *Rhyacionia rigya*, also specifically named the Crimson S. or Scissor Bill.

Sheath-Bill (*Cathartes*), a peculiar genus of *Razvazi* birds, of which the C. alba or White S.-B., occurring in the Australian and New Zealand coasts and on the islands of the South Seas, is a good example. The bill is short and stoutly made, its base being covered by a horny sheath, which the bird can erect or depress at will. The colour of the bird is pure white, and its length averages 15 inches. The hinder toe is short and elevated on the tarsus; the front toes long and united at the base. The food consists of molluscs and crustaceans.

Sheathing, in shipbuilding, is a covering of plates of copper or an alloy of that metal applied to the bottom of a wooden ship, to protect it from the ravages and attachment of marine animals and weeds. Muntz's metal, composed of 60 parts of copper and 40 of zinc, is very generally employed. Sheets of various sizes and thicknesses are used, and they are nailed to the ships' bottom with nails composed of copper and tin, each sheet slightly overlapping its neighbour. Copper S. was introduced into the British navy in 1783. Its efficacy lies in oxidation by the seawater, but this change proceeds so rapidly that the copper requires renewal every five years or thereby. Muntz's S. was patented in 1832; it resists oxidation, and is very durable and cleanly.

Sheave is the grooved wheel in a block or pulley over which the rope or chain runs.

She'ba. See **SABÆANS**.

Sheboygan, a town of Wisconsin, U.S., on Lake Michigan, at the mouth of the S. river, 60 miles N. of Milwaukee. It has a fine harbour, where 500,000 bushels of wheat are annually shipped, 10 churches, 3 newspapers, and numerous manufactories, while there are many mills at the S. Falls, on the river, 6 miles above S. Pop. (1875) 6828.

Shechem. See **NABLUS**.

Shechi'nah (late Heb. 'habitation,' from Heb. *shakan*, 'to dwell') is a term which is not found in the Bible, but which was used by the later Jews, and borrowed from them by Christians, to express the Divine Presence. It is first used in the Targums as a periphrasis for God, with special reference to his presence in the Tabernacle and Solomon's Temple, although not in Zerubbabel's, for the absence of the S. from the latter was among the points in which it differed from the former. Its return, however, was expected in the time of the Messiah. The visible symbol of the S. was a most brilliant light or glory enveloped in a cloud, so that in general only the cloud was visible, but sometimes appearing out of the cloud (cf. Exod. xiii. 21, xiv. 24, xix. 9, 16, 18, xxiv. 16, 17, xl. 34, 35; Num. vii. 89, ix. 15, 16, xiv. 10, xvi. 19, 42). It is distinctly to be understood that the name S. is never applied in the Targums either to the cloud or the glory, but only to the presence which is indicated by these things. Allusions to the S. are supposed to occur in the New Testament (cf. Luke ii. 9; John i. 14; Acts vii. 2, 55; Rom. ix. 4; 2 Cor. xii. 9; Rev. xxi. 3).

Sheep (*ovis*), a genus of *Ruminant* (q. v.) quadrupeds, belonging to the family *Bovide*. Both sexes as a rule have horns, but in some S. horns are wanting in the female. The forehead is flat or concave. No special odoriferous secretion is exhaled from the male S. as from the goat. The domestic S. (*O. aries*) is the typical species, but there are very numerous varieties of it. The various 'wild' S. seem to differ materially from existing domestic breeds, but it is quite possible that the process of domestication and breeding by man may have generated these differences. Wild S. are inhabitants of mountainous regions. Timid in the domesticated state, the ram will nevertheless occasionally defend itself and its flock with fortitude and pugnacity, and may pit itself with success even against the bull; butting with great force and agility, and even throwing its antagonist. The wool of wild S. is short, and there is an outer covering of long hair; domestication and breeding have, however, the effect of increasing the wool and diminishing the hair. In certain breeds of S. which have been neglected, the hairy outer coat becomes better developed than in ordinary breeds, and a *reversion* to the natural state of the fleece is thus seen. Of foreign breeds one

of the most remarkable is the Fat-tailed S. of Tartary and Syria. It is remarkable for the development of fat on the tail and hind-quarters—a development weighing from 40 to 80 lbs. The Cretan or Wallachian S. has large horns and soft wool. The Moufflon (q. v.) is represented by the Argali (q. v.) of Siberia and Central Asia. The Bearded Argali, or Aoudad (q. v.), is the *Ammotragus Tragelaphus* of N. Africa. The Rocky Mountain S., or Bighorn (q. v.), is famous alike for its flesh and wool.

