

female lives are inferior to insured male lives until they become middle-aged; and to allow for this, most companies charge an annual extra premium of 5s. per cent. for all insurances on the lives of females under the age of fifty, the extra being removed when that age is reached. The same extra is charged by some offices for insurances on the lives of persons who have not been vaccinated, while others admit them only on the condition that the sum assured is not to be paid if death occur from smallpox. Extra premiums, at various rates, are charged in the case of persons engaged in hazardous occupations—*e.g.* mariners, coal-miners, masons, etc., or in the retail liquor trade, as well as in the case of persons residing in unhealthy climates. Persons engaged in active military service are charged extras varying with the nature of the risk run by them. In the S. African war the usual charge was from five to seven guineas per cent. the first year, in addition to the ordinary premium; and owing to the heavy mortality experienced, even this large extra was found to be barely sufficient to compensate the offices. Several companies, however, have schemes for insuring the lives of military men at a small extra, usually about 10s. per cent. per annum payable throughout the whole term of the assurance, instead of a heavy extra payable only during active service, thus freeing the insured from the risk of being called upon to make an inconveniently heavy payment. These schemes also enable the insured to reside in any part of the world without payment of any further extra.

Owing to the competition between the different offices, there has for many years been a decided tendency to relax steadily the conditions of assurance, and many companies now free their policies, after they have been five

years in force, from all conditions except payment of the premium. See *Text-book of the Institute of Actuaries*, pts. i. and ii.; *Journal of the Institute of Actuaries and Assurance Magazine*; *Young's Insurance* (1906). For other types of Assurance see under INSURANCE.

Assurance, LEGAL, as defined in the Mortmain and Charitable Uses Act, 1888, includes a gift conveyance, appointment, lease, transfer, settlement, mortgage, charge, incumbrance, devise, bequest, and every other assurance by deed, will, or other instrument. In short, an assurance includes any act in the law, or instrument, by which an estate in land may be created, extinguished, enlarged, merged, defeated, transferred, or released. Assurances may be divided, in respect of the source of their validity, into (*a*) common law assurances—*e.g.* feoffments, exchanges, releases; (*b*) customary assurances—*e.g.* assurances of copyhold; (*c*) statutory assurances—*e.g.* a conveyance on sale under the Settled Land Acts.

Assur-bani-pal. See ASSYRIA and SARDANAPALUS.

Assynt, LOCH, in the par. of Assynt, Sutherlandshire, Scotland, 8½ m. w. by s. of the head of Loch Shin. Length 6¾ m., by ½ to ¾ m. wide.

Assyria. This name is derived, to all appearance, from the native Assur or Asur, a word which was borrowed by the Hebrews under the form of Asshur, and which is frequently pronounced, in the East, Athur, the ancient Aramaic form. The name Assur, standing for Assyria, is derived from that of the city Assur, the old capital of the country, which, in its turn, was so called after the god Assur, the patron divinity of the land. Another form of the name, not in general use, was Ausar. (There are two suggested etymologies for Assur or Asur—one being that it means 'the holy one,' and the

other that it is for Assar, from an older Ansar, the god personifying the heavenly host.)

Assyria proper was that tract of country to the east of Mesopotamia having as its E. boundary the modern Kurdistan. Its S. boundary was Babylonia, often called Kar-Dunias in the inscriptions. On its N. border it had the land of Armenia, called Urartu (Ararat) and *mât Mannâa* (the land of the Vannites) in the inscriptions. Its W. boundary embraced a certain portion of the country on the W. bank of the Tigris, and therefore encroached slightly on Mesopotamia proper. The country was exceedingly fertile, with excellent clay for brickmaking and pottery (including tablets), and also good building stone, in the possession of which it had the advantage over Babylonia.

The ancient capital, Assur, now called Kalaat Shergat, about 60 m. below Mosul, was the residence of the early kings and viceroys; but the place was seemingly abandoned as the capital about 1300 B.C., and Nineveh substituted. It is noteworthy that the ancient form of the name of this city is Ninua or Ninâ, and that there was a little town of that name in the small kingdom of Lagas, in Babylonia, so called after the temple of the goddess Nina, which was situated there. The origin of the name was in all probability in both cases the same. Nineveh is now represented by the mounds of Kuyunjik and Nebi Yunus, opposite Mosul.

Another important city was Calah, the Kalakh of the inscriptions, about 12 m. S. of Nineveh. It is now represented by the mounds known as Nimrud. The city of Resen probably lay in the same neighbourhood, and has been identified with the modern Selamiyah. A city Res-eni (which is the same name) is mentioned by Sennacherib, but seems to have been situated to the north of Nin-

veh. The name, however, was in all probability a common one. Rehoboth-Ir ('the streets of the city') seemingly indicated a suburb of Nineveh, and if so, must be the Rêbit Ninua ('streets of Nineveh') on the north-east, towards Khorsabad. This last was named in ancient times Dûr-Sargina, or 'the fortification of Sargon,' and was built by him on the site of a city called, before his time, Magganubba. Another important city was Arbela, the modern Ervil, near the mountains on the east. It was an important centre of Assyrian worship, the patron goddess of the city being Istar.

The date when the colonists from Babylonia established themselves in Assyria is doubtful, but it is generally regarded as having taken place about 2500 B.C., when the amalgamation of the Semitic and the non-Semitic elements of the population had already been accomplished. A slight difference in the racial type of the Babylonians and the Assyrians suggests that the latter absorbed, in course of time, the original inhabitants of the country, who possibly had some relationship with the Armenians. On entering Assyria, the migrants brought with them the civilization, the manners, the customs, the religion, and the literature of the Babylonians, with whom they originated, and it is largely owing to them that that literature has been preserved.

The earliest rulers of Assyria, like those of Babylonia, were called *patesi*, or, in the Semitic idiom, *issaku*, rendered 'priest-kings' or 'viceroys.' Of these rulers, the most ancient known seems to have been Isme-Dagan, who ruled about 1850 B.C. He was succeeded by Samsi-Addu I., who built a temple at Assur to the gods Anu and Addu. Other rulers of later date were Igur-kapkapu and Samsi-Addu II., who rebuilt the great national temple to Assur at the

same place. A brick in the British Museum gives us the names of Hallu, and Irisum, his son, who seems to have built a temple, or rebuilt the temple of the god Asur (Assur), in the city of that name, for the preservation of his life.

According to the oldest traditions of the Assyrians, the monarchy was founded by a king named Bel-kapkapu, but there is no information as to his age or deeds. It is the name of Assur-bêl-nisi-su (about 1480 B.C.) which, in the documents at present at our disposition, first comes before us in connection with history in the true sense of the word. He was a contemporary of the Babylonian king Kara-indas; and during his reign, and that of Puzur-Assur, contemporary of the Babylonian king Burna-burias, and Assur-nadin-âhê, about 1420 B.C., agreements or treaties were made between the two nations with regard to their common boundaries. His son, Assur-uballit, states that his father received from the king of Egypt a present of twenty talents of gold. To all appearance, Kara-indas of Babylonia had married a daughter of Assur-uballit, the successor of Assur-nadin-âhê, and the issue of the marriage was Kadasman-Murus, who was killed by some disaffected Kassites. The Assyrian king avenged his son-in-law by invading Babylonia, and deposing and putting to death his murderer, at the same time setting Kuri-galzu on the throne. (See BABYLONIA.) The relations of Assur-uballit's successors—Bel-nirari, Pudi-ilu, and Addu-nirari I. (about 1345 B.C.)—were not so peaceful, and portions of the north of Babylonia were annexed to Assyria.

The son of Addu-nirari I., Shalmaneser I., came to the throne about 1330 B.C., and was regarded by the Assyrians as one of the more renowned of their kings. He seems to have extended the boundaries of the empire as far as the neighbour-

hood of Diarbekir, and is stated by King Assur-nasir-apli (885 B.C.) to have been the founder of Calah. His son was Tukulti-Ninip I., who signalized his reign by an expedition to the Sebbeneh-Su, where he had an image of himself carved on the rock. To all appearance, this king ruled also over Babylonia. About 1210 B.C. Assyria and Babylonia again came into conflict, the latter country, evidently having the advantage. The energy of Ninip-apil-Esarra, however, shortly before the year 1200 B.C., gave victory to the Assyrians, though it was not until the time of his son, Assur-dan I., that a satisfactory treaty was made with the Babylonians, whose king, Zagaga-sum-iddina, saw several of his cities fall into the hands of the Assyrians.

He was succeeded by Mutakkil-Nusku, concerning whom but little is known. The son of the latter, Assur-rês-îsi (c. 1140 B.C.), however, again raised the name of the Assyrian empire, overthrowing the Ahlamites, Lulumites, and Kutites, and defeating Nebuchadnezzar I. of Babylonia when he attempted to take possession of the borderlands between the two countries. Still more renowned than Assur-rês-îsi was his son, Tiglath-pileser I. (c. 1120 B.C.), whose long and complete inscriptions from the ruins of the temple at Assur speak of his numerous expeditions against the Moschians (Mesech), Kummuha or Commagene, Hatti (the land of the Hittites), Musri, on the north of Assyria, and other places—altogether forty-two lands and their princes 'from beyond the lower Zab to the other side of the Euphrates, the Hittites, and the upper western sea.' He also fought against Marduk-nadin-âhê of Babylonia, and captured many of his cities, including Babylon, Sippar, and Opis. His son was Assur-bêl-kala, who espoused the daughter of the Babylonian

king Addu-abla-iddina (about 1080 B.C.); after which there is a great gap in the history of the country.

Isolated names only occur in this gap, until we come to Tiglath-pileser II., after whom the series of rulers is unbroken to the end of the monarchy. This king was succeeded by Assur-dan II. about 930 B.C. The son and successor of the latter, Addu-nirari II. (911), warred against Samas-mudammiq, king of Babylon, and his successor, Nabu-sum-iskun, with success; and when peace was concluded, it was sealed by the marriage of the daughters of the two kings by each other respectively.

Whether on account of this marriage or not is not known, but the son and successor of Addu-nirari, Tukulti-Ninip II. (890 B.C.), made himself master of Babylonia, and ruled over the country until his death in a rebellion, in which his son and successor, Assur-nasir-apli, took part. By this, his first recorded act, is the character of Assur-nasir-apli revealed. He appears to have been the cruellest of a race not renowned for mercy, and carried fire and sword on every side. In his lengthy and tedious record he states that he conquered the region of the Urumia lake (884 B.C.), Huluh, Kummuh (Commagene), and the region of the Khabur. In succeeding campaigns he marched to the region of the Sebbeneh-Su; on the east to the districts of the Radanu and the Tornadotos; Suhu (the Shuites), far to the south-east; and Carchemish, on the west. In one of these expeditions he found himself opposed by Babylonian troops; but he was never in open conflict with Babylonia. He was successful in the land of Suhu, however, and took a terrible revenge. Besides Carchemish, on the west, he took tribute from Tyre, Sidon, Gebal, Arvad, and other places. Notwithstanding

his great military activity, he was also a great builder.

His son, Shalmaneser II. (860 B.C.), followed in his father's footsteps. After a military visit to Babylonia, in which he took the side of Marduk-sum-iddina against his brother, who laid claim to the throne, he turned his chief attention to the west of Assyria, where he came into conflict with Hazael of Damascus, as well as his murderer, Addu'idri (Benhadad), Ahab of Israel, and other kings of the west, the principal occasion being at the battle of Qarqar (854 B.C.). He also received tribute from Tyre, Sidon, Gebal, and Jehu, 'son of Omri.' As his eldest son rebelled against him, the throne was inherited by Samsi-Addu II., a younger son, and, like his father, a great warrior, who, besides his conquests on the west, carried his arms into Media. He also attacked Babylonia, and brought away great booty.

The reign of Addu-nirari III. (811), son of Samsi-Addu, brings with it the same story of conquest: Tyre, Sidon, Israel, Damascus, Edom, Arpad, etc., felt the force of his arms. Babylon, Umlia, and places on the south-east were also overrun. It is noteworthy that the wife of this king was called Sannuramat—regarded as the same name, though not the same person, as the Semiramis of Herodotus. Shalmaneser III. (782) warred in Armenia, Damascus, and Hadrach. His successor was Assur-dan III. (772), whose reign was an unfortunate one, distinguished by many rebellions against the power of Assyria, and pestilence. An eclipse of the sun is recorded for the year 763 B.C.

With Tiglath-pileser III., his successor (745), a new dynasty begins. He is noted as the king of Assyria who went farther west than most of his predecessors, and as having deposed Azariah, repla-

cing him, seemingly, by Eni-ilu. He is the Pul of 2 Kings 15:19, that being his name in the Babylonian canon. Later on he received tribute from Ahaz of Judah, Mitinti of Askalon, and others. In his inscriptions he relates how the people of Israel killed their king, and that he thereupon set Hoshea on the throne over them, and exacted tribute. He is renowned also as the conqueror of Chinzoros of Babylonia, whose empire he annexed to Assyria. (See BABYLONIA.) He was succeeded (727) by Shalmaneser IV., the Ululâa (Elulæus) of the Babylonian canon, a king whose five years' reign was distinguished by great attempts and but little success. He failed to capture the city of Tyre, and besieged Samaria, but died before the place was taken. To Sargon, his successor (722), fell the honour of receiving the city's submission. Sargon then led his forces against Hamath, Carchemish, and Ashdod, and on each occasion the nations around felt the force of his arms. These campaigns were followed by his long struggle with Merodach-baladan of Babylon, ending in the conquest of the country in 709 B.C., though operations against Merodach-baladan and his supporters still continued. Mesech, Commagene, Cyprus, Armenia, and numerous other countries felt the force of his arms, and sent tribute. Sargon is renowned as the builder of the great palace at Dûr-Sargina, now called Khorsabad. He was, to all appearance, assassinated in the year 705 B.C., and Sennacherib, his eldest son, mounted the throne.

The connection of Sennacherib with Babylonia will be found under that article. In consequence of the aid Elam had given to the Babylonians, that country was attacked by the Assyrian king. But, in all probability, the campaign which is regarded as being of the greatest importance is that

against Hezekiah, king of Judah, caused by the latter's interference in the affairs of Ekron. The result was the siege of Jerusalem, which, however, was not taken, for some reason not stated in the inscriptions. (See 2 Kings 18:13-37; 19; Isa. 36, 37.) As related in the Old Testament, Sennacherib was assassinated by his sons whilst worshipping in the temple of Nisroch (Assur), or, according to the Babylonian chronicle, by one of his sons, who was leader of a revolt against him. The murderers fled to Armenia, whither, to all appearance, their younger brother, Esarhaddon, pursued them, and defeated their adherents, afterwards mounting the Assyrian throne (680 B.C.).

The new ruler was also a successful one, adding prudence and mildness to warlike zeal. He fought against Abdimilkutti, king of Sidon, whose head, together with that of the king of Sanduarri, was brought to Nineveh. It was probably about this time that Manasseh was taken with 'hooks' (or fetters) and brought to Babylon (2 Chron. 33:11). Egypt was likewise attacked, and made practically an Assyrian province. Esarhaddon also defeated, in Cappadocia, Teuspa the Kimmerian, the first of those hordes which were, later on, to join in the destruction of the Assyrian empire. Esarhaddon died in 669 B.C., when on his way to Egypt for the third time, and was succeeded by Assur-bani-apli (the great and noble Asnapper) in Assyria, and Samasum-ukin (Saosduchinos) in Babylonia.

The reign of Assur-bani-apli (Assur-bani-pal) saw the culmination of Assyrian power, and the beginning of its decline. A rebellion in Egypt was put down; but the success was short-lived, for Psammeticus put an end to Assyrian overlordship for ever. After receiving the tribute of the kings of

the west—Manasseh of Judah and his contemporaries—the Assyrian ruler had to turn his attention to the east, where the Elamites were stirring up the Aramean tribes against Assyria. The result was the defeat and death of Te-umman, king of that country. Having divided the country, and set there two vassal kings, the Assyrian ruler had to send an army to Babylonia, where his brother Saosduchinos had revolted against his authority. The result was the conquest of Babylonia, and the death of its king in his burning palace. (See BABYLONIA.) Further expeditions to Elam were found necessary in order completely to subdue that country, and were carried out successfully. Arabia and Ararat also felt the force of the Assyrian arms.

Of Assur-bani-apli's son and successor, Assur-êtil-ilâni (-ukinni), nothing is known, except that he claimed to rule over Babylonia, and began to build a palace at Calah. He was followed by Sin-sarra-iskun, the Saracos of Syn-cellus, under whom the Assyrian empire saw its downfall. It would seem that either he or his predecessor, foreseeing impending disaster from the Medes, raised two armies, one of which he sent to Babylonia under Nabopolassar, with orders to hold the district of Babylonia against the enemy. Nabopolassar, however, turned his arms against his royal master, and advanced with the allied forces against Nineveh, where, in consequence of a breach made in the walls by the Tigris undermining them, the city was taken, and Sin-sarra-iskun, seeing that all was lost, set fire to his palace, and perished in the flames.

Thus ended the great Assyrian empire. Of the same race with the Babylonians, whom they closely resembled, the Assyrians added to their love of art, letters, and capacity to rule a great power of

organization and warlike energy. Inheriting all the literature of the ancient Babylonians, both Semitic and non-Semitic, their liking for that literature surpassed, if anything (especially from the time of Sargon onwards), that of the people of the country where it originated. Babylonian history was likewise a study to which Assyrian scribes paid attention, the more especially, apparently, with regard to those periods when the two nations came into contact for the rectification of their boundaries, etc. Babylonian laws, too, seem to have been their study only less than it was the study of the Babylonians themselves. Like the Babylonians, they were excellent agriculturists and equally good builders, and though they imitated their teachers by a large employment of brick, for the interior decorations of their palaces they used alabaster, which enabled them to produce bas-reliefs which were real works of art, and are even now the wonder of the beholder. Boastful as they were bold, they were fond of the composition of long inscriptions, and the frequent writing of reports to the king.

One of the most remarkable characteristics of the Assyrians was that aptitude which brought about their success in war. In all probability this was due to their superior mobility, and also to the perfection of their defences and their engines of attack. In the sieges which they carried on, they constructed enormous towers on wheels, which were pushed up specially-constructed causeways, approaching so close to the walls that battering-rams worked from within the towers could be brought into play. To this must be added their skilfully-made chain-mail and scale armour, which, with their enormous wicker shields, enabled their soldiers to fight to the greatest advantage.

The religion of the Assyrians was practically the same as that of the Babylonians, the chief difference being that they gave their national god, Assur, the highest place in the pantheon. To all intents and purposes he replaced the god Merodach, who was also worshipped by the Assyrians, and with whom he seems to have been identified. See Hommel's *Geschichte Babyloniens und Assyriens* (1885); Mürdter-Delitzsch's similar title (1891); George Smith's *Assyria*, S.P.C.K.; A. H. Sayce's *Assyria: its Princes, Priests, and People*, R.T.S. (1885); Fossey's *Manuel d'Assyriologie* (9 vols. 1904, etc.); Budge and King's *Annals of the Kings of Assyria* (1903, etc.); Maspero's (ed. by Sayce) *The Dawn of Civilization* (1896), and *The Struggle of the Nations* (1897); J. F. M'Curdy's *History, Prophecy, and the Monuments* (1894 and 1896); T. G. Pinches' *The O.T. in the Light of the Records and Legends of Assyria and Babylonia* (1902); and for translations, *The Records of the Past*, 1st series, ed. by S. Birch, vols. i., iii., v., vii., ix., xi., 1873, etc.; 2nd series, ed. by A. H. Sayce, vols. i.-vi., 1888-92; and from time to time in the *Proc. of the Soc. of Bib. Arch.*, and *Jour. of the R.A.S.*, etc. Compare also BABYLONIA and CUNEIFORM.

Astacus, the genus to which belongs the common fresh-water crayfish of Britain.

Astarte, the Syrian Venus, is identical with 'Ashtaroth the abomination of the Zidonians' (2 Kings 23:13), and with the Ishtar of Assyria, besides having affinities with other classic deities. The licentious worship of the devotees of Astarte in her temples in Tyre and Sidon rendered the names of these cities, in the Jewish Scriptures, synonymous with all that was wicked. There was a temple in her honour at Memphis as early as the period of the 19th

Egyptian dynasty, about which time it is supposed that the cult of Astarte was brought into Egypt from Assyria.

Astatic Couple. See GALVANOMETER.

Astatki is the residue from the distillation of Russian petroleum. It is largely used for fuel in the neighbourhood of its production (Baku), and in the Caucasus and Caspian regions.

Aster, a genus of plants, with about 200 species, belonging to the Compositæ, chiefly natives of N. America. They are much cultivated in gardens, under the name of Michaelmas daisies, because they flower about Michaelmas. They are conspicuous for their pink, blue, lilac, or purple ray florets, and yellow discs. The plants vary, according to species, from a few inches to several feet in height; their leaves are willow-like, on wiry stems which become woody, but all the aerial parts die down in winter.

Aster, CHINA (*Callistephus chinensis*), a species of Compositæ, native of China and Japan; first cultivated in France at the end of the 18th century. There are now many varieties in size and colour, but all are annuals.

Aster, ERNEST LUDWIG VON (1778-1855), Saxon military engineer, born at Dresden. In 1815 he joined the Prussians, fought at Waterloo, and was made a general and inspector of fortifications. He superintended the elaborate defence works of Coblenz and Ehrenbreitstein.

Asterabad. See ASTRABAD.

Asteroids, small planets circulating between Mars and Jupiter, and thus named by Sir William Herschel in 1802. They seem to replace a single large planet, conjecturally located, before they were found, in the wide interval occupied by them, and collectively represent a term in the series of planetary distances designated as

'Bode's Law.' The first asteroid (see CERES) was discovered on Jan. 1, 1801; and on January 1, 1911, the known members of the family numbered 691. Their detection has been accelerated by the use, now almost exclusive, of the photographic method introduced by Dr. Max Wolf in 1892. Its principle is that a sensibly moving object leaves a trail instead of a dot on a plate exposed in a telescope following the diurnal movement of the stars. Through the availability of this rapid and easy process, 117 new asteroids, down to the fourteenth stellar magnitude, were registered in 1908. These bodies differ greatly in size. The largest has a diameter of nearly five hundred, the smallest of probably less than twenty miles, and there may be multitudes beyond the range of perception, constructed on the modest scale of shooting-stars. None can possess appreciable atmospheres; yet their markedly diverse albedoes suggest unexpected varieties in physical constitution; some are slightly variable in brightness, indicating rotation about an axis. Their joint mass is almost certainly much smaller than that of the moon, but cannot be estimated with any approach to precision. The zone tenanted by the asteroids extends from within the orbit of Mars beyond that of Jupiter, Eros making the closest approach to the sun, while four asteroids revolve in almost exactly the same period and at the same mean distance as Jupiter, each thus forming with Jupiter and the sun an equilateral configuration. The distribution of these 675 interlacing ellipses presents some significant features. They are most crowded near the place where, by Bode's Law, the missing planet should have revolved—*i.e.* at 2.8 times the earth's mean distance from the sun—but there are

conspicuous gaps in their scattering, and the occurrence of these just where a commensurability of periods with that of Jupiter would have come in, attests the powerful influence of the great planet over the localization of his pigmy neighbours. See authorities cited under ASTRONOMY.

Asterolepis, an extinct genus of fishes, remains of which are found in the Old Red Sandstone of Nairn, Orkney, and Shetland, in Scotland. It was covered with bony plates, marked with star-shaped tubercles, and resembled pterichthys in general configuration. See Dean's *Fishes, Recent and Fossil* (1895).

