William, Duke of Bedford,

Endsleigh.

POCKET ENCYCLOPEDIA.

VOL. I.

ЕМИЛІЄВЪ ЛОККЪ

POCKET ENCYCLOPEDIA

OR A

DICTIONARY

OF

ARTS, SCIENCES,

AND

POLITE LITERATURE:

COMPILED FROM THE BEST AUTHORITIES

BY

EDWARD AUGUSTUS KENDAL.

Embellished with Copper Plates designed and engraved by EMINENT ARTISTS.

SECOND EDITION.—Corrected and much enlarged.

IN FOUR VOLUMES.

VOL. I.

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME AND CO., J. HARRIS, SCATCHERD AND LETTERMAN, PEACOCK AND BAMPTON, WILKIE AND ROBINSON, AND R. BALDWIN.

1811.

Printed by T. C. HANSARD,
Peterborough Court, Fleet Street, London.

PREFACE

TO THE

SECOND EDITION.

IN presenting the public with a new impression of the POCKET ENCYCLOPEDIA, the editor, into whose hands it has now fallen, thinks it right to notice the additions which have been made to it. The quantity of letter press is increased full a third; much of the original matter has been obliterated, to make room for other subjects that were deemed more useful and interesting. The former edition was composed chiefly with a view to Polite Literature and the Arts; in the present is combined a vast quantity of materials connected with the Sciences properly so denominated.

In Natural Philosophy, a variety of articles will be found in their respective places, such as Electricity, Hydraulics, Hydrostatics, Magnetism, Mechanics, Optics, Pneumatics, and Voltaism. These have been explained and illustrated with many well-engraved plates.

A brief introduction to Chemistry will be found under the proper term, connected with the articles Chemical Apparatus, Distillation, Hydrogen, Laboratory, Metals, Mineralogy, Oxygen, &c.

PREFACE.

It cannot be expected that the young persons for whom this Encyclopedia is chiefly adapted will have made much progress in mathematics; nevertheless the knowledge of scientific terms, and of the introductory parts of the abstruse sciences, should be familiar to every well-educated youth; on this account, short articles on Conic Sections, Geometry, Mensuration, Perspective, Trigonometry, &c. have been introduced, with explanatory figures. Articles connected with Arithmetic, and which may be of practical importance in business, and the active employments of life, will be found under the terms, Interest, Insurance, Life Annuities, Leases, Reversions, &c.

The article Chronology, connected with Memory (artificial) and other subordinate articles, will be found extremely well adapted to the student in History.

Without attempting an enumeration of all or even a large proportion of the new articles introduced into this edition, it may be observed that the editor has endeavoured to render it amusing as well as useful; interesting as well as scientific. He has inserted, from the best authorities, a considerable number of articles in Natural History, illustrated with plates. In this department and in Botany, the Linnæan arrangement has been adopted and explained, and a multitude of facts recorded which will instruct, delight and surprise the youthful reader: and in no instance has any thing been

inserted that can offend the delicacy of the purest mind.

In compilations of this sort the editor stands in need of the candour of his readers. He may have omitted much which in the judgment of others ought to have been inserted; in his justification let it be remembered that he was confined to certain limits, and that in many cases he could only select from materials, which, had space been allowed him, he would gladly have given at large. For himself and the proprietors, who have spared neither labour nor pains in the execution of the work, he solicits that patronage which he hopes it will be found to merit.

J. J.

London, Sept. 12, 1811.

PREFACE.

List of Plates.

The Binder is requested to place the Plates in the following order, taking care to make all the Plates face an even page.

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POCKET ENCYCLOPEDIA.

A

A is the first letter of the alphabet in every known language, except that of Ethiopia; its Greek name is Alpha, from the Hebrew Aleph, which is very significant, denoting either an ox or a leader; each a mark of excellence or priority. The first place is deservedly given to this letter on account of its simplicity, and the ease with which it is pronounced; the first sound uttered by human creatures in their most infantile state, being that by which this letter is expressed.

In the English language, this letter has four different sounds. The broad sound, as in all, wall. The open, as in father, rather. The slender or close, which is the peculiar *a* of the English, exemplified in place, face, &c. And the short sound, of which we have instances in hat, cat, fat.

In numerals A denoted 500, and $\bar{A}$ 5,000. In the Italian calendar, A, is the first of the seven dominical letters.

A, as a word, has the following significations: A, an article set before nouns of the singular number; a man, a tree. Before a word beginning with a vowel, it is written *an*; as, an ox, an egg.

A, in abbreviations, stands for artium, or arts; as, A. M. artium magister; or anno; as A. D. anno domini.

In medical prescriptions, this letter with a dash above it, ā, is used for ana, of each.

In music A is the nominal of the sixth note in the diatonic scale: it is also the name of one of the two natural moods.

Abacus, in architecture, the superior member of the capital, to which it serves as a kind of crown. It was originally intended to represent a square tile laid over a basket; and it still retains its original form in the Tuscan, Doric, and Ionic orders; but in the Corinthian and Composite, its four sides or faces are arched inwards, having some ornament, as a rose or other flower, in the middle.

Abacus, Pythagorean, so denominated from its inventor, Pythagoras; a table of numbers, contrived for readily learning the principles of arithmetic, and was probably what we now call the multiplication table.

Abacus Logisticus is a right angled triangle, whose sides, about the right angle, contain all the numbers from 1 to 60; and its area the products of each two of the opposite numbers. This is called a canon of sexagesimals, and is no other than a multiplication table carried to 60 both ways.

Abbe', a french word, literally meaning an *abbot*. The abbots of France, however, were divided into two classes; and these became so totally different from each other, that the character generally spoken of under the name of abbé, has long ceased to be of any official nature. Its origin must be dated about the middle of the seventeenth century;

and, from its institution, which will be seen by referring to the article Abbot, it is plain, that it was not at first, what it latterly has been, a perfectly empty title. Of the modern abbé, in the confined acceptation of the term, to which the present definition is restricted, it is not easy to give a precise account. It is a nominal abbotship which neither imposes duty, nor conveys emolument, but is valuable on account of the respect in which it is held by society, and the consequent assistance that it affords to advancement in church or state. In short, it is a station in which a man of liberal education and little wealth waits, as it were, for the favours of fortune.

Abbess, in catholic countries the superior of an abbey of nuns, or of a community or chapter of canonesses. An abbess was formerly elected by her community, but latterly, with scarcely any other exceptions than those of St. Clare, they have been in the royal gift. To preserve, however, an appearance of the ancient freedom of choice, the pope's bull, by which they are severally confirmed in their offices, states, that they have been recommended by a letter from their king, and approved of by a majority of the nuns. An abbess exercises all the functions of an abbot, with the exception of those which appertain to his priesthood.

Abbey. The abbeys of England, as those of Westminster and Bath, are churches which formerly belonged to such houses of monks or nuns as were governed by an abbot or abbess. At present, an abbey is, in general, the cathedral or episcopal church of the see or diocese in which it stands; and on that account retains the more ancient and

solemn, but expensive, form of divine worship. The abbey at Westminster still possesses this distinguishing feature, as a *collegiate* church; and the church of Saint Paul, is the cathedral of the diocese of London.

ABBOT signifies FATHER, and is a corruption of AB; which, in the Hebrew imports, first, a natural father; and, secondly, by figure, a person to whom filial reverence is due. It is easy to perceive, that the custom of calling superiors "fathers," has descended from those early ages of the Jews in which the government of each family was held by its patriarch or parent; but it is somewhat remarkable, that it should have obtained general use among Christians, whom Jesus, alluding to the arrogance with which the Jewish doctors assumed the title, enjoined to call no one on earth their father: because they have but one father, who is in Heaven. 'Father,' however, notwithstanding this command, is the distinction by which the monks, priests, and bishops of the Roman church have always been addressed. From *ab*, *abba*, *baba*, or *papa* (grand or pre-eminent father,) is derived the French *pape*, and the English *pope*, the chief of the church; and abba, which makes *abbé* in the French, the superior of a monastery. An abbot was, originally, a plain monk, to whom the care of his monastery was committed. He lived like the other monks, except that he had a separate table for the reception of guests, a duty which was one of the prominent motives for the foundation of monasteries. An abbot has a jurisdiction over priories, and is consequently of higher rank than a prior. He has three sorts of authority: the first

consists in the maintenance of order among the monks, in the repair of the building, and the management of its estates; the second, in regulating divine service, in receiving the vows of those who enter into the society, giving the tonsure, and bestowing the benefices or livings that are in the gift of the monastery; the third, in correcting, excommunicating, and suspending offenders. It was because certain abbots and priors in England, in right of their monasteries, held lands of the crown, for which they owed military service, that they obtained the title of LORDS, and were summoned, as barons, to parliament; and from this custom, bishops, in modern times, have the same honour.

ABBREVIATION OF FRACTIONS, in arithmetic and algebra, the reducing them to lower terms: that is, the proportional lessening of both the numerator and denominator. This may be performed either by continual division of the respective terms, or by dividing at once by the greatest common-measure. Thus $\frac{48}{72} = \frac{16}{24} = \frac{4}{6} = \frac{2}{3}$: by dividing both terms continually by 3, 4, and 2. Or, since 24 is the greatest common measure we have, at once, $\frac{48}{72} = \frac{2}{3}$, by dividing by 24.

ABDOMEN, in anatomy, the lower part of the trunk of the body reaching from the thorax to the bottom of the pelyis.

ABDOMINALES, an order of fishes having ventral fins placed behind the pectoral in the abdomen. This order contains sixteen genera.

ABERRATION, in astronomy, a small apparent motion of the celestial bodies, occasioned by the progressive motion of light; and the earth's an-

nual motion in her orbit. The word is compounded of *ab* from, and *erro* to wander, because the stars appear to wander from their true situations. This apparent motion is so minute, that it could never have been discovered by observations, unless they had been made with extreme care and accuracy; and although it naturally arises from the combination of the two causes just mentioned, yet as it was never even suggested by theorists, until it was discovered by observation, it furnishes us with one of the strongest proofs of the truth of the Copernican system. The discovery is owing to the accuracy and ingenuity of Dr. Bradley, astronomer royal: he was led to it accidentally by the result of some careful observations, which he had made with a view of determining the annual parallax of the fixed stars.

Aberration, in optics, that error or deviation of the rays of light, when inflected by a lens or speculum, whereby they are hindered from meeting or uniting in the same point, called the geometrical focus; it is either lateral or longitudinal. The lateral aberration is measured by a perpendicular to the axis of the speculum, produced from the focus, to meet the reflected or refracted ray: the longitudinal aberration is the distance of the focus from the point in which the same ray intersects the axis.

Abeyance, in law-books, something that only exists in expectation, or in the intendment, or remembrance of the law.

Abjuration. A forswearing, or renouncing by oath: in the old law it signified a sworn banishment, or an oath taken to forsake the realm for

ever. In its modern, and now more usual signification, it extends to persons, and doctrines, as well as places. Thus for a man to abjure the pretender by oath, is to bind himself not to own any regal authority in the person called the Pretender, nor even to pay him any obedience, &c.

Ablution, a ceremonious washing of the whole, or part of the body, instituted by the several founders of the religions of the East, for the prevention of those disorders that, especially in warm climates, result from the filth in which the greater part of the people were, and still are condemned to live. For this purpose it was made a religious rite; and by an easy transition of idea, the purity of the body was made to typify the purity of the soul: an idea the more rational, as it is perhaps physically certain that outward wretchedness debases the inward mind. A frequent change of the clothes next the skin, affords, perhaps, especially in cold countries, the same advantages as ablution; and hence, in Europe, the custom has almost universally fallen into disuse. Ablution is still practised in Turkey, as well as in most other parts of the ancient continent.

Abomasus, a name used for the fourth stomach of ruminating beasts, or such as chew the cud. These have four stomachs: the last, where the chyle is formed, and from which the food descends into the intestines, is called the Abomasus.

Aborigines, originally a proper name, given to a certain people in Italy, who inhabited the ancient Latium, or country now called Campayna di Roma. Whence this people came by the appellation is much disputed. The name is now given to

the primitive inhabitants of a country, in contradistinction to colonies, or new races of people.

Abridgement, in a literary sense, is the compression of the matter of a work into a smaller compass than that in which it has been originally written. With respect to private abridgements and commonplace books, theorists in education have frequently taken pains to engage youth in their compilation. On this subject, however, it may be doubted whether the practice will confer any advantage, and even suspected that it may do much mischief. If the mind is desirous of acquiring a thorough knowledge of any particular subject, the notation of facts, dates, &c. will, no doubt, most effectually enable it to accomplish the purpose; but where this is not the design, the time that is devoted to the tedious task of copying one author, had better be employed in reading twenty. If, as has been said before, any minute study is the object, copying is useful; but if it be done merely to assist the memory with sentiments, terms of expression, &c. it is wrong: for the habit of making memorandums, by discharging memory from its office, takes from it every opportunity of improvement.

Absciss, or Abscissa, of a conic section, or other curve, is a part or segment cut off by a line at some certain point, which is determined by an ordinate to the curve.

Absorbents, calcarious earths, or other medicines which soak up the redundant humours of the body. Also, a system of vessels that absorb and convey fluids from every cavity of the body to the thoracic duct, which is their common trunk. These last are likewise denominated lymphatics, and those of the

smaller intestines, from the milky hue of the fluid in most animals, lacteals.

ABSTINENCE may be defined, the habit of refraining from what is either useful, agreeable, or pernicious. The Christian system more particularly enjoins the discipline of the passions, and an abstinence from those pleasures which have a tendency to degrade our nature. In England, certain days have been appointed, called vigils and fasts, in which flesh is prohibited, and fish enjoined: this, however, being more a political restriction than a religious obligation, was first enacted in the reign of queen Elizabeth, with a view to encourage our fisheries. Of the brute animals, many are remarkable for their long abstinence from food, such as the serpent, the rattlesnake, tortoise, bear, dormouse, elephant, &c. Instances may also be found of men who have been abstemious to a degree almost incredible; and experience has demonstrated that, from habit and use, the power of abstinence may be either increased or diminished.

ABYSSINIA, is bounded on the north by Nubia; on the east by the Arabian gulf, or Red Sea, and the kingdom of Adel; on the south by the kingdoms of Ajan, Alaba, and Gingiro; and on the west by the kingdom of Gorem, and part of Gingiro. In this country the famous river Nile has its source. On the mountains the air is pretty temperate; therefore their towns and fortresses are generally placed on them; but in the valleys the heat is intense. The torrents of water in the rainy seasons wash a great deal of gold from the mountains. These seasons commence in May, and end in September. The inhabitants of this country, in

general, are of an olive complexion, tall, graceful, and well featured. Their language is the Ethiopic, which bears a great affinity to the Arabic. Gold, silver, copper, and iron, are the principal ores which abound there, but not above one third part of their gold is converted into money, or used in trade.

Academics, a sect of philosophers, who followed the doctrine of Socrates and Plato, as to the uncertainty of knowledge, and the incomprehensibility of truth. Academic, in this sense, amounts to much the same with Platonist; the difference between them being only in point of time. They who embraced the system of Plato, among the ancients, were called Academici; whereas those who did the same since the restoration of learning, have assumed the denomination of Platonists.

Academy, in the modern acceptation, is a society of persons united for the pursuit of some objects of study and application, as the Royal Academy of Arts of London, and the Royal Academy of Sciences of Berlin. The term is derived from a house and gardens, once the residence of Academus, a celebrated Athenian, in which Plato and his disciples held philosophical conversations.

Acceleration, in mechanics, the increase of velocity in a moving body. Accelerated motion is that which continually receives fresh accessions of velocity, and is either equally or unequally accelerated. Acceleration stands directly opposed to Retardation, which denotes a diminution of velocity. See Mechanics.

Accent, is 1. The manner of speaking or pronouncing. 2. The sound of a syllable. 3. The

marks made upon syllables to regulate their pronunciation. 4. A modification of the voice, expressive of the passions or sentiments. It is also used for a character placed over a syllable, to mark the accent, i. e. to shew it is to be pronounced in a higher, or in a lower tone; and to regulate the inflexions of the voice in reading. It is distinguished from emphasis, as the former regards the tone of the voice, the latter the strength of it. We reckon three grammatical accents in ordinary use, all borrowed from the Greeks, viz. the acute accent, which shews when the tone of the voice is to be raised. In modern writings it is a little line, or virgula, placed over the vowel, a little sloping or inclined, in its descent, from right to left, as ´. It is not ordinarily used, either in English or Latin: the French, indeed, retain it; but it is only to mark the close or masculine é. The grave accent, when the note or tone of the voice is to be depressed; and is figured thus `. The circumflex accent, which is composed of both the acute and the grave; it points out a kind of undulation of the voice, and is expressed thus ~ or ^.

Accent, in music, is a modulation of the voice, to express a passion. Every bar or measure is divided into accented and unaccented parts. The accented parts are the principal; being those intended chiefly to move and affect; it is on these the spirit of the music depends.

Acceptance, in commerce, is when a man subscribes, signs, and makes himself a debtor for the sum contained in a bill of exchange, or other obligation, drawn upon, or addressed to him; as thus:

" Sir, " London, January 20, 1811.

" Two months after date, pay to Mr. John Doe, " or his order, the sum of one hundred pounds, for " value received of, Sir,

" Your obedient, servant,

(Signed) " Richard Roe.

" *Accepted,*

" £. 100 0 0 " Thomas Styles.

(Addressed)

" Mr. Thomas Styles, Broad-street Buildings."

In this case Mr. Thomas Styles makes himself liable to pay 100*l.* to Mr. John Doe or his order.

If there be a right understanding between both parties, a small matter amounts to an acceptance, as " Leave your bill with me, and I will accept " it ;" or, " Call for it to-morrow, and it shall be " accepted." This obliges as effectually, by the custom of the merchants, and at law, as if the party had actually signed the bill.

Accessory, or Accessary, in common law, is chiefly used for a person guilty of a felonious offence, not principally, but by participation: as, by advice, command or concealment. There are two kinds of accessories: before the fact, and after it. The first is he who commands or procures another to commit felony, and is not present himself; for if he be present, he is a principal. The second is he who receives, assists, or comforts any man that has done murder, or felony, whereof he has knowledge.

Accipitres. The first order of the Linnéan class, of Birds: the ordinal character being, bill

somewhat hooked downwards, the upper mandible dilated near the point, or armed with a tooth; nostrils open; legs short, and strong; feet formed for perching, having three toes forwards and one backwards; toes warty under the joints; claws hooked and sharp pointed; body muscular; flesh tough and not fit to be eaten; food, the carcasses of other animals, which they seize and tear; nest in high places: eggs about four; female larger than the male: they live in pairs. The birds of this order subsist by preying on other animals. There are four genera, viz. the *Vultur*, *Falco*, *Strix* and *Lanius*.

Accolade, a ceremony practised in the days of chivalry, in conferring knighthood. The word obviously means something done to the neck. It is probable that, with the simplicity of ancient times, the sovereign originally embraced the hero whom he intended to dignify. This familiar expression of regard appears to have been exchanged for the more stately act of touching, or gently striking, with the royal sword, the neck of the kneeling knight. The form now used in *dubbing* a knight is, doubtlessly, a remain of the ancient accolade.

Acetates, in chemistry, certain neutral salts formed by the combination of the acetic acid, or radical vinegar, with different substances, or bases. These salts differ from acetites in this respect; the acid employed in the production of the former is fully saturated with oxygen, or the acidifying principle, that is, it is completely acid; while that which is used to form the latter, contains a less proportion of oxygen than is sufficient to saturate it. The different acetates are expressed by the addition

of the word denoting the substance to which the acid is united, as acetate of lime, &c.

Acetic Acid, in chemistry, one of the vegetable acids, produced by distilling the acetous acid with metallic oxydes. It is of a green colour, but becomes white by rectification. It is extremely volatile and inflammable; corrodes and cauterizes the skin; and when heated in contact with air, takes fire. Combined with earths, alkalies, and minerals, it forms salts called acetates.

Acetites, compound or neutral salts, formed by the union of the acetous acid, or distilled vinegar, with different bases: the most remarkable of these substances, and those whose properties are best known, are the acetite of alumene, copper and lead.

Acetous Acid, distilled vinegar, or the acid of vinegar, is obtained from mucilaginous substances by that degree of fermentation which succeeds the spirituous, called the acetous fermentation, and by concentrating the product. It is a transparent colourless fluid, of the specific gravity of 1·0095, nearly as volatile as water, exhaling a pungent fragrant odour, and of a lively agreeable taste.

Acid, in chemistry, the generic name of a comprehensive class of substances, which possess the following properties: sourness of taste; a power of changing blue vegetable colours to red; of forming with water a combination whose specific gravity is not a medium between the water and the acid; and of combining (and usually effervescing) with all the alkalies, and most of the metallic oxyds and earths, by which means those compounds are formed which are called neutral, or secondary salts. Though every acid does not possess all

these properties, yet they all possess a sufficient number of them to distinguish them from other substances. The form under which acids most commonly appear, is that of a transparent liquor, in which case they are generally combined with a greater or less quantity of water; several of them, however, are found in a solid state, as Benzoic acid, or the flowers of Benzoin; and some exist in a state of gas: as carbonic acid gas. Acids are divided into four classes, according to their bases or radicals. First, those with simple radicals, of different kinds. Secondly, those with double radicals, viz. carbon and hydrogen, in different proportions. Thirdly, those with triple radicals, carbon, hydrogen, and azote. And fourthly, those with unknown radicals. The old chemists were only acquainted with the three mineral acids, as they are called, the sulphuric, the nitric, and the muriatic, besides the acetous acid, or vinegar.

Acidulated Waters, generally called *Acidulæ*, a species of mineral waters, which contain a considerable quantity of carbonic acid, and which are known by the poignancy of their taste, the sparkling appearance which they assume when shaken or poured from one vessel into another, and the facility with which they boil.

Acis, in fabulous history, the son of Faunus and Simethus, was a beautiful shepherd of Sicily, who being beloved by Galatea, Polyphemus the giant was so enraged, that he dashed out his brains against a rock; after which Galatea turned him into a river, which was called by his name.

Acoustics is the science which instructs us in the nature of sound. It is usually divided into

two parts, viz. 'diacoustics,' which explains the properties of those sounds that come directly from the sonorous body to the ear; and 'catacoustics,' which treats of reflected sounds. Almost all sounds that affect us are conveyed to the ear by means of the air; but water is a good conductor of sound; so also are timber and flannel.

A bell rung under water returns a tone as distinct as if rung in the air.

Stop one ear with the finger, and press the other to one end of a long stick, or piece of deal wood, and if a watch be held at the other end of the wood, the ticking will be heard be the wood or stick ever so long.

Tie a poker on to the middle of a strip of flannel, two or three feet long, and press with the thumbs or fingers the ends of the flannel into your ears, while you swing the poker against an iron fender, and you will hear a sound like that of a very heavy church bell. These experiments prove that water, wood, and flannel are good conductors of sound, for the sound from the bell, the watch, and the fender pass through the water, and along the deal and flannel to the ear.

It must be observed, that a body, while in the act of sounding, is in a state of vibration, which it communicates to the surrounding air, the undulations of the air affect the ear, and excite in us the sense of sound. Sound, of all kinds, it is ascertained, travels at the rate of thirteen miles in a minute: the softest whisper travels as fast as the most tremendous thunder. The knowledge of this fact has been applied to the measurement of distances.

Suppose a ship in distress fire a gun, the light of which is seen on shore, or by another vessel, 20 seconds before the report is heard, it is known to be at the distance of 20 times 1,142 feet, or little more than four miles and a half.

Again, if I see a vivid flash of lightning, and in two seconds hear a tremendous clap of thunder, I know that the thunder cloud is not more than 760 yards from the place where I am, and should instantly retire from any exposed situation.

The pulse of a healthy person beats about 76 times in a minute; if, therefore, between a flash of lightning and the thunder, I can feel 1, 2, 3, 4, &c. beats of my pulse, I know the cloud is 900, 1,800, 2,700, &c. feet from me.

Sound, like light, after it has been reflected from several places, may be collected into one point as a focus, where it will be more audible than in any other part: on this principle whispering galleries are constructed. Suppose fig. 1, plate 1, to represent the concave hemisphere of such a gallery, if a sound be uttered at A, its vibrations expanding every way on the points D, D, &c. will be reflected to E, E, &c., thence to F, F, G, G, &c. till they all meet in C, the opposite part of the gallery, where the sound is distinctly heard.

Speaking trumpets, and those intended to assist the hearing of deaf persons, depend on the reflection of sound from the sides of the trumpet, and also upon its being confined and prevented from spreading in every direction. A speaking trumpet, to have its full effect, must be directed in a line towards the hearer. The report of a gun is much louder when fired towards a person, than one

placed in a contrary direction. Thus, in fig. 2, the sound is received in the open part A C, and is eventually reflected from all sides into the line D B, by which it is sent to the hearer.

An echo is the reflection of sound striking against a surface adapted to the purpose, as the side of a hill, house, wall, &c. Thus fig. 3, if a person stand at *m*, and the bell *a* be struck, the sound along *a x* will proceed to the wall and be reflected from *c* to *m*, so that a person standing at *m* will hear the direct sound coming along *a m*, and afterwards, the reflected sound or echo, along *c m*.—See Music.

Acquittal, a discharge, deliverance, or setting free of a person from the guilt or suspicion of an offence. Acquittal is of two kinds; in law, and in fact. When two are appealed or indicted of felony, one as principal, the other as accessary, the principal being discharged, the accessary is, by consequence, also freed: in which case, as the accessary is acquitted by law, so is the principal in fact.

Acre, a measure of land very general in name, but differing almost in every two places as to the extent which it is intended to denote. A statute-acre in England contains four square roods; a rood, containing forty perches or poles, of sixteen feet and a half each; but, in different countries, the length of the pole varies, from the statute measure of sixteen feet and a half, to twenty-eight: these several lengths are called *customary measures*. In Scotland, the acre is larger than in England. The French acre contains one English and a half. The Strasburgh acre is about half an English acre. The Welsh acre commonly contains two English.

The Irish acre is equal to one acre, two roods, 19 $\frac{27}{128}$ perches English.

Acronychal, in astronomy, is applied to a star or planet, when it is opposite to the sun. It is from the Greek, signifying the point or extremity of night, because the star rose at sun set, or the beginning of night, and set at sun-rise, or the end of night; and so it shone all the night. The acronychal is one of the three Greek poetic risings and settings of the stars; and stands distinguished from cosmical and heliacal. By means of which, for want of accurate instruments, and other observations, they might regulate the length of their year.

Acrostic, a poem, the lines of which are so contrived, that the first letters of each, taken together, will make a proper name or other word.

Act. Act, in the universities, is the delivery of orations, or other exercises, in proof of the proficiency of a student who is to take a degree. At Oxford, the time when masters or doctors complete their degrees, is called the *act*. At Cambridge, the same period is called the *commencement*.

Act of Faith, or *auto-da-fé*. In dark and barbarous countries where the Spanish inquisition had power, the *act of faith* was a solemn murder of infidels and heretics, usually performed on some great festival, and always on a Sunday.

Act of Parliament is a positive law, consisting of two parts, the words of the act, and its true sense and meaning; which, being joined, make the law. The words of the acts of parliament are to be taken in a lawful sense. Cases of the same nature are within the intention, though without the letter, of the act; and some acts extend, by equity, to cases not mentioned therein.

Action, in law, denotes either the right of demanding in a legal manner, what is ones due, or the process brought for the recovering the same.

Acts of the Apostles, a canonical book of the New Testament, which contains great part of the lives of St. Peter and St. Paul; commencing at the ascension of our Saviour, and continued down to St. Paul's arrival at Rome, after his appeal to Cæsar; comprehending in all about thirty years. St. Luke has been generally taken for the author of this book, and his principal design in writing it was to obviate the false acts, and false histories, which began to be dispersed up and down the world. The exact time of his writing is not known; but it must have been at least two years after St. Paul's arrival at Rome, because it informs us that St. Paul dwelt two whole years in his own hired house; perhaps he wrote it while he remained with St. Paul, during the time of his imprisonment. The council of Laodicea places the Acts of the Apostles among the canonical books, and all the churches have acknowledged it as such without any controversy. The truth and divine original of Christianity, may be deduced from a comparison of the Acts of the Apostles, with the other received books of the New Testament. To this end Dr. Paley has, in his very masterly work, entitled Horæ Paulinæ, brought together from the Acts of the Apostles, and from the different Epistles of Paul, such passages as furnish proof of undesigned coincidence; and which, therefore, are so many independent proofs of the authenticity both of the Acts and those Epistles.

Acute diseases, are distinguished from chronic, which latter are of greater duration and slower progress. Acute diseases are attended with violent

symptoms, and require immediate aid: chronic diseases are those which usually last long.

Adit of a Mine, the hole, or aperture, whereby it is entered and dug, and by which the water and ores are carried away. The term amounts to the same with cuniculus or drift, and is distinguished from an air-shaft. The adit is usually made on the side of a hill.

Adjutant, a military officer, whose duty it is to carry orders from the major to the colonel and serjeants. When detachments are to be made, he gives the number to be furnished by each company or troop, and assigns the hour and place of rendezvous. He also places the guards, receives and distributes the ammunition to the companies, &c.; and, by the orders of the major, regulates the prices of provisions.

Adjournment, the putting off a court or other meeting till another day. In parliament, adjournment differs from prorogation, the former being not only for the shorter time, but also done by the house itself, whereas the latter is an act of royal authority.

Administrator, in law, is he to whom the administration of the goods of a deceased person, in default of an executor, is committed. If the administrator die, his executors are not charged with the administration; but a new administration is granted. This office was established by an act made in the 31st year of Edward III.

Admiral, in England, a great naval officer, who has the government of a navy, and the hearing of all maritime causes.

Admiral, Lord High of England, a great officer of state, who presides over all persons and matters

connected with the navy. His office is of such high antiquity, and his powers so very unlimited, that its authority is defined rather by what it is not, than by what it is. Ever since the reign of queen Anne, the duties of lord high admiral have been executed by commissioners, commonly known by the title of Lords of the Admiralty.

Admiral, is also the commander in chief of any single fleet, or, in a general way of speech, any flag-officer whatever, as, though improperly, vice and rear admirals are called admirals.

Vice-Admiral, is the commander of the second squadron, and carries his flag at the fore-topmast head.

Rear-Admiral, is the commander of the third squadron, and carries his flag at the mizen-topmast head.

Vice-Admiral, is also an officer appointed by the lords-commissioners of the admiralty for executing jurisdiction within prescribed limits.

Admiralty, Court of, is a sovereign court held by the lord high admiral, or by the lords commissioners of the admiralty, where cognizance is taken in all maritime affairs, whether civil or criminal. All crimes committed on the high seas, or on great rivers below the first bridge next the sea, are cognizable in this court only, before which they must be tried by a judge and jury. By the late act of the 39th of his present majesty, it is enacted, "That all offences committed upon the high seas, out of the body of any county, shall be, and are declared to be, offences of the same nature respectively, as if they had been committed upon the shore. In consequence of which act, all offences

committed on the high seas are now to be heard and determined before a jury, as at common law. In civil matters, the verdict lies in the breast of the judge; but there is an appeal to the court of delegates; and from the vice-admiralty courts in foreign settlements an appeal may be brought before the court of admiralty here, or before the king in council. The advantages resulting to mariners from suing in the court of admiralty, rather than in the common courts of law, are, 1st. A whole ship's company may join in a suit for wages, by which means the expence is lessened; and 2d. The ship itself is responsible to the admiralty, and not to the owners. A third province of the court of admiralty relates to the law of nations. It belongs to this court to decide whether a captured ship be a lawful prize or not? If the affirmative is declared, the ship is said to be condemned.

ADVERB, a word joined to verbs, expressing the manner, time, &c. of an action. Example. It is conducive to health to rise *early*: here the word early is an adverb, and is joined to the verb rise.

ADVOWSON, signifies a right to present to a vacant benefice. This right is so called because it was first gained by such as were founders, benefactors, or maintainers of the church. Advowsons are either *presentative*, as when the patron presents or offers his clerk to the bishop to be instituted; *collative*, as where the benefice is given by the bishop, as original patron thereof, or by means of the right he has acquired by lapse; or *donative*, as where the king, or other patron, does, by a simple donation in writing, put the clerk into possession, without presentation, institution, or induction.

ÆNIGMA, or *Enigma*, is commonly called a riddle. The Greek words of which the term is formed, mean an obscure hint or saying. Enigmas may be either painted or written. The true end of language and of arts, however, is to enlighten, and not to obscure. Enigmas were the invention of intelligent men, who had the misfortune to live in countries, and in ages, where and when truth could not be openly spoken: a state of things which gives birth to wit of various kinds. In modern times, enigmas can serve no other purpose than that of enabling the inventor or propounder to obtain a contemptible triumph over those who do not happen to guess their meaning. An aptitude at unravelling them is, on the other hand, a talent scarcely to be desired. In all periods, enigma-makers seem to have endeavoured rather to intrap than to inform. This is a fact so true, that the understanding of enigmas, or dark sentences, became proverbial among the Hebrews, intimating skill in deception.

ÆOLIPILE, in hydraulics, a hollow ball of metal, with a small hole or opening; chiefly used to shew the convertibility of water into elastic steam. The best way of fitting up this instrument, is with a very slender neck or pipe, to screw on and off, for the convenience of introducing the water into the inside; for by unscrewing the pipe, and immerging the ball in water, it readily fills, the hole being pretty large; and then the pipe is screwed on. But if the pipe do not screw off, its orifice is too small to force its way in against the included air; and therefore to expel most of the air, the ball is heated red hot, and suddenly plunged with its orifice into water, which will then rush in till the

ball is about two-thirds filled with the water. The water having been introduced, the ball is set upon the fire, which gradually heats the contained water, and converts it into elastic steam, which rushes out by the pipe with great violence and noise; and thus continues till all the water is so discharged; though not with a constant and uniform blast, but by fits: and the stronger the fire is, the more elastic will the steam be, and the force of the blast. Care should be taken that the ball be not set upon a violent fire with very little water in it, and that the small pipe be not stopped with any thing; for in such case, the included elastic steam will suddenly burst the ball with a very dangerous explosion.

Æolus's Harp, a very pleasing musical instrument, invented by Kircher. The construction is perfectly simple, consisting of little more than a number of catgut or wire strings, distended in parallel lines over a box of wood, with a thin top containing sound-holes. When the strings are tuned in unison, and the instrument is placed in a proper situation to receive a current of air, it produces, by the tremulous motion given by the wind to the strings, a soft, murmuring, and pleasing combination of sounds, which is beautifully described by Thomson in his Castle of Indolence. Fig. 3.

Ætiolation, a term denoting the state of vegetables which, by growing in the shade, and being deprived of light, become pale, white, and insipid. How this change is produced, the present state of our knowledge will not permit us to explain; but it is a fact of general observation, that the colour of herbs is pale or deep in proportion as they are less or more exposed to the rays of the sun; and those

which, for the want of those rays, are pale or white, are said to be ætiolated, from a French word signifying star, as if they grew by star-light.

Æra, or *Era*, a fixed historical period whence years are reckoned: as the building of Rome, or the birth of Christ. *See* Epoch.—Era and Epoch are not exactly synonymous. An era, is a point fixed by a particular people or nation; an epoch, one determined by chronologists and historians. The idea of an era, also, comprehends a certain succession of years, proceeding from a fixed event; and an epoch is that event itself. Thus, the christian era began at the epoch of the birth of Christ. See Chronology.

Aeronaut, one who sails in the air. The term is applied to a person who ascends with an air-balloon.

Aerostation, aerial navigation, or the art of passing through the atmosphere in a buoyant state. Hence, also, the machines which are employed for this purpose are called aerostats, or *aerostatic* machines, and, from their globular shape, *balloons*. In the ancient history or romance of almost every nation, instances of persons travelling through the air have been related; and among the philosophers of Europe, since the revival of letters, the possibility of a mechanical contrivance, by means of which a man might rise into the air, or at least descend from heights with safety, has sometimes been discussed. The first experiments that may be strictly said to have introduced balloons, were made about the year 1766. In the year 1781, the Montgolfiers, considerable paper-manufacturers of Annonay, in France, raised a fine silk bag, of an elongated oval shape, to the height of seventy feet.

M. Pilatre-de-Rozier, who afterward fell a sacrifice to the project, was the first to ascend with a balloon. His voyage took place on the 15th of October, 1783, from the neighbourhood of Paris. The success of former experiments, induced M. M. Charles and Roberts to make an attempt, upon a principle somewhat different from those that had been employed, with a balloon of a spherical form. They rose from Paris, and descended at the distance of twenty-seven miles. There, M. Roberts left the boat or car; but the balloon still retaining a considerable quantity of inflammable gas, and its burthen being thus lightened, M. Charles resolved to take another voyage by himself. He was carried up with so much velocity, that in twenty minutes he was almost 9000 feet high, and entirely out of sight of terrestrial objects. At the moment of his parting from the ground, the globe had been rather flaccid; but it soon began to swell, and the inflammable air escaped from it in great quantity, through the silken tube. He frequently opened the valve, that it might be the more freely emitted, and the balloon effectually prevented from bursting. The heat of the inflammable gas being considerably greater than that of the external air, the former diffused itself all around, and was felt like a warm atmosphere; but, in the space of ten minutes, the thermometer indicated a variation of temperature as great as that between the warmth of spring and the ordinary cold of winter. M. Charles's fingers were benumbed by the cold; and he felt a violent pain in his right ear and jaw, which he ascribed to the dilatation of the air in these organs, as well as to the external cold. The beauty of the prospect which at this

juncture presented itself, made amends, however, for these inconveniences. At his departure, the sun was set on the valleys; but the height to which M. Charles was got in the atmosphere rendered its orb again visible, though only for a short time. He saw, for a few seconds, vapours arising from the valleys and rivers. The clouds seemed to ascend from the earth, and collect, one upon another, still preserving their usual form; though their colour was grey and monotonous for want of light in the atmosphere. By the radiance of the moon, he perceived that the machine was turning round with him in the air; and he observed that there were also contrary currents which brought him back again. He beheld, with surprize, from some unusual effect of the wind, the streamers of his banners pointed upward; a circumstance which, as he was moving horizontally at the time, cannot be attributed either to his ascent or descent. At last, recollecting his promise of returning to his friends in half an hour, he pulled the valve, to release a portion of the gas. When within 200 feet of the earth, he threw out 2 or 3 pounds of ballast, which rendered the balloon again stationary; but in a little time afterward he gently alighted in a field about 3 miles distant from the place where he set out; though, making allowance for all the turnings and windings of the voyage, he supposed that he had travelled 9 miles at least. By the calculations of Maunier, he rose 10,500 feet; a height somewhat greater than that of Mount Etna. During this voyage, the idea of guiding the machine by means of oars suggested itself to M. Charles; and this new experiment was made by M. Blanchard, who found, however, that

the strength he could apply in his apparatus was not great enough to counter-act, in any sufficient degree, the impression of the wind.

The only expedition in which a balloon has appeared to accomplish a practical purpose, was that of M. Blanchard and Dr. Jefferies, who, in the month of January, 1785, crossed the straits of Dover, and in the space of about 3 hours alighted safely in the forest of Guiennes. In the month of September, in the same year, Mr. Baldwin ascended from Chester in Mr. Lunardi's balloon. His account of the prospect which the earth afforded is extremely curious. At the height of what appeared 7 miles, though, by the barometer, it was only a mile and a half, he had a grand and most enchanting view of the city of Chester and its environs. The river appeared of a red colour; the city of a blue, and very diminutive. The whole looked a perfect plain; the highest building having no apparent height, and every thing seeming reduced to the same level. The lowest bed of vapour was of a pure white, in detached pieces, uniting as they rose: at the second height, the clouds appeared, to use Mr. Baldwin's expression, as a sea of cotton, tufted here and there by the action of the air. The prospect presently became an extended white floor of cloud, the upper surface being smooth and even. Above this white floor, Mr. Baldwin observed, at great and unequal distances, a vast assemblage of thunder-clouds, each parcel containing whole acres in extent, of the densest form; he compares their shape and appearance to the smoke of pieces of ordnance, consolidated, as it were, into masses of snow, and penetrating through the upper

surface of common clouds, and there remaining and visible at rest; while some, moving slowly in various directions, completed a view truly majestic.

As we cannot give a detail of all the ærial voyages made in this and other countries, we shall only mention those of Mr. Garnerin, in one of which he ascended at Ranelagh, near London, and descended at Colchester, a distance of 60 miles in about 3 quarters of an hour. This was in June 1802: but in September, he ascended from North Audley-street, London, in order to shew that he could come down in safety, by means of a parachute: which he did, in a field near St. Pancras church. The balloon used on this occasion, was of the common sort, viz. of oiled silk, with a net, from which ropes proceeded that terminated in or were joined to a single rope, at a few feet below the balloon. To this rope the parachute was fastened. The parachute was a large umbrella, about 30 feet in diameter, but destitute of ribs or handle. Several ropes about 30 feet in length, proceeded from the edge of the parachute terminating in a common joining, from this, shorter ropes were fixed, to the extremities of which a circular basket was fastened. In this Mr. Garnerin placed himself, and when every thing was steady, he cut the rope, and in an instant was separated from the balloon, trusting his safety to the parachute. For a few seconds, before the parachute opened, he fell with very great velocity, but as soon as that expanded the descent became gradual. On coming to the earth, Mr. Garnerin experienced some pretty severe shocks, but without receiving any material injury. Fig. 4. represents a balloon in its ascent: and fig. 5. Garnerin as coming down by means of the parachute.

As *hydrostatics* is the science of the weight of water, so aerostatics is that of the weight of air: air and water are both fluids: and a balloon rises into the one, upon the same principle that a vessel floats upon the other. Air is lighter than water; and, therefore, a body, containing a quantity of air greater in bulk than the water it displaces, will swim; and rarefied or inflammable air being lighter than the common atmosphere, a body containing either the rarefied or inflammable air will ascend till its nature is altered, or it arrives in a fluid as light as itself, and consequently has gained the surface of the heavy atmosphere. The most familiar exposition of this principle that can be offered, may be seen in those air-bubbles which, on pouring water rapidly into a glass, arise, with the utmost velocity, from the bottom to the surface, and there, becoming stationary, form a temporary froth. The water represents the air, and the air-bubble the balloon. See more on this subject under the article PNEUMATICS.

ÆTHER, or *Ether*, a thin, subtle, and perfectly pure fluid. The term is used by natural philosophers ancient and modern; but the thing or matter meant is variously described. According to electricians, it is the electric fluid, or solar light. It may be understood to be a fluid that fills all space; in which the stars revolve; and which, when impregnated with earthy exhalations, forms the air or atmosphere. In this sense, ether is what is called rarefied air: that is, ether disburdened of intermingling particles. See *Air*.

ÆTNA. A volcano or burning mountain of Sicily, situated in lat. 38. N. long. 15½. E.—This mountain, famous from the remotest antiquity both for

its bulk and terrible eruptions, stands in the eastern part of the island, in a very extensive plain, called Val Demoni, from the notion of its being inhabited by devils, who torment the spirits of the damned in the bowels of this volcano. Authors are not agreed as to its dimensions, or its height above the surface of the sea. The accounts given of the phænomena which have accompanied its eruptions, by sir William Hamilton and Mr. Brydone, are exceedingly interesting. According to the observations of the last mentioned traveller, the height of Ætna is about 12,000 feet. Faujas de S. Fond states it at 10,036 feet. The circumference of the base is commonly reckoned about 180 miles. There are 77 cities, towns, and villages, scattered over different parts of the sides of this mountain, and the number of its human inhabitants above is 100,000. The distance from Catania to the summit exceeds 30 miles. The fire which is continually burning in the bowels of this mountain, led the poets to place here the forges of the cyclops, under the direction of Vulcan, and the prison of the giants who rebelled against Jupiter. The eruptions of this mountain have likewise been described by several of the ancient poets.

Affinity, in natural philosophy, 1. The tendency which the particles of matter have to be attracted or united to each other. 2. Elective attraction simple, reciprocal, or double. 3. Sympathy or consent of parts. The power by which one organ is affected by another, whether directly or inversely.

Aerica, one of the quarters of the globe: commencing, northward, at the opposite coast of the strait of Gibraltar; extending along the whole

western side of the Mediterranean Sea; divided from Asia by the Red; extending into the Indian; and forming the eastern boundary of the Atlantic, from the Cape of Good Hope, to the strait whence its limits have been traced. The principal rivers of Africa are the Niger, the Senegal, the Gambia, the Laira, the Coanza and the Nile: the principal mountains are the Atlas, the Mountains of the Moon, and the Sierra Leona. Africa produces lions, leopards, tigers, panthers, rhinoceroses, elephants, cameleons, ostriches, camels, monkeys, &c. and in the rivers there are crocodiles and river-horses.

AFRICAN COMPANY, a society of merchants established by Charles II. for trading to Africa. This commerce is now laid open to all the subjects of the realm, paying 10 *per cent.* for the maintenance of the forts.

AFTERSWATH, or *Aftersward*, in husbandry, the grass which grows up after mowing: it is called in some counties ROWEN.

AGA, in the Mogul language, a great lord or commander; in the Turkish, it is applied in courtesy, to a gentleman or wealthy landholder; or on account of post or rank, as to the commander in chief of the janissaries. The title Aga is known in other Mahometan countries. The chief officers under the khan of Tartary are called by this name; and among the Algerines we read of *agas* chosen from among the *boluk bashi* (the first rank of military officers) and sent as governors in chief of towns and garrisons. The *aga* of Algiers is the president of the divan or senate.

AGATE, a precious stone, which naturalists have ranked among the semi-transparent precious

stones. Agates are distinguished, with reference to their degrees of transparency, into two kinds, and called *oriental* and *occidental*: the first generally comes from the eastern parts of the world, as its name implies; and the second is found in the western, as Germany, Bohemia, and other countries. The oriental agate is known by its clearness, transparency, and the beautiful polish of which it is susceptible: the occidental, on the other hand, is obscure, its transparency cloudy, and its polish much inferior to that of the former. All agates from the east have not, however, the perfections for which this class are celebrated; and some occidental are occasionally found that may be compared to the oriental without disadvantage. It is more difficult to distinguish the agate from other demi-transparent stones, such as the chalcedonix and the sardonix, than to recognize it among stones entirely opaque. Owing to this variety, and this affinity to other stones, which are its characteristics, the agate has been divided into several kinds. The agate, simply so called, is of one colour, or more, clouding, like the veins in marble, into irregular forms, placed without order, and confounded with one another. The tints and shades of these colours vary almost to infinity, and, in their mixture, present curious, and sometimes very singular, shapes. Banks, rivulets, and trees, and often animals and human figures, are to be distinguished; and, with a little assistance from the imagination, complete pictures are perceived.

AGE, signifies 1. Any period of time attributed to something, as the whole, or part of its duration. 2 A succession or generation of men. 3. The

time in which any particular man, or race of men, lived. 4. In a man, the age of 14 years, is the age of discretion; and 21 years is the full age. A woman at 21 is able to alienate her lands. By the Roman law different ages were ascertained for different purposes. Thus the consular age, or that at which a person might hold the consulship, was the 43rd year. The judiciary age, between the 30th and 60th year. The military age, 17 years. The prætorian age, 40 years. The legitimate age, 25 years.

Age. Among ancient physiologists, the life or age of man was divided into six stages; pueritia, or childhood extending from birth, to the year five: adolescentia, or boyhood, to the year 18: juventus, or youth, to the year 30: virilis ætas, manhood, to 50: senectus, old age, to 60: crepita ætas, decrepitude, to death.

Agio, in commerce, a term chiefly used in Holland and at Venice, to signify the difference between the value of bank stock and the current coin. See Exchange.

Agrarian laws, or statutes, which forbid the possession of more than a certain extent of land by any single individual. That law of the Romans, called, by way of eminence, *the agrarian law*, was published by Spurius Cassius, about the year of Rome, 268, enjoining a division of the conquered lands, in equal parts, among the citizens, and limiting the number of acres that each might enjoy. Mr. Harrington, in his *Oceana*, has discussed the policy of agrarian laws.

Agriculture, the cultivation of the fields. In the theoretical study of agriculture, the first things

to be known are the food of plants, the nature of vegetable mould, and the different kinds of manure by which different soils may be fertilized. The next object of attention are the vegetables proper to be raised with a view to the melioration of the soil, or, for the rearing of cattle; and to these is to be added, an acquaintance with the diseases of plants. In practical agriculture, are to be considered the instruments of husbandry; the preparation of land for cropping; preparing, or bringing into culture, native soils; clearing ground of weeds; the character of the soil, and crop to which it is best adapted; the management of cattle; and the modes of cultivating the several sorts of grain and other vegetables.

Aid-de-camp, in military affairs, an officer employed to receive and carry the orders of a general. In the old military establishment of France, this name was applied to young volunteers, who attached themselves to general officers, to carry their orders wherever necessary, and principally during battle. The merit of an aid-de-camp consists in apprehending, with the utmost clearness, the orders he receives, and delivering them with perfect exactness and precision.

Air, in natural philosophy and chemistry, a general term used to denote such invisible and exceedingly rare fluids as possess a very high degree of elasticity, and are not condensable into a visible fluid state by any degree of cold we are acquainted with. By this last circumstance air is distinguished from vapour, which is condensable by cold. This term was originally, and for a long time peculiarly, applied to the air of which the at-

mosphere is composed; and in this sense we shall here consider it. The different kinds of air, now comprehended under the general term gas, which the researches of chemistry have discovered, will be mentioned hereafter. See GAS, CHEMISTRY, and PNEUMATICS.

AIR, in the elegant fables of the Greeks, was personified under the names of Jupiter and Juno. Jupiter was said to reign in the upper atmosphere, and Juno in the lower. The air is sometimes, also, represented as a divinity, whose wife is the moon, and whose daughter the dew.

AIR, MANNERS. The *air* seems to be born with us; it strikes at first sight: *manners* are the result of education. A man pleases by his air; he distinguishes himself by his manners. The air prejudices; the manners engage. Such a one displeases and repulses you by his manners. He *gives* himself an air; he *affects* manners; he *composes* his air; he *studies* his manners.

AIR, in music, is properly the tune which is adapted to the words of a song, or little piece of poetry intended to be sung; and, by the extension of the term, the song itself is called an *air*. In operas, the name of *air* is given to all measured music, to distinguish it from the recitative; and, generally, to every piece of music, whether vocal or instrumental, which has its beginning and end. If the subject is divided into two parts, it is called a *duo;* if into three, a *trio;* if into four a *quartetto*, &c.

AIR-BALLOONS, a general name given to bags formed of a light substance, and filled with inflammable air. See AEROSTATION.

Air-bath. The use of the air-bath, that is, the act of plunging, as it were, from a warm bed into a cold room, and, after some time, returning into bed again, has been strongly recommended, by example, from Dr. Franklin and Lord Monboddo. "Every morning," says Dr. Franklin, "at daybreak, I get out of bed, and pass half an hour or an hour in my chamber, according to the season, in writing or reading, without my clothes; and this seems rather pleasant than otherwise; and if I return to bed, as is sometimes the case, before I dress myself, I have an addition to my night's rest of one or two hours sleep, sweeter than you can imagine." Lord Monboddo, whose great age, mental serenity, and bodily energy, are well known, was in the habit of springing from his bed in the morning, and walking briskly up and down a cold, adjoining room. The air-bath, a contrivance "for the reception of fresh air," is recommended by Dr. Willich, "to all persons, but especially children," whom, he says, ought to resort, at least for a short time, *every day*, to this method of enjoying the salubrious influence of that universal agent.

Air bladder, a kind of vesicula found in the bodies of fish, and denominated "the Sound," by means whereof they are enabled to sustain themselves in any depth of water, and either to rise or sink at pleasure. The air-bladder is the same with what is otherwise called the swimming-bladder; it lies close to the back-bone; and has a pretty strong muscular coat, whereby it can contract itself. By contracting this bag, and condensing the air within it, fish can make their bodies specifically heavier

than water, and so readily fall to the bottom; whereas the muscular fibres ceasing to act, the air is again dilated, and they become specifically lighter than water, and so swim above. According to the different degrees of contraction and dilatation of this bladder, they can keep higher or lower in the water at pleasure.

AIR-GUN, a machine, the general form of which resembles a musquet, and so contrived, that bullets are exploded from it, with great violence, by means of air. The force of air, however, is not so great as that of gunpowder. See PNEUMATICS.

AIR-JACKET, a sort of jacket made of leather, in which are several bags or bladders, containing air. By the help of these bladders, which are placed near the breast, a person is supported in the water, without making the efforts used in swimming.

AIR-PIPES, an invention for drawing foul air out of ships, or any other close places, by means of fire.

AIR-PUMP. The name of this machine is sufficiently explanatory of its object. It is used in PNEUMATICS, which see; and by means of it, a vessel adapted to the experiment may be entirely exhausted of air.

AIR-SHAFTS, among miners, denote holes or shafts let down from the open air to meet the *adits*, or shafts of entrance, and furnish fresh air.

AIR-THREADS, in natural history, the long filaments seen floating in the air at the autumnal season of the year. These threads are the work of spiders, especially of that species called the long-legged field-spider. This animal, having gained the summit of a bush or tree, darts from its tail

several of these threads, till one is produced capable of supporting it in the air: and this it mounts in quest of prey, and frequently rises to a very considerable height.

Air-vessels, ducts in the leaves and other parts of plants, supposed to convey air to the vegetable system, as the lungs do to the animal.

Ajutage, or Adjutage, in hydraulics, part of the apparatus of a jet d'eau, or artificial fountain; being a kind of tube fitted to the aperture or mouth of the cistern, or the pipe; through which the water is to be played in any direction, and in any shape or figure.

It is chiefly the diversity in the ajutage, that makes the different kinds of fountains. So that, by having several ajutages, to be applied occasionally, one fountain is made to have the effect of many.

It has been found that jets do not rise quite so high as the head of water; owing chiefly to the resistance of the air against it, and the pressure of the upper parts of the jet upon the lower: and for this reason it is, that if the direction of the ajutage be turned a very little from the perpendicular, it is found to spout rather higher than when the jet is exactly upright. It is found by experiment too, that the jet is higher or lower, according to the size of the ajutage: that a circular hole of about an inch and a quarter in diameter, jets highest; and that the farther from that size the worse. Experience also shews that the pipe leading to the ajutage should be much larger than it; and if the pipe be a long one, that it should be wider the farther it is from the ajutage.

Alabaster, a stone whose basis is calcareous

earth. Its fineness and transparency renders it in some measure transparent. There is a church at Florence illuminated by alabaster windows: instead of panes of glass, it has slabs of alabaster, nearly fifteen feet high, each of which forms a single window. In the German province of Hohenstein, a kind of laminated alabaster is found in great abundance, beautifully variegated with the figures of trees, shrubs, and sprays.

Alarum, any contrivance for the purpose of *alarm*. A bell, or rattle, to call assistance. A bell fastened to, or communicating with, a door or window. A piece of mechanism is sometimes affixed to clocks, by means of which a noise is made at any required time. At the royal observatory, at Greenwich, the deputy astronomer is by this means roused at all hours of the night, to make the necessary observations; and the same method is resorted to by persons desirous of rising at unusual times. The slug-a-bed (or *lig-a-bed*), however, can easily render the alarum of no avail. A fellow of one of the colleges of Oxford, desirous of overcoming his indolence, had procured an alarum. It was a weight, that at a given hour, descended with rapidity from a clock in his chamber. The alarum descended, and the ly-a-bed awoke; but still he rose no earlier than before. In this dilemma, by an addition of his own, he rendered the alarm complete. He had a china bowl, the gift of a friend whom he highly valued: this he placed under the alarum; and now he was obliged to spring up at the instant of summons, lest the weight should demolish his relic.

Albino, the name given by the Portuguese to a

white Moor; that is, one who is afflicted with the *nyctalopy*. The term is sometimes applied to such Europeans, as have the same constitutional imperfections. See *Nyctalopy*.

Albumen, in its primitive sense, signifies the white of an egg; but it is now applied to one of the constituent parts of vegetable bodies, exactly resembling this animal substance.

Alburnum denotes the white soft substance that lies between the inner bark and the wood of trees, composed of layers of the former, which have not attained the solidity of the latter. A new layer of alburnum is added annually to the tree in every part, just under the bark, and the former layer of alburnum becomes perfect wood.

Alchemy, or *Alchemistry*, is properly applied to the higher pursuits of chemistry, as *The* chemistry, by way of eminence; but the name has become obsolete on account of two objects, which speculators hoped for, and impostors, by its means, pretended to have acquired. These were, 1. The philosopher's stone, by which all metals might be transmuted into gold; and, 2. A potation, called the *elixir of life*, with which youth might always be renewed.

Alcohol, an Arabian word, signifying any thing reduced into extremely thin parts, or rendered extremely subtle by distillation. The word, at present, is used for a highly rectified spirit. This preparation is extremely light and inflammable: it is colourless and transparent, appearing to the eye like pure water. To the taste it is exceedingly hot and burning: but without any peculiar taste. From its lightness, the bubbles which are

formed by shaking, subside almost instantaneously which is one method of judging of its purity. Alcohol boils at 165°: but it cannot be frozen or converted from the fluid to the solid form, and on this account, it has been much used in the construction of thermometers. It is employed as a solvent for resinous gums, which form the basis of varnishes. Its antiseptic power renders it valuable in preserving animal substances.

ALCORAN. See *Koran*.

ALDERMAN, among our Saxon ancestors, was a degree of nobility, from which is derived the *earl* of the present day. Modern aldermen form the principal branch of a town or city corporation. Their number is not limited, but differs according to the magnitude of the place, where they exercise the authority of commissioners of the peace. In London, their number is twenty-six; each having a ward, or district of the city committed to his more peculiar care; but, serving by rotation, as sitting magistrate for the whole. The office is for life, or for so long as the individual chooses to retain it. When a vacancy happens, through death or resignation, the livery of the ward are assembled, or, to use the peculiar term, a *ward-mote* is held; a new alderman is chosen, whom the lord mayor returns to the other aldermen, in the court of the lord mayor and aldermen, where the person so returned must be admitted, and sworn into the office, before he can act. If the person elected refuses to wear the gown, he is liable to a fine of 500 *l*. Aldermen are exempted from inferior offices; from being put upon assizes; or from serving on juries. In the present day persons are not

fined for refusing to take the gown; the honour is an object of great and anxious contest: but owing, it is supposed, to some recent failures in the city of London, it has been determined that no person shall be admitted to take the gown who cannot swear that he has property equal to 30,000*l*.

ALECTOROMANTIA. An ancient kind of divination by means of a cock, called also Alectryomancy; of which there appear to have been different species. But that most spoken of by authors was in the following manner: A circle being described on the ground, and divided into 24 equal portions, in each of these spaces was written one of the letters of the alphabet, and on each of the letters was laid a grain of wheat; after which a cock being turned loose in the circle, particular notice was taken of the grains picked up by the cock, because the letters under them, being formed into a word, made the answer desired. It was thus, according to Zonaras, that Libanius and Jamblicus sought who should succeed the emperor Valens; and the cock eating the grains answering to the spaces ΘΕΟΔ, several whose names began with those letters, as Theodotus, Theodistes, Theodulus, &c. were put to death, which did not hinder, but promote, Theodosius coming to the succession.

ALEMBIC. One of the simplest and most ancient vessels employed in distillation. It is not at present much used in England; the retort and still having been adopted in its stead; but in France and many parts of the continent, it continues to be the favourite vessel for distillations in the large way. The most frequent use of alembics is for distillations of very volatile principles drawn from several sub-

stances, particularly from vegetables. When the principles intended to be procured by distillation are such as do not act upon metals, and when they will rise with a degree of heat equal to, or very little exceeding, the heat of boiling water, copper alembics are employed, having their internal surfaces well tinned; but when acid and saline substances, which attack metals, are to be distilled, it is necessary to make use of glass alembics.

ALEXANDRIAN LIBRARY. This famous library was founded by Ptolemy Soter, for the use of an academy that he instituted in Alexandria; and, by continual additions by his successors, became at last the finest library in the world, containing no fewer than 700,000 volumes. The method followed in collecting books for this library, was, to seize all those which were brought into Egypt by Greeks or other foreigners. The books were transcribed in the museum by persons appointed for that purpose; the copies were then delivered to the proprietors, and the originals laid up in the library.

Alexandrian Manuscript, a famous copy of the Scriptures, consisting of four volumes, in a large quarto size; which contains the whole bible, in Greek, including the Old and New Testament, with the Apocrypha, and some smaller pieces, but not quite complete. This manuscript is now preserved in the British Museum. It was sent as a present to king Charles I, from Cyrillus Lucaris, patriarch of Constantinople, by sir Thomas Rowe, ambassador from England to the grand signior, about the year 1628. Cyrillus brought it with him from Alexandria, where probably it was written. In a schedule annexed to it, he gives this

account; that it was written, as tradition informs them, by Thecla, a noble Egyptian Lady, about thirteen hundred years ago, not long after the council of Nice.

Algæ, in botany, an order of the cryptogamia class of plants. It is one of the seven families or natural tribes into which the vegetable kingdom is distributed. The plants belonging to this order have their root, leaf; and stem entire. Sea-weeds and other aquatic plants are comprehended under this division.

Algebra is a method of performing the calculation of all sorts of quantities by means of general signs or characters. At first numbers and things were expressed by their names at full length, but afterwards these were abridged, and the initials of words were used in their stead: then the letters of the alphabet came to be employed as general representatives of any kinds of quantity. Hence algebra has been called "Specious Arithmetic," on account of the species of letters of the alphabet used: it is also called "Universal Arithmetic" from the manner in which it performs all arithmetical operations by general signs. All figures or arithmetical characters as 5, 7, 9, &c. have a determinate value, and always represent the same numbers, but algebraical characters are general and independent of any particular signification. The value of some quantities, in this science, are assumed as known, and others are supposed to be unknown. The known quantities are usually represented by the early letters in the alphabet, and the unknown ones by the final letters. Thus *a*, *b*, *c*, &c. are commonly put for known quantities, and *z*,

y, x, &c. for unknown or indeterminate quantities: thus if $a + x$ be equal 9 and a is known to be equal to 4, then $x = 9 - 4 = 5$. Again if $a + x = 12$, and $a - x = 8$, then by adding the two quantities together I get $2a = 20$ (because there being $+ x$ and $- x$ they destroy one another) and $a = \frac{20}{2} = 10$, of course $x = 2$. On such operations as these, extended almost indefinitely, algebra depends, and by them every problem in arithmetic, and almost all in geometry may be solved.

Algol, the fixed star in Caput Medusæ, and marked β in Perseus. This star is subject to periodic variations in its brightness. It changes from the second magnitude to the fourth in about three hours and a half, and back again in the same time; when it continues of the greatest brightness for about two days and seven hours, then it changes again.

Alguazil, in Spain, is the title of one of the lower orders of officers of justice. His business is to execute the orders of the magistrate. An alguazil is nearly the same officer as one whom, in some parts of our civil polity, we call a serjeant: as a serjeant-at-mace.

Alienation, in law, the act of making a thing another man's: or the altering and transferring the property and possession of lands, tenements, or other things, from one man to another. To alienate, or alien, in mortmain, is to make over lands or tenements to a religious community, or other body politic. To alienate in fee, is to sell the fee-simple of any land, or other incorporeal right. All persons who have a right to lands, may generally alien them to others; but some alienations

are prohibited: such as alienations by tenant for life, &c. whereby they incur a forfeiture of their estate.

ALIBI, *elsewhere*, a latin word, used, in criminal proceedings, to signify the absence of the accused with respect to the *place* where he is charged with having committed an offence:—thus, to alledge and prove an *alibi*, is to protest and establish, by good testimony, that when the crime was committed, the party accused was in a different place from that in which it is said to have happened.

ALIEN, in law, implies a person born in another country.

ALIMENT, the nourishment which food affords. Animal food contains the greatest proportion of aliment; but, as a redundance of aliment is not less injurious than the contrary extreme, it is not proper that the stomach should be wholly filled with what is highly alimentary; for this reason, vegetables ought to be consumed in a greater quantity than flesh. Arrow-root, rice, sago, salep-powder, and tapioca, are said to contain an uncommon quantity of aliment, and are therefore recommended to the infirm.

ALIQUANT PART, in arithmetic, is that number which cannot measure any other exactly without some remainder. Thus, 7 is an aliquant part of 16; for twice 7 wants 2 of 16, and 3 times 7 exceeds 16 by 5.

ALIQUOT PART, is that part of a number or quantity which will exactly measure it without any remainder. Thus, 2 is an aliquot part of 4; 3 of 9; 4 of 16, &c. All the aliquot parts of any number may be thus found: divide the given number

by its least divisor, then divide the quotient also by its least divisor; and so on, always dividing the last quotient by its least divisor, till the quotient 1 is obtained; and all the divisors, thus taken, are the prime aliquot parts of the given number.

ALKALI, a general term for an order of salts of great use and importance. There are two kinds of alkalies; the fixed, which have no smell, and the volatile, which have a pungent one: of the former kind there are two, potass, potash, or the vegetable fixed alkali; and soda, or the mineral fixed alkali; of the latter there is but one species, which is called ammonia.

The general properties of alkalies, which are common to them all, are the following: 1. A peculiar acrid taste, which acts with so much energy as to corrode the tongue. 2. The power of changing the blue colours of vegetables green: from this, however, there are deviations; for they change the red of archil or litmus to a blue, and the yellow of turmeric, as well as the light brown of many roots and woods, to a dull red. 3. They are highly soluble in water, giving out heat on their union. 4. They corrode woollen cloth, and if strong, reduce it to the form of a jelly. 5. They render oils miscible with water, by uniting with them, and forming with them the well-known compound, soap. 6. Combined with sulphur, they form alkaline hepars, or livers, now called alkaline sulphurets. 7. With the acids they form neutral salts, of different degrees of solubility; these are distinguished by different names, according to the acid and the alkali employed; thus, a salt formed by the union of sulphuric acid with potash, is called

sulphat of potash; that composed of nitric acid and soda, is called nitrate of soda; and so on.

The fixed alkalies are so called, because they are not volatilized without an intense heat: they melt, however, with a moderate degree of heat, and, uniting with earthly substances, form glass. They will also dissolve by heat all the metallic oxyds, and assist in the effusion of all earthly and metallic mixtures. When pure and solid, they are remarkably deliquescent, absorbing water from the atmosphere or any surrounding medium; so that they are sometimes used to render the air of vessels perfectly dry. Both the fixed alkalies, potash and soda, have these properties; but with some variation, which can scarcely be observed when both are in a state of purity: it is only in their combinations that the difference of their natures can be distinguished. From these combinations, it appears that they differ from each other in the strength of their affinity with acids, which is greater in the former; in a slight degree in their action on oils and animal fats; but chiefly in the neutral salts which they produce with acids, which, in all cases differ in form of crystallization, in solubility, often in taste, and in several other particulars.

Potash is called the vegetable alkali, because it is procured from the ashes of all vegetables, in a greater or less proportion, except marine plants, and a few that grow near the sea-shore, which yield soda. This latter is termed the mineral alkali, because it is not only obtained from the ashes of the last-mentioned plants, but is sometimes found native in the earth.

Ammonia, or the volatile alkali, is procured by

decomposition, from all animal, and from some vegetable substances; and by putrefaction from all these matters. It is distinguished from the fixed alkalies by its volatility, which is so great that it very easily assumes a gaseous form, and is dissipated by a very moderate degree of heat; and by its pungent smell. Its purest form is that of a gas: it is never solid, unless combined with some other substances; nor liquid but when it is united with water. It is weaker in all its affinities than the fixed alkalies; and is composed of hydrogen and azote, in the proportion of 193 parts of the former to 807 of the latter.

Alkalies are either mild, or caustic. In the first state they are combined with fixed air, or carbonic acid gas, which moderates their action, and which occasions them to effervesce with acids—a character formerly thought to be essential to alkalies in general, but now known to depend upon the expulsion of the acid to which they are united. In their second or caustic state, the carbonic acid is separated from them by lime, which thus renders them more pure, and increases the energy of their action. All the mild or effervescent alkalies, then, in the new nomenclature, are really carbonates of potash, soda, or ammonia: and the caustic alkalies are the only ones that exist in a state of purity. See *Potash*, *Soda*, *&c.*

Alkaline Earths, are those which partake, of the nature both of earths and alkalies; or, in other words, those earths which agree with alkalies in being soluble in water, to a certain extent, and thereby rendering it sapid, in the property of changing to green, certain blue, and red vegetable

colours; of absorbing carbonic acid with eagerness; and of possessing, when pure, those caustic or acrid qualities that so much distinguish the alkalics. These earths are barytes, magnesia, lime, and strontian; whose saline properties generally predominate over their earthy ones.

ALLEGIANCE, the fidelity due to the king as a temporal prince and sovereign. The oath of allegiance acknowledges this part of his character, while that of supremacy regards him as the head of the English church.

ALLEGORY, a figure of rhetoric, in which, terms are employed that, taken in their literal sense, signify something very different from what is intended, but which bears an allegorical resemblance. The allegory is a continued simile; it is a picture that is intended to attract by the objects it presents, and instruct by its obvious meaning. Allegory is fable. Thus, orators and poets have represented a state under the figure of a vessel, and the troubles that agitate it under those of unruly winds and waves; by pilots they mean sovereigns and magistrates: and by a haven, peace or concord.

ALLEGRO, in musical composition, points out the third of the four principal degrees of time, as established in Italian music. *Allegro* is an Italian adjective, signifying gay, and also expressing a gay and animated movement.

ALLIGATION, a rule of arithmetic, which resolves questions that relate to the compounding or mixing together divers simples or ingredients. There are two kinds of alligation, medial and alternate. The *former* is the method of finding the rate or quality of the composition, from having the given rates and

quantities of the ingredients. The *latter* is the method of finding the quantities of ingredients necessary to form a compound of a given rate.

Example in alligation medial: If 6 pounds of tea worth 5*s*. per lb., and 8 lb. worth 6*s*. per lb. be mixed; to find the value of 1 lb. of the mixture.

Rule. Multiply each quantity by its rate and add all the products together, then divide the sum of the products, by the sum of the quantities, and the quotient will be the rate sought.

Thus in the example,

lb.		*s*.		
6	×	5	= 30	and 14) 78 (5*s*. 6$d\frac{3}{4}$ Answer.
8		6	= 48	70
14			78.	8, &c.

Ex. in alligation alternate: Teas at 9*s*. and 6*s*. per lb. to find the proportions, so as to sell a mixture of the two kinds at 7 shillings per lb.

Rule. Set down the prices and find the difference between each of them, and the proposed price, which set down in alternate order, and they will shew the proportions: thus

Tea . . . 9 }
Tea . . . 6 } 7 { 1 } Therefore a mixture of one
{ 2 } part of that at 9*s*. and two parts of that at 6*s*. is the answer.

Alliteration, a figure in poetry, which consists in the repetition of the same letter. Tastefully used, it is a most enchanting ornament. It will equally contribute to softness, to energy, and to solemnity. The reason of this effect, and of its adversity is,

that each letter of the alphabet has a peculiar character: thus the R will generally be found to begin words that imply *violence*; or, by metaphor, something that does violence to the imagination: as *r*end, *r*oar, *r*ugged; the s, such as have a reference to quiet: as *s*till, *s*tand, *s*tone. The following examples will explain what is called alliteration, and show, so far as they go, its influence on the expression:

"*F*ields ever *f*resh, and *g*roves for ever *g*reen."

"*R*uin seize thee, *r*uthless king."

"To *h*igh-born *H*oel's *h*arp, or soft *L*lewe*ll*yn's *l*ay.

"Stamp we our vengeance *d*eep, and gratify his *d*oom."

ALLODIAL *lands*, are those which, under the feudal system, were free. Their owners owed no service to a superior lord.

ALLOY, or *Allay*, a proportion of a baser metal, mixed with a finer one. Silver and gold are alloyed, in order to render them of such a degree of hardness, free from brittleness, as will fit them for use. The principal reasons alledged for alloying national coin are these: 1. The natural mixture of metals, which, when melted from the mine, are not perfectly pure. 2. The saving the expence that must ensue if they were to be refined. 3. The necessity of rendering them hard, by mixing some parts of other metals with them to prevent the diminution of weight in passing from hand to hand. 4. The melting of foreign gold or coin, that is alloyed. 5. The charges of coinage, which must be made good by the profit arising from the money coined. 6.

The duty belonging to the sovereign, on account of the power he has of causing money to be coined in his dominions. Many alloys of metals are used in our manufactures, of these the most useful are brass, type-metal, tutenag, bronze and speculum metal. When two metals are fused together and produce a mass whose specific gravity is greater or less than the mean specific gravity of its elements, the result is an alloy, or proper chemical combination. Combinations of this kind are more fusible than the metals of which they are formed. Thus an alloy of tin, bismuth, and lead, in certain proportions will melt in boiling water, which is a less heat than is necessary for the liquefaction of bismuth, the most fusible of the three.