Of the breeds of S. which have become extinct, one of the most curious was the Ancon or Otter S., the ancestor of which was bred from an ordinary ewe and ram by Seth Wright, a Massachusetts farmer during last century. It had a long body and very short legs, and a whole flock was bred from it, the progeny always being either a pure Ancon or an ordinary S. The Ancon breed was neglected after the introduction of the Merino (q. v.), perhaps the most famous of all the breeds of S. The Merino S. is difficult to fatten, and its flesh is not of high quality. The horns of the males are spirally twisted; the females are usually hornless. The merinoes are kept in large flocks in Spain, the flocks being driven to the mountains in summer, and the winter spent chiefly in Andalusia. The chief shepherd, or *mayoral*, has charge of a large number of flocks, in each of which 10,000 S. may be included. S.-shearing begins in Spain on May 1st, and is performed under cover, the S. being kept closely confined together, the perspiration causing the fleece to separate readily. In Germany the merino breed is highly valued, and at Stolpen in Saxony the most famous breed is cultivated. The merinos were first regularly brought to Britain in 1787, but the native varieties are more valuable to the British S.-breeder. One of the most famous breeds is the Blackfaced S. (q. v.) of the N. of Scotland, which presents close resemblance in many points to the wild S. The Welsh S. has also both sexes horned, and allied to the latter are the Shetland S. and that breed found in the N. islands of Scotland. The Forest S. was so named from its being bred in the ancient forest-lands. It is almost extinct, but wherever bred, the mutton is in demand. The Dorset S. is a breed with small horns in both sexes. The Cheviot S. (q. v.) is a well-known breed in Scotland and in many parts of England, its characteristics being the absence of horns in both sexes, and its adaptation to high lands. The Leicester breed is also hornless; its wool is long, and it fattens readily on flat lands. The Cotswold or Gloucester S. was celebrated in the Middle Ages. It is now, however, crossed with other breeds, and specially with the Leicester S. The famous Southdown S. is hornless, generally white-coloured, has a short curly fleece, and will breed with facility when crossed by most other varieties. The Iceland S. is notable for the number of its horns. The wool is long and fine, and the flesh is of excellent quality. S.-breeding has become an art on which the highest skill of the breeder and agriculturist is brought to bear. The young are born in spring, and one, two, or three lambs may be produced at a birth. The lambs are suckled for about three months, the annual S.-shearing taking place in May. The milk of the S. was used in ancient times, but even in the most primitive districts it is rarely drunk at the present time. The food consists of grasses, supplemented by turnips, mangold-wurzel, beans, oil-cake, and other fodder. The diseases of S. (see ROT) are numerous, and have been made the subject of special study by veterinarians.

The *Stealing of S.* is by statute felony, the penalty ranging from two years' imprisonment to fourteen years' penal servitude.

Sheep Bot-Fly. See BOT-FLY.

Sheep's-Head Fish (*Sargus*), a genus of *Teleostean* fishes belonging to the family *Sparidae*. *S. ovis* is common in summer on the N. American coasts, and may attain a weight of from 12 to 15 lbs. It is caught by lines and nets, and is palatable. The teeth are sharp in front, and rounded in the back of the mouth. Another species is *S. Rondeletii* of the Mediterranean.

Sheep-tiok, or Sheep-louse, the name given to a species of flies, or *Dipterous* insects, belonging to the family *Hippoboscidae*, or *Forest Flies*. The S. is the *Melophagus ovinus* of Linnaeus. The body is horny and flattened, the antennæ are rudimentary, and the proboscis is formed by the labium and maxillæ. The head is wider than the chest, and the proboscis is long. The limbs are short and thick, and the abdomen is unjointed. The larvæ appear to be hatched within the body of the female. The S. fixes itself in the skin of the sheep by means of its proboscis. The larvæ become pupæ immediately after birth.

Sheerness, a seaport and royal dockyard in Kent, 52 miles E. of London by rail, occupies the N.W. angle of the Isle of Sheppey (q. v.), and thus commands the mouths of the Thames and Medway. It consists of the four suburbs of Blue Town, Mile Town, Banks Town, and Marina, the last of which is growing to be a favourite watering-place, while the first contains the dockyard, and is strongly fortified. S. has two churches, a Roman Catholic chapel (1864), designed by E. W. Pugin in Second Pointed style, large naval and military barracks, a pier 3000 feet long, and a sea-water bath, with an area of 11,259 sq. feet. The dockyard, covering 60 acres, and employing some 2000 men, comprises a wet-dock of 3½ acres, two others of smaller size, three dry-docks, each 248 feet long by 88 feet wide, &c. In July 1878 ten vessels of the Royal Navy were stationed here, besides four steam tugs. S. publishes two weekly newspapers, and had a pop. (1871) of 13,956. Captured by the Dutch under De Ruyter in 1667, S. was shortly after fortified, but the dockyard was not commenced until 1814, since which time nearly £3,000,000 has been expended on its construction.