Asterophyllites (for which the synonym Calamocladia is used by some botanists) is supposed to be the foliage of certain fossil Equisetaceæ, such as calamites, which flourished principally in the Carboniferous epoch. The branches are long and slender, and bear at their numerous nodes whorls of little linear or lanceolate leaves, each with a midrib down the centre. As preserved they are usually flattened out, and have a stellate appearance. In some cases the bases of the leaves were fused to form a continuous sheath. In *Annularia* the leaflets were unequal, and lay in one plane, which was oblique to the axis of the branch. See Seward's *Fossil Plants* (1898, etc.); Scott's *Studies in Fossil Botany* (1900).

Asthenopia, weakness of sight. See REFRACTION, ERRORS OF.

Asthma, a respiratory disease, spasmodic and recurrent in character, marked by great temporary difficulty of breathing. The causes of asthma may be divided into *predisposing* and *exciting*. Heredity is the great predisposing factor. Not that a child inherits asthma; but it inherits some weakness of constitution, often neurotic, which makes it

more liable to attack. Other predisposing causes are said to be gout, syphilis, skin diseases, and kidney diseases, in all of which the blood is more or less affected, and might be supposed to affect, in its turn, an unstable nervous system. Exciting causes are many and various. Almost every asthmatic patient seems to have his idiosyncrasy, both in cause and cure. An attack may be started by a sudden variation of temperature, or by a change of residence from inland to the coast, or *vice versa*. It may follow closely on exhaustion from any cause, on sudden physical exertion, or on an error in diet.

There is no sure or marked premonitory symptom before the initial wheezing begins; half an hour before the height of an attack the sufferer may be quite at ease. A slight heaviness of breathing develops to a condition in which, to all appearance, the patient is fighting for his last gasp, with slow, loud, convulsive respiratory efforts, in which every muscle of the body seems to be strained, the face taking an appearance of anxious effort, and being often covered with sweat. In half an hour or an hour the illness may end, leaving merely exhaustion in proportion to the severity of the attack. Or the paroxysm may last for days, with occasional short intervals when it seems as though the disease had worn itself out. During the paroxysm there is undoubtedly spasm of the non-striated muscle in the bronchioles, and some hold that there is congestion of the mucous membrane.

The treatment between the attacks must depend upon the predisposing cause. For the relief of an attack, antispasmodics, stimulant or sedative, are the most generally useful, though which of them will suit any particular case can only be discovered by experiment. One patient can

often stave off a commencing illness with a teaspoonful of neat liqueur brandy; another must burn a nitre-paper; another finds a stramonium cigarette most serviceable; a fourth tries all possible drugs, and journeys to Italy, Algeria, and Egypt in vain, flying at last to rooms in the East End of London whenever an attack is threatened. Chloroform will often break the course of a paroxysm, and the patient will wake well; but chloroform cannot safely be self-administered. Chloral hydrate, given every four hours until the breathing improves, will often stop an attack; but with chloral, as with injections of morphia—another possible remedy—the danger of habit must be reckoned with, as well as that of an overdose if self-administered. A regular, healthy life will help all cases. Children developing asthma early often outgrow it as they mature, if care be taken not to tax their strength too severely.

Asti, tn. and episc. see, prov. Alessandria, Italy, 20 m. w. of Alessandria; the birthplace of the poet Alfieri (1749–1803), to whom a marble statue was erected in 1862. Asti was one of the most powerful of the republics of the middle ages, and a great centre of commerce. Its cathedral dates from the 13th and 14th centuries; and it has a baptistery of the 10th century, and another church of the 10th or 11th. Asti is famous for its wine and its gardening, and manufactures silk, matches, cream of tartar, joinery, and produces silk cocoons. Pop. 40,000.

Astigmatism, that defect of vision in which the rays of light proceeding from a point do not reach the retina as a point, but as an area or spot. This is owing to irregularity in the refracting surfaces in front of the retina, through which the rays first pass. The treatment is by glasses made

to focus the rays rightly on the retina. See REFRACTION, ERRORS OF.

Astilbe Japonica, a saxifrage from Japan, erroneously termed spiræa, because of the resemblance of its foliage and flowers to those of that species. The dark-green leaves are much divided, and the small white flowers form a conspicuous inflorescence. It requires much water, and is perfectly healthy when the pot is left standing in water. Other species are found in Japan, China, and India.

Astle, THOMAS (1735-1803), bibliophile, author of the *Origin and Progress of Writing* (1784; new ed. 1876), a work of importance, for its explanations of mediæval handwriting. His other works include *The Will of Henry VII.; An Account of the Seals of the Kings, Royal Boroughs, and Magnates of Scotland* (1792). The valuable MSS. of his collection are now in the British Museum.

Astley, SIR JACOB, LORD ASTLEY (1579-1652), Royalist general, born in Norfolk. After several years' military service in the Netherlands and Denmark, he became governor of Plymouth (1638). He fought at Edgehill, Newbury, and Naseby; but in 1646 he was defeated and captured at Stow-on-the-Wold. Imprisoned in Warwick Castle, and released at the surrender of Oxford to Fairfax, he was afterwards brought before the council in London, but allowed to return to his house at Maidstone.

Astley, SIR JOHN DUGDALE (1828-94), English sportsman, born at Rome; served in the Crimea, and was wounded at the battle of the Alma. He was a successful owner of racehorses; patron of boxing, swimming, and walking competitions, and of other sports. See his *Fifty Years of my Life in the World of Sport* (1894).

Astley, PHILIP (1742-1814), equestrian performer and theatri-

cal manager, was a cabinetmaker who, after distinguishing himself at Emsdorff and Friedberg, during the Seven Years' War, travelled through the country as a tradesman or as a performer at fairs and markets, and subsequently gave theatrical and equestrian performances, for which he built nineteen circuses, chiefly in London (Astley's Royal Amphitheatre, 1770), Dublin, and Paris. See De Castro's *Memoirs* (1824), and Brayley's *Theatres of London* (1826).

Astley Bridge, vil. Lancashire, England, 3 m. N. of Bolton. Has cotton-spinning and bleaching. Pop. 7,500.

Aston, or ASTON MANOR, par. Warwickshire, England, N. of Birmingham, with which it is partly included. The Hall and surrounding grounds were opened in 1858 as a public recreation ground. The Hall (now partly a museum, winter garden, and aquarium) sheltered Charles I. before the battle of Edgehill. The division has returned one M.P. since 1885. Pop. 78,000.

Aston, SIR ARTHUR (d. 1649), Royalist general. After several years' service on the Continent against the Poles, Turks, and Austrians, he was engaged in quelling the Scottish rebellion (1640). He took an active part in the civil war, commanding the dragoons at Edgehill, defended Reading, and thrice successfully repulsed the Parliamentary forces. His death took place two years afterwards, in the slaughter which followed Cromwell's capture of Drogheda.

Astor, JOHANN JAKOB (1763-1848), founder of the American Fur Company; born near Heidelberg; sailed for America (1783); entered the fur trade, which he carried to the Pacific by a chain of trading stations from the Great Lakes along the banks of the Missouri and Columbia, at whose

mouth he founded Astoria in 1811. At his death he left a legacy of \$350,000 to found a public library (Astor Library) in New York, and the remainder of his wealth, consisting largely of real property in New York City, estimated at \$30,000,000, to his son, WILLIAM BACKHOUSE (1792-1875) who added \$550,000 at different times to his father's library bequest. — WILLIAM WALDORF (b. 1848), great-grandson of Johann Jakob, was appointed U.S. minister to Italy (1882-5); settled in England (1891); became (1893) proprietor of the *Pall Mall Gazette*, *Budget*, and *Magazine*, and bought the Duke of Westminster's Cliveden estate (1893). See Parton's *Life of John Jacob Astor* (1865), and Washington Irving's *Astoria* (1836).

Astoreth. See ASTARTE.

Astorga (anc. *Asturica Augusta*), tn., Spain, prov. of, and 30 s.w. of Leon; has old castle, fine 15th-century cathedral, and was the ancient capital of the Astures. Pop. 5,600.

Astorga, BARON EMANUELE D' (1681-1736), Italian musician, born at Palermo. He developed his musical talent in the monastery of Astorga; led a life of adventure, in the course of which he visited Portugal, Italy, and England; and died in Bohemia. His best-known compositions are a *Stabat Mater* for four voices; an opera, *Dafne*; and cantatas entitled *Quando Penso* and *Torna Aprile*.

Astorga Collection, one of the finest collections of Spanish literature. It was formerly the property of the Marquis of Astorga, and was purchased, at the suggestion of Gibson Lockhart when engaged on his *Spanish Ballads*, for the Advocates' Library, Edinburgh, where it is still preserved.

Astoria, city, Oregon, U.S.A., co. seat of Clatsop co., at the

mouth of the Columbia R. It has a large lumber industry and numerous salmon canneries. Founded by J. J. Astor in 1811. The tonnage entering the port aggregates 1,500,000 tons yearly. Pop. 15,000. See Washington Irving's *Astoria* (1836).

Astrabad, or ASTERABAD, walled tn., Persia, cap. of prov. of Astrabad (area, 5,791 sq. m.; pop. 180,000), about 20 m. E.N.E. of Bender-Gez, its port on the Bay of Astrabad. It was formerly the residence of the Shahs, and contains the ruins of a fine palace erected by Shah Abbas. It exports cotton, wool, grain, dried fruit, fish, silk, and hides, etc. Pop. about 25,000.

Astræa, goddess of justice, daughter of Zeus and Themis, or of Aristæus and Eos (Aurora), and the last of the celestials to leave the earth during the Iron Age (Ovid's *Metamorphoses*, bk. i.). She is the Virgin, the sixth sign of the zodiac. It is she who rears up Sir Artegal (*Faërie Queene*, v. i.). The name was often applied to Queen Elizabeth, to whom Sir John Davies (?1560-1626) addressed his *Hymns of Astræa*, a series of twenty-six acrostics making the words 'Elisabetha Regina.' Dryden's *Astræa Redux* (1660) celebrates the restoration of Charles II. Astræa was also a *nom de plume* of Mrs. Aphra Behn.

Astragal, a small moulding: usually applied to the bars in windows which carry the glass.

Astragalus, one of the bones forming the ankle-joint. It is commonly called the ankle, huckle, or sling-bone.

Astragalus, a large genus (1,200 species) of plants, of the order Leguminosæ, found in almost every country except Australia. Many are spiny, the stump of the leaf adhering to the stem, and assuming a sharp point. There are three British species—*A. hypoglottis*, 'purple milk vetch';

A. glycyphyllos, 'sweet milk vetch' or 'wild liquorice'; and the rare *A. alpinus*, found only on certain Scottish mountains. *A. gummifer*, a native of Asia Minor and Persia, is the source of tragacanth gum, chiefly used for stiffening textile fabrics. The seeds of *A. bœticus* are used in Hungary as a substitute for coffee.

Astrakhan. (1.) Government, the extreme s.e. prov. of European Russia. Area, 91,042 sq. m. Pop. 1,200,000, of whom 700,000 are Russians (including Cossacks), 120,000 Kalmucks, and 134,000 Kirghiz. The surface is mainly level, treeless steppe; but the Ergheni Hills, along the r. bk. of the Volga, reach 500 ft. Fishing and salt export are the main industries. The wool, soap, and caviare are famous. (2.) City, cap. of Astrakhan gov., on the Volga, and 40 m. from its mouth. The town consists of the 'Kreml,' the 'White City,' and the suburbs. In the first named are the bishop's palace and the cathedral (1696). Astrakhan is the most important port on the Volga, with a trade of from £8,000,000 to £9,000,000 with foreign countries, and of £14,500,000 with the interior of Russia; and has one of the most important fairs in Russia. Fish, wool, caviare, and petroleum are the chief objects of transport into the interior of Russia; cotton goods, sugar, and manufactured articles into foreign parts, mainly Persia. Imports are cotton, fruit, rice, silk, and leather, principally from Persia and Central Asia. The city has rapidly advanced since 1880. Pop. (1863) 42,800; now (1910) 125,000.

Astral Spirits, in the language of theosophy, 'inhabit the "astral plane," or "light," which, although belonging more especially to the realm of soul, is, nevertheless, as substantial a reality as the atmospheric air we breathe; and, indeed, the grosser element

is interpenetrated by this mystic ether. Its existence was believed in by the alchemists, to whom it was known as the *Anima Mundi*, or Azoth. See THEOSOPHY; also *The Mystery of the Ages*, by Maria, Countess of Caithness (1887), and Nizida, *The Astral Light* (1889).

Astringents, drugs which contract tissues, chiefly by coagulating albumin. When applied in the form of lotions or ointments, they reduce the congestion of mucous membranes, and thus assist in the healing of wounds and ulcers; when taken internally, they are useful in cases of hæmorrhage or diarrhœa. Ferric chloride, sulphate of copper, alum, nitrate of silver, tannic and gallic acids, have an astringent action. Another has quite recently been made from the adrenal bodies.

Astrolabe, an arrangement of rings representing the equator, prime meridian, ecliptic, etc., which was used by astronomers in the middle ages. Chaucer wrote a *Treatise on the Astrolabe* in 1391, which was edited by Professor Skeat for the Early English Text Society in 1872. An instrument used by mariners in the age of the great discoveries for ascertaining the altitude of the sun was also called an astrolabe. It consisted of a graduated disc with an alidade pivoted on the centre. See *S.G.M.*, vol. xiv. p. 357.

Astrology is the science whereby celestial phenomena are interpreted for the direction of mundane affairs. Originally identical with astronomy, the two sciences were long regarded as one. Astrology proceeds from the assumption that a careful study of the stars may serve to guide us through life as certainly as their observation guides the mariner at sea. The astrologer's judgment is founded on the configuration of the heavens at a given moment, and depends

principally on the seven planets (Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon), their 'aspects,' or the angles between them (conjunction, opposition, trine or 120° , quartile or 90° , sextile or 60°), and their positions among the 12 signs of the zodiac and the 12 'houses' of heaven. Each planet has one or two signs of the zodiac ascribed to him for his 'mansion,' and may be further 'fortified' by 'exaltation,' 'term,' 'triplicity,' or 'face;' or he may be weakened in his 'detriment' or 'fall,' or should he be 'retrograde,' 'combust,' or 'peregrine.' Among the planets, Jupiter and Venus are generally benefic, Saturn and Mars malefic. Of the aspects, sextile is good, opposition and quartile evil; conjunction is neutral. The 12 houses are equal divisions of the sky, 6 above the horizon and 6 below; and all save circumpolar stars necessarily pass once through each house every twenty-four hours. The first house, or 'the ascendant,' is that immediately below the eastern horizon, so that the stars in it are on the point of rising. The second follows immediately after; and so on to the sixth house, which contains the stars immediately below the western horizon. The seventh house is the first above the horizon, and contains the stars about to set; the eighth and ninth lie above it; and the tenth, in the 'mid-heaven,' contains the stars approaching culmination; while the eleventh and twelfth, containing stars recently risen, lie between the mid-heaven and the ascendant. The astrologer's first care would be to draw a figure of the heavens, visible and invisible, divided into 12 houses, and to mark on it the zodiacal signs and the planets at their proper places. This is called 'casting the horoscope,' or the 'nativity' if it refers to the birth of a child. He next observes

which sign is rising, and takes the planet whose mansion it is for the 'lord of the ascendant,' or the querent's significator. Then, if a significator is wanted for the quesited, or person inquired about, he looks to the sign in the proper house. Thus, the lord of the seventh would stand for the querent's wife, the lord of the fourth for his father, etc. When all the evidence has been carefully weighed, judgment may be given.

Astrology has now fallen into general disrepute. One must recollect, however, that the present reflection on astrology is not more conclusive proof of its fallacy than its former acceptance was of its truth. But even though astrology could be revived, the pretensions of modern astrologers must be abandoned. The discovery of Uranus and Neptune, not to mention the planetoids, placed them on the horns of a fatal dilemma. They might have denied the influence of the new planets altogether, but they preferred to find new influences for them. Thus they have confused the distribution of the 'mansions;' acknowledged, in effect, that up to 1845 (including all the centuries during which it was highly esteemed) the science was grossly delusive; and created the suspicion that, since new planets may be discovered at any time, we can never trust it again. Further complications have been introduced by the invention of new 'aspects,' lacking many of the geometrical properties of the old. Thus, the sesquiquadrate (135°) is not a division of the circle; and the quintile (72°) lies under the same reproach in respect of its supplement. It would seem, too, that astrologers are without the mathematical ability required to erect their 'houses' on a secure foundation, for a little knowledge of the geometry of the sphere reduces

the haphazard division of houses published in astrological tables to an utter absurdity. See Ptolemy's *Tetrabiblos*; Lilly's *Christian Astrology* (1647); Sibley's *Astrology* (1789); and, for modern astrology, Foulsham's publications and Meyer's *Handbuch der Astrologie* (1891).

Astronomer Royal, the official title of the head of Greenwich Observatory. He receives his appointment directly from the prime minister, and holds office by warrant under the royal sign manual. The late astronomer, Sir W. H. M. Christie, K.C.B., who retired on Oct. 1, 1910, was the eighth holder of the office since its establishment in 1675. He was succeeded by Mr. F. W. Dyson, formerly astronomer royal for Scotland and director of the Royal Observatory, Edinburgh. The corresponding office for Ireland is held by Professor E. T. Whittaker.

Astronomy first took definite shape in Babylonia, where, in the third millennium B.C., the sphere began to be measured, and the zodiac was delimited and divided. But it developed into a coherent science only through the formative influence of Greek genius. The theory of homocentric spheres, invented by Eudoxus of Cnidus (406-350 B.C.) and elaborated by Aristotle, represented a memorable effort to grapple with the problem of celestial movements. But the line of great astronomers started with Hipparchus (about 140 B.C.), whose adoption of the epicycles and eccentrics of Apollonius decided the plan of the great edifice raised by Claudius Ptolemæus three hundred years later. Even Copernicus did not attempt its subversion. He changed the point of view, but not the principle of interpretation. Ptolemy's *Almagest*, though undermined, stood erect until brought to the ground by the impact of Kepler's discov-

eries. Wren, Hooke, and Halley all divined the law of gravitation, but failed to apply it as the main-spring of the planetary machine. Newton came to the rescue; and his continental successors, Euler, D'Alembert, Lagrange, and Laplace, using the flexible methods of analysis, needed a full century to complete in its details the colossal work he had reared on a massive base. Laplace's *Mécanique Céleste* (1799-1805) was the complement to Newton's *Principia* (1687), and presented astronomy under the aspect of a solved mechanical problem.

Meanwhile, descriptive or telescopic astronomy, initiated by Galileo (1564-1642), was assuming predominant importance through the labours of William Herschel (1738-1822). Attention had until then been concentrated on the solar system, stars and nebulae being regarded incidentally. Herschel originated their systematic study, which prescribes the leading methods of modern astronomy.

A typical 20th-century observatory combines astrophysics with astrometry. Investigations into the nature of the heavenly bodies proceed side by side with determinations of their positions and movements. For the latter purpose the transit circle is essential. It consists of a telescope movable in the plane of the meridian, attached with a large graduated circle to a rigid horizontal axis. The culmination of a star is fixed by noting the successive instants of its transits across a set of vertical spider-lines, an electric chronograph serving as the recorder, while the corresponding declination is read off on the perpendicular circle. Fifty or sixty such complete observations constitute a good night's work, and the materials accumulated serve, when reduced and corrected, for the construction of star catalogues, and

for the improvement of solar, lunar, and planetary tables. Extra-meridional determinations of position on the sphere are made with the prime vertical, and the altitude and azimuth instruments; and the zenith telescope is used primarily for measuring star declinations, secondarily for investigating variations of latitude and the constant of aberration.

The relative situations of adjacent objects in the sky can be accurately ascertained by means of an equatorial and micrometer. A telescope is said to be equatorially mounted when it follows, actuated by clockwork, the diurnal revolution of the heavens. One of a pair of crossed axes, directed towards the pole, carries the 'hour circle;' the other, at right angles to it, supports the telescope and 'declination circle.' Any object with known co-ordinates can then, by setting the circles, be readily brought into the field of view; and to keep it there, it is only necessary to start a driving-clock, by which uniform rotation, once in twenty-four hours, is imparted to the polar axis. In the 'Coudé' form of equatorial, recently adopted at Paris, a revolving plane mirror reflects the objects to be observed into the tube of the telescope, which itself remains stationary.

Micrometers are of two principal types. In the first, fine wires are moved by delicate screws until they bisect the objects to be determined. This gives their distance apart; and the angle made with the meridian by the line joining them is learned by rotating the apparatus until the threads run parallel to that direction, and then reading the 'position circle.' Measures of double stars are always thus executed, while the heliometer gives the best results for stellar parallax. A heliometer is an equatorial with a divided object-glass: as the segments

slide apart, the image of each star or planet is duplicated, and the amount of displacement needed to produce coincidence between the opposite members of the pair of objects to be measured gives their angular distance on the sphere.

A profound change has been brought about in the scope, no less than in the methods, of astrometry by the adoption of the camera as an instrument of precision. Much progress has already been made with the preparation, at eighteen observatories, of a catalogue likely to embrace some 4,000,000 stars; and the corresponding chart of the sky will secure the identification of perhaps 30,000,000. Mainly photographic, too, was the remarkable solar parallax campaign of 1900-1, when combined determinations of the minor planet Eros were made at 58 observatories. Detected in 1898 by its motion-trail on a negative strewn with the round images of fixed stars, Eros proved to be the one known asteroid circulating nearer to the earth than Mars.

The characteristic astrophysical instrument is the spectroscope, or rather the spectrograph; for the spectra of the heavenly bodies are now ordinarily recorded photographically. (See SPECTRUM.) By means of spectroscopic investigations, the heavenly bodies have been assimilated chemically, as they were physically by the discovery of gravitation, to our common earth.

By the application of 'Doppler's principle,' the spectroscope has been made available for determining the radial movements of celestial objects, and in this novel research astrometry and astrophysics find common ground. The direct use of the telescope supplies only the component of velocity at right angles to the visual line; the other remained undetermin-

able until Sir William Huggins, in 1868, succeeded in measuring the line-displacements in stellar spectra depending upon the approach or recession of the stars themselves. The effect is similar to that of motion upon sound, exemplified by the rise and fall in pitch of a steam-whistle as a train dashes past a stationary auditor. The method has afforded valuable information regarding the sun's rotation, cyclonic velocities in prominences, and the constitution of Saturn's rings; and it obtained a vast increase of refinement through Vogel's substitution, in 1887, of photographic for visual measurements of motion-shifts. Remarkable discoveries have resulted from these researches. Double stars, revolving too close together for telescopic separation, disclose their nature through the evidence of rapid periodic motion legible in their spectra. 'Spectroscopic binaries' are very numerous; nearly threescore are already known, and the list continually lengthens. Professor Campbell estimates that one star in five or six is double. These wonderful systems are held to be in the most primitive stage of development: their members sometimes revolve almost in contact, but will, according to Dr. See, gradually withdraw from one another under the influence of tidal friction; yet many of them, though very large, are non-luminous. A certain proportion, moreover, are subject to eclipses, because circulating in a plane that passes approximately through the earth. Twenty-five or twenty-six occulting systems have been recognized.

Systematic determinations of stellar radial movements are, or will shortly be, carried on at Potsdam, Pulkowa, and Lick, at the Yerkes Observatory near Chicago, and at the Royal Observatory, Cape of Good Hope. They are mainly designed for the pro-

motion of knowledge regarding the mechanism of the sidereal universe, but their by-products in the detection of individual stellar systems are of more immediate, if less sublime, interest.