Allspice, so called from its flavour, which unites that of the cinnamon, of the nutmeg, and of the clove, is the pimento, or, Jamaica-pepper. It is, to most persons, an agreeable spice; and, in medicine, it is used as an aromatic.

Alluvial, this is a term used by mineralogical and geological writers, and by alluvial depositions is meant the soil which has been formed by the destruction of mountains, and the washing down of their particles by torrents of water. The alluvial formations constitute the great mass of the earth's surface. They have been formed by the gradual action of water upon other formations. See Mineralogy.

Almagest, the name of a celebrated book, composed by Ptolemy; being a collection of many of the observations and problems of the ancients, relating both to geometry and astronomy. The Arabic word is almaghesti. Ptolemy was born about

the year of Christ 69, and died in 147, and wrote this work, consisting of 13 books, at Alexandria in Egypt, where the Arabians found it on the capture of that kingdom. It was by them translated out of Greek, into Arabic, by order of the caliph Almaimon, about the year 827, and first into Latin about 1230, by favour of the emperor Frederic II. The Greek text however was not known in Europe till about the beginning of the 15th century, when it was brought from Constantinople, then taken by the Turks, by George a monk of Trabezond, who translated it into Latin, which translation has several times been published.

ALMANAC, an astronomical table of the days of the year, with the addition of various civil particulars. The name and plan of this yearly work, and particularly the astrological part, which still disgraces a very popular almanac of our own age, is borrowed from the Arabs: but Regiomontanus, or, John Muller, of Monteregio, who flourished at Nürnberg, in the latter part of the fifteenth century, was the first that reduced it into the present method. His first almanac was published in 1474.

Nautical Almanac, and *Astronomical Ephemeris*, a kind of national almanac, published by anticipation for several years beforehand, for the convenience of ships going out upon long voyages; it is adapted to the first meridian, and contains, besides many particulars common to other almanacs, the sun's longitude, right ascension, declination: the planet's longitudes, latitudes, times of passing the meridian; the times of solar and lunar eclipses, together with those of Jupiter's satellites; the distances of the moon from the sun, and certain fixed

stars; and, in general, the times when any remarkable celestial appearances may be seen at the place for which the ephemeris is calculated.

ALMONER, originally denoted an officer in religious houses, to whom belonged the management and distribution of the alms of the house. By the ancient canons, all monasteries were to spend a tenth part, at least, of their income in alms to the poor. The almoner of the cathedral church of St. Paul's, in London, is to dispose of the monies left for charity, bury the poor who die in the neighbourhood, and breed up eight boys to singing, for the use of the choir. All bishops are likewise, by ancient canon, enjoined to keep almoners.

Almoner, Lord, or Lord High-Almoner of England, is an ecclesiastical officer, generally a bishop, who has the forfeiture of all deodands and goods of suicides, which he is to distribute among the poor. He has, also by virtue of ancient custom, the power of giving the first dish from the king's table to whatever poor person he thinks proper.

ALMS, a general term for what is given out of charity to the poor. Anciently, the ecclesiastics subsisted wholly on alms, which were thus divided: one part was allotted to the bishop, another to the priests, and a third to the deacons and subdeacons, which made their whole subsistance; the fourth part was employed in relieving the poor, and in repairing the churches.

ALMUCANTERS, are circles of the sphere passing through the centre of the sun, or a star parallel to the horizon, being in fact the same as parallels of altitude. They are the same with respect to the azimuths and the horizon, that parallels of latitude are with regard to the meridians and equator.

Alphabet, the natural or customary series of the several letters of a language. The word is formed from alpha and beta, the first and second letters of the Greek alphabet. The number of letters is different in the alphabets of different languages. The English alphabet contains 24 letters; to which if we add j and v consonant, the sum will be 26: the French contains 23; the Hebrew, Chaldee, Syriac, and Samaritan, 22 each; The Arabic 28; the Persian 31; the Turkish 33; the Georgian 36; the Coptic 32; the Muscovite 43; the Greek 24; the Latin 22; the Sclavonic 27; the Dutch 26; the Spanish 27; the Italian 20; the Shanscrit 50; the Ethiopic and Tartarian, each 202; the Indians of Bengal 21; the Baramese 19. The Chinese have, properly speaking, no alphabet, except we call their whole language by that name; their letters are words, or rather hieroglyphics, amounting to about 80,000.

Alps, a range of high mountains, separating Italy from Gaul and Germany, in the form of a crescent. They take their rise from the Vada Sabatia, or Savona; and reach to the Linus Flanaticus (now Golfo di Carnaro of the Adriatic), and the springs of the river Colapis, (now the Kulpe); extending, according to Livy, 2,000 stadia in length, or 250 miles; they are divided into several parts, and accordingly have different names. From Savona to the springs of the Varus, where the Alps lie against the sea of Genoa, they are called Maritime, now le Montagne di Tenda. These extend from south to north, between Gaul to the west and Genoa to the east, beginning at Monaco on the Mediterranean; then running out through the east of the County of Nice, and between that and the

marquisate of Saluzzo, terminate at length at mount Viso, between Dauphiné and Piedmont.

The Alps are the highest mountains in Europe; being, according to some geometricians, about two miles in perpendicular height. They begin at the Mediterranean, and, stretching northward, separate Piedmont and Savoy from the adjacent countries; whence directing their course to the east, they form the boundary between Switzerland and Italy, and terminate near the extremity of the Adriatic Sea, north-east of Venice. It was over the western part of those mountains, towards Piedmont, that Hannibal forced his passage into Italy.

ALTERNATION, or *Permutation*, of quantities or things, is the varying the order or position of them,

Thus two things, or quantities, a and b, may either of them stand first, as a b, or b a, making $1 \times 2 = 2$, alternations. A third thing may stand three different ways relatively to either of the positions a b, or b a, of the other two; for it may stand either before, or between, or after them, thus making $1 \times 2 \times 3 = 6$, the changes of three things. In like manner, it will appear that with four things there may be four times as many changes as with three, making $1 \times 2 \times 3 \times 4 = 24$. And so on, always multiplying the last found number of alternations, by the ordinal number of the next thing added. For example, the number of changes which may be rung on twelve bells, will be expressed by the product of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 = 479{,}001{,}600$.

ALTITUDE, in geometry, is the third dimension of body, considered with respect to its elevation above the ground: and is otherwise called its height or

depth; the former, when measured from bottom to top, the latter when measured from top to bottom.

Altitude of a figure, is the distance of its vertex from the base, or the length of a perpendicular let fall from its vertex to the base. The altitudes of figures are useful in computing their areas or solidities.

Altitude or height of any point of a terrestrial object, is the perpendicular let fall from that point to the plane of the horizon. Altitudes are distinguished into accessible and inaccessible.

Altitude, Accessible, of an object, is that to whose base there is access, to measure the nearest distance to it on the ground, from any place.

Altitude, Inaccessible, of an object, is that to whose base there is not free access, by which a a distance may be measured to it, by reason of some impediment, such as water, wood, or the like.

To measure or take Altitudes. If an altitude cannot be measured by stretching a string from top to bottom, which is the direct and most accurate way, then some indirect way is used, by actually measuring some other line or distance which may serve as a basis, in conjunction with some angles, or other proportional lines, either to compute, or geometrically determine, the altitude of the object sought.

There are various ways of measuring altitudes, or depths, by means of different instruments, and by shadows or reflected images, on optical principles. There are also various ways of computing the altitude in numbers, from the measurements taken as above, either by geometrical construction, or trigonometrical calculation, or by simple numeral computation from the property of parallel lines, &c.

The instruments mostly used in measuring altitudes, are the quadrant, theodolite, geometrical square, line of shadows, &c.

ALUM, a fossil, salt, and mineral, of an acid taste, which leaves in the mouth a sweetness, accompanied by an astringency so considerable as to cause a sensation of shuddering. There are two sorts of alum, the natural and the artificial. In a natural state, it is said to be met with in Egypt, Sardinia, Spain, Bohemia, and other places, and the counties of York and Lancaster, in England. On account of its astringent qualities, it is used in several mechanic arts, and in medicine. In dying, it fixes and brightens colours; it constitutes the basis of crayons; it gives hardness and consistence to tallow, in the manufacture of candles; and wood, soaked in a solution of alum, being incapable of taking fire, and answering the purpose, also, of excluding the air, is used for powder magazines.

AMALGAM, in chemistry and the arts, a mixture or alloy of any of the other metals with mercury.

As mercury is habitually fluid in the common temperature, and as it is sufficient for most combinations that one of the bodies be fluid, it follows that without the help of heat, mercury may be amalgamated with many of the metals. Hence there are two methods generally used in the making of amalgams. The first is merely by trituration in a mortar, and without heat: the second is by fusing the metal which is to be amalgamated, and by adding to it, when fused, the intended quantity of mercury.

Amalgams are more or less soft according to the proportion of mercury employed: if this be small

they become solid, but brittle, and capable of being pulverised; if it be more considerable, a kind of paste is formed which has no ductility or tenacity; and if the proportion of mercury is very great, the amalgam is only distinguished from that substance by an appearance of foulness.

Amalgam of Tin, is prepared in the same manner as that of lead, by pouring heated mercury into melted tinfoil. This is much used for tinning mirrors, and enabling them to represent images more sensibly and perfectly. It was formerly employed in the preparation of mercury-balls for purifying water; these were composed of four parts of tin and one of mercury, and were suspended in water, which was at the same time boiled, to purify it from extraneous matter. Mr. Canton observed that a small quantity of this amalgam, with a very little chalk or whiting, being rubbed on the cushion of an electrical machine, contributed very much to increase the power of electricity. The amalgam of zinc is now preferred for this use.

Ambassador, or *Embassador*, a representative sent by one nation to another. Embassadors are ordinary or extraordinary. An ordinary embassador is one who resides at the court or seat of government of a foreign power, as an officer of state, to maintain a mutual good understanding, to be watchful of the interest of his own nation, and to negotiate the affairs that occur. This is a modern institution: two hundred and fifty years ago, all embassadors were *extraordinary*, or such as were sent upon particular and pressing occasions. These latter are now generally called *envoys extraordinary*. Embassadors of kings are not to attend marriages or

burials, nor public or solemn assemblies, unless their masters have an interest in them. They are not to wear mourning, even for their own relations, because they represent the persons of their princes, and must resemble them in every thing. Their persons are sacred, both in peace and war: so that according to the law of nations, if hostilities break out between two nations, the respective embassadors are permitted to depart without molestation; and if, during the continuance of such hostilities, they are received into an enemy's country for the purpose of negotiation, they are to pass freely, and be treated with punctilious civility.

Amber, appears to be a bitumen, of fossil origin. It is found in the earth, and on the sea shore. It abounds more particularly in Prussia, which, on this account, once obtained the name of Country of Amber. Several hypotheses have been set up, repecting the nature of amber. By some, it is supposed to be resinous gum, oozing from pines, and falling on the earth, or into the sea; by others, a fossile formed in the earth, and washed ashore by the sea; and, by Dr. Girtanner, an animal product, nearly resembling wax. He relates, that the old pine-forests are inhabited by a large species of ant which forms hills of about six feet in diameter, and that it is generally in these ancient forests, or in places where they have been, that fossile amber is found. This substance is not hard, like that taken up on the shores of Prussia: it has the consistence of honey, or of half-melted wax: but it is of a yellow colour, like common amber; it gives the same produce by chemical analysis; and it hardens, like the other, when it is suffered to remain for some

time in a solution of common salt. Insects are found in amber; among these, ants are always the most general; circumstances that undoubtedly support Dr. Girtanner's opinion. According to this gentleman, amber is nothing but a vegetable, rendered concrete by the acid of ants, as wax is an oil, hardened by the acid of bees. Pliny describes amber as oozing from certain trees of the fir kind, grown in the islands of the northern ocean: the liquor, he says, previously congealed by the cold, falls into the sea, and is carried by the waves to Prussia, the nearest continent. From the various accounts that are given, it is certain, that amber is found in great quantities beneath the earth, and picked up on the sea-shores, in many parts of the world. In England, it has been found in clay-pits, and on the coast.

Amber is of several colours: it is commonly yellow, varying from the lemon to the orange; in other instances, it is whitish, or somewhat inclining to brown. The yellow gold-coloured amber is so transparent, and so susceptible of the highest polish, that it has been ranked among precious stones, and is applied to various purposes of elegance. It is made into all sorts of trinkets. A French writer of the present age observes, that amber was once fashionable in France; and fell into obscurity when costly metals and jewels grew sufficiently common to be subservient to luxury: but the medicinal virtues of amber, he subjoins, have not suffered the same fate; these, says he, will render it, in all ages, more precious than the brightest gems. It is prepared in the several forms of a tincture, an oil, and a salt, and recommended as a cordial and nervous

medicine. It is a principal ingredient in the composition of all varnishes. As a cabinet curiosity, it is valuable on account of the insects, pieces of moss, &c. that are frequently found in it. The inclosure of these objects evidently proves that amber is originally in a soft state; at which time, insects, leaves, and other casual matters are liable to adhere.

This curious production of nature is inflammable, and, when heated, yields a strong and bituminous odour. Its most extraordinary properties are those of attracting, after it has been exposed to a slight friction, straws, and other surrounding objects; and of producing sparks of fire, visible in the dark. Many thousand years before the science of electricity had entered the mind of man, these surprising qualities were known to exist in amber, and hence the Greeks called it *electrum*. The Romans, supposing it to be a vegetable juice, named it *succinum;* by the Arabs it is denominated *ambra*, whence the French write it *ambre*, and the English, *amber*.

AMBERGRIS, *ambre-gris*, or *Grey-amber*, a perfume which is found floating on the sea, and in the intestines of the spermaceti whale. It is very much admired in Asia and Africa, where it is made use of to flavour luxurious dishes: In Europe, it is valued only as a scent. It is an ash-coloured, solid, unctuous body, yielding to a hot needle, and easily melting over a fire. When found in the body of the whale, it is soft, and very offensive in its scent; but after having been exposed to the air for some time, it becomes, like that which is taken from the water, hard, and an admirable perfume.

AMENDE-HONORABLE, is an open apology for an

injury done. The name is taken from an old custom in the criminal law of France.

AMERCEMENT, a pecuniary punishment imposed upon offenders at the mercy of the court. Amercements differ from fines, the latter depending, or proceeding from some statutes, the former one imposed arbitrarily in proportion to the fault.

AMERICA, sometimes called the New World, is styled, in geography, one of the four quarters of the globe. It is understood to have been first discovered to Europe by Christopher Columbus, who landed on one of the Bahama islands on the 12th October, 1492; and is named from Americus Vesputius, a Florentine, who, in 1497, landed on the southern part of that continent. It deserves to be remarked, however, that though individual nations may differ from each other, there is, after all, a sort of family likeness between all the inhabitants of the same quarter of the world. The dress, the language, the manners, and the manner of thinking, of all the nations of Europe, are radically the same. In each of these particulars, the Briton and the Spaniard doubtlessly vary from each other; but, compared with a Chinese, all their variations vanish. In the same point of view, all the nations of Asia resemble each other; the same connection is observable in those of Africa; and throughout America, in like manner, is to be seen the same obvious dissimilarity from the other quarters of the world, and the same varied uniformity among all its numerous and wide-spread tribes of men. In Asia, we see a people whose fathers, for thousands of years, have dwelt in cities, and lived under established governments; and in Europe and Africa, though the history of

their institutions is not so remote, the same habits have been copied: but, in America, by far the greater part of the human race have never yet united in what is called society. If, therefore, the history of the old world is interesting on account of its governments and institutions, the new presents a striking field for observation, by contrasting with the former, a portion of mankind to whom these governments and institutions have been, and still are, totally unknown. As the prevailing colour of the Europeans is white, of the Asiatics brown, and of the Africans black; so that of the Americans is red, copper-red. They pride themselves in the name of *red-men*. Their manner of living is, in a great degree, wholly independent of each other; but they form tribes or nations, and elect a military chief.

The principal districts of N. America are those of Mexico, California, Louisiana, Virginia, Canada, Newfoundland; and the islands of Cuba, Dominica, Domingo, and the Antilles (commonly called the West Indies): those of South-America are Terra-Firma, Peru, Paraguay, Chili, Magellan's Land, Brazil, and Amazonia. Of the merchandize for which it is ransacked by Europeans, the principal articles are, gold and silver in South America, and furs in the North. Pearls are brought from the islands of Las Perlas, and emeralds from the environs of S. Fé and Bogetta. The more common productions of both divisions are sugar, tobacco, indigo, ginger, cassia, mastic, aloes, cotton, cochineal, anatto, quinquina, cacao, vanilla, campeachy, wood, sassafras, the balsams of Capaiva, Gilead, and Tolu, Peru, Chili, jesuits-bark, tamarinds,

ambergris, and a great variety of woods, roots, and plants. The animals of America, in many instances, differ very much from those of the old continent. It is hard to say how many different languages there are in America, a vast number being spoken by the different people in different parts; and as to religion, there is no giving any tolerable account of it in general, though some of the most civilized of the aborigines seem to have worshipped the sun. The principal motive of the Spaniards in sending so many colonies here was the thirst of gold; and indeed they and the Portuguese are possessed of all those parts where it is found in the greatest plenty. This vast continent is divided into N. and S. America, which are joined by the isthmus of Darien. It has the loftiest mountains, in the world, such as those that form the immense chain called the Andes; and the most stupendous rivers, such as the river Amazons, the "sea-like Plata," the Oronoko, the Mississippi, the Illinois, the Missauses, the Ohio, the St. Lawrence, the Hudson, the Delaware, the Susquehannah, the Potomac, &c. Besides the aborigines, who inhabit the interior parts, and the United States of America, who possess some of the finest provinces that formerly belonged to Great Britain, the different European powers have rich and flourishing colonies here. The American States are fifteen in number, each having a separate local government; but they are formed into one federal republic. These states long flourished as provinces of Great Britain; but parliament attempting to tax them by its sole authority, without the intervention of their assemblies, a civil war ensued; a congress was formed, which,

in 1776, disclaimed all dependence on the mother country: the French king entered into an alliance with them in 1778; the colonies, powerfully assisted by France, were successful; and Great Britain, in 1782, acknowledged their independence in preliminary articles of peace, finally ratified by the definitive treaty in 1783. The Americans have since formed a new federal constitution. Between America (the New World) and the Old World, are several very striking differences; the most remarkable of which is, the general predominance of cold throughout the whole extent of this vast country. Here the rigour of the Frigid Zone extends over half that which should be temperate by its position, with regard to the same parallels of latitude in the Old World: and even in those latitudes where winter is scarcely felt on the Old Continent, it reigns with great severity in America, though but for a short period.

Amethyst, a precious stone, of a violet or purple-violet colour. Its name is derived from its colour, as likened by the ancients to that of wine and water. The hues of different amethysts are as various as the tints of purple; that is, as all the mixtures of blue and red. These stones are sometimes found in the form of pebbles, and sometimes in the angular shapes usual among all chrystalline objects, in the mountains of Auvergne, in Germany and Bohemia, and in a mountain of Catalonia in Spain. Amethysts may generally be discovered where chrystal is produced; for they are merely chrystals, tinged by a mineral.

Ammonia, or volative alkali, is composed of about 80 parts of azote and 20 of hydrogen rendered

gaseous by caloric, in which form only it is in a state of purity, though the word is commonly applied to a solution of the gas in water, with which it readily combines, forming the liquid ammonia of the shops.

Ammoniac. The plant producing this concrete, gummy, resinous juice, is said to grow in Nubia, Abyssinia, and the interior parts of Egypt. It has been supposed a species of the *ferula*, from another species of which asafœtida is obtained.

Ammoniac, sal, a volatile salt, of which vast quantities are thrown out by Mount Etna. The sal-ammoniac now used in the shops, is artificial. When pure, this salt promotes perspiration.

Amphibia. Amphibious animals or those which are capable of existing in two distinct elements as air and water. In zoology, the third class in the Linnæan system. The following is its classical character: heart, one auricle, one ventricle; blood, cold and red: jaws incumbent; organs of sense, tongue, nostrils, eyes, ears; covering, a naked skin; supporters various, in some none: creep in warm places and hiss.

They were formerly divided into four orders, nantes, and meantes, constituting the third and fourth: these have since been removed into the first two orders, which now embrace the entire class, and are denominated: 1. reptilia, reptiles: 2. serpentes, serpents: of which the first have feet, and flat naked ears without auricles; the last have no feet; eggs connected in a chain.

These last are cast upon the earth naked, without limbs, exposed to every injury; but frequently armed with a mortal venom, contained in tubular fangs, resembling teeth, placed without the upper

jaw, protruded, or retracted at pleasure, and surrounded with a glandular vesicle, by which this fatal fluid is secreted. But lest this tribe should too much encroach upon the limits of other animal life, the benevolent author of nature has armed about a fifth part only of it in this deadly manner; while in order to inspire other animals with a suspicion sufficiently extensive, he has ordained that all of them should cast their skins, as a mark of the class to which they belong. The jaws are dilatable and not articulate; and the œsophagus so lax, that they can swallow, without mastication, an animal twice or thrice as large as the neck of the deglutient serpent; the colour is variable, and changes according to season, age, or mode of living; and is frequently converted to another in the dead body; tongue filiform, bifid: skin reticulate. The term amphibious is sometimes also extended to men, who have the faculty of living a long time under water.

We have divers instances of such amphibious men; the most remarkable is of a Sicilian, named the Fish-Colas. Kircher relates, that by a long habitude from his youth, he had so accustomed himself to live in water, that his nature seemed to be quite altered; so that he lived rather after the manner of a fish than a man. A Calabrian monk at Madrid laid claim to this kind of amphibious capacity, making an offer to the king of Spain to continue twice twenty-four hours under water, without ever coming up to take breath.

Amphictyons, in Grecian antiquity, an assembly composed of deputies from the different states of Greece; and resembling, in some measure, the

diet of the German empire. They decided all public differences, and disputes between any of the cities of Greece; but before they entered on business, they jointly sacrificed an ox cut into small pieces, as a symbol of their union. Their determinations were received with the greatest veneration, and even held sacred and inviolable.

AMPHITHEATRE, among the remains of antiquity, a building, in which all the spectators, by being ranged in a circular form, had equally open view of the show. These shows were generally of a barbarous nature, like the modern bull-fights in Spain, cock-fighting in England, and leopard-baiting at Calcutta, or Bengal.

AMPHION, in fabulous history, the son of Jupiter and Antiope: he played so well on the lyre, that the rocks were said to follow him, and the stones moved by his harmony, ranged themselves in order, and formed the walls of Thebes. He married Niobe, whose insult to Diana occasioned the loss of their children; when the unhappy father, filled with despair, attempted to destroy the temple of Apollo, but was punished by the loss of his sight and skill, and cast into the infernal regions.

The fable of Amphion's moving stones and raising the walls of Thebes by his harmony, has been explained by supposing that he persuaded, by his eloquence, a wild and uncivilized people to unite together and build a town to protect themselves against the attacks of their enemies.

AMPLIFICATION, in rhetoric, part of a discourse or speech, wherein a crime is aggravated, a praise or commendation heightened, or a narration enlarged, by an enumeration of circumstances, so as to ex-

cite the proper emotions in the souls of the auditors. Such is the passage in Virgil, where instead of saying merely that Turnus died, he amplifies the circumstances of his death.

—Ast illi solvuntur frigore membra,
Vitaque cum gemitu fugit indignata sub umbras.

The masters of eloquence make amplification to be the soul of discourse.

AMPLITUDE, in astronomy, an arch of the horizon intercepted between the east or west point and the centre of the sun, or a planet, at its rising or setting; and so is either north and south, or ortive and occasive. The amplitude of a heavenly body may be found trigonometrically by saying, as the cosine of the latitude, to radius, so is the sine of the declination of the body, to the sine of its amplitude.

Amplitude Magnetical, is an arch of the horizon contained between the centre of the celestial body when rising or setting, and the east or west point of the compass. It is always equal to the difference between the true amplitude and the variation of the compass.

AMULET, a charm, or preservative against diseases or inchantment. Amulets were made of stone, metal, vegetables, animals, or any thing that the imagination suggested. In some cases, they consisted of words or letters, ranged in a particular order, engraved upon wood, and fixed on some part of the body; in others, they were neither written nor engraved, but prepared with many superstitious ceremonies, and particular regard to the influence of the stars: among the Arabians, this latter species of amulet is called a talisman. It need not be added, that amulets have fallen into discredit.

ANABAPTISTS, see BAPTISTS.

ANACHRONISM, an error with respect to chronology whereby an event is placed earlier than it really happened.

ANAGRAM, a happy transposition of the letters of a word or sentence, in such a manner as to form another. Various examples might be adduced; but a modern one may be most acceptable. Of the letters which compose the words "*Revolution Française*," after taking away those which make the word *veto*, the following sentence has been formed: "*Un Corse la finira;*" *i. e.* "A Corsican shall finish it."

ANALYSIS, in chemistry, is the separation of any substance into its constituent parts, to ascertain their nature, relative proportions, and their mode of union. Thus, water by chemical analysis is found to consist of certain proportions of hydrogen and oxygen. Again, nitrate of ammonia is a salt composed of nitric acid, ammonia, and water, but each of these are compounds; nitric acid consists of azote and oxygen; ammonia, of azote and hydrogen; and water; of hydrogen and oxygen, so that the three simple substances which enter into nitrate of ammonia are azote, hydrogen, and oxygen.

ANAMORPHOSIS, in perspective and painting, a representation of an image either on a plane or carved surface, deformed, or distorted, which in a certain point of view appears regular and in just proportion.

ANALEMMA, a planisphere, or projection of the sphere, orthographically made on the plane of the meridian, by perpendiculars, from every point of that plane, the eye supposed to be at an infinite distance, and in the east or west point of the horizon. In this

projection, the solstitial colure, and all its parallels, are projected into concentric circles, equal to the real circles in the sphere, and all circles whose planes pass through the eye, as the horizon and its parallels, are projected into right lines equal to their diameters; but all oblique circles are projected into ellipses, having the diameter of the circle for the transverse axis.

This instrument having the furniture drawn on a plate of wood or brass, with a horizon fitted to it, is used for resolving many astronomical problems; as the time of the sun's rising and setting, the length and hour of the day, &c. It is also useful in dialling, for laying down the signs of the Zodiac, with the lengths of days, and other matters of furniture upon dials.

Anatomy, the art of dissecting, or skilfully separating the solid parts of an animal, in order to discover their situation, figure, and connection. By anatomy, is generally understood the dissection of the human body in particular: that of the bodies of brutes is called, with reference to the former, comparative anatomy. The use of this art is, that by its assistance a guide is afforded to the operations of medicine and surgery. Considered by itself, it is, doubtlessly, an admirable pursuit for a contemplative mind: but if, after a steril examination of the separated parts of the body, we do not proceed to consider the whole machine re-united and complete, this labour resembles many others, which do infinite honour to the human mind, and are stupendous monuments of its patience, though unproductive of any real utility.

As a philosophic inquiry, it may be observed,

that it is impossible not to be interested in the conformation of our own bodies: as a religious one, it will not fail to impress us with the most becoming ideas of our creator. Considered as a matter of ordinary education, it cannot be too strongly recommended. No arguments, perhaps, can so effectually check the irregularities and acts of intemperance, which endanger our health and happiness, as those which a little knowledge of anatomy and medicine will suggest.—A general view of a subject is certainly the best introduction to particular investigation; and of such a nature, the following elegant and comprehensive description of the structure of the human body, by the late Dr. Hunter, will be found:

"In order to acquire a satisfactory general idea of this subject, let us, in imagination, *make* a man: in other words, let us construct a fabric fit for the residence of an intelligent soul. This soul is to hold a correspondence with all material beings around her; and, to that end, she must be supplied with organs fitted to receive the different kinds of impressions which they will make. In fact, therefore, we see that she is provided with the organs of sense, as we call them: the EYE is adapted to light; the EAR to sound; the NOSE to smell; the MOUTH to taste; and the SKIN to touch. Farther, she must be furnished with organs of communication between herself in the brain and those organs, to give her information of all the impressions that are made on them: and she must have organs between herself in the brain and every other part of the body, fitted to convey her commands and influence over the whole. For these purposes, the NERVES are actually given. They are chords which rise from the brain,

the immediate residence of the mind, and disperse themselves in branches through all parts of the body. They are intended to be occasional monitors against all such impressions as might endanger the well-being of the whole, or of any particular part; and this vindicates the Creator of all things in having actually subjected us to those many disagreeable and painful sensations, which we are exposed to from a thousand accidents in life. Moreover, the mind, in this corporeal system, must be endued with the power of moving from place to place, that she may have intercourse with a variety of objects; that she may fly from such as are disagreeable, dangerous, or hurtful, and pursue such as are pleasant, and useful to her; and, accordingly, she is supplied with MUSCLES and TENDONS, the instruments of motion, which are found in every part of the fabric where motion is necessary: but, to give firmness and shape to the fabric; to keep the softer parts in their proper place; to give fixed points for, and proper directions to, its motions, as well as to protect some of the more important and tender organs from external injuries, there must be some firm prop-work interwoven through the whole:—and, in fact, for such purposes the BONES were given. The prop-work must not be made into one rigid fabric, for that would prevent motion. Therefore, there are a number of bones. These pieces must all be firmly bound together to prevent their dislocation: and this end is perfectly answered by the LIGAMENTS. The extremities of these bony pieces, where they move and rub upon one another, must have smooth and slippery surfaces of easy motion. This is most happily provided for by the CARTILAGES and mucus

of the joints. The interstices of all these parts must be filled up with some soft and ductile matter, which shall keep them in their places, unite them, and at the same time allow them to move a little upon one another: and these purposes are answered by the CELLULAR MEMBRANE, or adipose substance. There must be an adequate covering over the whole apparatus, both to give it compactness and to defend it from a thousand injuries; which, in fact, are the very purposes of the SKIN, and other integuments. Lastly, the mind being formed for society and intercourse with beings of her own kind, she must be endued with powers of expressing and communicating her thoughts by some sensible marks or signs, easy to herself, and capable of great variety: and accordingly she is provided with the organs and faculty of SPEECH, by which she can throw out signs with amazing facility, and vary them without end.

"Thus we have built a body which seems to be pretty complete: but, as it is the nature of matter to be worked upon and altered, so, in a very little time, such a living creature must be destroyed, if there is no provision for repairing the injuries which she will commit upon herself, and those which she will be exposed to from without. Therefore, a treasure of BLOOD is actually provided in the heart and vascular system, full of nutritious and healing particles, fluid, and able to penetrate into the minutest parts of the animal: impelled by the HEART, and conveyed by the ARTERIES, it washes every part, builds up what was broken down, and sweeps away the old and useless materials. Hence we see the necessity or advantage of the heart and arterial system. What more than enough there was of the

blood to repair the present damages of the machine, must not be lost, but should be returned again to the heart; and for this purpose the VEINS are actually provided. These requisites in the animal explain *á priori*, the CIRCULATION of the blood. The old materials, which are become useless, and are swept off by the current of the blood, must be separated and thrown out of the system. Therefore the GLANDS, the organs of secretion, are given for straining whatever is redundant, vapid, or noxious, from the mass of blood; and, when strained, they are thrown out by EMUNCTORIES, called organs of excretion. But now, as the machine must be constantly wearing, the operations must be carried on without intermission, and the strainers must be always employed: therefore, there is actually a perpetual circulation of the blood, and the secretions are always going on. Even all this provision, however, would not be sufficient: for that store of blood would soon be consumed, and the fabric would break down, if there were not a provision made for fresh supplies. These we observe in fact are profusely scattered round her in the animal and vegetable kingdoms; and she is furnished with hands, the fittest instruments that could have been contrived, for gathering them, and for preparing them in a variety of ways for the mouth. But these supplies, which we call food, must be considerably changed: they must be converted into blood. Therefore, she is provided with teeth for cutting and bruising the food, and with a stomach for melting it down: in short, with all the organs subservient to digestion.—The finer parts of the aliments only can be useful in the constitution; these must be taken

up and conveyed into the blood, and the dregs must be thrown off. With this view, the INTESTINAL CANAL is actually given. It separates the nutritious part, which we call CHYLE, to be conveyed into the blood by the system of the ABSORBENT VESSELS; and the feces pass downward out of the body. Thus we see that, by the very imperfect survey which human reason is able to take of this subject, the animal man must necessarily be complex in his corporeal system, and in its operations; and in taking this general view of what would appear, *â priori*, to be necessary for adapting an animal to the situations of life, we observe, with great satisfaction, that man is accordingly made of such systems, and for such purposes. He has them all; and he has nothing more, except the organs of respiration. Breathing it seemed difficult to account for *â priori*: we only know it to be a fact, essentially necessary to life. Notwithstanding this, when we saw all the other parts of the body, and their functions so well accounted for, and so wisely adapted to their several purposes, there would be no doubt that respiration was so likewise: and accordingly, the discoveries of doctor Priestley have lately thrown light upon this function also.

"Of all the different systems in the human body the use and necessity are not more apparent, than the wisdom and contrivance which have been exerted in putting them all into the most compact and convenient form: in disposing them so that they shall mutually receive and give helps from one another; and that all, or many, of the parts shall not only answer their principal end or purpose, but operate successfully and usefully in a variety of secondary

ways. If we consider the whole animal machine in this light, and compare it with any, in which human art has exerted its utmost skill (suppose the best-constructed ship that ever was built), we shall be convinced, beyond the possibility of doubt, that there exists intelligence and power far surpassing what human art can boast of. One superiority in the animal machine is peculiarly striking. In machines of human contrivance, or of art, there is no internal power, no principle in the thing itself, by which it can alter and accommodate itself to any injury that it may suffer, or make up any injury that admits of repair: but in the natural machine, or animal body, this is most wonderfully provided for by the internal powers of the machine itself; many of which are not more certain and obvious in their effects, than they are above all human comprehension as to the manner and means of their operation. Thus, a wound heals up of itself; a broken bone is made firm again by a callus; a dead part is separated and thrown off; noxious juices are driven out by some of the emunctories; a redundancy is removed by some spontaneous bleeding; a bleeding naturally stops of itself; and a great loss of blood, from any cause, is in some measure compensated by a contracting power in the muscular system, which accommodates the capacity of the vessel to the quantity contained. The stomach gives information when the supplies have been expended, represents with great exactness the quantity and quality of what is wanted in the present state of the machine, and in proportion as she meets with neglect rises in her demand, urges her petition in a louder tone, and with more forcible arguments. For its

protection, an animal body resists heat and cold in a very wonderful manner, and preserves an equal temperature in a burning and in a freezing atmosphere. These are powers which mock all human invention or imitation: they are characteristics of the divine architect!"

ANATHEMA, among ecclesiastical writers, imports whatever is set apart, separated or divided; but the word is most usually intended to express the cutting off a person from the privileges of society, and from communion with the faithful. The anathema differs from simple excommunication, in as much as the former is attended with curses and execrations.

ANCIENT, OLD, ANTIQUE, are words that express age, in different degrees. A fashion is old when it ceases to be used; ancient when it has been long out of use; and antique when it has been long ancient. Young is opposed to old; new to ancient; and modern to antique. A man is said to be old, a family ancient, a statue or other monument antique. Old implies decrepid; ancient, immemorial; antique, remote. Old age diminishes the powers of the body, and enlarges the extent of the mind; ancientness takes away the beauty of garments, and gives authority to titles; antiquity weakens the evidence of history, and gives value to monuments. The epochs beyond which it is now generally agreed to call men and their works ancient, is that of the taking of Constantinople by Mahomet II. which event happened A. D. 1453. It was then that Europe began to re-emerge from barbarism. Tuscany opened her arms to men of genius in arts and literature, who took refuge in her bosom from the general storm.

ANCIENT LANGUAGES. Much has been said, and much may always be said, for and against the study of what are called the dead languages; such as Hebrew, Greek, and Latin, which are now only to be met with in books. A liberal man will, perhaps, wholly join with neither the one disputant nor the other. In all cases, those who give their thoughts to the past, to the neglect of the present, are to be blamed. If history is interesting, if antiquities, the documents of history, are interesting, then ancient languages must be interesting also.

ANCIENT LEARNING. Interested as we are in the history of man, we cannot be indifferent to those writings which have come down to us from ancient times. If we are unacquainted with ancient learning, we can scarcely avoid error in our estimate of its value: we shall probably reverence it too much or too little. Certainly, neither ancient learning, nor any thing else that is ancient, is essential to the education of a good member of society; but it is very essential to taste, without a certain mixture of which, all the ingredients of society must soon become vitiated. While on the one hand, however, it does not appear rational to join with those who would banish an inquiry into ancient learning from among the number of human studies, it is on the other most undoubtedly true, that the attainments of the ancients are frequently over-rated. We have availed ourselves of their discoveries, we have perceived many of their mistakes; and though we may have lost part of their lessons, and committed new errors of our own, still it is absurd to suppose that we have not surpassed them.

ANCIENT TIMES. Remote periods of antiquity.

Nothing can more forcibly show the use of an acquaintance with ancient learning, and, consequently, with ancient languages, than the erroneous opinions which are entertained of ancient times. Error can be dispelled only by knowledge. Our mistakes concerning ancient times are commonly these: 1. We suppose modern days to be greatly superior in arts and luxuries; and, 2. We give antiquity credit for a vast superiority in virtue. The first position, all history contradicts; and it will show, that with all their vices on their heads, public and private, the moderns can suffer nothing by comparison with the ancients. The history of ancient times evinces, that they witnessed the practice of all virtue; and not less will that of our own afford the same honourable testimony to the character of mankind. He that judges impartially, will confess, that in the past there will always be something to regret, in the present to condemn, and in the future to desire.

Anchor, a heavy, strong, crooked instrument of iron, cast or dropped from a ship into the water to retain her in a convenient station in a harbour, road, or river. Anchors were originally mere weights: at present they are intended to fasten in the ground as hooks. They are contrived so as to sink into the earth as soon as they reach it, and to hold a great strain before they can be loosened or dislodged. They are composed of a shank, a stock, a ring, and two arms with flukes. The stock, which is a long piece of timber fixed across the shank, serves to guide the flukes in a direction perpendicular to the surface of the ground; so that one of them sinks into it by its own weight, as soon as it falls, and is still preserved steadily in that position by the stock,

which, together with the shank, lies flat on the bottom. In this situation, it must necessarily sustain a great effort before it can be dragged through the earth horizontally. Every ship has, or ought to have, three principal anchors, with a cable to each, viz. the *sheet*, the *best bower*, and the *small bower*, so called from their usual situation on the ship's bows. There are besides small anchors for moving a ship from place to place in a harbour or river, where there may not be room or wind for sailing: these are the *stream*-anchor, the *kedge*, and the *grapnel*. The last, however, is chiefly designed for boats.

ANCONY, in the iron-works, a piece of half-wrought iron, of about three quarters of a hundred weight, of the shape of a bar, at the middle, but rude and unwrought at the ends. To bring the iron into this state, a piece of a proper size, from a *sow* of cast iron, is melted: this is hammered at the forge into a mass of two feet long, and of a square shape, which is called a *bloom;* when this is done, it is sent to the *finery*, where, after two or three heats and workings, it is brought to this figure, and called an *ancony*. The middle part, beat out at the finery, is about three feet long, and of the shape and thickness that is to be given to the whole: this is then sent to the *chafery*, and there the ends are wrought to the shape of the middle, and the whole is made into a bar.

ANDES, or Cordillieras, a great chain of mountains, which run almost the whole length of South America. They are the highest and most remarkable mountains in the world; for those within the torrid zone are always covered with snow; and in passing over the lower part of them, people are in

danger of being starved with cold. There are a great many volcanos, which break out sometimes in one place, and sometimes in another; and by melting the snow, occasion such a torrent of water, that numbers of men and cattle have perished.

ANDROIDES, a piece of mechanism representing a human figure, and performing human actions. The word signifies the human figure: it is an *automaton*, but it is precisely an *automaton of the human figure*. A very celebrated contrivance of this kind was made by M. Vaucanson, in the year 1738. It played upon the flute with a degree of excellence that gave pleasure even to connoisseurs. See *Automaton*.

ANEMOMETER, a machine for measuring the force and velocity of the wind. Several have been invented, but it will be sufficient to mention one. This consists of small sails, like those of a mill, from the axis of which two weights depend.

ANEMOSCOPE, a machine that shows either the course or the velocity of the wind. There is an anemoscope upon one of the wings of Buckingham house, and another at Somerset-place. These instruments, which, however, differ in their construction from others that have been invented, externally, resemble a clock. The dial plate represents the thirty-two points of the compass; and the index, or hand, is regulated by a vane, or weather-cock.

ANGEL, the name of an ancient gold coin in England, so called from the figure of an angel upon it. It weighed four pennyweights.

ANGLE, in geometry, the opening, or mutual inclination, of two lines, or of two or more planes, meeting in a point called the vertex, or angular point.

The most general division of angles is, into plane, spherical, and solid.

Angle, a plane, rectilineal, is the inclination of two straight lines to one another, which meet together, but are not in the same straight line. See Fig. 6.

Angle, spherical, is an angle formed on the surface of a sphere by the intersection of two great circles; or, it is the inclination of the planes of the two great circles. Fig. 7.

The measure of a spherical angle, is the arc of a great circle of the sphere, intercepted between the two planes which form the angle, and which cuts the said plane at right angles.

Angles, solid, is the mutual inclination of more than two planes, or plain angles, meeting in a point, and not contained in the same plane; like the angles or corners of solid bodies.

Angles are sometimes denoted, or named, by the single letter placed at the angular point, as the angle A; and sometimes by three letters, placing always that of the vertex in the middle. The former method is used when only one angle has the same vertex; and the latter method is necessary when several angles have the same vertex, to distinguish them from one another. See Fig. 6. and 8.

Angles in mechanics. 1. Angle of direction, is that comprehended between the lines of direction of two conspiring forces. 2. Angle of elevation, is that which is comprehended between the line of direction, and any plane upon which the projection is made, whether horizontal or oblique.

Angle of incidence, in optics, the angle which a ray of light makes with a perpendicular to that point of the surface of any medium on which it

falls; though it is sometimes understood of the angle which it makes with the surface itself.

Angle of refraction, now generally means the angle which a ray of light, refracted by any medium, makes with a perpendicular to that point of the surface, on which it was incident; but has sometimes been understood of the angle which it makes with the surface of the refracting medium itself. It is a constant law of refraction that the ratio of the sines of incidence and refraction, is a fixed ratio, whatever be the obliquity of the incident ray, the media remaining.

Angles, in fortification, are understood of those formed by the several lines used in fortifying, or making a place defensible.

Angling, a method of catching fish, singly, by means of a baited hook, appended to a rod and line. Various methods are suggested, by those who treat on angling, for attracting fish to the spot. In standing waters, this is by no means difficult: a quantity of grains, chopped worms, or other food, is thrown by way of invitation. In small running streams, those to whom they belong can easily confine their fish to any given part; but, in rivers, the following expedient is employed: a box made of tin, and capable of holding several hundred worms, is to be procured. It must be pierced with holes sufficiently large to permit the escape of the worms, and furnished with a weight that will cause it to sink, and a line to draw it back at pleasure. This being lowered into the water, the worms will crawl out, the fish assemble, and the angler, who throws in his hook higher up the stream, and suffers it to be carried down with it, if there be no pike in the

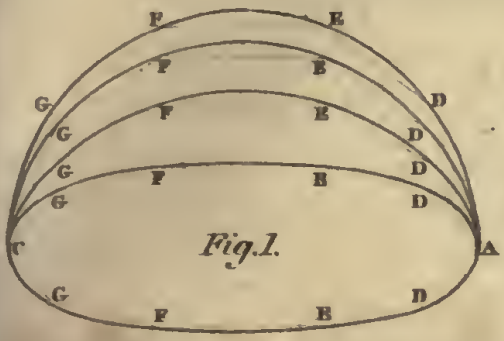


Fig. 1.

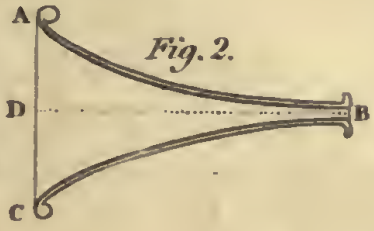


Fig. 2.

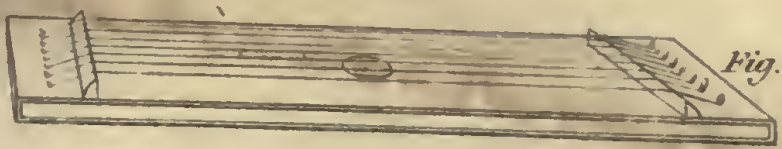


Fig. 3.

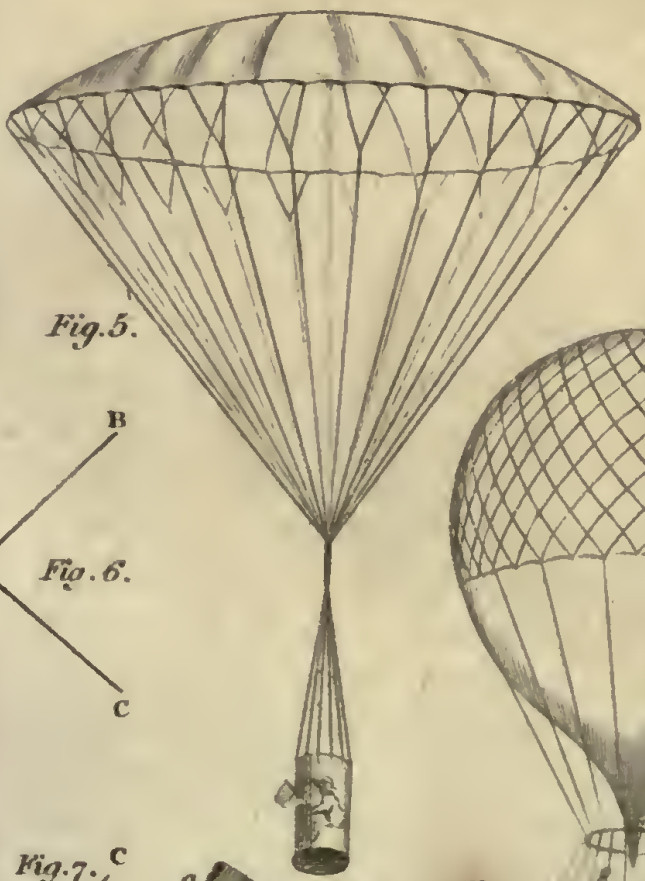


Fig. 5.

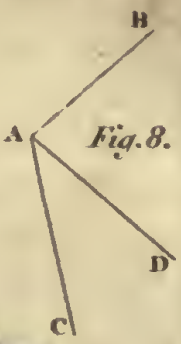


Fig. 8.

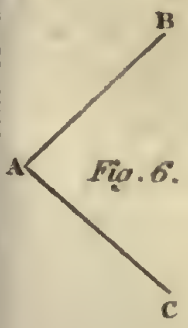


Fig. 6.

Fig. 4.

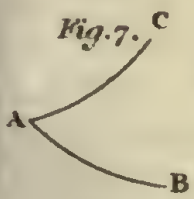


Fig. 7.

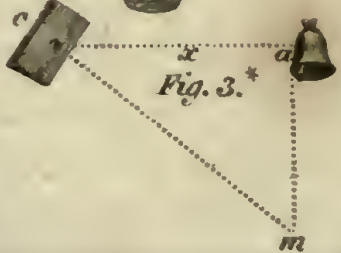


Fig. 3.*

Cooper sculp.

Published by J. Harris, St. Pauls C.h Y.d 1811.

neighbourhood, succeeds in his design. The angler is recommended to keep himself out of sight of the fish, by standing under a tree, or so far from the water that he can but just observe the float. The rod is to be kept in a moderate state of moisture; as if too dry it is brittle, and if too wet, rotten. In a pond, the best place for the angler to take his stand is usually that used by cattle. In rivers, if bream is fished for, it should be in the deepest and most quiet places; if eels, under overhanging banks: perch are to be expected in clean places, where the stream is swift; and chub in deep-shaded holes: roach are most commonly found in the same places as perch, and trout only in swift and clear streams. The best season is from April to October: the cooler the weather, in the hottest months, the better; but in winter, on the contrary, the warmest day is the most promising. A cloudy day, after a moonlight night, is always favourable; as the fish avoid feeding by moonlight, and are therefore hungry. Warm, lowering days are always coveted by anglers.

Animal. If the term be disputed, it is very difficult to define what classes of created things are strictly animal: in a general sense, it is applied to every thing that is supposed to be alive to the sensations of pain and pleasure. Under the name of animal, therefore, are included men, quadrupeds, birds, fishes, reptiles, and insects. Animal literally means a *living thing*: but plants live. Linnæus has formed a climax of the grand departments of creation: stones grow; vegetables grow and live; animals grow, live, and feel. See Natural History.

Animal acids, are those which have been discovered in animal substances, or which contribute to

their formation. These are, the acetic, the amniotic, the benzoic, the carbonic, the lactic, the malic, the muriatic, the oxalic, the phosphoric, the rosacic, the sulphuric, and the uric: many of them, however, are not peculiar to animals, but are frequently found both in vegetables and minerals.

ANIMAL-*flower*. The reverend Griffith Hughes, in his natural history of the island of Barbadoes, gives the following account of a very curious object in nature, which he calls the animal-flower: "The cave that contains this animal is near the bottom of a high rocky cliff facing the sea, in the parish of St. Lucy. Its bottom forms a natural bason of about sixteen feet in breadth; and when the wind is high, and at a certain point, the sea breaks into it, and it is thus kept full of water, which, with the exception of a small quantity that oozes from the roof of an anterior cavern, is intirely salt. In the middle of the bason, rises a small rock, which is always under water. Round the sides of this stone, at different depths, but seldom more than eighteen inches below the surface, are seen, at all seasons of the year, fine radiated flowers of a pale yellow, or bright straw-colour, slightly tinged with green. They have a circular border of petals, thickly set, and resembling, both in shape and size, the single garden-marygold. The whole of this seeming flower, however, is narrower at the *discus*, or central circle, round which the leaves adhere, than any other flower of that kind. I attempted to pluck one of these flowers from the rock to which they are always fixed, but found, to my surprise, that I was unable to touch it. When my fingers were under water, and had approached within two

or three inches of their object, it immediately contracted, closed its yellow border, and retreated into the hole from which it issued. If left undisturbed for the space of about four minutes, it gradually returned into sight; expanding, though at first with caution, its seeming leaves, and, at length, redisplaying its mysterious bloom: whenever my hand had nearly reached it, it constantly recoiled; and the effect was the same if I used a cane or slender twig. These were strong characteristics of animal life: yet, as its form and want of local motion classed it among vegetables, I was for some time in suspense, and imagined it to be an aquatic sensitive-plant. Though its contraction to avoid the touch was performed with more quickness than by any plant that I had seen of that description, yet, its seeming leaves might be, and in reality were, of a far thinner and more delicate texture than those of any known flower; and the weight of the water, so much greater than that of air, might contribute to this celerity. With respect to the extreme thinness of the petals, I had once an opportunity of ascertaining the fact: for though I could not, by any means, contrive to take or pluck from the rock one of these animals entire, I was fortunate enough to succeed, after waiting for some time with a knife near the mouth of a hole, in cutting off two deceptious leaves. When out of the water they retained, for a short time, their shape and colour; they were composed of a membrane-like substance, surprizingly thin; and they soon shrivelled up and decayed. I was inclined, then, till a subsequent visit decided my opinion, to consider this flower as a sensitive-plant: but I now plainly saw four dark-

coloured resemblances of threads, something like the legs of a spider, rising out of the centre of the leaves. Their quick spontaneous motion, from one side to the other of this circular border of seeming leaves, which, in reality, were so many arms or feelers, and their closing together like a forceps, as if they had hemmed in their prey, which the yellow border likewise soon surrounded and closed to secure, fully convinced me that it was a living creature. Its body, at a distance, appears to be about as big as a raven's quill, and of a blackish colour; the one end sticking to the rock, the other extending a very small distance from it; and incircled with a yellow border, as above described. Now, since the same goodness and wisdom which give being to creatures, preserve them in that being or existence by ways and means as wonderful as their creation itself, we may conjecture, with some probability, the intention of the amazing providence of God in induing this animal's arms or feelers with a fine yellow colour, and ordering it to differ, in this particular from the several tribes of fungous animals that are usually found cleaving to the rocks in the sea. These latter, may be fed with spawn, or other animalcules, which the flux and reflux of the waves throw in their way; and, in this case, there is no need of any uncommon means for enticing their prey, even supposing it to be animal, within their reach: but still water, like that in the cave, will not, in the same manner, of itself convey this supply of food. Here then, some extraordinary temptation is requisite, in order to allure the prey within the reach of the stationary animal that is to be fed. To this end, the fine brilliant colour that has been

described may have been given to the creature in question: for, as rays of light, or what resembles them, are inviting to almost every thing that lives, the beautiful border may serve as a decoy. All the species of this creature are not, however, of the same colour. In the uppermost part of the same rock, there are innumerable clusters of what are provincially called *water-bottles*, very much resembling scattered clusters of unripe grapes: the outside consisting of a bluish skinny tegument, like that of a grape, and the inside filled with water, in a somewhat turbid state. Among these are a great number of the animal-flowers. Like the yellow ones, they are fixed to the rock, not in holes, but sticking to the surface, among the water-bottles, and generally not more than nine inches under water. The leaves, or rather feelers, of these, are of a greyish-purple colour, variegated with black spots. Other animal-flowers, of a bluish green colour, some of which are not larger than an English two-penny piece of silver, grow in clusters upon the rocks. None of these latter sorts are so sensitive as the yellow; and they vary from each other. Having plucked one of those growing among the water-bottles, I found the body, which was about an inch long, to possess a sensible vermicular motion. The feelers, likewise, which decorated one end of it, when exposed to the air, shrunk up, and remained as lifeless; but as soon as the whole was dipped in the water, they would, as it were, assume a new life, and appear again in their full vigour, Soon after the discovery of these surprising animals, a great number of people came to view them: but as this was attended with some

small inconvenience to the person through whose lands they were obliged to pass, he, to get rid of the company resolved to destroy this object of their curiosity. In order to do this effectually, he took a piece of iron, prepared for the purpose, and carefully bored and drilled every part of the holes in which these seeming flowers were bred; but to his great surprise, in a few weeks, they appeared again, issuing out of the same holes.—Let us here, for a while, stop and consider whether our much-boasted reason can find out how even a latent principle of life can be preserved after the whole organic body is torn in pieces? When we see this animal, in a short time after its apparent destruction, resuscitate, and appear in its former proportion, beauty, and life, can we, after such an ocular demonstration of so astonishing a change in a creature destined for this life only, and removed, in all appearance, but a few degrees from the vegetable creation, any longer entertain doubts about the reasonableness of another doctrine of a far greater consequence? And as every past age has been, so, undoubtedly, every future will be, blest with some surprising new discovery of the unsearchable power and wisdom of God."

ANIMAL FUNCTIONS, are those by which the materials, that constitute and support the bodies of animals, are prepared and supplied. The principal of these functions are the following—circulation, digestion, nutrition or assimilation, respiration, and secretion, which are employed in producing animal matter from the substances that compose it. But, besides these, there are others, which though they do not act chemically, like the foregoing, are in many animals subservient to various important purposes.

ANIMAL HEAT. Heat is essentially necessary to life. That of a man in health is from about 94° to 100° of Fahrenheit. It appears to depend upon the absorption of oxygen in the lungs.

ANIMAL LIFE, it is difficult to mark the line, where vegetable life ends, and animal life begins. Animal life may be described that kind of existence, which enables its possessor to follow the dictates of its own will; renders it susceptible of pleasure both through the medium of the senses and of the imagination; subjects it, at the same time, to a similar sensibility to pain; endows it, in short, with a twofold being. The plant, as we suppose, is invigorated by the approach of spring without enjoying any attendant pleasure; whereas, the smallest fly receives from the beams of the sun, a mental as well as corporeal gratification.

ANIMAL MAGNETISM, a pretended science, the temporary reputation of some impudent pretenders to a knowledge of it, is one among the numerous proofs of the imbecility of the human understanding. The reader will clearly apprehend, that it supposes an attractive power by means of which the animal economy may be operated upon. It originated with father Hehl, a German philosopher, who, in 1774, strongly recommended the use of the magnet in medicine: but the founder of the imposture in question, was M. Mesmer, a physician of the same country, who, leaving his native land, where he obtained but little credit, flourished in a most extraordinary manner at Paris, about the years 1778 and 1779. M. Deston, a pupil and coadjutor of Mesmer, is said to have realized £.100,000 sterling by his practice; and this person explained the

principles of his art in the following manner. I. Animal magnetism is an universal fluid, constituting an absolute plenum in nature, and the medium of all natural influence between the celestial bodies, and between the earth and animal bodies. II. It is the most subtile fluid in nature; capable of a flux and reflux, and of receiving, propagating, and continuing, all kinds of motion. III. The animal body is subjected to the influences of this fluid by means of the nerves, which are immediately affected by it. IV. The human body has poles, and other properties, analogous to the magnet. V. The action and virtue of animal magnetism may be communicated from one body to another, whether animate or inanimate. VI. It operates at a great distance, without the intervention of any body or medium. VII. It is increased and reflected by mirrors; communicated, propagated, and increased by sound; and may be accumulated, concentrated, and transported. VIII. Notwithstanding the universality of this fluid, all animal bodies are not equally affected by it; on the other hand, there are some, though but few in number, the presence of which destroys all its effects. IX. By means of this fluid, nervous disorders are cured immediately, and others mediately; and its virtues, in short, extend to the universal cure and preservation of mankind.—A similar imposture was practised with success, many years in London, by an American, who rightly appreciating the credulity of our countrymen, sold for five guineas a couple of pieces of metal intrinsically not worth as many farthings, under the alluring title of METALLIC TRACTORS. The inventor having realized, it is

supposed, a good fortune, returned to his own country, laughing at the folly of those, whom he had so easily duped.

ANIMAL MATTER. Under this term are comprehended all the various kinds of substances, of which animal bodies are composed; not so much, however, with regard to the radical principles of which they consist, as to those particular and exclusive forms, in which they exist, throughout all the tribes of the animal kingdom, as far as they have been subjected to examination.

ANIMALCULE (a little animal), is a term which may be applied to any living creatures, whose existence, cannot be discovered without the aid of glasses. Naturalists suppose, and with great reason, that there is a farther order of animacules which escape the cognizance of even the best microscopes. The naked eye takes in a series from the elephant to the mite: at this point commences a new class of animals, which comprehends all those from the mite to those many millions of times smaller than the mite; and this class cannot be said to be wholly discovered, unless the microscope be also said to have attained its greatest possible perfection.

ANIMALCULES are said to be the cause of various disorders. The itch, from several experiments, is affirmed to be a disorder arising from the irritations of a species of animalcula found in the pustules of that disease, whence the communication of it by contact from one to another is easily conceived, as also the reason of the cure being effected by cutaneous applications.

ANIMATION, in physiology, signifies life itself: to the complete existence of which, the healthful

condition of all the organs of the body, and the due concurrence of all the elements, are necessary.

Animation *suspended.* Life may suffer considerable diminution of its powers, and even a total suspension, without being absolutely destroyed. The action of the lungs, and consequently all the functions of the body, depend upon the free use of air. The want of this great principle of life, causes faintings in crowded assemblies; and it is from the same privation of air that drowning and suffocation produce death. Various methods are employed to recover those who have unfortunately fallen into accidents of this nature. In England, a most laudable institution exists for the purpose of recommending and supplying a successful method of relief. See Humane Society.

Annals, a species of history, wherein events are related in the chronological order they happened. It differs from a perfect history, in being only a mere relation of what passes every year, as a journal is of what passes every day; whereas history relates not only the transactions themselves, but also the causes, motives, and springs of such actions. Cicero informs us that the Pontifex Maximus, in order to preserve the memory of events, wrote what passed each year on tablets, which were exposed to public inspection in his own house. These tablets were called annales maximi; hence the writers who imitated this method of writing were stiled annalists.

Annates, among ecclesiastical writers, a year's income of a spiritual living. These were, in ancient times, given to the pope through all Christendom upon the decease of any bishop, abbot, or

parish clerk, and were paid by his successor. At the Reformation they were taken from the pope; and vested in the king; and, finally, queen Anne restored them to the church, by appropriating them to the augmentation of poor livings.

ANNEALING, by workmen called nealing, is a practice in the manufacture of vessels of glass or of cast iron. These two materials, contrary to the nature of most others, increase in bulk as they cool. If a vessel of glass, or cast iron, be suffered to cool too quickly, it may be broken by the slightest touch. It is remarkable, in the case of glass, that the gentler the stroke it receives, the greater the danger. A pistol bullet may be dropped into it without injury, while a little sand will cause it to burst, a few seconds after it has fallen. Annealing, then, is the placing vessels of these substances in a kind of oven or furnace, where they are suffered to cool gradually. Glass or cast iron, that has not undergone this process, is called unannealed. By annealing, the glass is left for some time in a state approaching to fluidity; the heat increases the bulk of the chrystalized part, and renders it so soft that the internal parts have an opportunity of expanding and forming a regular chrystalization. A similar practice is now adopted for rendering kettles and other vessels of cast iron less brittle; and of this the same explanation may be given. The greater number of metals diminish in bulk when they pass from a fluid to a solid state; iron, on the contrary, expands. The outside cooling, first, does not permit the inner part of the fluid to expand, and this, in consequence, remains in a granular and unconnected state.

Annotta, or *Arnotta*, in dyeing, an elegant red colour, formed from the pellicles or pulp of the seeds of the bixa, a tree common in South America. It is also called Terra Orleana, and roucou. In making it, the red seeds are steeped in water till the liquor begins to ferment, then strongly stirred and stamped with wooden beaters, to promote the separation of the red skins; this process is repeated several times, till the seeds are left white. The liquor passed through close cane sieves, is pretty thick, of a deep red colour, and a very ill smell. In boiling, it throws up its colouring matter to the surface in form of scum, which is afterwards boiled down by itself to a due consistence, and made up while soft into balls. To rectified spirit of wine it very readily communicates a high orange or yellowish red, and hence is used as an ingredient in varnishes for giving an orange cast to the simple yellows. Alkaline salts render it perfectly soluble in boiling water, without altering its colour. Wool or silk boiled in the solution acquires a deep, but not a very durable orange dye.

Annuity, a sum of money payable yearly, half-yearly, or quarterly, to continue a certain number of years, for ever, or for life. An annuity is said to be in arrear, when it continues unpaid after it is due; and in reversion, when it is to fall to the expectant at some future time. Interest on annuities may be computed in the way of simple or of compound interest; but compound interest being most equitable, is universally used. See Life Annuities.

Annulet, in architecture, a small square member in the Doric capital, under the quarter round. It is also a narrow flat moulding, which is common to

divers parts of the columns, as the bases, capitals, &c. It is the same member which Vitruvius calls a fillet.

Anomaly, in astronomy, is an irregularity in the motion of a planet, by which it deviates from the aphelion or apogee; or it is the angular distance of the planet from the aphelion or apogee; that is, the angle formed by the line of the apses, and another line drawn through the planet.

Kepler distinguishes three kinds of anomaly, true, mean, and excentric.

Anodyne, a taker away of pain, a term applied to medicines which ease pain, and procure sleep. They are divided into three classes: 1. Paregorics, or such as assuage pain; 2. Soporifics, or such as relieve by procuring sleep; and, 3. Narcotics, or such as ease the patient by stupifying him. Opiates and narcotics destroy sensation.

A'nseres. In zoology, the third order of the Linnéan class aves: thus ordinally characterized. Bill smooth, covered with a soft skin, and broader at the point, feet formed for swimming; toes palmate, connected by a membrane; shanks short, compressed; body fat, downy; flesh mostly tough; food, fishes, frogs, aquatic plants, worms, &c. nest mostly on the ground; the mother takes but little care in providing for the young. There are eleven genera divided into those that have bills with, and bills without teeth. This order comprehends all kinds of water fowl.

A'nthos, *Anthus*. 1. The anther, or uppermost part of the stamen of a flower. 2. The entire flower, or corol itself. 3. The flosculent parts or flowers of minerals. 4. The aroma or fine volatile

parts, or essences of spirits and other chemical preparations.

Antichrist is a term particularly used for a tyrant who is to reign on earth, toward the end of the world; to make the ultimate proof of the elect; and to give a shining instance of the divine vengeance, before the last judgment.

The bible and the fathers all speak of Antichrist as a single man; though they assure us, that he is to have divers precursors, or fore-runners. Yet many protestant writers apply to the Romish church, and the pope, who is as the head of it, the several marks and signatures of antichrist enumerated in the Apocalypse; which would rather imply antichrist to be a corrupt society, or a long series of persecuting pontiffs, than a single person. Or rather, a certain power or government, that may be held for many generations, by a number of individuals succeeding one another. See Letters on the Prophecies, Johnson and Co, 1810.

Antimony, a metallic substance of a greyish white colour, considerable brilliancy, and strongly resembling tin, or silver. Its texture is laminated, and the lamina appear arranged one over another, and crossing in every direction: its surface often exhibits a kind of crystal, in the form of stars or fir-leaves. It is very brittle, and easily pulverized; melts, when heated just to redness, at about 810 deg. Fahrenheit; evaporates, if the heat be increased; communicates to the fingers a peculiar taste and smell when rubbed upon them. Its specific gravity varies from 6·702 to 6·86. The substance to which this name has been commonly, though erroneously applied, is a mineral, or ore of

antimony, composed of a mixture of sulphur with that metal; and it is accordingly, in the language of modern chemistry, denominated a sulphuret of antimony.

Antinomians, a sect of christians, who pretend that the gospel dispenses with the observance of the moral law; who regarding virtuous conduct as insufficient to deserve or obtain salvation, teach that no attention to its precepts is necessary, or, rather, efficacious: as if these were incompatible with the dogmas of religion: and as if the gospel were not the completion and perfection of the law of nature. No terms can express the horrid depravation of manners, and utter destruction of all true religion, to which this doctrine must generally lead: at the same time, it is easy to perceive, that its origin is to be attributed to an enthusiastic and misinformed devotion, rather than to vice.

Antipathy is reckoned by many, a natural horror and detestation, an insuperable hatred, an involuntary aversion, which a sensitive being feels for some other object, whatever it is, though the person who feels this abhorrence is entirely ignorant of its cause, and can by no means account for it. Such is the invincible aversion of particular persons against cats, mice, spiders, &c.; a prepossession which is sometimes so violent, as to make them faint at the sight of these animals.

M. C. G. Lehmann, in his observations on the manner in which the spider spins its web, speaking of this antipathy: says "It is of importance to consider by what means that aversion commonly called natural, and which is merely the result of improper education, can be overcome. Rosel ac-

customed himself to view these insects first at a distance. He then considered their webs; and at last looked at the insects themselves through a microscope. Goze first viewed individual parts of spiders, such as the legs, head, &c. till he was at length able to look without any sentiment of aversion at the entire insect. Both these naturalists, by long habit, so far overcame this aversion, that they could handle and examine spiders with the same indifference as others can flies."

ANTIPODES, in geography, a name given to those inhabitants of the globe that live diametrically opposite to each other. The antipodes lie under opposite meridians and opposite parallels; in the same degree of latitude, but of opposite denominations, one being north and the other south. They have nearly the same degree of heat and cold, and days and nights of equal length, but opposite seasons. It is noon to one, when it is midnight to the other; and the longest day with the one, is the shortest with the other. The terms upward and downward are merely relative, and signify nearer to, and farther from, the centre of the earth, the common centre to which all heavy bodies gravitate: wherefore, our antipodes, or the people who, with respect to us, seem to walk with their heads downward, have not their feet upward, nor their heads downward, any more than ourselves; because they, like us, have their feet nearer to the centre of the earth, and their heads farther from it. We all tend toward the centre of the earth in a direction from head to foot.

ANTIQUITIES, such documents of ancient history as industrious and learned men have collected;

genealogies, inscriptions, monuments, coins, names, etymologies, archives, mechanical instruments, fragments of history, &c. Antiquities form a very extensive science, including an historical knowledge of the ancient edifices, magistrates, habiliments, manners, customs, ceremonies, religious worship, and other objects, worthy of curiosity, of all the principal nations of the earth. This science is not a matter of mere curiosity: it is indispensable to the divine, who ought to be thoroughly acquainted with the antiquities of the jews, to enable him properly to explain numberless passages in the old and new testaments; to the lawyer, who, without the knowledge of the antiquities of Greece and Rome, can never well understand, and properly apply, the greater part of the Roman laws; to the physician and philosopher, that they may have a complete knowledge of the history and principles, or the physic and philosophy of the ancients; to the critic, that he may comprehend and interpret ancient authors; to the orator and poet, who will thereby be enabled to ornament their writings with numberless images, allusions, and comparisons.

Antithesis, a figure of rhetoric, which consists in opposing thoughts to one another, to increase their force. "Antitheses, well managed, (says Bohours), give infinite pleasure in the perusal of works of genius; they have nearly the same effect in language as lights and shadows in painting, which a good artist distributes with propriety: or the flats and sharps in music, which are mingled by a skilful master." The antithesis is a favourite ornament with young writers: it gives energy, and, like all other departures from the straight road, its

reputation depends upon its success. The following is an example:

Polite, as all her life in courts had been;
Simple, as courts she never yet had seen.

Lyttleton.

ANTITRINITARIANS, those who deny the existence of the trinity, and assert, that there are not three persons in one God. Such are Arians, who admit that Jesus Christ existed with his father before all worlds, but maintain that he is subordinate and inferior to the father, and his messenger and most high prophet. Such are Unitarians, or, as they were formerly denominated Socinians, who hold that Jesus Christ, though a messenger and the highest prophet ever commissioned by Almighty God, for purposes of mercy to mankind, is only a man, born as others of the human race are born, and that he never had existence, till his birth of Mary.

ANTOECI, an appellation given to those inhabitants of the earth, who live under the same meridian, but on different sides of the equator, and at equal distances from it.

AORTA, a large artery arising with a single trunk, from the left ventricle of the heart above its valves, and it serves to convey the mass of blood to all parts of the body.

APOCRYPHA, literally signifies *concealed, kept private.* The word was applied by the Jews to such of their books as were not published. At present, the apocrypha is a collection of writings that are placed at the end of the Old Testament, the sacred authority of which is not ascertained. They are regarded therefore, as books merely moral,

The Protestants do not only reckon those books to be apocryphal, which are esteemed such in the church of Rome, as the Prayer of Manasseh, king of Judah, the third and fourth book of Esdras, St. Barnabas's epistle, the book of Hermas, the addition at the end of Job, and the 151st Psalm; but also Tobit, Judith, Esther, the book of Wisdom, Jesus the son of Sirach, Baruch the prophet, the Song of the Three Children, the history of Susanna, the history of Bel and the Dragon, and the first and second book of Maccabees. It is not pretended that these books were received by the Jews, or so much as known to them. None of the writers of the New Testament cite or mention them: neither Philo nor Josephus speak of them. The Christian church was for some ages an utter stranger to these books. Origen, Athanasius, Hilary, Cyril of Jerusalem, and all the orthodox writers, who have given catalogues of the canonical books of Scripture, unanimously concur in rejecting these out of the canon. And for the New Testament they are divided in their opinions, whether the Epistle to the Hebrews, the Epistle of St. James, and the second Epistle of St. Peter, the second and third Epistles of St. John, the Epistle of St. Jude, and the Revelations, are to be acknowledged as canonical or not. The Protestants acknowledge such books of Scripture only to be canonical as were so esteemed to be in the first ages of the church.

Apocalypse, revelation, the name of one of the sacred books of the new testament, containing revelation or prophecies, with respect to the future state of the church and world. The apocalypse consists of 22 chapters; the three first are filled

with instructions to the bishops of the seven churches of Asia-Minor; the 15 following ones describe the persecutions of the church: after these, the writer prophesies the vengeance that God will exercise against those persecutors. The four last chapters speak of the subsequent triumph and happiness of the church. Several other books have been published under the same title.

Apodes, the name of one of the orders of fishes in the Linnæan distribution of animals. Their leading character is, that they have no belly fins. There are 12 genera, among which is the eel tribe.

Apogee, *Apogæum*, in astronomy, that point in the orbit of the sun, moon, &c. which is farthest distant from the earth. It is at the extremity of the line of the apsides; and the point opposite to it is called the perigee, where the distance from the earth is the least.

The ancient astronomers, considering the earth as the centre of the system, chiefly regarded the apogee and perigee: but the moderns, placing the sun in the centre, change these terms for the aphelion and perihelion. The apogee of the sun, is the same thing as the aphelion of the earth; and the perigee of the sun is the same as the perihelion of the earth.