Sheers, a kind of hoisting apparatus used in masting or dismasting ships, putting in or taking out boilers, &c. They consist of two long spars or *legs* in an inclined position, so that the upper ends meet and are secured together. The legs are steadied by guys, and from the top depends the necessary tackle for hoisting. S. are usually erected on a wharf in dockyards, but formerly were mounted on an old ship termed a *sheer-hulk*.

Sheet (Old Eng. *scat*, from *scellan*, 'to shoot,' 'extend,' comp. Ger. *schote*), the rope fastened to the after or leeward corner or 'clew' of a sail, *extending* it to the wind. The rope attached to the weathermost clew is called a 'tack,' except in the square sails above the 'courses.' The *S. Anchor* (older form *shoot-anchor*) is the largest anchor of a ship, *shot* out in extreme danger.

Sheeting, a term applied to linen or cotton cloth, bleached or unbleached, used chiefly for bed-sheets; also in hydraulic engineering, a continuous wall of timber or metal for protection of a river bank.

Sheffield ('the field on the Sheaf'), a town in the W. Riding of Yorkshire, and the home of the steel trade, is picturesquely situated on a succession of hills, amid whose dells and dingles the Don makes a mighty bend, receiving here the Sheaf, Rivelin, and two other streams. It is 162 miles N.N.W. of London by rail, 53 S.S.W. of York, and 41 E. of Manchester. Ancient in origin but modern in its growth, the population having sextupled within the present century, S. has few historic relics, though almost all its buildings are old enough to have grown black with the overhanging smoke that has gained it the title of the 'City of Soot.' Its 13th c. Castle, in which Mary Queen of Scots was a prisoner (1570-84), was demolished by the Parliament in 1648; but a part of the Manor House of the Earls of Shrewsbury, where Wolsey rested on his last journey (1530), is still standing, and in 1873 was restored by the Duke of Norfolk. The one old church, St. Peter's, a Perpendicular structure of the 16th c., with a crocketed spire 180 feet high, a fine organ just rebuilt, and the Shrewsbury Chapel containing some stately monuments, is now (1878) being enlarged by the addition of two bays to the arcades, a S. porch, and N. and S. transepts, and when completed will measure 165 feet long by 98 feet wide. Of the 32 other Anglican churches need only be noticed St. Paul's (1720); St. James' (1788; restored 1876), St. George's (1825), with a tower of 139 feet; All Saints' (1867), with a spire of 190 feet; St. John the Baptist (1874); and the Sale Memorial Church (1876-78), with a tower of 130 feet, this last the first of nine new churches to be erected in the next five years. Nor are any of the 93 non-established places of worship especially remarkable, except the Roman Catholic Church of St. Marie (1850), Decorated in style, and having the loftiest spire in S. (195½ feet). The public buildings include the Townhall (1808-67); Corn Exchange (1830); County Court Hall (1855); Police Buildings (1867); Post Office (1870); the Cutlers' Hall (1832-67), with a Corinthian façade; Masonic Hall (1877); Norfolk Market Hall, 296 feet long by 113 wide, erected (1851) in Tuscan style at a cost of £40,000; Theatre Royal (1773; enlarged 1855); and the Albert Music Hall (1870-73), which, built in Italian style at a cost of £26,000, has a magnificent organ and can seat 3000 persons. Wesley College (1838), connected with the London University, in October 1878 has 19