The 'double-slit' method, suggested by Janssen in 1869, was, in 1891, successfully applied by Hale and Deslandres to the photography of solar prominences and faculæ. The power which it gives of isolating any given quality of light supplied the means of turning to account for their portrayal the singular vividness, in those objects, of the violet rays of calcium. Professor Hale devised a special instrument—the 'spectroheliograph,' now installed at the Yerkes Observatory—for the purposes of this novel kind of photography. Other instruments in astrophysical use are heliostats, for throwing the light of a moving object into a fixed telescope; bolometers, for exploring the invisible heat spectrum; concave gratings, by which rays are simultaneously concentrated and analyzed; galvanometers, refractometers, photometers, comparators. Photometric researches have been extensively prosecuted, under the direction of Professor Pickering, at Harvard College Observatory, and at its southern station in Peru, with the result that the relative lustre of all the stars in the sky down to and even below the seventh magnitude is now very exactly known. A similar but more limited photometric survey has been completed at Potsdam. The equalization of the compared images is effected, at both establishments, by means of a polarizing apparatus.

Portrait lenses of short focus are used for photographing the Milky Way and finding the utmost extension of diffused nebulosity. Lenses, on the other hand, of great focal length are used in

eclipse photography to record the details of structure in the sun's corona, and for the direct scrutiny of the lunar surface. In the portraiture of nebulae reflectors are found, in general, to give better results than refractors; and their natural achromatism recommends them for employment in certain branches of sidereal spectroscopy. Refractors do not, like reflectors, lend themselves indifferently to visual and photographic use; and so greatly has the latter come to preponderate, that large object-glasses are frequently, by correction for the actinic rays, rendered unserviceable to the eye.

At the opening of the 19th century astronomy seemed almost a completed science. Now problems are numerous and insistent. A few out of the multitude may be specified. Taking first those that relate to the earth, we encounter Dr. Johnstone Stoney's theory, still *sub judice*, of the selective dissipation of planetary atmospheres. Their composition, if it be true, depends upon the mass of the globes they encompass; and the earth, though capable of holding oxygen and nitrogen, was helpless to control the swifter velocities of hydrogen molecules, and may also have been obliged to surrender a primitive helium envelope. Another question of profound interest relates to the nature of the solar influence upon terrestrial magnetism. Sun spots, auroræ, and magnetic disturbances obey an identical period. What is the common cause that determines their cyclical vicissitudes?

The sun itself presents a crowd of pending problems, now being investigated by an International Association for Solar Research. His peculiar mode of rotation; the level of sun spots; the constitution of the photospheric cloud-shell, its relations to the faculae which rise from it, and to the surmounting vaporous

strata; the nature of prominences; the alternations of coronal types; the affinities of the zodiacal light—all await investigation. And the importance insensibly accruing to inquiries into the functions of cosmical electricity is significant as to the line which such investigations must take. Provisionally, at least, the forms of all bright comets and of some nebulae, as well as the marvellous traceries in the solar corona, may be ascribed to electromagnetic influences; and a multitude of spectral phenomena can be elucidated only by the study of electrical discharges in high vacua, and of the modifying effects upon light-emission of a powerful magnetic field.

The origin of meteors, and the part played by them in the scheme of things, are still largely enigmatical. The mystery of non-gaseous nebulae (which are the immense majority) has not been penetrated; every star cluster embodies a most formidable dynamical problem; while intrinsic stellar variability sets theory at naught. The sudden apparitions of new stars cannot be detached from the recurrent outbursts of those that are periodical; yet a harmonizing principle is difficult to find. Nor are the quick, punctual changes of cluster components less difficult to rationalize. The evolutionary history of the stars is likely to remain long in debate. It gives rise to most interesting considerations; and one of the prerequisites for its adequate treatment is to obtain complete experimental acquaintance with the spectrum of hydrogen.

The formidable topic of sidereal construction can be profitably discussed only in reference to the distances of the stars, their proper movements, the translation among them of the sun, their distribution in space, the structure of

the Milky Way, the relations of nebulae and clusters to that great annulus.

Astronomical enterprises tend more and more to assume an international character. England commands both hemispheres through the activity of the sister establishments at Greenwich and the Cape. The organization centred at Harvard College has been extended from pole to pole by the foundation of a post at Arequipa; and the recent dispatch, from the Lick Observatory, of an expedition to southern latitudes is a further sign of the desire to give the widest possible scope to research. The meeting of an astronomical congress at Gotha in 1789 was an early symptom of a social tendency among observers; and it took permanent form through the foundation, in 1820 and 1863 respectively, of the London and German Astronomical Societies. The wants, however, of a more general public are provided for by the British Astronomical Association in this country; abroad, by the Société Astronomique de France, the Urania Gesellschaft in Berlin, the Russian Astronomical Society, by the Astronomical Societies of the Pacific and of Toronto, and the Astronomical and Astrophysical Society of America. The Società degli Spettroscopisti Italiani is more special in its aims. Most of these bodies issue journals or memoirs; numerous periodicals, besides, are devoted to the interests of the science, such as the *Astronomische Nachrichten*, *Sirius*, *Himmel und Erde*, the *Bulletin Astronomique*, the *Observatory*, *Popular Astronomy*, and the *Astrophysical Journal*; news of discoveries is flashed round the globe from the 'Centralstelle' at Kiel.

Historical Works.—Grant's *Hist. of Physical Astronomy* (1852) is of standard authority; Sir George

Cornwall Lewis's *Astronomy of the Ancients* (1862) has permanent interest; Berry's *Short Hist.* (1898) and Clerke's *Popular Hist. of Astronomy during the 19th Century* (4th ed. 1902) supply recent information; Mädler's *Geschichte der Himmelskunde* (1873), Wolf's *Geschichte der Astronomie* (1877), and W. W. Bryant's *History of Astronomy* (1907) should also be consulted.

Handbooks for Practical Use.—Chauvenet's *Manual of Spherical and Practical Astronomy* (2 vols. 1893), Loomis's *Introduction to Practical Astronomy* (7th ed. 1894), Wolf's *Handbuch der Astronomie* (2 vols. 1893), W. W. Campbell's *Handbook of Practical Astronomy* (1891), Newcomb's *Compendium of Spherical Astronomy* (1906), Ball's *Spherical Astronomy* (1908) can be recommended; and as an encyclopædia of instrumental lore, Dr. L. Ambronn's *Handbuch der Astronomischen Instrumentenkunde* (2 vols. 1899).

Text-books for Students.—Barlow and Bryan's *Elementary Mathematical Astronomy* (2nd ed. 1892) is serviceable and compact; Young's *Elementary Astronomy* (1890), *Manual of Astronomy* (1902), and *General Astronomy* (revised ed. 1898) form an admirable series of graduated difficulty; Proctor's monumental *Old and New Astronomy*, ably completed by A. C. Ranyard in 1892, and Chambers's *Handbook of Descriptive and Practical Astronomy* (4th ed. in 3 vols. 1889-90), are instructive as regards traditional astronomy; while the astrophysical branch is included in Comstock's *Text-book of Astronomy* (1901). Airy's *Gravitation* and Herschel's *Outlines of Astronomy* are still invaluable aids to acquaintance with the theory of planetary perturbations.

Books for General Reading.—Sir Robert Ball's *Story of the Heavens*, frequently reissued, is of deserved popularity; Professor

Turner's *Modern Astronomy* (1901) appeals to a higher class of readers. Other works, variously meritorious, are: Newcomb's *Popular Astronomy* (2nd ed. 1883); Ledger's *The Sun: its Planets and their Satellites* (1882); *Concise Astronomy*, by A. M. Clerke, A. Fowler, and J. E. Gore (1898); Langley's *New Astronomy* (1888); H. A. Howe's *Elements of Descriptive Astronomy* (1898); *Stars and Telescopes* (1899), and *A New Astronomy* (1898), by David P. Todd; Gregory's *Vault of Heaven* (1893); and Meyer's splendidly illustrated *Weltgebäude* (1898).

Books for Amateur Telescopists.

—The first place is due to Webb's *Celestial Objects for Common Telescopes* (5th ed. in 2 vols. 1893); Admiral Smyth's *Cycle of Celestial Objects*, revised by G. F. Chambers in 1881, is brilliant, but less accurate; Denning's *Telescopic Work for Starlight Evenings* (1891), Fowler's *Telescopic Astronomy* (1896), Mary E. Byrd's *Laboratory Manual of Astronomy* (1899), Mee's *Observational Astronomy* (2nd ed. 1897), *Astronomy with an Opera Glass* (8th ed. 1902) and *Pleasures of the Telescope* (1901), by Garrett P. Serviss, Dunkin's *Midnight Sky* (1891), Noble's *Hours with a Three-Inch Telescope* (1886), and Ambrown's *Sternverzeichnis* (1907), a catalogue of all stars down to 6.5 magnitude, will also be found useful.

Works on Special Subjects.—

The sidereal heavens form the theme of Newcomb's *The Stars: A Study of the Universe* (1901); Clerke's *System of the Stars* (1890); of *Traité d'Astronomie Stellaire*, by Ch. André (2 vols. 1899-1900); *The Visible Universe*, by J. E. Gore (1893); and *Les Etoiles*, by Flammarion (1882). Stellar classification is ingeniously but unconvincingly treated of in Sir Norman Lockyer's *Meteoritic Hypothesis* (1890) and *The Sun's Place in Nature* (1897). The

solar constitution is dealt with in Young's excellent monograph *The Sun* (revised ed. 1897), and in Lockyer's *Chemistry of the Sun* (1887), enforcing the theory of celestial dissociation. Volumes on *The Moon*, by E. Neison (1876) and T. G. Elger (1896) respectively, describe the superficial features of our satellite. One of the best recent works on the subject is W. H. Pickering's *The Moon* (1903). The condition of individual planets is discussed in Proctor's *Saturn and its System* (1865), A. S. Williams's *Zenographical Fragments* (1909), Flammarion's *La Planète Mars* (1892), in Percival Lowell's clever but highly speculative *Mars* (1896), R. A. Gregory's *The Planet Earth* (1895), and in E. M. Clerke's pamphlets, *Jupiter and his System* (1892) and *The Planet Venus* (1893). The best modern work on comets is Chambers's popular *The Story of the Comets* (1909). Guillemin's *World of Comets* (1876) is out of date, and W. T. Lynn's *Remarkable Comets* (7th ed. 1899) is on a diminutive scale. It belongs to a capital set of booklets by the same author, diligently re-edited at short intervals, entitled severally, *Astronomy for the Young*, *Celestial Motions*, and *Remarkable Eclipses*. Particular stress is laid upon spectroscopic results in A. M. Clerke's *Problems in Astrophysics* (1902); and Scheiner's *Astronomical Spectroscopy* (Frost's trans. 1894) supplies a solid groundwork for the study of the newer methods. Kayser's authoritative *Handbuch der Spectroscopie* (2 vols. 1900-2), Scheiner's *Photographie der Gestirne* (1897), and Müller's *Photometrie der Gestirne* (1897) are of great technical importance. Valentiner's *Handwörterbuch der Astronomie* (1897, etc.) is a high-class work of reference; while G. H. Darwin's *The Tides and Kindred Phenomena in the Solar System* (1898) is both

popular and profound. Finally, children and beginners should read Miss Giberne's *Sun, Moon, and Stars* (revised ed. 1893), and *Radiant Suns* (1894), together with Sir R. Ball's *Primer of Astronomy* (1901), and *Star Land* (1900).

Astrophel (Gr. 'star-lover'), the name under which Sir Philip Sidney addressed his sonnets to Stella ('star') or Penelope Devereux. Spenser's *Astrophel* laments the death of Sir Philip.

Astruc, JEAN (1684-1766), physician and theologian, born in Languedoc. After studying medicine at Montpellier, he was appointed (1710) professor of anatomy at Toulouse, and then (1716) at Montpellier; finally he settled (1717) in Paris, where he became professor of medicine and consulting physician to Louis xv. European fame was gained by the publication of his medical researches, especially in venereal diseases, *De Morbis Venereis* (1736). To Biblical critics he is specially interesting as the anonymous author of *Conjectures* (in French, published in 1753, professedly at Brussels, but really at Paris) regarding the original (Jahvistic and Elohist) documents used by Moses in compiling the Book of Genesis. This work gave the clue to the critical analysis of the Pentateuch. See *Reformed Presbyterian Review for 1892* (full bibliography).

Astura, anc. tn., prov. Rome, Italy; stood on a promontory of the Mediterranean coast, 9 m. E. of Antium (now Anzio), at the mouth of the Astura R.; is known in history as a place of ill-fortune. Here Cicero had a villa, where (*Ep. ad Att.*, xii. 15) he spent many unhappy days; here the Emperor Tiberius contracted his last fatal illness; and here the last of the Hohenstaufen emperors, Conradin, was, in 1268, betrayed into the hands of his

enemies by Frangipani, the lord of the town. In requital of this treachery the Sicilians burned the town in 1286.

Asturias, principality, Spain; now the modern prov. of Oviedo. Since 1388 the heir to the thrones of Leon, Castile, and Spain has borne the title of Prince of the Asturias.

Astyages, son of Cyaxares, was the last king of Media, reigning from 585 to 550 B.C., when he was conquered and dethroned by Cyrus.

Asuncion, cap. of Paraguay, 50 ft. above the Paraguay R., on the E. bank, 827 m. from Buenos Ayres. Principal buildings—the Government House, cathedral, Lopez's palace, now occupied by the Bank of Paraguay, and the National College. The Central Paraguayan Railway runs into the interior, and tramways are laid to San Lorenzo, 10 m. to the S.E. Vessels anchor in three fathoms close to the shore. Asuncion was founded on the day of the Assumption of the Virgin (Aug. 15, 1537). There is a trade in tobacco, sugar, hides, and especially *maté*, or Paraguay tea. In 1869 the city was plundered by the Brazilians. Pop. 60,000.

Asylum. See LUNACY.

Asylums Boards. (I.) The METROPOLITAN ASYLUMS BOARD was appointed in 1867, by order of the Poor Law Board, under the powers conferred by the Metropolitan Poor Act, 1867, for the purpose of dealing with the relief of paupers in all the unions and parishes not in union, within the district, who are suffering from fever or smallpox, or are insane. Diphtheria was added by an act of 1889, which also authorized the admission of persons who are not paupers into the hospitals of the board. The district over which the board has control consists of what is now the administrative

county of London. By the Metropolitan Poor Act, 1869, guardians and managers of school and asylum districts were empowered to acquire and manage training ships for boys. Thus the Admiralty vessel the *Exmouth* is under the management of the Metropolitan Asylums Board. It lies at Grays, in Essex, and has accommodation for between 500 and 600 boys. For fever patients the board have 12 hospitals, two being for convalescing patients; two smallpox hospitals, both at Dartford, Kent; and a smallpox convalescent hospital at Gore Farm, Dartford, Kent, which has at times been used as a convalescent hospital for fever cases. Smallpox cases are provided for in two hospital ships—the *Castalia* for men, and the *Atlas* for women. For imbeciles the board have five asylums—Leavesden (Herts), Caterham (Surrey), Darenth (Kent), and Tooting Bec (opened in 1903), for adults; and Rochester House, Ealing, for children. The insane paupers dealt with by the board and admitted into their asylums are harmless persons of the chronic imbecile class who could lawfully be detained in a workhouse. (2.) The LANCASHIRE ASYLUMS BOARD, for the management of asylums in the county of Lancashire, consists of representatives of the County Council and the councils of most county boroughs in the county. For details as to its constitution, etc., see the Lancashire Lunatic Asylums (and other powers) Act, 1891. See LUNACY AND THE LUNACY LAWS.

Asymptotes (Gr. 'not coinciding') are lines which continually approach a curve, but which, though they and their curve were infinitely continued, would never meet, and may be conceived as tangents to their curves at an infinite distance. They may be rectilinear or curvilinear. See CURVE.

Asyndeton (Gr. 'not bound together'), a figure of speech consisting in the omission of the usual connectives, as in the famous *Veni, vidi, vici*, 'I came, I saw, I conquered.'

Atabapo. See ORINOCO.

Atacama, prov. Chile, having Antofagasta on the N., Coquimbo on the S., and the Argentine on the E. The prov. is mostly unfertile but is rich in minerals, including silver, copper, gold, nickel, and iron; the salt and saltpetre deposits are very extensive. Area, 30,720 sq. m. Pop. 65,000. Cap. Copiapo.

Atacama Desert. A region of N. Chile, embracing the littoral of the provs. of Atacama and Antofagasta. From the coast it rises in terraces crossed by numerous ridges up to the Cordillera Real, and covers some 77,000 sq. m. Between the ridges are dry, sandy plains, several being the beds of dried-up lakes. The Oruro (Titicaca)-Antofagasta Ry. carries to the coast nitrate, the products of the silver mines of Caracoles, lying on the flank of the cordillera 22 m. from Sierra Gorda, and the borax from Carcote and from Lake Ascotan, a basin, 25 m. long by 4½ m. wide, covered with a dazzling white deposit of salt, borax, sulphate of lime, etc. See Pissi's *El desierto de Atacama*; *Anal. Univ. Chili* (1877).

Atacamite, the native hydrous oxychloride of copper, a not uncommon mineral in veins of copper ores, and usually a decomposition product. It is green or dark green, soft (hardness = 3), with a vitreous lustre, and crystallizes in the rhombic system. When a fragment is heated before the blowpipe it colours the flame cornflower blue (chloride of copper).

Atahualpa (d. 1533), a son of Huayna Capac, the great Inca emperor of Peru. On the death of Huayna Capac (1525) a struggle for power began between Ata-

hualpa and his half-brother Huascar, who had succeeded to the throne. This civil war ended in the complete victory of Atahualpa, and he was the recognized emperor of Peru when the memorable meeting took place between him and Pizarro at Caxamarca (1532). To the demands of the Spanish leader that he should accept Christianity and become the vassal of Charles v. the Peruvian monarch naturally returned a direct refusal; whereupon the Spaniards seized the Inca, and massacred hundreds of his unsuspecting followers. On Aug. 29, 1533, Atahualpa was executed, after a mock trial. See Prescott's *Conquest of Peru*.

Atakpame, tn. in the hinterland of Togoland, German S.W. Africa, 90 m. from the coast; has extensive rubber trade. Pop. about 10,000.

Atalanta. (1.) The Arcadian Atalanta is said to have been the daughter of Iasus and Clymene: her father exposed her on the Parthenian (virgin) hill; she was suckled by a she-bear. She took part in the hunt of the Calydonian boar (see Swinburne's *Atalanta in Calydon*). When her father wished her to marry, she made it a condition that every one of her suitors should compete with her in a foot-race. As she was the swiftest of mortals, she was only beaten by Milanion, thanks to his dropping, one after another, three golden apples, which she stopped to pick up. She and her husband were turned into lions for having defiled with their embraces a sacred grove of Zeus. (2.) The Bœotian Atalanta was a daughter of Schœneus, and married Hippomenes. The same stories are told of her as of the Arcadian Atalanta. It is certain that in both cases Atalanta is only another form of Artemis. For the story, see Ovid's *Metamorphoses*, bk. x.; and as to her con-

nection with Artemis, Farnell's *Cults of the Greek States* (1896).

Ataman. See HETMAN.

Ataulf (d. 415?), king of the Visigoths; succeeded his brother-in-law, Alaric I. (411), and laid the foundations of the great West Gothic kingdom. He conquered Aquitaine, and married a sister of Honorius. He was assassinated at Barcelona.

Atavism, the inheritance from a more or less remote ancestor of any bodily or mental quality which has failed to show itself in intervening generations. In sociological writings the term is commonly employed by Lombroso and other criminologists of the Italian and French schools to denote reversion to a more primitive type, as an explanation of criminal instincts and other pathological aberrances. See HEREDITY.

Ataxia, term applied to irregularity of co-ordinated muscular movements, especially in the lower limbs. It is sometimes used as synonymous with the disease locomotor ataxy, or tabes dorsalis, in which a failure of co-ordination in the lower limbs is an early and prominent feature.

Atbara, trib. of Nile, Egypt; has its source in the mountains to the n.w. of Lake Dembea or Tsana, in Abyssinia, and flows in a n.w. direction through S. Nubia, and joins the Nile at El Damer. Its chief tributaries are the Takazze and Mareb. In its course of some 700 m. it passes the towns of Tomat and El Fasher, to which the river is navigable from June to September. A barrage has been constructed across the river near its junction with the Nile, in order to regulate its flow and to keep out the Nile flood from its valley. At the Atbara, on April 8, 1898, General Kitchener defeated the Khalifa's force.

Atchafalaya Bayou, a river of Louisiana, U.S.A., near the junction of the Red R. and the

Mississippi. It takes the flow of the former, and when the latter is in flood supplies are received from it also. It enters the Gulf of Mexico, 150 m. w. of the mouth of the Mississippi, through Atchafalaya Bay. It is 225 m. long, and is navigable for steamboats.

Atchin, ACHIN, or ATJEH, a residency of the Dutch E. Indies, embraces the N. portion of Sumatra—the boundary on the w. coast beginning at 2° 53' N. lat., and on the E. coast at 4° 32', and running over the interior, between these two points, in an irregular line. The interior forms a continuation of the highlands of the Batak region. (See SUMATRA.) This area is about 20,550 sq. m., and the population is approximately 110,000, not counting the inhabitants of the unknown interior. The Atchinese down to 1878 maintained themselves as an independent state, and from 1873 to 1899 stubbornly withstood the efforts of the Dutch to subdue them, though in the latter year their power was finally broken, and Dutch rule firmly established, by General van Heutsz. The ethnological relations of the Atchinese are not conclusively established; as a race they are thick-set, and their skin is of a darker colour than the skin of the Malays. They work gold and iron (into weapons), manufacture silk and pottery, carry on fishing, and engage in trading. Pepper, rice, betel, and tobacco are exported. The principal towns are Kota Raja, or Atchin, with its port, Olehleh; Segli, on N. coast; Edi, on the E.; and Malabuh, or Analabu, on the w. coast. See Veth's *Atchin* (1873) and Snouck's *De Ajehers* (1893-5).

Atchison, city, Kansas, U.S.A., the co. seat of Atchison co., on the Missouri, about 50 m. N.W. of Kansas City, named after David Rice Atchison (1807-86), a prominent pro-slavery politician, who

was twice president *pro tem.* (1846-49 and 1852-4). It has three colleges, and is an important commercial and distributing centre. Pop. 18,000.

Atchison, or ATCHESON, a copper coin plated with silver, and named after one Atchison, assay master of the Edinburgh mint under James VI. when it was coined. Its value was 8d. Scots, or two-thirds of an English penny.

Atchison, Topeka, and Santa-Fe Railway runs through the American states of Illinois, Iowa, Missouri, Kansas, Oklahoma, Texas, Louisiana, Colorado, Nevada, and California, and territories of New Mexico and Arizona. The railway proper covers 7,438 m., but there are other lines included in the system, which brings up the whole to 9,792 m. The company fell into the hands of receivers in 1893, but was reorganized in 1895-6. Since August 1900 full dividends at the rate of 5 per cent. per annum have been paid on the preferred shares. On the common shares, dividends at the rate of 4 per cent. per annum were paid in the years 1902 to 1906, when the semi-annual rate was increased to 2½ per cent.; from June 1907 to June 1908 6 per cent.; and from the latter date to December 1909 at the rate of 5 per cent. per annum. In December 1909 a semi-annual dividend of 3 per cent. was paid; and in March, June, and September 1910 quarterly dividends of 1½ per cent. each.