Apologue, a poetical fiction, the purpose of which is the improvement of morals. Some writers are of opinion, that this term ought to be confined to that species of fable in which brute or inanimate things, as beasts or flowers, are made to speak; but this distinction, so far from being followed, is generally reversed. It is, in reality, more usual to give the name of apologue where human actors only are introduced.

Apostacy, is the quitting any system of thinking or acting, good or bad: but the word is generally used, in a reproachful sense, of one who has changed his religious opinions. To guard against this it was enacted by statute, 9 and 10 W. 3, "That if any person educated in, or having made profession of the Christian religion, shall by writing, printing, teaching, or advised speaking, deny the Christian religion to be true, or the holy scriptures to be of divine authority, he shall upon the first offence be rendered incapable to hold any office or place of trust; and, for the second, be rendered incapable of bringing any action, or of being guardian, executor, legatee, or purchaser of lands, and shall suffer three years imprisonment without bail. To give room however for repentance, if within four months after the first conviction, the delinquent will in open court publicly renounce his error, he is discharged for that once from all disabilities.

Apostle, in the New Testament, a name given by way of eminence to twelve of the disciples of Jesus Christ, chosen by himself to preach his gospel, and spread it through all parts of the world. Apostle, literally signifies a person sent upon any mission. St. Paul is frequently called The Apostle, by way of eminence; and The Apostle of the Gentiles, by reason that his ministry was chiefly made use of, for the conversion of the Gentile world, as that of St. Peter was for the Jews, who is therefore stiled The Apostle of the Circumcision. The several apostles are usually represented with their respective badges or attributes: St. Peter, with the keys; St. Paul, with a sword; St. Andrew, with a cross or saltier; St. James, minor, with a fuller's pole;

St. John, with a cup, and winged serpent flying from it; St. Bartholomew, with a knife; St. Philip, with a long staff, whose upper end is formed into a cross; St. Thomas, with a lance; St. Matthew, with a hatchet; St. Matthias, with a battle-axe; St. James, major, with a pilgrim's staff, and a gourd bottle; St. Simon, with a saw; and St. Jude, with a club.

Apostrophe, in rhetoric, a figure, whereby the orator, in an extraordinary commotion, turns his discourse from the audience, and directs it to some other person, present or absent, living or dead, or to inanimate nature. Thus Cicero, in his oration for Milo, addresses himself to the great patriots who had shed their blood for the public; and calls them to the defence of his client. So the same orator, in his first Catilinarian oration, directs himself to Jupiter, the protector of the city and empire, and beseeches him to repel the parricide, &c.

Apothecary, one who practises the art of pharmacy, or prepares and sells medicines. There are in this profession various degrees, as to employ and extent. Some do little more than make up medicines, according to the prescription of the dispensatory (compiled by the order of the College of Physicians, for their direction) and of those of particular physicians, besides visiting their patients. Others not only prepare almost all kinds of medicines, as well galenical as chemical, but likewise deal in drugs, with all which they supply their brethren in trade; and so become a sort of wholesale dealers, as well as apothecaries.

Apotheosis, in antiquity, an heathen ceremony, whereby their emperors and great men were placed

among the gods. It was one of the doctrines of Pythagoras, which he had borrowed from the Chaldees, that virtuous persons, after their death, were raised into the order of the gods. And hence the ancients deified all the inventors of things useful to mankind, and who had done any important service to the commonwealth.

Apparent *conjunction of the planets*, is when a right line, supposed to be drawn through their centres, passes through the eye of the spectator, and not through the centre of the earth. And, in general, the apparent conjunction of any objects, is when they appear, or are placed in the same right line with the eye.

Apparent Diameter of an object, is not the real length of that diameter, but the angle it subtends at the eye, or under which it appears. This angle diminishes as the distance increases; so that a small object at a small distance may have the same apparent diameter, as a much larger object at a greater distance, provided they subtend the same or equal angles at the eye. If the objects are parallel to each other, their real diameters are, in this case, proportional to their distances. The apparent diameter also varies with the position of the object; and of equal objects at equal distances, those which stand in a position most nearly perpendicular to the line of their direction from the observer, will appear to have the greatest diameter: our idea of the apparent magnitude generally varying nearly as the optic angle.

Appurent Motion, is either that motion which we perceive in a distant body that moves, the eye at the same time being either in motion or at rest;

or that motion which an object at rest seems to have while the eye itself only is in motion. The motions of bodies at a great distance though really moving equally, or passing over equal spaces in equal times, may appear to be very unequal and irregular to the eye, which can only judge of them by the mutation of the angle at the eye. And motions, to be equally visible, or appear equal, must be directly proportional to the distances of the objects moving. Again, very swift motions, as those of the luminaries, may not appear to be any motions at all, but like that of the hour-hand of a clock, on account of the great distance of the objects: and this will always happen, when the space actually passed over in one second of time, is less than about the 14000th part of its distance from the eye; for the hour-hand of a clock, and the stars about the earth, move at the rate of 15 seconds of a degree in one second of time, which is only the 13751 part of the radius or distance from the eye. On the other hand, it is possible for the motion of a body to be so swift, as not to appear any motion at all; as when through the whole space it describes there constantly appears a continued surface or solid as it were generated by the motion of the object, like as when any thing is whirled very swiftly round, describing a ring, &c.

Appeal, in law, the removal of a cause from an inferior to a superior court or judge, when a person thinks himself aggrieved by the sentence of the inferior judge. Appeals lie from all the ordinary courts of justice to the House of Lords.

Appeal, in common law, denotes an accusation by a private subject against another for some heinous

crime; demanding punishment on account of the particular injury suffered, rather than for the offence against the public. The only crime against one's relation, for which an appeal can be brought, is that of killing him, by either murder or manslaughter. But this cannot be brought by every relation; but only by the wife for the death of her husband, or by the heir-male for the death of his ancestor; which heirship was also confined by an ordinance of Henry I. to the four nearest degrees of blood. It is given to the wife on account of the loss of her husband; therefore, if she marry again, before or pending her appeal, it is lost and gone; or, if she marry after judgment, she shall not demand execution. The heir, as was said, must also be heir-male, and such a one as was the next heir by the course of the common law at the time of the killing of the ancestor.

Application, in geometry, is used either for division, for applying one quantity to another, whose areas, but not figures, shall be the same; or, for transferring a given line into a circle, or other figure, so that its end shall be in the perimeter of the figure.

Application of one science to another, is the use made of the principles of the one in perfecting the other: as in the application of algebra and geometry to mechanics; of mechanics to geometry; of geometry and astronomy to geography; of geometry and algebra to natural philosophy.

Apprentice, a learner, pupil, or student. Among traders or manufacturers, an apprentice is one who, upon certain conditions, and particularly that of being instructed in his master's art or trade, engages

to serve his said master for a certain term of years. The following is the form of an indenture, or agreement:

"This indenture witnesseth, That A. B. son of E. F. doth put himself apprentice to C. D. to learn his art; and with him (after the manner of an apprentice) to serve from the day of the date of these presents, until the full end and term of seven years from thence next following, to be fully complete and ended. During which term, the said apprentice his said master faithfully shall serve, his secrets keep, his lawful commandments every where gladly do: he shall do no damage to his said master, nor see to be done of others, but that he to his power shall *let* [i. e. *prevent*]; or forthwith give warning to his said master of the same: he shall not waste the goods of his said master, nor lend them unlawfully to any: he shall not commit fornication, nor contract matrimony, within the said term: he shall not play at cards, dice, tables, or any other unlawful games, whereby his said master may have any loss: with his own goods or others, during the said term, without licence of his said master, he shall neither buy nor sell: he shall not haunt taverns or playhouses, nor absent himself from his said master's service day nor night unlawfully; but in all things as a faithful apprentice, he shall behave himself towards his said master, and all his, during the said term. And the said master, his said apprentice in the same art and mystery which he useth, by the best means that he can, shall teach and instruct, or cause to be taught and instructed, finding unto his said apprentice meat, drink, apparel, lodging, and all other necessaries, during the said

term. And to the true performance of all and every the said covenants and agreements either of the said parties binds himself unto the other by these presents. In witness whereof, the parties above-named to these indentures interchangeably have put their hands and seals the day of in the year of the reign of our sovereign lord of the united kingdom of Great Britain and Ireland, king, &c. and in the year, &c.

This is the regular form in law of all Indentures of Apprenticeship; which must be stamped with the proper duty, as well as with a stamp proportionate to the premium paid, previous to being executed: when other stipulations are made, such as respecting cloathing, boarding, &c. a counter agreement, or bond is usually taken, particularly in indentures of the city of London, where the form is invariably as above.

Appropriation, in canon law, the annexing of an ecclesiastical benefice to the proper and perpetual use of some religious house, bishopric, college, or spiritual person, to enjoy for ever; in the same way as impropriation is the annexing a benefice to the use of a lay person, or corporation; that which is an appropriation in the hands of religious persons, being usually called an impropriation in the hands of the laity. It is computed that there are in England 3845 impropriations.

Appulse, in astronomy, the actual contact of two luminaries, according to some authors; but others describe it as their near approach to each other, so as to be seen, for instance, within the same telescope. The appulses of the planets to the fixed stars have always been very useful to astronomers

as serving to fix and determine the places of the former. The ancients, wanting an easy method of comparing the planets with the ecliptic, which is not visible, had scarce any other way of fixing their situations, but by observing their track among the fixed stars, and marking their appulses to some of those visible points.

April, the fourth month of the year, according to European computation. The word is derived from the Latin *aprilis*, of *aperio*, I open; because in this month the leaves and blossoms open; and the frost, by which the earth is closed, retires. In this month the sun passes through the sign *Taurus*, or the bull: or, to speak more exactly, he enters this sign on the 20th of April, and remains in it till about the 20th of May.

Apses, in astronomy, are the two points in the orbits of planets, where they are at their greatest and least distance from the sun or the earth; the point at the greatest distance being called the higher apsis, and that at the nearest distance the lower apsis.

Aptera, in the Linnæan system, is the seventh order of insects, the distinguishing characteristic of which is, that the beings comprehended in it have no wings. This order includes all kinds of spiders, the lice of different animals, scorpions, crabs, &c.

Aqua-fortis: another name for the nitric acid. This name is applied to denote the common nitrous acid used by workmen.

Aqua-regia: another name for the nitro-muriatic acid.

Aquatinta, a style of engraving, or rather etching, by which an effect is produced similar to that of a drawing in Indian ink. For the performance of

the mechanical part of this art, the principal thing necessary is the following powder: Take equal portions of asphaltum and fine transparent rosin, suppose two ounces, and pound them separately. Then, with a muslin sieve, the rim of which may be formed of part of a chip box of three or four inches diameter, alternately sift thin strata of asphaltum and rosin upon paper, till the powders are exhausted: then pass the mixture through the same sieve upon paper once or twice, so as to render the incorporation complete, and it will be fit for use: or according to some, powdered gum-sandarach alone will answer the purpose. The act of acquatinting is to be performed as follows: The outline being etched upon the plate in the usual manner, the ground is to be softened with a little grease, and then wiped clean with a soft rag, so as only to leave a dimness on the surface of the copper. The powder already described is now to be sifted upon the plate; and the latter, afterward, struck upon its edge, to the end that all the powder not detained by the grease may fall off. This done, the back of the plate is to be held with a hand-vice over a charcoal fire, or lamp, till it becomes so hot as to give pain if touched. The powder which adhered to the grease will now be fixed to the plate. The plate being suffered to cool, take turpentine varnish, mixed with ivory-black, and with this, by means of a hair pencil, cover all the lights, or parts, where it is intended that the paper shall be left perfectly white. The aquafortis is now to be used, as in common etching. Suffer it to remain on the plate five minutes for the lightest tint; after which pour it off, and set the plate on its edge to dry. Then,

with the varnish stop out the light shades, and proceed in the same manner for the several tints that are required, adding the deepest last, when all the fainter are completed and covered. On the fineness of the powder depends that variation in the grain of the tint which is observed in different prints, or in different parts of the same. In Paris, aquatinted designs are printed in colours; for which purpose, several plates must be used, on each of which only the parts that are of the same colour are to be etched.

AQUÆDUCT, a conduit of water, is a construction of stone or timber, built on an uneven ground, to preserve the level of water, and convey it, by a canal, from one place to another. There are aquæducts under ground, and others raised above it supported by arches. The Romans were very magnificent in their aquæducts; they had some that extended 100 miles. Frontinus, a man of consular dignity, and who had the direction of the aquæducts under the emperor Nerva, tells us of nine that emptied themselves through 13,594 pipes, of an inch diameter. Vigenere has observed, that, in the space of 24 hours, Rome received from these aquæducts no less than 500,000 hogsheads of water. The three chief aquæducts now in being, are those of the Aqua Virginea, Aqua Felice, and Aqua Paulina.

ARABIA, a considerable country in Asia: it is bounded on the west by the Red Sea; the isthmus of Suez, Palestine, and Syria; on the north by the Euphrates, on the east by the gulf of Persia, and the sea; and on the south by the straits of Babelmandel, and the sea. Europeans have divided this

country into three parts, named from their supposed qualities, viz. Arabia Deserta; Arabia Petræa, and Arabia Felix. The inhabitants are denominated Arabs, though they are sometimes called "Ishmaelites" as descended from Ishmael, the son of Abraham: they are likewise called "Scenites," signifying people that live in tents: they are also denominated Saracens, and Bedouins, by which terms are understood robbers and wanderers. They derive their subsistence from their flocks, from hunting, and from what they acquire by plunder. They acknowledge no sovereign, but the emirs of their tribes, who are their natural princes, and to whom they pay obedience. They have also scheiks or chiefs, who are persons of an advanced age, whom they often consult, and whose advice they follow. As there are no fixed judges among the Arabs, these scheiks supply their places, and from their determination there is no appeal. The Arabs are Mahometans, and observe circumcision, ablution, &c. &c. Believing in the doctrine of predestination, misfortunes give them but little pain, and they derive but a small portion of pleasure from prosperity, they receive both from the hands of God, to whom they refer every event. They have no habitations but their tents, which, with their flocks, they transport from one country to another, and erect them in those places, where they find the greatest abundance of pasturage and water. They generally stop in vallies, taking always the precaution to place some of their tents on the summit of a neighbouring hill, to prevent their being surprized by different tribes, who are their enemies. Arabia enjoys the prospect of constant verdure, though most

of the trees shed their leaves, and the annual plants wither, and are reproduced, but the interval between the fall of the leaf in one year, and the reproduction of new leaves for the next is so short, that the change is hardly observable.

ARACK, ARRACK, or RACK, is said to be an Indian name for all spirituous liquors. What in Europe is called arack, is procured by distillation from a vegetable juice, called *toddy*, which flows by incision out of a cocoa-tree. The Goa-arack appears to be made from the toddy, and the Batavia-arack from rice and sugar. The manner of making the Goa-arrack is this: a man provides himself with a number of earthen pots, resembling bird-bottles, and with these fastened to his girdle, or in any other tolerably commodious manner, he climbs up the trunk of the cocoa-tree. When he comes to the boughs, he takes out his knife, and, cutting off several of the small knots or buttons, he applies the mouths of the bottles to the wounds, fastening them with bandages. The next morning, he takes off the bottles, the greater part of which are generally filled, and empties the juice into a proper receptacle, where it is left to ferment. When the fermentation is over, and the liquor or wash is become a little tart, all the spirit that it will yield is drawn from it, by the process of distillation. It is remarkable that all savage nations with which we are acquainted, have found means to manufacture ardent spirits of some kind or other.

ARÆOMETER, an instrument wherewith to measure the density or gravity of fluids. The aræometer, or water poise, is usually made of glass; consisting of a round hollow ball, which terminates in a long

slender neck, hermetically sealed at top: there being at first as much quicksilver put into it as will serve to balance, or keep it swimming in an erect position. The stem, or neck, is divided into degrees or parts, which are numbered, to shew, by the depth of its descent into any liquor, the lightness or density of it: for that fluid is heaviest in which it sinks least, and lightest in which it sinks deepest.

ARBITRATION, is where the parties, injuring and injured, submit all matters in dispute, concerning any personal chattles or personal wrong, to the judgment of two or more arbiters or arbitrators; who are to decide the controversy. If these do not agree, it is usual for another person to be called in as umpire, to whose sole judgment it is then referred; or frequently there is only one arbitrator originally appointed. The decision, in any of these cases, is called an award, and thereby the question is as fully determined, and the right transferred or settled, as it could have been by the agreement of the parties, or the judgment of a court of justice.

Arbitration, or Comparison of Exchange, in arithmetic, determines the method of remitting to, or drawing upon, foreign places, in such a manner as shall be most advantageous to the merchant.

Arbitration is either Simple or Compound.

Simple Arbitration respects three places only. Here by comparing the par of arbitration between a first and second place, and between the 1st, and a 3d, the rate between the 2d and 3d, is discovered; from whence a person can judge how to remit, or draw to the most advantage, and to determine what that advantage is.

Compound Arbitration respects the cases in

which the exchanges among three, four, or more places are concerned. A person who knows at what rate he can draw or remit directly, and also has advice of the course of exchange in foreign parts, may trace out a path for circulating his money, through more or fewer of such places, and also in such order as to make a benefit of his skill and credit: and in this lies the great art of such negociations. See EXCHANGE.

ARBOR DIANÆ, or Silver Tree, is the result of an experiment in chemistry, by which the branches and figure of a tree are represented by an amalgam of silver and mercury, which appear to vegetate in a very beautiful manner. Experiment. Take one part of silver, and with it saturate a certain portion of nitrous acid: this is to be diluted with 20 parts of clean water, and poured upon two parts of mercury. After a short time a crystallization will take place, in the shape of a tree, with its branches, &c.

ARCH, a concave building with a mold bent in form of a curve, erected to support some structure. Arches are either circular, elliptical or straight, as they are improperly called by workmen. Elliptical arches consist of a semi-ellipsis, and have commonly a key-stone and imposts, they are usually described by workmen on three centres. Straight arches are those used over doors and windows, and having plain straight edges, both upper and under, which are parallel, but both the ends and joints point towards a centre. The term arch is peculiarly used for the space, between the two piers of a bridge, for the passage of water, vessels, &c.

ARCHBISHOP, the highest dignity in the English

church. It is possessed by the two prelates of Canterbury and York. An archbishop consecrates the inferior diocesans, as those ordain priests and deacons. When invested with his dignity, he is said to be enthroned; a term which probably originated with that period of English history, in which the archbishop of Canterbury had some of the privileges of absolute royalty. At this day, the stile and title of archbishop of Canterbury is as follows: "JOHN, by divine providence, lord archbishop of Canterbury, primate of all England, and metropolitan:" and he is addressed, "your grace;" a form likewise observed toward the metropolitan of York, who is not, however, stiled a primate, and whose jurisdiction, though similar in nature, is considerably less extensive. The archbishop of Canterbury is the first peer of England, and ranks next to the royal family, having precedence of all the great officers of the crown: he claims, by custom, the office of crowning the king and queen. The archbishop of York takes the same precedence of the nobility and officers of state, with the exception of the lord chancellor.

As the district over which a bishop presides is called a diocese, so that under an archbishop, which includes many dioceses, is denominated a province; and thus, in ecclesiastical matters, all England is divided into two provinces. Each archbishop, in his province, exercises authority over the bishops and inferior clergy; and has the power of probates of wills, and of granting letters of administration, as each particular bishop has within his own peculiar diocese: thus the probate of the will of a person who has resided within the diocese

of London, may issue from the bishop of London, or from the archbishop of Canterbury, within whose province London is included. The archbishops have also power to grant licenses and dispensations in all cases formerly carried to the court of Rome; and accordingly issue special licenses to marry, to hold two livings, &c. They have likewise the several courts of ecclesiastical judicature; as court of arches, court of audience, prerogative court, and court of peculiars.

ARCHDEACON, an officer of the church, next in rank below a bishop. Every diocese has one, and the generality more. England contains sixty archdeaconries. These are usually appointed by their diocesans; but their authority is independent. They visit the clergy, and have courts for the punishment of offenders by spiritual censures, and for hearing all other causes that fall within ecclesiastical cognizance.

ARCHERY, the use of the bow and arrow. Since the introduction of gunpowder, the arrow has ceased to be employed as an offensive weapon: but, in former times it was reckoned of the utmost importance to the military strength of this kingdom. The success of the English, at the battles of Cressy and Poictiers, has been attributed to the arrows shot from long-bows. On various occasions, the bowmen gained great victories without the least assistance from the men-at-arms. In the dreadful battle between the English and Scotch, fought at Hamilton in 1402, the rest of the English army were but spectators of the valour and victory of their archers; and a circumstance occurred which sufficiently proves the power of this instrument of death. The

earl of Douglas, enraged to see his men falling thick around him beneath showers of arrows, and trusting to the impenetrableness of his armour, the manufacturing of which, it is said, had employed three years, accompanied by about eighty lords, knights, and gentlemen, in complete armour, rushed forward, and attacked the English archers sword in hand: but the arrows of the latter were so sharp and strong, and discharged with so much force, that no armour could repel them. The earl, after receiving five wounds, was made a prisoner, and all his brave companions, who escaped death, shared his fate. In those days it was said, "The might of the realme of England standyth upon archers;" and this being the case, we cannot be surprised at the attention at that time paid by the government to archery. Among instances of this attention, of which the knowledge has reached us, it appears, that, in the year 1482, planting of yew trees in church-yards was encouraged: the branches of that tree making the best bows, and such bows bearing a high price. In saying, however, that yew-trees were encouraged in church-yards for this purpose, it is by no means intended to suggest, that this was the first reason of their introduction into those places (See *Yew*): the government only made use of a practice previously established. By the regulations prescribed in the statute-book for the practice of archery, it appears that those who had arrived at maturity, were prohibited from shooting at any mark that was not distant 220 yards. As an amusement, archery is still practised in Britain. There are several societies of archers in England, the chief of which are the *Woodmen of*

Arden, and the *Toxophilites.* In Scotland, there is a *Royal Company of Archers;* the members of which annually shoot for prizes given by the king and several corporate towns.

ARCHITECT, a term compounded of two Greek words, and literally signifying a *principal workman.* By this name, we understand, professionally, a man whose capacity and knowledge render him worthy of being confided in by persons who wish to build: in a more general sense, we mean one who is skilful in the theory and practice of architecture. A good architect is not an ordinary man; for, without reckoning the general literature which he has acquired, as the *belles lettres*, history, &c. he should be a proficient in the art of designing, as the soul of all his productions; in the mathematics, as the only means of regulating the judgment, and guiding the hand in its different operations; in masonry, as the basis of all the manual part of building; in perspective, to be acquainted with the several points of sight, and the *plus-valeurs*, which he is obliged to give to the decorations loftily situated. He must join to these talents the natural gifts of sound understanding, taste, discernment, and imagination. On employing an architect, he is required to present a design, and an estimate of the expence at which that design can be carried into execution. A general complaint against architects is, that the sum is eventually found to exceed, in a considerable degree, the estimate which they have thus given. It is said, that in some parts of Greece there was a law, which obliged architects to finish their undertakings at their own charge, if the expence of the building exceeded the sum at which

they had fixed it; and the justice of such a law is obvious, when it is considered, that, owing to this species of chicanery, many edifices have remained unfinished and useless for want of money: or, being completed have caused the ruin of families. An architect ought not to be suffered to gain reputation by risking the destruction of his employers. It is no unusual thing for modern architects to publish designs of different kinds of buildings, which are a sort of guide to gentlemen and others in explaining their wishes when they set about building. We have seen a very beautiful work of this kind by Mr. James Randall, a young man of distinguished excellence in this art.

Architecture, the science of building in an elegant and graceful manner. We speak of military architecture, as in the construction of fortifications; and of naval architecture, when we mean the building of ships; but, these exceptions apart, we always intend, by the term architecture, something very different from the mere art of building; and accordingly, an architect and a builder are persons of separate professions. Architecture is always an indulgence of taste: but taste has suggested to nations, unacquainted with each other, very dissimilar notions of beauty. There exist at present several stiles of architecture, that appear to be radically distinct from each other. One stile, though much varied, presents itself in India, Africa, and the ancient fabrics of Europe: but between the architecture of Hindostan and that of China no affinity is discoverable: and still less does that of Greece bear any comparison with the rest. Respecting the origin of this latter, which is that at present admired in Europe, history carries us no

farther than to that period (itself remote) when Egypt was the seat of empire and of arts; and even there, the information is so obscure, that we can by no means decide upon the degree of excellence to which it was at that time carried, but are forced to allow to Greece a considerable share of the praise that we bestowed upon the art of which she undoubtedly learned the rudiments, at least, in Egypt. Rome, the next heir of civil glory, studiously copied the merits of her parent; and, from Rome, all Europe has in this, as in most other instances, received its lessons. To Greece we are indebted for the three principal orders of architecture, the Doric, the Ionic, and the Corinthian; Rome added two others, both formed out of the former, the Tuscan and the Composite. Each of these has a particular expression; so that a building, or different parts of a building, may be rude, solid, neat, delicate, or gay, accordingly as the Tuscan, the Doric, the Ionic, the Corinthian, or the Composite are employed. The columns of these several orders are easily distinguishable to common observers, by reason of the ornaments that are peculiar to their capitals; but the scientific difference consists in their proportions. We shall now proceed to describe these orders more particularly, observing that every order consists of three divisions, viz. the *pedestal*, the *column*, and the *entablature*. fig. 9. The *pedestal* consists of a base or plinth, the dado, and the cornice, and it is used, in certain cases, to elevate the column to a necessary height. The *column* includes likewise a base, a shaft and a capital, and the *entablature* consists of an architrave, a frize, and a cornice.

The plinth of a pedestal, takes its name from the

Greek, of a brick or flat stone on which columns in the early state of architecture are supposed to have stood. The dado, or, the die, as it is sometimes called from its cubical form, and the cornice takes its name from corona, top or summit.

The base of a column is its foundation; the shaft is comprehended between the capital and the base, and is so denominated from caput, the head; the abacus is the upper member of the column, and serves as a covering.

The architrave is so called from two Greek words signifying "principal beam," because the architrave is the chief support of the whole entablature. The frize is a large flat face, which is sometimes enriched with figures. The cornice crowns the whole.

The parts of a complete order, excepting the dado and shaft, are composed of small members; as the *torus* or swell above the plinth: the *astragal*, a round member which terminates the extremities of the column: the *scotia*, a hollow moulding used in bases, so called on account of the strong shadow which its concavity produces.

The five orders already enumerated are distinguished from each other by the column with its base and capital, and by the entablature. To begin with the most simple: the *Tuscan*, fig. 10, is characterized by its simplicity and strength. It is devoid of all ornament. The *Doric*, fig. 11, is enlivened with ornaments in the frize and capital. The *Ionic* fig. 12, is ornamented with the volute scroll, or spiral horn. Its ornaments are in a style of composition between the plainness of the Doric, and the richness of the Corinthian. The *Corinthian* order, fig. 13,

is known by its capital being adorned with two sorts of leaves; between these rise little stalks, of which the volutes that support the highest part of the capital, are formed. The *Composite*, fig. 14. is nearly the same as the Corinthian, with an addition of the Ionic volute.

Each column has its particular base; the Tuscan is the most simple, having only a torus, and plinth; the Doric has an astragal more than the Tuscan. To the Ionic base the torus is larger, on a double scotia, with two astragals between. The Corinthian base has two toruses, two scotias, and two astragals. The Composite base has one astragal less than the Corinthian. See BALUSTERS, and also GOTHIC ARCHITECTURE.

ARCHITRAVES. See ARCHITECTURE.

ARGILS. See ALUMINE.

ARCHIVES, ancient records, or charters which contain titles, pretensions, privileges, and prerogatives of a family, city, or kingdom.

ARCHON, a Greek word, which literally signifies a commander. This word is applied by some authors to divers offices, both civil and religious, in the eastern or the Grecian empire. But it is more generally confined to the chief magistrate of the city and commonwealth of Athens. After the Athenians had abolished monarchy, they created archons, who were obliged to render an account of their administration to the people. These were at first chosen for life, and made hereditary: but a perpetual magistracy seemed to this free people too lively an image of royalty; they therefore reduced the term of an archon's administration to ten years, and ere long to one year. There were nine archons, one of

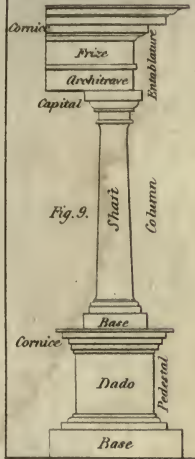


Fig.9.

Fig.10.

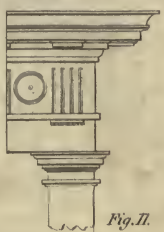


Fig.11.

Fig.12.

Tuscan.

Doric.

Ionic.

Cooper sculp

Published by J.Harris S.Pauls C.Yd 18a

whom, called Polemarch, was minister of war, but nothing more: they were all debarred from commanding the armies of the republic. Thus their charge was only an honorary function, so little calculated to excite the envy of the people, that they never aspired eagerly after this dignity, from which they were excluded by the laws of Solon.

ARCHIPELAGO, a sea interrupted by a great number of islands. Thus the word denotes a considerable part of the Mediterranean sea, having Romania in the north: Natolia on the east, Macedonia, Livadia, and the Morea on the west, and the isle of Candia on the south. It is partly in Europe and partly in Asia, containing the islands of Rhodes, Negropont, Lemnos, Samos, Patmos, &c.

ARCTIC. Northern; lying under the arctos, or bear. In astronomy, the arctic or north pole, is that which is raised above our horizon, and is nearly pointed out by the last star in the tail of Ursa minor. The arctic circle is a less circle of the sphere parallel to the equator, and distant 23° 28′ from the north pole. This and the antarctic are often called polar circles, and may be conceived to be described by the motion of the poles of the ecliptic round those of the equator.

AREA. See MENSURATION.

AREOMETER. See HYDROMETER.

AREOPAGUS, or ARÆOPAGUS, a sovereign tribunal at Athens, famous for the justice and impartiality of its decrees, to which the gods themselves are said to have submitted their differences. It was in the town, on a rock or hill opposite to the citadel. The word signifies strictly, rock of Mars; Mr.

Spon, when at Athens, found some remains of the areopagus still existing in the middle of the temple of Theseus, which was heretofore in the middle of the city, but is now without the walls. The foundation of the areopagus is a semicircle, with an esplanade of 140 paces round it, which properly made the hall of the areopagus. There is a tribunal cut in the middle of a rock, with seats on each side of it, where the areopagites sat, exposed to the open air.

ARETHUSA, in mythology, the daughter of Oceanus and one of Diana's attendants. As she was returned one day from hunting, she sat near the Alpheus, and bathed in the stream. The god of the river was enamoured with her, and pursued her over the country, when Arethusa offered up her prayers to Diana for protection, who changed her into a fountain.

ARGENT, silver in heraldry, the metal of which all white fields or charges are supposed to consist. Argent of itself is used to signify purity, innocence, beauty and gentleness.

ARGENTUM. Silver. Of a whitish colour not tarnished by the air, hard and tenacious, sonorous, exceedingly malleable, and ductile, specific gravity before hammering 10·478: melting when perfectly red hot, and its brilliancy much increased. Soluble in nitric acid; giving no colour to the solution, and capable of being precipitated from it by copper, iron, or zinc. See SILVER.

ARGO, in antiquity, a ship or vessel celebrated among the poets; being that wherein the Argonauts, of whom Jason was the chief, made their expedition in quest of the golden fleece. Sir Isaac

Newton thinks that this expedition was really an embassy sent by the Greeks, during the intestine divisions of Egypt, in the reign of Amenophis, to persuade the nations upon the coasts of the Euxine and Mediterranean seas to take that opportunity of shaking off the yoke of Egypt, which Sesostris had laid upon them: and that fetching the golden fleece was only a pretence to cover their true design.

ARGONAUTA, a curious shell fish, of which there are several species, the Argonauta Nautilus inhabits the Mediterranean and Indian oceans, and was supposed in former ages to have taught mankind the first use of sails. When the little animal means to sail, it discharges a quantity of water, by which it was made heavier than sea water, and rising to the surface erects its arms, and throws out a membrane between them; by this contrivance it is driven forwards like a vessel under sail, hanging two of its arms over the shell to serve as oars or a rudder.

ARGUS, in mythology, was said to have a hundred eyes, fifty of which were always open. Mercury cut off his head, and Juno, grieved at his death, to make him some amends turned him into a peacock, and scattered his hundred eyes about the tail of the bird.

ARIADNE, in mythology, daughter of Minos, king of Crete, fell in love with Theseus, who was shut up in the labyrinth to be devoured by the Minotaur. She gave him a clue of thread, by which he extricated himself from the different windings of his confinement. He escaped and married Ariadne, and then deserted her, which so affected her mind

that she hanged herself. Bacchus had given her a crown of seven stars, which after her death was made into a constellation.

Arians, professors of those religious opinions which are comprehended under the term *arianism*, or the doctrines of Arius, a presbyter of the church of Alexandria in the fourth century. Arius denied the consubstantiality, that is to say, the sameness of the substance of the Son with the Father, in the trinity, and pretended that the Son was a mere creature produced in the course of time. The Arians allow that the Son is the Word; but maintain that the Word did not exist externally: they allow it only a priority of existence to all other creatures. They advance, moreover, that Christ had nothing human in his composition, except his body, in which the Word was rendered visible, that Word operating in Christ as the soul does in ourselves. The Arian, therefore, appears to differ from the Socinian in this: that, whereas the latter supposes Jesus to have been a natural man, acting under the supernatural direction of the Deity, while the former considers the same person as a human form, filled with a superior spirit. The Arian differs, consequently, from the Trinitarian less than the Socinian, in as much as he denies only the *equality* of the second person.

Aries, a constellation of fixed stars in the Ram. It is the first of the 12 signs in the zodiac, and consists of 66 stars.

Aristocracy, an hereditary government, composed of the nobles, or superior citizens of a country: such was the government of Venice.

Aristotelians. See Peripatetics.

ARITHMETIC is the science of numbers, and it teaches the method of computing by them. The Greeks made use of the letters of their alphabet to represent their numbers. The Romans followed the same method, and besides characters for each rank of classes, they introduced others for five, fifty, five hundred, &c. As for example

One.	Five.	Ten.	Fifty.	One hundred.
I	V	X	L	C

Five hundred.	A thousand.
D	M

Now it is evident that with these seven letters any number may be represented, by repetition and combination, thus XXX stand for three tens or thirty: CCX for two hundred and ten, and so on.

The general rule with regard to the addition and subtraction of these letters is this: when a numeral letter is placed *after*, or on the right hand of one of greater value, their values are to be added, thus XVI stand for sixteen, and MDCCCXI for the date of the present year 1811. But when a numeral letter is placed *before*, or on the left hand of one of greater value, the value of the less is taken from that of the greater, thus IV stand for five less one, or four: XC one hundred less ten, or ninety.

The method of notation that we now use is said to be taken from the Arabians, and the characters by which all the operations of common arithmetic are performed are these, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0. The first nine are called significant figures, which when placed singly denote the simple numbers subjoined to the characters; but when several significant numbers are placed together the first or right hand figure only is to be taken

for its simple value: the second signifies so many tens, the third so many hundreds, and so on: thus in the number 55555 the right hand figure stands for five only; the next stands for fifty; the third for five hundred; the fourth for five thousand, and the fifth for fifty thousand, and so on. The cypher in any place denotes the want of a number in that place, thus 60 denote six tens, and no simple number; 503 denote five hundred and three, there being no significant figure in the ten's place.

The whole art of arithmetic is comprehended in various modifications of the four rules, Addition; Subtraction; Multiplication; and Division. In each of these rules we shall give an example or two, and refer the reader to any of the common school books for farther illustrations and examples: that by Joyce is the most simple and best adapted for learners, and that by Bonycastle, is particularly useful to teachers as giving explanations of the theory and principles on which the science is founded.

Addition is the operation by which several numbers or sums are collected into one total:

	£.	£.	s.	d.
Examples	487	54	14	6 ½
	395	39	19	0 ¾
	648	99	0	11 ½
	432	5	5	4
Total	1962	£198	19	10¾

Subtraction is the operation by which we take a

less number, or sum, from a greater, to find their difference: Examples.

	lb.	£.	s.	d.
	5764	875	6	$9\frac{1}{2}$
	3982	493	12	$4\frac{3}{4}$
Difference	1782	£. 381	14	$4\frac{3}{4}$

Multiplication is a compendious mode of addition, and teacheth to find the amount of any given number by repeating it any proposed number of times: Examples.

	Cwt.	£.	s.	d.	
	4765	325	4	$6\frac{1}{4}$	$\times 25 = 5 \times 5$
	56			5	
	28590	1626	2	$7\frac{1}{4}$	
	23825			5	
Product	266840	£. 8130	13	$0\frac{1}{2}$	

Division, teacheth to find how often one number is contained in another of the same denomination, and thereby performs the work of many subtractions: Examples.

		£.	s.	d.
	8)7649	4)874	16	3
Quotient.	956—1	£. 218	14	$0\frac{3}{4}$

There have been various mechanical helps to the attainment of the early rules in arithmetic, we shall insert the following tables, with an explanation, which have been regarded as a sort of toy or puzzle.

(No. 1)	(No. 2)	(No. 3)	(No. 4)	(No. 5)	(No. 6)
1	2	4	8	16	32
3	3	5	9	17	33
5	6	6	10	18	34
7	7	7	11	19	35
9	10	12	12	20	36
11	11	13	13	21	37
13	14	14	14	22	38
15	15	15	15	23	39
17	18	20	24	24	40
19	19	21	25	25	41
21	22	22	26	26	42
23	23	23	27	27	43
25	26	28	28	28	44
27	27	29	29	29	45
29	30	30	30	30	46
31	31	31	31	31	47
33	34	36	40	48	48
35	35	37	41	49	49
37	38	38	42	50	50
39	39	39	43	51	51
41	42	44	44	52	52
43	43	45	45	53	53
45	46	46	46	54	54
47	47	47	47	55	55
49	50	52	56	56	56
51	51	53	57	57	57
53	54	54	58	58	58
55	55	55	59	59	59
57	58	60	60	60	60
59	59	61	61	61	61
61	62	62	62	62	62
(No. 1)	(No. 2)	(No. 3)	(No. 4)	(No. 5)	(No. 6)

These columns of figures are to be written or pasted on slips of card-board, ivory, bone, &c;

which are to be given into the hands of a person to fix upon a number, and having done so he returns the cards, and *on which the number fixed on is found*, and his friend tells him instantly, by *addition* what number he has selected; this is done by adding together the top figures on the cards returned.

Examples. (1.) Suppose he fix on 18, then he will return the cards, No. 2, and 5, because 18 will be found on those only, and the top figures of those cards are 2 and 16, which added together give 18.

(2.) Suppose he fix on 41, then he will return No. 1, 4 and 6, and the top figures in these are 1, 8 and 32 =41.

(3.) Suppose he fix on 58, then he will return No. 2, 4, 5 and 6, and the upper figures on these are 2, 8, 16, 32=58.

For subtraction, the method is equally obvious; and in this case, the cards are to be returned which have *not* the number, and the upper figures added together and their sum, subtracted from 63 (which is the sum of the top figures on all the cards), will give the number fixed on.

Examples. (1.) Suppose a person fix on 41, as above, then for an exercise in subtraction he will return the cards, No. 2, 3 and 5, the top figures of which are 2, 4, 16=22, and 22 taken from 63 leave 41.

(2.) Suppose he fix on 51, then he will return No. 3 and 4, the top figures of these are 4 and 8=12, and 12 from 63 gives 51, and so of all other numbers.

ARMADA, a Spanish term, signifying a fleet of men-of-war. The armada, which was called by the proud Spaniards *invincible*, and which was in-

tended to destroy the liberties of this country, during the reign of the illustrious Elizabeth, was scattered by the elements and almost annihilated by the English fleet, on the 30th July 1588. On which occasion a medal was struck with the motto, —"Afflavit Deus, et dissipantur,"—in grateful memory of the interposition of Heaven in our favour.

ARMILLARY SPHERE, an artificial sphere composed of a number of circles put together in their natural order to assist the imagination in conceiving of the motions of the celestial bodies. This sphere revolves on its axis with a silvered horizon, which is divided into degrees, and moveable every way upon a brass supporter. The other parts are the equinoctial, zodiac, meridian, tropic and polar circles.

ARMINIANS, followers of Arminius, a sect of Christians which arose in Holland, about the beginning of the 17th century, and separated themselves from the Calvinists. The tenet of Arminius, which expresses, that the predestination of the Almighty relating to the salvation of mankind, consisted simply in a decree to justify and save the believers in Christ, they are said to have abandoned; Episcopus having taught that God makes choice of the faithful, not by predestination, but according to their actual belief. They consider the doctrine of the trinity as unessential to salvation; and the worship of the holy spirit as unordained by any precept of the scriptures. Their great principle is, that all sects of christians ought to be tolerated; because, say they, it has never yet been decided, which it is that has embraced the truest religion, and most conformable to the word of God.

ARMS, OR ARMORIAL BEARINGS. See HERALDRY.

ARMONICA. See HARMONICA.

ARMOUR, a defensive habit, wherewith to cover and secure the body, from the effects of any offensive weapon. In ancient statutes this is frequently called harness. A complete armour anciently consisted of a casque or helm, a gorget, cuirass, gauntlets, tasses, brassets, cuishes, and covers for the legs, to which the spurs were fastened. This they called armour cap-a-pie; and was worn by cavaliers and men at arms. The infantry had only part of it, viz. a pot or head-piece, a cuirass and tasses; but all of them made light. Lastly, the horses themselves had their armour, wherewith to cover the head and neck. Of all this furniture of war, scarcely any thing is now retained except the cuirass; the gorget or neck-piece, worn by officers, being at present only a badge of honour and of no defence.

AROMA, that principle in plants, to which they owe their smell.

ARRAIGNMENT, in law, the arraigning or setting a thing in order, as a person is said to arraign a writ of *novel disseisin*, who prepares and fits it for trial. The term is most properly used to call a person to answer in form of law upon an indictment, &c. When brought to the bar, the criminal is called upon by name to hold up his hand; which, though it may seem a trifling circumstance, yet it is of this importance, that by holding up of his hand 'constat 'de persona,' and he owns himself to be of that name by which he is called. However, it is not an indispensable ceremony; for, being calculated merely for the purpose of identifying the person, any other acknowledgment will answer the purpose

as well: therefore, if the prisoner obstinately and contemptuously refuses to hold up his hand, but confesses he is the person named, it is fully sufficient. Then the indictment is to be read to him distinctly in the English tongue (which was law, even while all other proceedings were in Latin,) that he may fully understand his charge. After which it is to be demanded of him, whether he be guilty of the crime whereof he stands indicted, or not guilty? When a criminal is arraigned, he either stands mute, or confesses the fact, or else he pleads to the indictment.—1. If he says nothing, the court ought 'ex officio' to impannel a jury to enquire, whether he stands obstinately mute, or whether he be dumb 'ex visitatione Dei.' If the latter appears to be the case, the judges of the court (who are to be of counsel for the prisoner, and to see that he hath law and justice) shall proceed to the trial, and examine all points as if he had pleaded not guilty. But whether judgment of death can be given against such a prisoner, who hath never pleaded, and can say nothing in arrest of judgment, is a point yet undetermined.—If he be found to be obstinately mute (which a prisoner hath been held to be that had cut out his own tongue,) then if he be on an indictment of high treason, it hath long been clearly settled, that standing mute is equivalent to a conviction, and he shall receive the same judgment and execution.—The English judgment of penance for standing mute was, till of late years, a species of torture, effected by loading the body of the prisoner with heavy weights, till a plea of some kind was drawn from him; but the doubts entertained as to its legality, and the repugnance of its

theory to the humanity of the laws of England, concurred to require a legislative abolition of this cruel process, and a restitution of the ancient common law; whereby the standing mute in felony, as well as in treason and in trespass, amounted to a confession of the charge.—2. If the prisoner make a simple and plain confession, the court hath nothing to do, but to award judgment: but it is usually very backward in receiving, and recording such confession, out of tenderness to the life of the subject; and will generally advise the prisoner to retract it, and,—3. Plead to the indictment, in order that he may be tried.

Arrest, in common law, the apprehending or restraining of one's person, in execution of the command of some court, or officer of justice. The word arrest is French, and is used in that language for a decree or determination of a cause debated to and fro: in which sense it seems derived from placitum, the pleasure of the court. Hence, when a person is legally stopped, apprehended, and restrained of his liberty, for debt, &c. he is said to be arrested, or put under an arrest; which is the beginning of imprisonment. None shall be arrested for debt, trespass, &c. or other cause of action, but by virtue of a precept or commandment out of some court: but for treason, felony, or breach of the peace, a man may arrest without precept or warrant.

Arrest of Judgment, in law, the assigning just reason, why judgment should not pass; as, want of notice of the trial; a material defect in the pleading; when the record differs from the deed impleaded; when persons are misnamed; where more

is given by the verdict than is laid in the declaration, &c. This may be done either in criminal or civil cases.

ARROW, a light shaft, or rod, pointed at one end, and feathered at the other, intended as a weapon of offence. See *Archery*. Arrow-makers were called *fletchers* (from *flêche*, the French word for *arrow*), and thus has originated an English surname.

ARSENIC, one of the brittle metals, is a most active and dangerous poison, but is nevertheless used, in very small quantities, as a valuable medicine. If a quantity is swallowed large enough to endanger life, let an emetic be instantly given, and then large quantities of hepar sulphuris dissolved in water be taken: this, a scruple at a time, given with emetics, milk, castor oil, &c. may prevent the dire effects that would otherwise follow the dose of poison. See CHEMISTRY.

ARSON, is house burning, and burning the house of another is felony. If a servant through carelessness, shall set fire to a house, he or she shall forfeit 100*l*., or be committed to hard labour in prison for 18 months.

ART and PART, a phrase used in Scotland: when any one is charged with a crime, they say, he is art and part, in committing the same, that is, he was concerned both in the contrivance and execution of it.

ARTERY, a blood vessel, which proceeds from the heart, and gradually becomes less in diameter, the farther it goes; but it gives out numberless ramifications in its course. Arteries carry the blood from the heart, to every part of the body, for the preservation of life, for nutrition, generation of heat, and the secre-

tion of the different fluids. The action of the arteries, called the pulse, corresponds with that of the heart.

ARTICLE, in grammar, a particle in most languages, that serves to express the cases and genders of nouns. *The* is a definite article in English and *a* the indefinite article.

ARTILLERY, a French term, originally applied to *archery*, but, since the introduction of gunpowder, used for cannon, and all military stores connected with those engines of war.

ARTILLERY COMPANY, originally a company of archers; a regiment consisting of four battalions, whose line of service is that of working mortars, and all pieces of ordnance, springing mines, &c. also a band of infantry of 600 men, making part of the militia, or city-guard of London: anciently, the artillery-company was a band of *archers*.

ARTILLERY FLYING, a modern invention, of the utmost value in the operations of war. A small cannon, as a six pounder, is slung between two horses; and these tractable animals are accustomed by practice, to stand while the piece is discharged between their heads. Beside the originality of the thought, the merit of this contrivance consists in the disposition of the leathern gear, by which the horses are saved from the shock attendant upon the recoil of the cannon. The great utility of this invention is obvious. The heavy artillery has always been an extreme incumbrance upon the march of an army; to bring it to the place of an action, is a work of time, as well as labour; and in case of precipitate retreat, it can seldom be carried away: the *flying artillery* keeps pace with the most rapid

march of the troops; can be galloped from one part of the field to another; and, being harnessed during the whole action, retires as swiftly as the cavalry itself. It is said to have been the invention of a professor in the university of Edinburgh.

ARUNDELIAN MARBLES, called also the Parian Chronicle, are ancient stones, on which is inscribed a chronicle of the city of Athens, supposed to have been engraven in capital letters, in the island of Paros, 264 years before Christ. They take their name from the earl of Arundel, who procured them from the east, or from his grandson, who presented them to the University of Oxford. The authenticity of these marbles has led to a controversy between Mr. Robertson, who in his Parian Chronicle questioned it, and Mr. Hewlett, who defended it in a Vindication of the Authenticity of the Parian Chronicle.

As, a weight used by the ancients, consisting of 12 ounces: it was also used as a coin, and as an integer divided into 12 parts.

ASCENSION, *Right*, of the sun, or of a star, is that degree of the equinoctial, accounted from the beginning of Aries, which rises with them, in a right sphere.—Or, Right Ascension is that point of the equinoctial, counted as before, which comes to the meridian with the sun or star, or other point of the heavens. And the reason of thus referring it to the meridian, is, because this is always at right angles to the equinoctial; whereas the horizon is so only, in a right or direct sphere.

ASCENSION, *Oblique*, is an arc of the equator intercepted between the first point of Aries, and that point of the equator which rises together with

the star, &c. in an oblique sphere.—The Oblique Ascension is counted from the west to east; and is greater or less, according to the various obliquity of the sphere.

Ascensional Difference, is the difference between the right and oblique ascension of the same point on the surface of the sphere.

Asia, the most extensive, the most anciently-civilized, and, perhaps, the finest quarter, or grand division, of the globe. It lies under all latitudes; the Greater Tartary forming part of the northernmost region of the Russian empire, and the large island of New Holland, extending farther toward the south pole than the corresponding extremities of either Africa or America. Mankind, in this part of the world, have a very peculiar character, deducible from the primitive establishment of patriarchal or parental authority.

This vast country lies to the eastward of Europe, commencing at the isthmus of Suez, divided from Africa by the Red Sea, and extending on the side of the ocean to the Frozen Sea. The continent, in a political point of view, may be divided into six parts, 1. Turkey; 2. Asiatic Turkey; 3. Arabia; 4. Persia; 5. India; and 6. China: the islands are innumerable.

Great Tartary occupies more than half Asia, and makes part of the Russian empire. Through the greater part of its extent, it is uncultivated and a desert. The northern part is covered with forests abounding with white bears, ermines, and martins, the peltry of which forms the staple commerce of the country. It is called Great Tartary, to distinguish it from the Lesser, which is in Europe.

Great Tartary is itself divided into three districts, known by the additional names of Russian, Chinese, and Independent. Russian Tartary, also called Asiatic Russia, is separated into three governments, which take the name of their several capitals, Astracan, Casan, and Tobolski or Siberia. This latter forms the northern part of Asia, and runs along the northern sea. The coldness of its climate is extreme; but its soil is by no means so desolate as is vulgarly supposed. Turkey in Asia comprehends five provinces. Arabia is an extensive peninsula, distinguished into three parts: Petrea, or the Stony; Deserta, or the Desert; and Felix, or the Happy. The capital of Persia is Ispahan, one of the largest and finest cities in the world. In it are assembled the most admirable productions of Asia and Europe; and its streets are crowded with merchants of all nations and religions, drawn thither by its extensive commerce. India contains four principal countries: 1. The Mogul Empire; 2. The Western Peninsula, on this side of the Ganges, in which the English have acquired an immense territory; 3. The Eastern Peninsula, beyond the Ganges; and, 4. The Islands of Sunda, called the East Indies. China is the largest, the richest, the most populous, the most peaceful, and the most flourishing empire in the world: alone, it contains more inhabitants than all Europe. Among the islands of Asia, there are vast empires, not to mention that of Japan, scarcely known to us but by name.

The most considerable rivers in this venerable portion of the globe, are the Obi, the Lena, and the Yenisei, which in the north, run from the southward into the Frozen-sea; the Ki-ang and the

Ho-ang, in the east; and the Tigris, the Euphrates, the Indus, and the Ganges in the south. Asia is traversed in the direction of west to east, by two principal chains of mountains: the first, Mount Taurus or Caucasus, and the second composed of Poyas Noss. It abounds with corn, wine, rice, and almost every species of delicious fruit; it exports perfumes, coffee, tea, spices, calicos, silks, painted linens, cloths of tree-bark, beautiful porcelain, and the diamonds, gold, silver, and copper of its mines. Its more peculiar animals are, the lion, tiger, elephant, rhinoceros, camel, crocodile, and tortoise. Mahometanism is the prevailing religion through all the interior of Asia; the rest, with the exception of the countries in which Europeans have established themselves, have not yet emerged from the rudeness of idolatry. All the sovereigns of this quarter of the globe reign with absolute authority, and are revered by their subjects; to inspire whom with respect, they maintain the innocent and commendable policy of being seldom seen.

Aspect, in astronomy, denotes the situation of the planets and stars, with respect to each other. There are five different aspects. 1. Sextile aspect is when the planets or stars are 60° distant, and marked thus ⚹. 2. The quartile, or quadrate, when they are 90° distant, marked □. 3. Trine, when 120° distant, marked △. 4. Opposition, when 180° distant, marked ☍. And, 5. Conjunction, when both in the same degree, marked ☌. Kepler, who added eight new ones, defines aspect to be the angle formed by the rays of two stars, meeting on the earth, whereby their good or bad

influence is measured; for it is to be observed, that these aspects being first introduced by astrologers, were distinguished into benign, malignant, and indifferent; the quartile and opposition being accounted malign; the trine and sextile, benign or friendly; and the conjunction indifferent.

Assassin, one who kills another, not in open combat, but privately, or suddenly. The name is generally restrained to murderers of princes or other political characters; or, to speak perhaps more explicitly, to where the murder is committed from some sentiment of hatred, but in a private and dastardly manner. We do not call an ordinary murderer, who has nothing in view but plunder, an Assassin. Some attribute the origin of this word to a prince of the family of the *Arsacidæ*, or *Assassins*, who brought up a number of young men to the employment of murdering the princes with whom he was at enmity; but M. Volney says, that in the vulgar Arabic, the word *Hassassin* signifies "Robbers of the night," persons who "lie in ambush to kill;" and is always understood in this sense in Cairo and in Syria.

Assaying, in metallurgy, or the docimastic art, is used to express those chemical operations which are made in small to ascertain the quantity of metal contained in ores, or to discover the value or purity of any mass of gold, silver, or any other metal. This mode of examination differs from analysis in being principally concerned about only one of the ingredients in the ore or alloy, whereas the object of the latter is to ascertain the quantity and proportion of every substance in the mass to which it is applied. Thus, in the assay of copper ores, the

object is to know the proportion of pure metallic copper which a given weight of the ore can be made to yield, disregarding all the other component parts, such as the sulphur, iron, silex, &c. or, rather, confounding them together under the general term impurities. Thus also in the assay of a mixture of gold, or of gold and silver, with copper, lead, tin, or any other of the inferior metals, the whole attention is directed to the proportion of fine, or of gold and silver contained in the alloy.

Assay-Master, an officer, under certain corporations, entrusted with the care of making true touch, or assay, of the gold and silver brought to him; and giving a just report of the goodness or badness thereof. Such is the assay-master of the mint in the Tower, called also assayer of the king. The assay-master of the goldsmiths' company is a sort of assistant-warden, called also a touch-warden, appointed to survey, assay, and mark all the silver work, &c. committed to him.

Assets, in trade, signifies goods or property enough to answer all demands made upon them.

Assignment, in law, the act of assigning or transferring the interest or property a man has in a thing; or of appointing and setting over a right to to another. Bills of Exchange are assigned over by indorsement.

Assimilation, is that process in animal economy by which the different ingredients of the blood are made parts of the various organs of the body: thus the stomach converts the food into chyme; the intestines change the chyme into chyle, and the blood vessels convert the chyle into blood. The healing of every fractured bone, and of every

wound in the body, is a proof of the existence, and an instance of the action of assimilation.

Assise, a periodical court, held in the several districts of the united kingdom of Great Britain and Ireland, for the decision of all writs and processes, whether civil or criminal, by judge and jury. An assize is a *sitting*, or session; and the other senses in which the word is used, apply to the results of such sitting, or session. Before assises or judges of assise, at least, were established, the business was done by the justices in eyre, who, in more early times, made their circuit once in seven years, but were directed by *Magna Charta*, to be sent into every county once a year, to try certain actions, the most difficult of which they were to return into the court of Common Pleas, to be there determined. At present, all the counties of England are divided into six circuits; and two judges, by the king's commission, are assigned to each, who hold their assises twice a year, except in the four northern counties, which they visit but once. The evils of septennial assises must have been dreadful; those of the yearly ones just mentioned are deplorable; and even half-yearly trials are a stigma on the British system of jurisprudence: for, setting humanity totally out of the question, prisons are but nurseries of crimes. The judges upon their circuits sit by five several authorities: 1. The commission of the peace, in each county; 2. That of *oyer* and *terminer* (*hearing* and *determining*), directed to them and many other gentlemen of the county, by which they are empowered to try treasons, felonies, &c. and this is the largest commission they have; 3. That of general gaol-delivery, directed to the judges and the

clerk of the assise associate, which gives them the power of trying every prisoner in the gaol, committed for any offence whatever, but none but prisoners in the gaol; so that, one way or other, they rid the gaol of all the prisoners it contains; 4. That of assise, directed to the judges and clerk of assise, to take assises, that is, to take the verdict of a peculiar species of jury called an assise, summoned for the trial of landed disputes. The other authority is, 5. That of *nisi prius*, which is a consequence of the commission of assise. All justices of peace are bound to be present at the assises, and sheriffs are also to give their attendance on the judges, on pain of fine.

Association of *ideas*, is where two or more ideas constantly and immediately follow one another in the mind, so that one shall almost infallibly produce the other, whether there be any natural relation between them or not. According to Dr. Hartley, particular sensations result from previous vibrations conveyed through the nerves to the medullary substance of the brain, and these are so intimately associated together, that any one of them, when impressed alone, shall be able to excite in the mind the ideas of all the rest. This author maintains that simple ideas run into complex ones by association.

Assurance, see Insurance and Life *Annuities*.

Assyria, a country of Asia, which formerly comprehended those provinces of Turkey and Persia, now named Diabekr, and Irac Arabia: it is bounded on the east by Media, on the west by Mesopotamia, north by Armenia, and south by Arabia.

Asteroids, a name given by Dr. Herschel to the new planets, or four small planetary bodies, discovered by the foreign astronomers, Piazzi, Olbers, and Harding, which are defined as "celestial bodies either of little or considerable excentricity round the sun, the plane of which may be inclined to the ecliptic in any angle whatever. The motion may be direct or retrograde; and they may or may not have considerable atmospheres, very small comas, discs, or nuclei."

Astrolabe, a stereographic projection of the sphere, either upon the plane of the equator, or upon that of the meridian; the eye, in the first construction, being supposed to be in the pole of the world, and in the second, in the point of the intersection of the equinoctial and horizon. Astrolabe is also the name of an instrument formerly used for the purposes now performed by the quadrant.

Astrology, a pursuit by means of which it is pretended to foretel future events, physical and moral, according to these separate objects of inquiry, Astrology is divided into two branches, called, respectively, *natural* and *judiciary*. To the former, belongs the prediction of physical occurrences; as storms, earthquakes, changes of the weather, &c. and to the latter, the foreknowledge of human actions and destinies, which, according to the visionary philosophers, or barefaced impostors, who profess it, are under the immediate influence of the stars.

Astronomy, a research of a very different nature from that of Astrology, the subject of the preceding article. In every age and country, Astronomy has

engaged the attention of mankind: and who, indeed, can behold the "dread magnificence of heaven," a magnificence that continually increases on the eye that surveys it, without feeling the most earnest solicitude to learn every thing respecting it, that the powers of his mind can discover? "I saw the stars," says the *Paria* of *Saint-Pierre*, "I saw the stars rising from the east in endless succession; and I felt that nature, who has linked the lot of man with so many invisible objects, has surely given him a relationship, to those that present themselves to his eyes!" And we are connected with this scene! from it we receive not only the sublimest, but the clearest conceptions of creation, and its Creator! Nor does its vastness oppress us: let us watch the impression it makes, and observe whether it does not rather prompt us "to claim a kindred with the skies?" What a melancholy thought would it be, did we look at the stars, and believe that they should continue to revolve through an eternity, after ourselves were lost in nothingness! but this is not the spontaneous, and therefore not the instinctive, feeling of man. On the contrary, how natural, how congenial to the heart, is the exclamation of Fingal: "When thou, sun of heaven, shalt fail—if thou shalt fail, thou mighty light,—if thy brightness is for a season, like Fingal, our fame shall survive thy beams!"

He that has made himself acquainted with astronomical facts, is enabled to behold with the mind's eye, a prospect in which this our globe forms but a small part indeed! and it is impossible to think justly, on those three great objects of all thought,—Man, the World, and the Deity,—without begin-

ning at this point. The low theology of the ancients arose out of astronomical ignorance. To their eyes, the earth was a plane: beneath its surface were the abodes of the dead; above it, rose the vaulted skies, at once a canopy to men, and a flooring to the gods. The shining stars ornamented the heavens, as the flowers did the fields. Observe, the world was not a part, but the centre of a system. With some of the more metaphysical teachers, heavens were raised above heavens; and it must be allowed, that in proportion as his seat was raised, the idea entertained of the Supreme, became more abstract and sublime. Still, however, the sole object of divine solicitude was the world: the world was not a part, but the whole.

But what are our conceptions? Reclined upon the green surface of the earth, as a mariner upon the side of a vessel, we look at once into the ocean of universal space. We suppose this space unbounded; because, with the idea of boundaries we must connect that of something beyond those boundaries, and this can be nothing but a recommencement of space. We consider ourselves as resting upon a body which is continually turning round, and to which we adhere by the unalterable nature of matter. We reflect that if a bird, or a balloon, *could* rise to the height at which the attractive influence of the earth ceases, it must fall into the void. We reflect that, could we divest ourselves of matter, we should be released from that power by which we are chained to the earth: and having supposed this alteration, we may please ourselves with the thought of our liberty, or trembling, that as the world turns round we shall drop from it into the dark and chill

space that we conceive unbounded. From this reverie, let us turn to the view of creation: we are aware that the planet in which we live is surrounded by exhalations, or light particles of itself, which form what is called its atmosphere. This atmosphere, though light and fluid, is material, and compounded of the very elements that, in a compacted state, form the sod on which we tread. We perceive, then, that we are surrounded by matter. That, to us the viewless fluid, in which we breathe and move, is as absolutely a body as water, and as essential to our existence, as is water to that of fish. But this material atmosphere extends only to a certain distance round the surface of the earth. Beyond this, commences a space of the nature which we can give no account of, but which some philosophers have supposed a sea of ether, and in which we must conclude that neither animals nor plants can live. This is that space in which the stars are placed.

The stars are supposed to be centres of systems, that is, points, round which their attending planets revolve; suns, by whose power those planets are enlightened and warmed: and are not these stars, in their turn, but parts of still larger systems? Is there not a point round which they, with all their worlds, in harmonious order, revolve, and which is to them a sun?

Imagination, tutored by astronomy, might here place the abode of God. Beyond a doubt, there is a physical, a mechanical, centre of the universe: for surely the stars are upheld in heaven by the same law of attraction through which the planets are supported by the stars. Did a star cease to

attract its planets, they must fall till they came within the reach of the next attracting centre; and it is only by attraction that the stars themselves are retained in their quarters of the heavens. Imagine, then, all constellations revolving round one point: see them advance in splendid and solemn procession! and where, with more sublimity than in that commanding station, can the theologist place the all-disposing mind? Where can the poet and the painter, with more grandeur, place that throne before which universal nature is prostrate, and whence life and all its enjoyments are dispensed?

But whatever metaphysical creed we may adopt, we have, at least, obtained a comprehensive view of creation. We have ascertained the place and magnitude of a world that is and must be so very interesting to us; and we are enabled, by regular induction, to make some estimate of our own.

Such is the philosophical value of astronomy. Its great practical use is in navigation and geography: by their bearings with respect to the celestial bodies, the situation of places is described, and their relative distances determined. As a science, we have been taught by Newton to study it in the general laws of MATTER; to which article, with those of MOTION, ATTRACTION, and GRAVITATION, the reader is referred. For astronomical facts and descriptions, as of the EARTH, MOON, PLANETS, STARS, and SOLAR SYSTEM, &c. see the several subjects required.

ASYMPTOTE, is properly a right line, which approaches continually nearer and nearer to some curve, whose asymptote it is said to be, in such sort, that when they are both indefinitely produced, they

are nearer together than by any assignable finite distance; or it may be considered as a tangent to the curve when conceived to be produced to an infinite distance.

ATCHIEVEMENT, or *Achievement*, in heraldry, denotes the arms of a person or family, together with all the exterior ornaments of the shield; as helmet, mantle, crest, scrolls, and motto, together with such quarterings as may have been acquired by alliances, all marshalled in regular order. See HERALDRY.

ATHEIST, one who denies the existence of a God. Perhaps no man, for any length of time, was a real Atheist; he must have had feelings that advertised him of some being superior to what he sees. It will be said, indeed, that men have suffered persecution, and even martyrdom, in its cause: but martyrdom, though it proves the martyr's resolution; and, one would think, the firmness of his belief in the doctrine for which he resigns his life, is no argument for the truth of that doctrine. Perhaps there have been no real atheists but among speculative men: for the libertine, so long as his libertinism lasts, is in a state of continual intoxication: in his sober moments, he is no atheist. Speculative atheists are wanderers from the true paths of philosophy; and it is to be hoped, that there are few who do not soon perceive their mistake. It is probable, that at some period of their lives, most reflecting men have entertained ideas a little inclining to this unhappy point; and, if the conjecture be true, we may rest on it a consolatory hope, that, of those who profess atheism, not many continue long its votaries. It is not at all wonderful, nor ought the error to be denied indulgent discussion, if among the smatterers

in that philosophy which describes matter as acting upon matter by necessary laws, and thus producing necessary effects, some should be tempted to reject the existence of a primitive and preserving cause: especially, as in the pursuit of that philosophy the mind is accustomed to find every thing explained upon mechanical and comprehensible principles, while a distinct conception of a God exceeds the intellectual capacity of man. It is no argument, that the original professors of these doctrines were far from drawing any such conclusions. We know they were; but we know that all doctrines are perpetually misunderstood, and that the best have been made to do much mischief. Let those, however, who have been staggered by the considerations alluded to, remember, that, beyond all which mathematics or chemistry can discover, there is a something that as certainly exists as it defies inquiry. We may have traced the wheels of nature's machinery; but must there not have been a maker? We may have learned the laws of matter; but must there not have been a law-giver? We may have analyzed the component parts of matter, and reduced those parts into atoms; but, after all, what have we found that will supply the place of a Creator? It were more rational to believe that the majestic oak produces, of its own power and intelligence, its foliage and its fruit, than that atoms, of their power and intelligence, produced the majestic oak. Matter, then, must have had a Creator; and it is of little consequence to the fact, whether, in attracting and yielding to attraction, in assuming every modification, in combining into all forms, here an ocean, and there a flower; here an elephant,

and there a butterfly; it is of little consequence, whether it acts upon instinctive endowments, or is senseless, and obeys controling laws: in either case, a superior power and intelligence are indispensable. This power and intelligence must have existed from all eternity; since, if it ever began to be, it must have had a cause capable of producing it; and thus, to whatever distance we push the perspective, a deity closes up the scene: it must exist eternally, unless that which produced all matter, can itself be annihilated, and the source of life expire.

But we have an evidence on this question, so strong, so authentic, as would justify us, were it necessary, in refusing credit to all the calculations of philosophy. That the human mind entertains an idea of a God, is a positive proof of his existence. Whence could such an idea arise? Whence, but from the contemplation of the objects around us? Was it not, is it not, communicated by the mysterious impression that nature is always capable of making upon us? Have not the mute fields impelled us, secretly, indeed, but irresistibly, to assert the being of an invisible power?

It has, however, been maintained, that this idea is not natural; that it is the effect of education; and that we believe it only because it has been repeated to us: now it happens, that we may admit even this proposition, false as it is, without any danger from the doctrine of atheism; for, as it is a fact that man has such an idea, if it be proved that it is not natural, it can only follow that it is supernatural: and if it be called supernatural, the Deity is placed in full view at once. The atheist has accomplished nothing: he has only taken away from na-

tural religion a foundation which some have been inclined to allow it, and established, beyond a possibility of doubt, the truth of revelation.

Athwart, in navigation, is synonymous with across the line of the course. Athwart the forefoot, is a phrase that denotes the flight of a cannon ball from one ship across the course of another; to intercept the latter, and oblige her to shorten sail, that the former may come near enough to examine her.

Atlantis (New,) is the name of a fictitious philosophical commonwealth, of which a description has been given by Lord Bacon. Its chief design is to exhibit a model of a college, instituted for the interpretation of nature and the production of great and marvellous works, for the benefit of men, under the name of Solomon's House, or, "the college of "the six day's work." Thus much, at least, is finished; and with great beauty and magnificence. The author proposed also a frame of laws, or of the best state or mould of a commonwealth. But this part is not executed.

Atlas, a king of Mauritania, said to have been contemporary with Moses, who took observations of the stars from a certain mountain. In process of time, the mountain was called by the name of the king; the poets feigned a metamorphosis; and as the "cloud-capt" mountain seemed to support the skies, Atlas was said to bear the heavens on his shoulders.

Atlas, a chain of mountains supposed to stretch across the whole continent of Africa, and deriving their name from Atlas the king.

Atlas, in allusion to the above circumstances, a book of universal geography.

Atlas, a silk-satin, manufactured in the East-Indies, plain, striped, or flowered, and inter-worked with gold. These are manufactured with an excellence beyond the reach of European art. In China, slips of gilded paper are wrought into the atlasses, which, with little cost, gives them a very rich appearance.

Atlas, a denomination given to a large size of paper, such as atlasses, or large maps, may be printed upon.

Atmosphere is that invisible elastic fluid which surrounds the earth to an unknown height; and encloses it on all sides. This fluid is essential to the existence of all animal and vegetable life, and even to the constitution of all kinds of matter whatever, without which they would not be what they are: for by it we literally may be said to live, move, and have our being: by insinuating itself into all the pores of bodies, it becomes the great spring of almost all the mutations to which the chemist and philosopher are witnesses in the changes of bodies. Without the atmosphere no animal could exist; vegetation would cease, and there would be neither rain nor refreshing dews to moisten the face of the ground; and though the sun and stars might be seen as bright specks, yet there would be little enjoyment of light, could we ourselves exist without it. Nature indeed, and the constitutions and principles of matter would be totally changed if this fluid were wanting.

The mechanical force of the atmosphere is of great importance in the affairs of men, who employ it in the motion of their ships, in turning their mills, and in a thousand other ways connected with the arts of life.

With regard to the weight and pressure of the atmosphere, it is evident that the whole mass, in common with all other matter, must be endowed with weight and pressure: and it is found by undeniable experiments, that the pressure of the atmosphere sustains a column of quicksilver in the tube of a barometer of about 30 inches in height; it accordingly follows, that the whole pressure of the atmosphere is equal to the weight of a column of quicksilver of an equal base, and 30 inches in height, or the weight of the atmosphere on every square inch of surface is equal to 15 pounds. It has moreover been found, that the pressure of the atmosphere balances in the case of pumps, &c. a column of water 34½ feet high; and the cubical foot of water weighing just 1000 ounces, or 62½ lbs., 34½ multiplied by 62½, or 2,158 lbs. will be the weight of a column of water, or of the atmosphere on the base of a square foot; and consequently the 144th part of this, or 15 lbs. is the weight of the atmosphere on a square inch. From these data, Mr. Cotes computed the pressure of the atmosphere on the whole surface of the earth to be equivalent to that of a globe of lead 60 miles in diameter. Dr. Vince and others have given the weight at 77,670,297,973,563,429 tons. This weight is however variable; it sometimes being much greater than at others. If the surface of a man, for instance, be equal to 14½ square feet, the pressure upon him, when the atmosphere is in its lightest state, is equal to 13½ tons, and when in the heaviest, it is about 14 tons and one third; the difference of which is about 2,464 lbs. It is surprising that such weights should be able to be borne without

crushing the human frame; this indeed would be the case, if all the parts of our body were not endowed with some elastic spring, whether of air or other fluid, sufficient to counterbalance the weight of the atmosphere. Whatever this spring is, it is certain that it is just able to counteract the weight of the atmosphere, and no more; of course it must alter in its force as the density of the atmosphere varies: for if any considerable pressure be superadded to that of the air, as by going into deep water, it is always severely felt; and if on the other hand, the pressure of the atmosphere be taken off from any part of the human body, by means of the apparatus belonging to the air-pump, the inconvenience is immediately perceived.