masters and 256 students; and there are also a free grammar-school (1609), and a collegiate proprietary school (1835). Mr. Mark Firth is (1878) erecting large buildings for the accommodation of the classes connected with the Cambridge University Extension; and close by a spacious central school is being built, designed to furnish higher education to the most promising pupils of the fourteen Board schools. Besides four free libraries, S. has an Athenæum (1824), a Literary and Philosophical Society (1822), Public Library (1771), and St. George's Museum, founded for working men by Mr. Ruskin (1875); while among its charitable institutions are the General Infirmary (1797-1872), Public Hospital (1835-78), the Jessop Hospital for Women (1878), Shrewsbury Hospital (1673), and Firth Almshouses (1869). A fever hospital is about to be erected, and on the 16th September 1878 the foundation-stone was laid of a new workhouse at Fir Vale, which is to accommodate 1662 inmates, have a façade of 1100 feet, broken by a clock-tower 120 feet high, and cost £180,000. In 1836 were opened the Botanical Gardens (18 acres); in 1874 the Weston Park (12 acres), containing a free museum; in 1875 the Firth Park (35 acres); and the Duke of Norfolk further set apart three pieces of land (25 acres in all) as recreation grounds, 9th October 1878. Of monuments there are bronze statues of James Montgomery, and Ebenezer Elliot the Corn-Law Rhymer, a Crimean Memorial (1858) 60 feet high, a stone cross marking the spot where 339 victims of the cholera were buried in 1832, and a monument to the late Mr. G. Sykes, a distinguished art student of S. The Town Council has obtained extensive powers for making street improvements, involving an outlay of nearly £600,000, and these are now (1878) being carried out. S.'s most typical sights, however, are its numberless iron and steel works, which, while almost monopolising the older cementation process, include 18 out of the 110 Bessemer converters in Great Britain, and a large proportion of the furnaces for the Siemens-Martin processes. With 51 collieries working or sinking in the district, and firms so widely known as Firth's, Cammell's, Mappin's, or Brown's ceaselessly turning out huge armour plates, 81-ton guns, and every variety of cutlery, Britannia-metal, and electro-plating, S. does not seem to have turned the tide of its prosperity, in spite of home and foreign competition. The census returns (1871) of the employment of adults in the S. district furnish the surest insight into the extent and relative importance of S. industries:—Cutlers, 6003 persons; engaged in iron manufacture, 4003; file-makers, 2497; engaged in steel manufacture 1619; coalminers, 1619; engine and machine makers, 1060; scissor-makers, 729; tool-makers, 691; saw-smiths, 550; wire-makers, 231; brassfounders, 229; bricklayers 228, &c. S. publishes three daily and one bi-weekly newspaper, and returns two members to Parliament. The borough, extending over 19,651 acres, contained (1871) 48,496 inhabited houses (amongst them 1501 beer and public houses), and in June 1877 had a pop. of 274,914. The ancient manor of Hallamshire, of which S. is the capital, has for over five centuries been famous for its cutlery, and Chaucer's Miller bore a S. whittle in his hose. But during the 300 years that followed Chaucer's day the manufacture languished, and under James I. S. was a 'singularly miserable place,' with barely 2000 inhabitants, a third of whom were half-starved and half-naked beggars, besides a great number of deformed wretches. The charter granted to the Cutlers' Company in 1624, only enumerates the ruder kinds of cutlery, and surgical instruments were first produced in the reign of George I. The modern history of S. is closely, and often unhappily, connected with that of Trades Unions (q. v.). The town narrowly escaped being burnt by Chartists, 12th January 1840; and was drowned by the bursting of the Bradfield Reservoir, 12th March 1864, when 276 lives were lost and property destroyed to the value of £500,000. The Social Science Congress met at S. (1865), the British Archaeological Association (1873), the Trades Unions Congress (1874), the British Medical Association (1877), the Church Congress and Associated Chambers of Commerce (1878). See Hunter's *History of Hallamshire* (1819; new and enlarged ed. by Dr. A. Gatty, 1869), the Rev. A. Gatty's *S. Past and Present* (Sheff. 1873), and R. E. Leader's *Reminiscences of Old S.* (Sheff. 1876).

Sheff'ield, John, Duke of Buckinghamshire, was born in 1649, and in his tenth year succeeded his father as Earl of

Mulgrave. By the time he was twenty-five he had served in two naval wars against the Dutch, obtained the Garter and a colonelcy, and been appointed Gentleman of the Bedchamber; in 1680 he successfully commanded an expedition sent to the relief of Tangiers; and in the reigns of James, William, and Anne he held office in Tory administrations as Lord Chamberlain, Lord Privy Seal, Lord Steward, and Lord President of the Council. Created Marquis of Normanby by William (1694) and Duke of Buckinghamshire by Anne (1705), S., from the accession of George I., and consequent rise of the Whigs to power, continued the opponent of the court party down to his death, 24th February 1721. A brilliant orator, a sharp-judging politician, and a free-thinker, the Duke of Buckinghamshire, like him of Buckingham, was also—to follow Dryden's phrase—'the Muse's friend, himself a Muse.' At least, he published anonymously insipid *Essays on Satire* (1679) and *Poetry* (1682), besides some occasional pieces in prose collected in his *Works* (2 vols., 1723); and he numbered among an admiring clientele of poets, Pope, Prior, and 'Glorious John.' See the account of him in Johnson's *Lives of the Most Eminent English Poets*.