Ate, an ancient Greek divinity, daughter of Eris (Strife) according to Hesiod, and of Zeus according to Homer. In the tragic poets, particularly in Æschylus, she is regarded as the power which avenges sin on its doers, and so becomes almost identical with Nemesis (Vengeance) and Erinnys (the Fury).

Atef Crown, a symbolic head-dress worn by Egyptian deities,

consisting of the tall white cap of Upper Egypt, flanked with two plumes, and bearing the solar disc and uræus in front.

Ateles. See SPIDER MONKEY.

Ateliers Nationaux. See SOCIALISM.

Atellanæ Fabulæ, so called from Atella, a town of Campania, and also known as *Ludi Osci*; a kind of unpolished popular drama which was performed in Roman theatres, in the Oscan dialect, to excite the laughter of the more cultured Romans. The most popular characters, Maccus and Bucco, were probably the origin of the modern harlequin.

A tempo, or A TEMPO PRIMO, in musical score, denotes a return to the original time after any acceleration or retardation. *A tempo giusto* means 'in just, marked, or proper time.'

Ateshgah (the 'place of fire') locality on Apsheron peninsula, Caspian Sea, 15 m. N.E. of Baku. Centre of petroleum oil wells, and anciently a place of Zoroastrian fire-worship.

Atessa, tn., prov. Chieti, Italy; stands on the eastern slope of the Apennines, 26 m. S.S.E. of Chieti; manufactures sausages (*salami*) and woollens. Pop. 11,000.

Ath, tn., prov. Hainault, Belgium, 32 m. by rail S.W. of Brussels; is the seat of cotton industries, the manufacture of cutlery, machinery, gold and silver wares, brewing, and lime-burning. Pop. 12,000.

Athabaska. (1.) Formerly a district, then a territory, of N.W. Canada, between W. long. 100° and 120° and N. lat. 55° and 60°, with an area of 251,300 sq. m. In 1905 that portion of it which lies west of 110° W. was assigned to the province of Alberta, and the part lying E. of the meridian was given to the province of Saskatchewan. See ALBERTA and SASKATCHEWAN. (2.) RIVER (or *La Biche*, 'red-deer or elk river'),

Canada, rises in Alberta, E. of Mt. Hooker, and flows N.E. in a deeply-cut valley for 60 m. through a mountainous and heavily-wooded country. At Athabaska Landing, an important Hudson Bay station, 80 m. N. of Edmonton, the river bends to the N., and becomes navigable for stern-wheel steamers drawing 2½ to 3 ft. as far as Grand Rapids, a distance of 166 m. From this point to Fort M'Murray, 85 m. to the N., the river drops 360 ft., and is impeded by rapids and falls. From Fort M'Murray to its mouth in Lake Athabaska, a distance of 200 m., the river is again navigable. Its total length is some 550 m. (3.)

LAKE, in the provs. of Alberta and Saskatchewan, Canada, is about 200 m. long and from 5 to 35 m. broad, with an area of 2,850 sq. m. It is navigable throughout. The shores are rocky, and unfit for cultivation. The lake has its outlet at its W. end, in the Slave R., which flows northwards.

Athaliah, daughter of Ahab and Jezebel, married Jehoram, king of Judah. On the death of her son Ahaziah, she caused all the royal male children to be put to death—Joash alone escaping—and usurped the crown, which she wore for six years (841–836 B.C.). At the expiry of this period Joash was made king, and Athaliah perished in a tumult. (See 2 Kings 11; 2 Chron. 22 *f.*) Handel and Mendelssohn have treated the subject musically, and Racine's drama *Athalie* is founded on the story.

Athamas, son of Æolus and Enarete, married the goddess Nephele, but secretly loved Ino, daughter of Cadmus, and by her had two sons, Learchus and Melicertes. Discovering this, Nephele returned in anger to heaven, and demanded the sacrifice of Athamas, who thereupon became mad and killed Learchus. Ino and Melicertes, to escape from him,

threw themselves into the sea. Athamas had to flee from Bœotia, and settled in Athamania.

Athanasius (d. 381), king of the Visigoths, waged war against the Emperor Valens, but was defeated (369). In 374 the Gothic empire was invaded by the Huns, and the Goths were allowed by Valens to settle in Mœsia. Athanasius, however, defended himself in the mountains of Dacia, but was forced to ask the protection of Theodosius (380) at Constantinople, from whom he received most favourable treatment.

Athanasian Creed. See CREEDS.

Athanasius (c. 296-373) was born at Alexandria. Early in life he attracted the attention of Bishop Alexander, by whom he was in due course ordained. In 325 he was with this bishop at the Council of Nice, at which about 300 bishops, nearly all belonging to the east, were assembled to deal with questions which had arisen over the teaching of Arius, already locally condemned by councils at Alexandria in 315 and 319. Athanasius, at this time about twenty-nine, and in deacon's orders, displayed at the council something of those unusual powers of mind and determination which afterwards established him as the champion of the orthodox faith. His characteristic doctrine of the consubstantiality of the Father and the Son was conditioned by his conception of redemption. Redemption, he contended, must be the work of God, not of any created being. But, since God is a unity, the Son, who redeems, must be of the same essence, substance with the Father. He is, therefore, not created, but eternally generated within the eternal Father, in the sense of participating in the whole essence or nature of the Father (*homoousios* in contrast to the *homoiousios* of Arius—of a like substance.) All

representations of Christ as a creature, in the New Testament writings, refer, he held, to His human nature. When he returned to Alexandria he was elected by acclamation bishop, in room of Alexander, who died four months after the conclusion of the council. After the death of Helena, the Emperor Constantine was influenced in favour of the Arians, and Arius brought with him to Alexandria the imperial command that he should be admitted to communion. Athanasius refused, and, though for the moment successful in his attitude of stern resolve to uphold orthodoxy at any cost, was made the victim of cabals against him by the opposite party, who obtained his banishment to Trèves. The wheel again turned in his favour after Constantine's death, and he made a triumphant return to Alexandria. Constantius, however, was with the Arians, and Athanasius was driven to seek refuge at Rome. The Council of Sardica endorsed the decision of a provincial council at Rome in Athanasius's favour. In 349 he was again in his episcopal seat at Alexandria. In the meanwhile Arianism spread under the patronage of Constantius, and again Athanasius was driven into exile. Under Julian he returned in 361, but was soon involved in a struggle with the pagan party, and again fled. In 363 he was restored, only to be driven out by Valens in 367. The popular voice in this case restored him, and he remained undisturbed till his death in 373. '*Athanasius contra mundum*' became a proverb. Nor were his labours in vain. Arianism had nearly triumphed, and it needed a man of exceptional resolution to turn the tide. See *Select Works and Letters of Athanasius*, ed. by Robertson, with translations on Nicene and Post-Nicene Fathers (1892); Harnack's *Outlines of the History of Dogmas* (1893).

Athapaskan or ATHABASKAN INDIANS, sometimes known as Tinné or Dinné, a large linguistic family formerly called Chippe-wayans. The main body occupies all the interior of Canada from Hudson Bay to Alaska, and from the Saskatchewan north. A branch of this stock is found in California (see HUPA), and other branches are found near the Rio Grande (see NAVAJO, APACHE, and JICARILLA). Most of the northern bands occupy the forests of the Mackenzie River basin, and live by hunting and fishing. See Mackenzie's *Voyages from Montreal, etc.* (1801); Brinton's *The American Race* (1901); Buschmann's *Der Athapaskische Sprachstamm* (1856).

Atheism is the formal opposite of theism. It is a distinct denial of God's existence, whether as a thing without *evidence* or as *disproved*. Few men have accepted the position of atheists, thinking it odious, and perhaps dangerous. Whatever be true of Democritus, his successor in Greek atomic speculation, Epicurus, provided a theory of otiose gods who were indifferent to human welfare or sin. This, no doubt, is practical atheism. It recalls the 'atheistic religion' of Buddha, who verbally, and perhaps in earnest, admitted the existence of gods, but taught that they too needed salvation from the evil of life, and that each man or god must save himself. As is our view of theism, so will be our definition of atheism. The early Christians were called atheists because they set aside the mythology and superstition of their time. When Spinoza is called an atheist by the sceptics Bayle and Hume, their criticism is apt to be endorsed by those who miss in Spinoza's teaching the possibility of communion with a personal God. His defenders—Novalis ('Spinoza is a God-intoxicated

man'), Schleiermacher, Goethe, Hegel—test him by a different standard, namely, the philosophical depth of his thought of the infinite substance; and in that, of course, he excels. It is hardly necessary to add that Spinoza is properly a pantheist. Comte's refusal to be called an atheist (or a materialist) is stranger, since he regards the theological and metaphysical stages of thought as both thoroughly obsolete. He speaks, no doubt, as an agnostic; he is himself fully alive to the difficulties of atheism, summed up by Bacon: 'I had rather believe all the fables in the Legend, and the Talmud, and the Alcoran, than that this universal frame is without a mind.' Voltaire, too, was as much in earnest as it was in his nature to be when he wrote the line: 'Si Dieu n'existait pas, il faudrait l'inventer.' Still, there have been dogmatic atheists—generally materialists. Materialism is the one dogmatic theory of the universe which justifies atheistic denial. At the present day agnosticism is in fashion rather than materialism, mainly through the influence of the negative side of Kant's thinking. It is equally dogmatic with atheism, for it tells us that *men never can know* ultimate truth; but it regards atheism and theism as kindred extravagances. Practically, such agnosticism differs little from atheism. See Flint's *Anti-Theistic Theories* (1885).

Athelney, a vil. and par. in Somerset, England, 9 m. E.N.E. of Taunton. The district to the N., known as Athelney Isle, and nearly surrounded by the Parret and Tone, is famous in history as the place of retreat of Alfred the Great in 879, before the Danish onslaught. The 'Alfred jewel,' which is now in the Ashmolean Museum, Oxford, was discovered at Newton Park, in the vicinity, in 1693.

Athelstan, king of the English (895-940), was a son of Edward the Elder, and therefore grandson of Alfred the Great. He succeeded his father in 925, and extended still further the sway of his dynasty, obtaining many victories over the Welsh of Devonshire, Cornwall, and Wales proper, and defeating the Northumbrian Danes and their northern and Irish allies at the battle of Brunanburh (937). Athelstan was king of the English, instead of merely king of the West Saxons, as his father had nominally been. See the *Anglo-Saxon Chronicle* and Freeman's *Old English Hist.* (1869).

Athena, or ATHENE, also PALLAS ATHENE, or PALLAS, one of the greatest of the Greek divinities, was the daughter of Zeus (Jupiter) and Metis (Counsel); but she was born from her father's head, because, having been warned that any child born of Metis would overthrow its father, he enticed Metis to transform herself into a fly, and then swallowed her. Her parentage indicates her character: she represents a combination of might and wisdom. Although her worship was spread through Greece, it was at Athens that she was revered with the deepest devotion. She is described as the patroness of agriculture, city life, war, and the industrial arts. She was held to have taught mankind the use of the plough; but her chief boon was the creation of the olive tree. There is a legend that Athena and Poseidon were contending for the possession of Attica. Poseidon offered the people a horse, which was his creation; but the olive of Athena carried the day. It is, however, in her aspect as Athena Polias, the goddess of the city, that she was specially venerated at Athens: to her Æschylus attributed the establishment of the court of the Areopagus. As the goddess of war she differs greatly

from Ares, who personifies the lust of battle; she is rather the deity of civilized warfare. The arts of weaving and spinning were especially attributed to her teaching. Though a maiden goddess, Athena is so rather because of the essentially unfeminine nature of her characteristic occupations; under this aspect she was revered as Parthenos at Athens, but her worship set up no ideal of chastity. It was as the goddess of public law and political virtue that she influenced the Greek mind. In the myths, we find that in the war with the giants she buried Enceladus under Sicily, and slew Pallas; in the Trojan war she favoured the Greeks, and especially protected Achilles, Diomedes, and Odysseus. She was represented in ancient art with a serious countenance and a somewhat masculine figure, wearing the helmet, the ægis, and a shield with the Gorgon's head; she is invariably clothed. Phidias made three famous statues of her—one of ivory, ornamented with gold, 30 ft. in height, which stood in the Parthenon; a second, still larger, of bronze, which stood on the Acropolis; the third a small bronze statue, called the Lemnian, because dedicated by the Lemnians at Athens. Athena is also known under the title Hippias, as the tamer of horses; Nike, as the goddess of victory. The Romans identified the Etruscan goddess Minerva with Pallas.

Athenæum. (1.) The Athenian temple of Pallas, where poets and philosophers met to read their works. (2.) A school founded by the Emperor Hadrian at Rome, on the Capitoline Hill. It appears to have maintained its reputation until the 5th century A.D. See A. S. Wilkins's *Roman Education* (1905).

Athenæum, THE, an English weekly journal of literature, music, science, and the fine arts,

was first published on Jan. 2, 1828, by J. Silk Buckingham. Dr. Stebbing and Charles Knight were among the first contributors, and the former soon became real editor. On July 30 the *Athenæum* was united with the *London Literary Chronicle*, and the united journals were purchased by a group of friends, chief among whom were John Sterling and F. D. Maurice. The latter filled the editorial chair until May 1829, when he was succeeded by Sterling. The most noteworthy feature of Sterling's term of office was the warm welcome extended to Tennyson's *Timbuctoo* in the issue of July 22. The magazine was, however, in a very bad way financially when, on June 5, 1830, Charles Wentworth Dilke took on himself the editorship and sole control of the journal. In 1831, John Francis, future publisher of the paper, joined the staff as junior clerk, and was quickly entrusted with the entire business management. Among the contributors at this period were Elizabeth Barrett, Walter Savage Landor, and Thomas Carlyle. Charles Lamb contributed both prose and verse; and the other writers embraced John Hamilton Reynolds, Tom Hood, William and Mary Howitt, William and Thomas Roscoe, Allan Cunningham, Bryan Waller Procter, and Harriet Martineau. Dilke was succeeded in the editorship in 1846 by T. K. Hervey, who occupied the post until 1853, when he was succeeded by W. Hepworth Dixon. On the retirement of the latter in 1869, he was followed by Norman MacColl. During this epoch the *Athenæum* played a prominent part in the agitation for the repeal of taxes on knowledge. Its pages included numerous historical articles by Dr. Doran, and scientific articles by Professors Hunt and De Morgan, besides contributions from

John Rutter Chorley (the Spanish scholar), Howard Staunton, Henry Clarke Barlow (the Dante student), Professor Conington, James Cotter Morison, George Smith (the Assyriologist), H. T. Riley, John Bruce, G. W. Thornbury, and Christina Rossetti. From 1833 to 1868 the musical department of the journal was under the charge of Henry F. Chorley. More recent contributors include Austin Dobson, Algernon Charles Swinburne, Theodore Watts-Dunton, F. H. Groome, Andrew Lang, Joseph Knight, and Arthur Symons. Mr. MacColl retired from the editorship at the end of 1900, and was succeeded by Mr. Vernon Rendall. The policy of the *Athenæum* is that of sound intellectual culture. Its criticism is never severe merely for the sake of severity; it exercises a wise and scholarly discretion in its pronouncements. Its scientific, musical, and dramatic notices are as authoritative as its literary critiques. The history of the *Athenæum* up till 1882 is contained in *John Francis: a Literary Chronicle of Half a Century*, by his son, J. C. Francis (2 vols. 1888); also *Athenæum*, Jan. 1, 1898.

Athenæum Club was instituted in 1824 by the Right Hon. J. W. Croker, Sir T. Lawrence, Sir Humphry Davy, and others, for the association of persons of scientific, literary, and artistic attainments, or liberal patrons of learning. The club-house, 107 Pall Mall, London, of Grecian design, was built in 1829-30, and has a frieze which is an exact copy of that of the Parthenon at Athens. It has the finest club library in Europe. There are 1,200 ordinary members. The entrance fee is thirty guineas, and the annual subscription eight guineas. The committee has the power of electing annually not more than nine persons of eminence in science, litera-

ture, or the arts, or for public services. See Waugh's *Athenæum Club and its Associations* (1900).

Athenæus (c. 230 A.D.), a native of Naucratis, in Egypt, was a man of great learning, but is only known to us by his work, the *Deipnosophistæ*, or *Banquet of the Learned*. The work is clumsily arranged, but is of great interest, owing to its illustration of ancient manners, its collection of curious facts, and, above all, to its abundance of quotations from some 800 authors, of whose works these fragments are in many cases the sole examples extant. Editions, Schweighäuser (1801-7), W. Dindorf (1827), Kaibel (1887-90), G. Dindorff (1896); Eng. trans. 1854.

Athenagoras, an Athenian philosopher and Christian apologist. In his apology, *Legatio pro Christianis* (177), he refutes the accusations of atheism, cannibalism, and licentiousness brought against the Christians, and attacks pagan institutions. See Roberts and Donaldson's *Ante-Nicene Christian Library* (1867-72). The best edition of his works is in Von Otto's *Corpus Apologetarum Christianorum Sæculi II.*, vol. vii. (1857).

Athens (*Athēnai*), the most distinguished city of ancient Greece, and capital of the modern Greek kingdom, lies in the peninsula of Attica, about 4 m. from the s.w. coast, on a group of limestone hills between Cephissus and Ilissus valleys. The central hill (512 ft. high, 300 ft. above the town) forms a precipitous citadel, the Acropolis. Mars' Hill, or Areopagus (375 ft.), lies close below to the n.w., and Museion Hill, Pnyx, and Nymph Hill from w. to s.w., about $\frac{1}{4}$ m. away. North-eastward, the conical Lycabettus (910 ft.) has always lain outside the city, and has no part in its history.

The earliest settlements were on the Acropolis (traditionally

founded by Cecrops), and close below it to the s. and w. (ascribed to Theseus, the unifier of Attica). Parts of the so-called Pelasgic Wall remain, and numerous relics of the Stone and Bronze Ages. To the period of the early Iron Age belong the Dipylon cemetery, the massive substructures of the Pnyx, and the early orchestra below the theatre. The economic reforms of Solon (594 B.C.) and the splendid tyranny of Pisistratus (560-527 B.C.) raised Athens to the first rank of culture, industry, and trade; large suburbs spread s.e. towards Ilissus, and n.w. beyond the market place (Agora) and public offices (Prytaneion), which lay n. of the Agora, to join the potters' quarter (Ceramicus), whose wares outsold those of Corinth and Ægina, from Cyprus to Etruria. New temples rose to Zeus Olympius near Ilissus, and to Athene on the Acropolis; a great conduit brought Ilissus water into the old town; and much gorgeously-painted sculpture of this era survives in the museums. The constitution of Clisthenes (506 B.C.) gave freedom at home, and the naval reform of Themistocles (483 B.C.) led to the establishment of an arsenal at Piræus and an efficient fleet.

After total destruction by Xerxes in 480 B.C., Athens was splendidly restored. The walls, hurriedly built by Themistocles (479-470 B.C.), still visible near the Dipylon Gate, enclosed a nearly circular area three-quarters of a mile across. The Acropolis was enlarged by embankments of débris, and wholly refortified by Cimon (470-460 B.C.), the organizer of the Delian League. Under Pericles's administration (460-429 B.C.) the Long Walls (458 B.C.) enclosed a new suburb, Coilé, s.w. of Pnyx, and united Athens securely with Piræus. On the

Acropolis a new temple to Athena, the Parthenon, was begun by Ictinos and Callicrates (454), and completed (438); and a great gateway (Propylæa), begun by Mnesicles (437), was left unfinished (432). The so-called Theseion, near the Agora, the best-preserved temple in Greece, is of the same date and of Doric style. To the period of the Peloponnesian war (432-404) belong the Erechtheion, on the Acropolis, and the Niké Temple at its entrance, both in Ionic style. The capitulation of 404 and the dissolution of the Delian League affected only the political prestige of Athens; her supremacy in art and letters remained unquestioned, and her industry and trade increased. Even in 404 the city contained 10,000 houses, and an estimated population of 300,000. To the 4th century belong the completion of the great theatre, and the sanctuaries of Dionysus and Asclepius (all south of the Acropolis), together with the fine monument of Lysicrates (in Corinthian style, close by), and numerous sculptured tombs by the Dipylon Gate. From the time of Alexander (d. 322) to the Roman conquest (146) Athens was unimportant politically. But her population in 317 (21,000 citizens, 10,000 resident aliens, 400,000 slaves) indicates her material prosperity; and her pre-eminence as a centre of learning and culture is reflected in the monuments of her patrons—the college and library of Ptolemy II. of Egypt (287-47), the Stoai of Eumenes II. and Attalus II. of Pergamum (197-59-38), and the gigantic Olympian temple begun by Antiochus IV. of Syria (174). Her defection from Rome in the war with Mithridates led to a disastrous siege by Sulla in 86, and curtailed her political freedom; but the build-

ings of Roman date mark her still as the chief university of the empire—*e.g.* the Tower of the Winds, an observatory (100-35 B.C.); the Stoa of Hadrian, who lived much in Athens (120-128 A.D.), completed the Olympian temple (*v.* above), and laid out a new suburb round it, and the water supply which is still in use; and the Odeum and Stadium of Herodes Atticus (150-170 A.D.). In spite of the early introduction of Christianity by St. Paul, Athens remained a headquarters of the ancient beliefs and of Neo-Platonic philosophy. But the Gothic raid of 258 and consequent refortification, the spoliation of the temples by Constantine (330), and the invasion of Alaric (396) are landmarks of decline; and the suppression of the schools of law and philosophy by Justinian (529) completed the transformation. The Acropolis became a Byzantine fortress; the Parthenon was consecrated to St. Sophia, and the Theseion to St. George; and many churches—*e.g.* the Capnicarea (founded 444, actual buildings 9th century), St. Theodore (1049), and the old cathedral (13th century)—sprang up in the lower town, now mainly north of the Acropolis.

The Latin conquest of 1204 brought a disastrous siege, and established a Frankish dukedom. The temples were adapted to Western ritual; the Propylæa became the ducal palace, and Hadrian's Stoa the residence of the governor. Passing from one adventurer to another (Otho de la Roche, 1204; Walter de Brienne, 1308; the Grand Company, 1311; Manfred of Sicily, 1326; the Florentine Nerio Acciajuoli, 1386), the duchy fell under the protectorate of Venice in 1394; but being freed by Duke Antonio in 1403, it fell under Ottoman suzerainty in 1435, and was finally annexed

by Mohammed II. in 1458. Under the Frankish dukes Athens regained prosperity and culture, but lay off the pilgrim routes, and was little known in the west. John of Basingstoke, however, had studied there in 1202, and in 1436-47 Cyriac of Ancona made invaluable sketches of the ruined monuments. Under Turkish rule the Greek Church was reinstated at first, but the Parthenon and other buildings were soon converted to Moslem uses. The best-preserved Turkish building is the 18th-century mosque adjoining Hadrian's Stoa, which remained the governor's palace. The introduction of artillery and the Venetian raid of 1464 brought fresh fortifications and more destruction. The Propylæa was blown up in 1636, and the Parthenon in 1687. The Niké Temple (reconstructed in 1836) was demolished soon after 1686, and thenceforward destruction was rapid. Western travellers, however, had already begun their studies (Babin, 1672; Vernon, 1675; Spon and Wheeler, 1676; Dalton, 1749; Stuart and Revett, 1751-5), and in 1801 Lord Elgin rescued the majority of the remaining sculptures. At the Greek revolt of 1822 Athens fell at once, but was recaptured by the Turks in 1827. Finally, in 1833, it became the capital of the new Greek kingdom.