The difference in the weight of the atmosphere is very considerable, as has been observed, from the natural changes in the state of the air. These changes take place chiefly in countries at a distance from the equator. In Great Britain, for instance, the barometer varies from 28.4 to 30.7. On the increase of this natural weight, the weather is commonly clear and fine, and we feel ourselves alert and active; but when the weight of the air diminishes, the weather is often bad, and we feel listlessness and inactivity. Hence invalids suffer in their health from very sudden changes in the atmosphere. In our observations on the barometer, we have known the mercury to vary a full inch, or even something more, in the course of a few hours. Such changes, however, are by no means frequent. Ascending to the tops of mountains, where the pressure of the air is very much diminished, the inconvenience is rarely felt, on account of the gra-

dual change; but when a person ascends in a balloon with great rapidity, he feels, we are told by Garnerin and other aeronauts, a difficulty of breathing, and many unpleasant sensations. So also, on the condensation of the air, we feel little or no alteration in ourselves, except when the variations are sudden in the state of the atmosphere, or by those who descend to great depths in a diving-bell. See DIVING-BELL.

Various attempts have been made to ascertain the height to which the atmosphere is extended all round the earth. These commenced soon after it was discovered by means of the Torricellian tube, that air is endued with weight and pressure. And had not the air an elastic power, but were it every where of the same density, from the surface of the earth to the extreme limit of the atmosphere, like water, which is equally dense at all depths, it would be a very easy matter to determine its height from its density and the column of mercury which it would counterbalance in the barometer tube: for, it having been observed that the weight of the atmosphere is equivalent to a column of 30 inches or $2\frac{1}{2}$ feet of quicksilver, and the density of the former to that of the latter, as 1 to 11040; therefore the height of the uniform atmosphere would be 11040 times $2\frac{1}{2}$ feet, that is 27,600 feet, or little more than 5 miles and a quarter. But the air by its elastic quality, expands and contracts; and it being found by repeated experiments in most nations of Europe, that the spaces it occupies, when compressed by different weights, are reciprocally proportional to those weights themselves; or that the more the air is pressed, so much the less space it takes up; it

follows that the air in the upper regions of the atmosphere must grow continually more and more rare, as it ascends higher; and indeed that, according to that law, it must necessarily be extended to an indefinite height. Now, if we suppose the height of the whole divided into innumerable equal parts, the quantity of each part will be as its density; and the weight of the whole incumbent atmosphere being also as its density; it follows, that the weight of the incumbent air is every where as the quantity contained in the subjacent part; which causes a difference between the weights of each contiguous parts of air.

The atmosphere, or air, has also a reflective power; and this power is the means by which objects are enlightened so uniformly on all sides. The want of this power would occasion a strange alteration in the appearance of things; the shadows of which would be so very dark, and their sides enlightened by the sun so very bright, that probably we could see no more of them than their bright halves; so that for a view of the other halves, we must turn them half round, or if immoveable, must wait till the sun could come round upon them. Such a pellucid unreflective atmosphere would indeed have been very commodious for astronomical observations on the course of the sun and planets among the fixed stars, visible by day as well as by night; but then such a sudden transition from darkness to light, and from light to darkness, immediately upon the rising and setting of the sun, without any twilight, and even upon turning to and from the sun at noon day, would have been very inconvenient and offensive to our eyes. However, though

the atmosphere is greatly assistant in the illumination of objects, yet it must also be observed that it stops a great deal of light.

Atom, in philosophy, a particle of matter, so minute as to admit of no division. Atoms are the *minima naturæ*, and are conceived as the first principles or component parts of all physical magnitude.

Atomical philosophy, or the doctrine of atoms, a system which, from the hypothesis that atoms are endued with gravity and motion, accounted for the origin and formation of things. This philosophy was first broached by Moschus, some time before the Trojan war: but being much cultivated and improved by Epicurus, is denominated the Epicurean *philosophy*, which see.

Atropa, deadly-nightshade, a remarkable species of which, the *Belladonna*, grows wild in Britain. It has a perennial root, which sends out strong herbaceous stalks of a purplish colour, rising to the height of four or five feet, garnished with entire oblong leaves, towards autumn, that changes to a purplish colour. The flowers are large, and come out singly between the leaves, upon long footstalks, bell-shaped, and of a dusky colour on the outside, but purplish within. After the flower is past, the germen becomes a large round berry, a little flatted at the top. It is first green; but, when ripe, turns to a shining black, sits close upon the empalement, and contains a purple juice of a nauseous sweet taste, and full of small kidney-shaped seeds. This particular description may be acceptable in the present publication, because there have been many instances, it is said, of children killed by eating berries of a fine black colour, and about the size of a

small cherry, which are no other than those of the *Belladonna;* and it is asserted, that if an accident of this kind be discovered in time, a glass of warm vinegar will prevent the bad effects.

Atrophy, in medicine, a disease wherein the body, or some portion of it, does not receive the necessary nutriment, but wastes and decays incessantly.

Attachment, in law, is the taking or apprehending a person or thing, either by commandment or writ. There is a great difference between *arrest* and *attachment;* he who arrests a person carries him to another higher person, to be disposed of; but he who attaches keeps the party attached, and presents him in court at the day assigned in the attachment. Again, an arrest lies only on the body of the man, an attachment often on his goods also.

Attainder. The stain or corruption of the blood of a criminal capitally condemned; the immediate, inseparable consequence, by the common law, on pronouncing the sentence of death. He is then called attaint, attinctus, stained, or blackened. He is no longer of any credit or reputation; he cannot be a witness in any court; neither is he capable of performing the functions of another man: for, by an anticipation of his punishment, he is already dead in law. This is after judgment: for there is great difference between a man convicted and attainted; though they are frequently through inaccuracy confounded together. After conviction only, a man is liable to none of these disabilities: for there is still in contemplation of law a possibility of his innocence. Something may be offered in arrest of judgment: the indictment may be erroneous, which

will render his guilt uncertain, and thereupon the present conviction may be quashed: he may obtain a pardon, or be allowed the benefit of clergy; both which suppose some latent sparks of merit, which plead in extenuation of his fault. But when judgment is once pronounced, both law and fact conspire to prove him completely guilty; and there is not the remotest possibility left of any thing to be said in his favour. Upon judgment, therefore, of death, and not before, the attainder of a criminal commences: or upon such circumstances as are equivalent to judgment of death; as judgment of outlawry on a capital crime, pronounced for absconding or fleeing from justice, which tacitly confesses the guilt: and therefore, upon judgment either of outlawry, or of death, for treason or felony, a man shall be said to be attainted.

A person attainted of high treason forfeits all his lands, tenements, and hereditaments; his blood is corrupted, and he and his posterity rendered base; and this corruption of blood cannot be taken off but by act of parliament.

Attainders may be reversed or falsified (i. e. proven to be false) by writ of error, or by plea. If by writ of error, it must be by the king's leave, &c. and when by plea, it may be by denying the treason, pleading a pardon by act of parliament. &c.

ATTORNEY, a proxy; any one acting for another: hence we call a legal power, given in writing, enabling a person, not otherwise concerned, to receive money for him who signs such a writing, *a Letter of Attorney.*

ATTORNEY AT LAW, one who is put in the place of another, to manage his matters at law. Formerly,

every suitor was obliged to appear in person. As a matter of convenience, it is now, by divers statutes, generally permitted, that attorneys may prosecute or defend any action in the absence of the parties to the suit. No attorney can practise in any court, unless he has been admitted and sworn an attorney of that particular court. As an officer of the court in which he is admitted, an attorney enjoys several privileges, and is liable, on the other hand, to the censure and correction of the judges.

ATTORNEY-GENERAL, a great officer under the king, made by letters patent. It is his duty to exhibit informations, and prosecute for the crown, in matters criminal, and to file bills in exchequer for any thing concerning the king, in inheritance or profits; and others may file bills against the king's attorney.

ATTRACTION, in natural philosophy, the primary law of matter, in obedience to which, atom unites to atom, and body to body; and by which all created things are prevented from separating, as a handful of dust cast into the air. When a ball is discharged from a cannon, the force by which it is propelled overcomes for a time the power by which it is attracted to the earth; but no sooner has the resistance of the air diminished this force, than it descends with a swiftness proportioned to its weight; that is, to the power with which it overcomes the resistance of the air; but for which, when the propulsion ceased, it would remain afloat, like the down of thistles. That which in common language is called weight, is by philosophers explained to be gravitation; that is, a tendency to the centre of gravity. If a little water, or any other liquid, is

dropped on a table, and a piece of loaf sugar placed upon it, the fluid will ascend, or, ordinarily speaking, be sucked up into the pores of the sugar; that is, the one is attracted by the other. If pieces are pared off two leaden bullets, the surfaces of the parts that are cut being made perfectly smooth, and the two bullets pressed together, they will be found to adhere strongly; that is, they mutually attract each other. If a smooth piece of sealing-wax or amber be rubbed on any woollen body till it be warm, it is well known that it will attract light bodies that are brought within the distance of half an inch or an inch. The attraction of iron by the power of the magnet is familiar to every one. There remains to be mentioned another effect of attraction: if to a phial of water, in which bruised galls have been infused, and which is colourless, be added the contents of another phial, containing a solution of copperas or green vitriol, also colourless, the mixture becomes immediately black: if to this, aqua-fortis (or the nitrous acid, as it is called by chemists), be added, the clearness of the liquor is restored, nothing of its former state being perceived, except a little sediment at the bottom; and, by a farther addition of salt of wormwood in a fluid state, which is an alkali, the black complexion is resumed. These phenomena are explained upon the principle of attraction. The iron which the salt of vitriol contains, has a strong attraction for the galls, and on its union with it, the mixture becomes black; but when the nitrous acid is introduced, the iron, which has a still stronger attraction for this than for the gall, joins with it; and, the galls separated from it, the liquid is again clear. On the admission

of the alkali, the nitrous acid, which has a stronger attraction for this than for the iron, drops the latter; and this re-uniting with the galls, the black colour is restored.

These several kinds of attraction are arranged under five distinct heads. 1. That of the cannon ball falling to the ground, the attraction of gravity, or gravitation. 2. That of the two leaden bullets adhering together, and of water ascending into the pores of the sugar, is called the attraction of cohesion, and also capillary attraction, from the experiment having been made with small tubes in which water will rise to a considerable height. 3. Electric attraction, because the sealing-wax, when warmed by friction, is in an electrified or excited state. 4. Magnetic attraction; and, 5. Chemical attraction, or the attraction of combination; so called because upon it many of the processes in chemistry depend; and because by this means most of the combinations which we observe in salts, the ores of metals, and other mineral bodies, are effected.

AVALANCHES, a name given in Switzerland and Savoy, to wonderful masses of snow that are precipitated, with a noise like thunder, from the mountains, which destroy every thing in their course, and which have sometimes overwhelmed whole villages and their inhabitants in inevitable destruction.

AVARICE, an insatiable, selfish, and hoarding propensity. The word is commonly used for the hoarding of wealth, and in this sense Avarice is the degenerated state of an originally innocent and honourable disposition of the human mind, produced,

for the most part, by the unfavourable circumstances with which humanity has to struggle.

Auctions, and *Auctioneers*, are regulated in almost all their proceedings by acts of parliament. It is not generally known that a bidder, at an auction, under the usual conditions, may retract his bidding any time before the hammer is down.

Audience given to ambassadors, a ceremony used in courts at the admission of ambassadors or other public ministers to a hearing. In England, audience is given to ambassadors in the presence chamber; and to envoys and residents in a gallery, closet, or any place where the king happens to be. Upon being admitted to the presence, as is the custom at all courts, they make three bows; after which they cover and sit down: but not before the king has covered and sat down, and has given them the sign to put on their hats. When the king does not wish them to be covered and seated, he himself stands uncovered, which procedure is taken as a slight. At Constantinople, ministers usually have audience of the prime vizier.

Audience, the name of a court of justice established in the West Indies, by the Spaniards, answering to the parliaments of France, before the revolution.

Ave Maria, the angel's salutation of the Virgin, and used in the Roman ritual as a form of prayer or ejaculation.

Average, in commerce, signifies the accidents and misfortunes which happen to ships and their cargoes, from the time of their loading and sailing to their return and unloading; and is divided into three kinds: 1. The simple or particular average,

which consists in the extraordinary expenses incurred for the ship alone, or for the merchandizes alone. Such is the loss of anchors, masts and rigging, occasioned by the common accidents at sea; the damages which happen to merchandize by storm, prize, shipwreck, wet, or rotting; all which must be borne and paid by the thing which suffered the damage. 2. The large and common average, being those expences incurred, and damages sustained for the common good and security both of the merchandizes and vessels, consequently to be borne by the ship and cargo, and to be regulated upon the whole. Of this number are the goods or money given for the ransom of the ship and cargo, things thrown overboard for the safety of the ship. The expenses of unlading for entering into a river or harbour, and the provisions and hire of the sailors when the ship is put under an embargo.

AUGSBURG CONFESSION, denotes a celebrated confession of faith drawn up by Luther and Melancthon, on behalf of themselves and other ancient reformers, and presented in 1530 to the emperor Charles V. at the diet of Augusta or Augsburg, in the name of the evangelic body.

AUGURY, originally a divination, or foretelling of future events, by the actions of birds. This, like other human errors, appears to have arisen from ideas tolerably rational at first. The regular appearance and disappearance of the birds, and the precision that is observable in almost their whole proceedings, might naturally impress an ignorant race of men with a belief that they either inherently possessed, or from time to time received, supernatural information. Accustomed to regulate by

these monitors their rural occupations, the shepherd and the husbandman (then the whole of mankind) were led, by the most excusable association of ideas, to consult the same advisers in the few other concerns of life that fell to their lot: but on the foundation laid by superstition, imposture, assuredly, raised a fantastic structure.

From how many unnecessary fears, from what days and nights of unfounded anxiety and false alarm, has not natural and experimental philosophy delivered mankind! "Of how many pleasing assurances," may the advocate of ignorance, who has the picturesque side of the question, exclaim, "of how many anticipations of delight, of how many salutary warnings, has it not robbed us!" True; and it was not to be expected, *á priori*, that a state of mind to which the Creator has in all ages destined the greater portion of mankind, should be without its blessings.

August, the eighth month of our year, containing 31 days. August was dedicated to the honour of Augustus Cæsar, because in the same month, before called Sexatilis, or the sixth from March, he was created consul, thrice triumphed in Rome, subjugated Egypt to the Roman sway, and put an end to the civil wars.

Aulic, an epithet given to certain officers of the German empire, who compose a court which decides, without appeal, in all processes entered in it. Before the late changes in the empire, the Aulic Council was composed of a president, who is a catholic; of a vice-chancellor, presented by the archbishop of Mentz; and of 18 counsellors, nine of whom are protestants, and nine catholics.

Aumil, in Bengal, a native collector or manager of a district, on the part of government.

Avoirdupois, the weight by which the quantity of large and coarse goods, as groceries, cheese, wool, lead, &c. are reckoned. Such bakers as live without the boundaries of corporation towns, are directed to make their bread by avoirdupois weight; those in corporations by troy. Apothecaries buy by avoirdupois weight, but sell by troy. The avoirdupois pound contains sixteen ounces. The proportion of a pound avoirdupois to a pound troy is as 17 to 14.

The avoirdupois ounce is less than the troy ounce, in the proportion of 700 to 768, but the avoirdupois pound is greater than the troy pound in the proportion of 700 to 576.

for 1lb. avoird. is = 7000 grains troy.
but 1lb. troy is = 5760 grains troy.
also 1oz. avoird. is = 437½ grains troy.
and 1oz. troy is = 480 grains troy.

The first statute that directs the use of the avoirdupois weight is that of 24 Henry VIII. which plainly implies it was no legal weight till sanctioned by that statute; the particular use to which the said weight is thus directed, is simply for weighing butcher's meat in the market. After this it gradually grew into general use, for weighing such goods as are very coarse and drossy, or subject to waste.

Auricle, that part of the ear which is prominent from the head.

Auricles *of the heart*, are appendages of the heart at its base, distinguished by the names right and left, and they are intended as diverticula for the blood, during the contraction of the heart. In other words the auricle is a reservoir, holding the blood,

till the ventricle has emptied itself by its contraction.

AURIGA, the waggoner in astronomy, a constellation of the northern hemisphere, containing about 46 stars of the first six magnitudes.

AURUM, see GOLD.

AURORA, the morning twilight, or that faint light which appears in the morning when the sun is within eighteen degrees of the horizon.

AURORA-BOREALIS, northern irradiance, northern lights or streamers, a meteor appearing in the northern part of the heavens. It is most frequent and most brilliant during the winter solstice. In the Shetland islands, the *merry dancers*, as they are there called, are the constant attendants of clear evenings, and cheerers of the long winter nights. In still more northern countries, as Norway, Lapland, and Siberia, they greatly enliven the snowy landscapes. They commonly appear at twilight, near the horizon, of a dun colour, approaching to yellow; sometimes continuing in that state for several hours, without any sensible motion; after which they break out into streams of stronger light, spreading into columns, and altering slowly into a thousand different shapes, varying their colours from all the tints of yellow to the obscurest russet. They often cover the whole hemisphere, and then make the most splendid appearance. Their motions, at all these times are amazingly quick; and they astonish the spectator with the rapid change of their form. They break out in places where none were seen before, skimming briskly along the heavens, and are suddenly extinguished, leaving behind them a uniform dusky track. This is again illumined in

the same manner, and as suddenly left a dull blank. In certain nights, they assume the appearance of vast columns, on one side of the deepest yellow, on the other declining away till it becomes undistinguished from the sky. They have generally a strong tremulous motion from the end, which continues till the whole vanishes. In a word, we, who only see the extremities of this northern phenomenon, have but a faint idea of their grandeur or their motions. According to the state of the atmosphere, they differ in colour: they often put on that of blood, and make an awful appearance. It need not be added, that these are among the occurrences of nature at which the ignorant tremble.

With regard to the cause of the aurora-borealis many conjectures have been formed. 1. The first which naturally occurred was, that it resulted from the ascent of inflammable sulphureous vapours from the earth. 2. Dr. Halley, who was unacquainted with the electric power, supposed that this earth was hollow, having within it a magnetical sphere corresponding in virtue with all the natural and artificial magnets on the surface; and that the magnetic effluvia, passing through the earth from one pole of the central magnet to the other, might sometimes become visible in their course, and thus exhibit the beautiful coruscations of the aurora-borealis. 3. "Is not the aurora-borealis" says Mr. Canton, "the flashing of electral fire from positive toward negative clouds at a great distance, through the upper part of the atmosphere, where the resistance is least?" 4. Mr. Mairan supposed this phenomenon to proceed from the atmosphere of the sun, particles of which were thrown off by the centrifugal force, ac-

quired by his rotation on his axis; and that these particles falling upon the atmosphere of the earth near its equatorial parts, were from thence propelled by the diurnal motion of the earth towards the polar regions, where they formed the aurora-borealis. 5. M. Bernardin de St. Pierre imagines the atmospherical reflection of the beams of the sun from the ice of the poles, to produce these coruscations. 6. It is now generally thought that this is one of the multiform appearances of the electric fluid; but the precise manner of its operation is by no means settled. From the observations of Mr. Foster in the southern hemisphere, it is received as an established fact, that the course of these flashes is directed from both poles towards the equator. May it be conjectured that the rare state of the atmosphere at the poles, is itself the cause of this phenomenon? or that it is the cause of the visibility of a process which is performed every where? or, to explain why the electricity of those parts of the atmosphere should be constantly found to direct its course from the poles toward the equator, and not from the equator to the poles, may we suppose that it is the return to the equator of the electric fluid drawn during the day to the polar regions? Mr. Dalton says the aurora-borealis is a magnetic phenomenon, the beams being governed by the earth's magnetism.

Austria, a country of Germany, bounded on the north by Bohemia and Moravia, on the east by Hungary, on the south by Stiria, and on the west by the archbishopric of Saltzburg; the river Ens divides it into Upper and Lower. Vienna is the capital of the latter, and Lintz of the former, the whole six

hundred and thirty-seven thousand square miles; and in the year 1784, the number of the inhabitants was one million five hundred and eighty-two thousand, three hundred and ninety-five. It exceeds all other provinces of Germany in the fertility of its soil, abundance of its pastures, salubrity of the air, and beauty of the country; corn, wine, and fruit, every where abound; the saffron is superior to that of India. The inhabitants are polished, intelligent, and warlike. Austria was erected into a marquisate, by the emperor Otho I. and into a duchy by Frederick Barbarossa. The emperor Rodolphus of the house of Hapsburg, seized Austria, from Othogar king of Bohemia, who was slain in a battle near Vienna. This emperor laid the foundation of the grandeur of the present house of Austria, from which most emperors have since been chosen. Austria was then erected into an archduchy with great privileges. The circle of Austria contains, besides the archduchy, the duchies of Stiria, Carinthia, Carniola, the county of Tyrol, the bishoprics of Trent and Brixen, the four forest towns, Rheinfield, Seckingin, Lausenburg, and Walshut; Austrian Swabia, and the Brisgaw. To the House of Austria likewise belong Bohemia, Moravia, part of Silesia, Hungary, Sclavonia, Transylvania, Bosnia, part of Servia, and part of Walachia, the Milanese, and formerly the greatest part of Brabant, Luxemburg, Namur, part of Hainault, and part of Flanders.

AUTHENTIC, something of acknowledged authority. As a law term it signifies something clothed in all its formalities, and attested by persons to whom credit has been regularly given. Thus we say authentic papers, authentic instruments. With re-

spect to books there is an obvious difference between authenticity and genuineness. A *genuine* book, is that which was written by the person whose name it bears, as the author of it. An *authentic* book is that which relates matters of fact as they really happened. A book may be genuine without being authentic: and a book may be authentic without being genuine.

Autocrator, one who governs absolutely according to his own will. On some extraordinary occasions, the Athenians gave this title and authority to their generals and ambassadors. Ambassadors of this description are known in modern times, under the name of plenipotentiaries.

Auto-da-fe. See Act of Faith.

Autograph, the very hand-writing of any person; or the original of a treatise or discourse. The word is used in opposition to a copy. Autographa, or original manuscripts of the New Testament, are the copies written by the Apostles, or by amanuenses under their inspection, though even used in this sense, the term is not correct. St. Paul seems generally to have adopted the latter mode; but to prevent the circulation of spurious epistles, he wrote the concluding benediction with his own hand.

Automaton, a self-moving machine, so constructed as to be able to perform its office, for a considerable time, as if by its own will. According to this definition, clocks, and various other pieces of mechanism are automata; but the term is generally used for such as, to support the idea of living power, are contrived under the form of an animal, and made to perform animal functions. Four hundred years before Christ, Archytas of Tarentum is said

to have made a wooden pigeon which could fly: a report that the experiments of the moderns may justify us in believing. When automata are made to represent mankind, they may be called, for distinction sake, ANDROIDES, under which article, the flute-player of M. Vaucanson has been mentioned. This gentleman, encouraged by the reception which that admirable piece of mechanism obtained, made a duck which was capable of eating, drinking, and imitating exactly the voice of a natural one. All the actions of a living duck were copied in a really admirable manner; and even the wings, viscera, and bones, were so formed as very strongly to resemble nature. In Dr. Hutton's Addenda to his Mathematical Dictionary, is inserted a letter from Thomas Collinson, esq. by which it appears that much of the capacity of the famous chess-player, made some years ago by M. Kempbell, was to be attributed to a boy, small of his age, who was concealed under the chess-board. This was an imposture in mechanics; but though the *deception* throws a deserved stigma on the production, the performance was still, perhaps, the *acmé* of the art.

AUTUMN, the third season of the year, in which the harvest and fruits are gathered in. It begins on the day when the sun's meridian distance from the zenith, being on the decrease, is a mean between the greatest and the least; which in this part of the world, is supposed to happen when the sun enters *libra*, or the *balance*. Its end coincides with the beginning of winter.

AWN, a slender sharp process issuing from the glume or chaff in corn and grasses: it is called in English the beard.

Auxiliary verbs, in grammar, such as help to form or conjugate others; that is, are prefixed to them; as *to have*, and *to be*. In the English language, the auxiliary *am* supplies the want of passive verbs.

Axiom, from its Greek root, seems to have imported, that the proposition so named was *intirely worthy of credit*. An axiom is a self-evident or incontrovertible truth; as, that a part is less than the whole.

Axis, in astronomy, an imaginary right line supposed to pass through the earth, sun, planets, satellites, &c. and about which they perform their respective diurnal rotations.

The earth and planets, in their progress through the annual orbit, move in such a manner that the axis of each always keeps parallel to itself, or points to the same parts of the heavens.

The axis of the earth is inclined to the ecliptic, in an angle of nearly 66° ½, a position which is well adapted for promoting the fertility of the earth and rendering it habitable.

Axis, in geometry, the straight line in a plane figure, about which it revolves, to produce or generate a solid. Thus, if a semicircle be moved round its diameter at rest, it will generate a sphere, whose axis is that diameter. And if a right-angled triangle be turned about its perpendicular at rest, it will describe a cone, whose axis is that perpendicular.

Axis is yet more generally used for a right line conceived to be drawn from the vertex of a figure to the middle of the base.

Axis in Peritrochio, one of the five mechanical

powers, consisting of a peritrochium or wheel, and moveable together with it about its axis. The power is applied at the circumference of the wheel, and the weight is raised by a rope that is gathered up on the axis while the machine turns round. See MECHANICS.

AZIMUTH, in astronomy, an arc of the horizon, intercepted between the meridian of the place, and the vertical circle passing through the centre of an object.

Magnetical Azimuth, is an arc of the horizon contained between the sun's azimuth circle and the magnetical meridian.

AZIMUTH COMPASS, an instrument adapted to find, in a more accurate manner than by the common sea-compass, the sun or star's magnetic amplitude, or azimuth. It is also used to take the bearings of headlands, ships, and other objects at a distance. The azimuth compass differs from the common sea-compass in this, that the circumference of the card, or box, is divided into degrees, and there is fitted to the box an index with two sights, which are upright pieces of brass placed diametrically opposite to each other, having a slit down the middle of them, through which the sun, or star, or other object is to be viewed, at the time of observation. See COMPASS.

AZIMUTHS, called also vertical circles, are great circles intersecting each other in the zenith and nadir, and cutting the horizon at right angles.

AZOT, or AZOTE, which derives its name from the Greek particle *a*, privative, and *zoe*, life, signifying that it takes away life, or more properly, that it does not sustain it, is one of the most abundant ele-

ments in nature. In its aeriform state, when it is called *azotic gas* by the French philosophers, it constitutes about three-fourths of the air we breathe. When oxygenated, or combined with oxygen, it forms nitrous acid, or aquafortis. It composes no inconsiderable part of animal and vegetable bodies, from which it may be drawn by a chemical process; and the quantity of ammoniac, or volatile alkali, which, in putrefaction, is emitted by these substances, and which is the chief cause of their fetid smell when in that state, is formed by a union of the hydrogen and azote which they contain.

The properties of Azotic gas are, that it is invisible and elastic, and capable of condensation and expansion. It immediately extinguishes animal life, and the flame of a candle. It has no taste; some plants live and flourish in it. It is not absorbed by water, but is capable of combining with oxygen; and with different proportions of this substance it forms atmospheric air, gazeous oxyde of azote, or nitrous oxyde, nitrous gas, nitrous acid, and nitric acid. It is capable of dissolving sulphur, phosphorus, and charcoal in minute quantities. It unites with hydrogen and constitutes with it ammonia.

Azure, the blue colour of the sky. Among painters, this word originally signified *lapis-lazuli*, and the blue colour prepared from it. At present, it is called ultramarine; and the blue glass made from the earth of cobalt, and other vitrifiable matters, which, when in masses, is called smalt, is, in the state of fine powder, known by the name of azure. Azure being employed to colour starch, is also called starch-blue.

Azure, in heraldry, the blue colour in the arms

of any person below the rank of a baron. In the escutcheon of a nobleman, it is called *sapphire*; and in that of a sovereign prince, *Jupiter*. In engraving, this colour is expressed by lines, or strokes, drawn horizontally. This colour may signify justice, perseverance, and vigilance; when compounded with

Or	it signifies	Cheerfulness
Argent		Vigilance
Gules		Readiness
Vert		Enterprise
Purpure		Goodness
Sable		Mournfulness.

B.

B, The second letter of the English and most other alphabets. It is the first consonant, and first mute, and its pronunciation is supposed to resemble the bleating of a sheep. B is also one of those letters which are called labial, because the principal organs employed in its pronunciation are the lips. It is pronounced by pressing the whole length of them together, and forcing them open with a strong breath. As a numeral, B was used by the Greeks and Hebrews to denote 2; but among the Romans for 300, and with a dash over it (thus $\bar{B}$) for 3000.

B, is also used as an abbreviation. Thus B. A. stands for bachelor of arts; B. L. for bachelor of laws; and B. D. for bachelor of divinity.

Baboon, in zoology; a subdivision of the monkey tribe, adopted by Buffon. According to that great naturalist, the apes are those that are totally destitute of tails; the baboons have short tails, and those of the monkeys are long.

Babylon, the capital of the ancient kingdom of Babylonia or Chaldæa, and supposed to have stood in E. long. 44. 30. N. lat. 33. 20. Semiramis is said by some, and Belus by others, to have founded this city. But by whomsoever it was founded, Nebuchadnezzar was the person who put the last hand to it, and made it one of the wonders of the world.

This capital was, according to Herodotus (who was himself at Babylon) surrounded with walls, in thickness 87 feet, in height 350 feet, and in compass 480 furlongs, or 60 of our miles. It is observed, that those who give the height of these walls but at 50 cubits, speak of them only as they were after the time of Darius Hystaspis, who had caused them to be beaten down to that level. These walls formed an exact square, each side of which was 120 furlongs, or 15 miles in length; and were all built of large bricks cemented together with bitumen, which in a short time grows harder than the very brick and stone which it cements.

Bac, in *navigation*, a sort of ferry-boat; in *brewing*, a large kind of tub, wherein the wort is put, to stand and cool before boiling; in *distilling*, a vessel into which the liquor to be fermented is pumped from the cooler, in order to be worked with yeast.

Bacchanalia, popular, and, as almost all such things will be, somewhat licentious, feasts, celebrated in honour of Bacchus by the ancients. They were *fêtes-champêtres*, and *bals-parées*. Their times of celebration were spring and autumn: the former in the city, and the latter in the fields. The company personified Silenus, Pan, fauns, and

satyrs; and learned scandal says, that the characters were fully sustained: but, in their institution, they were scenes of cheerful innocence, and recals of "the old age."

Bachelor, in all its various senses, seems to include the idea of youth, or immaturity. In general society, the term is applied to an unmarried man. In many ancient states, rigorous laws were put in force against bachelors; and there can be no doubt that they are not the most useful members of the community. In England, by 7 Will. III. 1695, an unmarried duke, of the age of twenty-five years, paid a tax of 12*l.* 10*s.* and a common person 1*s.* At present, every man of the age of twenty-one years, and upward, never having been married, who keeps one male servant or more, shall pay 1*l.* 5*s.* for each, in addition to the ordinary duties leviable for servants; and every man of twenty-one years and upward, never having been married, keeping one female servant, pays 2*s.* 6*d.* in addition to the ordinary 2*s.* 6*d.*—5*s.* in addition for each, if he has two female servants; and 10*s.* in addition for each, for three or more female servants.

Bachelor, an ancient denomination of knighthood, given to such as had not a sufficient number of vassals to carry their banner; or to such knights-bannerets as were not of age to display their own banner; or, to young cavaliers, little more than initiated to arms; or, in a very honourable sense, to him who had overcome his antagonist in his tournament.

Knights-Bachelors, the lowest rank of knights, whose title was not hereditary. These are the *knights* of modern days.

Bachelor, in universities, one who has attained the first degree in the liberal arts and sciences, or the first degree in the particular study to which he devotes himself. At Oxford and at Cambridge, to attain the degree of bachelor of arts, a person must have studied there four years: after three more, he may become master of arts; and at the end of another series of seven, bachelor of divinity. He may commence bachelor of law after having studied it six years.

Bachelor, in the livery companies of London, is one who is not yet admitted of the livery; also called *yeoman*. The derivation of the word bachelor is much disputed. It is probable, considering how greatly the manners of Europe have grown out of chivalry, that it originated solely with the military profession. It has been said to come from *buccellarius*, a kind of cavalry; from *baccalaria*, fiefs of twelve acres, the possessors of which were called *bachelors*, (though the fiefs might be called *baccalaria*, because their possessors were bachelors); from *baculus*, or *bacillus*, a staff, because the young cavaliers fought with staves; from *baccalaureus*, in allusion to the ancient custom of crowning poets with laurel, *baccis lauri*. It is possible that, in contradiction to what has been said above, respecting the sameness of the origin, the university bachelor may be derived from *baccalaureus;* though, in Italy, where alone the ceremony mentioned appears to have been practised, the universities are unacquainted with bachelors: but nothing seems more likely than that we have the word from *bas-chevalier*, ["sub-knight"] a French term for one below the dignity of a knight.

Bachelor, in music, one who has taken his first degree in music. The qualification for this honour was, formerly, to be able to read and expound certain books of Boethius. Now the candidate is required to compose an exercise for voices and instruments, in six parts, which exercise is publicly performed in the music-school, or university.

Back, in brewing, a large flat vessel in which the wort is put to stand and cool before boiling. The ingredients of beer pass through three kinds of vessels: they are mashed in one; worked in another, and cooled in a third, called backs or coolers. See Brewing.

Back-*gammon*, an ingenious game played with dice and tables, to be learned by observation and practice.

Back-*staff*, an instrument formerly used for taking the sun's altitude at sea: it had its name because the back of the observer was turned towards the sun.

Backing, in law, a warrant of a justice of peace, which is granted in one jurisdiction and to be executed in another; as where a felony is committed in one county, and the offender escapes to another: in this case, if proof be given of the hand-writing of the justice who granted the warrant, a justice in the other county indorses or writes his name at the back of it, by which he gives authority to execute the warrant in that other county.

Badge, in naval architecture, an ornament placed on the outside of ships near the stern, containing either a window or the representation of one.

Bag, in commerce, a term signifying a certain

quantity of a particular commodity: a bag of almonds is about 300 weight.

Bag, in farriery, contains an ounce of assafetida, with as much powder of savin, which, being tied to the bitt, and the horse kept bridled for two hours, several times a day, will procure an appetite where it is deficient.

Baggage, in military affairs, denotes the clothes, tents, utensils of divers sorts, provisions and other necessaries belonging to an army.

Bag-pipe, a musical instrument of the wind kind, chiefly used in country places, especially in Scotland. It consists of a bag and pipes or reeds.

Bail, in law, surety for the appearance of a person who, on account of any process entered against him, civil or criminal, must otherwise be committed to prison till the time of trial. All civil cases are bailable; but many criminal ones are not; a distinction founded on the reason of the subject. Wherever money is the matter at issue, it is evident, that, if the defendant can find persons willing to take upon themselves the risque of payment, justice cannot be defeated; but where property is not concerned, where liberty or life is at stake, the penalty of bail-bond is no adequate security against the prisoner's escape; and, if forfeited, insufficient to answer the demands of the law.

Bailiff, a word derived from the French, and originally used to denote, as in France, an officer of great trust and authority. We have still chief magistrates of towns distinguished by that name; and the person to whom the care of a castle is committed, is, in some instances, called a *bailiff*: but the name is now held in contempt, on account

of one part of the duty of the bailiff of a sheriff, which is usually performed by mean persons: that of executing writs of arrest. A county, which is under the jurisdiction of a sheriff, is subdivided into hundreds. Over each hundred is a bailiff, whose duty it is to collect fines therein; to summon juries, to attend the judges and justice, at the assizes and quarter-sessions, and to execute writs and processes in his district. This is a *bailiff of the hundred;* the officer generally known by the name, is *a special bailiff.*

Bailiff, is also the name of an officer in every manor, and a sort of observer in husbandry and rural concerns.

Water-Bailiff, an officer who searches ships, gathers toll for anchorage, and arrests persons for debt upon the water.

Bailiwick, a liberty exempt from the power of the sheriff, in which district the lord exercises the office of sheriff, and appoints his own bailiff. A bailiwick is also the hundred, or district, through which the authority of a bailiff extends.

Bailment. The law of bailments is that by which persons receiving goods, without any particular contract to that effect, are made responsible for their safety and re-production.

Baker, a person who prepares bread, or who reduces meal of any kind into bread, biscuits, &c. In Rome the business of a baker was in high estimation. In this country, from very early times, bakers have not borne the best reputation. Formerly there was a pillory in Cornhill, expressly kept for the exhibition of fraudulent bakers, who either adulterated the materials, or whose loaves

were deficient in weight. Bread in London is denominated "Wheaten" or "Household," and is marked with a W or H.—See Bread.

Balance, in mechanics, a peculiar application of that simple mechanical power called the lever, by which it is rendered useful in determining the difference or equality of weights in heavy bodies, and consequently their masses or quantities of matter. The characteristic difference between a balance and a lever we conceive to consist in this, that the former is suspended from something which is above it, the latter supported by a prop or fulcrum below it. See Mechanics.

Balance. See Clock and Watch.

Balance of power, originates from, and is maintained by the alliances of different nations, as their circumstances and interest may require. Bonaparte has of late years set at defiance all principles connected with this subject, by seizing the whole power and resources of Europe.

Balance of trade, the equal exportation of native commodities, and importation of foreign. When a nation imports to a greater extent than it exports, the balance of trade is said to be against it; that is, it loses by its trade. This is very clear. The native commodities of a nation are its income, its property; and it needs no subtile logic to discover, that where-ever purchases exceed the income, there is a tendency to bankruptcy. Where the income expended, and the purchases received, are equal, there is no increase of property, but a convenient interchange of commodity. He that having cultivated a plot of ground, instead of subsisting himself upon the produce, exchanges it for

that of some other soil, quantity for quantity, is obviously not the richer for his bargain: he has merely gratified his taste at the expence of his labour; his imports are eqnal to his exports; his expences are equal to his income. If he can obtain the foreign article for a part only of his native produce, his wealth is actually increased; his exports are greater than imports; his income is greater than his expences: but if he parts with his own native produce for a smaller quantity of foreign, he is a loser; his imports are greater than his exports; his expences are greater than his income.

Bale, in commerce, a cloth package of goods, and a customary quantity: thus, a bale of cotton yarn is from 300 to 400 weight.

Bale-goods, with English merchants, are such as are packed in bales; but the French give that name to certain indifferent hardwares that are sent to Paris.

Ball, in military affairs, comprehends all sorts of bullets for fire arms, from the cannon, to the pistol; those for pistols and small arms are made of lead, but cannon-balls are formed of cast iron, and they are distinguished by their calibres, thus

a ball that weighs	pound, has a diameter of
42	6·7 inches.
32	6·1
24	5·4
18	5·0
12	4·4
9	4·0
6	3·5
3	2·7
2	2·4
1	1·9

Ballad, a popular song, adopted to the lower class of the people. It is usually a simple tale, contained in three or four verses or stanzas.

Ball-*and-sock* instrument, is made to move horizontally, vertically, and obliquely, and used for surveying and astronomical instruments. Many of the joints in the human frame are on the principle of the ball-and-socket.

Ballast, heavy matter, as stone, gravel, iron, &c. thrown into the hold of a ship, to sink her to a proper depth in the water, that she may be capable of carrying a sufficient quantity of sail without over-setting. The ballast regulates the ship's center of gravity, upon the due situation of which her sailing and safety greatly depend.

In ballasting a ship, three considerations are to be kept in view: the centre of gravity, the centre of motion, and the *point-velique*, or centre abaft the foremast, upon which the ship pitches. In the arrangement necessary for these purposes, the model, size, and form of the ship, must be consulted. All descriptions of ships should be balanced on one point as much as possible; and the placing the cargo, ballast, guns, or whatever the ship is to contain, is one of the greatest secrets in naval tactics. In a ship, of whatever form, the ballast must be placed in such a manner as to unite, as much as possible, the three points already mentioned; but little practical knowledge on this subject can be acquired otherwise than from actual experience. As general rules, it may be observed that, in a sharp-built ship, the ballast should be as low as possible; and, in a flat one, the reverse.

Ballet, a characteristic dance, consisting of

three parts, the entry, the figure, and the retreat.

Balloon. See *Aerostation.*

Balloon, a round short-necked vessel used by the chemists for the process of distillation

Balloting, a method of voting secretly at elections, in which, as the voter may follow his inclination without making a public discovery of it, his choice has the better chance of being independent. *Ballot*, is a French word for a *little ball.* The voter puts into a box, or other receptacle, a white ball or a black one, according as he wishes to say, *yes* or *no.*

Balls, in electricity, are two pieces of cork, or pith of elder, nicely turned in a lathe to the size of a small pea, and suspended by linen or silken thread, intended as electromers, to discover small quantities of electricity.

Balls, in meteorology, luminous bodies, generally appearing at a great height above the earth, with much splendour. Their tract is usually from north to south, and their velocity is very great. See Meteoric Stones.

Ballustrade, a series or row of ballusters, joined by a rail; serving as well for rest to the elbows, as for a fence or inclosure to balconies, altars, staircases, &c. The heights of ballustrades vary according to circumstances.

Balneum, bath, in chemistry, a contrivance to modify and regulate the heat in various chemical processes, particularly distillations, by the use of different intermedia. When the degree of heat required is below that of boiling water, a vessel containing that fluid is interposed between the fire and the substance to be acted upon; and when a supe-

rior degree of heat is necessary, sand, or some other matter of a similar nature is employed.

Balsam, an oily, resinous or liquid substance, flowing either spontaneously, or by means of incision, from certain plants, and used in the cure of several kinds of wounds, diseases, &c. Thus we have the Balsam of Copaiva; the Balsam of Tolu: the Balsam of Peru. There are ikewise solid balsams, viz. Benzoin, Storax and Dragon's blood.

Baltic Sea, this may be reckoned an Inland Sea, that opens from the German Ocean, by an inlet pointing N. E. called the Skager Rack, and afterwards passing S. in what is called the Cattegat to the Sound of Elsinore, a narrow entrance, or Strait, where vessels pay tribute to Denmark. Thence the Baltic extends east, and north east, in 60° N. latitude, dividing into two branches, called the gulfs of Bothnia and Finland; the former reaching northward about 100, and the latter eastward, 70, leagues. Both of these gulfs are covered, or interrupted, by ice, during four or five months in winter. The greatest depth of the Baltic is said not to exceed 50 fathoms, and its shallowness gradually increases at the rate of 40 inches in a century. Tides are there unknown; and the waves are not of such magnitude as those of the German Ocean; but rising more abruptly, and in greater numbers, they are sometimes turbulent and dangerous. When violently agitated, this sea throws up, on the coasts of Courland and Prussia, amber in considerable quantities. In several places the variation of the magnetic needle is remarkable. In one place particularly, it points between the south-west and west; and in another it points to the north-west.

The water of the Baltic is not very salt, on account of the many rivers which discharge themselves into it. Some persons who have analysed it, assert that it does not contain more than $\frac{1}{30}$th part of salt; whereas other sea water often holds $\frac{2}{30}$ths parts.

Bamboo, a very large species of the arundo or cane; it grows about the tropical regions, and was a native of Asia, but it has long since been introduced into the West-India Islands. It is used in building, in making bridges, vessels, boxes, caps, baskets, mats, and other utensils and furniture. Paper is likewise manufactured from it: it is the common fence for gardens and fields, and is used for pipes to convey water wherever it is wanted. The leaves are generally put round the chests of tea which are sent to Europe from China, to form a kind of mat. The tender tops make a fine pickle.

Bamboo Habit, a Chinese invention, by which a person, who cannot swim, may easily keep himself above water. Four bamboos, two before and two behind their bodies, are placed horizontally, and project about twenty-eight inches. They are crossed on each side by two others, and the whole properly secured, leaving a space for their body; it is put over their heads, and tied secure in two minutes.

Banana, the fruit of the plantain, a species of palm. Dampier compares it, when stripped of its integuments, to a large sausage, in size and shape; and to fresh butter in winter, as to substance and colour. Its taste resembles that of an apple, or the pear called by some the *good christian*, which melts in the mouth like a marmalade.

Banditti, robbers who infest the southern parts

of the continent, in troops. They are persons who live wholly unconnected with established society; but not unmindful of a certain legislation among themselves. They have even obtained the character of scrupulous honor; and rendered themselves so powerful as not to be treated like common highwaymen. Unable to dislodge them from their fastnesses, especially in the neighbourhood of Mount Etna, it has been found expedient to make the best compromise. The prince of Villa Franca, as a matter of prudence, has declared himself their protector; and such of them as choose to leave their forests, even temporarily, are safe, and receive an unbounded confidence, which they have never been known to abuse. Travellers put themselves under their care; and, it is said, that no one who has done so, ever had cause to repent of the proceeding. The name *banditti* appears to have originated with *outlaws*, called *bannitti*, to the miserable policy of placing persons in which situation, the existence of these pillagers of society is, probably, to be ascribed.

Banian-days, a proverbial expression, imported from the Asiatic colonies, used for a short or indifferent dinner, or days on which no animal food is eaten; in allusion to the Banians, the mercantile cast among the followers of Brahma, who, believing in the metempsychosis or transmigration of souls, will not kill any living creature.

Bank, a repository for money, from *banco*, the Italian word for a *bench*; the Lombard Jews having introduced banking, by keeping benches in the market places, for the exchanging of money. Banks, in the principle upon which they are con-

ducted, differ very distinctly from each other. Thus, the banks of Amsterdam and Genoa are standards of good and true money, in opposition to the current value of the clipt and worn coin which an extensive trade renders almost the whole circulation of a small state. The value of bank or standard-money above that of currency, is called the *agio*. In speaking of money at Hamburgh and other places on the continent, we commonly hear of marks-*banco;* that is, standard, or sterling money. The banks of Scotland keep what are called cash accounts, lending sums of money to responsible persons, receiving small sums in payment, and discounting a proportionable part of the interest of the great sum from the day on which each of these small sums is paid in, till the whole be in this manner repaid. All merchants, therefore, and men of business, find it convenient to keep such cash accounts with them, and are, consequently, interested in promoting the trade of those companies by readily receiving their notes in all payments, and by encouraging those with whom they have any interest to do the same. The banks, when their customers apply to them for money, generally advance it in their own promissory notes. These, the merchants pay away to the manufacturers for goods, the manufacturers to the farmers for materials and provisions, the farmers to their landlords for rent; the landlords repay them to the merchants for the conveniences and luxuries with which they supply them; and the merchants again return them to the banks, in order to balance their cash accounts, or to replace what they may have borrowed: and thus, almost the whole mo-

ney-business of the country is transacted through the medium of these notes. The basis of all banking is the profitable use to which the banker or company can apply the capital which is deposited. An ordinary banker is a depositary in whose hands money is placed for convenience; and his business is chiefly that of discounting bills of exchange; that is, advancing money upon them before they are due. He deducts, upon whatever he advances, the legal interest till the bill shall become due. The payment of this bill, when due, replaces to the bank the sum that had been advanced, together with a clear profit to the amount of the interest. The banker who advances to the merchant whose bill he discounts, not gold and silver, but his own promissory notes, has the advantage of being able to discount to a greater amount, that is, to the extent of his credit, and is thereby enabled to make his clear gain of interest on so much a larger sum.

Added to this source of profit in money-dealings, there are others in the purchase and sale of bullion, foreign coin, &c. and on these foundations arose the

Bank of England. In the fifth and sixth years of William and Mary, [A. D. 1694, 1695] in consideration of a loan to government of 1,200,000*l.* at an interest of almost eight *per cent.* a company was incorporated by the name of the "Governors and Company of the Bank of England," with a restriction by which they were prevented from dealing in any other than money concerns. Thus commenced the national debt. This amount was the capital of the company; and the interest, ex-

clusive of its trade in bullion, &c. its profit. In the 8th and 9th of the same reign, this capital was augmented to 2,201,171*l.* 10*s.* In the 7th of Ann, it was increased to 4,402,343*l.* at which time the company advanced a loan of 400,000*l.* and in the year 1714, another of 1,500,000*l.* In the 3d of George II. the interest on their capital was reduced to 5 *per cent.* and in consideration of an annuity of 100,000*l.* they agreed to deliver up exchequer-bills to the amount of 2,000,000*l.*: which interest was afterward reduced from 5 to 4 *per cent.* and, some other annuities purchased by the bank being redeemed, the national debt was reduced to 1,600,000*l.* In 1742, this was doubled; a loan of 1,600,000*l.* being supplied. This latter sum was advanced at 3 *per cent.* and was that now called the 3 *per cent. annuities*: the debt was, therefore, 3,200,000*l*, the one half carrying 3 and the other 4 *per cent.*

In the year 1746, the company having in its possession unsatisfied exchequer-bills, and being also a creditor of government for money advanced on certain duties for licences to sell spirituous liquors by retail, amounting, together, to 986,800*l.* agreed to cancel the same in consideration of an annuity of 39,442*l.* the interest of that sum at 4 *per cent.* At this time, also, the company contracted to advance the farther sum of 1,000,000*l.* into the exchequer, for which it received exchequer-bills. In return for this assistance, it was empowered to add the sum of 986,800*l.* to its capital, the interest of which, as that of the other annuities, was reduced to three and a half *per cent.* till the 25th of December, 1757, and from that

time allowed to carry only three *per cent.* The company of the bank were formerly obliged to keep in constant readiness a sufficient quantity of specie to answer all ordinary and even extraordinary demands, this has been dispensed with since the year 1797. The charter of the bank extends to the year 1833: for a renewal of their charters they have always paid government large sums of money. The chief privilege consists in the prohibition of all other companies, of more than six persons: from issuing bills payable on demand, or for any time less than six months. The permanent debt due to the bank from government, is upwards of eleven millions, bearing three *per cent.* interest: the capital stock of the company is likewise more than eleven millions, on which they pay a dividend of 10*l. per cent.* to the proprietors. The profits of the company arise from the interest received from government on the permanent debt: on their annual advances on exchequer-bills, &c. from their allowance for receiving the contributions to loans, and for paying the dividends on the public funds; from dealing in bullion, and from their large discounts with a mere paper currency.

The affairs of this company are in the hands of a governor, deputy-governor, and twenty-four directors, who are annually elected by the general court.

Bankrupt, one who, having been engaged in trade, is unable, or unwilling, to pay his debts. In this case, the law takes the affairs of the insolvent man into its own hands; divides his property among his creditors as far as it will go; and releases him from the danger of farther molesta-

tion. Bankruptcy may either be forced upon a dishonest man, or coveted by an unfortunate one. In all cases, some act of bankruptcy must be committed, before a creditor can render his debtor a bankrupt; and an act of bankruptcy is an act of such a nature as evinces an intention on the part of the debtor to deprive his creditors of the security which they might have in the possession of his person or his property. As falling under this description, the following are considered as acts of bankruptcy. 1. Departing from the realm, whereby a man withdraws himself from the jurisdiction and coercion of the laws. 2. Departing from his own house, and thus secreting himself. 3. Keeping in his own house, except for just and necessary cause, so as not to be seen or spoken with by his creditors. 4. Procuring, or suffering himself willingly to be arrested, or outlawed, or imprisoned, without just and lawful cause. 5. Procuring his money, goods, and chattels, and effects to be attached or sequestrated. 6. Making any fraudulent conveyance of his property to a friend, or secret trustee. 7. Procuring any protection, not being himself privileged by parliament, to screen his person from arrest. 8. Endeavouring or desiring, by any petition to the king, or bill exhibited in any of the king's courts against any creditors, to compel them to take less than their just debts, or to procrastinate the time of payment originally contracted for. 9. Lying in prison for two months or more, upon arrest or other detention for debt; because the inability to procure bail argues a strong deficiency in his credit, owing either to his suspected poverty, or

ill character: and his neglect to give bail, if he is able to do so, can arise only from a fraudulent intention. 10. Escaping from prison, after an arrest for a just debt of 100*l.* or upward: since no man would break prison who was able and desirous to procure bail. 11. Neglecting to make satisfaction for any just debt by a trader having privilege of parliament.

It was held by sir John Holt, that a man's removing his goods privately to prevent their being seized in execution is not an act of bankruptcy: for this, though a palpable fraud, is not mentioned by the statutes. It has also been expressly determined, that stoppage or refusal of payment by a banker is no act of bankruptcy; because he may have good reason, as suspicion of forgery. He may, however, on being arrested, become liable, by committing the ninth act in the foregoing enumeration.

BANN, or BAN, a British word for a proclamation, is used for the public notification of an intended marriage. Unless a licence be obtained from the bishop, no marriage can be solemnized in England until the bann has been published three several times in the face of the congregations, in the parishes of the man and the woman: so that if there be any just reason why such marriage should not take place, due opportunity may be given for exception being taken.

BANN OF THE EMPIRE, is a sentence that may be passed by the diet upon a prince or free city of Germany, in consequence of which, till such bann be recalled, the rights and privileges of the city or sovereign are taken away.

Bannerer, an ancient order of knights or feudal lords, who, possessing several large fees, led their own flag or banner. As the spirit of the feudal system declined, persons came to be created bannerets, and hence the institution must have become merely titular. The last knight of this description was sir John Smith, on whom the honour was bestowed after Edgehill fight, for rescuing the standard of Charles the first.

Baptism, a rite of the Christian religion, by which the members of its church are received into the communion. It is sufficient to refer to the *book of common-prayer*. Almost all sects of Christians style baptism a sacrament, and consider its use as important; but the manner in which it ought to be performed, and the effects to be derived from it, have been subjects of much controversy. The Remonstrants and Socinians reduce baptism to a mere sign of divine grace. The Romanists, on the contrary, exalt its power; holding that by it all sin is entirely taken away; that it absolutely confers the grace of justification, and consequently grace, *ex opere operato*. Some also speak of an indelible or ruling character impressed on the soul by it; but this is held by others a mere chimera, for that the spiritual character conferred in regeneration may easily be effaced by mortal sins. Dodwell maintained, that it is by baptism the soul is made immortal; so that those who die without it will not rise again. It must be added, he restrains this effect to episcopal baptism alone. Some Christians, like the Jews, restrain baptism to the admission of new members into the church, and hold that it ought to be administered only to new converts, and

not to the children of persons already believers in Christianity. The Bramins baptize with this latter view, at certain seasons, in the river Ganges. The necessity of baptism to salvation, is grounded on the words of Jesus: "He that believeth and is baptized shall be saved;" and, "Except a man be born of water and of the spirit, he cannot enter into the kingdom of God;" but the primitive professors of Christianity do not, generally speaking, appear to have thought that the mere want of baptism, excluded man from the hopes of salvation.

Baptism, abusively, the ceremony of giving names to inanimate things; as the great bell of the Lateran, which was christened by pope John III. Among sailors, a ship is generally christened at the time of launching her; and a ceremony or custom observed on board merchantmen, when crossing the line, is known by this name. Persons and vessels that have not yet been under the line, are to be baptized. With respect to the ship, the office is very simple, and not less commendable: she is washed throughout with sea-water. As to the passengers, the mysteries require a more extended description. The oldest of the crew that has passed the tropic or line, comes with his face blacked, a grotesque cap on his head, and some sea-book in his hand, followed by the rest of the seamen, dressed like himself, each having some kitchen utensil in his hand, with drums beating: he places himself on a seat on the deck, at the foot of the mainmast; and at the tribunal of this mock magistrate each passenger not yet initiated, swears he will take care the same ceremony be observed whenever he is in the like circumstances.

Then, by giving a little money, by way of gratification, he is discharged, with a little sprinkling of water; otherwise he is heartily drenched with streams of water poured upon him. The ship boys are inclosed in a cage, and ducked at discretion. The seamen, on baptizing the ship, pretend to a right of cutting off the beak head, unless redeemed by the captain. It has been justly remarked, that it is politic in commanders to allow a frolic, which serves to relieve the tedium of a protracted voyage.

Baptists, a sect of Christians who maintain, in opposition to others, that the word *baptism* means *immersion*, and that, therefore, those who are only *sprinkled* are not *baptized*. The baptists in England form one of the denominations of protestant dissenters. In other respects, they separate from the established religion for the same reasons as other dissenters. In 1538, a proclamation was issued against them, and several were burnt in Smithfield. Baptism is administered in the Greek church in the manner approved by the baptists; and it is even so directed, though not insisted on, by the church of England. In the latter, it is dispensed with, under the idea of danger to the health of infants; and infant-baptism, in reality, is the true point in dispute.

Bar, in music, a stroke drawn perpendicular across the lines of a piece of music, including between each two a certain quantity or measure of time, which is various, as the time is either triple or complex. In common time, between each two bars is included the measure of four crotchets. The principal use of bars is to regulate the beating of time in a concert.

Barbacan, or Barbican, an outer defence to a city or castle, used especially as a defence to a city or walls; also an aperture made in the wall of a fortress, through which to fire upon an enemy.

Barber, one who makes a trade of shaving the beards and heads of men, and of making wigs, &c. Formerly the business of a surgeon was united to that of a barber, and he was denominated a barber-surgeon. This union of profession was dissolved by a statute of Henry VIII. by which the surgeons were formed into a distinct corporation, that existed till the late establishment of the royal college of surgeons of London. In England a musical instrument was part of the furniture of a barber-surgeon's shop, which was used by persons above the ordinary level of life, who resorted thither for the cure of wounds, for bleeding, or trimming, a word that signified shaving, and cutting, or curling the hair. Bleeding and tooth-drawing are now very commonly practised in country places by barbers; and the pole stuck out as the sign of their profession, is supposed to indicate the staff which is held in the patient's hand during the act of bleeding, and the fillet with which it is bound, represents that which binds the arm after the operation is completed.

Barca, a country of Africa, between Tripoli and Egypt. It is a barren desert, chiefly inhabited by some tribes of wandering Arabs. In this country stood the famous temple of Jupiter Ammon; and notwithstanding the pleasantness of the spot where it was erected, this part of the country is said to be the most dangerous of any, being surrounded with vast tracks of quick and burning sands, which are very detrimental to travellers; not only as

they sink under their feet, but being light, and heated by the rays of the sun, are easily raised by every trifling breeze of wind; which, if it be in their faces, almost burns their eyes out, and stifles them, or, if vehement, overwhelms them.

Bard, a poet of the earliest ages of society. The poet of more advanced periods differs from the bard, on account of the complexity of his subject and ideas, which render his verses unfit for musical performances. In the first stages of society, in all countries, bards have made a conspicuous figure; and the "light of the song" has been the morning-beam that first broke upon the darkness of ignorance: but no where does it appear, did ever verse and its professors receive so much public regard as under the druidical establishment; a regard with which they continued to be honoured long after that system had perished. We gather from Cæsar's observations, that it was part of the policy of the druids to prevent their songs from being committed to writing. In latter times, this restraint was removed; every one had access to them without a bard; and the profession, in consequence, sunk by degrees into oblivion.

Barilla, or Barhilha, the name of a plant cultivated in Spain for its ashes, which are used in making glass and bleaching linen. Mr. King, of Newcastle upon Tyne, has procured a patent for a composition which he calls British barilla, and which, he says, is superior to the Spanish for the making of crown window-glass, broad window-glass, and glass-bottles, and also in the manufacturing of soap and alum. The materials of which the British barilla is to be made are as follows:

"Take a certain quantity of ashes obtained by burning the loppings or branches of ash, or any other kind of green wood or bramble, and an equal quantity of the ashes obtained by burning the green vegetables known by the name of fern, brecon, bean and pea-straw, whins, common field and highway thistles, the stalks of rape or mustard-seed, or, the bent or rushes that grow by the sea-shore."

Good barilla is firm, hard, heavy, porous, dry, and sounds on percussion: it is of a blueish colour, and imparts a flavour at first slightly resembling that of a violet. The plants, about the time the seeds become ripe, are pulled up by the roots, and exposed in a suitable dry place, where they are tied up in bundles, and burned in an oven constructed for the purpose, where the ashes are continually stirred, while hot. The saline matter falls to the bottom, and on becoming cold, forms a hard, solid mass, which is afterwards broken into pieces of convenient size for exportation. The term British barilla is applied sometimes to kelp, a much more impure soda, and sometimes, though improperly, to pearlash, or the ashes of plants containing potash.

Bark, in the anatomy of plants, the exterior part of trees, corresponding to the skin of an animal. As animals are furnished with a *panniculus adiposus*, usually replete with fat, which invests and covers all the fleshy parts, and screens them from external cold; so plants are encompassed with a bark replete with fatty juices, by means whereof the cold is kept out, and in winter-time the spicules of ice prevented from fixing and freezing the juices in the

vessels: whence it is, that some sort of trees remain evergreen the year round, by reason their barks contain more oil than can be spent and exhaled by the sun, &c. It appears that trees stripped of their bark in the time of the sap, and suffered to die, afford heavier timber, more uniformly dense, stronger, and fitter for service, than if the trees had been cut down in their healthy state.

Bark, in medicine, see *Cinchona*.

Bark, a small vessel with two or three triangular sails. It carries about 200 tons.

Barley, a sort of grain, principally used in England in the state of malt, for brewing.

Pearl barley and *French barley*, barley freed from the husk by a mill; the distinction between the two being, that the pearl barley is reduced to the size of small shot, all but the very heart of the barley being ground away.

Barley-corn, the least of our long measures, being the third part of an inch.

Barm, or yeast, used in the composition of bread, to render it light. When the art of brewing became known, this ingredient, which is much better adapted to the purpose than any thing previously used, was discovered. It is the spume which arises on the surface of the beer in fermentation.

Barometer, a *measurer of weight*, an instrument for measuring the weight of the atmosphere, and of use in ascertaining and anticipating the changes of the weather, and also for measuring the heights of mountains, &c. The common barometer consists of a glass tube, hermetically sealed at one end, and filled with quicksilver, well purified, and purged of its air. The finger being then placed at the open

end, in immediate contact with the mercury, so as not to admit the least particle of air, the tube is inverted, and the lower end plunged into a bason of the same prepared mercury; then, upon removing the finger, the mercury in the tube will join that in the bason, and the mercurial column will rise in the tube to the height of 29 or 30 inches, according to the state of the atmosphere at that time. This is the principle upon which all barometers are constructed. Fig. 15.

Baron, at present, a peer of the lowest degree. Baron was a territorial title; and being attached to hereditary property, in its nature hereditary. In the feudal system, which was a complete aristocracy, or at best, an assemblage of petty states under one head, the barons naturally asserted their right to a share in the deliberations of a government which they undertook to support. Hence the origin of a parliament; and thus the territorial chiefs were peers of parliament. The word *baron* appears to be derived from *varo* or *baro*, a *stout, noble person*. Modern *lords of manors* are the remains of the original barons.

Barons of the Exchequer, the four judges to whom the administration of justice is committed in causes between the king and his subjects in matters concerning the revenue. They are not, as barons of the exchequer, peers of parliament.

Barons of cinque-ports, members of the house of commons, elected by the five ports, two for each port.

Baronet, the lowest degree of honour that is hereditary. The order was founded by king James I. at the suggestion of sir Robert Cotton, when 200

Fig.13. Corinthian

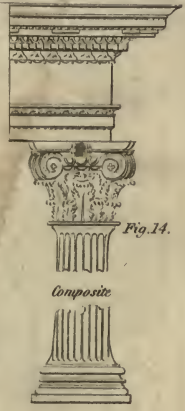


Fig.14. Composite

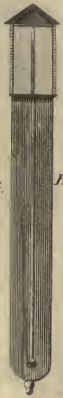


Fig.15. Barometer

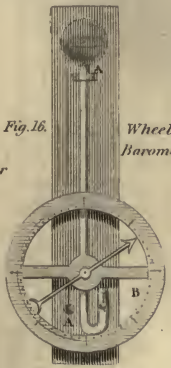


Fig.16. Wheel Barometer

Cooper sculp

baronets were created at once: to which number it was intended they should be always restrained: but it is now enlarged at the king's pleasure, without limitation. On their institution, they were allowed to charge their coat with the arms of Ulster in Ireland, which province they were to defend against the rebels, who then harassed it extremely: to which end they were each to raise and keep up 30 soldiers at their own expence for three years together, or to pay into the exchequer a sum sufficient to do it; which, at 8*d.* per day per head, was 1095*l.* So that, including fees, the expence of this dignity may be about 1200*l.* sterling. The baronetcies of Scotland, or of Nova Scotia in America, and of Ireland, were instituted with similar views to the advantage of the state.

Barrel, contains the eighth part of a ton of wine: of beer it contains 36 gallons.

Barrister, a counsellor learned in the law, admitted to plead at the bar, and there to take upon him the protection and defence of clients. They are termed *juris consulti;* in some countries *licentiate jure;* and anciently, barristers were called *apprentices* of the law: in latin, *apprenticii juris nobiliores.* In Scotland, they are called *advocates.*

Barrows, in ancient topography, artificial hillocks or mounts, met with in many parts of the world, and which, on being opened, are found to be repositories of the dead. When these mounts are composed of stones, they are usually distinguished by the name of *cairns.*

Baruch, (the prophecy of,) one of the apocryphal books, subjoined to the canon of the Old Testament. Baruch was the son of Neriah, who

was the disciple and amanuensis of the prophet Jeremiah. It has been reckoned part of Jeremiah's prophecy, and is often cited by the ancient fathers as such. Josephus tells us, Baruch was descended of a noble family; and it is said in the book itself, that he wrote this prophecy at Babylon; but at what time is uncertain.

Barytes, a very heavy mineral, common in many countries, especially in copper-mines. Formerly from its great weight it obtained the name of ponderous spar. It exhibits, when pure, the following properties. It has a sharp taste, changes vegetable blues to green, serves as an intermedium between oil and water, and in these respects it bears a strong resemblance to alkalies: when pure, it is infusible: it is between 3 and 4 times heavier than water. It will not unite with the alkalies.

Basaltes, in natural history, hard stone, chiefly black or green. The most remarkable property of this substance is its figure, being never found in strata, like other marbles; but always standing up, in the form of rectangular columns composed of a number of joints, one placed upon and nicely fitted to the other, as if formed by the hand of a skilful workman. Basaltes was originally found in columns in Ethiopia, and fragments of it in the river Tmolus, and some other places. We now have it frequently both in columns and small pieces, in Spain, Russia, Poland, near Dresden, and in Silesia: but the noblest store in the world seems to be that called the Giant's causeway, in Ireland, and Staffa, one of the western isles of Scotland. It has been considered by some as a crystalization from water, but others strenuously maintain that it is only a spe-

cies of lava. It is commonly found in the neighbourhood of volcanoes.

Base, in chemistry, a term used to denote the earth, the alkali, or the metal of which a salt is formed in union with oxygen: thus, in the oxyde of iron or copper, the iron or copper is the base.

Base, in architecture, is used for any body which bears another, but particularly for the lower part of a column and pedestal. The base of columns is differently formed in different orders: thus, the Tuscan base consists only of a single torus, besides the plinth: the Doric has an astragal more than the Tuscan: the Ionic has a large torus over two slender scotias, separated by two astragals: the Corinthian has two toruses, two scotias, and two astragals: the Composite has an astragal less than the Corinthian: the Attic base has two toruses and a scotia, and is proper for either the Ionic or Composite columns.

Bashaw, a dignity under the Turkish government. *Bashaw*, used absolutely, denotes the prime vizier; other bashaws, which are generally governors of provinces or cities, being distinguished by the name of the place under their command. The appellation is given by way of courtesy to almost every person of any figure at the Grand Signior's court.

Basilisc, in zoology, the trivial name of a species of lizard.

Basilisc, a fabulous kind of serpent. Kirchmayer and Van der Wiel have given the history of the basilisc, and detected the folly and imposture of the traditions concerning it. In some apothecaries' shops there are little dead animals shewn, which are said to be basilisces: but these appear to be a kind of

bird, almost like a cock, but without feathers: its head is lofty, its wings are almost like a bat's, its eyes large, and its neck very short. As to those shown and sold at Venice, and in other places, they are only thornbacks, artificially put into a form like that of a young cock, by stretching out their fins, and furnishing them with a little head and hollow eyes.

Basilisc, a large piece of ordnance, originally so named in allusion to its form.

Bass, the lowest in the four parts of music. Of all the parts, this is the most important; and it is upon this that the chords proper to constitute a particular harmony are determined. Hence the maxim among musicians, that when the base is properly formed, the harmony can scarcely be bad.

Basso-relievo, or low-relief, is opposed to *alto-relievo*, or high-relief. Basso-relievo is a piece of sculpture where the figures or images do not protuberate far beyond the body on which they are formed.

Bastile, denotes a small castle, fortified with turrets. Such was the Bastile of Paris, which was the last castle that retained that name. This was begun to be built in 1339, by order of Charles V. nd finished in 1383, under the reign of his successor. It was used as a state prison; and, in its administration, appears to have been a political inquisition.

Formerly, the Bastile was never mentioned in England unaccompanied by expressions of abhorrence: but recent circumstances have gained it so many friends on the one hand, and so many enemies on the other, that a plodding lexicographer

may scarcely venture to repeat the information that he can obtain from any source whatever. Every report is to be suspected. In the *Supplement to the Encyclopedia Britannica*, however, it is said that, the Bastile being considered as an engine of the ordinary police, not only the ministers of state, not only the magistrates, but every clerk, and even inferior officer, had in his power to procure the confinement of any individual he pleased within the walls of that prison. If this information be correct, no other evidence can be necessary to furnish a true estimate of the Bastile. It might be easy to argue the utility of intrusting to the hands of government authority to confine those whom it may know to be dangerous to its existence; but that the hands thus intrusted, should so far betray the confidence reposed, as to permit "every petty pelting officer" to wield its sacred thunder, is a circumstance so palpably scandalous as almost to exceed belief. The Bastile in Paris was gloriously demolished on July 14th, 1789: it is not one of the least faults of Buonaparte, that instead of one, he has erected eight to confine the objects of his suspicion.

Bastion, in modern fortification, a huge mass of earth, usually faced with sods, but sometimes with brick, and, in a few instances, with stone, standing out from a rampart, whereof it is a principal part, and what, in ancient fortification, was called a bulwark.

Bath, a receptacle of water for persons to wash or plunge in, for health or pleasure. Baths are distinguished into hot and cold; and these again are either natural or artificial. The natural hot baths

are formed of the water of hot springs, of which there are many in different parts of the world; especially in countries where there are, or evidently have been, volcanoes. The artificial hot baths consist of either water or some other fluid, made hot by art. The cold bath consists of water, either fresh or salt, in its natural degree of heat; or it may be made colder by art, as by a mixture of nitre, sal-ammoniac, &c. The chief natural hot baths in Great Britain are those of Bath and Bristol, in Somersetshire; and those of Buxton and Matlock, in Derbyshire; which latter, however, are rather warm or tepid, than hot. The use of these baths is found beneficial in diseases of the head, as palsies, &c. in cuticular diseases, as leprosies, &c. in obstructions, and constipations of the bowels, the scurvy and the stone, and in most of the diseases of women and children. The baths have performed many remedies, and are commonly used as a last resort in obstinate chronic diseases, where they succeed well, if they agree with the constitution of the patient: but whether they will agree or not, can only be known by trial.

Knight of the Bath, a title of honour in England; not hereditary, derives its origin from the days of chivalry. The order consists of the sovereign and thirty-seven knights companions. The name of "the bath" originates in a custom, said to be still continued, of *bathing*, among other preparatory solemnities. "The bath and white garment of the novice," says Gibbon, "were an indecent copy of the regeneration of baptism." The apparel of a knight of the bath is a red surcoat, lined and edged with white, girded about with a white girdle, with-

out any ornament thereon; the mantle is of the same colour and lining, made fast about the neck with a lace of white silk, having a pair of white gloves tied therein, with tassels of silk and gold at the end; which mantles are adorned upon the left shoulders with the ensign of the order, being three imperial crowns, or, surrounded with the ancient motto of this knighthood, *Tria juncta in Uno* ("Three in One"), wrought upon a circle, gules, with a glory, or rays, issuing from the centre, and under it the lace of white silk heretofore worn by the knights of the bath. They have red breeches and stockings, and white hats, with a plume of white feathers thereon.

Battalion, a small body of infantry, ranged in form of battle, and ready to engage.

Battalion, in number, is usually from 400 to 800 men; but the number is not determined. It is divided into thirteen companies, one of which is composed of grenadiers. They are usually drawn up three men deep. Some regiments consist of but one battalion; others are divided into four or five.

Battering-ram, a military engine used before the invention of gunpowder, to beat down the walls of places besieged. It consisted of a vast beam suspended to a frame, and armed at one end with a head of iron, resembling that of a ram; from the butting of which animal the idea was doubtless derived. This being equally balanced, and furnished with a number of ropes, at the extremity opposite to the ram's head, a great number of men threw it forward with violence, and thus *battered in breach*.