Sheil, Richard Lalor, born at Drumdowney, Waterford, 17th August 1791, and educated at Stoneyhurst (1804-07), graduated at Trinity College, Dublin (1811), and was called to the Irish bar (1814). During the years 1816-22 he wrote six dramas, in 1822 contributed to the *New Monthly* his brilliant *Sketches of the Irish Bar* (2 vols. 1855), and becoming in the same year a member of the Catholic Association, devoted himself with O'Connell to the cause of Catholic Emancipation. In 1829 he received his silk gown, in 1830 entered Parliament, and having there proved himself one of the greatest orators of the day, became a commissioner of Greenwich Hospital (1838), Vice-President of the Board of Trade (1839), Judge-Advocate-General (1841), Master of the Mint (1846), and British Minister at Florence (1850), where he died 23d May 1851. See his *Memoirs* by W. T. M'Cullagh (2 vols. 1855).

Sheik (Arab. 'elder'), the name originally of the chief or head of an Arab tribe, but now widely used among Moslems as a title of respect or reverence. The chief Mufti (q. v.) of Constantinople is the *S.-al-Islam*, and the title S. is common to the heads of Mohammedan monasteries, and to the higher order of priests who preach in the mosque. It is gradually becoming the mere equivalent of Mr., Herr, &c., before names.

Shek'el (Heb. 'weight') was a definite weight of gold or silver, which passed as current money among the ancient Hebrews (Gen. xxiii. 15, 16; Exod. xxi. 32, &c.). There is no evidence of coined money having been used by them before the time of Ezra, when the Persian daric was in circulation (Ezra ii. 69; Neh. vii. 72-dram). Three different kinds of S. seem to be mentioned—the ordinary S., the S. 'of the sanctuary' (Exod. xxx. 13), and the S. 'after the king's weight' (2 Sam. xiv. 26), but there is no evidence that these were actually different weights. The S. of gold, however, was double that of silver. Silver coins of the weight of a S. were struck by Simon Maccabeus (B.C. 140), who received that privilege from Antiochus VII. (1. Macc. xv. 6). The average weight of the best extant specimens of these is 220 grains; and the standard S. before the Captivity was probably a little more, say 240 grs. or $\frac{1}{2}$ oz. Valuing silver at 5s. per oz., and gold at £4, the old S. of silver would be worth about 2s. 6d., of gold about £4; the silver S. (coin) about 2s. 3½d.; the gold, which, according to Josephus (*Ant.* iii. 8, 10), was the same as the daric, or 129 grs., about £1, 1s. 6d.

Shelburne, William Petty, Earl of, son of the first earl, and great-grandson of Sir William Petty (q. v.), was born in Dublin, 20th May 1737. After a neglected youth he went up to Oxford in his seventeenth year; there studied law, history, the classics, and 'a good deal of religion'; and in 1757 joined the 20th regiment under Wolfe. His services at Minden and Kloster Kempen were rewarded by a colonelcy and the post of aide-de-camp to the King, much to the Whigs' annoyance. In 1761 he entered Parliament as member for Wycombe, but within a few weeks was raised to the Upper House by his father's death, and in the same year negotiated the coalition between Fox and Bute. He defended the Government in the peace debate, and on Bute's transference of the premiership to Grenville (1763) accepted the presidency of the Board of Trade, but owing to

differences with the Secretary of State soon resigned, and attached himself to Pitt, his estimate of whom had changed about this period. With Pitt, now Earl of Chatham, he returned to office in 1766 as Secretary of State for the southern or colonial department. Staunchly opposing the faineant foreign and arbitrary domestic policy of the Bedford faction, he found the post no easy one—his Irish measures thwarted, his protest against the French annexation of Corsica unheeded, himself the single assailant of coercion towards the American colonists. Close on his own resignation (19th October 1768) succeeded Chatham's, and from the troubles and disputes of the Grafton and North administrations S., having lately become a widower, withdrew for a time to the Continent (1771). At Paris, in Mdme. Geoffrin's *salon*, he met, amidst a host of notabilities, Morellet, the Adam Smith of France, to whom he owed his conversion to Free-trade principles, and whom, with Franklin, Garrick, and Priestley, he afterwards entertained at Bowood. Lexington, Saratoga, and France's alliance with the Colonies had brought Lord North upon his knees, the nation clamoured for Chatham's recall, when the 'Great Commoner' died (1778), and left in S. his recognised successor. During the brief and discordant Rockingham administration S. shared with Charles Fox (q. v.) the secretaryship of state; its dissolution was followed by his own scarce longer ministry (July 1782–February 1783). Short as this was, it witnessed the triumphant close of the siege of Gibraltar, the concession of independence to the United States, the conclusion of separate treaties with France and Spain; and with such results achieved S. could afford, at the bidding of the Fox and North coalition, to resign the Treasury and bid farewell to ministerial life, in 1785 being raised to the Marquisate of Lansdowne (q. v.). Thenceforth, though he opposed the war with revolutionary France and warmly upheld the Irish Union, he rarely emerged from his retirement at Bowood, Wiltshire, where he died, 7th May 1805. History has dealt but scant justice to S., whose very failures were due to a far-sightedness that made him overlook the petty wants of the moment. The taunt of duplicity, launched against him, is confuted by his consistent Liberalism; a later generation has justified his most Utopian schemes—of free-trade, reform, and Catholic emancipation. For his great-grandson, Lord Edmund Fitzmaurice, was reserved the honour of vindicating an illustrious ancestor, in the *Life of William, Earl of S.* (3 vols. Lond. 1875–76), the first volume of which contains a fragment of S.'s autobiography.