Modern Athens lies almost wholly north of the Acropolis and mediæval bazaar quarter, and is laid out on a triangular plan; the base, Hermes Street, runs east and west from the Dipylon Gate and Theseion railway station to the palace and principal hotels round the Syntagma Square. From Dipylon and Syntagma respectively Piræus Street and Stadion Street converge northwards to Homonoia Square, near which are the Opera House, Polytechnic, National Museum,

and railway stations for Laurion and Peloponnese. Near the palace are the Parliament (Boulè), Post Office, and Ministries; above Stadion Street, along the base of Lycabettus, the Academy, University (with over 2,500 students), Infirmary, and National Library, and residential quarter. Other institutions are the Evangelismos Hospital, Zappeion Exhibition, Observatory (on Nymph Hill); Greek Cathedral; Roman, Russian, and Anglican Churches; and Archæological Institutes of Germany, France, Britain, and America; Acropolis Museum; Academy coin collection; Karapanos collection (from Dodona); mediæval and modern relics at the Polytechnic; geology and natural history at the University; Library at the Boulè; Archæological Society; Parnassus Club.

Railways are open to Piræus, to Laurion, and to Peloponnese *viâ* Corinth; steam tramway to Phalerum (sea-bathing), and diligence daily to Eleusis and Thebes. Local industries: oil, boots, silks, and rugs. Pop. 170,000.

The French School of Archæology was founded in 1846, with a permanent director and six fellows. The latter are maintained for three years at the school—working in museums in winter, and carrying on exploration or excavation in summer; reporting their results to the Academy of Inscriptions in Paris; and proceeding to professorships at home at the end of their training. The school has an income of about £2,500. It has conducted excavations at Delos, Myrina, Thespiæ, Delphi, and elsewhere, and publishes its results in its *Bulletin des Correspondances Helléniques*.

The German Imperial Archæological Institute, founded in 1874, has two permanent secretaries, and a varying staff of assistants and students sent out from German universities, and a

government grant of about £3,500. Its principal excavations have been at Olympia, Tiryns, Pergamum, Troy, and in Athens; and it publishes quarterly *Mitteilungen*.

The American School of Classical Studies was founded in 1882, with an income of about £2,000, a resident director, and a varying number of students (5-10). It has excavated at Plataea, Eretria, the Heræon, Corinth, and elsewhere, and publishes reports in *The American Journal of Archaeology*.

The British School of Archæology was founded in 1883, and is maintained by private subscriptions, with a government grant (since 1895) of £500. It has a library (including the valuable collections of the historian Finlay), and offers two or more studentships of £50 annually, and the remainder of the five to ten students hold university scholarships or support themselves. It conducts excavations (as at Megalopolis, and in Cyprus, Melos, and Crete) when its funds allow, and publishes results in its *Annual*, and in the *Journal of the Hellenic Society* in London.

The Austrian government maintains a staff of expert archæologists in Athens, and sends out frequent students, who make use of the German Institute.

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(1874-90); Harrison and Verrall's *Mythology and Monuments of Ancient Athens* (1890); Curtius's *Stadtgeschichte von Athen* (1891); Gardner's *Ancient Athens* (1903). Mediæval—De Laborde's *Athènes aux XV., XVI., XVII. Siècles* (1854); Gregorovius's *Geschichte der Stadt Athen im Mittelalter* (1889). Architecture—Penrose's *Principles of Athenian Architecture* (1851); Beule's *Acropole d'Athènes* (1854); Fergusson's *The Parthenon* (1883); Bohn's *Die Propyläen der Akropolis zu Athen* (1882); Boetticher's *Die Akropolis nach den neuesten Forschungen* (1888). Sculpture and Antiquities—A. H. Smith's *Catalogue of Greek Sculpture in the British Museum* (vol. i.: Elgin Marbles, etc., 1892); Kavvadias's *Catalogue of the Greek National Museum*, in Greek (1890 ff.).

Athens. (1.) City, Georgia, U.S.A., co. seat of Clarke co., 73 m. E. by N. of Atlanta; seat of the state College of Agriculture (1872) and of the University of Georgia (1800); has cotton trade and manufactures and oil mills. Pop. 20,000. (2.) Co. seat of Athens co., Ohio, U.S.A., 75 m. S.E. of Columbus; seat of Ohio University (founded 1809). Pop. 3,000.

Atherfield Clay, beds of clay, resting upon the Weald clay, and underlying the Lower Greensand beds, exposed at Atherfield, Isle of Wight. Its best-known fossils are perhaps the crustaceans of the 'lobster bed,' *Meyeria vectensis*.

Atherina, a genus of small fishes, with two British species. They are carnivorous, and live in shoals, and, in spite of their small size, are valued as food.

Atheroma, inflammation followed by degeneration, and often by calcification, of the walls of arteries, thus weakening them and lessening their elasticity. It may give rise to aneurisms or cause embolism. Atheroma of

the cerebral arteries is a common cause of cerebral degeneration. Overstrain of the vessels, gout, and excess in alcohol are predisposing conditions. Treatment is mainly preventive and palliative. See AORTA, ARTERIES.

Atherstone, mrkt. tn., Warwickshire, England, 8 m. s.e. of Tamworth. The church dates from 1148. Hats and tennis shoes are the principal manufactures. Atherstone Hall was built in 1620 from the ruins of an ancient priory. Pop. 5,300.

Atherton, tnship., Lancashire, England, 5 m. s.s.w. of Bolton. Bolts and nuts, spindles, etc., are manufactured, and there are extensive cotton mills and collieries. Pop. 16,500.

Atherton, CHARLES GORDON (1804-53), American politician, born at Amherst, New Hampshire. While a member of Congress (1837-43) he gained notoriety by moving the 'Atherton Gang Resolution,' which proposed that 'all petitions relating to slavery or to its abolition be laid on the table without debate.' Although met by the strenuous opposition of John Quincy Adams, the resolution was carried by a majority of forty-two. At the opening of each new Congress, Adams presented a petition against the objectionable rule, and it was ultimately rescinded in 1844. See Wilson's *Rise and Fall of the Slave Power in America* (1872-7).

Atherton, GERTRUDE FRANKLIN, *née* HORN (1859), novelist, was born at San Francisco and educated at Benicia, California, and Lexington, Kentucky. Her first novel, *What Dreams May Come*, was published in New York in 1888. Her other works include *Los Cerritos* (1890); *American Wives and English Husbands* (1898); *The Californians* (1898); *A Daughter of the Vine* (1899); *Senator North* (1900); *The Splendid Idle Forties* (1902); an edition of

Hamilton's Letters (1903); *Rulers of Kings* (1904); *Bell in the Fog* (1905); *The Travelling Thirds* (1905); *Rez-anov* (1906); *Ancestors* (1907); *The Gorgeous Isle* (1908); and *Tower of Ivory* (1910).

Athletic Sports. *Historical Sketch.*—For the athletic contests of the ancient Greeks, see OLYMPIA. Beginning chiefly with the classes, the popularity of athletic sports, as we now understand them, slowly but surely spread among the masses, until, in the last decade of the 18th century, a class of professional pedestrians sprang up composed of men who made their living by running for sums of money. A great number of gentlemen also ran or jumped for money stakes deposited by themselves or their backers. About the year 1825, however, the popularity of foot racing among amateurs declined, and until well into the 'forties the sport was almost entirely confined to the professional 'ped.' In that decade the various universities and schools began to evince greater interest in athletic sports, and the first regularly organized meeting on the principles practically adopted at the present day was held in 1849, at the Royal Military Academy at Woolwich. This example was followed the year after by Exeter College, Oxford. The Mincing Lane Athletic Club, open to all amateurs, was formed in 1864; and that year also saw the first 'inter-*varsity*' meeting. In 1866 the title was changed to that of the London Athletic Club—the 'L.A.C.' now so well known. In the same year the Amateur Athletic Club was formed. The first meeting was held in that year, and the Lillie Bridge ground was opened in 1868. Nine years later a rupture occurred between the A.A.C. and the L.A.C., and the latter took up its quarters at Stamford Bridge. In 1880, however, chiefly owing to the action

of the two universities, differences were settled, and the famous Amateur Athletic Association came into being as a result of the conference which took place at Oxford. This association, which now occupies the same position with regard to athletics as the Jockey and Marylebone Clubs do to racing and cricket respectively, undertook the management of athletic meetings, the drafting of uniform rules, the repression of abuses, and the holding of an annual championship meeting.

Athletic Meetings, Grounds, Amateurs.—All the most important athletic meetings, such as those of the L.A.C., Oxford, Cambridge, and the annual championship meeting, as well as many of the athletic sports of smaller clubs, take place on cinder tracks specially prepared for running. By far the majority of meetings, however, are held in places where no such track is available, and a course is marked out around an ordinary field, generally one used for cricket or football by the local club. The 'times' taken in running races on cinder are almost always superior to 'times' on grass tracks, as the latter vary in quality, some—notably Catford Bridge and Trent Bridge, Nottingham—being practically equal to cinder tracks under favourable conditions of weather. Rain, of course, soon makes a grass track slippery or heavy running. Tracks should be made at least 20 ft. wide; and the circumference is usually a quarter-mile, although some of the best tracks are one-third of a mile. In estimating distances it must be remembered that the A.A.A. rules ordain that all tracks are to be measured 1 ft. from the inner edge. The ideal track should approximate as nearly as possible to a square with rounded edges. Long curves are to be avoided.

The A.A.A., while leaving a

fairly free hand to its affiliated clubs in the arrangement of their own sports, insists on certain rules being observed, including the prohibition of all open betting on the ground. All entries are limited to amateurs, an amateur being 'one who has never competed for a money or staked bet, or with or against a professional for any prize, or who has never taught, pursued, or assisted in the practice of athletic exercises as a means of obtaining a livelihood.' Owing to the enormous increase of athletic meetings during the last twenty years, and the consequent increase in the number of prizes, a certain class has sprung up the members of which are not only 'pot-hunters,' but unfair pot-hunters. 'Semi-amateurs' they may be called, who conceal their previous performances by giving false information as to 'times,' etc., with a view to deceiving the handicappers. By this means, if not found out, they receive favourable handicaps, and so obtain an unfair advantage. Many such men did and do not hesitate to sell their prizes; consequently the A.A.A. order that no handicap prize shall exceed the value of ten guineas, while they likewise punish with suspension, temporary or permanent, any offence against sport and fair play.

Hurdle Racing.—Hurdle races are held on a straight, level grass course 120 yds. long, over 10 flights of hurdles 10 yds. apart, the first being placed 15 yds. from the starting line. The hurdles are 3½ ft. high and from 4 to 5 ft. long, each competitor having his own line, and keeping it throughout the race. In handicaps the worst man is generally placed on the starting line, so as not to reduce the distance from the first hurdle, thereby allowing him to get up a good pace before he takes his first jump. Some hurdle races are over quarter-mile courses, with 10

flights of hurdles 20 to 40 yds. apart—attractive races to watch, but very exhausting to the competitors. Hurdle racing is by far the prettiest, and at the same time most difficult to acquire, of all the athletic arts. This is especially the case in 'sprint' hurdling over the usual 120 yds. course. Constant practice under a good coach is necessary, and practically no hurdler can win fame unless he can manage to cover the distance between the flights in three strides. In actually taking the hurdle, strength and time are wasted by jumping too high. The good hurdler skims the top.

Flat Racing.—Flat racing may be divided into three branches—viz. (a) sprint races, (b) middle-distance races (c) long-distance races. (1.) 'Sprinting' signifies running at top speed, and the limit of sprinting distance was at one time, and by many still is, considered to be 300 yds. Modern training and tracks, however, have led to such good performances that the quarter mile may now be said to be included in the category of sprint races, especially when we get such performances for the quarter as the 47 sec. of M. W. Long in America, the 48½ sec. of R. Buttery, and the 48½ sec. of H. C. L. Tindall and E. C. Bredin. On the other hand, at ordinary local sports, with such times as 55 sec. the race is, perhaps, scarcely worthy to be called a sprint. As the distance run in sprint races is so short, especially in the 100 yds. race, which is seldom won by more than a yard, it is obvious that the aim of every runner should be to get sharply off the mark on the report of the starter's pistol. Most of the best men start on what almost seems 'all fours,' using what is known as the 'hand-spring' start. Leaning forward with the hands touching the ground, they take a good grip of the track (often making a

small hole) with the spikes of the left foot just on or behind the 'scratch'—i.e. the starting line. The right foot is placed from 30 in. to a yard behind, also gripping the ground with the spikes. Practically all the weight of the body is on the hands and left foot, the right foot giving the propulsion when the pistol goes. In the 100 yds. the track should be divided by uprights about 2 ft. high, joined by cords, so that each man will have a path to himself from 3½ to 4 ft. wide. The track is usually in the centre of the ground, the race being run on grass. Next to the hurdle race, the quarter-mile is perhaps the most attractive event for the spectator. The best way of developing and improving speed for the shorter races is to have plenty of short sharp bursts of from 30 to 40 yds., with an occasional full-speed run of from 60 to 70 yds. Very rarely, if at all, should the full distance be run. A sound rule to observe in sprints is seldom, if ever, to exceed two-thirds of the course at top speed in practice. In training for the quarter-mile, the men who would be 'nowhere' in that race owing to their lack of first-class sprinting power, but who, possessing great strength and staying power, can keep up a long stride over the whole distance, can do no harm by running the whole distance occasionally in practice.

(2.) Middle-distance races. These include all races longer than a quarter-mile and less than a mile, the most usual events being the half-mile, 1,000 yds., and three-quarter mile. In these races sprinting power takes second place, and 'condition' becomes the essential to success. Wind and muscles have to be brought to as high a state of perfection as possible, and this end is attained by gradually increasing the pace over about two-thirds of the course, say

600 yds., if practising for the half-mile. This increase in pace must not be forced day after day; on one the 600 yds. is traversed at a steady trot, on the next briskly, etc., varying the distance every day, so as not to overdo the training, but to gradually increase muscle and improve wind. Once a week the whole distance is covered, but not too fast, and on Sundays a good brisk walk is taken. No starvation is undergone in diet; plenty of good nourishing food is eaten, such as chicken, joints, fish, steaks, with vegetables and milk puddings. The food avoided is pastry, potatoes, and sweet puddings, all ruinous to wind and very fattening. After three weeks or a month's training, if undue exhaustion has been avoided, a man will be as fit as he ever will be for any race coming under the category of 'middle distances.'

(3.) Long-distance races are those of a mile and upwards. They are only suited to men possessed of a considerable amount of natural stamina, for they necessitate severer training than does middle-distance running. In practising, as in the shorter races, the full distance is seldom run over. From a month to six weeks is necessary for training, the work varying day by day, but gradually increasing in severity week by week, thus slowly bringing muscle and wind to a fit state to meet the effort called for in the actual race. The following method of training for a mile race is given in the Badminton Library, one week being taken as a sample of the sort of thing the athlete has to go through:—1st day, two-thirds of a mile at steady pace; 2nd day, half a mile; 3rd day, slow mile; 4th day, fast half-mile; 5th day, 600 yds. at steady fast pace; 6th day, a fast three-quarter mile; Sunday, a brisk walk of from 6 to 10 m., with a good rub down

after the walk, as well as after the runs. See also MARATHON RACES.

Walking.—The art of walking has been for many years past, and still is, in great disfavour with the majority of the British public. The reason for this is chiefly the unfair style of walking adopted by most men, which, again, is due to the difficulty of defining 'fair walking.' Some judges contend that any walking is fair if the heel of one foot is on the ground before the toe of the other leaves it. Others hold that the foregoing is not a sufficiently complete definition of the art. The question is, What is fair 'toe-and-heel' walking? To begin with, before the toes of the back leg are lifted the heel of the front leg must be on the ground. The leg must be perfectly straight when the foot is down, not bent at the knee, which fault will tend to the lifting of both feet from the ground at the same moment. The body must be kept upright; if bent forward, the weight is thrown on the front foot. This leads, with increasing fatigue, to shortness of stride, to the toe instead of the heel of the front foot reaching the ground first, and eventually to a sort of jog-trot. The legs should be thrown out freely from the hips, which at each step should be given a sort of circular twist, producing a very slight outward sweep of the leg, which results in the front foot coming down almost exactly ahead of the other. In addition to the foregoing definition of style, the most important points for the novice to learn are to keep the weight of the body on the heels, to make the heel and not the toe reach the ground first, and to get a good action of the arms—utilizing them, as it were, as levers for lifting forward the body, and counteracting the unbalancing effect produced thereon by the sweeping strides of the legs.

When fatigued, there is nothing easier and more resting than to break into a kind of half trot, half walk, and this tendency can only be resisted by keeping the body upright and the weight off the toes. 'Mixing,' 'lifting,' and 'shuffling' are the vices of the unfair walker. 'Mixing' is the worst. It is a more or less deliberate attempt to mix running with walking, and can be detected by the consequent rise and fall of the walker's (?) head and shoulders. 'Lifting' generally occurs from fatigue, although it may be deliberate, and consists in getting one foot off the ground before the other has reached it. The vice is detected by watching if daylight can be seen beneath both feet at once, by the body leaning forward, and by bent knees. 'Shuffling' is running on the heels, and is very difficult to detect. Short, springy strides, with the head bent forward, are symptoms of this particular unfairness for which the judge must watch. In training for walking races, practically the same rules are observed as for other races, but rather more of the course proportionately is gone over in practice. Among famous English walkers, the name of W. J. Sturgess, amateur champion from 1895 to 1900, and again in 1902, stands for all that is fair in style and fast in practice.

Jumping.—As an event in every athletic meeting jumping takes two forms—the broad or long jump, and the high jump. A third form, which is dying out, but is still practised in many places, is the pole jump or vault. The long jump requires a straight, level piece of turf or circular track leading up to the 'take-off' line, which is marked by a piece of wood 4 to 5 ft. long, and about 12 in. by 2 in. This plank is let into the ground, with its top edge, painted white, flush with the surface. A pit about 1 ft. deep, 4 ft. wide, and 14 ft. long, is dug, commencing 12 ft.

from the take-off line. It is filled with sawdust and sand mixed, and gives a soft place to alight on. It is raked over and smoothed down after each jump. The number of tries allowed to each competitor is the same as in throwing the hammer. A jump is not measured, although it counts as a try, if the competitor does any of the following things—crosses the take-off with either foot, or passes it at one side; falls or steps back after jumping. The measurement of the jump is made from (and perpendicular to) the take-off line to the edge of the heel-mark nearest that line. A good style includes keeping the feet together when in the air and throwing them well to the front on landing. This, however, must not be overdone, or a back fall will result. The arms are kept straight and pointed towards the front, outwards and downwards. The jump must be made when travelling at full speed. Most men lose ground by taking off too soon—this requires plenty of practice—and by not jumping high enough.

The high jump. In high jumping, each competitor is allowed three jumps at each height, and all measurements of heights jumped are made from the ground to the centre of the cross-bar. Neither diving nor somersaulting over the bar is permitted. This last rule was introduced about 1890 in consequence of a weird method of jumping adopted by some Woolwich cadets in the inter-collegiate sports with Sandhurst a few years previously. The method consisted of diving over the bar head first, and landing on the hands. The high jump generally takes place on grass, though in wet weather a cinder track may be substituted with advantage. There is no athletic sport in which style differs so much as the high jump. Some men face the bar, and take it fair and square; others negotiate it from one side

or the other. Some take a long run before jumping, others but a few paces. To run too fast at the jump is a fatal error. The most difficult thing to learn is the right place to take off from; this requires constant practice. Most jumpers take off at a distance from the bar equal to about half the height of the jump. Any exercises which develop the muscles of the leg make good training for high jumping.

Pole Jumping.—A pole jump is a combination of a jump and a vault. It consists of jumping over a horizontal bar with the help of a pole of hickory wood about 14 ft. long and $1\frac{1}{4}$ in. diameter in the centre, tapering to $1\frac{1}{4}$ in. at each end. It is a very pretty sport to watch, an exhilarating one to the performer who can clear his 10 ft. odd, and a capital exercise for the muscles. The method of jumping is somewhat as follows:—The jumper takes hold of the pole with his right hand (with an under grip) at a point distant from the spiked end equal to the height of the jump *plus* about 6 in. With his left hand he takes an over-grip from 12 to 18 in. below the right. Holding the spiked end raised to the front, he runs about 20 yds. at full speed, plants the spike in the ground about $1\frac{1}{2}$ ft. short of the jump, and springs up, still gripping the pole. As he swings towards the bar, he throws his feet forward and over it, releases the pole so that it falls back, and drops lightly over the bar on to his feet.

Throwing the Hammer is a sport which is greatly neglected in England, though in Scotland (especially) and in Ireland it is a great favourite. The head of the hammer is of iron or lead, or both, and with the handle—which must not be longer than 4 ft.—must not exceed a weight of 16 lbs. The competitors throw from within a circle of 9 ft. diameter, except at

the universities, where the size of the circle is 30 ft., any step beyond the circumference disqualifying the throw. The usual method of throwing is as follows:—The thrower stands at the back of the circle, swings the hammer two or three times round his head, and, with a quick twisting run, travels to the front of the circle and lets his hammer fly at the proper moment. Each competitor is allowed three tries, and the best three competitors three more each. Distances are measured from the circumference of the circle on a line joining the centre to the point where the hammer drops. A good thrower must possess exceptional stature and strength. Dr. W. J. M. Barry, a noted hammer-thrower of the last thirty years, stood 6 ft. $4\frac{1}{2}$ in., and weighed 234 lbs.

Tossing the Caber.—This is essentially a Scotch sport, and demands both strength and skill. The caber usually consists of a beam or tree-trunk, tapering towards one end. It is held perpendicularly, resting on both hands and balancing against the body. It is then tossed so that it falls on its larger end, the competitor making the longest toss winning. As a rule, when first produced the caber is too heavy for any of the competitors to throw in the proper manner, and has to be sawn down. If only one man can toss it, he wins the event.

Putting the Weight.—This, a companion sport to throwing the hammer, also demands great muscular strength, and is a capital exercise for developing the back, loins, and shoulders. The 'weight' is a spherical iron shot of 16 lbs. It is 'put' from the shoulder with one hand, the competitor standing in a 7-foot square (the universities use a 10-foot square), beyond which he must not move. The number of puts allowed is the same as in throwing the hammer, and crossing the

'scratch'—*i.e.* the edge of the square—counts as a try, although the put itself is disqualified. There are many different styles of putting, but the most usual, and perhaps the best, is that

the ground. He raises the shot once or twice above his head in order to get the balance, lowers it to his shoulder, gives two quick hops forward on his right foot, jumps on to the left foot, makes a

Record performances in Athletic Sports.