Battery, in the military art, a parapet thrown

up to cover the gunners and men employed about the guns from the enemy's shot. This parapet is cut into embrasures, for the cannon to fire through. A *battery of mortars* is sunk in the ground, and has no embrasures. *Cross-batteries* are two batteries which play athwart one another upon the same object, thus forming an angle, and beating with great effect, because, what one ball shakes the other beats down. A battery sunk or buried, is where the platform of which is sunk or let into the ground, so that there must be trenches cut in the earth, against the muzzles of the guns, for them to fire out at, and to serve for embrasures. *Battery d'enfilade*, is one that scours or sweeps the whole length of a straight line. *Battery en echarpe*, is that which plays obliquely. *Battery de revers*, that which plays on the enemy's back. *Camerade battery*, is when several guns play at the same time upon one place.

Battery, in electricity, is a combination of coated surfaces of glass, commonly jars, so connected together that they may be charged at once, and discharged by a common conductor. Dr. Priestley describes a complete battery. This consists of 64 jars, each 10 inches long, and 2½ inches in diameter, all coated within an inch and a half of the top, forming in the whole about 32 square feet, of coated surface. A piece of very fine wire is twisted about the lower end of the wire of each jar, to touch the inside coating in several places; and it is put through a pretty large piece of cork, within the jar, to prevent any part of it from touching the side, by which a spontaneous discharge might be made. Each wire is turned round

so as to make a loop at the upper end; and through these loops passes a pretty thick brass rod, with knobs, each rod serving for one row of the jars; and these rods are made to communicate together by a thick chain laid over them, or as many of them as may be wanted. The jars stand in a box, the bottom of which is covered with a tin plate: and a bent wire touching the plate passes through the box, and appears on the outside. To this wire is fastened any conductor designed to communicate with the outside of the battery; and the discharge is made by bringing the brass knob to any of the knobs of the battery. When a very great force is required, the size or number of the jars may be increased, or two or more batteries may be used.

Battery Galvanic, or Pile, an apparatus employed for accumulating the electricity of galvanism, which is produced by the mutual agencies of certain metallic and carbonaceous substances, and peculiar fluids. It was invented by the celebrated Volta, from whose labours the new science of galvanism has derived many advantages and much improvement.

Bavaria, a duchy and electorate in Germany. It is the most considerable part of the circle of Bavaria, and is bounded on the north by the palatinate of Bavaria, Bohemia, and the duchy of Neuberg, on the west by Suabia, on the south by Tyrol, and on the east by the archbishopric of Saltsburg, the bishopric of Passau, and Austria. This electorate is about one hundred and twenty miles from east to west, and one hundred and five from north to south. It is watered by a great number of rivers, whereof the principal are the Inn, the Iser, and

the Lech. It contains thirty-five cities, ninety-four market towns, eight bishoprics, seventy-five convents, eleven thousand and seventy-four villages, and twenty-eight thousand seven hundred and nine churches. The air is healthy and temperate; the soil produces a little wine, some corn, and good pastures. There are likewise some mines. It was raised to the dignity of an electorate in 1623.

Bayonet, in the military art, a short three-sided dagger, formerly with a round handle, fitted for the bore of a firelock, to be fixed there after the soldier had fired; but they are now made with iron handles and rings that go over the muzzle of the firelock, and are screwed fast, so that the soldier fires with his bayonet on the muzzle of his piece, and is ready to act against the horse. This use of the bayonet fastened on the muzzle of the firelock was a great improvement, first introduced by the French, and to which, according to the chevalier Folard, they owed a great part of their victories in the last century; and to the neglect of this, in the next succeeding war, and trusting to their fire, the same author attributes most of the losses they sustained.

Bays, in commerce, a sort of open woollen stuff, having a long nap, sometimes frized, and sometimes not. This stuff is without wale; and is wrought with two treddles, like flannel. It is chiefly manufactured at Colchester and Bocking in Essex, where there is a hall called the Dutch Bay-Hall, or Raw-Hall. This manufacture was first introduced into England by the Flemings, who being persecuted by the duke of Alba, on account of their religion, fled hither about the fifth of queen Elizabeth's reign.

Bazar, or Basar, also called *bezestin*, is a kind of exchange or market place among the Turks and Persians. Some of these buildings are remarkable, not only for their extent, but for their magnificence.

Bdellium, a gummy resinous juice, produced by a tree in the East-Indies, of which we have no satisfactory account. It is brought into Europe from the East Indies, and from Arabia. As a medicine, in which quality it is brought to market, it is better in its simple state, than when formed into any preparation. It is one of the weakest of the deobstruent gums, but it is used as a pectoral, and emmenagogue.

Beacon, any object serving as an occasional signal, or as a constant sea-mark, by means of which ships may be warned of danger, or assured of their port. The king has the exclusive power, by commission under his great seal, to cause them to be erected in fit and convenient places, as well upon the lands of the subject as upon the demesnes of the crown; and, by statute 8 Eliz. c. 13. the corporation of the Trinity-house is impowered to set up any beacons or sea-marks wherever it shall think them necessary; and if the owner of the land, or any other person, shall destroy them, or shall take down any steeple, tree, or other known sea-mark, he shall forfeit 100*l.* or, in case of inability to pay it, be, *ipso facto*, outlawed.

Beadle, from the Saxon *bydel*, a messenger of a court, who cites persons to appear and answer. This officer is sometimes called a *summoner* or *apparitor*. *Beadle* is also an officer at a university, whose chief business is that of walking before the

masters with a mace, in all public processions. There are also church-beadles, whose duty it is to preserve order, to attend the minister, and to act as messengers on parochial affairs.

Bean, a vegetable, the seed of which is used for food. Among the ancients, many prohibitions were uttered against them, by various teachers. The reasons upon which they were thus interdicted are not clearly understood by the moderns. The precept of Pythagoras, "Abstain from beans," has been variously interpreted. It is generally supposed to have some hidden meaning. Beans were used in balloting for public offices; and hence some have imagined that Pythagoras, in reality, charged his disciples not to meddle with the affairs of the state. For whatever reason, beans appears to have been held by several nations in aversion, and even abhorrence. Cicero suggests, that they are unfavourable to tranquillity of mind.

Bearing, in navigation and geography, the situation of one place from another, with regard to the points of the compass, or the angle, which a line drawn through two places, makes with the meridians of each.

Beaver, See *Castor*.

Beauty, a general term for whatever excites in us pleasing sensations, or an idea of approbation. Hence the idea annexed to beauty may be distinguished into ideas and sensations, the former of which occupy the mind; the latter affect the heart: thus an object may please the understanding without interesting the sense; and, on the other hand, we perceive agreeable sensations, excited by some objects, whose ideas are in no way related to any

thing that is praiseworthy. Beauty, as opposed to deformity, is as goodness to evil, as truth to falsehood, or as right to wrong, and may, therefore, be considered as an outward demonstration, given by the Almighty to bring us, by analogy, to the contemplation of those divine attributes, by which we are bound to regulate our lives in this material world, that we may thereby be fitted for happiness in another.

Bee, in natural history, an insect described as having a mouth furnished with jaws, and an inflected proboscis, with two bivalve sheaths; wings flat and without plaits; sting, in the female and neutral insects, concealed. The history of this insect is full of wonders, our limits will allow us to say but little. We shall begin with the new colony, which a hive sends forth about June. Before they come off, they commonly hang about the mouth of the hole, or door of the hive, for some days, as if they had not room, and were of themselves unwilling to stir. The swarm consists of three classes, one or more females, males, and drones, which are supposed to be of no sex. They commonly come off in the heat of the day, often immediately after a shower. At first they seem to fly about in great confusion, but they soon appear to be directed to some fixed place, and whenever the stand is made, they immediately repair to it till they are all collected. When they have fixed on a future habitation, they immediately begin to make their combs. The comb seems, at first, to be formed for propagation, and the reception of honey to be only a secondary use. As soon as a few combs are formed, the female bee begins laying her

eggs. From the time of laying, to the birth of the bee, the life of the maggot, and the life of the chrysalis, is shorter than in most insects. When they hatch, we find the young maggot lying coiled up in the bottom of the cell, surrounded with a transparent fluid. There is now additional employment for the labourers, viz. the feeding and nursing the young maggots. The maggots grow larger and larger till they nearly fill the cell, and by this time they require no more food, and are ready to be enclosed for the chrysalis state; when perfectly enclosed the insect begins to line the cell with a silk, which it spins out similar to the silk-worm, and which makes a kind of pod for the chrysalis. Having completed this lining, they cast off the last maggot coat which is deposited at the bottom of the cell, and become chrysalises. In this state they are forming themselves for new life, and are so entirely changed, that not the smallest vestige of the old form remains.

Beg, or *begh*, pronounced *bey*, a Turkish governor. The political constitution of Turkey and its dependencies is feudal; and, every chief being thus rather a federalist than a subject, attempts at independence are frequent, and scarcely less frequently successful. In Egypt, the *Beys* are Mamelukes, whose submission to the Porte has been always precarious. Their respect for the Sultan's Pacha, or viceroy, is but little; and especially for some years past, they have scarcely ever rendered the tribute, or revenue, required. These defalcations, it is said, have facilitated the attempt which France, as well under its monarchy, as in a republican state, has long designed to make, for obtaining this

valuable country. It is asserted, that the invasion of the French took place in consequence of an agreement made between ministers on the part of France, and a Turkish ambassador, the stipulations of which were, that the French should pay the same tribute to the Sultan as that which was expected from the Beys; and it may be presumed, that the policy of this concession rested on the consideration, that no nation could be less punctual than the Beys themselves. Several members of the divan, on their part, promised to throw no obstacle in the way of the expedition to Egypt; and a secret plan was adopted for regulating matters with the Turkish government, the whole of which, it is not pretended, had any knowledge of the transaction, not even the Sultan himself. This intrigue, it is added, being counter-intrigued by Russia and her allies, the favourers of the French lost their influence in the counsels of the Porte, a new prime vizier came into office, and the resistance that has followed was the consequence.

Bell, a well known machine, ranked by musicians among the musical instruments of percussion. The constituent parts of a bell are the body or barrel, the clapper on the inside, and the ear or cannon by which it hangs to a large beam of wood. The matter of which it is usually made is a composition called bell-metal. The thickness of a bell's edges is usually $\frac{1}{15}$ of the diameter, and its height 12 times its thickness.

The sound of a bell is generally conjectured to consist in a vibratory motion of its parts, much like that of a musical chord. The stroke of the clapper must necessarily change the figure of the bell, and

of a round make it oval: but the metal having a great degree of elasticity, that part will return back again which the stroke drove farthest off from the centre, and that even some small matter nearer the centre than before; so that the two parts which before were extremes of the longest diameter, do then become those of the shortest; and thus the external surface of the bell undergoes alternate changes of figure, and by that means gives that tremulous motion to the air in which the sound consists. Bell-metal is composed of three parts of copper and one of tin.

Belles-lettres, that description of literature which has a peculiar reference to matters of taste. The term is used in a very vague manner, and made, by different writers, to comprehend almost every species of literature; yet, surely, there are objects that present themselves to the mind of a man of taste, which, if they be not understood by the term *belles-lettres*, deserve some other peculiar name. Such, for instance, as can answer no other purpose than that of gratifying the elegant curiosity of *vertû*. It is intended to be inferred, that all writings connected with *vertû* belong peculiarly to *belles-lettres*. Sometimes we are told that by the *belles-lettres* is meant the knowledge of the arts of poetry and oratory; sometimes that the true *belles-lettres* are natural philosophy, geometry, and other essential parts of learning; and sometimes, that they comprehend the art of war, by land and sea: in short, they are made to include all that we know, and whatever we please. Some comprehend under the term all those instructive and pleasing sciences which occupy the memory and the

judgment, and do not make part either of the superior sciences, of the polite arts, or of mechanic professions: hence they make history, chronology, geography, genealogy, blazonry, philology, &c. the *belles-lettres*. It were an endless task to attempt to enumerate all the parts of literature which different learned men have comprehended under this title. Nor would it be of any use to the reader for us to pretend to fix the true import of the term. Whatever arts or science, it may be supposed to include, they are severally explained in the course of this work. The reader may also consult Blair's Lectures on Rhetoric and *Belles-lettres*, and Rollin on the *Belles-lettres*.

Bellows, a machine so contrived as to expire and inspire the air by turns, by enlarging and contracting its capacity. This machine is used in chambers and kitchens, in forges, furnaces, and founderies, to blow up the fire: it serves also for organs and other pneumatic instruments, to give them a proper supply of air. All these are of various constructions, according to their different purposes; but in general they are composed of two flat boards, sometimes of an oval, sometimes of a triangular figure: two or more hoops, bent according to the figure of the boards, are placed between them; a piece of leather, broad in the middle, and narrow at both ends, is nailed on the edges of the boards, which it thus unites together; as also on the hoops which separate the boards, that the leather may the easier open and fold again: a tube of iron, brass, or copper, is fastened to the undermost board, and there is a valve within, that covers the hole in the underboard to keep the air from escaping.

Belts, in astronomy, zones or girdles surrounding the planet Jupiter, brighter than the rest of his body, and terminated by parallel lines. They are observed to be sometimes broader and sometimes narrower, and not always exactly in the same part of the disc. Jupiter's belts were first observed by Huygens. Dark spots have been seen on these belts, and M. Cassini observed that one was permanent on the northern side of the most southern belt, by which he first determined the length of Jupiter's days, or the time in which he revolves upon its axis. Some astronomers suppose that these belts are seas which alternately cover and leave bare large tracts of the planet's surface: and that the spots are gulphs in those seas, and it has been alledged that the spots are the shadows of Jupiter's satellites.

Benares, a country or subah of Hindostan, bounded on the north and north-west by Oude, on the east by Bahar, and on the south by the Orissa, about 120 miles long, and 100 broad: the principal towns are, Benares, Jionpour, Gazypour, Merzapour, and Chunar; the soil is fertile, and the country populous: it was ceded to the English in the year 1775, and produces a revenue of near 400,000*l.* a year.

Benefice, in the middle ages, any landed property or fee. After military fees became hereditary, these were called *feuds*, and the name *benefice* remained appropriate to the fees of the clergy. This fee is the revenue of a living, and is now styled indiscriminately a *benefice*, or a *living*. Benefices began about the year 500. The following account of those in England, is given as the fact by Dr.

Burn, viz. that there are 1071 livings not exceeding 10*l. per annum;* 1467 livings above 10*l.* and not exceeding 20*l. per annum;* 1126 livings above 20*l.* and not exceeding 30*l. per annum;* 1049 livings above 30*l.* and not exceeding 40*l. per annum;* 884 above 40*l.* and not exceeding 50*l. per annum.* Consequently, 5597 livings under 50*l. per annum.* It must be 500 years before any living can be raised to 60*l. per annum*, by queen Ann's bounty; and 339 years before any of them can exceed 50*l. per annum.* On the whole, there are above 11,000 church preferments in England, exclusive of bishoprics, deaneries, canonries, prebendaries, priest-vicars, lay-vicars, secondaries, &c. belonging to cathedrals or choristers, or even curates to well beneficed clergymen.

BENEFICE *in commendum*, is that the direction and management of which, upon a vacancy, is given, or confided to an ecclesiastic, till a proper incumbent be found.

BENEFIT *of clergy*, that is *benefit of learning;* a *clerk* formerly signifying a *literate* man. This was a privilege antiently extended to felons, who were intitled to exemption from death if they could read and write. At present, this privilege produces two descriptions of felony; the higher crimes being declared *death* without *benefit of clergy;* that is, in these cases the privilege is not allowed. Some of the lesser crimes are called *felonies with benefit of clergy*, to conviction of which sentence of death is not attached.

BENIN, a kingdom of Africa, bounded on the W. by Dahomy, and the Atlantic, on the N. by Biafara, on the E. by parts unknown, and on the S. by

Loango. It extends from about 1° S. latitude to 9° N. lat. The country exhibits many beautiful landscapes; but the air is noxious and even pestilential, on account of the gross vapours exhaled from the marshes by the heat of the sun. The dress of the natives is generally neat; and indeed the women aim at variety and taste in their dress. The people are skilful in making many sorts of dies, and they manufacture and export cotton cloths. Polygamy is allowed among them, and the number of wives is limited by the state of their circumstances only. Their religion is paganism. Their king is absolute, and has a great number of petty princes under him.

Benzoin. Gum Benjamin. This substance is classed, by modern chemists, amongst the balsams. There are two kinds of *benzoin*: benzoe amygdaloides, which is formed of white tears, resembling almonds, united together by a brown matter; and common *benzoin*, which is brown and without tears. The tree which affords this balsam is the styrax *benzoin*, from which it is obtained by incision. The *benzoin* of the shops is usually in very large brittle masses. Easily soluble in alcohol. When chewed, it imparts very little taste, except that it impresses on the palate a slight sweetness; its smell, especially when rubbed or heated, is extremely fragrant and agreeable.

Berberis, or Barbary tree, in botany, is a shrub rising to eight or ten feet high, well known as an ornamental shrub in our gardens. The leaves are a grateful acid; the flowers at a distance yield a pleasant smell, but very near they are rather offensive. The berries are so very acid that the birds

seldom touch them; they are used in this country as pickles and preserves. The roots of the shrub boiled in lye yield a fine yellow, which is used in Poland for dying leather: the bark, with the aid of alum, is used for the same purpose. Insects of various kinds are remarkably fond of the flowers of the barberry. The bees, in searching for honey, touch the filaments, and the anthers approximate to the stigma, and explode the pollen. Dr. Smith, our great English Linnæus, has given the following account of this curious phenomenon. "The stamens of such flowers as are open, bend back to each petal, and shelter themselves under their concave tips. No shaking of the branch has any effect on them; but if the inside of the filaments be touched with a small stick, they instantly spring from the petal and strike the anther against the stigma. The outside of the filament has no irritability, nor has the anther itself any, as may be easily proved by touching either of them with a blunt needle, bristle, &c. If the stamen be bent to the stigma, and by means of a pair of scissars applied to the anther, no contraction of the filament is produced. Hence the spring of the stamens is owing to a high degree of irritability in the side of the filament next the germ, by which, when touched, it contracts, that side becomes shorter than the other, and consequently the filament is bent towards the germ. This irritability is perceptible in all ages of the flower. If the germ be cut off, the filaments will still contract, and nothing being in their way, will bend over quite to the opposite side of the flower. After irritation the stamens will return to their original place. The purpose of this contri-

vance is evident. In the original position of the stamens, the anthers are sheltered from rain by the concavity of the petals. Thus they probably remain, till some insect coming to extract the honey from the base of the flowers, thrusts itself between the filaments, and almost unavoidably touches them in the most irritable part: thus the impregnation of the germ is performed, and as it is chiefly in fine bright sunny weather that insects are on the wing, the pollen is also in such weather most fit for the purpose of impregnation."

Bereans, a sect of Christians, who profess to follow the example of the ancient Bereans, in building their faith and practice upon the Scriptures alone, without regard to any human authority whatever. This is the only true principle of Christianity, to which every disciple of Christ should adhere, under all circumstances. It is this which gives value to our privileges above those of our ancestors: from them, the Bible was hidden, by existing only in an unknown language, to us the book is presented from our earliest infancy, and we shall be without excuse, if we suffer any power, any authority, to impose upon us articles of faith that are not manifest in the Scriptures.

Beryll, a mineral, is noticed on account of its properties. It is of a green colour, in all its shades. It is crystallized in six-sided prisms, which are perfect or truncated on the edges and angles. It is nearly as hard as the topaz, and can scarcely be melted without the addition of some other substance. With borax, it melts easily. It becomes electrical by rubbing, and is found in primitive rocks, accompanied with quartz, felspar, garnet,

mica, fluor-spar, and topaz. The most beautiful specimens are brought from China and the Brazils. When pure, they are cut into rings and necklaces.

Beta, the beet root, in botany, consists of three or four species, two of which are mentioned on account of their utility. The first is the common beet-root of our gardens, which produces very large and broad leaves of red or deep purple colour. The value of these roots depend upon their size and colour. The leaves of the white beet are eaten as spinach, and the stalks are sometimes stewed and brought to table as a substitute for asparagus. A large variety of it has lately been introduced from abroad, under the title of the "root of scarcity." It is much cultivated on the continent: the leaf and root afford capital nourishment for man and cattle. It is said not to be liable to any attacks from insects, nor to be affected by drought. The leaves and root of a single plant will yield from twelve to fifteen or eighteen pounds of food.

Betula, the *birch-tree*. The trees of this genus most commonly known, are the *birch* and the *alder*. All the betula love a moist soil. The birch is applied to an infinity of uses. A wine is drawn, by tapping, from the trunk, by the natives of Canada; and, in Europe, wine is made from the fruit of the alder. The birch, though the worst of timber, is manufactured into vessels of various domestic uses. It makes capital charcoal. The inner silken bark which peels off annually, was formerly used for writing on, before the invention of paper. In the northern climates the coarse bark is used instead of tiles or slates for the covering of houses. It is also used in certain processes of dying, and for tanning

leather. In Kamtschatka, they form the bark into hats and drinking cups. One great advantage in the birch, is, that it will grow where scarcely any thing else will thrive, and thus, almost barren land may be made to bring in a certain income of at least 20*s*. per acre. Broom makers are constant customers for the twigs, and hoop benders for the larger branches, and for the trunks, the turners and manufacturers of instruments of husbandry have a constant demand.

Bevel, among masons, carpenters, &c. a kind of square, one leg whereof is frequently crooked, according to the sweep of an arch or vault. *Bevel-angle*, any other angle than those of 90 and 45 degrees.

Bey. See *Beg*.

Bezoar, a general name for certain animal substances, supposed to be effectual in preventing the fatal consequence of poison. The bezoar spoken of in the *materia medica* is considered as a calculous concretion found in the stomach of animals of the goat kind: though some authors insist that all stones sold under this name are artificial.

Bible, a name applied by Christians by way of eminence to the collection of sacred writings, or the Holy Scriptures of the Old and New Testaments, known also by various other appellations, as, the Sacred Book, Holy Writ, Inspired Writings, &c.

The sacred volume, including the Old and New Testaments, is justly looked upon as the foundation of the Jewish as well as the Christian religion. The Jews, it is true, acknowledged only the Scriptures of the Old Testament, the correcting and publishing of which, is unanimously ascribed, both

by the Jews and Christians, to Ezra. Some of the ancient fathers, on no other foundation than that fabulous and apocryphal book, the second book of Esdras, pretend, that the Scriptures were entirely lost and destroyed at the Babylonish captivity, and that Ezra restored them all again by divine revelation. What is certain, is, that in the reign of Josiah there was no other book of the law extant, besides that found in the temple by Hilkiah; from which original, by order of that pious king, copies were immediately written out, and search made for all the other parts of the Scriptures (2 Kings, XXII.;) by which means copies of the whole became multiplied among the people, who carried them with them into their captivity. After the return of the Jews from the Babylonish captivity, Ezra got together as many copies as he could of the sacred writings, and out of them all prepared a correct edition, disposing the several books in their proper order, and settling the canon of scripture for his time. These books he divided into three parts, viz. 1. The Law. 2. The Prophets. 3. The Cetubim or Hagiographia, that is to say, The Holy Writings.

I. The Law contains—1. Genesis. 2. Exodus. 3. Leviticus. 4. Numbers. 5. Deuteronomy. II. The writings of the Prophets are, 1. Joshua. 2. Judges, with Ruth. 3. Samuel. 4. Kings. 5. Isaiah. 6. Jeremiah, with his Lamentations. 7. Ezekiel. 8. Daniel. 9. The twelve minor Prophets. 10. Job. 11. Ezra. 12. Nehemiah. 13. Esther. III. The Hagiographia consists of, 1. The Psalms. 2. The Proverbs. 3. Ecclesiastes. 4. The Song of Solomon. This division was

made for the sake of reducing the number of the sacred books to the number of the letters in their alphabet, which amount to 22. At present, the Jews reckon 24 books in their canon of scripture, in disposing of which the Law stands as it did in the former division, and the Prophets are distributed into the former and latter Prophets.

The former Prophets are, Joshua, Judges. Samuel, Kings. The latter Prophets are, Isaiah, Jeremiah, Ezekiel, and the 12 minor Prophets. And the Hagiographia consists of the Psalms, the Proverbs, Job, the Song of Solomon, Ruth, the Lamentations, Ecclesiastes, Esther, Daniel, Ezra, the Chronicles.—Under the name of Ezra they comprehend Nehemiah.

The division of the Scriptures into chapters, as we at present have them, is of much later date. Some attribute it to Stephen Langton, archbishop of Canterbury, in the reigns of John and Henry III. But the true author of the scheme was Hugo de Sancto Caro, commonly called Hugo Cardinalis, because he was the first Dominican that ever was raised to the degree of cardinal. This Hugo flourished about the year 1240. He wrote a Comment on the Scriptures, and projected the first Concordance, which is that of the vulgar Latin Bible. The aim of this work being for the more easy finding out any word or passage in the Scriptures, he found it necessary to divide the book into sections, and the sections into subdivisions; for till that time the vulgar Latin Bibles were without any divisions at all. These sections are the chapters into which the Bible has ever since been divided. But the subdivision of the chapters was not then into verses as

it is now. Hugo's method of subdividing them was by the letters A, B, C, D, E, F, G, placed in the margin at an equal distance from each other, according to the length of the chapters. The subdivision of the chapters into verses, as they now stand in our Bibles, had its origin from a famous Jewish rabbi, named Mordecai Nathan, about the year 1445. This rabbi, in imitation of Hugo Cardinalis, drew up a concordance to the Hebrew Bible, for the use of the Jews. But though he followed Hugo in his division of the books into chapters, he refined upon his invention as to the subdivision, and contrived that by verses: this being found to be a much more convenient method, it has been ever since followed. And thus, as the Jews borrowed the division of the books of the Holy Scriptures into chapters from the Christians, in like manner the Christians borrowed that of the chapters into verses from the Jews.

Bice, or Bise, a blue colour, prepared from the *lapis armenus*. Bice bears the best body of all the bright blues used in common work, as house-painting, &c. but it is the palest in colour. It works tolerably well; but inclines a little to sandy, and therefore requires good grinding. Next to ultramarine, which is too dear for general use, it lies best near the eye, of all other blues.

Bigamy, properly signifies being twice married; but with us is used as synonymous to polygamy, or having a plurality of wives at once. Such second marriage, the former husband or wife being alive, is simply void, and a mere nullity, by the ecclesiastical law of England; and yet the legislature has thought it just to make it felony, by reason of its

being so great a violation of the public economy, and decency of a well-ordered state.

Bile, in the animal economy, is a liquid of a yellowish green colour, and of a bitter taste, and is secreted by the liver. In most animals considerable quantities of it are collected in the gall bladder. The principal use of the bile seems to be to separate the excrement from the chyle, after both have been formed, and to produce the evacuation of the former out of the body. These substances would, probably, otherwise mix together, and perhaps be even absorbed in the body, did not the bile combine with the excrement, and by this combination facilitates its separation from the chyle, and thus prevents its absorption. The bile, as soon as it is mixed with the contents of the intestinal canal, suffers a decomposition: the alkaline ingredients combine with the chyle, and render it more liquid, while its albumen and resin combine with the excrementitious matters to render them less liquid. When the resinous oil is in excess, so as not to become soluble in the bile, it crystallizes, and forms gall-stones or Biliary-*calculi*, which see. The retardation of bile in the substance of the liver, is the cause of various bilious or liver diseases. Bile, by its acridity, excites the peristaltic motion of the intestines, hence the bowels are always inactive when the bile is deficient in quantity, which is the case in the jaundice. It imparts a white colour to the excrements, therefore when they are white, there is certainly something amiss in the liver.

Biliary-Calculi, or Gall-Stones, are concretions of bile formed in the gall-bladder, or in the duct through which the bile passes into the intestinal

canal. These concretions are of a very bittter taste, and are generally of a brown colour, so light as to float in water, and inflammable; they occasion the jaundice and other disorders; and are themselves supposed to be formed by the absorption of oxygen by the bile in its passage.

Bill of exchange, is a letter of request, when A owing B a sum of money, B desires A to pay it to C. In common speech, such a bill is frequently called a *draught;* but *bill of exchange* is the more legal, as well as more mercantile, expression. The person, however, who writes this letter is called, in law, the *drawer;* and he to whom it is written the *drawee;* and the third person or negotiator to whom it is payable is called the *payee.*

Bill, in parliament, a paper containing certain propositions, offered to the two houses to be passed, or agreed to, by them, and then presented to the king, to pass into a law. To bring a bill into the house, if the relief sought for is of a private nature, it is first necessary to prefer a petition, which must be presented by a member, and usually sets forth the grievance desired to be remedied. This petition, when founded on facts that may be disputed, is referred to a committee of members, who examine the matter alledged, and accordingly report it to the house; and then (or otherwise upon the mere petition), leave is given to bring in the bill. In public matters, the bill is brought in upon motion made to the house, without any petition at all. When the house has agreed or disagreed to the bill as it comes from the committee, and sometimes added new amendments of its own, the bill is ordered to be engrossed, or written in a strong gross

hand, on one or more long rolls (or presses) of parchment, sewed together. When this is finished it is read a third time, and amendments are sometimes there made to it; and if a new clause be added, it is done by tacking a separate piece of parchment on the bill, which is called a *ryder*. In the house of lords it passes through the same forms; and, if rejected, no more notice is taken, but it passes *sub silentio*, to prevent unbecoming altercations. The royal assent may be given in two ways. 1. In person; when the king comes to the house of peers, and sending for the commons to the bar, the titles of all the bills that have passed both houses are read, and the king's answer is declared by the clerk in *Norman-French*. If the king consents to a public bill, the clerk declares "*Le roy le veut*" ["The king is willing that it be"]: if to a private bill, "*Soit fait comme il est desire*" ["Be it as it is desired"]. If the king refuses his assent, it is done in the unassuming language, "*Le roy s'avisera*," ["The king will advise upon it"]. 2. The king may give his assent through the medium of commissioners, authorized by his letters-patent for the occasion. When a bill has received the royal assent in either of these ways, it is then, and not before, a statute, or act of parliament.

Binary Arithmetic, that in which two figures or characters, viz. 1 and 0, only, are used: the cipher multiplying every thing by 2, as in the common arithmetic by ten: thus, 1 is one, 10 is 2, 11 is 3, 100 is 4, 101 is 5, 110 is 6, 111 is 7, 1000 is 8, 1001 is 9, 1010 is 10; being founded on the same principles as common arithmetic. This sort of arithmetic was invented by Leibnitz, who pretended

that it is better adapted than the common arithmetic for discovering certain properties of numbers, and for constructing tables.

Bird. See *Ornithology*.

Bird catching, is practised either for the sake of singing-birds, or for those that are used as food. Water fowl are caught in prodigious numbers on the Orkneys and islands of Scotland, where the dangers of the situation, the dexterity of the adventurers, and the quantity of the prey, are equally objects of surprise. On the Feroe-islands, more especially, those characteristics are extremely remarkable. The cliffs which contain the objects of search are often two hundred fathoms in height. They are assaulted from above and below. In the first case, the fowlers provide themselves with a rope 80 or 100 fathoms in length. One of the party fastens one end about his waist and between his legs, recommends himself to the protection of the Almighty, and is lowered down by six others, who place a piece of timber on the margin of the rock, to prevent the rope from wearing against the sharp edge. They have, beside, a small line fastened to the body of the adventurer, by which he gives signals that they may lower or raise him, or shift him from place to place. The last operation is attended with great danger, by the loosening of the stones, which often fall on his head, and would infallibly destroy him, was he not in some degree protected by a strong thick cap; but even that is found unequal to shield him against the weight of the larger fragments of rock. The skill and agility of the fowlers is amazing: they will place their feet against the front of the precipice, and

dart themselves some fathoms from it; with a cool eye survey the places where the birds nestle; and again spring into their haunts. In some instances, the birds lodge in deep recesses. The fowler will alight there, disengage himself from the rope, fix it to a stone, collect the booty, fasten it to his girdle, and at his leisure resume his pendulous seat. At times, he will again shoot from the rock, and, so doing, with a fowling-net placed at the end of a staff, catch the old birds that are flying to and from their retreats. When he has finished his daring enterprise, he gives a signal to his friends, who pull him up, and share the hard-earned profit. The feathers are preserved for exportation. The flesh is partly eaten fresh, but the greater portion dried for winter's provision. The fowling from below has its share of danger. The party goes on the expedition in a boat; and when it has gained the base of the precipice, one of the boldest, having fastened a rope about his waist, and furnished himself with a long pole with an iron hook at one end, either climbs, or is thrust up by his companions, who hoist him, by means of a pole, to the next footing-spot he can reach. He, by means of the rope, brings up one of the boat's crew; the rest are drawn up in the same manner; and each is furnished with his rope and fowling-staff. They then continue their progress upward in the same manner, till they arrive at the region of the birds, and wander about the face of the cliff in search of them. They then act in pairs. One fastens himself to the end of his associate's rope, and in places where birds have nestled beneath his footing, he permits himself to be lowered down, depending for

his security on the strength of his companion who has to haul him up again. They fling the fowl into the boat, which attends their motions. They often pass seven or eight days together in this employ, and lodge in the crannies which they find in the face of the rocks.

Bird-lime, a viscid substance, which being smeared on twigs detains such small birds as alight upon it. The most common birdlime is made from holly-bark.

Birds-nests, in cookery, the nest of the hirundo esculenta or Indian swallow, very delicately tasted, and frequently mixed among soups. On the sea-coasts of China, at certain seasons of the year, there are seen vast numbers of these birds. They leave the inland country at their breeding time, and come to build in the rocks, and fashion their nests out of a matter which they find on the shore, washed thither by the waves. The nature of this substance is scarcely yet ascertained. According to Kempfer, it is molluscæ or sea-worms; according to M. le Poivre, fishspawn; according to Dalrymple, sea-weeds; and according to Linnæus, it is the animal substance frequently found on the beach, which fishermen call blubbers or jellies. The nests are of an hemispheric figure, and of the size of a goose's egg, and in substance much resemble the ichthyocolla or isinglass. The Chinese gather these nests, and sell them to all parts of the world; they dissolve in broths, &c., and make a kind of jelly of a very exquisite flavour.

Birman Empire comprises the kingdoms of Ava and Pegu, in the country formerly called India beyond the Ganges. The subjects of this empire are about 15 millions.

Bishop, a prelate, or person consecrated for the spiritual government and direction of a diocese. The word comes from the Saxon *bischop*, and that from the Greek *episcopos*, an overseer or inspector, which was a title given by the Athenians to those whom they sent into the provinces subject to them, to look into affairs. The Romans gave the same title to those who were inspectors of the bread and provisions. It appears from a letter of Cicero, that he himself had a bishopric, being *episcopus Oræ et Campaniæ*. In England, the king being certified of the death of a bishop by the dean and chapter, and his leave requested to elect another, the *conge d'elire* is sent to them with a letter missive, nominating the person whom he wishes to be chosen. The election is to be within twelve days after the receipt of it, otherwise the king, by letters patent, appoints whom he pleases; and the chapter, in case of refusing the person named by the king, incurs a *præmunire*. All bishops in England are peers of the realm, with the exception of the bishop of Man; and as such sit and vote in the house of lords, and claim all the privileges enjoyed by the temporal lords, excepting that they cannot be tried by their peers, because, in cases where life is concerned, they cannot, on account of the prohibition of the canon law, vote upon the trial. They have the titles of *lords*, and *right reverend fathers in God*.

Bisket, a sort of bread much dried, to make it keep for sea service. For long voyages, they prepare it six months before the embarkation. It will hold good a whole year.

Bismuth, or *tin-glass*, one of the brittle metals, of a reddish or yellowish-white colour and a lamel-

lated texture, and moderately hard and brittle; so that it not only breaks into pieces under the strokes of the hammer, but may even be beat into powder. Bismuth is more commonly found in a native state than any other semi-metal. Most metallic substances unite with bismuth, and are thereby rendered more fusible than before; hence it is used in making solder, printer's types, pewter, &c.

Bissextile, or Leap-Year, a year consisting of 366 days, and happening every fourth year, by the addition of a day in the month of February, which that year consists of 29 days. And this is done to recover the six hours which the sun takes up nearly in his course, more than the 365 days commonly allowed for it in other years. See Chronology.

Bistre, the burnt oil extracted from the root of dry beech-wood, used in drawing, as a brown colour. It is seldom to be had in such a state as to wash freely. Its general fault is grittiness, or the admixture of an over-abundance of gum in the preparation, which is an artifice to procure that adhesion which its sandy texture resists. If well prepared, the goodness next to be required is a warm deep-brown colour.

Bitumens, oily matters of a strong smell, and of different consistencies, which are found in many places within the earth.

Black, a well-known colour, supposed to be owing to the absence of light, most of the rays falling upon black substances being not reflected but absorbed. In proof and illustration of this hypothesis it is observed, that "one and the same body assumes different degrees of blackness, according

to the disposition of the sensible part of its surface; and in this respect there is not perhaps any other colour which is so much affected by an apparent mechanism. Thus, black velvet, when the pile is raised, appears intensely black; much more so than the silk it was made from; but on pressing the pile smooth it looks pale, and in certain positions shows somewhat even of a whitish cast." The explanation is, that "When the surface is composed of a multitude of loose filaments, or small points, with the extremities turned toward the eye, much of the light is stifled among the interstices between them, and the body appears dark: when the filaments are pressed close, and the surface smoothed and polished, more of the light is reflected from it, and the intenseness of the blackness is diminished." —That a black surface is a more or less intensely black, according to the manner in which it receives the light, is doubtlessly true; but, many objections present themselves against this theory, if it be offered as explanatory of the cause or origin of that colour which we call black. All the remarks that are here offered might be made upon crimson, or blue, or green velvet, as upon black; and consequently the same conclusion might be drawn, that these colours are owing to the absence of light. All the colours, in their most concentrated or intense state, assume the appearance of black: and we do not discover our mistake without dilution or contrast. Very frequently that which seems black is found, on contrast with blue, to be brown, or, on contrast with brown, blue. That colour is allowed to be a real black, which on dilution is a real grey. Now, it is known, that a perfect grey may be produced

by the due mixture of yellow, red, and blue; and a concentrated, intense, or deep grey, being a true black, it seems reasonable to found upon these premises, an assertion that black is a colour produced upon the same combining principle that renders blue and red a purple; and to be compounded of yellow, red, and blue in a concentrated state, and in such proportions as to prevent the preponderance of either.

Black-lead, otherwise called plumbago and graphites. A mineral substance used in the making of pencils, in forming a composition for crucibles, and in covering the surface of iron utensils to preserve them from rust and give them a good appearance. It has a dark iron-black colour, a metallic lustre, and a thin slaty fracture: it is found in separate loose pieces of a fine grain which are very soft, and leave, as is well known, strongly-coloured traces on paper by friction. Its specific gravity varies from 1·9 to 2·2. "It suffers no change even by the most violent heat, if exposed to it in closed vessels, neither does it melt, but if it be roasted with a strong and continued heat, and air be admitted, the greatest part of it disappears, leaving behind a small portion of oxide of iron." This substance was formerly thought to contain lead, as two of its names obviously indicate, but it is now discovered by analysis to be a compound of carbon and iron, in the proportion of about nine parts of the former to one of the latter; and therefore in modern chemical language it has received the more appropriate name of Carburet *of iron*.

Blacking, is sometimes used for a factitious black, as lamp-black, shoe-black, &c. A mixture

of ivory or lamp-black with linseed oil makes the common blacking. For a shining blacking, small beer or water is used instead of oil, in the proportion of about a pint to an ounce of ivory-black, with the addition of half an ounce of brown sugar and as much gum-arabic. The white of an egg substituted for the gum, gives the blacking more gloss, but is supposed to hurt the leather and render it apt to crack.

Blanc-mont, a stupendous mountain in Savoy, the highest of the Alps, and encompassed by those wonderful connexions of snow and ice called the Glaciers. Of these glaciers there are five, which extend almost to the plain of the vale of Chamouni, and are separated by wild forests, corn-fields, and rich meadows; so that immense tracts of ice are blended with the highest cultivation, and perpetually succeed to each other in the most singular and striking vicissitude. All these several valleys of ice, which lie chiefly in the hollows of the mountains, and are some leagues in length, unite together at the foot of Mont-Blanc; the highest mountain in Europe, and probably of the ancient world. It was reckoned that the summit of this mountain was inaccessible, before Dr. Paccard, a physician at Chamouni, attempted to reach it in August 1786, and succeeded in the attempt. Soon after, the same undertaking was resolved upon and accomplished by M. de Saussure, who published a narrative of the journey.

This excellent naturalist states that the summit of the mountain is a ridge nearly horizontal, lying east and west; the slope at each extremity is inclined from 28 to 30 degrees, the south side between

15 and 20, and the north about 45 or 50. This ridge is so narrow as scarcely to allow two people to walk abreast, especially at the west end, where it resembles the roof of a house. It is wholly covered with snow; nor is any bare rock to be seen within 150 yards of the top. The surface of the snow is scaly, and in some places covered with an icy crust, under which the snow is dusty and without consistence. The highest rocks are all granites; those on the east side are mixed with steatites; those on the south and the west contain a large quantity of schorl, and a little lapis corneus. Some of them, especially those on the east, which are about 150 yards below the summit, seem to have been lately shivered with lightning.

M. de Saussure saw no living animal on the mountain except two butterflies, which he supposes must have been driven thither by the wind. Lichens are the only vegetables which are found on the more elevated parts of these mountains: the silene acaulis, which grows in great quantities on the lower parts, disappears at the height of about two miles above the level of the sea.

Blast, in agriculture and gardening, is by some attributed to cold: by others to a want of a due supply of sap; by others to ascending fumes of the earth; by others to sharp winds and frosts; immediately succeeding rains. That species called *uredines*, or *fire-blasts*, is supposed, by Mr. Hales, owing to the solar rays reflected from or condensed in the clouds, or even collected by the dense steams in hop-gardens and similar places.

Blasting, among miners, a term for the tearing up rocks, which they find in their way, by gun-

powder. The method of doing it is this: they make a long hole like the hollow of a large gun-barrel in the rock they would split; this they fill with gun-powder; then they firmly stop up the mouth of the hole with clay, except a touch-hole, at which they leave a match to fire it.

Blasting of wood, the rending in pieces logs of wood, such as roots of trees, &c. by means of gun-powder. A method has been lately described by Mr. Knight, which is simple and easily effected. The instrument used is a screw, with a small hole drilled through its centre. The head of the screw is formed into two strong horns, for the more ready admission of the lever with which it is to be turned, and a wire, for the purpose of occasionally clearing the touch-hole. When a block of wood is to be broken, a hole is to be bored with an augre to a proper depth, and a charge of gun-powder introduced. The screw is to be turned into the hole till it nearly touches the powder; a quick match is then to be put down the touch-hole till it reaches the charge. The quick match is eighteen inches long, to afford the operator an opportunity of retiring, after lighting it, to a place of safety: it is made by steeping a roll of twine or linen thread in a solution of salt-petre.

Blazon or Blazonry, in heraldry, the art of decyphering the arms of noble houses, or of naming all the parts in their proper order and particular terms.

Bleaching, or the art of whitening linen, &c. has, within the course of a few years, received, through the medium of chemistry, very considerable improvements. The common method is to

expose the articles to be bleached in the open air, to saturate them with water, to leave them to the action of the atmosphere, and to apply an alkaline ley. When the muriatic acid had been discovered, and a method by which it might be impregnated with oxygen; and when it was farther perceived that the oxymuriatic acid deprived vegetables of their colour, and in so doing parted with its oxygen, it occurred to M. Berthollet, that this acid might produce the same effect upon those particles which give colour to thread as cloth, and which is the object of bleaching to destroy. He reflected upon the circumstances of common bleaching, and endeavoured to imitate its process, because he thought the oxygenated muriatic acid might act in the same manner as the exposition of the cloth in the meadows, which alone does not suffice, but appears to dispose the colouring parts of the cloth to be dissolved by the alkali of the ley. He examined dew, not only that which falls from the atmosphere, but also that which comes from the nocturnal transpiration of plants; and he observed that both were impregnated with oxygen sufficient to destroy the colour of paper slightly tinged with *turnsol*. On these principles, he employed leys, and the oxygenated muriatic acid, alternately.—The theory of the new bleaching, it follows, is this: that air and water naturally, and the acid artificially, by communicating oxygen, render the colouring matter soluble in alkali. Another part, but not the whole of the colouring matter, which is principally composed of carbon and hydrogen, yielding to alkali alone. Wool and silk are bleached by different processes.

Blockade, in military affairs, the blocking up a place, by posting troops at all the avenues leading to it, to keep supplies of men and provisions from getting into it; and by these means proposing to starve it out, without making any regular attacks. To *raise a blockade*, is to force the troops that blockade to retire.

Bloom, a mass of iron, that has undergone the first hammering.

Blocks, the usual name, on board ship, for pullies. The *blocks* now used in the navy are made in Portsmouth by means of circular saws and other machinery, which have been lately erected by a most ingenious mechanic. This machinery performs the several operations from the rough timber to the perfect *block*, in the completest manner possible. The whole is worked by means of a steam engine; the manual labour required is simply to supply the wood as it is wanted to the several parts of the machinery, so that the commonest labourer almost may be made to act in this business with very little instruction.

Blood. A red homogeneous fluid, of a saltish taste, and somewhat urinous smell, and glutinous consistence, which circulates in the cavities of the heart, arteries and veins. The quantity is estimated to be about twenty-eight pounds in an adult: of this, four parts are contained in the veins, and a fifth in the arteries. The colour of the blood is red; in the arteries it is of a florid hue, in the veins darker, except only the pulmonary veins, in which it is of a lighter cast. Physiology demonstrates, that it acquires this florid colour in passing through the lungs, from the oxygen it absorbs.

Blood-hounds, a variety of the dog genus and species. From the accuracy of their scent these animals have in various countries and different ages been employed to trace certain descriptions of persons, whose effluvium, either direct or collateral, infallibly betrayed them. In the West Indies they have, for tne last century and half, been solely employed in hunting the Maroons or mixed breed of natives; to make them accurate in which they undergo a system of preparatory education. The Spanish colonists have the first disgrace of having commenced this brutal mode of warfare, and the English colonists the second disgrace of having copied from them. Some few centuries ago blood-hounds were common in our own country, and like other hounds, confined to the pursuit of deer, foxes, or hares, or employed in the custody of sheep. The accuracy with which they were able to trace the scent of the first and last, made them admirable coadjutors in the detection of deer or sheep stealers; about whose persons the effluvia of the stolen animals hang for a long period of time, and of which it is extremely difficult for them to divest themselves. There can be no doubt that a variety of culprits were formerly detected by this method; and hence originated the absurd belief and vulgar prejudice that *blood-hounds* could ascertain by their scent, not only deer and sheep stealers, but robbers, murderers, and depredators of every description.

Blow-*Pipe*, in chemistry and mineralogy, a wind instrument for the purpose of increasing the heat of a candle or lamp, in the same manner as a pair of bellows is employed for raising the temperature of a common fire or furnace. It is not known

at what time, or by whom, this very useful instrument was invented; but it appears to have been employed by glass-workers, enamellers, and jewellers long before it was adopted as an article of chemical apparatus.

A blow-pipe very frequently used consists of five parts: the mouth-piece, a plain tube, a bulb, a curved tube, and a nut. The mouth-piece is made of ivory, the rest of the apparatus being of brass, and fits closely into the pipe so as to be air-tight; the bulb is divided into two hemispheres, which screw into each other; into the lower hemiphere is fixed a recurved tube, in such a manner as to prevent the condensed vapour from escaping out of the bulb; the nut is a hollow cylinder sufficiently wide at one end to receive the extremity of the curved tube, and perforated at the other with a small round hole, to allow a passage for the air: each blow-pipe has generally three of these nuts, with apertures of different sizes, the largest of which does not exceed the diameter of a small pin.

The use of the blow-pipe, both to the artist for the purpose of enamelling, of softening and soldering small pieces of metal, and in the fabrication of glass instruments, and to the chemist and mineralogist in the examination of substances, and in various docimastic operations, is very important. When small portions of any mineral or metal are intended to be fused, they are laid either in a cavity made in a lump of charcoal, or in a spoon made of silver or platinum; and are thus exposed to the action of flame urged by the blow-pipe. The strongest heat of this flame is at the point of the luminous bluish cone, which may be observed sur-

rounded by another of a white and more faint appearance.

Blue, one of the seven colours into which the rays of light divide themselves when refracted through a glass prism. The principal blues used in painting are prussian-blue, bice, saunders-blue, azure or smalt, and verditer. In dying, the principal ingredients for giving a blue colour are indigo and woad. Bishop Watson, in his Essays, vol. 1, has related an experiment by which he produced one of the most vivid blues he ever saw. Into a solution of green vitriol (sulphate of iron) he poured an infusion of raspings of heart of oak in hot water, and the colour just mentioned was instantly formed. If the raspings be boiled for an hour in water they lose their property; and if the solution of vitriol be poured upon the dry raspings, the whole is changed into a blue mass.

Boat-*Life*, see Life-Boat.

Boatswain, the officer who has the boats, sails, rigging, colours, anchors, and cables committed to his charge. It is particularly the duty of the boatswain to direct whatever relates to the rigging of a ship, after she is equipped from a royal dockyard. It is likewise his office to summon the crew to their duty; to assist with his mates in the necessary business of the ship, and to relieve the watch when it expires; he is directed by his instructions to perform his duty with as little noise as possible.

Body, in physics, or natural philosophy, a solid, extended, palpable substance; of itself merely passive, being indifferent either to motion or rest, yet capable of any sort of motion or figure.

Body, in geometry, is a figure conceived to be

extended in all directions, or what is usually said to consist of length, breadth, and thickness; being otherwise called a solid. A body is conceived to be formed or generated by the motion of a surface, like as a surface by the motion of a line, and a line by the motion of a point.—Similar bodies, or solids, are in proportion to each other, as the cube, of their like sides, or linear dimensions.

Bodies (Regular or Platonic,) are those which have all their sides, angles, and places, similar and equal.

Of these there are only 5; viz. the tetraedron, contained by 4 equilateral triangles; the hexaedron or cube, by 6 squares; the octaedron, by 8 triangles; the dodæcadron, by 12 pentagons; and the icosaedron, by 20 triangles. To find the superficies or solidity of the regular bodies,

1. Multiply the proper tabular area (taken from the following table) by the square of the linear edge of the solid, for the superficies.

2. Multiply the tabular solidity by the cube of the linear edge, for the solid content.

Table of the Surfaces and Solidities of the five Regular Bodies, the linear edge being 1.

No. of Faces	*Names*	*Surfaces*	*Solidities*
4	Tetraedron	1.73205	0.11785
6	Hexaedron	6.00000	1.00000
8	Octaedron	3.46410	0.47140
12	Dodecaedron	20.64573	7.66312
20	Icosaedron	8.66025	2.18169

Bohemia, a kingdom of Europe, in Germany, bounded on the north by Lusatia and Upper Saxony, on the east by Moravia and Silesia, on the

south by Bavaria, and on the west by Franconia. Although this country is situated in the middle of Germany, and its king be an elector of the empire; nevertheless, it has its particular assemblies, customs, and language, different from the Germans. The name Bohemia, in the German language, signifies the home or abode of the Boii, a people of ancient Gaul, who under their leader Segovesus, settled in that country about 590 years before the Christian era. These Boii were soon after expelled by the Marcomanni, a nation of the Suevi, who were afterwards subdued by the Sclavi, a people of Scythia, whose language is still spoken in Bohemia and Moravia. Notwithstanding the expulsion of the Boii, the present inhabitants are still called Bohemians by foreigners, but the natives call themselves Czekowe, or Czechs. At first they were governed by dukes, but the emperor Otho I. conquered the duke of Bohemia, and reduced the province under the empire. Afterwards Henry V. gave the title of king to Ladislaus, duke of Bohemia; and since that time these kings have been electors and chief cup-bearers of the empire, and the kingdom has been elective; which privileges have been confirmed by the golden bull.

Boiling, or Ebullition, the bubbling up of any fluid. The term is most commonly applied to that bubbling which happens by the application of caloric, though that which ensues on the mixture of an acid and alkali is sometimes also distinguished by the same name. Boiling, in general, is occasioned by the discharge of an elastic fluid through that which is said to boil; and the appearance is the same, whether it is common air, fixed air, or steam,

that makes its way through the fluid. The boiling of water is occasioned by the lowermost particles being rarefied into vapour by reason of the vicinity of the bottom of the containing vessel to fire. In consequence of this, being greatly inferior in specific gravity to the surrounding fluid, they ascend with great velocity, and, agitating the body of water in their ascent, give it the tumultuous motion called boiling.

Every particular liquid has a fixed point at which boiling commences, and this is called the boiling point of the liquid. Thus water begins to boil when heated to 212 degrees. After a liquid has begun to boil, it never becomes hotter, however strong the fire may be to which it is exposed. A strong heat, indeed, makes it boil more rapidly, but does not increase its temperature. This fact was first observed by Dr. Hooke. The following table shows the boiling point of a number of liquids:

Bodies.	*Boiling point.*
Æther	98
Ammonia	140
Alcohol	176
Water	212
Muriat of lime	230
Nitric acid	248
Sulphuric acid	590
Phosphorus	554
Oil of Turpentine	560
Sulphur	570
Linseed oil	600
Mercury	660

The boiling point however is found to depend on the degree of pressure to which the liquid is ex-

posed. If the pressure is diminished, the liquid boils at a lower temperature, if it is increased, a higher temperature is necessary to produce ebullition. From the experiments of professor Robison, it appears that, in a vacuum, all liquids boil about 145 degrees lower than in open air, under a pressure of 30 inches of mercury: therefore water would boil in vacuo at 67 degrees, and alcohol at 34 degrees. In Papin's digester, the temperature of water may be raised to 300 degrees, or even 400 degrees without ebullition; but the instant that this pressure is removed, the boiling commences with prodigious violence.

Boles, are viscid earths, less coherent and more friable than clay, more readily uniting with water, and more freely subsiding from it. They are soft and unctuous to the touch; adhere to the tongue, and by degrees melt in the mouth, impressing a slight sense of astringency. There are a great variety of these earths; and they are sometimes used medicinally, in fluxes and complaints of the *primæ viæ*. 1. Armenian bole, of a bright red colour. 2. French bole, of a pale red. 3. Bole of Blois, yellow. 4. Bohemian bole, yellow. 5. Lemnian earth, pale red. 6. Silesian bole, pale yellow.

Bomb, a large shell of cast iron, filled with a cement compounded of quicklime, ashes, brickdust, and steel filings, worked together in a glutinous water or prepared liquid. The shell has a vent, by which a fusee is introduced, which is so calculated, as that, being lit previous to the discharge of the bomb, it shall communicate with the contents about the time of its descent. The bomb is thus contrived to annoy the enemy, partly by the weight

with which it falls, but more by the destruction it may scatter in bursting.

Bomb-vessel, small ships, adapted to throwing bombs into fortresses on the sea-shore. They are said to have been first used at the siege of Algiers; before which enterprize it was never thought practicable to carry on a bombardment from the sea.

Bombasine, a name given to two sorts of stuff; the one of silk, and the other crossed with fine worsted.

Bombast, in literary composition, is a stile either too lofty for the occasion, or one, in which a writer, from deficiency in taste, mistakes unwieldiness for magnificence.

Bombay, an island on the west coast of the peninsula on this side the river Ganges, in the East Indies, about seven miles long, and 20 in circumference. This island came into the possession of the English (in whose hands it has ever since continued) by the marriage of Charles II. with Catharine, infanta of Portugal. The ground is barren, yielding little else beside cocoa-nuts. Good water is exceedingly scarce; and the air is not very healthy. The inhabitants are numerous, amounting to about 60,000. The factory, and those depending upon them, are now a corporation, and governed by a mayor and aldermen, as in England.

Bond, in law, a deed whereby the obligator obliges himself to pay a certain sum of money agreeably to the terms of the bond. This is a simple bond; but in general, a bond is an engagement to perform certain stipulations, therein mentioned, under pain of forfeiting a certain sum or penalty. If the stipulation is the payment of money, the pe-

nalty to be incurred by non-fulfilment, is generally double the sum for the payment of which the bond is given.

Bones (Analysis of.) As chemistry is inexhaustible in its objects, so it is indefatigable in its researches, and especially within the last fifty years has laid, as it were, all nature under tribute. Hence the bones of various animals, and even those of man himself, have been subjected to experiment. Many of the products afforded by the combustion and distillation of bone, such as bone-ash, lamp-black, ammonia, &c. have been long known, and employed in the arts. From the analysis of bones we learn that, although the proportion of ingredients varies in the bones of different animals, the general constituents of bone are as follow: 1. Gelatin, soluble by boiling rasped or bruised bones in water, and giving a fine clear jelly; 2. Oil or fat, separable during the boiling, by rising to the top of the water, and when cold concreting into a suet; 3. Phosphat of lime, soluble in dilute nitrous, muriatic, or acetous acid, and precipitable thence by pure ammonia; 4. Some sulphat of lime; 5. A little carbonat of lime; and, 6. A membranous or cartilaginous substance, retaining the form of the bone after every thing else has been extracted by water and an acid. Of these ingredients the phosphat of lime exists in far the greatest abundance, amounting in different bones to between 52 and 85·5 parts in 100 of the whole. To the gelatin is owing the property which bones are well known to possess of contributing to the richness of soups, and even, when properly boiled, of making soup by themselves.

Bones, are very useful articles for making different kinds of toys, and also in several of the chemical arts, as for making cast iron malleable, for absorbing the sulphur of sulphurous ores, for forming tests and coppels, or vessels for refining gold and silver with lead; for burnt bones compose a mass of a porous texture, which absorbs vitrified lead and other metals, while the unvitrescible gold and silver remain entire behind. They are used for the preparation of milky glasses and porcelains, for the rectification of volatile salts, and of empyreumatic oils, and for making glue. The bones of different animals are not equally fit for different uses. The bone of the cuttle-fish is used by goldsmiths for making moulds; those of bullocks for painters' black; also, in lieu of ivory, for toys and cutlers work.

Bookseller, one who trades in books, whether he prints them himself, or gives them to be printed by others. Among us, they are the same with bibliopolæ among the ancients, whose office was distinct from that of librarii. Petty dealers, or venders of small ware, like some with us, were more particularly denominated libelliones. At Rome, the Argiletum was the mart of books, as Paternoster-row, and St. Paul's Church-yard, still are in London. Booksellers in many places are ranked among the members of universities, and entitled to the privileges of students: as at Tubingen, Saltsburg, and Paris, where they have always been distinguished from the vulgar and mechanical traders, and favoured by an exemption from divers taxes.

Formerly, the offices of bookseller and printer

were united in the same persons. Labbe gives a list of learned booksellers; most of whom were also authors. Of late, booksellers have drawn their business into less compass, and, leaving the labour of composing books to one set of persons, and that of printing them to another, content themselves with the gainful part; thus ministering to the republic of letters not with the head or the hand, but the purse only. In this view, they have been very important and useful agents between authors and the public; and have contributed in no small degree to the encouragement of genius and literary industry, and the diffusion of science. There are few authors who have undertaken the printing and publishing of any work likely to be transmitted to posterity, without being connected with some bookseller, or booksellers, eminent in the trade.

Bookseller's *marks*: An acquaintance with the bookseller's marks or signs, expressed on the title pages of their books, is of some use; because many books, especially in the century before the last, have no other designation, either of printer, bookseller, or even city. The anchor is the mark of Raphelengius at Leyden; and the same with a dolphin twisted round it, of the Manutii at Venice and Rome; the Arion denotes a book printed by Oporinus at Basil; the caduceus, or pegasus, by the Wecheliuses at Paris and Francfort; the cranes, by Cramoisy: the compass, by Plantin at Antwerp; the fountain, by Vascosan at Paris; the sphere in a balance, by Janson or Blaew, at Amsterdam; the lily, by the Juntas at Venice, Florence, Lyons, and Rome; the mulberry-tree, by

Morel at Paris; the olive-tree, by the Stephenses at Paris and Geneva, and the Elzeviers at Amsterdam and Leyden; the bird between two serpents, by the Frobeniuses at Basil; the truth, by the Commelins at Heidelberg and Paris; the Saturn, by Colinæus; the printing-press, by Badius Ascencius, &c.

Boracic Acid, the sedative salt of Homberg, is obtained from the mineral called borax, which consists of this acid in conjunction with soda. The acid, when separated, appears in the form of a white, scaly, glittering salt, with hexahedral scales; soft and unctuous to the touch. Its taste is bitterish, with a slight degree of acidity. It is soluble in alcohol, which it causes to burn, when set on fire, with a green flame surrounded with a white one. It is of difficult solubility in cold water, but is readily dissolved by boiling water. It is not altered by exposure to the air; nor is it volatilized by fire, but by aqueous vapour, it may be mechanically raised up; a strong heat fuses it into a transparent glass, which has a great tendency to dissolve the clay of the crucible. By this melting it undergoes no farther change than the loss of its water of crystallization. This acid has no action on combustible bodies: its composition is at present unknown.

Borax, which, in the new chemistry, is called a sub-borate of Soda, being a compound of Soda and Boracic Acid (see above) is a species of white salt much used in various manufactures. It is found chiefly in Thibet.

Borneo, an island of the East-Indies, of a nearly circular form, and supposed to be the largest in

the world, except New Holland, being about 2,500 miles in circumference. It was discovered by the Portuguese in 1521. The inland country is very mountainous. It abounds with gold; and the finest diamonds of the Indies are found in its rivers, being probably washed from its hills by torrents. Here are also mines of iron and tin, and loadstones. The beasts are oxen, buffaloes, deer, goats, elephants, tigers, and monkeys. From April to September this country is frequented by heavy rains, attended with violent storms of thunder and lightning. The inhabitants on the sea-coast are generally Mahometans; but those of the inland parts of the country are pagans. It is situated directly under the equinoctial line.

Borough, such town or village as sends burgesses or representatives to parliament. Boroughs are equally such whether they be incorporate or not; there being several boroughs that are not incorporated, and, on the contrary, several corporations that are not boroughs; *e. gr.* Kingston, Deal, Kendal, &c.

Borough, *English*, a customary descent of lands or tenements, in certain parts of our country, by which they descend to the youngest instead of the eldest son. The custom goes with the land, although there be a devise at the common law to the contrary. The reason of this custom is, because the youngest is presumed in law to be the least able to provide for himself.

Borrowing, when money, corn or other commodity, merely esteemed according to its price, be borrowed, it is repaid by returning an equal quantity of the same thing, or an equal value in money.

If money is borrowed it is always understood that interest is payable, and is by law demandable; but when a house, or a horse, &c. is borrowed, the restoration of the identical property is always understood, and if a thing be used for any other purpose, than that for which it is borrowed, or if it be lost, the party lending may have his action on the case for it.

Borseholder, among the Anglo-Saxons, one of the lowest magistrates, whose authority extended only over one tithing consisting of ten families. Each tithing formed a little state of itself, and chose one of its most respectable members for its head, who was called a borseholder, a term derived from two words signifying a "surety" and a "head" or "chief."

Borysthenes, a large river of Scythia falling into the Euxine sea: it is now called the Dneiper, and is inferior to no European river but the Danube. The name of this river signifies a rampart formed by a forest of pines, because the shores of the Borysthenes were lined with forests of pines.

Boshmen, a class of Hottentots, who, like the Maroon Negroes in the West Indies, live without laws and without any discipline: they are a sort of land-pirates who have no resources but plunder. Their name signifies *bush-men*, or men of the woods, and under this appellation the inhabitants of the Cape of Good Hope distinguish all those malefactors who desert from the colonies to avoid the punishment due to their crimes.

Bosphorus, a narrow sea, which, from the derivation of the words, is supposed to be no wider than what a bullock can swim over. It is also a

sea separating two continents, and by which two seas, or a gulph and a sea, are made to communicate. The word is usually applied to the Straits of Constantinople, called the Bosphorus of Thrace.

Botany, the science of plants. It teaches their natural history and intrinsic qualities; and, to facilitate an acquaintance with these particulars, arranges all vegetables in classes, orders, and other subdivisions. This arrangement is called a system. Various systems, or plans of arrangement, have been from time to time proposed; but the sexual system of Linnæus is at present generally received. This naturalist has drawn a continued analogy between the vegetable economy and that of the animal; and has derived all his classes, orders, and genera, from the number, situation, and proportion of the parts of fructification. In twenty-four *classes*, he has comprehended every known genus and species. In considering a plant with a view to its characteristics or distinguishing features, it is divided by Linnæus into the following parts, making so many outlines, to which the attention of the botanical observer must be directed: 1. Root; 2. Trunk; 3. Leaves; 4. Props; 5. Fructification; 6. Inflorescence. 1. The *root* consists of two parts, the *caudex* and the *radicula*. The *caudex*, or stump, is the body or knob of the root from which the trunk and branches ascend, and the fibrous roots descend, and is either solid, bulbous, or tuberous: solid, as in trees and other examples; bulbous, as in tulips, &c. tuberous, as in potatoes, &c. The *radicula* is the fibrous part of the root, branching from the *caudex*. 2. The *trunk*, which includes the branches, is that part which rises im-

mediately from the *caudex*, is either herbaceous, shrubby, or arborescent, and admits of several other distinctions, according to its shape, substance, surface, &c. 3. The *leaves* are either *simple*, as those that adhere to the branch singly, or *compound*, as when several expand from one footstalk. Leaves are farther described by various terms indicative of their form and outline. 4. The *props*, those external parts which strengthen, support, or defend, the plants on which they are found, or serve to facilitate some necessary secretion: as, the *petiolus*, or footstalk of the leaf; the *pedunculus*, or footstalk of the flower; the *stipula*, or husk, that is, the small leaves that generally surround the stalk at its divisions; the *cirrhus*, or tendril; the *pubes*, or down; the *arma*, or defensive weapon, as thorns. 5. The *fructification*, or *mode* of fruit-bearing. 6. The *inflorescence*, or *mode* by which the flowers are joined to the several peduncles.

The various parts of a flower are arranged under distinct heads, consisting of the "Calyx," or Empalement: the "Blossom" or Corolla: "Stamens" or Chives: "Pistils" or Pointals: "Seed Vessel" or Pericarpium, and "Seeds" or Semina. To these are to be added the "Nectary" and "Receptacle." The calyx is formed of one or more green or yellowish green leaves placed at a small distance from, or close to the blossom. There are different kinds of calyxes, as the perianthium or cup near the flower, in the rose:—the involucrum, remote from the flower, in umbelliferous plants, as is seen in the hemlock and carrot:—the catkin, or amentum, as in the willow or hazel:—the sheath or spatha, in the snow-drop:—the husk or gluma,

in wheat, oats, and different kinds of grasses:—the veil, or calyptra, covering the fructification of some of the mosses, and resembling an extinguisher:—the curtain or volva, surrounding the stems, and attached to the pileus or cap, that spreading part which forms the top of several fungi, and covers the fructification, and which in the common mushroom covers the gills.

The Blossom is that beautifully coloured part of a flower, which principally attracts the attention. It is composed of one or more petals, or blossom leaves. When it is united in one, as in the Polyanthus or Auricula, it is termed a blossom of one petal, but if it be composed of many parts, it is then said to be a blossom of one, two, three, or many petals.

The Stamens are slender thread-like substances, generally placed within the blossom, and surrounding the Pistils. It is composed of two parts, the Filament or Thread, and the Anther or Tip, but the latter is the essential.

A Pistil consists of three divisions, the Germen or Seed-bud, the Style or Shaft, and the Summit or Stigma; but the second is often wanting. Some flowers have only one Pistil: others have two, three, four, &c. or more than can easily be counted. The Seed-Vessel, in the newly opening flower, is called the Germen; but when it enlarges it is termed the Seed-Vessel. Some plants have no appendage of the kind, and then the seeds are uncovered, as in the dead nettle; the cup, however, generally incloses and retains the seeds till they ripen: and in the tribe of grasses, this friendly office is generally performed by what was previ-

ously called the blossom. Seeds are sufficiently well known to render a description unnecessary: the part to which they are affixed within the Seed-Vessel, is termed the Receptacle of the seeds.

Nectaries are those parts in a flower which are designed to prepare a sweet nectareous liquor. The tube of the blossom, as in the honey-suckle, frequently answers the purpose; but in many other flowers, there is a peculiar organization for the purpose. At the base of the petal, in the crown imperial, the Nectary is a very peculiar one, containing the liquor, from which, as there are few flowers in a greater or less degree unprovided with it, the little industrious bee derives its honey.

The Receptacle is the seat or base to which the various divisions of a flower are affixed. Thus, if you pull off the Calyx, the Blossoms, the Stamens, the Pistils, and the Seeds or Seed-Vessel, the substance remaining on the top of the stalk is the Receptacle. In many plants it is not particularly striking, but in others it is remarkably so; thus in the artichoke, after removing the Calyx, the Blossoms, and the bristly substances, the remaining part, so highly esteemed for the table, is the Receptacle.

The application of the different divisions of a flower, are simply elucidated in the following specimen of a crown imperial; but should it not be easy to procure one, a tulip or lily will answer the purpose nearly as well.

CROWN IMPERIAL.

(Figure 32. Pl. Botany.)

Calyx . . . . None.

Blossom . . . Six Petals, *a. a. a. a. a. a.*

Stamens . . . Six, *bc. bc. bc. bc. bc. bc.* Filaments six-shaped, like an awl, *b. b. b. b. b. b.* Anthers oblong, four-cornered, *c. c. c. c. c. c.*

Pistils . . . . . Single.
Germen oblong, three-cornered, *d.*
Style longer than the Stamens, *e.*
Summit with three divisions, *f.*

Seed-Vessel . An oblong capsule with three cells and three valves. Fig. 33. represents the Seed-vessel, cut across to show the three cells in which the seeds are contained.

Seeds . . . . Numerous and flat.

The Classes are next to be considered, which were, according to the system of Linnæus, divided into twenty-four.

The characters are taken either from the number, length, connection, or situation of the Stamens.

The first class comprehends all that have a single stamen in each blossom, and this he calls *monandria* (one male) fig. 1; the second class such

as have two stamina, called *diandria* (two males) fig. 2; the third, fourth, and so on, up to the tenth, are named in the same way, *triandria* (three males) fig. 3, *tetrandria* (four males) fig. 4, to 10, &c. &c. There being no plants with eleven stamina, and the number not being uniformly twelve in many plants, though there or thereabouts, the eleventh class, called *dodecandria* (twelve males) fig. 11, includes all plants that have from eleven to nineteen inclusive. If the stamina are twenty or more, and are attached to the calyx or corolla, the plants belong to the twelfth class, *icosandria* (twenty males) fig. 12. If above nineteen, and attached to the base of the flower, and not to the calyx or corolla, they are of the class *polyandria* (many males) fig. 13, which is the thirteenth class. Plants with four stamina, two of which are shorter than the other two, are in the fourteenth class, *didynamia* (two powers) fig. 14. Plants with four long and two short stamina constitute the fifteenth class, the *tetradynamia* (four powers) fig. 15. In *monadelphia*, which is the name of the sixteenth class, the threads of the stamina are all united at bottom, but the antheræ are separate, fig. 16. In *diadelphia* the threads are united, not altogether, but in two bodies, fig. 17. In *polyadelphia* they are connected in three or more bodies, fig. 18. If the threads are separate, but the antheræ united, the plant is in the nineteenth class, *syngenesia*, fig. 19. In all the above classes the stamina are distinct, and separate from the pistillum; but where the former grow upon the latter, the plant is of the class *gynandria*, which is the twentieth, fig. 28. Sometimes the stamina are in one blossom, and the pistillum or pistilla in another

but on the same plant: in this case they form the class *monœcia* (one house) fig. 29. But if the staminiferous blossom is on one plant, and the pistilliferous on another, it is of the twenty-second class, *diœcia* (two houses) fig. 30. And lastly, if some blossoms have both stamina and pistilla, and others only one or the other, whether on the same plant, or on different plants, they come under the twenty-third class, *polygamia*, fig. 31. These include all vegetables whose flowers are conspicuous. But there are some, as mosses, sea-weeds, mushrooms, &c. whose flowers are inconspicuous, or whose parts of fructification are not stamina and pistilla. These are all arranged together in the twenty-fourth class, called *cryptogamia*: See fig. 20—7.

These 24 classes have been recently reduced to 20, which may be thus arranged with examples under each.

TABLE OF THE CLASSES.