Shelif, or **Ohalif**, the principal river of Algeria. It rises in the Jebel Amour, flows successively N. and W., and enters the Mediterranean between Algiers and Oran, after a course of 370 miles.

Shell, the name given generally to the hard structures secreted by various *Invertebrate* animals, but distinctively to the exoskeleton of *Mollusca* (q. v.), which consists of a limy or calcareous investment formed by the *pallium* or *mantle*. All structures not formed by the mantle, however similar in appearance to shells, are not to be regarded as such. For example, the *argonaut* or paper nautilus, a delicate papery cover, which is not, however, a true S., inasmuch as it is not secreted by the mantle, but by two of the *arms* or *feet* of the animal modified for this purpose. On the other hand, the two-gilled cuttlefish, which has no outer S., has a horny or limy structure utterly unlike a S. imbedded in the mantle or investing skin, and formed by it. Hence this structure, despite its unlikeness to a S., is to be considered a true S. The name *test* is given to structures which are of the nature of shells, but which are formed by other animals than molluscs. Thus among the lowest animals or *Protozoa* (q. v.) we find the *Foraminifera* (q. v.) and *Radiolaria* (q. v.) making *tests* of lime and flint, some of which imitate exactly the shape of the S. of mollusca. The *Echinodermata*, including the *Echinii* or 'sea urchins,' secrete a complicated S. or test formed of hexagonal limy plates disposed in meridional series; and among the *Crustacea* are found 'shells' of hardened or limy epidermis which may be annually cast off and renewed. The S. of the barnacles consists of a regular series of limy pieces articulated together, and closely resembling in some respects the true or molluscan S.

True shells, as found in molluscs, are divisible according to form into *univalve*, *bivalve*, and *multivalve*. The first of these is fully described in the article *Gasteropoda* (q. v.), the second under *Brachiopoda* (q. v.) and *Lamellibranchiata* (q. v.), and

the third under *Chiton* (q. v.). The S. is usually formed of lime; with a proportion of organic matter. The lime exists in the atomic proportions of *calcite*, although in some groups (e.g. the *Pholadidae*, a boring mollusca) the S. may be composed of *aragonite*—a much harder substance, and an allotropic form of calcic carbonate. Freshwater shells in particular (e.g. Freshwater mussels) have a *periostracum*, or outer covering of horny matter, which is believed to prevent the injurious action on the S. of the carbonic acid of the water. As to composition, three chief varieties of S. are distinguished. These are (1) the *puccellanous*, in which three layers are to be discerned, each layer consisting of delicate limy plates set on edge, and occasionally varying in their direction; (2) the *fibrous* S. consists of layers of prismatic cells; and the (3) *nacreous* S. are formed of limy matter into the composition of which *nacre* or *Mother-of-Pearl* (q. v.) enters.

Shell, in artillery, a hollow projectile containing a bursting charge of gunpowder, which is exploded either by a 'time' or a 'percussion' fuze. It is the offspring of the *olla* or 'firepots' of the ancients, which held the celebrated Greek fire. The use of explosive projectiles has been known to the Chinese from a very remote period. Small shells (grenades) were thrown by hand, slings, or other means, before they were used with mortars. The earliest recorded employment of mortar and S. is at Jadra in 1376 by the Venetians. Horizontal fire of shells from howitzers, and afterwards from guns, was first attempted in the 18th c.