Event.	British Amateur Record.	American Record.	World's Professional Record.
100 Yards.	9 $\frac{1}{2}$ sec. W. A. Schick, 1904. A. F. Duffey (grass), 1901.	9 $\frac{1}{2}$ sec. A. F. Duffey, 1902. D. J. Kelly, 1906.	9 $\frac{1}{2}$ sec. E. Donovan, 1895.
120 Yards.	11 $\frac{1}{2}$ sec. R. E. Walker, 1909.	11 $\frac{1}{2}$ sec. B. J. Wefers, 1897.	11 $\frac{1}{2}$ sec. T. M. Malone, 1883.
120 Yards Hurdles.	15 $\frac{1}{2}$ sec. A. C. Kraenzlein, 1900.	15 $\frac{1}{2}$ sec. A. C. Kraenzlein, 1898.
Quarter-Mile.	48 $\frac{1}{2}$ sec. W. Halswelle, 1908.	47 $\frac{1}{2}$ sec. M. W. Long, 1900.	47 $\frac{1}{2}$ sec. B. R. Day, 1908.
Half-Mile.	1 min. 54 sec. M. W. Sheppard, 1908.	1 min. 52 $\frac{1}{2}$ sec. E. Lunghi, 1909.	1 min. 53 $\frac{1}{2}$ sec. F. Hewitt, 1871.
One Mile.	4 min. 16 $\frac{1}{2}$ sec. J. Binks, 1902.	4 min. 15 $\frac{1}{2}$ sec. T. Conneff.	4 min. 12 $\frac{1}{2}$ sec. W. G. George, 1886.
Four Miles.	19 min. 23 $\frac{1}{2}$ sec. A. Shrubbs, 1904.	20 min. 15 $\frac{1}{2}$ sec. W. D. Day, 1889.	19 min. 25 $\frac{1}{2}$ sec. P. Cannon, 1888.
Ten Miles.	50 min. 40 $\frac{1}{2}$ sec. A. Shrubbs, 1904.	51 min. 5 $\frac{1}{2}$ sec. H. Watkins, 1899.
Putting the Weight.	48 ft. 2 in. D. Horgan, 1897.	50 ft. 1 in. R. Rose, 1904.	55 ft. 6 in. A. A. Cameron, 1902.
Throwing the Hammer.	176 ft. M. J. M'Grath, 1908.	179 ft. 6 $\frac{1}{2}$ in. J. Flanagan.	165 ft. T. Carrol, 1895.
Long Jump.	24 ft. 11 $\frac{1}{2}$ in. P. J. O'Connor, 1901.	24 ft. 7 $\frac{1}{2}$ in. M. Prinstein, 1900.	23 ft. 4 in. Bush (a half-caste Maori), 1900.
High Jump.	6 ft. 4 $\frac{1}{2}$ in. P. Leahy, 1898.	6 ft. 5 $\frac{1}{2}$ in. M. J. Sweeney, 1895.	6 ft. 8 $\frac{1}{2}$ in. R. N. Baker, 1900 (doubtful).
Pole Jump.	11 ft. 9 in. R. D. Dickinson, 1891.	12 ft. 9 $\frac{1}{2}$ in. W. R. Dray, 1908.	11 ft. 6 $\frac{1}{2}$ in. R. Dickinson, 1899.
One Mile Walk.	6 min. 26 sec. G. E. Larnier, 1904.	6 min. 25 $\frac{1}{2}$ sec. F. P. Murray, 1883.	6 min. 23 sec. W. Perkins, 1874.
Two Miles Walk.	13 min. 11 $\frac{1}{2}$ sec. G. E. Larnier, 1904.	13 min. 14 sec. J. W. Raby, 1883.

adopted by Dr. Barry, already mentioned in connection with throwing the hammer. The putter stands sideways, with the right foot against the back edge of the square. His body rests on the right foot, while the left just taps

sharp half-turn and a spring, and with body and arm launches the shot into space, coming down on the right foot just short of the 'scratch.'

Record Performances in Athletic Sports.—The above table gives

a complete list of those records which have been accepted as authentic by the A.A.A. The 100 yds. race was run in New Zealand in $9\frac{1}{2}$ sec. by T. Macpherson in 1891, and J. H. Hempton in 1892. The records for the weight and hammer are for performances from the 7-ft. square and 9-ft. circle respectively. A. C. Kraenzlein's extraordinary time of $15\frac{1}{8}$ sec. for the 'hurdles' was made on a cinder track in America. He won the A.A.A. championship hurdles in 1900 with $15\frac{3}{8}$ sec., and again in 1901 with $15\frac{3}{8}$ sec. The long jump of 24 ft. 11 $\frac{3}{4}$ in., made in 1901 by an Irish amateur—O'Connor—stands as the world's record. The walking record (amateur) for an hour is 8 m. 439 yds. 1 ft. 9 in., by G. E. Larner, at Stamford Bridge, Sept. 30, 1905.

The best books on athletic sports are *Athletics*, by H. H. Griffin (1891); *Athletics and Football* (Badminton Library), by M. Shearman.

Athlone, mrkt. tn. of Ireland, Co. Westmeath (only since 1898), on both banks of the Shannon, 17 m. s.e. by s. of Roscommon. It has extensive barracks. Portions of the old walls still remain. Manufactures linens and woollens, and has distilleries, saw-mills, excellent fisheries, and has a good carrying trade by canal and river. From its position at one of the chief fords of the Shannon, it was in early times a place of great strategic importance. A castle erected in John's reign became the residence of the Earl of Essex in Elizabeth's day. In 1641 the town sustained a protracted siege; later it was taken by Cromwell and burnt. De Ginkell, William III.'s general, took the castle by assault after two days' destructive cannonade (1691). In 1697 the powder magazine of the castle was struck by lightning, and the town was wrecked by the explosion. Pop. 6,600.

Athlone, GODART DE GINKELL, FIRST EARL OF (1630-1703), military commander, born at Utrecht, and followed William of Orange to England in 1688. His capture of Ballymore, Athlone, and Limerick won for him the thanks of the House of Commons and the earldom of Athlone. In the wars of William III. with France, Ginkell distinguished himself at the recapture of Namur and in the surprise of Givet. In the war of the Spanish Succession (1702) he served under Marlborough.

Athni, tn., Belgaum dist., Bombay, India, 44 m. w. by s. of Bijapur. Coarse cotton cloth, blankets, and saltpetre are manufactured. Pop. 11,000.

Athol, vil., Worcester co., Mass., U.S.A., 40 m. N.E. of Springfield; manufactures boots and shoes, and furniture. Pop. 7,200.

Athole, or ATHOLL, dist. of N. Perthshire, Scotland, at s. base of the Grampian Mts. Area, 450 sq. m. Here are great deer forests.

Athole, or ATHOLL, DUKES OF, a noble Scots family, dating back to the reign of Alexander I., when Madách, a son of Donald Bane, was styled Earl of Athole. DAVID, 11th earl, forfeited the title by his connection with the Baliol party (1311). The estates were then granted to Sir Neil Campbell, whose son JOHN, created Duke of Athole, was killed at Halidon Hill (1333), leaving no issue. The title passed to SIR W. DOUGLAS, then to ROBERT STEWART, lord steward of Scotland, and became extinct (1625). It was revived and granted to JOHN MURRAY, Earl of Tullibardine (1628), descended, through his mother, from the Stewarts. JOHN, 3rd earl of this family, was created duke (1703). The Dukes of Athole were Lords of the Isle of Man until 1765.

Athor, AYTHOR, HETHER, or HATHOR, an Egyptian goddess, daughter of Ra, in whom the

Greeks recognized their Aphrodite. The cow was her symbol.

Athos, a mountainous peninsula which projects from the s. coast of Macedonia into the Ægean Sea. It is the E. arm of the Chalcidice peninsula, is 30 m. long and 6 broad, and reaches a height of 6,350 ft. Its circumnavigation was so much dreaded by ancient mariners that Xerxes, when invading Greece in 480 B.C., cut a canal (traces of which are still visible) through the isthmus. Here, in 492 B.C., the Persian fleet under Mardonius had been completely wrecked. In ancient days the peninsula contained several prosperous towns. At the present time it is covered with a score of monasteries, besides other religious edifices, belonging to the Orthodox Greek Church, the monks forming a kind of republic, though under the suzerainty of the Sultan. The first Christian monasteries were built here in the 9th and 10th centuries. They possess some 13,000 MSS., many of great palæographic value. See Riley's *Athos, the Mountain of the Monks* (1887); Schmidtke's *Das Klosterland des Athos* (1903); Lambros's *Catalogue of Greek MSS. on Mount Athos* (Cambridge, 1895-1900).

Athrepsia, the wasting of infants, through insufficient or improper food or imperfect digestion. Wasting, or marasmus, may of course be due to definite disease, tuberculosis and syphilis being common causes; but in both there will be characteristic signs. In the early stages, while the child's strength is sufficient, its cries are almost incessant and piercing. The wailing of a tuberculous child is not often as powerful. The athreptic child cries because it suffers, not only from hunger, but also from flatulence, colic, and other discomforts of the alimentary tract, with frequent diarrhœa and

rashes, especially if the trouble is due not so much to the quantity as the quality of food. In the child the nervous system is specially unstable, and therefore mistakes in feeding may even cause convulsions, which have before now been mistaken for signs of meningitis. In the later stages of athrepsia the child's face is characteristically sharp-featured and pinched, the body is cold, the temperature may be much below normal, and the child is consequently liable to the complications of all those common diseases which attack a weakened organism. The treatment consists in determining the faults in the diet, and altering it at once. More food may be all that is needed; but a child is often found to be starving because it gets too much of what it cannot digest. It must be remembered that the child lives only by what it can assimilate, and to give it food is not to feed it, if that food be not suited to the child's age and stage of development. See INFANT, FEEDING OF.

Athy, mrkt. tn., Co. Kildare, Ireland, on the Barrow and the Grand Canal, 12 m. s. by w. of Kildare; manufactures bricks and tiles, and was the scene of a great battle between Irish tribes in the 3rd century. The town which grew up around the monasteries of the Crutched Friars (founded 13th century), on w. side of the river, and of the Dominicans, on the E. side, was plundered by the Scots in 1315, after the victory of Ardscull (4 m. N.E. of town). White's Castle, now a police barrack, the 'moat of decapitation,' connected with a massacre in Elizabeth's reign, and Woodstock Castle (w. side of river), said to date from the 12th century, are the chief places of interest. Pop. 3,600.

Athyroidea, symptoms following defective production or absorption of the secretion from the

thyroid gland. See THYROID GLAND.

Atitlan, tn., lake, and volcano in the dep. Solola, Guatemala, C. America, 50 m. w. of Guatemala. The lake is 24 m. long and 10 m. broad, and has no visible outlet. On the southern shore rises the volcanic peak Mt. Atitlan, 11,723 ft. The town Santiago de Atitlan is on the s. side of the lake, and has cotton mills and mineral springs. Pop. 9,000.

Atjeh. See ATCHIN.

Atkarsk, tn., Russia, gov. of and 60 m. w.n.w. of Saratov city, near the junction of the Atkara and Medvieditza. Pop. 10,000.

Atkins, TOMMY, the slang name for the British private soldier; more shortly referred to as 'a Tommy' (pl. 'the Tommies'). The term is used in a friendly rather than a derogatory sense, and figures prominently in Mr. Kipling's works. Its origin seems to have been similar to 'John Doe and Richard Roe'—the name of a certain Thomas Atkins having headed a specimen form sent out by the War Office.

Atkinson, RIGHT HON. JOHN, Baron (1845), Irish politician, called to the Irish bar (1865) and the English bar (1890); took silk in 1880. He represented Londonderry N. from 1895 to 1905. In 1889 he became solicitor-general for Ireland, and in 1892 attorney-general and privy councillor for Ireland, and again attorney-general 1895-1906. In 1905 he was created a lord of appeal in ordinary.

Atkyns, SIR ROBERT (1621-1709), English judge, assisted in the defence of Lord William Russell (1683), and of Sir William Williams, the Speaker of the House of Commons. He was made a judge in 1672; retired 1679. After the revolution he became Chief Baron of the Exchequer. He was Speaker of the House of Lords (1689-93). See *Foss's Judges* (1848-64), vol. vii.

Atlanta, city, Georgia, U.S.A., the cap. of the state and the co. seat of Fulton co.; situated in lat. 33° 44' N., and long. 84° 20' W. It exports tobacco and cotton, and its industries include machine shops, foundries, furniture works, cotton, paper, and cotton-seed oil mills. It is the seat of Clark University (1870), the Georgia School of Technology (1888), the Atlanta University (1869), for coloured persons, and Atlanta Baptist College (1867). Pop. 155,000. See Reed's *History of Atlanta* (1889).

Atlantic City, city, Atlantic co., New Jersey, U.S.A., on the coast, on a long, narrow sand-bar, 60 m. s.e. of Philadelphia; is a popular health and pleasure resort. It suffered severely from a fire in 1902. Pop. 45,000.

Atlantic Monthly, THE, an American review, was founded in Boston in 1857. It is more exclusively literary than its older and greater rival, the *North American Review*, with which it shares the honour of numbering James Russell Lowell among its editors. Mr. William Dean Howells directed it from 1865 to 1881. It is now edited by Mr. Ellery Sedgwick. The contributors to the *Atlantic Monthly* have included Longfellow, Oliver Wendell Holmes, and John Greenleaf Whittier.

Atlantic Ocean, stretches from the Arctic Ocean in the N. to the Antarctic Ocean in the S., washing the shores of Europe and Africa on the E., and those of N. and S. America on the W. Its N. and S. limits are more or less conventional, a partial separation from the Arctic being the Wyville Thomson ridge, which stretches N.N.W. from the N. of Scotland towards the Faroes, and rises to within 250 fathoms of the surface. Length of ocean (N. to S.), 8,500 m.; breadth, from 1,800 m. (between Brazil and Guinea coast) to 4,500

m. (between Saharan coast and Florida); area estimated at 27 to 30 million sq. m. Directly and indirectly the Atlantic receives about one-half the entire rainfall of the globe. The floor is a gently undulating plain (average depth, 2,200 fathoms), with a narrow ridge, at less than 1,700 fathoms, along the centre, roughly parallel to the Europeo-African coasts, the volcanic peaks of the Azores being its greatest elevation. North and south of these islands the ridge widens out considerably, and farther to the N. stretches out arms eastward to Ireland and westward to Newfoundland. Along this E.-W. elevation the chief Atlantic cables have been laid. In at least fifteen places on both sides of this median ridge are the 'deeps' of the oceanographers, abysses of over 3,000 fathoms. The deepest sounding thus far is that of the Nares deep (70 m. N. from Porto Rico), 4,561 fathoms, or nearly $5\frac{1}{4}$ m. The continental shelf is relatively narrow all round the Atlantic, but at its outer edge the shelf drops sharply nearly everywhere. Sir John Murray estimates this continental shelf and slope as covering 17 per cent. of the horizontal area of the ocean. The surface temperature over the greater part of the N. Atlantic averages 40° F., increasing to 50° F. near the shores of Europe. The heat equator lies a little to the N. of the geographical, and the surface temperature there averages 80° to 90° . Between this central belt and the polar waters a band of ocean intervenes on each side, with a temperature of between 50° and 60° . Over the greater portion of the S. Atlantic the bottom water varies between 35° and 40° , but in the N. Atlantic the average temperature ranges 2° higher. Soundings made between Europe and N. America by way of the Azores, by Mr. Peake, in 1899, appear to indicate that the temperature of the water

even at the lowest depths varies slightly according to the season. The Atlantic is relatively saltier than the other oceans, its salinity being greatest in the region of the trade winds, and least in the region of equatorial calms. The surface everywhere teems with pelagic life, animal and vegetable. 'Seaweed meadows' of gulf-weed form the Sargasso Sea. For the characteristics of the deposits on the Atlantic floor and for the currents, see OCEAN and GULF STREAM; and for the winds, TRADE WINDS.

Since the 16th century the Atlantic has been the chief commercial highway of the world. The progress made in its navigation may be illustrated by the following comparative statements. In the year 1620 the *Mayflower* took 106 days (Sept. 6 to Dec. 21) to cross from Plymouth to near Boston, though it should be noted that adverse winds and storms rendered the voyage exceptionally long. In 1819 the steamer *Savannah*, relying mainly on her sails, took 26 days to cross from New York to Liverpool. In 1840 the first regular steam liner, the *Britannia* (Cunard Line) crossed from Liverpool to Boston in 15 days. In 1910 the two Cunarders the *Lusitania* and the *Mauretania* accomplished the voyage to New York in about 4 days 10 hours, establishing a record. About a score of telegraph cables lie on the floor of the Atlantic, while the Marconi Co. maintains a regular service between Glace Bay, Nova Scotia, and Clifden, Ireland, by means of wireless telegraphy.

The foundation for our knowledge of this as of the other oceans was in great part laid by the *Reports on the Scientific Results of the Voyage of H.M.S. 'Challenger'*, edited by Sir Wyville Thomson and Dr. (Sir) John Murray, in 37 vols. (1880-9). See, further, a paper on the 'Annual Variations

of Temperature in the Oceans,' by Dr. Gerhard Schott, in *Petermann's Mitteilungen*, 1895, No. 7; Dr. A. Supan, 'On the Rainfall of the North Atlantic,' in the same journal, 1898, No. 8; Dr. G. Schott, on the 'Voyage of the *Valdivia*,' in *Annalen der Hydrographie*, 1899; Dr. O. Pettersson, in *Petermann's Mitteilungen*, 1900; Sir John Murray's 'Address to the Geographical Section of the British Association, 1899,' printed in *Scot. Geog. Mag.*, 1899; the same writer's 'On the Height of the Land and the Depth of the Ocean,' in *Scot. Geog. Mag.*, 1888, pp. 1, etc., and 1890, p. 265; and other works quoted under OCEAN; also R. E. Peake and Sir John Murray, 'Results of a Deep-sea Sounding Expedition in the North Atlantic during the Summer of 1899' (*Royal Geog. Soc. Suppl. Papers*, 1901).

Atlantic Shipping Trust, THE, or alternatively 'The Morgan Combine,' is the popular way of speaking of the International Mercantile Marine Company, which represents the great combination for the control of the principal North Atlantic steamship companies, British and American, organized in 1902 by the energy and enterprise of Mr. J. Pierpont Morgan, the millionaire banker and financier of the United States. The combination was the outcome of the struggle between the great carrying companies for the North Atlantic passenger and freight trade. Provisional agreements, dated Feb. 4, 1902, were entered into, the object and purpose of which were the acquisition, on or before Dec. 31, 1902, of certain maritime properties and businesses which proved to be the White Star Line, the Dominion Line, and the Leyland Line (British steamship companies), and the American Line and Atlantic Transport Line (American steamship companies). The agreements

also provided that the ships of the British companies should sail with British registers, and be officered and manned by British crews; and that Messrs. Harland and Wolff, shipbuilders, of Belfast, should have the sole right to build vessels for the fleet of the 'combine' which sailed under the British flag. A satisfactory working arrangement was also entered into with the North German Lloyd and the Hamburg-American Lines, the two German steamship companies which were in a position to make a strong bid for the North Atlantic trade. The provisional agreements were, on different dates during 1902, ratified by the shareholders of the constituent British companies; and on Oct. 2, 1902, the great shipping combination was incorporated at Trenton, New Jersey, by filing papers amending the certificate of incorporation, changing the name from the International Navigation Company to the International Mercantile Marine Company, and increasing the capital from \$15,000,000 to \$120,000,000, half in 6 per cent. cumulative dividend preference stock and half in ordinary shares, with power to issue 4½ per cent. bonds to the amount of \$75,000,000. Mr. C. A. Griscom, of the American Line, was appointed president of the company, but resigned early in 1904; and in March of that year Mr. Bruce Ismay, the head of the White Star Line, became president and general manager. A British committee for the management of the British lines, subject to the general control of the Anglo-American Board of the International Mercantile Marine Company, was also constituted.

In a speech at Sheffield on Sept. 30, 1902, Mr. Gerald Balfour announced that the government had entered into agreements both with the Cunard Company, which had resisted the invitation to join

the combination, and with Mr. Pierpont Morgan, on behalf of the International Mercantile Marine Company. Under their agreement, the Cunard Company pledged themselves to remain in every respect a British company; that their ships should be officered by British officers; that they would construct two vessels, with a speed of from twenty-four to twenty-five knots an hour, and that these vessels, with the entire fleet of the company, should remain at the disposal of the Admiralty, who were to be at liberty to charter or purchase any of them at any time on terms fixed in the agreement. It was also provided that the capital necessary for the construction of these two vessels, amounting to £2,600,000, should be advanced to the Cunard Company at 2½ per cent. interest; and that the company should receive from the government a subsidy, in lieu of the present Admiralty subvention, of £150,000 a year. The general effect of the agreement with Mr. Pierpont Morgan was to secure that the British companies in the combination should remain not merely nominally but in reality British, that these companies should be kept alive, and that the majority of their directors should always be British subjects. It further provided that every ship in the combination now flying the British flag, and half the ships hereafter to be built for the combination, should continue to be British ships and to fly the British flag, and that they should be officered by British officers and manned in reasonable proportion by British crews. The government, on their part, undertook that these ships should continue to be treated as heretofore on a footing of equality with other British companies in respect of any service, whether postal or military or naval, which H.M.

government might require from the British mercantile marine. These agreements, which are to remain operative for a period of twenty years, were ratified by Parliament towards the close of the session of 1903.

Atlantic Telegraph. See TELEGRAPHY.

Atlantic Transport Company, formed in 1886, and running between London and Baltimore, Philadelphia, and New York, principally for the purpose of carrying cargoes of refrigerated meat and live stock. In 1889 the present company was formed, and took over the National Steamship Company in 1896, and in 1898 the fleet and American business of the Wilsons and Furness-Leyland Line. The company owns eleven steamers, aggregating 86,593 tons, but has under construction several new steamers of more than 13,000 tons each. London offices: Cockspur Street, W.

Atlantis, according to ancient tradition a great island w. of the Strait of Gibraltar, opposite Mt. Atlas, the inhabitants of which were very prosperous and powerful; they even invaded Africa and Europe, but were defeated by the Athenians and their allies. Afterwards, owing to their impiety, they and their island were swallowed up by the ocean. Plato tells the story in the *Timæus*. It originated probably in information obtained from Phœnician sailors about the Canary Is. or the Azores. It has been considered as indicating that the ancients had a vague belief in the existence of a W. Hemisphere. See Archer-Hind's and Th. H. Martin's editions of the *Timæus* of Plato; Clarke's 'Examination of the Legend of Atlantis,' in *Trans. Hist. Soc.*, 1886; and the curious speculations of the Swedish writer Rudbeck, *Atlantica sive Mannheim* (1675-8). For the *New*

Atlantis, see BACON. Compare also ISLES OF THE BLEST.

Atlantosaurus, one of the group of Dinosaurs, the largest animal which is known to have at any time inhabited the globe. Its fossil remains are found in the Jurassic strata of Colorado, U.S.A. Its thigh bone was 6 ft. 2 in. in length, and the limbs were small relatively to the large body they supported. It is supposed to have been herbivorous in habit. See Marsh's *Dinosaurs of N. America* (1896).

Atlas, one of the Titans in Greek legend, son of Iapetus and Clymene; said to have been the leader of the Titans in the war against the gods, and to have been condemned, as a punishment, to the task of bearing the heavens on his shoulders. In some stories Perseus is said to have turned him to stone with the Gorgon's head for refusing to give him shelter; he then became Mt. Atlas. He was the father of the Pleiades, the Hyades and Hesperides, Ænomaus and Maia, Dione and Calypso.

The name Atlas (pl. Atlantes) is applied in architecture to statues of men, analogous to caryatides, set in the place of columns to bear the entablature, etc.

The name Atlas is given to the highest vertebra of the spinal column, which supports the skull.

Atlas, as a collection of maps, is a term first used by Mercator, evidently from the common decorative use of Atlas, bearing the heavens, as a symbol of earth.

Atlas Mountains, an extensive system of folded mountains in N. Africa, commencing on the shores of the Atlantic Ocean, to which it has given its name, and, after traversing Morocco, Algeria, and Tunis in a general w.s.w. to e.n.e. direction, terminating on the shores of the Gulf of Tunis. The system, which consists of broad ridges and rounded elevations,

sometimes connected, sometimes isolated, with numberless offshoots, extends for some 1,500 m., and is unconnected with any other highlands of N. Africa. The Great Atlas is the highest part of the chain in Morocco, where several of the summits exceed 10,000 ft., and bear snow in winter, the loftiest peaks being situated s. of the city of Morocco, where Jebel Miltzin reaches 15,000 ft. This grand chain is snow-clad during the greater part of the year, and is accompanied on the n. by the Lesser Atlas, which in several parts also contains *massifs* of more than 10,000 ft., and on the s. by the Anti-Atlas and the Jebel Bane. The Atlas of Algeria and Tunis is divided into two series—the Tell Atlas, comprising the chains bordering the Mediterranean, and the Sahara Atlas, fronting the desert. In the Atlas of Morocco Primary rocks appear to occupy a more important place than in the Atlas of Algeria and Tunis, and the foldings also seem to be more ancient. The vegetation is Mediterranean on the lower slopes, and even in the most elevated regions the alpine character of the flora is only slight. The Atlas Mts., alike in Morocco and Algeria, have furnished a refuge to Berber peoples more or less allied to the Kabyles. See Joseph Thomson's *Travels in the Atlas* (1889); also articles ALGERIA and MOROCCO.