Class.	Stamens in each Flower.	Fig.		Examples.
1. Monandria....	one	1	*(a.)*...	Mares-tail, Parsleypiert.
2. Diandria	two.....	2	.....	Privet, Sage.
3. Triandria	three.....	3	*(a.a.a.)*	Yellow Flag, the Grasses.
4. Tetrandria....	four, all of the same length.....	4	.....	Plantain, Scabious.
5. Pentandria ...	five, the anthers not united.....	5	.....	Honeysuckle, Primrose.
6. Hexandria	six, all of the same length.....	6	.....	Snowdrop, Asparagus.
7. Heptandria ...	seven.....	7	.....	Horse Chesnut.
8. Octandria	eight.....	8	.....	Mezereon, Heath, Willowherb.
9. Enneandria...	nine.....	9	.....	Bay Tree, Flowering Rush.
10. Decandria	ten, the filaments not united.....	10	.....	Campion, Pink, Arbutus.
11. Dodecandria..	12 to 19.....	11	.....	Houseleek.
12. Icosandria	more than 12, fixed to the calyx or petals..	12	.....	Hawthorn, Plumb, Rose.
13. Polyandria ...	20 to 1000, fixed to the receptacle.....	13	.....	Poppy, Larkspur, Anemone.
14. Didynamia....	four, 2 long and 2 short.....	14	....	Ground Ivy, Foxglove.
15. Tetradynamia	six, 4 long and 2 short.....	15	.....	Cabbage, Wallflower.
16. Monadelphia.	the filaments united.....	16	.....	Mallow Geranium.
17. Diadelphia....	in 1 or 2 sets, blossoms butterfly shaped..	17	.....	Pea, Furze, Broom.
18. Polyadelphia.	in 3 or more sets.....	18	.....	Orange, St. John's Wort.
19. Syngenesia ...	5 stam. anthers united, flowers compound.	19	.....	Coltsfoot, Sunflower, Thistle.
20. Cryptogamia,	flowers inconspicuous.	20—27....		Fern, Moss, Liverwort, Sea-Weeds, Mushrooms.

A knowledge of the Orders may be very easily attained, by observing that,

In the class Didynamia, they depend upon the seeds having a seed vessel, or not.

Tetradynamia, upon the shape of the seed-vessel.

Syngenesia, upon the structure of the florets.

Cryptogamia, upon the natural assemblages of plants resembling each other.

And that in all the other classes, excepting Monadelphia, Diadelphia, and Polyadelphia, they depend upon the number of pistils only. In determining the number of pistils, count the styles, as they appear at their bottom part, or base; but if the summits are not supported upon styles, then count the summits.

Recapitulation of the Classes, with their attendant Orders and familiar examples.

Monandria.

Order Monogynia (1 pistil) Common Stonewort.
Digynia . . (2 pistils) Water Fennel.
Tetragynia (4 pistils) Pondweed.

Diandria.

Order Monogynia (1 pistil) Privet.
Digynia . . (2 pistils) Sweet-scented Vernal Grass.

Triandria.

Order Monogynia (1 pistil) Wild Vine.
Digynia . . (2 pistils) Meadow Foxtail.
Trigynia . . (3 pistils) Small-water Chickweed.
Enneagynia (9 pistils) Blackberried Heath.

Tetrandria.

Order Monogynia (1 pistil) Shepherd's Rod.
Digynia . . (2 pistils) Chickweed Toadgrass.

Trigynia . . (3 pistils) Common Box.
Tetragynia. (4 pistils) Common Holly.

Pentandria.

Order Monogynia (1 pistil) Water Mouse-ear.
Digynia . . (2 pistils) Common Hop.
Trigynia . . (3 pistils) Dwarf Elder.
Tetragynia (4 pistils) Grass of Parnassus.
Pentagynia (5 pistils) Round-leaved Sundew.
Polygynia . (many pistils) Little Mouse-ear.

Hexandria.

Order Monogynia (1 pistil) Common Snowdrop.
Trigynia . . (3 pistils) Meadow-Saffron.
Hexagynia . (6 pistils) Saracen's Birthwort.
Polygynia . (many pistils) Water Plantain.

Heptandria.

Order Monogynia (1 pistil) Chickweed Winter-Green.

Octandria.

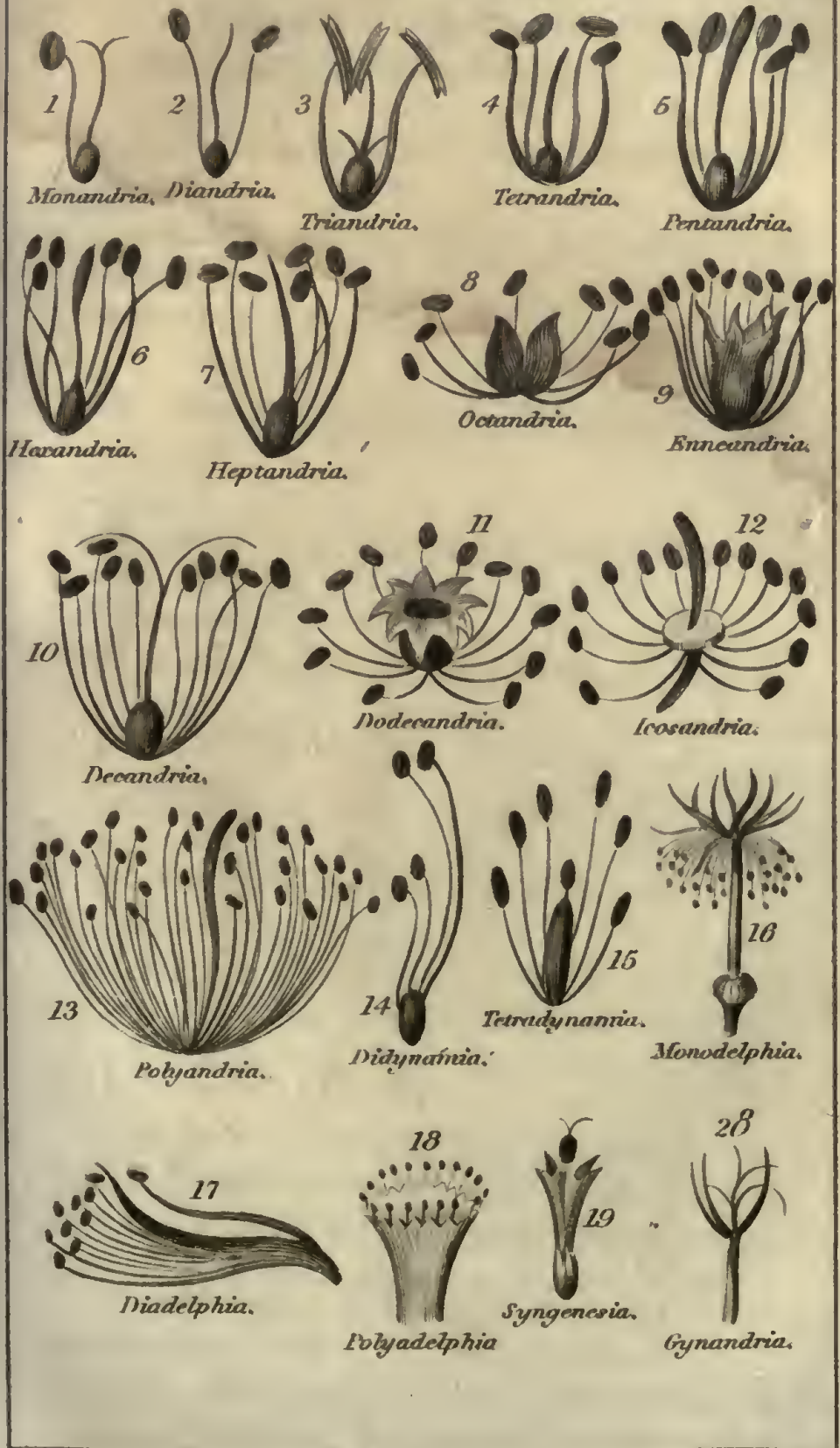
Order Monogynia (1 pistil) Rosebay Willow-Herb.
Digynia . . . (2 pistils) Common Hasel-Nut Tree.
Trigynia . . . (3 pistils) Snake Weed.
Tetragynia . (4 pistils) Water Wort.

Enneandria.

Order Digynia . . (2 pistils) Dog Mercury.
Hexagynia . (6 pistils) Flowering Rush.

Decandria.

Order Monogynia . (1 pistil) Wild Rosemary.



Cooper sculp.

Published by J. Harris, St Pauls Ch Yd 1811.

Digynia . . (2 pistils) London Pride.
Trigynia . . (3 pistils) Greater Stitchwort.
Pentagynia . (5 pistils) Cuckoo Flower.

Dodecandria.

Order Monogynia (1 pistil) Floating Hornweed.
Digynia . . (2 pistils) Common Agrimony.
Trigynia . . (3 pistils) Chesnut Tree.
Dodecagynia (12 pistils) Common Houseleek.

Icosandria.

Order Monogynia (1 pistil) Black-thorn.
Digynia . . (2 pistils) Hawthorn.
Trigynia . . (3 pistils) Mountain Ash.
Pentagynia (5 pistils) Crab Tree.
Polygynia . (many pistils) Common Meadow Sweet.

Although this is called the class of 20 Stamens, because the flowers arranged under it generally contain about that number; yet the classic character is not to be taken merely from the number of stamens, but from a consideration of the following circumstances, which will sufficiently distinguish it both from the preceding and following classes.

Calyx, consisting of one leaf, concave.
Petals, fixed by claws to the inside of calyx.
Stamens, more than 19, standing upon the petals or calyx, (but not upon the receptacle).

Polyandria.

Order Monogynia (1 pistil) Common Celandine.
Digynia . . (2 pistils) Upland Burnet.

Trigynia . . (3 pistils) Wild Larkspur.
Pentagynia . (5 pistils) Columbine.
Hexagynia . (6 pistils) Water Aloes.
Polygynia . (many pistils) Wood Anemone.

Most of this class are poisonous.

Didynamia.

Order Gymnospermia (seeds uncovered) Red Dead Nettle.
Angiospermia . . (seeds covered) Common Eyebright.

The plants in the first order of this class are odoriferous and cephalic, none of them are poisonous.

Tetradynamia.

Order Siloculosa (Pouch, or broad Pod) Horseradish.
Siliquosa (long Pod) Wall-flower.

It is necessary to remark, that the flowers of this class have uniformly 4 petals; an attention to this circumstance will probably save the learner some trouble, as the difference in the length of the stamens is not always very obvious, and especially as the plants of the Hexandria class have none of them 4 petals.

Monadelphia.

Order Triandria . (3 stamens) Juniper Tree.
Decandria (10 stamens) Wood Cranesbill.
Polyandria . (many Stamens) Common Mallow.

In this class the filaments are all together at the bottom, but separate at the top. The orders in this and the two following are determined by the number of the stamens.

Diadelphia.

Order Hexandria (6 stamens) Common Fumitory.

Octandria. (8 stamens) Common Milkwort.

Decandria. (10 stamens) Common Vetch.

This class comprehends the butterfly-shaped flowers. From the name of this class, the young Botanist will be induced to imagine, that the filaments are always formed into two sets, but this is by no means the case, as in many instances they are united into one set. The butterfly shape of the blossom will therefore (as in the garden pea) be a more certain guide.

Polyadelphia.

Order Polyandria. Common St. John's Wort.

Syngenesia.

Order, Polygamia Æqualis. Florets furnished with stamens and pistils. Common Sowthistle.

Polygamia Superflua. Florets in the centre, furnished with stamens and pistils, those in the circumference with only pistils. Groundsel.

Polygamia Frustanea. Florets in the centre, furnished with stamens and pistils, those in the circumference without any. Corn-flower.

Polygamia Necessaria. Florets in the centre, furnished with stamens and pistils, but producing no seed. Those in the circumference with only pistils, and producing seed. Marigold.

Polygamia Segregata. (Separated florets) That is when several florets, each having its own proper cup, are inclosed within one common calyx, so as to form altogether one flower only.

The Syngenesia class comprehend those flowers which Botanists have agreed to call compound. The essential character of a compound flower, consists in the anthers being united, so as to form a cylinder, and a single seed, being placed upon the receptacle, under each floret. The Dandelion, the Thistle, and the Sun-flower, are compound flowers, that is, each of these flowers are composed or compounded of a number of small flowers, called florets.

The Cryptogamia class, consists of those plants in which the obscure and peculiar fructifications do not fall under either of the preceding distributions; they are divided into five orders.

1. Miscellanæ—Miscellaneous. Including subjects incapable of arrangement under any of the following, and in many respects disagreeing with one another, as the horsetail, &c.

2. Filices—Ferns. A well known kind of production, comprising plants which have their flowers disposed in spots or lines, on the under surface of the leaves, as in the Polypody and Spleenwort, though sometimes in spikes, as in the Osmund Royal.

3. Musci—Mosses. Familiar subjects.

4. Hepaticæ, a kind of mosses. Distinguished from the foregoing, by a difference in the fructification.

5. Algæ, including plants which scarcely admit

of a division into root, stem, and leaf; to these belong the different kinds of Lichens, and Fucus or Sea-weed.

6. Fungi—Fungusses. Common objects comprising mushrooms, &c.

" Thus have we given a sketch of the Linnæan division of the vegetable kingdom into twenty-four classes, and of each class into two or more orders.

" The next division is into *genera* or families, each genus uniting together all those plants which bear so strong an affinity as to be considered members of the same family. The name given to the genus is the name by which all the plants of that family are known: thus, the genus *rosa* includes all the different kinds of roses; *salix*, which is the scientific name for willow, every kind of willow; *convolvulus*, every kind of bindweed; and *erica*, all the heaths. The distinctive or characteristic marks upon which the genera are founded, are always taken from the shape, position, number, or some other property of the different parts of the flower, as the calyx, petals, seeds, seed-vessels, &c.; whether they be round, or heart-shaped; whole, or divided; rough, or smooth; single, or many; and the like.

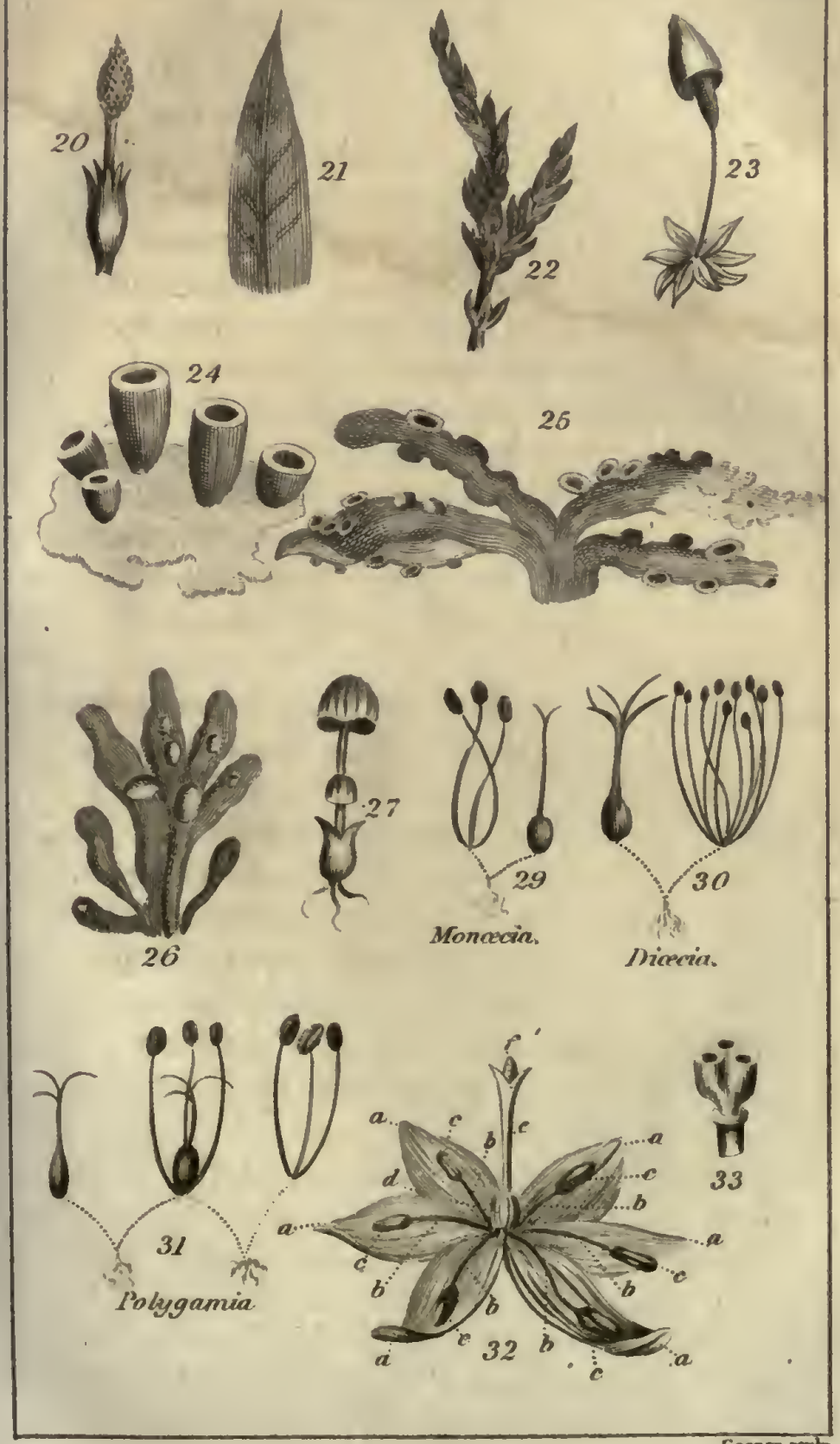
" There is only one more division necessary to bring us down to particular plants. For instance, I have found, that my newly gathered flower is a rose, a convolvulus, or a heath, but I want to know what kind of rose, convolvulus, &c. For this purpose each genus is divided into *species*, the characteristic marks of which are formed upon the leaves, stems, roots, or any other parts of the plant, except the flower; and some name, called the specific or

trivial name, is given to each species, thus characterized, which, added to the name of the genus, sufficiently distinguishes each particular plant: thus, there is the *salix lanata*, *salix latifolia*, *salix repens*, or the woolly willow, the broad-leaved willow, the creeping willow, and several others, which are all species of the genus *salix*, or willow, in the same way that the long-eared bat, the common bat, the vampyre bat, and the horse-shoe bat, are all species of the same genus *vespertilio*, or bat.

" We have now gone through all the divisions and subdivisions of Linnæus's system of classification for the vegetable kingdom; and have arrived at the ultimate object of our research, in ascertaining the family and species to which any individual plant may belong. I shall now elucidate the whole by an example.

" Suppose that you have found, and brought home from your walk, a delicate, blue, bell-shaped flower, called by some bell-flower, by others Canterbury-bell, and by others again blue-bell. You naturally wish to know by what name this plant is distinguished by the botanist, what name all scientific men in every country have agreed to give it, that you may be at no loss under what name to look for a description of it, or how to communicate to others any observations you may have made upon this plant yourself.

" In the first place, then, examine how many stamina, or how many of those small bodies called its antheræ, are to be found in the bell-shaped corolla, or blossom; you discover five; now run over the classes of Linnæus, till you come to that, which is distinguished by its five stamina; this is



Cooper sculp.

Published by J. Harris St. Paul's Ch. Yd. 1st Jan.

called *pentandria*, and you therefore know your flower to be in this class. Next look for the pistillum or pistilla, of which in this plant you will find only one; this characterizes the first order, called *monogynia*, and therefore your plant is in the class *pentandria*, and order *monogynia*. You have now done with the stamina and pistilla, and must attend to the other parts of the flower, comparing them, as you go on, with the characters of all the genera in this first order of the fifth class. The calyx you find to have five divisions, sharp, and not quite upright; the corolla of one petal, bell-shaped with five clefts, close at the base; shrivelling; segments broad, sharp, open; seed-vessel roundish, of three or four cells; all which tallies exactly with the generic character of *campanula;* this therefore is the genus, and you have now only to find out to what species yours belongs. The leaves nearest to the roots, and which are generally so close to the ground as to require care not to leave them behind in gathering the plant, you will find to be round, or rather heart-shaped, or sometimes kidney-shaped, whilst the leaves on the stem are narrow, and strap-shaped; this determines the species, and in this your flower agrees with the character of that called *rotundifolia*. You have therefore now determined your plant to be the *campanula rotundifolia*, and you may read all the descriptions of this plant without a doubt as to its being the same, and may describe to others, where you found it, when you found it, and what else you know of it, without any fear of confounding it with any other blue, bell-shaped flower, of which there are many, both of this and of other genera." See Skrimshire's Essays.

Botany-*Bay*. See *New* Holland.

Bote, in old law books, signifies recompence, amends, &c. thus *manbote* is compensation for a person slain.

Bottle, a small vessel proper to contain liquors, made of leather, glass, or stone. Dr. Percival cautions against the practice of cleaning wine-bottles with leaden shot. He thinks that, through negligence, some must sometimes be left behind; and that, dissolving in wine or beer, they communicate the poisonous sweetness sometimes perceived in port-wine, when such adulteration is neither designed nor suspected. Potash is recommended in their stead; a small quantity of which, with the water, will clean two gross. Bottles were formerly made of the skins of goats and other animals, which were apt to decay by use and length of time, hence the propriety of putting "new wine," that was apt to ferment, "into new bottles" which were strong and able to endure the force of the expansion; but "old wine" in which there was no danger of fermentation, might safely be put "into old bottles" that were less strong: or which from long use might have become brittle.

Bottomry, in commerce, is in the nature of a mortgage of a ship: when the owner takes up money to enable him to carry on his voyage, and pledges the keel or bottom of the ship *(pars pro toto)* as a security for the repayment.

Bounty, money given by government on the exportation or importation of certain articles of commerce, the trade in which it is thought necessary to encourage by temptations beyond its ordinary profits. The effect of bounty on the production of

any article, is to render it dearer in the home market.

Bow, a weapon of offence made of wood, with a string fastened at each extremity, and which, being bent, expels an arrow, on its rebound, with great force and velocity. The bow is the most ancient and most universal of all weapons; and one, in the construction and use of which those nations, that have no other, excel in a degree that appears wonderful to men not practised in its use.

Bowls, a game played upon a fine smooth grassy surface, used solely for the purpose, and denominated a bowling-green. The party may consist of two, four, six, or eight. The sides being selected by the throwing up of a coin, each player has two bowls, which are marked, so that all may know their own. The leader sends off a smaller bowl called a jack, which he follows with his first bowl, getting as near the jack as possible: he is then followed by one of the adverse party, and so on till all the bowls are played; as many of the bowls, on either side, as are nearer to the jack than the nearest on the opposite side, so many do the successful party score towards the game. Sometimes a ball laying very near the jack, is removed to a distance by the hit of an adversary's bowl, which remains nearer the jack than the bowl it has driven away: this is called a *rub*, hence the proverb, "he that plays at bowls, must expect rubs."

Brachman or Brachmin, an ancient religious denomination of men in India; the successors of whom, it is said, are called *Bramins*. See Bramins.

Brain, a soft whitish mass, enclosed in the cranium or scull, encompassed with two membranes

called *dura mater* and *pia mater*, and divided into three principal parts: the *cerebrum*, or brain, strictly so called; the *cerebellum;* and the *medulla oblonga*. The *cerebrum* is supposed by most authors to consist of innumerable minute glands, destined for the secretion of animal spirits from the blood, and of infinitely fine fibres, communicating with the nerves. The *cerebellum*, or hinder part of the brain, is esteemed a kind of little brain itself. Its substance is harder and more solid than that of the *cerebrum*, but of the same nature. The *medulla oblonga* or the medullary part, and the *cerebellum* are joined in one, of which the spinal marrow is a continuation, whence originate most of the nerves of the trunk of the body.

Bramins, the cast or hereditary division of Hindoos peculiarly devoted to religion and religious science, in the same manner as, among the Jews, the priesthood was ordained to continue in the tribe of Levi. The families of this cast claim peculiar veneration from the rest, and seem, in their name of *bramins*, to claim the merit of being the more immediate followers of Brahma, their incarnate deity. On the other hand, to maintain this character, they profess a peculiar circumspection over their conduct, and self-denial on many points wherein they allow indulgence to their less holy neighbours. To speak of the religion of the *bramins*, it is more correct to say the religion of Brahma, of whom the bramins make part of the disciples. Of this system it is impossible to enter into particulars within a narrow space; and, perhaps, Europeans ought to confess themselves altogether incompetent to the task. In its morals, it often presents very amiable features;

in its metaphysics, or at least in its attempts to describe the actions of the Creator toward mankind, its symbols are frequently absurd. How far these are the degeneracies of an ancient establishment, and the misconstructions of ignorance, it is by no means easy to say. It were too hasty a conclusion, however, to infer, that, in its institution, if not in its pure state at present, it was not founded on the basis of a praise-worthy morality and tolerably sound philosophy. Of the institutions of Brahma, that of the subdivisions of his disciples into perpetual casts is the most striking, and most deserving of attention.

Bran, the skins or husks of corn, especially of wheat, separated from the flour by a sieve. From this, starch is principally made: it is much used by dyers, and in other manufactures.

Branch, signifies the arm of a tree, which proceeding from the trunk, helps to form the head or crown thereof. The same term is applied in genealogy and anatomy; thus we say the branch of a family, the branch of an artery, vein, &c.

Branchiæ, *gills*, in the anatomy of fishes, the parts corresponding to the lungs of land animals, by which fishes take in and throw out a certain quantity of water impregnated with air: hence we have the term,

Branchiostegous, which denotes an order of fishes having gills without bony rays. Of these Linnæus made ten genera, which later naturalists have placed among the Cartelaginei, which see.

Brandy, a spirituous and inflammable liquor, extracted from wine and other liquors of distillation. The wine-brandy, made in France, is esteemed the

best in Europe. It is made wherever wine is made, and pricked wine is used for this purpose, rather than good wine. The chief brandies for foreign trade, and those accounted best, are the brandies of Bourdeaux, Rochelle, Cogniac, Blasois, Poictou, Touraine, Anjou, Nantz, Burgundy, and Champaign.

Brasil, a large country on the east side of South America, said to be in some places 15 or 16 miles broad, and a thousand miles long. It was discovered and settled by the Portuguese, and in the year 1807, the government and court of Portugal emigrated thither to free themselves from the power and tyranny of Bonaparte. The air of Brasil, though within the torrid zone, is rather temperate and wholesome. The water is good, and the soil rich and fertile. Its exports are sugar, rum, tobacco, hides, drugs, gold and diamonds: for which it receives, woollen stuffs, silk, hats, hardwares, wine, &c.

Brasil-wood, an American wood of a red colour, and very heavy, used in dying. It grows naturally in the warmest parts of America. The demand has been so great that none of the trees are left in any of the British plantations; so that Mr. Catesby owns himself ignorant of the dimensions to which they grow. The largest remaining are not above two inches in thickness, and eight or nine in height. The colour produced from this wood is greatly improved by a solution of tin in *aqua regia*.

Brass, is a most useful compound, formed by the union of copper with zinc in various proportions. This substance, as is well known, is of a beautiful yellow colour, but varying in its shades

according to the proportion of ingredients employed. It is more fusible than copper, and not so apt to tarnish: it is malleable when cold, but not when heated. The theory of Brass-making is this: mix together the oxydes of copper and zinc, and reduce them with a carbonaceous flux. The following are the proper proportions; 50 grains of oxyde of copper; 100 grains of lapis caliminaris; 400 grains of black flux and 30 grains of charcoal powder. Melt the mixture in a crucible till the blue flame is seen no longer on the lid of the crucible, and when cold a fine button of brass is found beneath the scoria, weighing rather more than the copper alone obtainable from its oxyde without the calamine. Brass is so ductile that sieves of extreme fineness are wove with the wire, after the manner of cambric weaving.

Brazing, the soldering or joining two pieces of iron together by means of thin plates of brass, melted between the pieces that are to be joined. If the work be very fine, as when two leaves of a broken saw are to be brazed together, they cover it with pulverized borax, melted with water, that it may incorporate with the brass powder, which is added to it. The piece is then exposed to the fire without touching the coals, and heated till the brass is seen to run.

Bread, in a general sense, signifies food; in a particular sense, it is a dry and simple preparation constituting the greater part of food: and it is observable, that without bread, or somewhat in this form, no nation seems to live. Thus the Laplanders, who have but little corn, make a sort of bread of dried fishes, and of the inner rind of the

pine, which seems to be used not so much for their nourishment as for supplying a dry food. For this, mankind seem to have a universal appetite, rejecting bland, slippery, and mucilaginous foods. This, says Dr. Cullen, is not commonly accounted for, but seems to arise from very simple principles. The preparation of our food depends on the mixture of animal fluids in every stage. Among others, the saliva is necessary, which requires dry food as a necessary stimulus to draw it forth; as bland, slippery, fluid aliments are too inert, and make too short stay in the mouth, to produce this effect, or to cause a sufficient degree of manducation to emulge that liquor. For this reason, we commonly use dry bread along with animal food, which would otherwise be too quickly swallowed. For blending the oil and water of our food, nothing is so fit as bread, assisted by a previous manducation; for which purpose, bread is of like necessity in the stomach, it being expedient that a substance of solid consistence should be long retained there.—Bread, well raised and baked, differs from unfermented bread, not only in being less compact, lighter, and of a more agreeable taste, but also in being more easily miscible with water, with which it does not form a viscous mass, a circumstance of great importance in digestion. With regard to the vegetables from which bread may be prepared, it is to be observed, that the grains of all are almost intirely composed of substances very proper for the nourishment of animals; but that those which contain a farinaceous matter are both the most agreeable and most nutritive. The following is reckoned an excellent recipe for making bread: to half a

bushel of flour add six ounces of salt, a pint of yeast, and six quarts of boiled water: in warm weather pour in the water nearly cold, but in winter and when the weather is cold, the water should be warm. These are to be put in a kneading-trough, and well worked into dough. This is to be covered up to ferment and rise, and in this state it is called sponge. Let it lie about an hour and half, then knead it again, and re-cover it for some time longer; heat the oven, and when properly cleaned, make the bread into loaves, and place them in it to bake.

Bread (Adulteration of,) by means of alum, may be considered as one lamentable source of the diseases of children, as obstructions in the bowels, rickets, &c. To discover such unlawful practices, requires no chemical skill: on macerating a small piece of the crumb of new-baked bread in cold water, sufficient to dissolve it, the taste of the latter, if alum has been used by the baker, will acquire a sweetish astringency. Another method of detecting this adulteration consists in thrusting a heated knife into a loaf before it has grown cold; and if it be free from that ingredient, scarce any alteration will be visible on the blade; but, in the contrary case, its surface, after being allowed to cool, wil appear slightly covered with an aluminous incrustation.

Bread-fruit, the fruit of the *artocarpus*, which appears to have been first discovered to Europeans by the great navigator Dampier. It is indigenous in the islands of the South Sea; the tree is said to be of the size of a large apple tree; the leaves broad, and of a dark green. The fruit is appended to the

boughs in the manner of apples, and of about the size of a pound of bread, inclosed with a tough rind, which, when ripe, turns of a yellow colour. The internal part is yellow, soft, and sweet. The natives of the countries where it grows, bake it in an oven till the rind is black; and this being scraped off, eat the inside, which is then white, resembling new-baked bread, having neither seed nor stone. If kept in this state twenty-four hours, it grows harsh. It is said to be very satisfying to the stomach, full of nourishment, and therefore proper for hard-working people. It is known at Bantam by the name of *foccum;* and Anson calls the tree, the *rima*. It supplies food during three fourths of the year.

Breviary, a book of divine service in the Romish church. It is composed of matins, lauds, third, sixth, and ninth vespers, and the *complini* or *post communio*.

Brewing, the operation of preparing ale or beer from malt. A quantity of water being boiled, is left to cool till the height of the steam be over; when so much is poured to a quantity of malt in the mashing-tub as makes it of a consistence to be just well rowed up. After standing thus a quarter of an hour, a second quantity of water is added; and that in proportion as the liquor is intended to be strong or weak. This part of the operation is called mashing. The whole now stands two or three hours, more or less according to the strength of the wort, or the difference of the weather, and is drawn off into a receiver, and the mashing repeated for a second wort, in the same manner as for the first, only the water must be cooler than before, and

must not stand above half the time. The two worts are then to be mixed, the intended quantity of hops added, and the liquor, closely covered up, quickly boiled for the space of an hour or two; then let into the receiver, and the hops strained from it into the coolers. When cool, the barm or yest is applied; and it is left to work or ferment till it be fit to tun up. For small-beer, there is a third mashing with the water nearly cold, not left to stand above three quarters of an hour, and hopped and boiled at discretion. For double beer or ale, the liquors resulting from the two first mashings must be used, as liquor for the third mashing of fresh malt. The following is a good receipt for brewing beer on a small scale. We can from our own experience testify to its value. The quantity of malt is one peck only. In a copper, &c. that will hold ten or twelve gallons, boil your water, and when so far cooled down that you can see your face in it, put some of the water into a mashing tub, and add the malt by degrees in order that it may be well mixed with a ladle, then add more malt and water, till the malt and about two or three gallons of water are used, let it stand closely covered up with a woollen cover of two or three doubles, about an hour, draw it off and pour on more boiling water. Let it stand half an hour, and repeat the process till you have the quantity of wort you wish to make. A peck of malt will make five gallons of decent table ale. After the wort has run off from the mash tub boil it quickly with about three ounces of hops. Then pour the liquor through a sieve into vessels to cool, and when about as warm as new milk fresh drawn from the cow, add about half a pint of yeast to it,

which must be mixed thoroughly with the wort. When the fermentation is over, put it into a barrel; and after a day or two let it be closely bunged down: it will be fit for use in a month.

Bribery, the act of prevailing upon any individual to do a legal or illegal act for the sake of reward. In elections, we have heard of voters bribed to a party; in law, of witnesses bribed to bear false testimony, of jurors bribed to return unjust verdicts, of judges bribed to forego their duty, or to do it. In many of the lower official departments, the practice of bribery is so notorious and systematic, that those who have any intercourse with them submit to the fraud as a matter of necessity, and the receivers are not deficient in effrontery; but the offence of taking bribes, if prosecuted at law, is punishable by fine and imprisonment.

Brick, a composition of earth, formed into long squares, four inches broad and eight or nine long, and baked or burnt in a kiln, or in a *clamp*, to serve as stones in building. Bricks are generally made of a yellowish-coloured, fattish earth, commonly called *loam*, ground into a paste, and mixed with ashes. Common bricks are of a brownish colour; *stock* bricks are made to resemble stone as nearly as possible. The red bricks, formerly so much admired, must be made of earths that contain ferruginous particles, and baked in kilns. Bricks may be made of any earth that is clear of stones.

Bridewell, a name first given to a building near Blackfriars-bridge, in London, where there was a well, "dedicated to one of the St. Brides or Bridgets. Bridewell is not only a prison for the dissolute, but an hospital for the education of indus-

trious youth. Here, twenty arts-masters (as they are styled), consisting of decayed tradesmen, such as shoemakers, taylors, flax-dressers and weavers, have houses, and receive apprentices, who are instructed in the several trades; the master receiving the profits of their labours. After the boys have served their time with credit, they are paid ten pounds to begin the world with, and are entitled to the freedom of the city. They are dressed in blue, with a white hat."

Bridge, a work of carpentry, or masonry, built over a river, canal, &c. for the convenience of passing from one side to the other, and may be considered as a road over water, supported by one or more arches, and these are supported by piers or buttments. The longest bridge in England is that over the Trent at Burton, being 1545 feet in length, and consisting of 34 arches. This was built in the 12th century. The triangular bridge at Croyland, in Lincolnshire, which was erected in the 9th century, is said to be the most ancient gothic structure remaining in the kingdom. London-bridge is 900 feet long, 60 high, and 74 wide: it is supported by 18 piers from 34 to 25 feet thick. Westminster-bridge is 1220 feet long and 44 feet wide. It consists of 15 arches, was finished in 1750, and cost 389,000*l*. Blackfriars-bridge was finished in 1770: it consists of nine large arches, nearly elliptical, the breadth of the bridge is 42 feet, and the length, from wharf to wharf, 995 feet. It cost 150,840*l*.

Brief, in law, an abridgement of the client's case, made out for the instruction of counsel on a trial at law; wherein the case of the plaintiff, &c. is to be

briefly, but completely stated. The term *brief* is also used for a letter from the king, empowering distressed persons to ask for charitable contributions in all churches and chapels, and "from house to house."

Brig, or *Brigantine*, a term variously applied by the mariners of different European nations, to a peculiar sort of vessel of their own marine. Among British seamen, this vessel is distinguished by having her mainsails set nearly in the plane of her keel, whereas the mainsails of other ships are hung athwart, or at right angles into the ship's length, and fastened to a yard which hangs parallel to the deck.

Brigade, a party or division of soldiers, either horse or foot. An army is divided into brigades of horse and brigades of foot: a brigade of horse is a body of eight or ten squadrons; a brigade of foot consists of four, five, or six battalions.

Brigade-major, an assistant officer to a brigadier.

Brigadier, the general officer who has the command of a brigade; the rank does not at present exist in the British service.

Brimstone. See Sulphur.

Brine, is either native, as sea-water, or the water flowing from salt springs; or artificial, being formed by the dissolution of salt in water. At the salt-works at Upwich, in Worcestershire, there are found at the same time, and in the same pit, three sorts of brine, each of a different strength. Curing or pickling fish in natural brine, is prohibited by act of parliament. Some steep their seed-wheat in brine, to prevent the smut. Brine is also commended as of efficacy against gangrenes.

BRISTOL-WATERS. See MINERAL-*waters*.

BRISTLE, a rigid glossy hair found on swine, much used by brushmakers, shoemakers, sadlers, and others. Bristles made use of in this country, are chiefly imported from Russia and some parts of the north of Germany.

BRITAIN, the present name of our island, says Macpherson, has its origin in the Celtic tongue: *Brit*, or *Braid*, signifying "extensive," and *in* "land." This island, which lies between 50° and 58°. 30′ north lat. containing, in a line from north to south, nearly 550 miles, was once divided into many sovereignties. From the time of Egbert, A. D. 819, they were reduced to three: England, Wales, and Scotland. Edward III. united Wales to England, by conquest. James VI. of Scotland, by succession to the throne of England, united the crowns of the two kingdoms in one person, and thus governing the two Britains, or *Britannia-Prima* and *Britannia-Secunda* of the Romans, he styled himself king of Great Britain. This union was completed by Ann. Henry VIII. erected Ireland into a kingdom, and annexed the crown to that of England. Great Britain and Ireland were united in *one* kingdom on the 1st day of January, A. D. 1801, and the 41st of George III.

BRITAIN, NEW, a country of North America, comprehending all the tract north of Canada, commonly called the Esquimaux country, including Labrador, New North, and New South Wales. The principal settlements belong to the English Hudson's Bay Company. There is also an island to the north of New Guinea named New Britain.

BROADCAST, a term in husbandry, signifying the

method of sowing field-plants by scattering the seed, and so called in contradistinction to the drill husbandry.

Broadside, a discharge of all the guns on one side of a ship at the same time.

Brocade or *Brocado*, a stuff of gold, silver, or silk raised and enriched with flowers, foliages, and other ornaments, according to the fancy of the merchants or manufacturers.

Broker, a profession, of which there are two principal kinds: exchange-brokers and pawn-brokers. Exchange-brokers, are a sort of negociators, who contrive, make and conclude bargains between merchants and tradesmen, in matters of money or merchandise; or stock-brokers, who are employed to buy and sell shares in the joint stock of a company or corporation, or in the public funds; or appraisers of household furniture. These, in London, are severally authorized to practise by one general licence granted by the lord-mayor, who administers an oath and takes bond for the faithful execution of the office. Pawn-brokers are persons who lend money to necessitous persons upon goods pledged as security for the same, at a legal interest, and under regulations established by act of parliament. See Exchange: Stocks, &c.

Bronze, a mixture of copper and tin, and sometimes zinc, used for bells, cannon, statues, &c. This metal is brittle, hard and sonorous. The relative quantities of the component metals are varied according to the use to which the bronze is to be applied. Tin being less subject to rust than copper, renders bronze capable of being exposed to the air without becoming covered with verdigrise,

which is one reason why it is used for such works as cannon and statues. The greater susceptibility of bronze than copper is also an advantageous property, and much facilitates the casting of large works. It appears that tin, on its mixture with copper, changes the size and disposition of its pores, and gives to the compound a compactness through which it becomes specifically heavier than either of the metals in a separate state, and more secure from the corrosion of the atmosphere.

Bruises, nothing more common than these among children. The injured parts are to have linen soaked with vinegar, cold-water, brandy, lime-water, &c. applied to them frequently. If the bruise is slight nothing is better than the application of a small quantity of Pomade Divine, which see. This is also excellent for burns, the sting of gnats, wasps, &c. When bruises are pretty considerable, rest and a dose of Epsom salts are very conducive to a cure. If very violent the injured parts should be bled with leeches. Afterwards opodeldock, and liniments containing camphor may be used.

Brush, a well known instrument, adapted, according to its structure, to a thousand different purposes. Brushes are chiefly made of bristles. Mr. Thomason, of Birmingham, has obtained a patent for hearth brushes, so formed as to conceal the hair in a metal or wooden case by means of rack work.

Bruta, the second order of animals in the class Mammalia, according to the Linnæan system. The animals of this order are characterised as having no fore teeth in either jaw; feet with strong hoof-

like nails; slow motions, and as feeding chiefly on vegetables. There are nine genera: as the Sloth, Elephant, &c.

Bubbles, are small drops of fluids filled with air. The little bubbles, rising up from fluids, or hanging on their surface form the white scum at top, and these same bubbles form the steam or vapour flowing off from liquors in their boiling state.

Bubbles, in commerce, a term given to projects for raising money on imaginary, or false pretences. The most remarkable one in this country was that of the year 1720.

Bucaneer, one who dries and smokes flesh or fish after the manner of the Indians. The name was particularly given to the first French settlers on the island of St. Domingo, whose sole employment consisted in hunting bulls or wild boars, in order to sell their hides and flesh. The name was also applied to those famous piratical adventurers, chiefly English and French, who, in the seventeenth century, joined together to make depredations on the Spaniards in America.

Buckler, a piece of defensive armour used by the ancients, commonly composed of hides, fortified with plates of metal.

Bucklers, votive, were those consecrated to the Gods, and hung up in their temples, in commemoration of some hero, or as a thanksgiving for a victory obtained over an enemy, whose bucklers, taken in war, were offered as a trophy.

Buckram, a sort of coarse cloth made of hemp, gummed, calendered and dyed of several colours. Used in drapery, garments, &c. required to be kept stiff to their form.

Bucolic, in ancient poetry, a poem relating to shepherds and rural affairs. The most celebrated of the ancient bucolics are those of Virgil.

Budding, a method of propagating fruit trees. The stocks are raised from seed; and in these, buds of other trees are inserted, which invariably produce the same kind of tree, fruit and flower, as those from which the buds are taken.

Buff, in commerce, a sort of leather prepared from the skin of the buffalo; which, when dressed with oil after the manner of chamois, makes what we call buff-skin. This is a very considerable article in the French, English and Dutch commerce at Constantinople, Smyrna, and along the coast of Africa. The skins of elks, oxen, and other like animals, when prepared after the same manner as that of the buffalo, are likewise called *buffs*.

Bug, a very troublesome insect in London and other crowded places. The destruction of bugs may be effected by a solution of corrosive sublimate in water, or in water and alcohol. This solution should be applied with a brush to every crevice where it is possible the insects can lodge.

Bulimy, a disease in which the patient is affected with an insatiable and perpetual appetite for food; and, unless he is indulged, he falls into fainting fits: we have a well authenticated account of a person afflicted with this disease who devoured 879 lbs. of meat and drink in six days, nevertheless he lost flesh rapidly.

Bulk-*heads*, are partitions made athwart a ship, by which one part is divided from another; as the great cabin, gun-room, bread-room, &c.

Bull, among ecclesiastics, a written letter, or

public instrument, issued by order of the Pope from the Roman chancery, and sealed with lead; which seal is, properly speaking, the *bull* itself. It is impressed on one side with the heads of St. Peter and St. Paul, and on the other with the name of the pope, and the year of his pontificate.

Bull, *Golden* so called because the seal or *bull* is of gold, an edict or imperial constitution, made by the emperor Charles IV. reported to be the *Magna Charta*, or fundamental law, of the German empire.

Bullion, gold or silver, uncoined, and in the mass. When these metals are in their purity, they are so soft and flexible that they cannot well be brought into any fashion for use, without being first reduced and hardened with an alloy of some baser metal. To prevent the abuses that might be committed in making such alloys, European legislatures have generally established the quantity of alloy to be used, and thus fixed a standard-fineness within their several jurisdictions. According to the law of England, wrought plate in general is to be made to the legal standard; and the price of our standard gold and silver is the common rule whereby to set a value on bullion, whether the same be ingots, bars, dust, or foreign specie: whence it is easy to conceive that the value of bullion cannot be exactly known without being first assayed, that the exact quantity of fine metal therein contained may be determined.—Silver and gold, whether in coin or bullion, though used as a common measure for other things, are no less commodities than sugars, hemp, or cloth.

Bunt, of a sail, the middle part of it, formed

designedly into a bag or cavity that the sail may gather and hold the wind. It is used mostly in topsails. Bunt-lines are the small ropes made fast to the bottom of the sails.

Buoy, in sea affairs, a sort of close cask, or block of wood, fastened by a rope to the anchor, and which, floating on the surface of the water, points out its situation.

Burden, or Burthen, generally implies a load or weight supposed to be as much as a man, horse, &c. can carry. One horse will draw as much as six or seven men, or about 300 or 350 lb. Burden of a ship, is its contents, or the number of tons it will carry.

Burgage, or *Tenure in Burgage*, is where the king, or other person, is lord of an ancient borough, in which the tenements are held by a rent certain. It is indeed only a kind of town soccage; as common soccage, by which other lands are holden, is usually of a rural nature. (See Soccage.) A borough is distinguished from other towns by the right of sending members to parliament; and where the right of election is by burgage-tenure, that alone is a proof of the antiquity of the borough. Tenure in burgage, therefore, or burgage-tenure, is where houses or lands which were formerly the scite of houses in an ancient borough, are held of some lord in common soccage, by a certain established rent. And these seem to have withstood the shock of the Norman encroachments principally on account of their insignificancy, which made it not worth while to compel them to an alteration of tenure, as 100 of them put together would scarce have amounted to a knight's fee. Besides, the

owners of them, being chiefly artificers, and persons engaged in trade, could not with any tolerable propriety be put on such a military establishment as the tenure in chivalry was. The free soccage, therefore, in which these tenements are held, seems to be plainly a remnant of Saxon liberty; which may also account for the great variety of customs affecting many of these tenements so held in ancient burgage; the principal and most remarkable of which is that called Borough English.

Burgess, an inhabitant of a borough, or one who possesses a tenement therein. In some countries burgesses and citizens are confounded, but not so here. Burgess is now commonly used for the representative of a borough-town in parliament.

Burgh-*bote*, signifies a contribution towards building or repairing castles or walls, for the defence of a borough or city.

Burglary, the offence of breaking by night into a mansion house, with intent to commit a felony. In this definition, there are four things to be considered: the *time*, the *place*, the *manner*, and the *intent*. 1. The time must be *night;* and herein the spirit of the distinction is, that it be that time called the *dead of the night*, in which mankind in general are in a defenceless state. 2. The *place* must be a mansion-house, that is a dwelling house, or some building adjoining a dwelling house, because the idea of inviolable security is exclusively attached to the place in which a man resides, and because it is only there that peculiar alarm or danger can attend a midnight attack; a barn or other distant building being, in general, as

much without the protection of the owner by day as by night. 3. The *manner* must be both a breaking and an entry. It must be a breaking, because if a person leave his doors or windows open, it is his own folly and negligence; but to come down a chimney is held a burglarious entry, since that aperture is as much closed as the nature of things will permit. To gain an entry by artifice is also burglarious. 4. The *intent* to commit a felony must be shown; otherwise, all the rest is only a trespass. Burglary is a felony at common law, but within benefit of clergy.

Burgo-master, the chief magistrate of the great towns in Flanders, Holland and Germany. The authority of a Burgomaster resembles that of the Lord Mayor in London.

Burn, an injury received in any part of the body either by fire itself or by instruments made hot by fire, &c. When a scald or burn is general, or a large part of the body is burnt, the person should be kept immersed in cold water, renewed frequently and as cold as possible; when burns are local, and confined to particular parts of the body, powdered ice, or snow, or rags soaked in cold water should be applied. The following lotion is extremely useful, and should be kept in every house.

Take of camphorated spirit two drams, Goulard's extract one dram, and a pint of water. The mixture to be made in the order in which they are set down, otherwise the camphor will separate. The application to be renewed till the pain and inflammation subside: the wound may then be dressed with white cerate. See Bruise.

Burning, of females, by their cloaths having

caught fire. The following directions are circulated by the Royal Humane Society. If no person is present to assist her, she may relieve herself by throwing her clothes over her head, and laying down and rolling upon them. She must by no means run away, and flame always tending upwards, much of the mischief will be prevented if a person in that unfortunate situation will throw herself on the ground, and if possible roll about her a carpet, hearth rug, &c. If another person be present, then, without any regard to delicacy, such person should instantly pass the hand under all the clothes to the lowest garment, and raise the whole together, and close them over the head, by which in an instant almost, the flame will be indubitably extinguished. This is the most expeditious and effectual method of preventing the dire effects of a terrible accident which is perpetually occurring.

Burning-glass, a convex glass, commonly spherical, which being exposed directly to the sun, collects all the rays falling thereon into a very small space, called the *focus*; where wood, or any other combustible matter, being put, will be set on fire. The term burning-glass is also used to denote certain concave mirrors, whether composed of glass quicksilvered, or of metalline matter. Among the ancients, the burning mirrors of Archimedes and Proclus are famous. By the former, the Roman navy was set on fire and consumed, at the distance of a bow-shot; and by the latter, according to Zonaras, the navy of Vitellius, while besieging Byzantium, was burnt to ashes. By means of a mirror made by Villette, a French artist of Lyons, a sixpence was melted in seven minutes and a half; and a half-

penny in sixteen minutes. This mirror was 47 inches wide, and ground to a sphere of 76 inches radius; so that its focus was about 38 inches from the vertex. Its substance was a composition of tin, copper, and glass. A glass made by M. de Tschirnhausen vitrifies tiles, slates, pumice-stones, &c. in a moment. It melts sulphur, pitch, and all rosins under water; the ashes of vegetables, woods, and other matters are transmuted into glass: every thing presented to its focus is either melted, turned into a calx, or dissipated in vapour.

Burnishing, the art of polishing a metallic body, by a brisk rubbing of it with a burnisher, generally a round polished piece of steel. Book-binders burnish the edges of their books by rubbing them with a dog's tooth.

Bursars, in the Scotch Universities, are youths chosen as exhibitioners, and maintained for four years.

Burse, a place for merchants to meet in and negotiate their business publicly, commonly denominated an Exchange, which see.

Bushel, a measure of quantity for things dry; as grain, pulse, dry fruit, &c. containing four pecks, or eight gallons, or one eighth of a quarter.

A bushel, by 12 Henry VIII. c. 5, is to contain 8 gallons of wheat; the gallon eight pounds of troy-weight; the ounce twenty sterlings; and the sterling thirty-two grains, or corns of wheat growing in the midst of the ear.

This standard bushel is kept in the exchequer, and it is found to contain 2145.6 solid inches, and the water with which it has been filled weighed 1131 ounces, and fourteen penny-weights troy. By

act of parliament made in 1697, it is determined that every round bushel with a plain and even bottom, being 18½ inches in diameter, and 8 inches deep, should be esteemed a legal Winchester bushel according to the standard in his majesty's exchequer. A vessel thus made will contain 2150.42 cubic inches; of course the corn gallon contains 261. 8 cubic inches. Besides the standard or legal bushel, there are several local bushels of different dimensions in different places. But, by 31 Geo. III. c. 30, the bushel by which all corn shall be measured and computed for the purposes of this act, shall be the Winchester bushel, and a quarter shall be deemed to consist of 8 bushels: and all measures shall be computed by the stricken and not by the heaped bushel: and where corn shall be sold by weight, 57lbs. avoirdupoise of wheat shall be deemed equal to one Winchester bushel.

Buss, a small sea vessel, used in the herring fishery, about 50 tons burden: it has two cabins, one at the prow and the other at the stern, the former serves for a kitchen.

Bust or busto, in sculpture, denotes the figure or portrait of a person in relievo, showing only the head, shoulders, and stomach, the arms being lopped off. The stomach and shoulders are, strictly speaking, the bust. The term is also used, by the Italians, for the *torso* or trunk of the body, from the neck to the hips. The bust is the same with what the Latins called *herma* from the Greek *hermes*, Mercury, the image of that God being frequently represented in that manner by the Athenians.

Butments, supporters or props on or against which the feet of arches rest.

Butter, the fat, oily and inflammable part of milk. This kind of oil, in its natural state, is distributed through all the substance of the milk in very small particles, which are interposed between the caseous and serous parts, among which it is suspended by a slight adherence, but without being dissolved. It is in the same state as that of oil in emulsions; hence the same whiteness in milk and in emulsions; and hence, by rest, the oily parts separate from both these liquors to the surface, and form a cream. When butter is in the state of cream, its proper oily parts are not yet sufficiently united together to form an homogeneous mass. They are still half separated by the interposition of a pretty large quantity of serous and caseous particles. The butter is completely formed by pressing out these heterogeneous parts by means of continued percussion. It then becomes a uniform solid mass. Butter is constantly used in food. Fifty thousand tons have been computed to be annually consumed in London. Butter is a name given in old books of chemistry to several metallic muriates, on account of their texture when newly prepared. Hence there are the butters of Antimony, Arsenic, Bismuth and Tin. Thus butter of antimony is a compound of antimony and oxygenized muriatic acid, and is a muriate of antimony, and so of the rest.

Button, an article of dress, intended as a fastening, made of various materials, as mohair, silk, horsehair, metals, &c. In making buttons of mohair, silk, &c. the material is previously wound on a bobbin, and the mould fixed to a board, by means of a bodkin thrust through the hole in the middle of it: this being done, the workman wraps the mohair,

round the mould in three, four, or six columns, according to the intended pattern of the button. A button is not finished when it comes from the maker's hands. The superfluous hairs and hubs of silk must be taken off, and the button rendered beautiful and glossy before it can be sold. This is done in the following manner: a quantity of buttons are put into a kind of iron sieve, called by workmen a *singeing box;* then, a little spirit of wine being poured into a kind of shallow iron dish, and set on fire, the workman moves and shakes the singeing box briskly over the flame of the spirit, by which the redundant parts are burnt off, without damaging the buttons. The mould of *gold twist buttons* is first wrapped round in the same manner as that of common buttons. This being done the whole is covered with a thin plate of gold and silver, and then wrought over with purle and gimp.

Buttress, a kind of butment, built archwise, serving to support the sides of a building on the outside. They are used against the angles of towers, and on other occasions where the walls, unless very thick, would be liable, without this support, to be thrust out. They are also placed for a support and butment at the feet of arches turned over great halls, &c.

Buxton-waters, are of two sorts, hot and cold. The former resemble those of Bristol; the latter, those of Tunbridge. See *Mineral Waters.*

Buxus, the box-tree, of which there are three species: 1. The arborescens, with oval leaves. 2. The angustifolio, with narrow leaves. 3. The suffruticosa, commonly used for bordering of flower-beds. The two first sorts, when suffered to grow

in a natural manner, are deciduous shrubs of a very elegant figure. There were formerly large trees of these kinds upon Boxhill, near Dorking in Surry, in England. They are all easily cultivated. Boxwood is extremely hard and smooth, and therefore capable of being wrought with great neatness by the turner. It is used for the same reasons by engravers on wood.

By-law, a law made *obiter*, or by the by, for the good of those that make it. All by-laws are to be reasonable, and for the common benefit, not the private advantage of particular persons, and must be agreeable to the public laws in being. In Scotland, these laws are called laws of *birlaw* or *burlaw*.

C.

C, The third letter, and second consonant, of the alphabet, is pronounced like *k* before the vowels *a*, *o*, and *u*, and like *s* before *e*, *i*, and *y*. C is formed, according to Scaliger, from the K of the Greeks by retrenching the stem or upright line; though others derive it from the caph of the Hebrews, which has in effect the same form; allowing only for this, that the Hebrews read backwards, &c. the Latins, &c. forwards. As a numeral C signifies 100.

Cabbala, a mysterious kind of science, delivered by revelation to the ancient Jews, and transmitted by oral tradition to those of our times; serving for interpretation of the books both of nature and scripture.

Cable, a thick, long three-strand rope, ordina-

rily of hemp, serving to hold ships firm at anchor and to tow vessels in large rivers. In Europe, the cables are commonly made of hemp; in Africa, of long straw or rushes called bass; and in Asia, of a peculiar kind of Indian grass. The term cable is sometimes also applied to the cordage used to raise massy loads, by means of cranes, wheels, and other like engines: though, in strictness, cable is not to be applied to ropes of less than three inches circumference. Every cable, of whatever thickness it be, is composed of three strands; each strand of three twists; and each twist of a certain number of caburns, or threads of rope yarn, more or less as the cable is to be thicker or smaller.

Cadence, in music, the termination of an harmonical phrase; or a pause, or suspension, at the end of an air or some of its parts. Its use is very analogous to that of a point or stop in reading.

Cadence, in reading, is a falling of the voice below the key-note at the close of every period. In reading, whether prose or verse, a certain tone is assumed, which is called the key-note; and in this tone the bulk of the words are sounded; but this note is generally lowered towards the close of every sentence.

Cadmean Letters, the ancient Greek or Ionic characters, such as they were first brought by Cadmus from Phœnicia; whence Herodotus also calls them Phœnician letters. According to some writers, Cadmus was not the inventor, nor even importer of the Greek letters, but only the modeller and reformer of them, and it was hence they acquired the appellation Cadmean or Phœnician let-

ters; whereas before that time they had been called Pelasgian letters.

CADET, every son of a family, below the eldest. The word is adopted from the French. Cadette, a younger sister.

Cadet, one who enters a marching regiment as a private man, and receives pay accordingly, with the hope of promotion. In the East-India service a cadet receives a commission as soon as he lands; but by sending out their officers as cadets, the company saves the pay during the voyage.

CADI, or CADHI, a civil judge or magistrate in the Turkish Empire.

CADUCEUS, the rod or sceptre of Mercury, being a rod entwisted by two serpents, and tipped with wings, borne by that deity as the ensign of his quality and office. It was used by the Romans as a symbol of peace and concord: and thus, when they meant to offer to the Carthaginians the choice of war and peace, they sent a javelin and a caduceus. It is used on medals as an emblem; the rod signifying power; the serpents, prosperity or plenty; and the wings, diligence.

CAISSON, denotes a kind of chest, frame, or flat bottomed boat used in laying the foundation of bridges in deep or rapid rivers. The piers of such bridges are built in caissons. The most considerable work where caissons were used was Westminster bridge.

CALAMANCO, a fine sort of woollen stuff, manufactured in England and in Brabant. Some calamancoes are quite plain, others have broad stripes, adorned with flowers, and others plain stripes, &c.

CALAMINE, *lapis-calaminaris*, a sort of mineral,

principally known as containing zinc, and therefore used in making brass. It is found in several parts of Europe; but the calamine of England is allowed, by the best judges, to be of the best kind. In some parts of Wales, it makes so large a portion of the common soil, as to have been used for mending the roads. See Zinc.

Calcination, in chemistry, the reducing of substances to a calx by fire: by this process, calcareous substances are reduced into quick lime; metal, into metallic oxydes, or, as they were formerly termed, calces, and vegetable matters into white ashes. In metallurgic operations the term is employed to denote the process by which the ores are deprived of their water and salts, as a preliminary step towards the separation of the metal, and in this sense it may be considered as an advanced stage of roasting. The change which metallic bodies undergo in calcination is produced by the absorption of oxygen; hence the process, in this instance, is now called oxydation.

Calender, or Kalender, a distribution of time as accommodated to the uses of life; or an almanac, or table, containing the order of days, weeks months, feasts, &c. occurring in the course of the year: being so called from the word calendæ, which among the Romans denoted the first days of every month, and anciently was written in large characters at the head of each month. See Kalends.

Calendar, *Julian Christian*, is that in which the days of the week are determined by the letters A, B, C, D, E, F, G, by means of the solar cycle; and the new and full moons, particularly the paschal full moon, with the feast of Easter; and

the other moveable feasts depending upon it, by means of golden numbers, or lunar cycles, rightly disposed through the Julian year. See CHRONOLOGY, EASTER &c.

CALENDAR, *Gregorian*, is that which, by means of epacts, rightly disposed through the several months, determines the new and full moons, with the time of Easter, and the moveable feasts depending upon it, in the Gregorian year. This differs therefore from the Julian calendar, both in the form of the year, and in as much as epacts are substituted instead of golden numbers.

CALENDER, a machine used in manufactories, to press stuffs, silks, linens, &c. to give them a fine gloss. This instrument is composed of two cylinders, round which the stuff is rolled, and they pass under a smooth board loaded with several tons weight. When waves are required on the cloth, the weight gives the polish, and the waves are made by means of a shallow indenture on the roller.

CALIBER, denotes the diameter of a body, but is usually applied to the bore of a gun, cannon, &c.

CALICO, a sort of cloth, resembling linen, and made of cotton. It is called *calico*, because originally brought from *Calicut*, a kingdom of India on this side of the Ganges, on the coast of Malabar. These cloths, whether plain, printed, dyed, stained, or painted, chints or muslins, are all included under one general denomination. The printing of calicoes commenced in London about the year 1676.

CALICO-*Printing*: the art of cloth-printing or calico-printing, in other words, of dyeing in certain

colours particular spots of the cloth, or figures impressed on it, while the ground shall be of a different colour, or entirely white, affords perhaps the most direct and obvious illustration of the application of chemical principles. The mordant which is principally used in this process is the acetate of argil. It is prepared by dissolving 3lbs. of alum and 1lb. of acetate of lead in 8lbs. of warm water. An exchange of the principles of these salts takes place: the sulphuric acid of the alum combines with the oxyde of lead, and the compound thus formed being insoluble is precipitated, the acetic acid remains united with the argil of the alum in solution. Some calicoes are only printed of one colour, others have two, others three or more, even to the number of eight, ten, or twelve. The smaller the number of colours, the fewer in general are the processes.

1. One of the most common colours on cotton prints is a kind of nankeen yellow, of various shades down to a deep yellowish brown, or drab. It is usually in stripes or spots. To produce it, the printers besmear a block, cut out into the figure of the print, with acetite of iron, thickened with gum or flour; and apply it to the cotton, which, after being dried and cleansed in the usual manner, is plunged into a potash ley. The quantity of acetite of iron is always proportioned to the depth of the shade. 2. For yellow the block is besmeared with acetite of alumina. The cloth, after receiving this mordant, is dyed with quercitron bark, and then bleached. 3. Red is communicated by the same process; only madder is substituted for the bark. 4. The fine light blues which appear so often on

printed cottons are produced by applying to the cloth a block besmeared with a composition, consisting partly of wax, which covers all those parts of the cloth which are to remain white. The cloth is then dyed in a cold indigo vat; and after it is dry, the wax composition is removed by hot water. 5. Lilac, flea brown, and blackish brown, are given by means of acetite of iron; the quantity of which is always proportioned to the depth of the shade. For very deep colours, a little sumach is added. The cotton is afterwards dyed in the usual manner with madder, and then bleached. 6. Dove colour and drab, by acetite of iron and quercitron bark. When different colours are to appear in the same print, a great number of operations are necessary. Two or more blocks are employed, upon each of which that part of the print only is cut, which is to be of some particular colour. These are besmeared with different mordants and applied to the cloth, which is afterwards dyed as usual.

Caliph, the chief sacerdotal dignity among the Saracens or Mahometans, vested with absolute authority in all matters relating both to religion and policy. In the Arabic, it signifies *successor* or *vicar*; the caliphs bearing the same relation to Mahomet as the Popes to Jesus Christ, or St. Peter. It is at this day one of the Grand-Signior's titles, as successor of the Prophet; and of the Sophi of Persia, as successor of Ali. The government of the original caliphs continued from the death of Mahomet till the 655th year of the hegira.

Call, a sort of whistle or pipe, used by the boatswain, on board ship, to summon sailors to their em-

ployments, and it is sounded in various strains, according to the different exercises.

Calling *the House*, in parliamentary proceedings, is the calling over the names of the members, every one answering to his own, and going out of the house in the order in which he is called. This is done in order to discover whether there be any person present not a member of the house, or whether any member be absent without its leave.

Caloric, a term employed in the new chemical nomenclature to denote the cause of heat, as distinguished from the sensation. Heretofore the language of chemistry had been perplexed by the use of the word 'heat' to express both these ideas indiscriminately; it is therefore with great propriety that the latter term is now applied to one of the effects of that principle, which, as the cause of that effect, is denominated caloric; and it would conduce very much to perspicuity of expression, if this distinction, both in speaking and writing, were uniformly regarded.

The principal sources of caloric are, the sun, combustion, and various other instances of chemical action, percussion or collision, friction, the elective spark, and galvanism.

Caloric is always sensible and never latent. The proportion of it in any body is always sufficiently indicated either by its temperature or its state, with regard to the counterpoise of those attractive and repulsive powers of which we have been speaking; and no change can take place in that proportion without its occasioning a concomitant change in one or other of these affections.

Calvinism, the doctrine and sentiments of John Calvin, who flourished at Geneva about the year 1541. The doctrinal parts of this system differ from that of other reformers of Calvin's period, chiefly in what regards the absolute decrees of God, by which, according to this teacher, the future and eternal condition of the human race was determined out of his sovereign will: that is, Calvin denied the free agency of man, and maintained predestination. In France, the Calvinists are distinguished by the name of *Huguenots*. In Germany, they are confounded with the Lutherans, under the general title of *Protestants;* or sometimes distinguished by an addition of the epithet *reformed*.

Calumet, a symbolical instrument of great importance among the Indians of America. It is a smoking-pipe, the bowl of which is generally made of a soft red marble, and the tube of a very long reed, ornamented with the wings and feathers of birds. This instrument, the use of which bears a great resemblance to the caduceus of the Greeks, is on all occasions a pledge of peace and good faith.

Calx. See Oxyde.

Calyx. See Botany.

Camblet, a stuff, the chief places of manufacture of which are England, Holland, and Flanders. Brussels exceeds them all in the beauty and quality of its camblets, and those of England are reputed the second. The true oriental camblet is made of the pure hair of the goat of Angora; which animal is the wealth of that city, furnishing all its inhabitants with employment. Wool, silk, and hair are used in this manufacture; sometimes severally, and sometimes together

Cambric, a species of linen, made from very fine and white flax, deriving its name from the city of Cambray, where it was first manufactured. The cambrics now worn in Great Britain are chiefly made in Scotland and Ireland.

Camel, in natural history. This animal is found in Asia and Africa, and is easily domesticated. Camels are patient of labour, and will carry immense weights. They will travel eight or ten days without water, which they scent at a distance of half a league, and drink most copiously when they reach it. Besides the four stomachs peculiar to other ruminating animals, they have a fifth for the purpose of holding water, which they can preserve unmixed with the other liquors of the body, and from this stomach, they can, by the contraction of certain muscles, make the water mount into their throats and proper stomachs to macerate their dry food. They kneel down to be loaded and unloaded, at the command of their keepers. The milk and flesh of camels are used as food, and their hair is used in the manufactures of the most costly stuffs. The Camelopard is a native of several parts of Africa, living in forests, and on the leaves, as food. It is mild and inoffensive, and, in cases of danger, has recourse to flight for safety. When obliged to stand on self-defence, it kicks its adversary. Its usual pace is a quick trot. The camelopard was introduced into Europe anciently by Julius Cæsar; and in more modern times, one was presented in the 16th century by the Dey of Tunis to Laurentius de Medicis. See Pl. I. Natural History. Fig. 1 and 2.

Camel, in mechanics, an ingenious machine, by

means of which vessels are raised over bars that would otherwise interrupt their course. The camel was invented by De Wit for the use of Holland, and carried to Petersburgh by the czar. A camel is composed of two separate parts, whose outsides are perpendicular, and whose insides are concave; shaped so as to embrace the hull of a ship on both sides. Each part has a small cabin, with sixteen pumps and ten plugs, and containing twenty men. The two parts are braced to the ship, under water, by means of cables, and, when fitted intirely, inclose its sides and bottom. Being towed to the bar, the plugs are opened, and the water admitted, until the camel sinks with the ship, and runs aground. Then, the water being pumped out, the camel rises, lifts up the vessel, and the whole is towed over the bar. This machine, which is thought to strain very large ships, can raise the vessel eleven feet; that is, make her draw so many feet less water.

CAMERA-OBSCURA, or *dark chamber*, a machine or apparatus, in which the light being collected and thrown through a single aperture, external objects are exhibited distinctly, and in their native colours, on any white surface placed within the chamber or receptacle. A miniature picture, thus set forth in the most accurate and natural manner, is in all cases a pleasing object; and, consequently, the *camera-obscura* furnishes a source of elegant amusement. To those unhabituated to sketching, it affords an opportunity of delineating objects and prospects with the utmost exactness; and a painter cannot study these living pictures from the very pencil of nature herself, without deriving considerable advantage.

Camp, the ground on which an army pitches its tents. An army always encamps in the front of the enemy; and generally in two lines, running parallel, at about 500 yards distance from each other; the horse and dragoons on the wings; and the foot in the centre.

Campaign, in the art of war, denotes the space of time in which an army acts on the offensive, or is encamped.

Camphor, or Camphire, a solid concrete juice, extracted from the wood of the *laurus-camphora*, a native of the eastern parts of Asia. It exists ready formed in the wood of this tree, and is obtained by sublimation. The wood is cut into small pieces, and exposed with a little water to a moderate heat, in an alembic, to the head of which is adapted a capital in which straw is put. The camphor is volatilized, and attaches itself to the straw. A second sublimation renders it pure, and in this process it is fitted to be made into cakes.

Canal *of communication*, a cut of water furnishing an artificial means of navigation. This is one of the most useful as well as arduous labours in which the industry of man has been employed. The difficulties surmounted, and the magnitude of the work, are often, in these cases, objects of equal admiration. The canal of Languedoc, in France, by which the main ocean communicates with the Mediterranean, by a navigation of 64 leagues; and that which runs 825 miles from Canton to Pekin, in China, are among the most remarkable at present in existence. Within these few years, a great number of canals have been cut in Great Britain. Most of the counties between the mouth of the Thames

and the Bristol-channel are now connected together by natural or artificial navigations. The most extensive on the island are the duke of Bridgewater's in Cheshire, and that between the Forth and the Clyde in Scotland. The obstacles that present themselves, in an enterprize of this kind, are generally various and innumerable. If the ground to be cut were a dry level, nothing but a reservoir of water would be necessary: but if the course is to pass through marshes, mountains, and rocks, and over rivers and vallies, it is easy to perceive that the engineer must have constant employment for his invention, the labour and expence will be enormous, and the progress frequently tedious. In one place, a tunnel is to be cut through a hill or quarry; in another, an aqueduct-bridge is to be thrown over water, or across a dale. Beside these grand impediments, the general inequality of the ground renders it necessary to provide *locks*, in order to raise or lower the water to a level which, along the whole course, is perpetually varying. The largest canal in England is that which runs across the Isle of Dogs, being between 40 and 50 yards wide.