Spherical shells are fired from smooth-bore ordnance, and elongated shells from rifled guns. British Service smooth-bore are classed as *common* and *Shrapnel*. The former include *common*, *mortar*, *naval*, and *hand-grenade* shells, which are simply spheres filled with heavy charges of gunpowder. The *personnel* of an enemy suffers from a common S. bursting during flight, but if it explodes when at rest it acts like a mine in destroying parapets, *material*, &c. Shrapnel S. takes its name from Colonel Shrapnel, R.A., who about 1781 conceived the idea of filling S. with bullets to take effect at ranges beyond grape- or case-shot. Such a S. was first employed at Roliça and Vimiera in 1808. The fundamental principles of the Shrapnel S. are (1) a small bursting charge sufficient to open the S. and release the bullets with a minimum dispersive effect, and (2) a maximum firing charge to impart high velocity to the S. The Diaphragm Shrapnel S. for smooth-bore ordnance, introduced by Colonel Boxer in 1852, and now in general use, is shown in section with fuze complete in fig. 1.



Fig. 1. Section of Boxer Shrapnel Shell with fuze. Diaphragm.

The bursting charge is better disposed than in the original, for the rupture of the S. without scattering the balls, and it is also completely separated from them by a diaphragm. The musket and carbine bullets are surrounded by coal-dust. Shrapnel is fired from guns, howitzers, and carronades against masses of troops, the explosion being timed to occur at a short distance in front. This, as well as the common smooth-bore S., is fitted with a wood bottom which serves to keep it in the proper position (with the fuze outwards) during discharge. An elongated S. for use with rifled ordnance is fitted on the circumference with gun-metal studs, or on the base with a copper *sabot*, to take the grooves. Figs. 2, 3, and 4 show sections of the principal muzzle-loading rifled shells of the British Service. Fig. 2 illustrates the 8-inch Boxer-Shrapnel S. (weight 170 lbs., bursting charge 1 lb.). The bullets are embedded in resin and separated by an iron diaphragm from the bursting charge placed in the base of the S., and a tube passing down the centre connects the fuze in the apex with the powder-chamber. On explosion the bullets receive a forward impetus which to some extent counteracts the tendency to lateral dispersion arising from rotary motion of the S. The head is only lightly attached to the body, and 'lines of least resistance' are formed in the S. by grooving it internally. Fig. 3 shows a 12-inch Palliser S. of chilled iron with ogival head (weight 700 lbs.). The charge (9½ lbs.) held in a serge bag is placed in the hollow, and on impact it explodes, no fuze being required. A 10-inch 'common' S. of cast iron (average weight 398 lbs., bursting

charge 20½ oz.) is represented in fig. 4. It is burst by means of a fuze fitted in its apex. Martin's S. is a cast-iron globe filled with molten iron, and is employed to set ships, stores, &c., on fire.

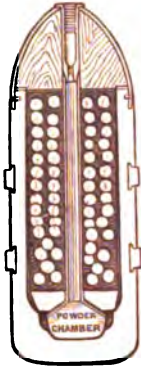


Fig. 2.

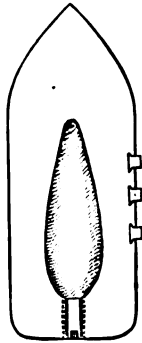


Fig. 3.



Fig. 4.

Rifled Muzzle-loading Shells.

Other noteworthy British inventions are the Armstrong, Whitworth, and Lancaster shells. Among American inventions the most important are the Parrott, Dyer, Hotchkiss, Schenckle, Reed, and Blakely projectiles. These are all on the 'expansive' or 'American system,' as opposed to the Prussian 'compressive system.' They are used without respect to the rifling, and by the action of the gases of discharge on a peculiar device are forced to 'take the grooves.' The objection to expansive projectiles, that they cannot sustain heavy charges, has been met by recent improvements, as seen in the United States cored-shot.

Shell'drake, Shel'drake, or Sheil'drake (*Tadorna vulpanser*), a species of duck, inhabiting Britain, in winter especially, and attaining a length of 7 feet. The plumage is green on the head, chestnut over the forepart of the back, and white behind. The name 'Burrow Duck' is given to the bird, from its habit of laying its eggs in the disused burrows of rabbits. The Ruddy S. (*Casarka rutila*) is occasionally found in Britain, but is more common on the Continent. The S. has a peculiar modification of the lower larynx or organ of voice, rendering its voice harsh and loud.