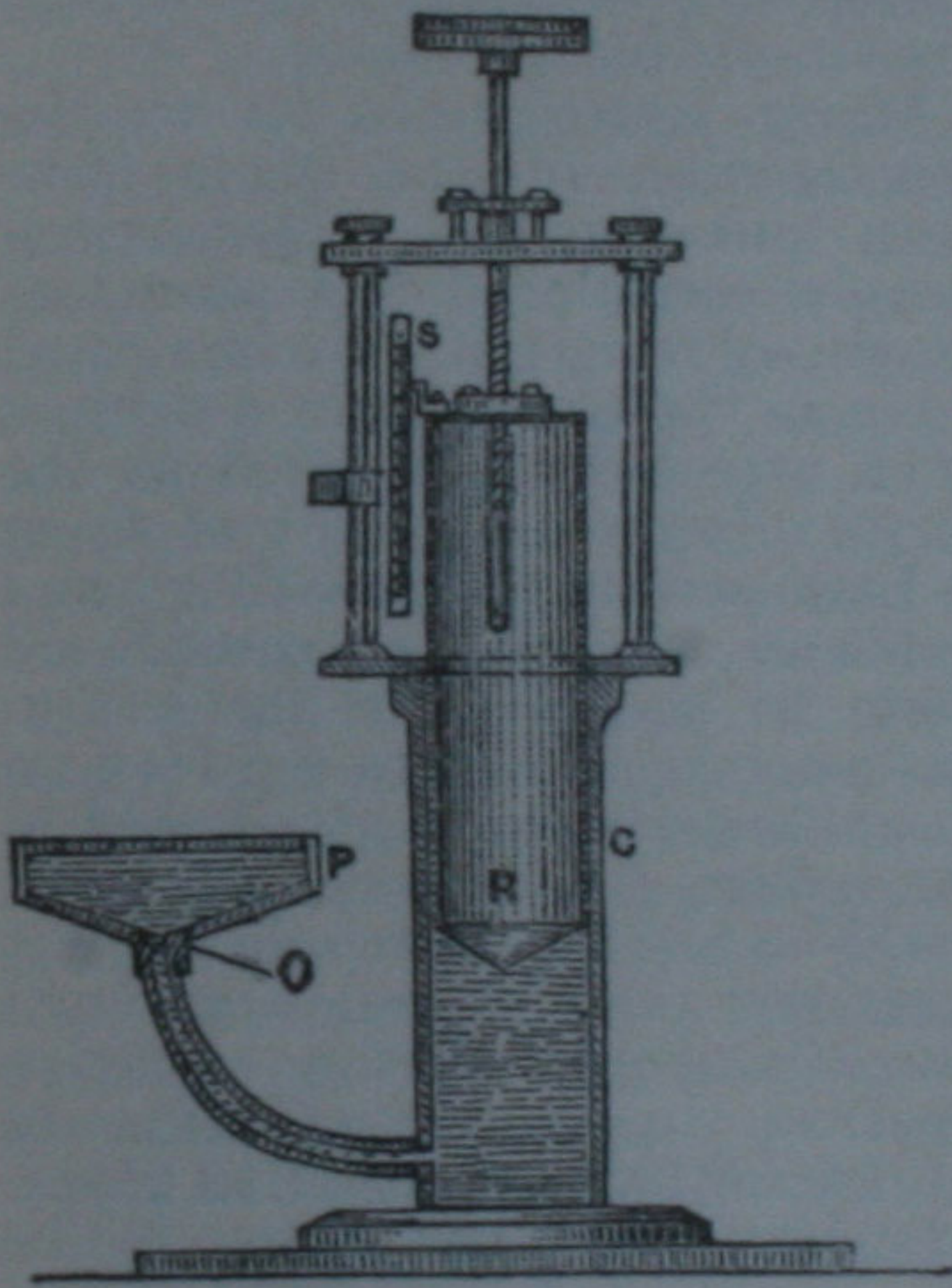
Atlixco, tn., Mexico, state of and 15 m. s.w. of Puebla, situated in a rich agricultural and fruit-growing region. Pop. 10,000.

Atmolysis is the method of separating gases of different densities by means of porous tubes or other septa. By diffusion the gases pass through the porous septum at rates inversely proportional to the square roots of their densities.

Atmometer, an instrument for the determination of the amount of water passing into the air by

evaporation. No quite satisfactory form has been invented. In Von Lamont's atmometer, which may serve as an example of smaller instruments, a pan, P, is connected by a pipe with a cylinder, C, in which a closely-fitting piston plunger, R, carrying a scale, S, is adjusted by means of a screw. The scale being set at zero, water is poured into the pan until it stands flush with the opening of the outflow pipe; the water is then driven by the piston to within

Neptune appear to be dense and cloud-laden; that of Mars, although much less dense than terrestrial air, almost certainly includes a considerable ingredient of water-vapour. Mercury is believed to be still more thinly covered; and refractive phenomena on Venus indicate her possession of an atmosphere fully comparable with our own. The airless condition of the moon is accounted for by its slight gravitative power; for the gases that may have primitively enwrapped it would, according to the kinetic theory, have gradually escaped into space, owing to the ineffective control exercised by the central body over the velocities of their particles. Even the earth is affirmed by some authorities to be incapable of retaining such volatile substances as hydrogen or helium, although heavier gases continue permanently subject to her attraction.



Atmometer.

a little of the top of the pan, and the evaporation is allowed to take place. When an observation is to be made, the piston is raised to such a height that the water sinks again from the pan to the same level as before, and the reading on the scale showing the change of level of the piston gives the amount of water evaporated.

Atmosphere (Gr. 'sphere of vapour'), a gaseous envelope surrounding a body in space. The atmospheres of the several planets differ greatly in quality. Those of Jupiter, Saturn, Uranus, and

The atmospheres of massive globes condense rapidly downward, and are hence, other things being equal, less extensive proportionately than those of minor orbs. That of the earth may extend in a highly-rarefied state to a height of 200 m., and meteors give rise to conspicuous light at elevations up to 120 m. Above 45 m., however, the effects of refraction cease to be perceptible. With each ascent of $3\frac{1}{2}$ m. the density of the air is halved, and the steps shorten through the condensing power of cold at high altitudes. On the summit of the Misti, for instance (18,000 ft.), the barometer stands at about 15 in.; and at the highest point reached by sounding balloons (72,000 ft.), the atmosphere is balanced by $1\frac{1}{2}$ in. of mercury. The whole of the air, if concentrated into a shell of uniform sea-level density, would rise no higher than 5 m. (26,163 ft.), and this imaginary stratum is called the 'homogeneous atmos-

phere.' If reduced to a liquid by the cooling of the earth to -200° c., it would, as Professor Dewar has shown, form a universal ocean only 35 ft. in depth. See GASES AND VAPOURS.

Atmospheric air is a mechanical mixture of about 78 volumes of nitrogen with 21 of oxygen and 1 of argon; a small percentage (0.04) of carbon dioxide is also present, besides traces of free hydrogen and helium (probably supplied by mineral springs), of neon, krypton, and xenon. It also contains a variable but all-important proportion of water vapour. It is through the thermal opacity of this part of its atmosphere that the earth is rendered habitable, the heat received from the sun being, through its intervention, stored, distributed, and hindered from departing uselessly back into space. Water-vapour, too, is the mainspring of atmospheric circulation, as well as of all the actions and disturbances concerned in meteorological processes; and the amount suspended over a given area largely determines the type of prevalent weather. (See METEOROLOGY.) The total weight of the atmosphere, as computed by Sir John Herschel, amounts to $11\frac{2}{3}$ trillion tons, or $\frac{1}{12500000}$ that of the solid globe itself. It exerts a pressure, when the barometer stands at 30 in., of 14.73 lbs. avoirdupois to the square inch, so that an average man sustains a constant weight of about 14 tons. The unit of pressure, called an 'atmosphere,' is defined at Paris as that of 760 millimetres (29.922 in.), in London as that of 30 in., of mercury at 0° c. See TEMPERATURE, STRATOSPHERE,

Atolls. See CORAL ISLANDS.

Atom. All substances consist of minute particles which cannot be broken up without changing the chemical character of the substance. These bricks, so to speak, of which the substance is built

are called the molecules. The molecules of a pure substance are all exactly alike, while a mixture of different kinds of molecules is a mixture of different substances. Each molecule can in general be split up into a few smaller parts, which may remain apart and form the elements, or may combine with others to form the molecules of another substance. Those parts into which a molecule may be split are called atoms, and are thus the smallest portions into which matter can be subdivided and still remain ordinary matter.

Many speculations as to the construction of the atom have been put forward. Boscovitch merely considered the atoms as centres of force; Kelvin imagined them as vortex rings in a perfect fluid, which he identified as the æther; Larmor thought of them as little strains in the æther; and Osborne Reynolds considered them to be spaces in the æther. Each conception required its own characteristics to be attributed to the æther, but as none of these could be tested, the whole subject remained pure speculation until the discovery of the negative electron in the conduction of electricity through rarefied gases. Negative electrons seem to be absolutely identical from whatever source they are derived, and therefore it is natural to consider them as the fundamental particles out of which all matter is constructed. The mass of a negative electron is about a thousandth part of that of a hydrogen atom, and therefore one may suppose that there are one thousand negative electrons in a hydrogen atom if all the mass is associated with them.

Positive electricity has never been found associated with anything smaller than a whole atom, and consequently it is difficult to see what rôle it plays in the construction of the atom. Up to the

present the most suggestive conception of the atom has been that of Sir J. J. Thomson. He imagines the atom as a uniform mass of positive electricity with the negative electrons imbedded in it. The electrons rotate as the planets do in a planetary system, and the difference between atoms is simply a difference in number and arrangement of the electrons.

The mathematics of such a system is complicated, but there are certain general characteristics to be seen:—Firstly, the electrons would arrange themselves in a series of concentric spherical shells, and if we were gradually to increase the number of electrons we should at certain intervals get the same inner shells recurring. This would account for the series of elements with similar properties—*e.g.* the alkali metals. Secondly, the spectra of these series of elements show certain remarkable points of similarity, indicating that there are in the atoms natural periods of vibration connected by the same law. These similar inner shells of electrons would have the same natural periods of vibration in the different atoms, but they would, of course, be modified by the added outer electrons. Thirdly, it can be shown that certain arrangements of the electrons have a great tendency to lose one of their number, others have a tendency to annex one, while others are so stable that it would require a very great force either to abstract one or to add one. This would very readily account for electro-negative, electro-positive, and inert elements. Finally, although most of the stable arrangements are very stable, so that it would be very unlikely that an atom would lose or gain more than one, or at most two, electrons, yet the splitting up of an atom is quite conceivable. This would be more probable with

heavy atoms containing very large numbers of electrons, and therefore we might expect the heavy atoms of radio-active bodies to break down into simpler and more stable arrangements. A rough calculation of the number of electrons in the atom on other assumptions than that the whole mass resides in them has been carried out in quite a number of different ways. The results vary from one to four hundred thousand, but this large discrepancy is caused by the difference in the assumptions made. The last number would give the total number of electrons in a radium atom, and it is possibly quite near to the truth. The smaller numbers are given by effects in which we should expect most of the electrons to be quite inactive, only the few active ones being counted. The great difficulty in this conception of the construction of the atom is the uniform mass of positive electricity in which the negative electrons are embedded. Nothing at all like it has ever been realized, and it will no doubt be gladly abandoned when some better conception can replace it. In spite of this drawback, however, the idea has been a very fruitful one. See Sir J. J. Thomson's *Corpuscular Theory of Matter*, Sir Oliver Lodge's *Electrons*, and N. R. Campbell's *Modern Electrical Theory*.

Atomic Heat. Dulong and Petit of Paris were the first to show (1819) that a remarkable relation exists between the specific heat and the atomic weight of elements—*viz.* that the specific heat is inversely proportional to the atomic weight: the higher the specific heat, the lower the atomic weight. They concluded that 'all atoms of the solid elements have the same specific heat or thermal capacity,' and termed this the atomic heat. Expressed in another way, the same quantity of

heat is required to raise an atomic proportion of mercury, an atom of iron, an atom of sulphur, and an atom of lithium, or an atom of any solid element, through 1° c. For example:—

Element.	Specific Heat.	Atomic Weight.	Atomic Heat.
Platinum.	·032	195	6·2
Iron . .	·112	56	6·3
Sulphur .	·178	32	5·7
Lithium .	·941	7	6·6

There are four well-marked exceptions to this law—viz. carbon, boron, beryllium, and silicon, but the specific heats rise at high temperatures, approximating to the normal. The mean specific heat multiplied by the atomic weight of a great number of elements is approximately 6·4; the departure from this number more or less is small, and may be due to the fact that the specific heats are not strictly comparable or all accurate. The atomic heat (6·4) is of value in the determination of the atomic weight of an element, when there is any doubt as to the result by other methods.

Atomic Theory. The atomic theory is the foundation on which modern chemical science is built. John Dalton, in the first decade of the 19th century, revived the idea of atoms, which was first taught by the ancient Greek philosophers, 400 B.C.; and it is now generally agreed that all matter consists of atoms of elements united with each other by the force of chemical affinity. An atom is an indivisible (lit. 'uncuttable') particle, and is defined as the smallest part of an element which can take part in a chemical change. Each atom is considered to have a definite and unchangeable weight, but in the case of the recently-discovered element radium, and possibly in other

cases as well, there appears to be going on something closely resembling atomic disintegration. Definite proof of this, however, is still wanting. We cannot isolate individual atoms, and by no conceivable method could they be weighed if isolated; but though unable to determine their *absolute* weights directly, we know the weights of the various atoms *relatively* to one another. The atom of hydrogen, being the lightest, is taken as unity; and compared with it the atom of oxygen weighs in round numbers 16, nitrogen 14, iron 56, and mercury 200. These numbers are known as 'atomic weights.' When a chemical change takes place, it is due to the union or separation of atoms, and it necessarily follows from the indivisibility of the atoms that this union or separation must occur in definite or fixed proportions by weight—*i.e.* the weights of the atoms themselves. For example, if the atoms of nitrogen and oxygen weigh respectively 14 and 16 times as heavy as a hydrogen atom, then, according to the theory, they can only unite 1 to 1, 2 to 1, 3 to 1, 3 to 2, etc.; and the proportion of nitrogen to oxygen in the compound formed will be that of 14 parts by weight of nitrogen to 16 of oxygen, 14 × 2 to 16, 14 × 3 to 16, 14 to 16 × 2, and so on. And this we know by experiment to be the case.

Carbon combines with oxygen to form two compounds—the monoxide and dioxide; and with hydrogen to form marsh gas and ethylene. An analysis of these compounds, stated in the usual way, shows them to contain the weights as follows:—

Carbon Monoxide.	Carbon Dioxide.	Marsh Gas.	Ethylene.
C = 42·8	C = 27·2	C = 75	C = 85·7
O = 57·2	O = 72·8	H = 25	H = 14·3
100·0	100·0	100	100·0

There is here no apparent relation

between the weight of carbon in the four compounds to the oxygen and hydrogen; but if we calculate the weight of oxygen and hydrogen in each to unit weight of carbon, we obtain the following figures:—

Monoxide.	Dioxide.	Marsh Gas.	Ethylene.
C=1	C=1	C=1	C=1
O=1·33	O=2·66	H=·33	H=·166

We thus learn that the dioxide contains twice as much oxygen as the monoxide, and that ethylene contains but half as much hydrogen as marsh gas relative to the weight of carbon. Though Dalton was unable to understand and explain all his facts, he laid down the following laws of definite (or constant) and multiple proportions:—

1. The same compound always contains the same elements, combined in the same proportion by weight; or, in every chemical compound, however produced, the proportion by weight of the elements is always the same. 2. When two elements unite with each other in more than one proportion by weight, the quantity of one of these being constant, the weights of the others vary in simple ratio. Further advances were made by the investigations of Gay-Lussac and Avogadro. The researches of the former were chiefly confined to gases. He proved by experiment that 2 volumes of hydrogen (say 2 cub. in.) combine with 1 volume of oxygen (1 cub. in.), no more and no less, to produce 2 volumes of water vapour (2 cub. in.). He thus arrived at the following conclusions, known as 'Gay-Lussac's Laws:—(1.) There is a simple ratio between the volumes of gases which combine. (2.) The volume of the resulting compound bears a simple ratio to the volumes of the original gaseous constituents. Avogadro was the first to suggest an explanation of these experimental facts. By the assumptions (a) that atoms combine to

form molecules, (b) that atoms of the common elementary gases unite in pairs to form molecules (*e.g.* H₂ and O₂ represent molecules respectively of hydrogen and oxygen), and (c) that atoms of different elements unite to form compound molecules (HCl, H₂O, CH₄, and C₂H₄ represent molecules of hydrogen chloride, water, marsh gas, and ethylene respectively), he concluded that equal volumes of all gases at the same temperature and pressure contain the same number of molecules, independently of their size or the number of atoms in them, and thus laid the foundations of modern chemistry.

It is impossible to describe here how atomic weights are determined, or all that the atomic theory leads to, but one result is that we can employ symbols, formulæ, and equations. A *symbol* of an element indicates (1) its name, (2) one atom of the element, (3) the weight of the element compared with hydrogen or its atomic weight. A *formula* indicates (1) the name of the substance, (2) the number of atoms in the molecule, (3) the composition of the molecule (*i.e.* the elements which by combination produce it), and (4) the weight of the molecule (molecular weight) compared with the atom of hydrogen. *Equations* describe or express chemical changes. They indicate graphically the nature of the combinations or decompositions which take place, the relative weights of the substances involved, and, in the case of gases, their volumes.

A table of the atomic weights of the chemical elements will be found under the art. ELEMENTS. Certain important relations which atomic weights bear to one another, pointed out by Mendeléeff, are indicated in the article PERIODIC LAW. See CHEMISTRY, and for further information consult Ostwald's *Outlines of General Chemistry* (trans. Walker,

substitutionary punishment, a view (believed by some to be the teaching of St. Paul) which is superficially clear, but leads to insoluble difficulties. Bishop Butler held that *no* theory of atonement was competent. Recent thinkers try to construct a *moral* theory. F. D. Maurice, F. W. Robertson, and Ritschl exclude an objective propitiation or remedial aspect in the work of Christ; Bushnell offers many changing views, striking in themselves, but none of them exactly a doctrine of atonement; M'Leod Campbell's *Nature of the Atonement* (1853) unfolds a complex theory, not, perhaps, homogeneous throughout, but full of intellectual subtlety and spiritual tenderness. One very striking suggestion is that Christ's work consisted, not in bearing any punishment, but in offering to God a perfect repentance on behalf of sinful man, so that henceforth it is not merely *legally possible* but *morally right* that God should forgive sin. The old Protestant view will be found slightly modified in R. W. Dale's *Doctrine of the Atonement* (1885). Oxenham wrote on the *Catholic Doctrine* (1881). One of the most recent discussions is Mr. Scott Lidgett's *Spiritual Principle of the Atonement* (3rd ed. 1901). See also Ritschl's *History of the Doctrine of Justification and Atonement* (1874; Eng. trans. 1900), and *The Atonement in Modern Religious Thought* (1900).

Atony, a medical term, indicating a want of tone; weakness; debility.

Atossa, queen of Persia, was daughter of Cyrus the Great, and wife successively of her brother Cambyses, Smerdis the usurper, and Darius Hystaspis, to whom she bore Xerxes and three other sons. She possessed great influence over Darius, and is said to have urged him to the invasion

of Greece. In Æschylus's play *The Persæ* she is a prominent character. See also Herodotus, bks. iii. and vii.

Atrak, or ATREK, riv. of Persia, rising in Khorassan, with course N.W., then W. (about 350 m. in all), through Khorassan and Transcaspian districts, and entering the Caspian Sea at its S.E. corner.

Atrato, riv. in Colombia, rising on the W. flank of the W. Cordillera, and flowing N. to the Gulf of Darien. It is 410 m. long, drains a basin of 11,400 sq. m., and with its tributaries affords waterways of 680 m. in aggregate length. Small steamers can ascend to Lloro, 345 m. from its mouth. The watershed on the S. is only 360 ft. high, and a canal has been suggested to the San Juan, to connect the Atlantic and Pacific.

Atrauli, tn., Aligarh dist., United Provinces, India, 65 m. N. by E. of Agra. Centre of local disaffection during the mutiny. Pop. 16,500.

Atrebates, ancient Celtic people of Gallia Belgica, having as their capital *Nemetacum* or *Nemetocenna* (now Arras). A branch was also settled in England, in what is now Berkshire, their chief town being *Calleva* or *Calleva Atrebatum* (i.e. Silchester). See Terninck's *Etude sur l'Atrébatie avant le VI^e Siècle* (1866 and 1874).

Atreus, son of Pelops and Hippodamia, grandson of Tantalus; he was the father of Pleisthenes, and grandfather of Agamemnon, Menelaus, and Anaxibia. He and his brother Thyestes murdered their half-brother Chryseus, and, taking to flight, were entertained at Mycenæ by Eurystheus, whom Atreus afterwards succeeded as king. Thyestes seduced Aërope, the wife of Atreus, and was banished by his brother; he then sent Pleisthenes, whom he had brought up as his

own son, to slay Atreus, but Atreus killed his son unwittingly. When he found what he had done, Atreus pretended to be reconciled to Thyestes; recalled him to Mycenæ, killed his two sons, and served them up to their father at a banquet. Thyestes fled in horror. It was this crime in particular which called down the curse of the gods on the house of the Atreidæ. Their misfortunes supply the theme for many of the plays of the great Greek tragedians, especially for the *Agamemnon*, *Choephoræ*, and *Eumenides* of Æschylus, the *Electra* of Sophocles, and the *Electra* and *Orestes* of Euripides. According to some accounts, Atreus was slain by Ægisthus, son of Thyestes. The so-called Treasury of Atreus is the largest of the ancient tombs at Mycenæ in Greece; it is also known as the Tomb of Agamemnon. See MYCENÆ.

Atri (anc. *Hatria*), tn. and episc. see, prov. Teramo, Italy, 8 m. from the Adriatic, and 87 m. by rail s. of Ancona. It has a fine Gothic cathedral. Pop. 14,000.