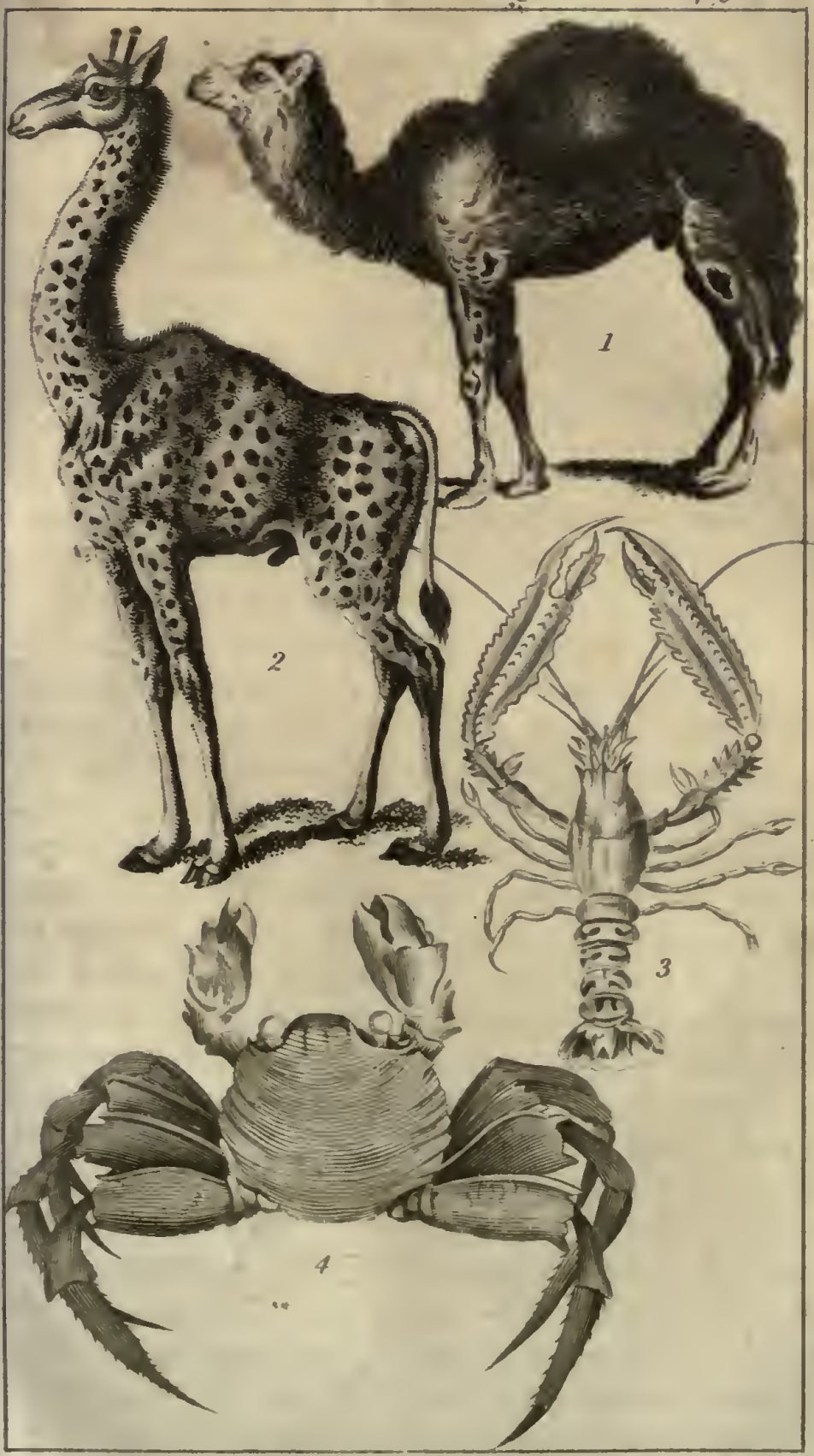
Cancer, in astronomy, one of the twelve signs of the zodiac, represented on the globe in the form of a crab, and marked ♋ in the books.

Cancer, the crab, in natural history, is reckoned among the insects. Crabs have eight legs: they cast their shells annually; previously to this their limbs shrink to facilitate their extrication. The loss of a limb, with other animals, is irreparable, but with regard to crabs it is but of little importance, as in a few weeks another is reproduced. The lobster is a species of the crab: this is extremely prolific,

depositing about 12,000 eggs each time of laying. See Fig. 3 and 4. Pl. I. Nat. Hist.

Candia, the ancient Crete, celebrated for its hundred cities, is an island situated in the Mediterranean sea. The largest river is Lethe: Mount Ida covers the middle of it, and is for the most part a barren rock, with scarcely a tree upon it. The valleys are full of vineyards, olive plantations, myrtles, orange-groves, &c.

Candle, a contrivance in which the cotton or rushen wick of the more ancient lamp is surrounded by an oily substance in a solid state, and which, being lit, yields, in burning, a good and steady light. Candles are severally made of tallow, wax, or spermaceti. In the manufacture of tallow candles, the tallow, which should be made of equal quantities of sheep's and bullock's fat, being melted, and mixed with a proportionable quantity of water, which serves to precipitate its impurities, is poured into a tub; and the wicks, already three times dipped in tallow not mixed with water, are repeatedly lowered into the mixture, till a sufficient quantity has adhered to answer their intended weight: a point of which an experienced workman, who holds the wicks, pendent from rods, is a very accurate judge. In making mould-candles, the tallow, wax, or spermaceti, are poured upon the wicks in leaden moulds, placed perpendicularly. By the result of minute observations, it appears that a pound of common candles, 12 in the pound, burn 41 hours, 24 minutes; a pound of mould-candles, 5 7-8ths in the pound, 42 hours, 39 minutes; a pound of common candles, 8 in the pound, 34 hours; and a pound of mould-candles, 4 in the pound, 36 hours, 20 minutes.



Cooper fculp.

Fig. 1. Camelus *dromedarius: the Dromedary.*
Fig. 2. Camelopardalis *giraffe: the Camelopard.*
Fig. 3. Cancer *norvegicus: Norway Crab.*
Fig. 4. Cancer *araspus: Streaked Crab.*

Published by J. Harris, St. Pauls C.h Y.d 1811.

Hence mould candles are more economical than common candles, if they remain at rest while burning.

Candlemas, a feast of the church, held on the 2nd of February, in honour of the purification of the Virgin Mary. On that day, the ancient Christians used an abundance of lights, both in their churches and in processions. Candlemas term begins the 15th of January, and ends the 3d of February.

Canis, the dog. The chief peculiarities of the tribe of dogs are these. They cultivate the society of men, and are but rarely found wild: they feed on flesh and farinaceous vegetables: they digest bones: they are extremely docile, affectionate and vigilant in their intercourse with men: they have an aversion from strangers, and particularly beggars. They are capable of imitation and instruction, and in many instances seem endowed with almost human intelligence. It is said that a Florentine nobleman had a dog that would wait at table, change his plates, and carry his wine with the utmost steadiness. About the year 1806 a watchman in the neighbourhood of London fell down the deep area of a new house, and was unable to rise, his dog ran to the nearest public house, and made the most pitiful moans; but could get no assistance, he ran back to his master, then to the public house, till at length a person followed him, extricated the master, and received from the affectionate animal the most grateful acknowledgments.

Canoe, the small boat or primitive ship of simple nations. In all instances, these have generally been found of a construction and magnitude ade-

quate to the undertakings for which they are designed: for it is increasing necessities that enlarge the bounds of science, and multiply the efforts of invention. The materials most at hand have commonly supplied the savage with his bark. In some places, he has formed a basket coated with hides; in others, he has taken a hollow tree for his model, and the Eskimaux have even proceeded to place the ribs of their vessels on stocks, to bend branches to the requisite shape, and cover the whole with the bark of the birch. On the coast of Africa, amid a dangerous surf, the natives travel with incredible swiftness, in canoes easily overset, and as easily righted.

Cannon. See Gun.

Canon, a person who possesses a prebend, or revenue allotted for the performance of divine service in a collegiate or cathedral church.

Canon, in church government, a law or rule, either of doctrine or discipline, enacted especially by a council, and confirmed by the authority of the sovereign. The word is also used for the authorised catalogue of the sacred writings.

Canonization, an act of the Romish church, by which it takes upon itself to rank a deceased person among the catalogue of its saints.

Cantata, a song, or composition, intermixed with recitatives, airs, and different movements, chiefly intended for a single voice, with a thorough bass, though sometimes with other instruments.

Canteen, is a small vessel usually made of tinned plate, or wood, in which soldiers when on their march, or in the field, carry their liquor. The wooden canteens generally used in the British

armies are cylindrical, $7\frac{1}{2}$ inches diameter and 4 inches long outside; they contain about three pints.

Cantharides, insects used to raise blisters. They differ in their size, shape, and colour: they are of the most brilliant colours. Those who collect them, tie them in a bag or piece of linen cloth, which they hang in the vapour of hot vinegar till the insects are dead. The cantharides of Mount Etna are reckoned better than those of Spain.

Canticles, the Song of Songs, in the Bible, supposed to be a marriage song written by Solomon, to be explained by compositions of a similar nature in Eastern countries. By other writers it is supposed to be a series of poems each distinct and independent of the other. By them the canticles are regarded as sacred idyls.

Canto, a song which is used for a division of a poem supposed to make one song, or a portion sung at one time.

Canton, a small division: hence, in heraldry, a small square, separated from the rest of the coat, is called a *canton;* in military affairs, troops billetted into different quarters or divisions, are said to go into *cantonments;* in geography, a small distinct country, such as the Swiss *cantons.*

Canvas, a coarse sort of cloth, of which there are several kinds. Among others, are 1. That worked regularly in little squares as a basis for tapestry: 2. That called buckram; 3. The cloth used for pictures; 4. That employed for sails of ships.

Caoutchouc, or India Rubber, improperly called elastic gum, is obtained from the juice of a

tree found in Guiana, and other parts of South America.

Cap, of *maintenance*, one of the ornaments of state, carried before the kings of England at the coronation, and other great solemnities. It is of crimson velvet faced with ermine. It is frequently met with above the helmet, instead of wreaths, under gentlemen's crests.

Cape of *Good Hope*, the Southern extremitiy of Africa, discovered by the Portuguese. The chief town is called Cape Town, rising in the midst of a desert surrounded by black and dreary mountains. Of these mountains the Table Mountain is the principal, the view from which is amazingly extensive.

Capillary *tubes*, those the diameter of which is scarcely larger than to admit a hair: See Hydrostatics.

Capital, in architecture, the uppermost part of a column or pilaster, serving as a head, and placed immediately over the shaft, and under the entablature: it is made differently in the different orders, and is that which principally characterises the orders. See Architecture.

Capital *stock*, among merchants, bankers, and traders, signifies the sum of money which individuals bring to make up the common stock of a partnership when it is first formed. It is also said of the stock which a merchant at first puts in trade for his account. It likewise signifies the fund of a trading company or corporation, in which sense the word stock is generally added to it. Thus we say 'the capital stock of the bank,' &c. The word

capital is opposed to that of profit or gain, though the profit often increases the capital, and becomes of itself part of the capital when joined with the former.

Capitol, a famous fort or castle on the Mons Capitolinus at Rome, wherein was a temple dedicated to Jupiter, thence also denominated Capitolinus, in which the Senate anciently assembled; and which still serves as the city hall or town-house, for the meeting of the conservators of the Roman people. It had its name *capitol*, from *caput*, "a man's head;" one having been found fresh and bleeding upon digging the foundation of the temple built in honour of Jupiter. Arnobius adds that the man's name was *Tolus*; whence *caput-tolium*.

Capra, the goat, is domesticated in every part of the globe. He resembles the sheep, but is more alert, and possesses more sentiment and intelligence. He is won by kindness, will climb the most steep and terrific precipices. He lives on herbs, but prefers barren heaths to luxurious fields. The Syrian goat is remarkable for its pendulous ears, and is common in various parts of the East. The animals of this species are driven in flocks through the oriental towns every morning and evening, in order to supply the inhabitants with milk. Fig. 6.

Caprification, a method used in the Levant for ripening the fruit of the domestic fig tree, by means of insects bred in that of the wild fig tree. The caprification of the ancient Greeks and Romans corresponds in every circumstance with what is practised at this day in the Archipelago, and in Italy. These all agree in declaring that the wild

fig tree, caprificus, never ripened its fruit; but was absolutely necessary for ripening that of the garden or domestic fig tree, over which husbandmen suspend its branches. The reason of this success has been supposed to be, that by the punctures of these insects the vessels of the fruit are lacerated, and thereby a greater quantity of nutritious juice derived thither. Perhaps too, in depositing their eggs the gnats leave behind them some sort of liquor proper to ferment gently with the milk of the figs, and to make their flesh tender.

Capstan, in a ship, a large piece of timber, in the nature of a windlass, placed behind the main-mast, used for weighing, or raising up anchors, or any other purpose in which great force is required.

Captain, a military commander. A *captain in the army* commands a troop of horse, or a company of foot, under a colonel. In the horse and foot guards, the captains have the rank of colonels. It is the duty of this officer to superintend the discipline and well-being of his men; and he has the power of appointing his own serjeants, corporals, and lanspesades. A *captain in the navy* is an officer who commands a ship of the line of battle, or one that carries at least twenty guns. His charge is very extensive; inasmuch as he is answerable not only for the military government, navigation, and equipment of the ship he commands, but also for the conduct of his inferior officers.

Carabine, a short piece of fire-arms, having a barrel two feet and a half long, carrying a ball of the weight of the 24th of a pound.

Carat or Caract. 1. A weight of four grains. 2. A manner of expressing the fineness of gold; an

ounce is divided into twenty-four parts, if of the mingled mass two or three or four parts out of four and twenty be base metal, the whole is said to be 22, 21, or 20 carats fine.

Caravan, or *karavanne*, a company of travellers and pilgrims, and more particularly of merchants, who, for their greater security, and in order to assist each other, march in a body through the desarts and other dangerous places, which are infested with Arabs or robbers.

Caravansera, a sort of inn, the erection of which is generally an act of charity among the Mahometans. It commonly consists of a large square court, surrounded by piazzas, under which, supplied with a resting place, and secure from robbers, man and beast take up their lodging for the night. In the upper part, there are generally private apartments, the use of which is costly.

Carbon, or pure coal, the radical of carbonic acid, is a term introduced by the French chemists to denote the pure or essential part of charcoal. Though this substance abounds throughout the vegetable kingdom, and is also contained in animal and even mineral bodies, yet it is very rarely to be met with in a state of absolute purity; it is indeed remarkable, and would be almost incredible if the results of modern chemistry did not render it indisputable, that the most valuable of all the gems, the diamond, is nothing but pure crystallized carbon. For many ages the diamond was considered as incombustible; and Newton was the first person who conjectured, from its great refractive power, that it was capable of combustion. This conjecture was verified before the death of

that illustrious man, by the members of the Academy Del Cimento at Florence, who, in 1691, consumed several diamonds by placing them in the focus of a burning lens. Other philosophers repeated the experiment with the heat of a furnace: and the nature of the diamond was at length ascertained by the successive attempts of Lavoisier, Morveau, and Tennant. Carbon, in the state of diamond, is transparent, crystallized, intensely hard, and perfectly colourless. In oxygen gas it burns with great heat, like other combustible bodies, attracting the oxygen, and at length is wholly converted into carbonic acid gas. Carbon combines with iron, and converts it into steel; it may be united with sulphur, copper, &c. forming with them carburets of sulphur, copper, &c. Steel is a carburet of iron, so is black lead as it is called, the proportions of carbon differ in each substance.

Carbonic Acid Gas, carbonic acid (*i. e.* carbon and oxygen) combined with caloric. The carbonic acid gas (fixed air of the lungs) is the result of the combination of about 72 parts in weight of oxygen and of 28 parts of carbon.

Carbonic *Oxyde*, or gaseous oxyde of carbon, is compounded also of carbon and oxygen, but with a less proportion of the latter than is necessary to constitute an acid.

Carbuncle, in natural history, a very elegant gem, whose colour is deep red, with an admixture of scarlet. It has yet been found only in the East Indies, and there but very rarely.

Cards, were invented about the year 1390, to divert Charles VI. of France, who had fallen into a melancholy disposition. The inventor proposed,

by the figures of the four suits, or colours as the French call them, to represent the four classes of men in the kingdom. By the *cœurs* (hearts) are meant the *gens de chœur*, choir-men, or ecclesiastics; and therefore the Spaniards, who certainly received the use of cards from the French, have *copas*, or chalices, instead of hearts. The nobility, or prime military part of the kingdom, are represented by the ends or points of lances or pikes: the Spaniards have *espadas*, swords, in lieu of pikes; and hence we call them spades. By diamonds are designed the order of citizens, merchants, or tradesmen, *carreaux* (square stones, tiles, or the like): the Spaniards have a coin *(deniro)* which answers to it; and the Dutch use the word *strencen* (stones or diamonds), on account of the form of what is here called *carreaux* by the French. Trefle, the trefoil-leaf, or clover-grass (corruptly called *clubs*), alludes to the husbandmen and peasants. The Spaniards appear to have substituted *bastos* (staves or clubs), and we too have given the Spanish name to the French figure. The four kings, which the French, in drollery, sometimes call the *cards*, are David, Alexander, Cæsar, and Charles; which names were, and still are, on the French cards. The first three of these names represent the celebrated monarchies of the Jews, Greeks, and Romans, and the last that of the Franks, under Charlemagne. By the queens are intended Argine, Esther, Judith, and Pallas (names retained on the French cards) typical of birth, piety, fortitude, and wisdom, the qualifications severally attributed to the persons named. Argine is an anagram for *regina*, a queen by descent. By the knaves were intended

the servants of knights (*knave* originally meaning a *servant*); but pages and valets, now indiscriminately used by various orders of persons, were formerly only allowed to men of quality, under the name of esquires (*escuires*, shield or armour-bearers.)

Cardinal, which, in a general sense, and as an epithet, signifies principal or pre-eminent, is formed of the Latin word *cardo*, a hinge, agreeably with the common expression, in which it is said of an important matter, that every thing *turns* upon it: thus Justice, Prudence, Temperance, and Fortitude are called the four cardinal virtues. The cardinal signs, in astronomy, are Aries, Libra, Cancer, and Capricorn. The cardinal points of the compass, north, south, east, and west.

Cardinal, in the Roman hierarchy, an ecclesiastical prince and subordinate magistrate, who has a voice in the conclave at the election of a Pope, and who may be advanced to that dignity himself. The dress of a cardinal is a red soutanne, a rocket, a short purple mantle, and a red hat; and his title of address, 'His eminence.'

Careening, in sea-language, the bringing a ship to lie down on one side, in order to trim and caulk the other.

Carillons, a species of chimes frequent in the Low Countries, particularly at Ghent and Antwerp, and played on a number of bells in a belfrey, forming a complete series or scale of tones or semitones, like those of the harpsichord and organ.

Carnelian, a precious stone, either red, yellow, or white. The finest carnelians are those of the East Indies: there are some beautiful ones in the

rivers of Silesia and Bohemia; and some of a quality not to be despised in Britain. The use to which they are is most generally applied is that of seals.

Carnival, a period previous to Lent, celebrated with great spirit throughout Italy, and during which feasts, balls, operas, concerts, intrigues, marriages, &c. abound. The churches are filled with choristers, and the streets with masks. This festival flourishes more particularly at Venice, where it begins on the second holiday in Christmas, and where it boasts to have had at one time seven sovereign princes and thirty thousand foreigners among its votaries.

Carpet, a thick cloth, of wool or other materials, the most valuable of which are made in Persia and Turkey. Paris, however, is said to produce carpets of an equal if not superior quality. In Germany, a variety of carpets are manufactured. The most esteemed carpets of British make are the Wilton.

Cartel, an agreement between two states for the exchange of their prisoners of war. A *cartel-ship*, a ship commissioned in time of war to exchange the prisoners of any two hostile powers; also to carry any particular request from one power to another. The officer who commands her is ordered to carry no cargo, ammunition, or implements of war, except a gun for the purpose of firing signals.

Cartesians, those who adhere to the opinions of Des-Cartes. This philosopher has laid down two principles, the one metaphysical, the other physical. The metaphysical proposition is this: "I think, therefore I am;" the physical one, "Nothing exists but substance." Substance he makes of

two kinds, the one a substance that thinks, the other a substance extended; whence actual thought and actual extension are the essence of substance. He reasons against the possibility of a vacuum.

Cartilage, a white, elastic, shining substance growing to the bones, and commonly called gristle. Some cartilages cover the moveable articulations of the bones, and others unite one bone with another.

Cartilaginous fishes, those which have a cartilaginous instead of a bony skeleton. Dr. Shaw and others have united the Branchiostegi and Chondropterygii fishes under the general title of Cartilaginei. Linnæus separated the cartilaginous from the other fishes, and placed them in the class Amphibia, where they constituted the order Nantes.

Cartoon, from *carta*, paper, and *oni*, large [Italian], a design drawn upon large sheets of paper for the purpose of being traced upon any other substance, where the subject is to be finished. The most famous are those of Raphael, seven of which, after having lain in the store-rooms of a tapestry manufactory, from the age of Leo X. and suffered various rough usage, were purchased by Charles I. of England, and are now at Windsor-castle.

Cartouche, in the military art, a case of wood about three inches thick at the bottom, girt with marlin, holding about 400 musket balls, besides 6 or 8 balls of iron of a pound weight to be fired out of a howitzer for the defence of a pass.

Carving, the art or act of cutting or fashioning a hard body, by means of a chissel or other sharp instrument. The term *carving* is generally applied when wood is the body carved: the same operation upon stone being denominated *sculpture*.

In carving a figure or design, the outline must first be drawn or pasted on the wood. The wood fittest for the use is that which is hard, tough, and close; as beech, but especially box.

CARYATIDES, in architecture, an order of columns or pilasters, under the figure of women, dressed in long robes, after the manner of the Carian people, and serving instead of columns to support the entablement.

CASE, in grammar, implies the different inflections and terminations of nouns, serving to express the different relations they bear to each other and to the things they represent. See GRAMMAR.

CASEHARDENING of iron is a superficial conversion of that metal into steel by the ordinary method of conversion, namely, by cementation with vegetable or animal coals. This operation is generally practised upon small pieces of iron wrought into tools, and instruments to which a superficial conversion is sufficient, and it may be performed conveniently by putting the pieces of iron to be casehardened, together with the cement, in an iron box, which is to be closely shut and exposed to a red heat during some hours.—By this cementation, a certain thickness from the surface of the iron, will be converted into steel, and a proper hardness may be afterwards given by sudden extinction of the heated pieces of converted iron in a cold fluid.

CASSIOPEIA, a constellation in the northern hemisphere, situated opposite the great bear, on the other side the pole. In the year 1572, a remarkable new star appeared in this constellation, surpassing Sirius or Lyra in brightness. It appeared bigger

than Jupiter, but after a few months it declined; and in a year and a half entirely disappeared.

Cast, among artists, any statue or part of a statue, of bronze, or of plaster-of-Paris. A cast is that which owes its figure to the mould into which the matter of it has been poured or cast while in a fluid state; and thus differs from a model, which is made by repeated efforts with a ductile substance, as any adhesive earth; and from a piece of sculpture, which is the work of the chissel.

Cast, in Indian polity, a tribe, or grand division of the people. By this establishment, the lot of every individual is hereditarily fixed. The highest cast is religious; the second warlike; the third commercial; and the fourth infamous. The names of the three latter of these are differently reported. Persons of the religious cast are universally denominated *Bramins;* the soldiers or princes are styled *Cuttery* or *Rajahs;* the traders, *Choutres* or *Shuddery;* the lowest order, *Parias* or *Tyse;* but this statement is probably incorrect.

Casting, in foundery, the running of metal into a mould: among sculptors, it is the taking casts or impressions of figures, &c. Plaster-of-Paris is the most usual material employed for this purpose. This, when bought at the shops, requires no other preparation than that of a careful mixture with water, to the thickness of treacle, when it may be poured into the mould. It dries, or *sets,* in a short time, and ever afterward retains a sufficient degree of hardness.

Castle, a fortress or defensible place. Mr. Grose, the Antiquarian, was of opinion, that the

English castles, walled with stone, and designed for residence as well as defence, are for the most part of no higher date than the conquest. Those previously erected had been suffered to fall into ruin; and many writers have assigned this circumstance as a reason for the facility with which the duke of Normandy made himself master of the country. It was the policy of this able general to build a considerable number; and in process of time the martial tenants of the crown erected them for themselves; so that, toward the end of Stephen's reign, we are told that there existed no less than eleven hundred and fifteen. At this period castles were an evil of the greatest magnitude to both the sovereign and the subject; considerable struggles appear to have taken place with regard to their continuance; several were demolished; and their general decline commenced. A complete castle consisted of a ditch or moat, an outwork, called a barbican, which guarded the gate and drawbridge; an artificial mount; an outer and inner ballium or inclosure; and the keep, or lofty tower, in which the owner or governor resided, and under which were the dungeons.

Castle, in sea-language: the forecastle is the uppermost deck, toward the boltsprit; and the hind-castle, which is no longer spoken of, the quarter-deck. The appellation of castle is easily accounted for by referring to representations of ancient ships, in which the castellated style of building is used, the decks having their turrets and battlements.

Castor, the beaver, found chiefly in North America, famous for its policy and neatness in

building, by means of trees, and their branches, which it fells, and drives into the ground with much dexterity. Beavers make use of stone, wood, and a sandy kind of loam in their structures, which by their compactness preclude injury from the winds and rain. The instruments made use of by the beaver in its operations are their teeth to cut down the trees, and take off the branches, their feet for driving the stakes into the ground, and their tails for laying on the mortar. Fig. 6. Nat. Hist.

Casuist, one who propounds the doctrine and science of conscience and its cases, with the rules and principles of resolving the same.

Catacomb, a sepulchre or subterraneous chamber, containing cells for a great number of dead bodies. They are frequent in Italy and Egypt.

Cataract of water: a fall or precipice, in the channel, or bed of a river; caused by rocks or other obstacles, stopping the course of its stream from whence the water falls with a noise and impetuosity. Such are the cataracts of the Nile, the Danube, Rhine, &c. In that of Niagara the perpendicular fall of the water is 137 feet.

Catch, in music, is defined by Mr. Jackson to be "A piece for three or four voices, one of which leads, and the others follow in the same notes."

Cathedral, a church in which is a bishop's see, or seat. The word is from the Greek, signifying a "chair."

Catholic, any thing that is general or universal. The Romish church distinguishes itself by the name of *Catholic*, in opposition to all those which have separated themselves from her Communion, considering herself as the only true and Christian

Cooper sculp.

Fig. 5. Canis *hyena: striped Hyena.*
Fig. 6. Capra *ægagrus: Syrian Goat.*
Fig. 6. Castor *fiber: beaver.*

Published by J. Harris, St. Pauls Ch. Yd. 1820.

church. In the strict sense of the word, there is no Catholic church in being; that is, no universal Christian Communion.

Catoptrics, that part of optics which explains the properties of reflected light, and particularly that which is reflected from mirrors.

Cavalier, an armed horseman or knight, called by the French a *chevalier*.

Cavalry, a body of soldiers that charge on horseback. Their chief use is to make frequent excursions to the disturbance of the enemy, intercept his convoys, and destroy the country; in battle, to support and cover the foot, to break through and disorder the enemy, and to secure the retreat of the foot.

Caveat, an entry in the Spiritual Courts, by which the probate of a will, letters of administration, licence of marriage, &c. may be prevented from being issued without the knowledge, and, if the reason be just, the consent of the party entering the caveat.

Cauking, or *caulking a ship*, is driving a quantity of oakum into the seams of the planks. After the oakum is driven very hard into these interstices, it is covered with melted pitch to keep the water from rotting it.

Cause, that from whence any thing proceeds, or by virtue of which any thing is done: it stands opposed to effect. We get the ideas of cause and effect from our observation of the vicissitude of things, while we perceive some qualities or substances begin to exist, and that they receive their existence from the due application and operation of other beings. That which produces is the cause;

and that which is produced, the effect: thus, fluidity in wax is the effect of a certain degree of heat, which we observe to be constantly produced by the application of such heat.

Causeway, a common, hard, raised road, made for the convenience of travelling.

Caustic, in chemistry, a fixed alkaline salt, deprived of its carbonic acid, and most of its water by means of quick lime, evaporation and fusion. The alkali used for this purpose is generally pot-ash, and the form that is chosen is the lixivium of the soap-boilers, which is evaporated to dryness in a copper or silver vessel, fused in a crucible, poured into a bason, and when solid cut into small pieces, which must be kept in a bottle well closed to prevent deliquescence. If a piece of this caustic be applied to the skin, it corrodes it in about half or three quarters of an hour, producing a painful eschar like that which is occasioned by burning; and forming most probably a saponacious compound with the fat-parts of the skin, or flesh.

Cautery, in surgery, a remedy by which solid parts of the body may be burnt, ate, or corroded away. The *actual cautery* is a red-hot instrument, usually of iron; the *potential cautery*, a corroding substance.

Cement, in a general sense, any glutinous substance capable of uniting and keeping things together in close cohesion. In this sense the word cement comprehends mortar, solder, glue, &c. but has been generally restrained to the compositions used for holding together broken glasses, china, and earthenware. For this purpose the juice of garlick is recommended as exccedingly proper,

being both very strong, and, if the operation is performed with care, leaving little or no mark. Quick-lime and the white of an egg mixed together and expeditiously used, are also very proper for this purpose. Dr. Lewis recommends a mixture of quick-lime and cheese in the following manner: "Sweet cheese shaved thin, and stirred with boiling-hot water, changes into a tenacious slime; which does not mingle with the water. Worked with fresh parcels of hot-water, and then mixed upon a hot stone with a proper quantity of unslaked lime, into the consistence of a paste, it proves a strong and durable cement for wood, stone, earthen-ware and glass. When thoroughly dry, which will be in two or three days, it is not in the least acted upon by water.

Cementation, in the arts, a general method of forming steel from iron, by means of the application of charcoal. In a proper furnace layers of bars of malleable iron and layers of charcoal are placed one upon another, the air excluded, the fire is raised to a great height, and kept up for eight or ten days. If after this the conversion of the iron into steel be complete, the fire is extinguished, and the whole is left to cool for six or eight days longer. Iron prepared in this manner is named blistered steel, from the blisters which appear on its surface. Copper is converted into brass by cementation with the powder of calamine and charcoal.

Cenotaph, in antiquity, an empty tomb, erected in honour of the deceased, and differing from a sepulchre, in which the body was actually deposited.

Cent, from *centum*, "a hundred," is used in commercial concerns to signify a hundred pounds. A profit of 10 *per cent*, is the gain of 10*l*. by the use of 100*l*.

Centaur, in classic antiquity, a monster, half man and half horse. It is intimated by Virgil, and generally believed, that the Centaurs were a tribe of Lapithæ, who inhabited the city of Pelethronium, adjoining to Mount Pelion, and who first broke and rode upon horses. Nations to whom the sight of a man on horseback was new, believed, as did the Americans of the Spaniards, the horse and his rider made but one animal.

Center of gravity, that point about which all the parts of a body do, in any situation, exactly balance each other: hence if a body be suspended by the center of gravity it will remain at rest in any position:—When the center of gravity is supported the whole body is kept from falling; and when this point is at liberty to descend, the whole body must descend, either by sliding, rolling, or tumbling down. See Mechanics.

Central *forces*, the powers which cause a moving body to tend *towards*, or *recede* from a center of motion. The *former* is called the centripetal force, the *latter* the centrifugal force. If a stone at the end of a string be whirled round by the hand: the centripetal force is represented by the hand, and the centrifugal force by the endeavour which the stone makes to fly off in a right line.

Cerberus, in mythology, a three-headed mastiff, who guarded the gates of hell;—that is, the abodes of the dead. It has been conjectured, that Cerbe-

rus was the symbol of time ; and, that his three mouths denoted the past, the present and the future. If this be right, the allegory is exceedingly elegant ; since it goes on to say, that Cerberus fawned upon all who entered, but devoured those who attempted to return.

CEREBELLUM. See *Brain.*

CEREBRUM. See *Brain.*

CEREMONIES, *Master of*, an officer instituted by James I. for the more honourable reception of ambassadors and strangers of quality, and for the regulation of all matters of etiquette in the assemblies over which they preside.

CERTIFICATE (Trial by), in the law of England, a species of trial allowed in those cases where the evidence of the person certifying is the only criterion of the point in dispute. For when the fact in question lies out of the cognizance of the Court, the judges must rely on the solemn averment or information of persons in such a station as affords them the most clear and competent knowledge of the truth. As therefore such evidence, if given to a jury, must have been conclusive, the law, to save trouble and circuity, permits the fact to be determined upon such certificate merely.

CERVUS, the deer, abounds in cold countries, but the Cervus tarandus, or rein-deer, is the most valuable of all the species, as to the Laplander it is a complete substitute for the horse, the cow, the sheep and the goat: it will travel, with a sledge at his back, and a person sitting in it, more than 100 miles a day: is extremely docile, and will live upon little. Its favorite food is the Lichen Islan-

dicus, or Lapland moss, which it digs out from under the snow with its horns.—See Plate Nat. Hist. fig. 7.

Cete, an order of animals in the Linnæan system, including the Monodon, the Balæna, Physeter, and Delphinus. Though ranked among the Mammalia, they live in water like fish, but in their structure they are more nearly allied to quadrupeds than fishes.

Chain. See Mensuration.

Chalcedony, a genus of the semipellucid gems, variegated with different colours, disposed in the form of mists or clouds, owing to an admixture of colours imperfectly blended in the general mass, and often visible in distinct molecules.

Challenge, in law, is an exception made to jurors who are returned to a person on a trial.

Chalybeate, in medicine, an appellation given to any liquid containing particles of iron or steel.

Chamberlain, *Lord*, of Great Britain, the sixth high officer of the crown, to whom belongs various duties on the coronation-day; and also appertains many privileges. To him belong the care of providing all things in the House of Lords during the sitting of Parliament, and the government of the Palace of Westminster. The office is hereditary, and is sometimes in the hands of a lady, who may execute it by deputy.

Chamberlain *of London*, keeps the city money, presides over the affairs of citizens and their apprentices, and presents the freedom of the city to those who have faithfully served their apprenticeships. The office lasts but one year, it is usual, however, to rechoose the same man annually, unless he shews himself unworthy the high situation.

Champion, a person who undertakes a combat in the place of another: sometimes the word is used for him who fights his own cause.

Champion *of the King*, an officer who rides armed into Westminster Hall on the coronation, while the King is at dinner, and by herald makes proclamation, "That if any man shall deny the king's title to the crown, he is there ready to defend it in single combat:" which being done, the king drinks to him, and then presents him with the cup for his fee.

Chancellor, *Lord High*, one of the principal officers of the civil government, created without writ or patent, by the mere delivery of the king's great seal into his custody. He is a privy-counsellor by his office; and, according to lord-chancellor Ellesmere, prolocutor or speaker of the House of Lords by prescription. He appoints all the justices of peace throughout the kingdom. Persons exercising this office in former times having been ecclesiastics, and superintendants of the royal chapel, the Lord-Chancellor is still styled keeper of the king's conscience; and for the same reason is visitor, in right of the king, of all hospitals and colleges of the king's foundation; and patron of all the king's livings under the value of 20*l.* per annum in the king's books. He is the general guardian of all infants, ideots, and lunatics; has a controul over all public charities; and a jurisdiction of vast extent, as the head of the law, in his Court of Chancery; where he decides without the assistance of a jury, but from which there is an appeal to the House of Lords. He takes precedence of every lord, except the royal family, and

the archbishop of Canterbury. The title of chancellor is derived, according to sir Edward Coke, *a cancellando*, from the act of cancelling the king's patents when granted contrary to law, which is the highest power he possesses.

Chancery, the Court of the Lord-Chancellor; the highest seat of justice in Great-Britain, save the parliament itself. This Court is at once the strength of the law, and the bulwark of individuals against its unavoidable imperfections. As a court of common law, it can enforce proceedings in the lower Courts; and as a Court of Equity, give relief where nothing can be done before a jury, and soften the rigour of law where it falls hardly and unjustly upon individuals. In this court, the law is viewed as always intending to do right; and the *spirit* is consulted, where the *letter* would produce an improper consequence. No plaintiff, however, is to come to this Court in any case where remedy may be had at law; and that which can be tried by a jury is not triable in this Court.

Chances, *doctrine of*, is a subject of great importance in Life Annuities, Assurance, &c. All games depend on it, and also Lotteries, and did people understand the subject, they would less willingly embark their money in such deceitful speculations as the public lotteries. Mr. Morgan, a great mathematician, has calculated the chance that a person has of gaining the high prizes, after which all are striving, and he says that in a lottery of 25,000 tickets, of which 20 are prizes of 1,000*l.* and upwards, a person to have an equal chance o one of those tickets must purchase 740 tickets. Again supposing there are 3 prizes of 20,000*l.* and

three of 10,000*l.* and out of 25,000 tickets he has purchased 3,000 to his own share, in hopes of gaining one of each of these capital prizes, still the chances against him will be nearly 12 to one.

CHANGES, in Arithmetic, the variations or permutations of any number of things with regard to their order, position, &c. The number of changes is found by a continual multiplication of all the terms in a series of arithmetical progressionals, whose first term, and common difference is *unity*. Thus if we are seven in family, and it is required to find in how many different ways we may sit at table, the answer is $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 = 5040$.

If there were 8 persons, then the answer would be $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 = 40320$.

CHANNEL, the deepest part of a river, strait, &c. also an arm of the sea running between an island and the main or continent, as the British Channel, Irish Channel, &c.

CHAPLAIN, an ecclesiastic in the house of princes, or persons of quality, who officiates in their chapels, &c. The king has 43 chaplains in England, and 6 in Scotland. According to a statute of Hen. VIII. the persons who may retain chaplains, together with the number each is allowed to qualify, is as follows: an archbishop, 8; a duke or bishop, 6; marquis or earl, 5; viscount, 4; baron, knight of the garter, or Lord-Chancellor, 3; a duchess, marchioness, countess, baroness, the treasurer and comptroller of the king's house, clerk of the closet, the king's secretary, dean of the chapel, almoner, and master of the Rolls, two each; chief-justice of the King's-bench, and warden of the

cinque-ports, one each. All these chaplains may purchase a licence or dispensation, and take two benefices with the cure of souls. A chaplain must be retained by letters-testimonial under hand and seal; for it is not sufficient that he serve as chaplain in the family.

CHAPTER, in the affairs of the church, an assembly for the transaction of such business as comes under its cognizance. A meeting of the members of an order of knighthood is called a chapter. Every Cathedral is under the superintendance of the dean and *chapter* of its canons.

CHARADE, a sort of enigma, so named from its inventor, made upon a word the two syllables of which, when separately taken, are themselves words. It consists of three parts, or three enigmas; the two first describing the syllables separately; the second alluding to the entire word. The charade can have no merit if, when its subject is explained, what has been said of it does not appear obviously applicable. In proposing a charade, one might say to a lady: "My *first* may you seldom experience! my *second* is myself; my *whole*, yourself." WO-MAN.

CHARCOAL, an artificial fuel, consisting of wood half burnt, or charred, which is performed in the following manner: the wood is cut into proper lengths, and duly arranged in piles or stacks; and these being coated over with turf, and the surface covered with plaster made of earth and charcoal-dust well tempered together, are set on fire. In about two or three days, when the wood is known to be sufficiently charred, the apertures, which had been left to give vent to the flames, are closed

up; and all access of the external air being excluded, the fire goes out of itself. Considerable skill and judgment are required of the man who attends the fire, and upon his abilities the success of the operation depends. If the whole process is rightly managed, the coals will exactly retain the figure of the pieces of wood. Some are said to have been so dexterous as to char an arrow without altering the figure of the feather.—Charcoal is used in various arts and manufactures where a clear strong fire without smoke is needful; the humidity of the wood being here almost intirely dissipated. This article is also employed in polishing. The vapour of burning charcoal is found to be highly noxious, and is, in reality, absolute *fixed air*.

In the experiments and discoveries of modern chemistry, charcoal is frequently mentioned; and found to possess many extraordinary properties. It is incapable of putrifying, or rotting like wood, and is not liable to decay through age. New-made charcoal, by being rolled up in cloths that have contracted a disagreeable odour, effectually removes it. It takes away the bad taint from meat beginning to putrify, by being boiled along with it. It is, perhaps, the best tooth-powder known.

Chart, an hydrographical map, drawn for the use of navigators, and showing the situation of coasts, rocks, sand-banks, and sea-marks; the course of currents; the depth of soundings; and the direction of regular winds: the difference, therefore, between the several projections commonly known by the separate names of *maps* and *charts* is very great; and the general appearance,

indeed, is so striking as to distinguish them to the eyes of the most ordinary observer.

Charta, *Magna*, the groundwork of the laws and liberties of England. Edward the Confessor is said to have been the founder of this national blessing. Henry I. renewed it; his charter is lost; but it was revived by Henry II. who first sapped the feudal system; and by John, at the instance of the barons. Henry III. took pains to learn the extent of the liberties of England during the reign of Henry I. which was probably regarded as the genuine model; and published a new charter, the same as the *magna-charta* now extant. In the fifty-second year of his reign, after some warfare with the barons, he also granted another, called, *The charter of the forest.*

The feudal system having mouldered away, and the condition of the church being materially altered, many of the provisions of the magna-charta are now of little apparent moment: but the true value of this celebrated instrument is to be estimated in a philosophical point of view. The path it opened to the future career of justice is to be observed; the outlines of liberal policy which it drew, and the broad and solid basis which it laid down, are to be considered. Several regulations of this charter, however, continue to be important. Care was taken therein to protect the subject against illegal processes for debt due to the crown, and against the abuse of purveyance and preemption; the forfeiture of lands in cases of felony was fixed upon its present footing; it prohibited future grants of exclusive fisheries, and the erec-

tion of bridges to the injury of the neighbourhood; established the testamentary power of the subject over part of his personal estate, and gave the rest among his wife and children; laid down the law of dower, and prohibited the appeals of women, unless after the death of their husbands; enjoined a uniformity of weights and measures; protected merchant-strangers; forbade the alienation of lands in Mortmain; prohibited denials of justice, and delays in its administration; fixed the court of common-pleas at Westminster, that the suitors might no longer be harrassed with following the king's person; established annual assizes; directed the egular awardment of inquests for life or member; prohibited the king's inferior ministers from holding pleas of the crown, or trying any criminal charge; regulated the time and place of holding the inferior tribunals of justice; confirmed the privileges of all cities, boroughs, towns, and ports of the kingdom: it even extended to the lowest orders of the state, since it enacted, that the *villain*, or bondman, should not be subject to the forfeiture of his implements of tillage: and, lastly, it protected every individual of the nation in the free enjoyment of his life, his liberty, and his property, unless declared to be forfeited by the judgment of his peers, or by the law of the land: "*per legale judicium parium suorum, vel per legem terræ.*"—By the 25th of Edward I. it is ordained that this charter shall be taken as the common law; and by the 43d of Edward III. all statutes contradicting it are declared to be void.

Cheese, a food made of curdled milk, separated from the serum or whey. The too free use of

cheese is not considered wholesome. When new, it is very difficult of digestion; and when old, it becomes acid and hot. Shaved thin, and mixed with hot water, it will form a hard, stony mass; it must, therefore, be dangerous to drink any hot or warm liquor immediately after eating cheese. The whole milk of a dairy, produced at one or two meals, is made into a cheese, the size of which depends on the number of cows in milk. The curd is either that which separates from the skimmed milk after standing, or is more speedily produced by the application of rennet. Rennet is a mixture of aromatics and acid. The cheese differs according to these two descriptions of curd. The cream is skimmed from the milk for making butter. Cream-Cheeses, in Lincolnshire, are made by adding the cream of one meal's milk to milk that comes immediately from the cow.

CHELTENHAM WATERS. See *Mineral-waters.*

CHEMISTRY, the science of separation and combination, and of the properties of the ingredients of bodies. It is the glory of the eighteenth century that, during its progress, this pursuit was prosecuted with a zeal and patient toil that have multiplied facts and discoveries with a rapidity altogether unexampled in the history of human attainments. It is a subject of the greatest importance to mankind; for to chemistry, more or less scientifically pursued, numerous arts owe their birth and progress; to chemistry, the naturalist must resort for the explanation of phenomena, that, without its aid, can only be spoken of by conjecture, and on a true knowledge of which our happiness, as thinking beings, eminently depends. The

science of chemistry consists in the knowledge of the simple substances that enter into the composition of bodies, of the manner in which these substances combine, and of the properties of the compounds which they form. Simple substances are those which have never yet been decompounded, and therefore answer to what the ancients called *elements*: but the moderns, warned by the rashness of their predecessors, are cautious of applying that term, because it is very possible, that the bodies we reckon simple may be real compounds; and all that is known is,—they have not yet been decompounded. Were we acquainted with all the elements of bodies, and with all the combinations of which those elements are capable, the science of chemistry would be as perfect as possible; but this is very far from being the case. All the bodies that are at present reckoned simple, because they have never been decomposed, may be reduced into six classes. 1. Oxygen, 2. Simple combustibles, 3. Metals, 4. Earths, 5. Caloric, 6. Light. Simple combustibles are bodies capable of combustion, that have not yet been decompounded: these are, sulphur, phosphorus, carbon, hydrogen, azot, and all the metals. OXYGEN, and the other articles, will be explained in the order of the alphabet.

Under the article ATTRACTION, is mentioned chemical attraction, or the attraction of combination. This power, which disposes the particles of different bodies to unite, is called by Newton, *attraction*; but by many of the modern chemists, *affinity*. Between all substances capable of uniting, there is said to be an *affinity*; between those substances, on the contrary, which do not unite, there is said to

be no affinity. Thus, there is no affinity between water and oil; and there is a greater affinity between water and spirit of wine than between water and common salt; inasmuch as a combination of the two latter ingredients is destroyed, if the water be permitted to combine with spirit of wine; in which case the salt sinks to the bottom, and the water is no longer saline to the taste.

Chemists once flattered themselves with the hope of a richer reward than commonly belongs to the labours of science. They believed that they should be able to make gold. It had been customary to consider all bodies as composed of certain permanent and unchangeable parts, called elements; and the end of chemistry as the power of resolving bodies into these elements, and recomposing them again by a proper mixture of the elements when so separated. Upon this supposition the alchemists went; who, conceiving that all bodies were composed of salt, sulphur, and mercury, endeavoured to find out the proportions in which they existed in gold, and then to form that metal by combining them in a similar manner. Had they taken care to ascertain the real existence of these elements, and, by mixing them together, composed any one metal whatever, though but a grain of lead, their pretensions would have been rational and well founded; but as they never did this, their want of success is not surprising.

Chemical apparatus: the object of chemistry being to ascertain the ingredients of which substances are composed, to examine the nature of those ingredients, and the properties resulting from their combination or union, it is necessary that

there should be divers instruments for the purpose. For the mechanical division of bodies it is requisite the chemist should have hammers, knives, files, and rasps, for breaking, cutting, rasping, filing and shaving: he should have mortars for pounding; a stone and muller for levigating: a pair of rollers for laminating metals, a forge for many of the purposes in which the blast-heat of a small fire is required; LAMPS, FURNACES, &c. descriptions of which will be found under the proper heads. We shall in this article describe some of the familiar apparatus necessary to a young chemist, and to which we shall have occasion to refer in other parts of our work. The very first thing to be got is the apparatus for obtaining gases. Plate I, Chemistry, fig. 1. is a tub or trough A Z full of water, with a shelf, K K K, in it. B, G, F are glass jars or receivers, inverted with their mouths downwards. We shall point out its use by the example of Oxygen gas. C is a glass bottle into which are put some red-lead or manganese, and a small quantity of dilute sulphuric acid. D is a glass tube generally fitted by grinding to the neck of the bottle, and curved so as to enter conveniently below the shelf and communicating with one of the jars or receivers B, G, F. E is a glass retort, such as is shewn figure 3, which may be applied to the same purpose. If the bottom of the bottle C be heated by means of a wax taper or common candle, the oxygen gas will rise in bubbles, and fill the receiver, from which it drives out the water.

Fig. 2. Represents an elegant chemical apparatus of the same nature, used by Mr. Davy, the professor of chemistry, at the Royal Institution.

A, is a japanned tin vessel, filled within two or three inches of the top with water. Just below the surface of the water is fixed a shelf, having several holes bored through it, to which small funnels are attached underneath. The glass receiver B, intended to receive the gas, is filled with water, and being inverted with its mouth under water, it is raised up gently, and placed upon the shelf over one of the holes, where it will remain full of water, which is kept up by the pressure of the atmosphere, in the same way as the mercury is retained in the tube of a barometer.

The materials from which the gas is to be disengaged, are put into the retort G, which is put through and suspended in one of the rings of the lamp furnace. A E is an improved Argand's lamp, having two concentric wicks, placed on a shelf which is moveable up and down to bring the lamp to a convenient distance from the retort. The lamp is to be lighted, and as soon as the substances in the retort act upon each other, the gas will begin to be disengaged, and will ascend through the whole of the shelf into the vessel B, and displace or force down the water with which it had been filled. When the water is displaced, the receiver is full of gas, which may be preserved in it, by keeping its mouth always under water in the cistern.

The gas so obtained may be transferred from the vessel B, to any other, in the following manner: fill the vessel into which the gas is to be transferred, with the fluid in the trough, and place it on the shelf, over one of the holes. Then take the vessel B, and keeping its mouth still under the

Chemical Apparatus.

Fig.1.

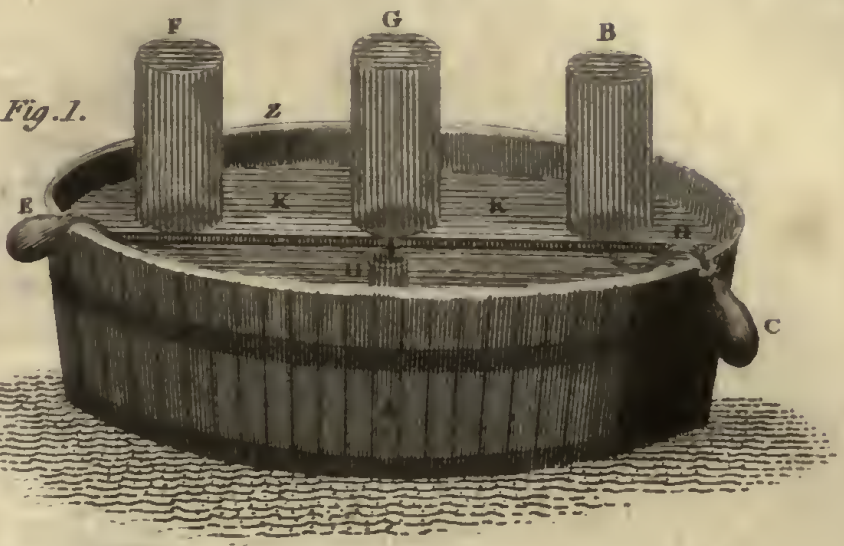
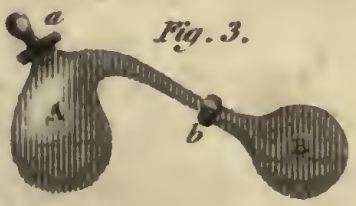


Fig.5.

Fig.3.



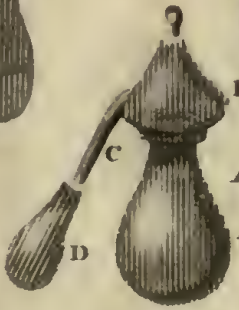
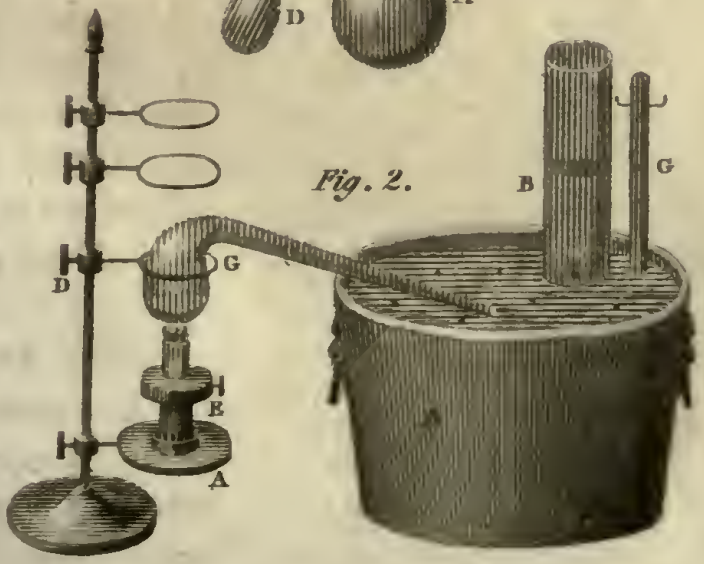


Fig.4.

Fig.2.



Cooper sculp.

Published by J.Harris, St.Pauls C.h Y.d 18n.

fluid, bring it under the hole above which the vessel to be filled is placed; then by depressing its bottom, and elevating its mouth so as to bring it to an horizontal position, the gas in it will escape and rise up through the hole, on which the other has been placed, and will fill it by displacing the fluid.

When the gas to be procured is absorbed by water, as carbonic acid gas, quicksilver is used instead of water, to fill the trough, and a much smaller vessel than A, made of stone or wood, is used. See fig. 6. Pl. II.

A small glass vessel, capable of containing an ounce measure, is used for measuring gases; if this phial be successively filled, and emptied under a larger jar, we may thereby throw into that jar whatever quantity of gases, or any mixture of them we please.

Adjoining the receiver B, and on the shelf, is a strong glass tube, for receiving a mixture of gases, intended to be exploded by means of the electrical sparks. Near the upper end, which is closed, two pieces of brass wire pass in the tube; they are cemented in so as to make the holes air-tight, and they nearly touch each other within the tube. If the interval between the two wires be made a part of the electric circuit, by putting chains, connected with a Leyden phial, to the hooked ends of the wires, the electric spark will pass through the interrupted space between the two wires and explode the gases.

Fig. 3. Represents a retort used in distillation. It is a vessel either of glass, or of baked earth, for containing the liquor to be distilled. When it has a small neck *a*, with a stopple fixed to it, for in-

troducing the materials through, it is called a tubulated retort. B is the receiver for condensing the vapour which is raised, and into which the neck of the retort is inserted. The joining *b*, is made air-tight by some substance, such as paste, applied to it, called in chemistry luting.

When great heat is employed, earthen retorts are used, and they are placed on a fire. When a less heat is wanted, glass retorts are used, which are suspended over a lamp. The receiver B is placed on some stand, which will keep it steady.

Fig. 4. A, is a chemical vessel, called a mattrass, used for distillation also, having a vessel B called an alembic, fitted to the head. The liquid, raised by heat into the state of vapour, is condensed in the alembic, and falls into a groove all round its inside, whence it runs out by the spout C into the receiver D.

Fig. 5. Is a phial with a bent glass tube, fitted into it for disengaging gases in the pneumatic apparatus.

Fig. 6. Plate II. Chemical Apparatus, is an apparatus contrived to collect such gas as cannot be received over water. The box contains mercury, and is used in every respect like the apparatus fig. 1.

Fig. 7. Exhibits the method of sublimation. Put some pieces of sulphur into the vessel A to which the receiver B is fitted and accurately luted round. A is put on a vessel filled with sand called a sand bath, which is to be heated by the furnace C. The sulphur melts, a thick white smoke arises, which is deposited in B in the form of powder. Hence it is called flowers of sulphur. The earthy

matter is left behind, and the sublimed sulphur is pure.

Fig. 8. is a crucible. Crucibles are generally made of baked clay, or a mixture of clay, and black lead in powder, which renders them capable of sustaining an intense heat. When used for melting substances, they have generally covers adapted to them, as is shewn in the figure.

Fig. 9. is called a philosophical candle, which is exhibited by setting fire to hydrogen gas. See HYDROGEN. A B is a glass jar containing iron filings; *a* is an additional neck, with a stopper, by which a fresh supply of iron filings and sulphuric acid may be readily introduced; *b x* is a piece of tobacco-pipe fixed into the cork or stopper *b* of the jar A B.

Fig. 10. is the representation of the combustion of iron in oxygen gas. A is the iron wire supposed to be in a state of inflammation, B C is a glass jar containing oxygen gas placed in a vessel containing water. This experiment was contrived by Dr. Ingenhouz.

Fig. 11. represents a blow-pipe eight or nine inches long. It is made of brass or silver, the mouth piece A, should be of ivory, the hollow globe B, is contrived to condense the vapours coming from the breath; the opening C, through which the wind is applied to the flame, must be as small as the finest wire.

Fig. 12. *Decomposition of water.*—E F is a tube of common glass, made very strong and thick, about an inch in diameter. C F E D is a furnace of iron, containing lighted charcoal; A is a glass retort, containing water, and resting on a small

surface V X. To the lower extremity of the glass tube, a worm S S is applied, connected with the flask H, which has two necks, or orifices. To this flask, a glass tube K k is adapted, in order to convey the gas formed, to any proper vessel for receiving it. When the apparatus is thus arranged introduce into the glass tube E F, a quantity of iron filings, and fill the retort A, with water. The fire being then lighted both under the tube and under the retort, the glass tube will become red hot, and the water in A will boil and rise through the iron filings in a state of vapour. The iron absorbs the oxygen of the water, and becomes oxidized. The hydrogen of the water passes through the worm S S into H, and from thence rises in the state of gas, into the tube K k, to which a bladder, or other receiver, may be applied, in order to obtain it. When the apparatus is cooled, the iron filings will be found to weigh much heavier than when first put in, from the quantity of oxygen they have absorbed; and in this state they exhibit a true oxide of iron. See the article LABORATORY, in which will be found an account of many of the substances used in chemical experiments.

CHESS, a game played by two persons sitting vis-a-vis, and having between them a square board, containing 64 rectangular chequers, alternate white and black: each player has the white corner square at his right hand. The pieces are as follows, for each party. A queen, which is always placed on her own colour: thus, the white queen is on a white square, the fourth from the corner, and the black queen on the black square facing the white queen. Their respective kings are then placed by

Fig. 11.

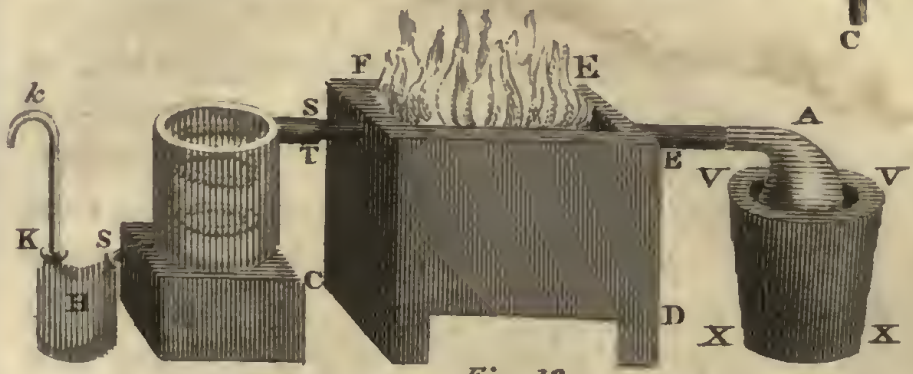


Fig. 12.

Fig. 6.

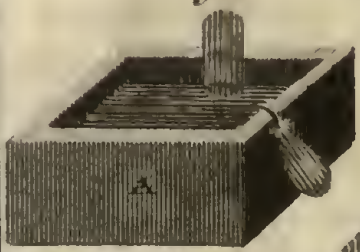


Fig. 7.

Fig. 8.

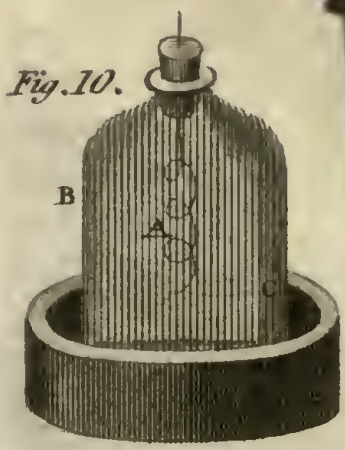


Fig. 10.

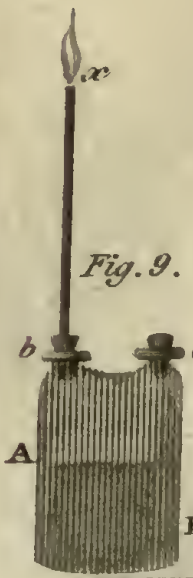


Fig. 9.

Cooper sculp.

Published by J. Harris St. Pauls Ch. Yd. 1811.

the sides of the queens, so that each couple occupy the two centre squares on the lines nearest the players. Two bishops are then placed, one on the side of the king, the other on the side of the queen, on squares of different colours. Bishops are generally distinguished by a kind of mitre on their tops: at the sides of the bishops are placed the two knights, also on different coloured squares: these are usually distinguished by horses heads, or by having a piece obliquely taken off from their flat round bonnets. The exterior pieces are called castles or rooks, and are commonly made to resemble turrets; or may be only pawns of a larger size. The pawns, eight in number, are ranged so as to occupy all the squares on the second line, immediately in front of the line of pieces. Pawns are generally pieces of turned wood, of a neat pattern, and with spherical summits. This description of one party will answer for both; observing that the players are designated according to the colour of their pieces. Directions for playing must be had from larger works, but the best mode of learning will be from observation and practice.

CHEVAL-DE-FRISE, spikes of wood, armed or pointed with iron, and six feet long, fixed in a strong beam of wood, somewhat in the manner of the well-known piece of household furniture, a *cat;* and used as a fence against cavalry, in military operations.

CHILBLAIN, in a mild state, is a moderately red tumour occasioning heat and itching. In a more severe state, the tumour is larger, redder, and approaching to a dark blue or black colour. In the third degree, blisters arise in the tumours, and they change to sores. The worst cases of chilblains end

in mortification. Chilblains are occasioned by suddenly warming a cold part, or suddenly cooling a heated part: hence the parts of the body most subject to the complaint are the toes, fingers, ears, &c. Chilblains in the mild stage may usually be cured by well rubbing the parts with POMADE Divine, which see: or by immersing the hands or feet in ice-cold water, or rubbing them with snow or pounded ice two or three times a day: after each application the part is to be dried and covered with a leathern sock.

CHILI, a country of South America, situated between the 25th and 45th degrees of south latitude, and between 65 and 85 degrees west longitude. It has Peru on the north, La Plata on the east, Patagonia on the south, and the Pacific Ocean on the west. The air and soil on the west are much better than on the east; for when the east side of the Andes is covered with gross vapours, the heavens are bright and clear on the west. The east side is a barren desert, but the west produces various kinds of corn, fruits and flowers in the greatest plenty.

CHILIAGON, is a regular plane figure of 1000 sides and angles.

CHILTERN-HUNDREDS, certain hundreds into which many of the counties of England were divided by Alfred, and which still retain their peculiar courts. The chiltern hundreds have been annexed to the crown. The *stewards* of their courts are appointed by the chancellor of the exchequer, with a salary of 20*s*. per annum. It being an established rule that a member of parliament receiving a place under the crown cannot sit, unless re-elected, the acceptance

of a stewardship of the chiltern hundreds is a formal manner of resigning a seat. *Chiltern* is from the Saxon word *chilt*, and generally applied to the hundreds that lie in the hilly part of a county.

Chimes, of a clock, a kind of periodical music, produced at certain hours by a particular apparatus added to the clock. The barrel which produces the chimes must be as long in turning round as the tune takes in playing. It may be made up of certain bars, with a number of holes punched in them, to fix the pins that are to draw each hammer: by this means the tune may be changed, without changing the barrel. Then the pins which draw the hammers, must hang down from the bar, some more, some less, and some must stand upright in the bar, to play the time of the tune rightly.

Chimney-*sweeping*; smoke in its passage through a chimney deposits a considerable quantity of soot, which is apt to take fire, and also to fall back into the room. It is therefore necessary frequently to have the flues cleansed and the soot removed from them. The usual method in this country is by means of children, who are from a very early stage forced up chimnies, sometimes at the hazard of their lives, always at the risque of their health. The evils of this unwholesome occupation have from time to time engaged the attention of the humane, and some years since a premium was offered for the best mechanical invention that should supersede the necessity of climbing boys. There were many candidates for the prize, which was after repeated examinations and experiments adjudged to Mr. George Smart, the patentee of a method of making hollow masts. As his method,

though by no means perfect in the practice, has been a good deal used in and about the metropolis, we shall give an account of its mode of operation. The principal parts of the machine are a brush, some rods or hollow tubes, that fasten into each other, by means of brass sockets, and a cord connecting the whole together. The method of using the machine is this; having ascertained, by looking up the chimney, what is the direction of the flue, a cloth is then to be fixed before the fire-place, with the horizontal bar, and the sides to be closed with two upright bars. The brush is introduced through the opening of the cloth, which opening is then to be buttoned, and one of the rods is to be passed up the cord into the socket on the lower end of the rod which supports the brush; the other rods are in like manner to be brought up, one by one in succession, till the brush is raised somewhat above the top of the chimney, observing to keep the cord constantly tight, and when those rods which have a screw in the socket are brought up, they are to be placed on the purchase; the cord is to be put round the pulley and drawn very tight, and screwed down, by which all the rods above will be firmly connected together, and the whole may be regarded as one long flexible rod. In pulling the machine down, the edges of the brush striking against the top of the chimney, will cause it to expand, and there being a spring to prevent its contracting again, it will bring down the soot with it. In drawing down the machine, the person should grasp with his left hand the rod immediately above that which he is separating with his right hand to prevent the upper ones from sliding down too soon.

The rods, as they are brought down, are to be laid carefully, one by one, in as small a compass as possible, and arranged like a bundle of sticks.

This machine has been found of great utility in extinguishing fires in chimnies, for that purpose a thick coarse cloth well drenched in water, is to be tied over the brush, and then forced up the chimney in the manner directed. The whole invention is very honourable to Mr. Smart's talents; but there still requires an addition to the machine, which will act the part of the chimney sweeper's scraper.

China, an extensive empire in Asia, bounded on the north by Tartary, from which it is separated by a great wall 500 leagues in length; on the east by the Yellow Sea, and the China Sea; on the south by the latter sea, and the kingdoms of Tonquin, Laos, and Burmah; and on the west by Thibet. It lies between 20° and 41° north latitude and between 100° and 125° E. longitude, being 2000 miles from north to south, and 1500 from east to west, and occupying 1,297,299 square miles. This country contains 15 provinces, exclusive of that of Lyantong, which is situated without the great wall. These provinces contain 4,402 walled cities divided into classes, the civil and the military: the civil class contains 2,045 and the military 2,357. This country probably owes its name to a Chinese word, signifying middle, from a notion the natives had that their country lay in the middle of the world. Its chief rivers and waters are the Yamour and the Argun, which are the boundary between the Russian and Chinese Tartary; the Whambo, or the Yellow river, the Kiam or the Blue river, and the Tay. Common water in China is very indifferent,

and in some places it is boiled to make it fit for use. The chief of its bays are those of Nankin and Canton. Its canals however are sufficient to entitle the ancient Chinese to the character of a most wise and industrious people. The commodiousness and length of these are incredible. The chief of them are lined with hewn stone on the sides, and they are so deep, that they carry large vessels, and sometimes they extend 1,000 miles in length. Those vessels are fitted up for all the conveniences of life, and it has been thought by some, that in China the water contains as many inhabitants as the land. They are furnished with stone quays, and sometimes with bridges of an amazing construction; the navigation is slow, and the vessels are sometimes drawn by men. No precautions are wanting, that could be formed by art or perseverance, for the safety of the passengers, in case a canal is crossed by a rapid river, or exposed to torrents from the mountains. These canals, and the variety that is seen upon their borders, render China delightful in a very high degree as well as fertile, in places that are not so by nature. According to the statement of the population of China delivered to Lord Macartney at his request by Chowta-Zhin, a Chinese mandarin, and which was founded on documents taken from one of the public offices in Pekin, the number of inhabitants in China is no less than 333,000,000. This estimate Sir George Staunton defends, and gives a variety of reasons from circumstances almost peculiar to China, to account for the great population, observing in conclusion, that from this statement it appears that China contains upon an average about one third more inhabitants

than are found upon an equal quantity of land in the most populous country in Europe. This country runs through so many climates, that the air is very different in the northern and southern provinces. The south of China, which lies under the tropic of Cancer, is excessively hot, and has its annual periodical rains as other countries under the same parallels. The middle of China enjoys a temperate climate and a serene atmosphere. The north is cold, and subject to the same inclemencies of weather, to which other northern countries are. The complexion of the Chinese is a sort of tawny, and they have large foreheads, small eyes, long beards, long ears, and black hair, and those are thought to be most handsome, that are most bulky. The women affect a great deal of modesty, and are remarkable for their little feet. The men endeavour to make as pompous an appearance as possible when they go abroad, and yet their houses are mean and low, consisting only of a ground floor. The government is absolute, and the emperor has the privilege of naming his successor; but the chief mandarin has permission to tell him of his faults. He looks upon his subjects as his children, and professes to govern them with parental affection. The Chinese empire is very ancient. It is generally allowed to have continued nearly 4,000 years. The annual revenues of the crown, according to Sir George Staunton, are about 66,000,000*l.* sterling, and the army in the pay of China, including Tartars, amounts to 1,000,000 infantry and 800,000 cavalry.

Chinese *Language*, is an object of much curiosity to literary men. The late lamented and il-

lustrious president of the Asiatic Society gives the following account of the Chinese characters from Li Yang Ping. The earliest of them were nothing more than the outlines of visible objects, earthly and celestial; but as things merely intellectual could not be expressed by those figures, the grammarians of China contrived to represent the various operations of the mind by metaphors drawn from the productions of nature. Thus the idea of rotundity and roughness, of motion and rest, were conveyed to the eye by signs representing a mountain, the sky, a river, and the earth. The figures of the sun, the moon, and the stars differently combined stood for smoothness and splendour, for any thing artfully wrought or woven with delicate workmanship. Extension, growth, increase, and many other qualities were painted in characters taken from the clouds, from the firmament, and from the vegetable part of the creation. The different ways of moving, agility, and slowness, idleness, and diligence, were expressed by various insects, birds, fishes and quadrupeds. In this manner passions and sentiments were traced by the pencil, and ideas not subject to any sense were exhibited to the sight, until by degrees new combinations were invented, new expressions added, the characters deviated imperceptibly from their primitive shape, and the Chinese Language became not only clear and forcible but rich and elegant in the highest degree.

Chinese religion. According to the books of the Chinese, the Supreme Being is the principle of every thing that exists, and the father of all living; eternal, immoveable, and independent: his power

knows no bounds; his sight equally comprehends the past, present, and the future, penetrating even into the inmost recesses of the heart. In ancient times, the Chinese sacrificed to the *Tao* in the open fields, or upon some consecrated mountain; and solemn sacrifices seem to have constituted the rites, and piety and virtue the lessons, of this primitive religion. The origin of the present popular doctrines of this extraordinary empire, forms a well-connected, and we may believe, correct history. About six centuries before the Christian era, was born a philosopher named *Ki-un*, or Confucius, and surnamed the *Ta-o-tse*, who after living to an advanced age, left a book containing 5,000 sentences for the use of his scholars. The opinions and temper of this luminary appear to have resembled those of the placid and cheerful, but misapprehended, Epicurus. He advised the banishment of all vehement desires and perturbing passions; praised the man whose innocent life permitted him to glide gently down the stream of life, unruffled with anxiety and care; and taught his followers to avoid, as much as possible, all useless retrospection of the past, and as useless inquiry about the future. It was found, however, by his disciples, that all their endeavours to obtain a tranquillity of mind were in vain, so long as the thoughts of death intervened: that is to say, the thoughts of death rendered their minds unfit to receive the philosophy of Ki-un. They listened to those who promised to remove this evil, by producing a drink that should confer immortality upon mankind; and, as if to discourage all future teachers, on the basis laid by Ki-un, arose a superstructure laden with the follies

and the crimes of superstition. To discover the elixir of life, they devoted their time to chemistry; and, amid the processes of that science, lost time themselves in the reveries and impostures of magic. The name of Ki-un was dishonoured by men who invoked spirits, who pretended to foretel future events, and who made lying promises of perpetual youth. His form of public worship was profaned in temples consecrated to fantastic powers, where spells and images were sold to gratify the avarice of priests, at the expense of truth and the peace of human life. Unfortunately, several series of emperors became the dupes of these artifices. They did not merely forbear to oppose them by the arm of authority, a line of conduct that had testified their wisdom, but became the most infatuated of devotees; and in return, when dead, were revered as Gods. The chief-priest was made grand mandarin of the empire; an eminence that is still enjoyed by his successors; though, through the imprudence of one of these dignitaries, a rival was engendered that has long drawn aside the larger half of the votaries. He promised the brother of the reigning emperor an introduction to the conversation of spirits: the credulous prince had heard of a mighty one, called Fo, whose abode, or rather whose worship, was in India, whither he prevailed on his brother to send embassadors. Whatever had been the ancient celebrity of Fo, it appears that the name was now on the point of falling into oblivion; since the envoys could only find two of his worshippers, whom, with their images and sacred writings, they carried in solemn procession to the imperial city. Such is the story of the introduc-

tion of the religion of Fo, which happened about the 65th year of the Christian era: but its enemies may have traduced its origin; more solid grounds might exist for the imperial embassy; and it might be at least as valuable as that which it in some measure supplanted. In its native country, it appears to have been a branch of the doctrines common to the banks of the Indus. It teaches the metempsychosis, or transmigration of souls, forbids, in consequence, the slaughter of living creatures, and enjoins honesty, purity, truth, sobriety, and acts of charity.

Chinese *Wheel*, is an engine employed in the province of Kiang-see, and probably through the whole empire, for raising water from rivers to irrigate plantations of sugar canes, on a sandy soil, considerably elevated above the level of the river. According to sir George Staunton, who says it is ingenious in its contrivance, cheap in its materials, easy in its operation, and effectual to its purpose, the wheel is from 20 to 40 feet in diameter, according to the height of the bank and elevation to which the water is to be raised. Such a wheel is capable of sustaining with ease 20 tubes or spouts, of the length of 4 feet, and diameter two inches in the clear. The contents of such a tube would be equal to six-tenths of a gallon and a periphery of 20 tubes 12 gallons. A stream of a moderate velocity would be sufficient to turn the wheel at the rate of four revolutions in one minute, by which would be lifted 48 gallons of water in that short period; in one hour, 2,880 gallons: and 69,120 gallons or upwards of 300 tons of water in a day.