Shelley, Percy Bysshe, grandson of Sir Bysshe Shelley, was born 4th August 1792, at Field Place, Sussex. At the village school of Warnham, at Sion House School in Brentford, and at Eton, the sensitive and delicate boy grew towards a premature manhood which asserted itself in pronounced atheism and wild romances. Two of these romances, interesting only for the amazing breadth of their extravagance, were actually printed, *Zastrozzi* in 1809, and *St. Irvyne, or the Rosicrucian*, in 1818. For *Zastrozzi* the publisher paid £40. S. likewise contributed the greater part of a volume entitled *Original Poetry, by Victor and Cazire* (1810). Of this book he had 1480 copies printed, but all were destroyed, on the discovery that a pirated poem of Monk Lewis was contained in the collection. In the autumn of 1810 S. went to University College, Oxford, where, along with a fellow-student named Hogg, he published some burlesques, as *Posthumous Fragments of Margaret Nicolson*, edited by John Fitzvictor. But the circulation of a pamphlet (consisting of one sheet) on *The Necessity of Atheism* led to his expulsion by the college authorities. On March 1811 S. left Oxford, and in September of the same year he eloped to Edinburgh with Harriet Westbrook, daughter of a London hotel-keeper. In spite of his theory regarding the relation of the sexes, the poet married the girl in Edinburgh; but he never found in her the companion he

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sought. She was beautiful but small-minded; and when, in London, S. met Mary, the daughter of William Godwin, Harriet was deserted. The unfortunate woman then gained from other men a protection that added guilt to her misery, and ere long she drowned herself in the Serpentine (November 10, 1816). In July of 1814 S. went to the Continent with Mary Godwin, whom he married on the death of his first wife. If his relations towards Harriet involved him in pain and obloquy, his connection with Mary Wollstonecraft's daughter brought him only the purest happiness. In 1813 he had printed *Queen Mab*, a poem with which he hoped to sweep the world clear of religion. Afterwards he despised this juvenile effort; and, indeed, it contains nothing that can satisfy the reader either in form or substance. For a time he settled at Bishopsgate, near Windsor Forest, and there he composed his first great poem, *Alastor* (1816). Then followed *The Revolt of Islam* (1818), after the publication of which S. migrated to Italy, never to return. In 1818 he completed *Rosalind and Helen*, and the same year brought out *Julian and Maddalo*, a fine poem recording some of his intercourse with Byron. In the next year were composed S.'s grandest works, *Prometheus Unbound* (not published till 1821) and the *Cenci*. In the *Prometheus* he utters the cry of modern spiritual unrest, while he worships nature like a Greek. The poem is ethereal, cold, majestic—beautiful as a sea of ice in the moonlight. In the *Cenci* he creates a character for the first and last time, and in hard, firm lines moulds revolting crimes into passionate and pitiful tragedy. So far does he command our sympathy in the play, that we are compelled to assent to the justice of a parricide. After these immortal works came the grotesque *Peter Bell the Third* (1819), *The Witch of Atlas* (1820), and *Ædipus Tyrannus, or Swellfoot the Tyrant* (1820), the latter suppressed at the instance of the Society for the Suppression of Vice. *Epipsychidion* (1821) lamented the death of the author's friend Emilia Viviani, and *Adonais* (1821), perhaps the greatest elegy in all literature, deplored the loss of Keats. *Hellas* (1821) was the result of the Greek Revolution, and is fired with glorious hopes. His enthusiasm culminates in lyric raptures of unsurpassable loveliness. On the 8th of July 1822, the poet was sailing from Leghorn with some friends on his way to Lerici, when a squall overturned the schooner which carried the party. S. was drowned, with Keats's poems in his pocket.

S.'s soul was the very spirit of freedom, and in his imaginary world he legislated for all men like himself. His teaching was not understood, and could have done no good to any bold enough to follow it. In his lifetime he was regarded as a beautiful demon; nowadays, biographers speak of him as a malignant saint. He was sometimes very selfish, but habitually generous; is known to have told absolute falsehoods, yet in the tenor of his life and his works inculcated the purest reverence for truth. Right or wrong, he always thought intensely, and spoke vehemently. His life was restless, unhappy, but pure and beneficent. He was irreligious on principle, but a Christian in practice. As a poet he has not the masculine vigour of Byron, or Keats's quaint luxury of language, but he is more finely intellectual than either, and his verse has a subtle and thrilling melody that no English poet has ever equalled.

Mrs. S. wrote several books during her husband's lifetime, the best known being the novel of *Frankenstein*. She edited her husband's poems, with preface and biographical notes, in 1839. The most complete critical editions of S. are those of Rossetti (3 vols. 1878), and Forman (4 vols. 1876-77). See *Medwin's Life of S.* (1849); *Recollections of the Last Days of S. and Byron*, by Trelawney (new ed. 2 vols. 1878); *Hogg's Life of S.* (2 vols. 1858); *Middleton's S. and his Writings* (2 vols. 1858); *S. Memorials*, by Lady Shelley, with essay by S. on Christianity, 1859; *Garnett's Relics of S.* (1862); *Barnett Smith's S., a Critical Biography* (1877); and *Rossetti's Lives of the Poets* (1878).

Shell-Lac. See LAC.