Atrium, the principal apartment of a Roman house; it represents what was in the earliest times, no doubt, the only chamber. It had a hole in the roof, called the *compluvium*, which collected the rain and conducted it to a cistern in the floor. In later times other rooms were built on to the atrium, but, with Roman conservatism, it retained its original character as the chief room of the house. In it were placed the sacred fireplace, the household gods, the bed of master and mistress, and the statues of their ancestors; and it was used as the formal reception room. In early Christian churches the atrium was an open court in front of the basilica, a place of abode for penitents, sometimes also as an

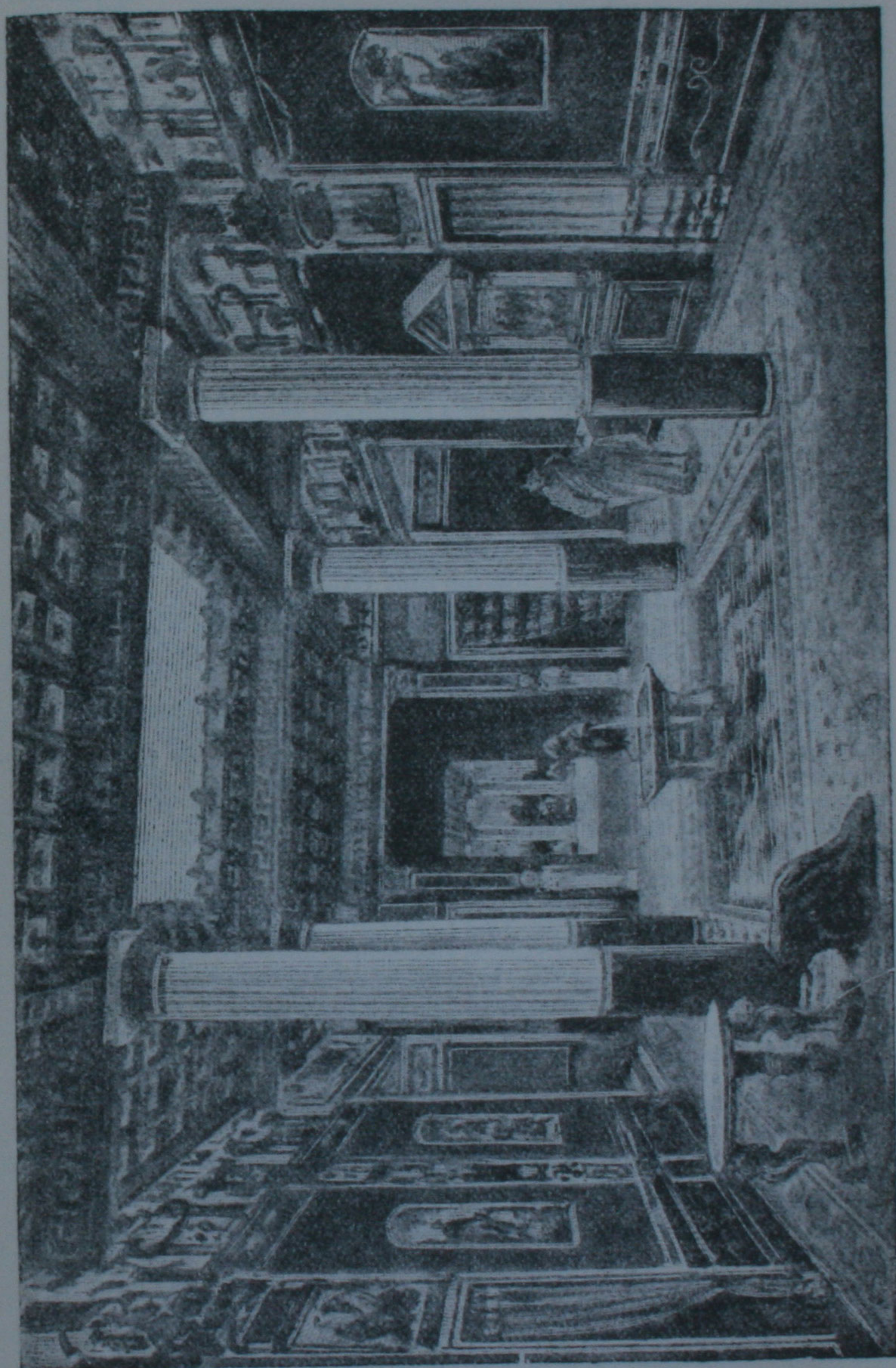
asylum for criminals. See Preston and Dodge's *Private Life of the Romans* (1893).

Atropatene, or MEDIA ATROPATIA, a mountainous region in the N.W. part of Media, near the Caspian Sea, corresponding to the existing Persian province of Azerbaijan. From 149 B.C. to 428 A.D. it formed part of Armenia, and subsequently became a Persian province.

Atrophy, a general or local wasting of the body. In children, general atrophy is most commonly due to unsuitable food, to catarrh of the digestive organs, to tubercle, or to worms in the alimentary canal. In adults it is generally the result of grave organic disease, such as gastric ulcer, tubercle, cancer, albuminuria, or long suppuration; it is occasionally due to nervous disorder, as in hysteria. Local atrophies of muscle and nerve may be caused by disuse, as in paralyzed limbs; more rarely by overwork. It is sometimes congenital, the normal growth of a part being arrested.

Atropine, an alkaloid which occurs along with hyoscyamine in all parts of the *Atropa belladonna* (deadly nightshade), and in the seeds of *Datura stramonium*. It is a powerful poison, but used medicinally it is valuable to dilate the pupil of the eye, quicken the heart's action, and relieve cardiac distress, and as an external application for the relief of pain. See BELLADONNA.

Atropos, the eldest of the three Fates. Her functions were to render the decisions immutable, according to Plato, and to sever the thread of life (spun by her sisters) with the scissors with which she is pictured, her features darkly veiled. Wytoun's witches, in his story of *Macbeth*, and Gray's *Fatal Sisters*, doubtless owe their origin to Atropos and her sisters, Clotho and Lachesis.



Atrium in Pompeii.

At Sight, a commercial term used upon bills of exchange, equivalent to 'on demand.'

Atsuta, tn. on the s. coast of Hondo, Japan, 70 m. E. of Kioto; has Shinto temples. Pop. about 30,000.

Attacca (Ital.), in music a term signifying that a succeeding movement is to be begun without stopping for any intermediate pause.

Attaché, MILITARY. A military attaché or a naval attaché, or both, are appointed to most important embassies. The duties of these officers are to make themselves thoroughly acquainted with every change that takes place in military or naval matters, and to report from time to time on the mobilization, armament, and equipment of the power to whom they are accredited. The task is one of no little difficulty, as they must refrain from procuring information in an underhand manner. In time of war the privilege of being attached to the headquarter staff of an army is usually conceded to representatives of friendly nations.

Attachment. (1.) OF PERSONS. A writ of attachment is a writ of execution addressed to the sheriff, or in the case of a county court action to the bailiff, ordering him to attach or to arrest the person therein named and bring him before the court. A writ of attachment will be granted only by leave of the court, and is issued when the person whom it is sought to attach is guilty of contempt or disobeys an order of the court—*e.g.* refuses to answer interrogatories or produce documents, refuses to deliver up property other than land or money, refuses to obey an order requiring an act to be done or not done, *e.g.* an injunction. An attachment will not be granted to enforce the payment of money except in certain cases under the

Debtors Act, 1869. (See DEBT.) A writ of attachment must take effect within one year from its date. The person attached will be released from imprisonment either (1) if he obeys the order for disobedience to which he is attached, or (2) at the expiration of the term for which he was attached, if a term was mentioned, or (3) on application to the court. Attachment is limited to one year in cases under the Debtors Act. (2.) OF DEBTS. An attachment, or 'garnishee order,' as it is called, is another method of obtaining execution of the order of a court. If A has obtained a judgment against B, and he hears that C owes a debt to B, he may obtain an order directing C to pay the debt to him (A), and not to B. But C may appear and dispute the debt. For Scots law, see ARRESTMENT. See Cababé, *On Attachment of Debts* (1900).

Attainder. Attainder originally followed upon all judgments for treason or felony, and upon all judgments of outlawry. Its effect was that the blood of the person thus convicted was said to be corrupted, and his real property was forfeited to the crown for treason, and to the lord of the fee for felony, subject to certain rights of the crown. Attainder was abolished in 1870. (See ESCHEAT.) In 1477, or thereabouts, arose a practice of introducing bills of attainder into Parliament, which were passed like any other Act of Parliament, and had against the persons or person mentioned therein the effect of a common law attainder. The last execution under an Act of Attainder was in 1797, and many Acts of Attainder have been reversed. In the United States a man may be attainted for treason, but the condemnation does not, and may not, involve corruption of blood—in other words, the at-

tainted man can bequeath, and his heirs inherit at his death.

Attalus, the name of three kings of Pergamus. (1.) Sur-named SOTER, reigned from 241 to 197 B.C.; defeated the Gauls near Sardis in 239 B.C.; waged frequent war against the Seleucids; and was allied with the Romans against Philip of Macedon and the Achæans. He was distinguished for his great wealth and his patronage of literature. (2.) A. PHILADELPHUS, reigned from 159 to 138 B.C., second son of (1), and like him an ally of the Romans; he overthrew Prusias of Bithynia. (3.) A. PHILOMETOR, succeeded (2), who was his uncle; he reigned from 138 to 133 B.C., and by his will left his kingdom to the Romans; it formed their original province of Asia.

Attap, the native name of the *Nipa fruticans*, a nearly stemless palm indigenous to the forests of the E. Indian Archipelago. Its long, thick pinnate leaves are in common use for thatching.

Attar, or OTTO, OF ROSES, a perfume which consists of the volatile or essential oil distilled from certain varieties of rose. The manufacture is carried on in India, Persia, and Bulgaria, the last district producing the largest quantity and the best quality. The flowers are gathered in May and June, and at once placed in copper stills heated with a wood fire and partially filled with spring water. The distillate from the first operation is again distilled, and the distillate is received in narrow-necked bottles. On allowing this distillate to stand at a temperature not exceeding 60° F. the oil gradually rises to the top, and is skimmed off. It is largely adulterated.

Attar, or ATHAR, FERID UD-DIN (1119-1230), Persian poet of the mystic school, and author of the *Mantik ut-Tair*, or *Conversations of the Birds*, a series of thirty

moral tales, describing, in terms of Sufic thought, the progress of the human soul to Nirvana. He also wrote the *Pandnama*, or *Book of Counsels*, and, in prose, a *Biography* (*The Tadhkiratu'l-Awliya*, ed. R. A. Nicholson, 1906) of famous mystics. Ed. and Fr. trans. of the *Mantik* by Garcin de Tassy (1857-63); and ed. and Eng. trans. of the *Pandnama* by Hindley (1809).

Attention, the process in which, or activity by which, an object is brought from the *margin* to the *focus* of consciousness, and thus acquires additional clearness and distinctness. It has been a matter of controversy within recent years whether attention is to be conceived as a complex process explicable in more ultimate terms, or as a unique activity incapable of further analysis. See James's *Principles of Psychology* (1890), vol. i. ch. xi.

Atterbom, PETER DANIEL AMA-DEUS (1790-1855), the most distinguished poet of the romantic school in Sweden. When a student at Upsala he helped to found the Aurora League, and played an active part in the strife which the romanticists waged against the old 'classic' writers, first in the journal *Fosfor* (1810-13)—whence they were called Phosphorists—and afterwards in the periodicals *Poetisk Kalender* (1812-22), which Atterbom himself edited, and in the *Svensk Litteratur Tidning* (1813-24). Atterbom's own *chef-d'œuvre* is the dramatic poem *Lycksalighetens O* (1824-7), or *Isle of Happiness*, which contains some of the sweetest lyrics in the language. A fragment, *Fågeln Blå*, is almost equally famous. Atterbom also wrote an important work on Swedish literary history entitled *Siare og Skaldar* (1841-64). In 1828 he was appointed professor of philosophy, and in 1835 professor of æsthetics and literary history, at Upsala

University. His collected works (*Samlede Skrifter*) appeared in 1854-70.

Atterbury, FRANCIS (1662-1732), bishop of Rochester, was born at Milton, or Middelton Keynes, in Buckinghamshire. He became lecturer of St. Bride's, a royal chaplain, and minister to Bridewell Hospital in 1691. He manifested his skill as a controversialist in a defence of Protestantism against Walker, master of University College (1687); in the *Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris* (1698), though the book appeared with the name of Charles Boyle; and in 1700 he ably upheld, on the High Church side, the powers and privileges of Convocation in an argument with Dr. Wake. This service procured him the archdeaconry of Totnes and a canonry of Exeter. He became dean of Westminster and bishop of Rochester in 1713. Atterbury is credited with Dr. Sacheverell's defence (1710), and the authorship of the well-known treatise *Representation of the State of Religion*. After the accession of George I. he bitterly resented the Hanoverian rule, and in 1722 he was committed to the Tower, and finally deprived of all his ecclesiastical offices and banished from the kingdom. He died in Paris, and was buried obscurely in Westminster Abbey. Atterbury wrote four volumes of *Sermons*, a Latin translation of *Absalom and Achitophel*, and letters to Swift, Pope, Bolingbroke, and others, all of which were published between 1682 and 1723. His *Private Correspondence* was published by Lord Hailes in 1800, and his *Epistolary Correspondence* by Nichols in 1790. Curll published in 1727 *Atterburyana: being Miscellanies by the late Bishop of Rochester* (1727). See Atterbury's *Memoirs* (1723), his *Life* by Stackhouse (1727);

Williams's *Memoirs and Correspondence of Atterbury* (1869); and *Life* by Canon Beeching (1909).

Attestation. It is customary, and often necessary, for the signature of deeds and important legal documents to be attested by a witness or witnesses, 'attestors,' who witnessed the signature. Wills and grants of land to charities must be attested by two witnesses. In the case of pauper apprentices to sea service, the indentures must be attested by two justices of the peace. Warrants of attorney and cognovits must be attested by a solicitor, and bills of sale by one witness. In Scotland all deeds require two witnesses, except where there are special statutory relaxations.

Attfield, JOHN (1835), English chemist, born at Barnet, Herts; was demonstrator of chemistry at St. Bartholomew's Hospital, London (1854-62); professor of practical chemistry, Pharmaceutical Society of Great Britain (1862-96); was a founder of the British Pharmaceutical Conference and of the Institute of Chemistry. He is an authority on pharmaceutical education; has published *A Manual of Chemistry* (1867; 19th ed. 1906); assisted to edit the *British Pharmacopœia* in 1885, and edited it as chief in 1898. In 1900 he edited the *Indian and Colonial Addendum to Pharmacopœia*.

Attic, an architectural term, designating a low story surmounting the main cornice of a building. The term is also applied to the tholobate or base on which a dome or cupola rests, as in St. Paul's Cathedral, London.

Attica, a division of ancient Greece, with the Ægean Sea to the E. and S.W., and Bœotia to the N. It was divided into several independent states, but before the dawn of history they were united into one polity (by Theseus, according to the legends); Athens was the capital city. At-

tica and Bœotia now form a nomarchy of Greece, extending from the Ægean Sea and the Egeiros Channel w. to the Gulf of Corinth. Area, 2,472 sq. m. Pop. 340,000.

Atticism, a term used to denote a well-turned phrase, was, among the Athenians, applied to those grammarians (Atticists) who endeavoured to retain the pristine purity of the Attic dialect. *Attic wit* and *Attic salt* signify a poignant and delicate wit characteristic of the Athenians.

Atticus (c. 400 A.D.), patriarch of Constantinople and successor of Chrysostom. He wrote a treatise, *De Fide et Virginitate*, opposing Nestorian views.

Atticus Herodes, TIBERIUS CLAUDIUS (104-180 A.D.), celebrated Greek rhetorician of the 2nd century. He possessed great wealth, even after presenting five minæ—nearly £20—to every Athenian citizen in fulfilment of his father's will. He built a race-course (ruins of which remain) and a theatre at Athens, erected a theatre at Corinth, an aqueduct at Olympia, a stadium at Delphi, and hot baths at Thermopylæ. He taught rhetoric both at Athens and Rome, having for pupils the Emperors Marcus Aurelius and Lucius Verus. In 143 A.D. he was made consul by Antoninus Pius, and at one time was administrator of the free towns in Asia. None of his works survive.

Atticus, TITUS POMPONIUS (109-32 B.C.), a Roman knight, whose full name was Quintus Cæcilius Pomponianus Atticus. The last name was given to him because of his residence in Athens (86-65 B.C.) and his skill in Greek literature and culture. Though distinguished for his ability among his contemporaries, he decided to stand aside from the politics of Rome, especially from the civil war of 87 to 81 B.C. He was on terms of intimate friendship with the younger Marius, Sulla, Pom-

pey, Brutus, Cassius, Antony, and Augustus, and, above all, with Cicero, from whose correspondence with him, covering the years from 68 to 43 B.C., we gain a picture of him as the ideal classical man of culture. In philosophy he was an Epicurean. He wrote on Roman history, and also in Greek on Cicero's consulship; but none of his works survive. See Cicero's *Letters*; biography in Drumann's *Rome* (1834-44), vol. v.

Attila, or ETZEL, king of the Huns, succeeded to the kingship in A.D. 434. In the beginning of his reign his brother Bleda shared the kingship; but the overweening ambition of Attila speedily led him to deprive his brother of his sceptre, and even, according to some writers, of his life.

In the reign of Attila (434-453) the supremacy of the Huns is said to have extended from the Caspian Sea to the Rhine; and the commanding position then attained by this savage people was largely due to the resistless energy and masterfulness of their great leader. It is said that he styled himself the 'Scourge of God;' but Gibbon observes that 'the ancients, Jornandes, Priscus, etc., are ignorant of this epithet.'

In 441 Attila laid waste Thrace and Illyria, only withdrawing his forces on the receipt of a heavy fine. In 445 he founded the city of Buda as his capital. In 448 he extorted a heavy tribute from the Byzantine emperor, Theodosius II.; but in 450 again attacked the Eastern empire, until his attention was diverted to the Western empire, it is said by the offer of the hand of Princess Honoria. In the following year he marched on Gaul with an army nearly three-quarters of a million strong. Failing in his effort to detach Theodoric, king of the West Goths, from his alliance with the Romans under their general, Aëtius, Attila retired from Orleans to Chalons,

where he gave battle to the allies on the Catalaunian Fields (451). The Huns were defeated; but the Romans did not follow up their victory, and in the following year Attila laid waste Northern Italy, and even threatened Rome. In 453 he died, on the night of his marriage with the Burgundian princess, Hilda or Ildiko. See Gibbon's *Decline and Fall*, and Thierry's *Attila* (ed. 1874).

Attleboro, tn., Bristol co., Mass., U.S.A., 30 m. s.w. of Boston. Manufactures silverware, cotton, jewellery, and carriages. Pop. 12,000. See Daggett's *Sketch of the History of Attleboro* (1894).

Attleborough, mrkt. tn., Norfolk, England, 15 m. s.w. of Norwich, on ry. to Thetford. The town was in early times the capital of Norfolk, and a residence of the E. Anglian kings. Pop. 2,500.

Attock, small tn. and fort in Rawal Pindi dist., Punjab, India, on the l. bk. of the Indus, here crossed by a railway bridge (1883), and at its junction with the Kabul R. Its fortress was built by Akbar in 1583. Attock is 74 m. by rail and road from the mouth of the Khyber Pass. Pop. 3,000.

Attorney, legally any person appointed by another to act on his behalf. In a narrower sense, attorney, or more strictly attorney-at-law, formerly denoted a legal practitioner in the common law courts in England, as distinguished from a solicitor, who practised in the equity or chancery courts. Since the Judicature Acts this distinction has been abolished, and there are only solicitors. In the United States the term is wider in its extent, and embraces the barrister or advocate, as well as the solicitor. See POWER OF ATTORNEY.

Attorney-general, the principal law officer of the crown for England, and legal adviser of the government. He is always in

Parliament, and is a member of the ministry, with which he goes out of office; but he is not in the cabinet, nor a Privy Councillor. He represents the crown in the courts, both in criminal prosecutions and in civil cases where the prerogative is affected or the revenue concerned. He can file an information for any misdemeanour, and does so when delay should be avoided on public grounds. The effect is that the accused is tried without a true bill of indictment being found by a grand jury. In any criminal case he can enter a *nolle prosequi*, and so stop the proceedings. He can maintain an action to prevent interference with a highway or a navigable river, or restrain any unauthorized act likely to be injurious to the public. His sanction is required under many statutes for the recovery of penalties by local authorities and others. He appears in all cases affecting public charities, and to protect the property of lunatics, and he has statutory duties with regard to patents. He is the head of the bar for the time, and decides questions of professional etiquette. He and the solicitor-general have a right of reply in criminal cases, even when no evidence has been called for the defence. He is paid a salary of £7,000, and fees for crown business, and may not now engage in private practice. The solicitor-general has power to act for the attorney-general during a vacancy in the office. There is also an attorney-general for Ireland, with an analogous position and duties; and there is an attorney-general of the queen-consort, and of the Prince of Wales as Duke of Cornwall, and of the county palatine of Lancaster. There is a similar officer in the United States, who is also a member of the president's cabinet.

Attornment, an acknowledgment by one person that he is the tenant of another. Formerly, if

A leased property to B for 100 years, and before the end of the time A sold the property to C, the relation of landlord and tenant between C and B was created by attornment in the form, 'I, B, attorn and become tenant to C;' but this is now unnecessary. In mortgages, the mortgagor often attorns tenant to the mortgagee, and this enables the mortgagee to distrain for rent; but such an attornment must now generally be registered as a **BILL OF SALE**.

Attraction, the tendency of bodies to approach each other and unite; the force which brings bodies together and resists their separation. The chief kinds of attraction are: the attraction of gravitation; capillary attraction, meaning the attraction excited by a hairlike tube on a liquid within it—a variety of adhesion; molecular attraction, which acts only at infinitely small distances; chemical attraction (or affinity); magnetic attraction—the power of a magnet or loadstone of drawing iron to itself; and electrical attraction—the power possessed by an electrified body of drawing certain other bodies to itself. These attractions are divisible into two classes: (1) those which act at sensible and measurable distances, as gravitation, magnetic and electrical attraction; and (2) those which extend only to extremely small and insensible distances, as capillary, molecular, and chemical attraction.

Attribute, in logic. See **SUBSTANCE**.

Attwood, THOMAS (1765–1838), musician and composer, was born in London. He was a favourite pupil of Mozart at Vienna, and an intimate friend of Mendelssohn. He became organist of St. Paul's (1795), and composer and organist to the Chapel Royal (1796). His works include many songs and glees, operas and anthems.

Atur, or **ATTUR**, tn., Madras, India, 30 m. E. by S. of Salem. Pop. 10,000.

Atwood, GEORGE (1746–1807), English mathematician, educated at Westminster and Cambridge, where he was third wrangler, and afterwards excelled as a lecturer. In 1784, William Pitt, one of his pupils, bestowed on him a patent office—an indirect payment for his services in financial calculations. Atwood was the author of many mathematical works, one of which gives the first description of what is now called 'Atwood's machine.'

Atwood's Machine, a machine invented by George Atwood to demonstrate the laws of uniformly accelerated motion. It consists of an almost frictionless pulley over which hangs a fine string, at the two ends of which are equal weights just balancing one another. When a small extra weight is added to one of the weights, it falls with a small uniform acceleration; and by measuring the time taken to fall different distances the laws of uniformly accelerated motion can be demonstrated.

Atys, or **ATTIS**, a beautiful Phrygian shepherd beloved by the goddess Cybele, who made him her priest, then changed him into a fir tree. (See Catullus's *Ode 63*, and Ovid's *Fasti*, bk. iv.) The versions of the story vary very widely.

Atzgersdorf, manufacturing vil., Lower Austria, 5 m. S. by W. of Vienna. Pop. 8,000.

Aubagne, dist. tn., dep. of Bouches-du-Rhône, France, 10 m. E. of Marseilles; manufactures cloth, silk, earthenware, leather, and wines. There are a ruined castle and a monument to the Abbé de Barthélemy, and the 'Grottes Gardelaban' are in the neighbourhood. Pop. 9,600.

Aubaine, **DROIT D'**, an old French law (abolished in 1819) by