Chivalry, in the history of Europe, a military

institution, the origin, object, and character of which, are described, not to say painted, in the following words of Gibbon: "Between the age of Charlemagne and that of the Crusades [A. D. 800—1096], a revolution had taken place among the Spaniards, Normans, and French, which was gradually extended to the rest of Europe. The service of the infantry was degraded to the plebeians; the cavalry formed the strength of the armies; and the honourable name of *miles*, or soldier, was confined to the gentlemen, who served on horseback and were invested with the character of knighthood. The dukes and counts, who had usurped the rights of sovereignty, divided the provinces among their faithful barons; the barons distributed among their vassals the fiefs or benefices of their jurisdiction; and these military tenants, the peers of each other and of their lord, composed the noble or equestrian order, which disdained to conceive the peasant or burgher as of the same species with themselves. The dignity of their birth was preserved by pure and equal alliances; their sons alone who could produce four quarters, or lines of ancestry, without spot or reproach, might legally pretend to the honour of knighthood; but a valiant plebeian was sometimes enriched, and ennobled by the sword, and became the father of a new race. A single knight could impart, according to his judgment, the character which he received; and the warlike sovereigns of Europe derived more glory from this personal distinction than from the lustre of their diadem. This ceremony was in its origin simple and profane: the candidate, after some previous trial, was invested with his sword and spurs; and

his cheek, or shoulder, was touched with a slight blow, as an emblem of the last affront which it was lawful for him to endure. But superstition mingled in every public and private action of life: in the holy wars it sanctified the profession of arms; and the order of chivalry was assimilated in its rights and privileges to the sacred order of priesthood. The bath and the white garment of the novice were an indecent copy of the regeneration of baptism: his sword, which he offered on the altar, was blessed by the ministers of religion; his solemn reception was preceded by fasts and vigils; and he was created a knight in the name of God, of St. George, and of St. Michael the Archangel. He swore to accomplish the duties of his profession; and education, example, and the public opinion, were the inviolable guardians of his oath. As the champion of God and the ladies, he devoted himself to speak the truth; to maintain the right; to protect the distressed; to practise *courtesy*, a virtue less familiar to the infidels; to despise the allurements of ease and safety; and to vindicate in every perilous adventure the honour of his character. The abuse of the same spirit provoked the illiterate knight to disdain the arts of luxury and peace; to esteem himself the sole judge and avenger of his own injuries; and proudly to neglect the laws of civil society and military discipline. Yet the benefits of this institution, to refine the temper of barbarians, and to infuse some principles of faith, justice, and humanity, were strongly felt, and have been often observed. The asperity of national prejudice was softened; and the community of religion and arms spread a similar colour and generous emulation

over the face of Christendom. Abroad in enterprize and pilgrimage, at home in martial exercise, the warriors of every country were perpetually associated: and impartial taste must prefer a gothic tournament to the olympic games of classic antiquity. Instead of the naked spectacles which corrupted the manners of the Greeks, and banished from the stadium the virgins and matrons, the pompous decoration of the lists was crowned with the presence of chaste and high-born beauty, from whose hands the conqueror received the prize of his dexterity and courage."

Chondropterigious, a term applied by the Linnæan system to an order of fishes with cartilaginous gills. Dr. Shaw, and other naturalists, have united the branchiostegi and chondropterygii under the general title of cartilaginei. Linnæus separated the cartilaginous from the other fishes, and placed them in the class Amphibia, where they constituted the order Nantes.

This distribution was made under the supposition of the cartilaginous fishes being furnished both with lungs and gills. The supposed lungs, however, have been since ascertained by naturalists to be only a modification of the gills, and it, therefore, now appears that this cartilaginous tribe consists in reality of fishes, differing principally, if not entirely, from other fishes, in having a cartilaginous skeleton.

Chord, in music, the union of two or more sounds uttered at the same time, and forming together an entire harmony.

Chord of an arch is the right line joining the extremes of that arch.

CHORDS. See INSTRUMENTS.

CHOROGRAPHY, the art of delineating or describing some particular country or province: it differs from geography as a description of a particular country differs from that of the whole earth; and from topography as the description of a country from that of a town or district.

CHOROIDES, denotes the coat of the eye immediately under the sclerotica.

CHORUS, in dramatic poetry, one or more persons present on the stage during the representation, uttering an occasional commentary on the piece, preparing the audience for events that are to follow, or explaining circumstances that cannot be distinctly represented. Several examples may be referred to by the English reader, in the plays of Shakespeare. In tragedy, the chorus was at first the sole performer; at present it is wholly discontinued on the stage. Mason's Elfrida is celebrated for its chorusses.

CHORUS, in music, the part in which several persons join the singer.

CHRISTIANITY, the religion of Christians, who derive their name from the founder CHRIST, were first so designated at Antioch. The foundation of a Christian's faith and practice, his ultimate, and, in truth, only appeal, must be to the facts, the doctrines, and the precepts of the Scriptures, especially to those of the New Testament. Other formularies, or confessions of faith, are not to be regarded in comparison with the Scriptures. The reader will find in the New Testament a detail of instructions given, of wonders performed, and of future events revealed. He will be struck with a very particular

account of the sufferings, death, resurrection and ascension of JESUS the founder. The history containing those things appears to be fairly written; and to carry with it as substantial proofs of its authenticity as any history that has gained credit in the world. Is the young Christian asked why he believes in the antiquity of the writings of the New Testament, he may reply, for the same reason that he believes the works of Virgil, Horace and Sallust, to be of ancient origin. Is he asked why he believes that the several books were written by the persons whose names they bear; he will say, for the same reason that he believes the Georgics of Virgil and the Paradise Lost were written by Virgil and Milton. In reasoning upon the truth of Christianity, he may appeal to its internal evidence, and combining the doctrine and precepts of the system, infer from them the validity of the system itself. The early triumphs of this religion furnish another powerful argument in its support, especially if it be remembered that in the estimation of the world, it was neither honourable, profitable nor popular. Under every disadvantage, and struggling under the most terrible persecutions, it flourished, and has maintained its ground for nearly two thousand years. Another argument for the truth of the Christian religion arises from the completion of prophecies of which some preceded JESUS, and were accomplished by him, and others were uttered by him and came to pass during his life; such were the treachery of Judas, and the cowardice and meanness of Peter; or within a few years after his crucifixion, of this kind was the destruction of Jerusalem. The character of CHRIST and the miracles

which he wrought are the evidences of the divinity of his mission. On these grounds, if the question be put, why are you a Christian? the answer may be, "Not because I was born in a Christian country and educated in Christian principles: not because I find the illustrious Bacon, Boyle, Locke, Clarke and Newton among the professors and defenders of Christianity: not merely because the system itself is so admirably calculated to amend and exalt human nature, but because the evidence accompanying the gospel has convinced me of its truth." In other words, I am a Christian, because the Christian religion carries with it internal marks of its truth: because, not only without the aid but in opposition to the civil authority; in opposition to the art, the argument and violence of its enemies, it made its way and gained an establishment in the world, because it exhibits the accomplishment of some prophecies, and presents others which have been since fulfilled, and because its author diplayed an example and performed works which bespeak not merely a superior but a divine character. Upon these several facts I ground my belief as a Christian, and till the evidence on which they rest can be envalidated by counter evidence I must retain my principles and profession.

CHROMATICS, that part of optics which explains the several properties of the colours of light, and of natural bodies. On this very intricate subject no theory has been yet advanced against which formidable and perhaps unanswerable objections may not be brought. The Newtonian doctrine authorizes the following aphorisms: "1. All the colours in nature proceed from the rays of light. 2. There are seven

primary colours, *viz.* red, orange, yellow, green, blue, indigo, and violet. 3. Every ray of light may be separated into seven primary colours. 4. The rays of light, in passing through the same medium, have different degrees of refrangibility. 5. The difference in the colours of light arises from its different refrangibility: that which is the least refrangible producing red; and that which is the most refrangible, violet. 6. By compounding any two of the primary colours; as red and yellow, or yellow and blue, the intermediate colours, as orange, or green, may be produced. 7. The colours of bodies arise from their dispositions to reflect one sort of rays, and to absorb the other; those that reflect the least refrangible rays appearing red; and those that reflect the most refrangible, violet. 8. Such bodies, as reflect two or more sorts of rays, appear of various colours. 9. The whiteness of bodies arises from their disposition to reflect all the rays of light promiscuously. 10. The blackness of bodies proceeds from their incapacity to reflect any of the rays of light."

CHRONOLOGY treats of time, the method of measuring its parts, and of adapting these to past transactions for the illustrating of history. This important branch of knowledge is founded upon astronomy. By laborious calculations the date of remote events is attempted to be ascertained; but with what degree of certainty the disputes among chronologers may enable the world to guess. We are told that, "They count 132 contrary opinions concerning the year in which the Messiah appeared upon earth: among all these authors, however, there are none that reckon more than 7000 years, nor less than

3700; but even this difference is enormous." The admirable divisions of time into years, months, days, hours, minutes, and seconds, have given a general precision to the notions of mankind; taught us what regular history is; and enabled us to transmit to posterity a legacy that may remove, rather than multiply, its errors.

A day, in common discourse, usually means that period of time during which the sun remains above the horizon; but, in a philosophical sense, it denotes the time of a complete revolution of the earth about its axis. The beginning of the day is variously reckoned by different nations: some reckoned it from sun-set, some from sun-rise, and in most European nations the day is computed from midnight, but modern astronomers count the day from noon, the time at which the sun is on the meridian. The Jews and Romans divided their day into four watches; the first commenced at six in the morning, the second at nine, the third at twelve, and the fourth at three in the afternoon. In the same way the night was divided.

The division of time into weeks is arbitrary. The Greeks divided their time in portions of ten days each: the Chinese in those of fifteen, and the Mexicans in those of thirteen days. But the Jews, Oriental nations, and many others have used weeks of seven days.

The month was suggested by the phases of the moon, and hence months were originally lunar. They are divided into astronomical and civil. The astronomical months are measured by the revolutions of the moon, and the civil month is that space

of time by means of which the solar year is divided into twelve months. The length of the lunar month, or the time taken up between one new moon and the next, is 29 days, 12 hours and 44 minutes.

The year is measured by the motion of the earth round the sun, and it was formerly divided into twelve months of 30 days each; but it is now divided into months of 30 and 31 days each, excepting February which contains 28 days, but every fourth year February contains 29 days. Julius Cæsar ordained the year to consist of 365 days 6 hours, which is 11 minutes too long; the true length of the year is 365 days, 5 hours, 48 minutes and 48 seconds. To regulate this so as to make even days, it is now agreed that the common year shall consist of 365 days; but every fourth year, called leap year, is to consist of 366 days, and to avoid the excess which this would occasion, every hundredth year is common, and contains only 365 days, such was the year 1800, excepting every four hundredth year, which is to have 366 days, such will be the year 2000. In the greater part of Europe, the new style was introduced towards the close of the 17th century, but it was not admitted into England till the year 1752, when it was determined that the year should commence on the 1st of January instead of March, as it had formerly.

Chronology not only treats of the division of time into portions of years, months, &c. but shews the application of these portions under various forms, as cycles, æras, &c. to the elucidation of history. Cycles are fixed intervals of time, composed of the successive revolutions of a certain

number of years: the principal cycles in use among chronologers are,

(1). The Lunar Cycle, which is a period of 19 years, at the end of which interval the sun and moon return to very nearly the same part of the heavens. This cycle, on account of its utility in determining the time of EASTER, is called the "Golden Number." The first year of the Christian æra corresponds with the second of this cycle. To find the golden number, or year of the lunar cycle, add one to the given year, and divide by 19, the quotient shows the number of cycles which have revolved since the Christian æra, and the remainder, if any, is the golden number for the year.

Example for the year 1812:

$$\frac{1812+1}{19} = \frac{1813}{19} = 95 \text{ and } 8 \text{ over:}$$

Therefore there have been 95 complete cycles since the birth of Christ, and the golden number for the year 1812 is 8.—When there is no remainder, as will be the case in the year 1823, then the golden number will be 19.

(2). The Solar Cycle consists of 28 years, when the sun returns to the sign and degree of the ecliptic which he occupied at the conclusion of the preceding period, and the days of the week correspond to the same days of the month as at that time. The first year of the Christian æra corresponds to the ninth of the solar cycle: if therefore 9 be added to any given year, and the sum be divided by 28, the quotient denotes the number of the revolutions of the cycle since the 9th year before Christ, and the remainder will be the cycle.

Examples for 1811 and 1812:

$\frac{1811+9}{28} = \frac{1820}{28} = 65.$ $\frac{1812+9}{28} = 65$ and 1 over, so that the year of the cycle of the sun for the present year is 28, and for the next it will be 1.

(3). There is also another cycle, called the Cycle of the Roman Indiction, which, as it has no connection with any celestial motion, is only mentioned to say that its year is found by adding 3 to the given year and dividing by 15.

What is called the grand Julian Period is formed by the combination of these cycles, that is by multiplying the three numbers into one another; thus, $19 \times 28 \times 15 = 7980$; this is the number of years of which the Julian period consists, at the expiration of which, the first years of each of those cycles will come together.

The first year of the Christian æra corresponds with the 4714th of the Julian period, which is 710 years before the common date assigned to the creation of the world: therefore to find the year of the Julian period corresponding with any given year *before* or *since* the Christian æra: in the *former* case, subtract the year from 4714, and the *difference* is the answer: in the latter case, add 4714 to the given year, and the *sum* will be the year required.

Example for the year 1812.

$$1812 + 4714 = 6526,$$

which is the year of the Julian period. Epochs and æras may be thus explained: an *epoch* is a cer-

tain point generally determined by some remarkable event from which time is reckoned; and the years computed from that period are denominated an æra. Thus, the birth of Christ is reckoned an epoch; the years reckoned from that event are denominated the Christian æra.

The most remarkable epochs are: (1). That of the creation of the world, which, by modern chronologers, is supposed to have happened 4004 years before Christ. (2). The universal deluge, computed from the year 2348, before Christ. (3). The call of Abraham, B. C. 1921. (4). The departure of the Israelites from Egypt, B. C. 1491. (5). Sir Isaac Newton has made use of the Argonautic expedition as an epoch to reckon from, which is supposed to have happened 1225 years before Christ.

The Christian æra is dated from the birth of Christ, which is supposed to have happened 4004 years after the creation, and 1811 years before the present period. See MEMORY, *Artificial*.

CHURN, an implement for agitating cream, for the purpose of making butter. Churns are made in different shapes, but they all produce the same effect. By continual motion the cream is decomposed into its parts, viz. butter and whey.

CHYLE. See the next article.

CHYME, in the process of digestion, the food taken into the stomach, is by an increased temperature, by being mixed with the gastric juice, and by the action of the stomach upon it, converted into a soft uniform mass, in which the previous texture, or nature of the aliment can be no longer distinguished. This mass is called chyme, and it passes by the pylorus into the intestinal canal, where it is

mixed with the bile. The thinner parts of it are now absorbed by the lacteals, in the form of a white liquor called chyle. This passes through the glands of the mesentery, and is at length conveyed into the blood by the thoracic duct. The principal use of the chyle is to supply the matter from which the blood and other fluids of the body are prepared; from which fluids the solid parts are formed. See Assimilation, Bile.

Chronometer. See Longitude.

Chrysalis, or *aurelia*, in natural history, the worm or caterpillar in its second principal state of existence. The figure of the chrysalis generally approaches that of a cone: or at least the hinder part of it is in this shape. In every species, there may be distinguished two sides; the one of which is the back, and the other the belly, of the animal. On the anterior part of the latter there may always be observed certain little elevations running in ridges: the other side, or the back, in most of the chrysalises, is smooth, and of a rounded figure: but some have ridges on the anterior part and sides of this part, usually terminating in a point and making an angular appearance. From this difference is drawn the first general distinction of these bodies, by which they are divided into two classes; the round and the angular. The first French naturalists call *feves;* the chrysalis of the silk-worm being of this description, and so named. This division is extremely convenient to classification, the *phalanæ* or moths being almost universally produced by the rounded chrysalises, and the *papilios*, day-flies, from the angular. Among the latter, are some whose colours are as worthy of ob-

servation as the forms of others. Many of them appear superbly clothed in gold. These species obtained the names of *chrysalis* and *aurelia;* derived, the one from a Greek, the other from a Latin word, signifying *gold*; and from these, all other bodies of the same kind have been called by the same names.

Chrysolite, or *yellowish-green topaz*, a precious stone of a grass-green colour, found in the East-Indies, Brasil, Bohemia, Saxony, and Spain; in Auvergne and Bourbon, in France, and in Derbyshire, in England. The chrysolite of the ancients was the same gem that is now called *topaz;* the propriety of which application of the word is obvious.

Church, in religious affairs, is a word which is used in several senses: 1. The collective body of persons professing one and the same religion, or that religion itself: thus, we say, the church of Christ. 2. Any particular congregation of Christians associating together, as the Church of Antioch. 3. A particular sect of Christians, as the Greek Church, or the Church of England. 4. The body of ecclesiastics, in contradistinction to the laity. 5. The building in which a congregation of Christians assemble.

High-Church, a denomination originally given to those otherwise called *non-jurors*, who refused to acknowledge the title of William III. to the crown of England, under a notion that James II. notwithstanding his exclusion, was still their rightful sovereign. The name of *High-Churchmen* is at present more usually applied to those who form pompous and ambitious conceptions of the autho-

rity and jurisdiction of the church; ideas which, in part, distinguished its first bearers.

Cinchona, a genus of low trees, growing to the height of 15 or 20 feet, and natives of Peru. Linnæus describes two species, the white and the coloured; and a third has been found in the West-Indies, particularly in Jamaica and St. Lucia. The two latter are used in medicine. It was first introduced for the cure of intermittent fevers: and in these, when properly exhibited, it rarely fails of success. Practitioners, however, have differed with regard to the best mode of exhibition, both as to the time when it should be taken, and the quantity of the dose. The latter, indeed, varies with the case that requires it; and in many vernal intermittents it seems even scarcely necessary. In some instances it is found to disorder the stomach in various ways; under which circumstances, opium and aromatics are severally employed to prevent the specific inconvenience experienced: but these additions should never be used except where necessity demands them.

Cinnabar, either a natural production, or a chemical one, the first called *native*, and the second *factitious*, is of a fine red colour, and chiefly used in painting. Native cinnabar is the ore of quicksilver; factitious, a mixture of mercury and sulphur sublimed.

Cinque-*ports*, five havens that lie on the eastern coasts of England, opposite France; by name, Hastings, Romney, Hythe, Dover, and Sandwich. As places where strength and vigilance were necessary, and whence ships might put to sea in cases of sudden emergency, they formerly received consi-

derable attention from government. They were invested, by king John, with several privileges, on condition that they should provide 80 ships at their own expense, for 43 days, as often as the king in his wars should find them necessary. Each port sends two representatives, dignified with the title of barons, to parliament.

Circle, in geometry, a plane figure bounded by a curve line which returns into itself, called its circumference, and which is every where equally distant from a point within, called its centre. The circumference or periphery itself is called the circle, though improperly, as that name denotes the space contained within the circumference. A circle is described with a pair of compasses, fixing one foot in the centre, and turning the other round to trace out the circumference. The circumference of every circle is supposed to be divided into 360 equal parts, called degrees and marked °; each degree into 60 minutes or primes, marked ′, and so on. So 24°, 12′, 15″, 20‴, is 24 degrees, 12 minutes, 15 seconds, 20 thirds. Circles have many curious properties, some of the most important of which are these:

1. The circle is the most capacious of all plane figures, or contains the greatest area within the same perimeter, or has the least perimeter about the same area; being the limit and last of all regular polygons, having the number of its sides infinite.

2. The area of a circle is always less than the area of any regular polygon circumscribed about it, and its circumference always less than the perimeter of the polygon. But on the other hand,

its area is always greater than that of its inscribed polygon, and its circumference greater than the perimeter of the said inscribed polygon. However, the area and perimeter of the circle approach always nearer and nearer to those of the two polygons, as the number of the sides of these is greater: the circle being always limited between the two polygons.

3. The area of a circle is equal to that of a triangle whose base is equal to the circumference, and perpendicular equal to the radius. And therefore the area of the circle is found by multiplying half the circumference into half the diameter or the whole circumference into the whole diameter, and taking the fourth part of the product.

4. CIRCLES, like other similar plane figures, are to one another, as the squares of their diameters. And the area of the circle is to the square of the diameter, as 11 to 14 nearly, as proved by Archimedes, or as as ·7884 to one more nearly.

5. The circumferences of circles are to one another, as their diameters or radii. And as the areas of circles are proportional to the rectangles of their radii and circumferences; therefore the quadrature of the circle will be effected by the rectification of its circumferences; that is if the true length of the circumference could be found the true area could be found also.

CIRCLES Druidical, in British topography, a name given to certain ancient inclosures formed by rude stones circularly arranged.

These, it is now generally agreed, were temples, and many writers think also places of solemn assemblies for councils or elections, and seats of

judgment. These temples, though generally circular, occasionally differ as well in figure as magnitude: with relation to the first, the most simple were composed of one circle. Stonehenge consisted of two circles and two ovals respectively concentric: whilst that at Bottalch near St. Just in Cornwall is formed by four intersecting circles.

The great temple at Abury in Wiltshire, it is said, described the figure of a seraph or fiery flying serpent represented by circles and right lines. Some, besides circles, have avenues of stone pillars. Most if not all of them have pillars or altars within their penetralia or centre. In the article of magnitude and number of stones, there is the greatest variety, some circles being only 12 feet diameter and formed only of 12 stones; whilst others, such as Stonehenge and Abury, contained the first 149, the second 652, and occupied many acres of ground. All these different numbers, measures, and arrangements, had their pretended reference, either to the astronomical divisions of the year, or some mysteries of the Druidical religion.

Circles *of the empire*, the nine provinces of the German empire, which compose the diet. These circles consist of separate sovereign states, united under this name for the management of the common concerns of the empire. They are severally styled, the circle of Upper-Saxony, the circle of Lower-Saxony, the circle of Westphalia, the circle of the Lower-Rhine, also called the Palatinate, the circle of the Upper-Rhine, also known by the name of Hesse, the circle of Swabia, the circle of Franconia, the circle of Bavaria, and the circle of Austria. Silesia, Moravia, and Lusatia, are

countries annexed to the empire, not constituent parts.

Circulation *of the blood* is performed in the following manner: the blood is returned to the right auricle of the heart, by the descending and ascending venæ cavæ, which, when distended, contracts and sends its blood into the right ventricle; from the right ventricle it is propelled through the pulmonary artery, to circulate through, and undergo a change in the lungs, being prevented from returning into the right auricle by the closing of the valves, which are situated for that purpose. Having undergone this change in the lungs, it is brought to the left auricle of the heart by the four pulmonary veins, and thence is evacuated into the left ventricle. The left ventricle when distended contracts, and throws the blood through the aorta to every part of the body, by the arteries, to be returned by the veins into the venæ cavæ. It is prevented from passing back from the left ventricle into the auricle by a valvular apparatus; and the beginning of the pulmonary artery and aorta is also furnished with similar organs to prevent its returning into the ventricles.

Circumferentor, a mathematical instrument used by land surveyors for taking angles by the magnetic needle. It is an instrument (where great accuracy is not desired) much used in surveying in and about woodlands, commons, harbours, sea coasts, in the working of coal mines, &c. &c.

Where a permanent direction of the needle is of the most material consequence in surveying, the instrument is made of brass, and in its most simple state consists of the following parts, a brass index

and circle all of a piece. The index is commonly about 14 inches long, and an inch and a half broad, the diameter of the circle about seven inches. On this is made a chart whose meridian line answers to the middle of the breadth of the index, and is divided into 360 degrees. There is a brass ring soldered on the circumference of the circle on which screws another ring, with a flat glass in it, so as to form a kind of box for the needle, suspended on the pivot in the centre of the circle. There are also two sights to screw on and slide up and down the index, as also a spangle and socket screw on the back of the circle for putting the head of the staff in.

CIRCUMFLEX, (^) in grammar, an accent, serving to note, or distinguish a syllable of an intermediate sound between acute and grave: generally somewhat long.

CIRCUMVALLATION, A *line of circumvallation*, is a trench bordered with a parapet, which a besieging general throws up quite round his camp, by way of security, and to prevent desertion.

CISTERN, denotes a reservoir, or vessel serving as a receptacle for rain or other water for the necessary uses of a family. Thus there are lead cisterns, jar cisterns, &c. Anciently there were cisterns all over the country of Palestine. There were some likewise in cities and private houses. As the cities for the most part were built in mountains, and the rains fell regularly in Judea at two seasons of the year only, in spring and autumn, people were obliged to keep water in their cisterns in the country for the use of their cattle, and in cities for the convenience of the inhabitants. There

are still cisterns of very large dimensions to be seen in Palestine some whereof are 150 paces long and 54 wide. There is one to be seen at Ramah of 32 paces in length and 28 in breadth. Wells and cisterns, springs and fountains are generally confounded in Scripture language.

Citric acid, is found in the juice of lemons, and limes, and is that which gives it the sour taste. This acid by chemical preparation may be converted into crystals, and in that state it can be kept any length of time. A very pleasant drink is made by dissolving 40 grains of the crystallized citric acid in a pint of water and then sweetening it with a small quantity of sugar.

City, a large town, usually corporate, and a bishop's see. Forming our ideas from what we commonly behold, we imagine that a city must necessarily be a close-built and confined plot of ground, with narrow paved ways, and a total exclusion of the face of nature; but these characteristics have originated in peculiar circumstances. Before the Roman invasion of Britain, its cities, and, among others, that of London, were extensive districts, begirt with woods or slight ramparts of earth, in which dwellings were scattered at some distance from each other. War having rendered it requisite that cities should be defensible posts, the smallness of the space they occupied became a consideration of importance. Their inhabitants were taught to crowd themselves together as much as possible; and among the expedients resorted to was that of building apartments over one another, thereby multiplying the number of dwellings without increasing the superficial mag-

nitude of the place. Trade, too, by requiring a multitude of persons upon one spot, has always been the foundation of what we now call cities. Cities usually possess, by charter, a variety of peculiar privileges; and these charters, though they now sometimes appear to be the supporters of a narrow policy, were, in their institution, grants of freedom then no where else possessed. These were the first dawnings of liberty; by these the spell that maintained the feudal tyranny was broken. *City* and *burg* were formerly synonymous words. In England, there are twenty-five cities.

Civil-*law*, a body of laws or institutes, published under the reign of Justinian, Emperor of Rome, and mingled more or less with the jurisprudence of the states of modern Europe. With respect to the origin of this celebrated code, we are told by M. De Lolme, that the law-collection, or system, that was formed by the series of edicts published at different times by the prætors, was called *jus-prætorium*, and also *jus honorarium*, (not strictly binding). The laws of the twelve tables, together with all such laws as had at any time been passed in the assembly of the people, were called, by way of eminence, the *jus civile*. In England, a general dislike has always been entertained against the civil law; a circumstance which the author already quoted attributes to its having been introduced by the clergy and written in a language which only the clergy could understand. It happened, therefore, by a somewhat singular conjunction of circumstances that to the Roman laws, brought over to England by monks, the idea of ecclesiastical power became associated, in the same manner as the idea of regal

despotism became afterward annexed to the *religion* of the same monks, when favoured by kings who endeavoured to establish an arbitrary government. The civil-law, in the few instances, where, notwithstanding, it is admitted, is comprehended under the unwritten or common law, because it is of force only so far as it has been authorised by immemorial custom. Some of its principles are followed in the ecclesiastical courts, the court of admiralty, and in the courts of the two universities: but it is here nothing more than *lex sub lege graviore;* and these different courts must conform to acts of parliament, and to the sense given of them by courts of common law; being moreover subjected to the controul of these latter. The principal defects of the civil law are the want of trial by jury, that only security of private liberty, and the privity of its proceedings; on the other hand, the writ of *capias*, by which a man's person is arrested and detained for debt, before trial, is unknown to this system. In the administration of criminal justice, according to the rules of the civil law, which in that respect are adopted all over the continent of Europe; as soon as the prisoner is committed, he is debarred the sight of every body, till he has gone through his several examinations. One or two judges are appointed to examine him, with a clerk to take his answers in writing; and he stands alone before them, in some private room in the prison. The witnesses are to be examined apart, and he is not permitted to see them till their evidence is closed: they are then confronted together before all the judges, to the end that the witnesses may see if the prisoner is really the man they meant in giving their

respective evidences, and that the prisoner may object to such as he thinks proper. This done, the depositions of those witnesses who are adjudged upon trial to be exceptionable, are set aside: the deposition of the others are to be laid before the judges, as well as the answers of the prisoner, who has been previously called upon to confirm or deny them in the presence; and a copy of the whole is delivered to him, that he may, with the assistance of a counsel, which is now granted him, prepare for his justification. The judges are to decide both upon the matter of law and upon the matter of fact, as well as upon all incidents that may arise during the course of the proceedings, such as admitting witnesses to be heard in behalf of the prisoner, &c. This mode of criminal judicature may be useful as to the bare discovering of truth; but, at the same time, a prisoner is so completely delivered up into the hands of the judges, who can even detain him almost at pleasure by multiplying or delaying his examination, that wherever it is adopted, men are almost as much afraid of being accused as of being guilty, and especially grow very cautious how they interfere in public matters.

Clan, a family or tribe, living under one chief. This appears to have been the original condition of the savages of northern Europe; and from this we ought to trace the germ of the feudal system. All the members of a clan held their lands of the chief, followed him to war, and were expected to obey him in peace. Some imagine the word *clan* to be only a corruption of the Latin *colonia*; but Mr.

Whittaker, with more apparent propriety, considers it as purely British, signifying a *family*.

Clarification, the process of clearing or fining any fluid from all heterogeneous matter or feculence, and is distinguished from filtration by the employment of chemical means, whereas the latter is only a mechanical operation. Clarification is performed either by heat, or by the addition of some substance which will unite with, and precipitate or raise to the surface the matters which render the liquor turbid. The substances usually employed are white of eggs, blood, and isinglass: the two first are generally used for such liquors as are clarified while hot; the last for such as are clarified in the cold state, such as wines, &c.

Clarion, a kind of trumpet, the tube of which is peculiarly narrow, and the tone acute and shrill.

Claro-*obscuro* (Latin), *chiaro-oscuro* (Italian) and *clair-obscur* (French), a phrase in painting, signifying light and shade. In pictural criticism, it means the relief that is produced by light and shade, independently of colour. In the art itself, it denotes that species of painting or design, in which no attempt is made to give colours to the objects represented, and where, consequently, light and shade are every thing.

Class, an appellation given to the most general subdivisions of any thing. Thus in the Linnæan system of natural history, the animal creation is divided into six classes, viz. Mammalia, Aves, Amphibia, Pisces, Insecta, and Vermes.

Class, in Botany, denotes the primary division of plants into large groups, each of which is to be subdivided by a regular downward progression,

into orders, genera and species, with occasional intermediate subdivisions, all subordinate to the division which stands immediately above them. So that the classes have been compared to the first layer of a truncated pyramid, which increases gradually as it receives the orders, general and occasional intermediate subdivisions, till at length it terminates in an immense base, consisting entirely of species.

Classic, a literary term, signifying excellent, or of the first class. It is said to owe its origin to the division of the Roman people into classes, the first of which was called, by way of eminence, the *classic*.

Clay, a genus of earths at present considered simple and primitive; that is, not decomposable into any other simple substances. See Earths.

Clef, or *cliff*, derived, through the French, from the Latin *clavis*, "a key," a character in music, placed in the beginning of a stave, to determine the degree of elevation occupied by that stave, in the general claviary or system, and to point out the names of the notes which it contains in the line of that clef. By it is expressed the fundamental sound in the diatonic scale, which requires a determined succession of tones or semitones, whether major or minor, peculiar to the note from which we set out; and hence, opening, as it were, a way to this succession, the technical term *key* is used with great propriety.

Clepsydra, a water clock, or an instrument to measure time by the fall of a certain quantity of water. There were many kind of clepsydræ among the ancients, but they all had this in common, that

the water ran generally through a narrow passage, from one vessel to another, and in the lower vessel, was a piece of cork or light wood, which as the vessel filled, rose up by degrees, and showed the hour.

Clergy, a general name given to the body of ecclesiastics of the Christian church, comprehending bishops, priests, and deacons. A clergyman cannot be compelled to serve on a jury, nor to appear at a court-bench, or view of frank pledge; neither can he be chosen to any temporal office, as bailiff, reeve or constable. During his attendance on divine service, he is privileged from arrests in civil suits. In certain cases of felony, he has the benefit of his clergy, without being branded in the hand, or suffering the punishment substituted for that branding by statute, or at most, only an imprisonment for one year; and this as often as he offends. Clergymen have been recently declared incapable of sitting in the house of commons, a point formerly undecided. They cannot take any lands or tenements to farm, upon pain of fine, to the amount of £ 10. per month, and total avoidance of the lease; nor upon like pain keep any taphouse, or brewhouse; nor engage in any manner of trade: nor sell any merchandize, under forfeiture of treble the value. 21 Hen. VIII. c. 13.

Clergy, *Benefit of*, under the article Benefit *of Clergy*, is said to have meant "benefit of *learning*." Other authorities appear to justify a different explanation, which shall be given in this place. It is true that in the old English writers, a *clerk* signifies a *literate man;* but it is evident that he who could write and read was called a clerk because in this

respect, he resembled an ecclesiastic, rather than that an ecclesiastic was so called because he could write and read: the word *clerk*, being derived from the Greek *cleros*, a name always appropriated to the priesthood, because synonymous to that given to the tribe of Levi, and signifying a *lot* or *heritage*, by which expression was intended the service of God; a duty that in the tribe of Levi, was a *lot* or *heritage*. With respect to the benefit of clergy, it appears that it was actually a benefit of the ecclesiastical profession; but that from the loose terms, or vague idea, of the law, to be attributed perhaps to the little notion entertained that any other persons than ecclesiastics would ever be able to write and read, it was at one time abusively held that all who possessed these accomplishments were entitled to the advantage.—But what was the original benefit proposed? That priesthood, or clergy, might be pleaded in bar to the jurisdiction of a secular court. Setting out from this point, the history of the subject is really curious. In the reign of Henry VI. when the privilege was first regularly established, it was directed that the prisoner should submit to be arraigned, and then, either immediately, or after the trial, plead the benefit of his clergy in the way of arrest of judgment. By a statute of 4 Henry VII. c. xiii. the distinction always intended was revived, and mere scholars were separated from those in holy orders. The former, however, retained a part of the immunity; but they were to be burned with a hot iron on the brawn of the thumb, and not allowed *their clergy* more than once. Under the reign of Elizabeth, it was enacted that a clerk, after pleading his privi-

lege, should not be resigned to the ecclesiastical authority, as formerly (a practice which had been found pregnant with the most scandalous abuses), but confined, at the discretion of the judge, for any term not exceeding one year. Under Mary, James I. and William and Mary, the original design of the provision was entirely lost. Certain small crimes were said to be within the benefit of clergy, and were punished accordingly, though the prisoners, if women, were not required to read. All women, and all male commoners who could read, were punished in this manner; and clerks in orders, though they might be imprisoned, could not be burnt on the thumb. This latter is easily accounted for: the clerk could, as he still can, claim the benefit of his clergy again and again; but the women and laymen were allowed the privilege but once: the burning on the thumb was a mark by which the offender might be known, after having once pleaded his clergy; and as the clerk might always plead it, this precaution, in his case, would have been useless. When, in a more enlightened age, it was perceived that the knowledge of the offender did but increase his guilt; and that if the punishment of death for a simple felony were too severe for those who had been liberally instructed, it was still more so for the ignorant, a statute, 5 Ann, c. 6. enacted that the benefit of clergy should be granted to all, the nature of whose offences entitle them to ask it, without requiring any proof that they can read. In this state the *benefit of clergy* stands at present; with the exception, that the court, in its discretion, may substitute transportation for seven years, for burning in the hand and

imprisonment. The clergy, as exempted from burning in the hand, and the imprisonment with hard labour, are also exempted from transportation. The privilege of peerage is in all respects similar to the benefit of clergy.

CLERK, a word originally used to denote a learned man, a man of letters: whence the term is appropriated to churchmen, who were called clerks or clergymen: the nobility and gentry being bred to the exercise of arms, and none left to cultivate the sciences but ecclesiastics. See CLERGY.

CLIMACTERIC, among physicians and astrologers, a critical year in a person's life. According to some this is every seventh year, but others allow only those years produced by multiplying 7 by the odd number 3, 5, 7, 9, to be climacteral. These years they say bring with them some remarkable change with respect to health, life or fortune; the grand climacteric is the 63d year, but some making two add to this the 81st: the other remarkable climacterics are the 7th, 21st, 35th, 49th, and 56th.

CLIMATE, or *clime*, in geography, a division of the surface of the globe, parallel to the equator, of such a breadth as that the longest day in the parallel nearer the pole exceeds the longest day in that next the equator by a certain space of time; as, half an hour. The *beginning* of the climate is a parallel circle wherein the day is shortest; the *end* of the climate, that wherein the day is longest. There are several climates in one zone. As the climates commence from the equator, the first climate at its beginning has its longest day precisely twelve hours long, and at its end, twelve hours and a half. The rest proceed in the same manner,

as far as the polar circles, where the *hour*-climates are said to terminate, and the *month*-climates to commence. The *month*-climate is a space terminated between two circles parallel to the polar circles, whose longest day-light is longer or shorter than that of its adjoining one by thirty days. In common speech, the term climate is applied to a peculiar state of the atmosphere; and the different parts of the world are spoken of as different climates, not on account of the length of the days, but of the heat of the atmosphere, and other natural circumstances. In this sense, the peculiarities of climates are of infinite importance in the economy of nature. On these, all the productions of the earth are dependent. Even man, who is justly said to be the creature of all climates, indures only by yielding to their influence. This influence has been too much controverted by Helvetius, and perhaps Montesquieu has allowed it too much importance: neither the one nor the other drew his observations from those quarters where most information is to be had, among men still living in a state comparatively wild. In countries where life may be maintained almost without exertion, and every pleasure of the senses is lavished, man is, and must be, a very different being from the native of a less bountiful soil and less indulgent climate, whose subsistence can only be obtained by a constant stretch of his faculties. We are accustomed to call the people of fruitful countries supine; and they term us restless. They sit still, because their wants are supplied; we roam from one end of the world to the other, because ours are craving.

Climax, or *gradation*, a figure in rhetoric, con-

sisting of an assemblage of particulars, forming a whole in such a manner that the last idea in the former member becomes the first in the latter; and so on, step by step, till the climax or gradation is completed. Its strength and beauty consists in the logical connection of the ideas, and the pleasure the mind receives from perfect conviction; as may be perceived in the following example: "There is no enjoyment of property without government; no government without a magistrate; no magistrate without obedience; and no obedience where every one acts as he pleases."

Clock, a machine for measuring time, called, when first invented, a nocturnal dial, to distinguish it from the sun-dial. On the credit of an epitaph recorded by Pavinius, some have attributed this invention to Pacificus, who lived in the time of Lotharius, son of Lewis the *Débonnaire*. Others ascribe it to Boethius, about the year 510. Clocks, like those now used, were either first invented, or at least revived somewhat more than two centuries ago. The contrivance of pendulum-clocks took place about the middle of the seventeenth century, either in Italy or in Holland. The first made in England was by a Dutchman, in the year 1662. See Horology.

Cloth, a manufacture either of wool or linen. The best wools for manufacturing of cloths of that kind are those of England and Spain; and of these, those of Lincolnshire in the one, and Segovia in the other, are preferred. To use wool to the best advantage, it must be scoured, by putting it into a liquor somewhat more than warm, and when it has continued long enough to dissolve the grease, drain-

ing it, and washing it thoroughly in running water. When it feels dry, and has no smell but that natural to the sheep, it is said to be sufficiently scoured. After this, it is hung to dry; this is done in the shade, the heat of the sun making it harsh and inflexible. When dry, it is beat with rods, on hurdles of wood, or on cords, to cleanse it from dust and the grosser filth. The more it is thus beat and cleansed, the softer it becomes, and the more adapted to spinning. After beating, it must be well picked, to free it from the filth that has escaped the rods.—It is now in a proper condition to be oiled, and carded on large iron cards placed slopewise; and this done, it is given to the spinners, who first card it on the knee, on small cards, and then spin it on the wheel, observing to make the thread of the warp smaller by one third than that of the woof, and much more compactly twisted. The thread thus spun, is reeled, and made into skeins: that designed for the woof is wound on little tubes, pieces of paper, or rushes, so disposed as that they may be easily put in the eye of the shuttle; that for the warp is wound on a kind of large wooden bobbin, to dispose it for warping. When warped, it is stiffened with size; and when again dry, is given to the weaver, who mounts it on the loom. The warp thus mounted, the weavers, of whom each loom has two, one on each side, tread alternately on the treadle, first on the right step and then on the left, which raises and lowers the thread of the warp equally; and between it they throw the shuttle transversely, from one to the other. Every time that the shuttle is thus thrown, and a thread of the woof inserted within the warp, they strike it con-

junctly with the same frame wherein is fastened the comb or reed, between the teeth of which the threads of the warp are passed, repeating the stroke as often as is necessary. The weavers having continued their work till the whole warp is filled with woof, the business of the loom is finished. The cloth is then taken off, by unrolling it from the beam whereon it had been wound as it was wove, and given to be freed from knots, ends of threads, straws, and other irregularities; which is done with iron nippers. In this condition it is carried to the fullery to be scoured. The cloth, being again cleansed of the matter with which it is fulled, is returned to the former hands, to have the lesser impurities, &c. taken off as before, and then re-delivered to the fuller, to be beat and fulled with hot water, wherein a proper quantity of soap has been dissolved. After fulling, it is taken out to be smoothed or pulled by the lists, lengthwise, to take out the wrinkles, &c. The smoothing is repeated every two hours, till the fulling be finished, and the cloth brought to its proper breadth: after which it is washed in clear water, to purge it of the soap, and given wet to the carders to raise the hair or nap on the right side with the thistle. After this preparation, the clothworker takes the cloth, and gives it its first cut or shearing: then, the carders resume it, and after wetting, give it as many more courses with the teazle as the quality of the stuff requires, always observing to begin against the grain of the hair, and to end with it; as also to begin with a smoother thistle, proceeding still with one sharper and sharper, as far as the 6th degree. After these operations, the cloth, being dried, is

returned to the clothworker, who sheers it a second time, and returns it to the carders, who repeat their operation as before, till the nap be well ranged on the surface of cloth, from one end of the piece to the other. The cloth thus wove, scoured, napped, and shorn, is sent to the dyer. When dyed, it is washed in pure water, and the worker with his brush spreads it on a table, while wet, and hangs it on the tenters, where it is stretched both in length and breadth, sufficiently to smooth it, set it square, and bring it to its proper dimensions, without straining it too much; observing to brush it afresh, while a little moist, the way of the nap. When quite dry, it is taken off the tenters, and brushed again on the table, to finish the laying of the nap; after which it is folded, and laid cold under a press, to make it perfectly smooth and even, and give it a gloss, and on being taken from the press it is in a condition for use.—Cloths of mixed colours are wove with wools previously dyed. In the islands of the South-sea, cloth is made from tree-bark. For linen cloth, see *Linen*.

Cloud, a collection of vapours, consisting of particles of earth, water, and other substances, which the heat of the sun, and the action of terrestrial bodies cause to rise above the face of the globe, to the height, as some have supposed, of a mile or two. Clouds are of various kinds according to the prevalence of any one of these component parts, and particularly according to the quantity of electric fluid they contain. When clouds assume strange and whimsical shapes, varying almost every moment, and small ones meet each other in the air, and vanish upon contact, thunder is thought to be at

hand. The vanishing, or dissipating, upon contact, is accounted for on the hypothesis, that two clouds, electrified, the one positively and the other negatively, in meeting, part with their electricity, and thus destroy each other. The uses of clouds are evident. From them proceeds the rain which refreshes the earth; and without which its whole surface must be one desert. Clouds are likewise screens interposed between the earth and the scorching rays of the sun, which are often so powerful as to destroy the more tender vegetables. In the less discoverable operations of nature where the electric fluid is concerned, clouds have a principal share; and, particularly, serve as a medium for conveying that subtile matter from the atmosphere to the earth, and from the earth into the atmosphere. See METEOROLOGY.

COACH, a commodious vehicle for travelling, invented by the French. Even in France, however, the coach was not very anciently known, since it is scarcely mentioned before the reign of Francis I. At first, its use was confined to the country; and writers observe that there were at this period no more than two coaches in Paris: the one that of the queen, and the other that of Diana, natural daughter of Henry II. The first courtier who had one was Jean de Lava de Bois Dauphin, whose enormous bulk disabled him from travelling on horseback. The first coach ever publicly seen in England, was part of the equipage of Henry, earl of Arundel, in the reign of Elizabeth. Mr. Tull, the son of a gentleman who wrote on husbandry, first imported the post chaise. Hackney-coaches are those exposed to hire, in the streets of London and

other great cities, at rates fixed by authority. Stage-coaches are those which undertake to convey travellers from one city to another. Mail-coaches are stage coaches of a peculiar construction, for the prevention of overturning; and which, for a certain consideration, carry his majesty's mails, or bags of letters to and from the general post office, protected by a guard, and subject to the regulations of government. They are obliged to depart and arrive at certain hours, and the number of their inside passengers is restricted to four. J. Palmer, esq. M. P. for Bath, has the merit of this establishment, which experience has shown to be of the greatest advantage to the trade and correspondence of Great Britain.

Coaks, fossil-coals, charred, or made to undergo a process similar to that by which *charcoal* is produced. Coaks are used for exciting intense heat, as in smelting iron ore; and for operations where the acid and oily particles of coals, of which they are deprived by charring, would be detrimental; as drying malt.

Coal, in mineralogy, a solid inflammable substance, supposed to be of a bituminous nature, and commonly used for fuel. Of this substance there are various species. Several kinds of coal are often found mixed with one another. There is scarcely any substance so useful to mankind as this; and it is dealt out to us with an unsparing hand. The mines of this article seem to defy the power of man to exhaust. It is always found in masses, sometimes in a heap, most frequently in beds, which are usually separated by layers of stones.

The principal mines of this useful mineral are

those of Newcastle and Whitehaven. The town of Newcastle absolutely stands on beds of coals, which extend to a considerable distance round the place. The principal opening for men and horses to the mines at Whitehaven is by an opening at the bottom of the hill, through a long passage hewn in a rock which by a steep descent leads down to the lowest vein of coal. The greatest descent is through spacious galleries, which continually intersect each other; all the coal being cut away except large pillars, which, in deep parts of the mine, are three yards high, and twelve square at the base. The mines are sunk to a depth of 7 or 800 feet, and are extended under the sea to places where above them, the water is sufficient for ships of very large burthen. These are the deepest coal mines that have hitherto been wrought, and, perhaps, the miners have not in any other part of the globe, penetrated to so great a depth below the surface of the sea. There are seventy kinds of coals brought to the London market, divided into four classes. The first class contains six kinds of coal, called Walls-end, Bigg's-main, Walkers, Heaton-main, Willington and Hepburn-main. The Walls-end, which is rather a small coal, is the dearest by about sixpence a chaldron.

Coal, *Small*, a sort of charcoal, prepared from the spray and brushwood stripped from the branches of coppice-wood.

Coalery, *coaliery*, *colliery*, or *coal-mine*, a coal-work, or place where coals are dug. There are several countries in Europe which possess considerable coal-mines; as France, Germany, and Sweden; and in America, coal has been discovered

and wrought in Newfoundland, Cape-Breton, Canada, and some of the New-England provinces: but in all these parts of the world the coal is of a quality much inferior to that of Britain, and entirely unfit for the use of several manufactures; so that even they import a large quantity from the latter. The most remarkable coal-work ever known in this island was that under the Firth or Forth, at Burrowstowness. The veins were found to continue under the bed of the sea, and the colliers had the courage to work them nearly half its width. At the distance of half a mile from the shore, there was a shaft that went down into the mine; and this was made into a kind of round key or mote, as it is called, built so as to keep out the sea, which flowed there twelve feet. Here the coals were laid; and a ship of that draught of water could lie her side to the mote, and take in the coal. This famous colliery belonged to the earl of Kincardine's family; and continued the wonder of all that saw it, and greatly profitable to the owners, during many years: but, at length, a tide of unwonted height filled the whole at once; and the labourers, who had no time to escape, perished in it.

Coat of arms, in the modern acceptation, is a device, or assemblage of devices, supposed to be painted on a shield; which shield, in the language of heraldry, is called the field. Under this sense, see Heraldry; but that subject will receive considerable elucidation from the following account of the ancient and original coat of arms. This, which is still the official dress of a herald, was a habit worn by the knights both in war and tournaments, a sort of surcoat, reaching nearly to the waist, open

at the sides, with short sleeves, sometimes furred with ermine or other hair, upon which were fixed the armories or badges of the knights, embroidered in gold and silver, and enamelled with beaten tin, coloured black, green, red, or blue; whence the rule never to apply colour on colour, or metal on metal. The coats of arms were frequently open, and diversified with bands and fillets of several colours, alternately placed, as we still see cloths scarletted, watered, &c. Hence they were called *devises*, as being divided, and composed of several pieces sewed together; whence the names *fess*, *pale*, *chevron*, *bend*, *cross*, *saltier*, *lozenge*, &c. which have since become honourable pieces, or ordinaries of the shield.

Coating, in chemistry, is used principally for the purpose of defending certain vessels from the immediate action of fire; thus, glass retorts and the inside of some furnaces, are coated with various compositions.

Coating, in electricity, means the covering of electric bodies with conductors, or the latter with the former, or, lastly, electrics with other electrics. Electrics are coated with conductors for the purpose of communicating to, or removing from their surfaces, the electric fluid in an easy and expeditious manner; otherwise an electric body, on account of its non-conducting property, cannot be electrified or deprived of the electric fluid without touching almost every point of its surface with an electrified or other body. This coating generally consists of tin-foil, sheet lead, gilt paper, gold leaf, silver leaf, or other metallic body, either in the form of a thin

extended lamina, or in small grains, such as brass filings and leaden shot. The coating may be fastened to the surface of the electric by means of paste, glue, wax, or other adhesive matter.

Cochin-China, a country of Asia bounded on the north by Tonquin, on the east by the Indian sea, part of which between the Continent and the island of Hainan, is called the gulf of Cochin-china, on the south it is bounded by Chiampa and on the west by Laos and Cambodia. This kingdom contains about 50 good sea port towns, and is divided into six provinces, to each of which belongs a governor and a seat of justice. It is about 150 leagues in length and 35 in breadth. The manners of the inhabitants are simple, they are affable, mild, laborious, and hospitable; their chief nourishment consists in rice and fish. They believe in the transmigration of souls.

Cochineal, an insect, the *cocus-cacti* of Linnæus, who has given it that name because it feeds upon the Indian fig-tree. The cochineal is a native of the warmer parts of America. It is an article of commerce, on account of the red colour of incomparable beauty which it communicates to wool and silk. Linen and cotton do not take the colour to so much advantage. This creature is found in most abundance at Oaxaca, where the breeding of it forms the chief employment of the Indians.

Cock-*fighting*, the act or entertainment of setting game-cocks to fight, which, to the disgrace of England, holds a prominent rank among the amusements of the vulgar; and was till lately permitted in a sort of theatre called the Royal

Cock-Pit, in Westminster. The Gentleman's Magazine for April, 1789, contains the following record: "Died, April 4th, at Tottenham, John Ardesoif, esq. a young man of large fortune, and in the splendour of his carriages and horses, rivalled by few country gentlemen. His table was that of hospitality; where it may be said he sacrificed too much to conviviality; but if he had his foibles, he had his merits also, that far outweighed them. Mr. Ardesoif was very fond of cock fighting; and possessed a favorite cock on which he had won many profitable matches. The last bet he laid upon this cock, he lost; which so enraged him, that he had the bird tied to a spit, and roasted alive before a large fire. The screams of the miserable animal were so affecting that some gentlemen, who were present, attempted to interfere, which so increased Mr. Ardesoif's anger that he seized a poker, and with the most furious vehemence declared that he would kill the first man who interposed: but in the midst of his passionate asseverations, he fell down dead upon the spot. Such, we are assured, were the circumstances, that attended the death of this great pillar of humanity." Cock-fighting is a mixture of barbarity, and of that most disastrous of passions,—the passion of gaming.

Cocket, a seal belonging to the king's custom-house: likewise a scroll of parchment, sealed and delivered by the officers of the custom-house to merchants, as a warrant, that their merchandize is entered.

Cockney, a very ancient name for a citizen of London; concerning the origin of which nothing

satisfactory appears. We may be permitted to doubt whether it was, at first, a word of ridicule. We learn from the following verses, which are attributed to Hugh Bagot, earl of Norfolk, that it was in use in the time of Henry II.

"Was I in my castle at Bungay,
Fast by the river Waveney,
I would not care for the king of Cockney."
[*i. e.* the King of London.]

The king of the Cockney is spoken of in the regulations for certain sports, formerly held in the Middle Temple, on Childermas day.

Code, a collection, or system, of laws. Justinian's code is distinguished by the appellation of *code*, in the way of eminence.

Codicil, a writing, by way of supplement to a will, containing any thing which the testator wishes to add; or any explanation, alteration, or revocation. A codicil must be executed with the requisite formalities.

Coffin, the chest in which a dead body is usually put for interment. The sepulchral honours paid to departed friends in ancient times are extremely curious. Their being put into a coffin was with them considered as a mark of the highest distinction; though with us the poorest people have their coffins. At this day, in the East, they are not at all made use of; and Turks and Christians, as Thevenot assures us, agree in this. The ancient Jews seem to have buried their dead in the same manner; neither was the body of Christ, it should seem, put into a coffin; nor that of Elisha (2 Kings xiii. 21.) whose bones were touched by the corpse that was let down a little after into his

sepulchre. However, that coffins were anciently made use of in Egypt all agree, since antique coffins of stone and sycamore wood are still to be seen in that country; not to mention those said to be made of a kind of pasteboard, formed by folding or glueing cloth together a great many times, curiously plastered, and then painted with hieroglyphics. It being an ancient Egyptian custom, and not practised in the neighbouring countries, was doubtless the cause that the sacred historian expressly observes of Joseph, that he was not only embalmed, but put into a coffin too; both being customs that were peculiar to the Egyptians.

We have, among other ingenious inventions, patent coffins, which effectually preclude the depredations of those that obtain a livelihood by robbing cemeteries. The security of this contrivance arises chiefly from making the coffin so very strong as to resist the instruments usually employed by what are termed "resurrection men" and by making the lid to fit on with spring plugs, fitting into hitched sockets; so that being once closed they never can be severed, except by breaking the coffin to pieces.

Cohesion, in natural philosophy, as distinguished from adhesion, is that species of attraction which, uniting particle to particle, retains together the component parts of the same mass. Whatever the cause of cohesion may be, its effects are evident and certain. The different degrees of it constitute bodies of different forms and properties. Thus Newton observes, the particles of fluids which do not cohere too strongly, and are small enough to render them susceptible of those agitations which

keep liquors in a fluid state, are most easily separated and rarefied into vapour, and make what the chemists call volatile bodies; being rarefied with an easy heat, and again condensed with a moderate cold. Those that have grosser particles, and so are less susceptible of agitation, or cohere by a stronger attraction, are not separable without a greater degree of heat, and some of them not without decomposition.

Modern Chemists have agreed to consider the attraction of cohesion as the instrument of aggregation, or the union of similar compounds, and are careful not to confound it with the ELECTIVE attractions (which see) though there may in strictness be no difference between them. In estimating the absolute cohesion of solid pieces of bodies, Muschenbroek applied weights to separate them according to their lengths; his pieces of wood were long square parallelopipedons, each side of which was the 26th of an inch, and they were drawn asunder by the following weights:

	lbs.
Fir	600
Elm	950
Alder	1000
Linden	1000
Oak	1150
Beech	1250
Ash	1250

He tried also wires of metal 1-10th of a Rhinland inch in diameter, the metals and weights are as follows:

	lbs.
Lead	29¼
Tin	40¼

Copper	299½
Yellow Brass	360
Silver	370
Iron	450
Gold	500

Cohort, the name of part of the Roman Legion composing about 600 men. There were ten cohorts in a Legion, the first of which surpassed all the rest in dignity and the number of men.

Coif, the badge of serjeants of law who are called serjeants of the coif, from the lawn coif they wear under their caps when they are created serjeants. The ancient use of the coif was to cover the clerical tonsure.

Coin, money stamped with a legal impression. Strictly speaking, coin differs from money as the species differ from the genus. See Class. Money is any matter, whether metal, or paper, or beads, or shells, &c. which have currency as a medium in commerce. Coin is a particular species always made of metal, and struck according to a certain process called coining.

The British coinage is wholly performed at the Tower of London, where there is a corporation for the purpose, under the title of the mint, which see.

The following are the coins and exchanges of the principal kingdoms and states of, or connected with, Europe :

Great Britain. Accounts are kept in pounds, shillings, pence, and farthings. One pound is equal to 20 shillings, one shilling to 12 pence or pennies, one penny to 4 farthings. The coins of gold are, the guinea, equal to £.1 1*s.* half-guinea to 10*s.* 6*d.*

and pieces of 7*s.*—Of silver, the crown, equal to 5*s.* half-crown, equal to 2*s.* 6*d.* shillings to 12 pence, six-pence to 6*d.* ; of copper, two-pennies, pennies, half-pennies and farthings. For the course of exchange between Great Britain and other countries, see those countries.

Ascheen, in the island of Sumatra.—Accounts are kept in tayels, padarves, and masses. One tayel equal 4 padarves, and one padarve equal 4 masses. The mass is most current money, and is of gold, and worth about 15*d.* three farthings, English.

Aleppo, *Alexandretto*, and *Sanderoon*. Accounts are kept in piastres of eighty aspers, see Turkey.—The same coins pass here as in Turkey.

Alexandria, in Egypt, and *Cairo*. Accounts are kept in piastres or dollars, of thirty medinas, each dollar worth 4*s.* 6*d.* sterling. The real money is the ducat of 24 medinas. A medina is worth three aspers of Turkey. The purse contains 75,000 aspers.

Alicant, in Spain. Accounts are kept in libras or pessos, equal 20 sueldos, sueldos equal 12 dineros; also by rials of 24 dineros. A libra is equal to 5*s.* 7*d.* halfpenny sterling.

United States of *America*. Accounts in America are kept in dollars, dismes, and cents. One dollar is worth 4*s.* 6*d.* st. One dollar equal 10 dismes; one disme equal 10 cents. The coins of Britain, France, Spain and Portugal, are current here, the American States have not yet issued any coin of their own.

Amsterdam and the *Province of Holland*. Accounts kept in florins or guelders, stuivers or skillings, and deniers or pennings. One florin equal

20 stuivers, and one stuiver equal 16 pennings. The gross pound is worth 6 florins or guelders. The current coins of Holland are rixdollars worth about 4*s*. 6*d*. ster. guelders or florins 1*s*. 9*d*. skillings 6*d*. 3-tenths, these are of silver; stuiver of copper 1 penny 1-twentieth, the grote the fourth part of a stuiver, the duyt the half a grote, and the penning half a duyt. There are also ducats of Holland, worth £. 1 16*s*. ster. and silver ducatoons worth 5*s*. 8*d*. The exchange between England is by shillings and skillings, 20 English shillings being worth about 37 Dutch skillings.

Ancona. Accounts are kept in scudi of 20 soldi, and soldi of 12 denari; and also by paoli, 10 of which make a scudo. The coins of Rome are current here.

Barcelona, in Spain. Accounts are kept in libras or catalan pounds of 20 sculdos, each sculdo of 12 dineros. A catalan pound is worth about 5*s*. 7*d*. sterling. England has no exchange on Barcelona.

Bassora. Accounts are kept in mamoudis of 10 danimes, danimes of 10 flouches, taman of 100 mamoudis. Coins current, of gold, are the sequin of Cairo, equal 13 mamoudis, 5 danimes; sequin gengirly equal 15 mamoudis;—of silver, mamoudi, worth 8*d*. sterl. abassi (old) equal 2 mamoudis, abassi, (new) equal 2 madoudis, 2 danimes. Of copper; danime.

Batavia. Accounts are kept in piastres or dollars of 60 stuivers each.—The real money current here are the Spanish dollar and the ecu of France and Holland.

Bengal. Accounts are kept in rupees of 16 annas. One anna equal 12 pieces. A crore is 100 lacs,

a lac 100,000 rupees. Rupees are of various kinds. Rupee sicca, a Mogul coin, worth about 24 and an half Dutch stuivers, or 2*s*. 6*d*. ster. Bombay rupee about 3 per cent. worse than the sicca. Arcot rupee about 6 per cent. worse than the sicca.

Berlin. In this city, Magdebourg, Francfort on the Oder, and other places in the electorate of Brandenburgh, they reckon by thalers of 24 gutegrosches. One gutegrosche equal 12 pfenings. The coins of the kingdom of Prussia are, of gold, the Frederic of 5 thalers, value 17*s*. 6*d*. ster. the ducat of 2 three-fourths thalers, value 9*s*. 4*d*. ster. Of silver; the thaler of 24 gutegrosches, value 3*s*. 6*d*. ster. Of copper; pieces of 3 and of 1 pfening.

Bologna, in Italy. Accounts are kept in lira of 20 soldi, soldi of 12 denari. The lira is 1*s*. English. The coins of Bologna are, pistoles, 15*s*. 6*d*. crown, 5*s*. ducatoons, 5*s*. 3*d*. scudi, 4*s*. 3*d*. testoons, 1*s*. 6*d*.

Bombay. Accounts are kept as in England, or by rupees. The coins current in Bombay are, rupees of silver worth about 2*s*. 3*d*. rupees of copper worth about 1*d*. and 1-6th, mohur of gold worth 12 and an half rupees of silver. Pagodas worth 8*s*. ster.

China. Accounts are kept in lyangs or tayels of 10 mass, mass of 10 candareen, candareen of 10 cass. The lyang or tayel of silver is worth 3 florins, 14 stuivers of Holland, or 6*s*. 8*d*. sterl.—Mass, 8*d*.—Candareen, 4-8ths of a penny.

Cologne. Accounts are kept in thaler of 80 albus cou an, albus of 12 hellers.—The coins are, of silver, 1 thaler or rix-dollar 4*s*. 8*d*. 1 guelder 2*s*. 4*d*.

1 copstruck 8*d*. 2-thirds, 1 plaphert 2*d*. 1-10th — Of copper, 1 stuyver equal 7-10ths of a penny.

Dantzic. Accounts are kept in guelders or florins of 30 grosches.—The coins are, of gold, the Frederic, worth about 17*s*. 6*d*. the ducat, worth about 8 florins or 9*s*. 4*d* ;—silver, ryksdalers of 3 florins, or 3*s*. 6*d*.

Denmark.—Accounts are kept in ryksdalers or rix-dollars of 6 marks, marks of 6 Danish skillings, skillings of 8 stuivers.—The coins current in Denmark are, gold, the ducat of 11 marks or 8*s*. 3*d* ;—silver, the ryksdaler of 6 marks or 4*s*. 6*d*. crown of 4 marks or 3*s*.

Flanders and *Brabant*. Accounts are kept in pounds Flemish of 20 schellings, schellings of 12 groots, or by florings or guelders of 20 stuivers, and stuivers of 12 pennings.—The coins current in Flanders are, gold, ducat worth 9*s*. 3*d*. sterling; silver, scheling worth 6*d*. 7-10ths.

France. Accounts were formerly kept in livres, sous, and deniers tournois.—One livre was equal to 20 sous, and one sous worth 12 deniers; the livre was nearly equal to 10*d*. sterling.—The exchange between Great-Britain and France was carried on by a fictitious money, called an ecu of 3 livres, which, when exchange was at par, was worth about 2*s*. 6*d*.—The coins of France were, of gold, the double louis-d'or of 48 livres, single louis-d'or 24 livres, half louis-d'or 12 livres ;—of silver, ecu of 6 livres, half ecu, equal to an ecu of exchange, 3 livres: there were also coins of the fifth, the tenth, and the twentieth of an ecu ; of bellen, or brass, pieces of two sous, one sou and half-sou ;—of copper, the double liard worth half

a sous, and the liard worth 3 deniers.—The coinage of the republic is regulated by its new metrical system. The lowest denomination, or unit, of coin, called a franc, is a silver piece of five grammes, containing 1-10th alloy, and 9-10ths pure silver, and is worth one livre and three deniers-tournois. The proportion of the new money to the old, is as 81 to 80. It is divided into decimes and centimes. The gold coin, like the silver, has 1-10th alloy, An hectogramme of gold is worth 25 franes.

Francfort. Accounts are kept in rixdollars of 90 kreutzers and kreutzers of 4 pfenings.—The coins are, the gold ducat of 2 rixdollars and 60 kreutzers, or 9*s.* 4*d.*—Silver, dollar of 120 kreutzer, or 4*s.* 8*d.*

Geneva. Accounts are kept in livres of 20 sols, sols of 12 dence.—A livre is equal to 1*s.* 3*d.* sterl.—The coins are, ducat, worth 2*s.* sterl. croisade, worth 5*s.* 10*d.* sterl.

Genoa. Accounts are kept in lire of 20 soldi, soldi of 12 denars.—The coins are of gold, pistole value 20 lire or 14*s.* 4*d.* sterl.—Of silver, genuen 6*s.*2*d.* testoon 1*s.* cavelot 1*d.* $\frac{18}{25}$.—Of copper, soldi $1\frac{43}{000}$.

Hamburgh. Accounts are kept in marks of 16 skillings-lubs, skilling of 12 pfenings.—The ryksdaller is 3 marks, dollar of exchange is 2 marks.—The coins of Hamburgh are, of gold, ducat worth 7 marks or 18*s.* 6*d.*—Silver rix-dollar, 3 marks, or 4*s.* 6*d.* thaler, 2 marks, or 3*s.* mark, 1*s.* 6*d.*

Hanover. Accounts are kept in dollars of 24 mariengroshen, of 12 pfenings each.—The coins are the ducat 9*s.* 2*d.* guelder 2-thirds of a dollar 2*s.* 4*d.* grosh 1*d.* three farthings.

Ireland. In Ireland, before the union, account were kept in pounds, shillings and pence, as in Britain, and the British coins were current, but at different rates, viz. a guinea passed for 22*s.* 9*d.* Irish, half-guinea for 11*s.* 4*d.* halfpenny, shilling for 1*s.* 1*d.* sixpence for 6*d.* halfpenny; that is, one hundred pounds sterling were equal to 108*l.* 6*s.* 8*d.* Irish.

Leghorn. Accounts are kept in lire or pezzos of 20 soldi of 12 denari.—The coins are, pistole of 22 lire or pezzos 15*s.* 6*d.* ducat of 7 and an half lire or pezzos 5*s.* 2*d.* halfpenny, piastre of exchange 6 pezzos 4*s.* 2*d.*

Leipsic. Accounts are kept by thalers of 24 gutegroschen, gutegroschen of 12 pfening.—A ryksdaler is worth 1 and an half thalers. The coins are, the ducat of two dollars specie, 9*s.* 4*d.* dollar 4*s.* 8*d.* gered or thaler 2*s.* 4*d.*—The dollar of specie is worth two thirds of dollar of accounts.

Naples. Accounts are kept in ducats of 10 carlin, carlin of 10 grain.—The coins are, of gold, the pistole value 15*s.* 4*d.* sterl.—Of silver, ducat, 3*s.* 4*d.* testoon, 1*s.* 4*d.* tarin, 8*d.* paul, 6*d.* carlin, 4*d.*—Of copper, grain, 2-5ths, quatrin, 2-15ths.

Portugal. Accounts are kept here in the most simple manner imaginable: in reas, of which 1,000 are worth 5*s.* 6*d.* sterling.—Coins, gold, moidore equal 48,000 reas, or £1. 7*s.* sterling, pataque equal 600 reas, or 3*s.* 4½*d.*—Silver, equal 400 reas, or 2*s.* 3*d.* testoon equal 100 reas, or 6¼*d.* —Copper, ventin equal 20 reas, or 1*d* 7-20, rea equal 27-400 of a penny.

Rome. Accounts are kept in scudi of 10 paoli,

paoli of 10 bojechi.—The coins are, of gold, the pistole, value 15*s.* sterling, sequin value 9*s.*—Of silver, the crown or piastre, value 5*s.* or 10 paoli, testoon 1*s.* 6*d.* julio 6*d.*—Of copper, bayoc three-farthings, quatrin 3-16.

Russia. Accounts are kept in roubles of 100 copeeks.—The coins are, the ducat, 9*s.* rouble, 4*s.* 6*d.* poltina 2*s.* 1*d.* grevina 5*d.* 1-5ths, copeek 27-10ths of a penny.

Savoy. Accounts are kept in lire of 20 soldi, soldi of 20 denari.—A lire is worth 1*s.* 3*d.*—The coins are, of gold, pistole of 18 lire, value 16*s.* 3*d.* Of silver, ducatoon 5*s.* 3*d.* crown 4*s.* 6*d.* lire 1*s.* 3*d.* florin 9*d.* sol, three-farthings.—Of copper, quatrin 2-16ths.

Sicily. Accounts are kept in onze of 30 tari, tari of 20 grani.—The onze is worth 7*s.* 8*d.* sterling.—The coins are, of gold, the pistole 16*s.* 4*d.*—Of silver, the ducat 3*s.* 4*d.* florin 1*s.* 6*d.* 5-15ths, tarin 3*d.* 1-13th, carlin 1*d.* 7-13ths.—Of copper, ponti 8-38ths.

Spain. Accounts are kept in Spain various ways, but always in rials, of which there are four sorts. The rial vellon of 8 1-8th quartos of 34 maravedis of vellon; this is used in the interior commerce, and is the 20th part of a dollar, or 2*d.* 7-8ths sterling.—The rial of plate, provincial, of 17 quartos or 34 maravedis, and is sometimes called the rial of new plate, is just double the value of the other, 5*d.* 3-8ths.—The rial of old plate of 10 quartos and 32 marevedis, 8 of which equal a dollar, 6¾*d.* sterling.—The rial of Mexican plate of 21-4 quartos, 34 maravedis Cellon, 8 of which rials make a dollar.—The coins of Spain, are the

pistole of gold worth about 16*s.* 2*d.* sterling, the dollar 3*s.* 7*d.* the old Seville or Mexican dollar worth about 4*s.* 6*d.*

Turkey. Accounts are kept in piastres or dollars of 10 mina or aspers,—The dollar is equal to 4*s.* sterl.—The coins are, the xeriff, worth 10*s.* sterling, caragrouch 5*s.* seloto 1*s.* ostic 6*d.* asper 3-5ths of a penny.

Venice. Accounts are kept in ducats of 24 grossi, grossi of 12 denare, or in leri, soldi, and denari.—The ducat-current is worth 3*s.* 5*d.* sterl.—A ducat of exchange is 4*s.* 4*d.* sterl.—The coins are, of gold, sequin at 9*s.* 2*d.*—Of silver, ducat 3*s.* 5*d.* testoon 1*s.* 6*d.* julio 6*d.* grossi 1½*d.*—Of copper, soldi, 1-3d.

Vienna. Accounts are kept in florins or guelders of 61 kreutzers, kreutzers of 4 pfenings.—The florin is equal to 2*s.* 4*d.* sterl.—The coins are, the ducat of 4 florins, value 9*s.* 4*d.* dollar 4*s.* 6*d.* kreutzer 7-15ths of a penny.

Coining or Coinage is the art of making money; and used formerly to be made with a hammer or mill. There were three machines chiefly in use, viz. the laminating engine:—the machine for making impressions on the edge of the coins, and the mill. The metal is first reduced to its proper thickness by the laminating engine, out of each lamina is cut as many pieces or planchets as it can contain: these then are brought to the machine that marks them on the edge, and when that operation is performed, they are taken to the mill to have the two faces stamped. The machinery now used in this country was invented by Messrs. Boulton and Watt; it works the screw presses for cutting out the circular pieces of copper, and coins

both the edges and faces at the same time, with such superior excellence and cheapness of workmanship as will prevent clandestine imitations. By this machinery, worked with a steam engine and four boys, 30,000 pieces can be coined in an hour, and the machine acts at the same time as a register, and keeps an accurate account of the number of pieces struck.

END OF VOL. I.

Printed by T. C. HANSARD, Peterborough-court, Fleet-street, London.