

probably a collection of the fatty acids present.

Adirondacks, group of mts. in N. of New York State, U.S.A., a part of the Appalachian system, made up of isolated peaks of Archæan crystalline rocks, small groups and short ranges. It abounds in lakes, and its streams are interrupted by rapids and falls. It is heavily forested, except where the timber has been removed by fire or by the lumbermen; and considerable parts (4,375 sq. m.) of the region, which amounts altogether to about 6,000 sq. m., are owned by the state as a forest reserve. The highest peak is Mt. Marcy, with an alt. of 5,344 ft. The region, which is noted for its wild beauty, is a favourite resort in summer.

Adis Abeba, or **ADDIS ABBEBA** (FINFINI), cap. of Shoa, and down to 1901 the cap. also of Abyssinia, in the midst of mountains, near one of the sources of the Blue Nile. Founded in 1885 as a pleasure resort, it is an important place of trade. Here peace was signed with the Italians in 1896. Pop. 10,000.

Adis Alam, or **ADDIS HALEM**, tn., was made cap. of Abyssinia in 1901; it lies about 35 m. w. of Adis Abeba.

Adit, a horizontal shaft or opening into a mine from the side of a hill.

Adjournal, in Scots law, the notification of a single sitting of the Court of Justiciary, or a single day's proceedings.

Adjudication. See **BANKRUPTCY**.

Adjuration. See **OATH**.

Adjustment of Average. See **INSURANCE, MARINE**.

Adjutant, a staff-officer who assists the officer commanding a larger unit, such as a battalion, in carrying out the details of military work. He may be either a captain or subaltern. He must, according to his branch of the

service, have qualified in musketry, in physical training, at the cavalry school, or in all. The tenure of office in the case of the regular forces is limited to three years. The adjutant has charge of the regimental office, with its books, records, and correspondence. He is responsible for the issue of all regimental orders, keeps the roster for duties, and also generally acts as prosecutor at courts-martial on men of his corps. He superintends the drilling and musketry instruction of young officers and recruits, and keeps a watchful eye on the way all military duties are performed. Captains of companies are, however, responsible for the discipline, drill, and administration of their commands, the adjutant's duty being merely to ensure uniformity on the lines laid down by the officer commanding the unit. Adjutants of auxiliary forces must be captains, or subalterns of over six years' service. They must have passed for promotion to the next higher rank, and, according to their branch of the service, have qualified in musketry, in signalling, or in both. The appointment is limited to three years, which may be extended to five.

Adjutant (*Leptoptilus dubius*), an Indian bird belonging to the same family as the storks, characterized by its naked flesh-red neck and throat, and the large throat-pouch. Owing to its practically omnivorous habits, it is protected as an efficient scavenger.

Adjutant-general, the second military member of the Army Council. He is charged with matters relating to *personnel*, such as recruitment, mobilization, and discipline.

Adjutators (often termed 'Agitators') were representatives elected by the regiments of the Puritan (Independent) army in 1647 to force from Parliament

Adler

which was strongly Presbyterian, satisfaction of the demands of the army before being disbanded. See Gardiner's *Hist. of the Great Civil War*; Carlyle's *Cromwell*; *Political Hist. of England*, vii. 15; and *Cambridge Modern Hist.*, iv. 11, in which the term 'Agitators' is retained.

Adler, FELIX (1851), born at Alzey, in Germany; went early to the United States; professor of Hebrew and Oriental languages and literature in Cornell University (1874-6); Theodore Roosevelt Professor in Berlin (1908-9). He established the Society of Ethical Culture, New York (1876), and published *Creed and Deed* (1877), *The Moral Instruction of Children* (1898), *Life and Destiny*, and *Religion of Duty*.

Adler, FRIEDRICH (1827-1908), German architect, born at Berlin; travelled extensively in Europe and Asia Minor, and returned to teach at Berlin. He has carried out some important designs, including those of the Christuskirche and Thomaskirche at Berlin, and has made valuable researches into ancient architecture in connection with excavations in the Peloponnesus. Among his works are *Baugeschichtliche Forschungen in Deutschland* (1870-79), *Die Baugeschichte von Berlin* (1861), and *Die Weltstädte in der Baukunst* (1872).

Adler, GEORG (1863), German economist, born at Posen; became lecturer on national economy at Freiburg (1886), professor at Basel (1893-9), and professor at Kiel (1900). He has published *Karl Marxsche Kritik* (1886), *Internationaler Arbeiter-Schutz* (1888), *Staat und Arbeitslosigkeit* (1894), *Die Social-Reform im Altertum* (1898), *Geschichte des Socialismus und Communismus* (1900), and *Ueber die Epochen der deutschen Handwerker politik* (1903).

Adler, HERMANN (1839), born at Hanover; succeeded his father,

Nathan, as chief rabbi of the Jews in the British Empire in 1891. He is president of the Jews' College, and one of the vice-presidents of the Mansion House Council for the Dwellings of the Poor. He has published *Ibn Gabirol, and Scholastic Philosophy* (1864), *Jewish Reply to Dr. Colenso* (1865), *A Volume of Sermons on the O.T.* (1869), *Can Jews be Patriots?* (1878).

Adler, JAKOB GEORG CHRISTIAN (1756-1834), Danish Orientalist; one of the best Arabic scholars of his day; author of an interesting treatise on the Cufic mss. in the University of Copenhagen (1770), and of the celebrated *Novi Testamenti Versiones Syriacæ simplex, philoxeniana et hierosolymitna* (1789). In 1789-93 he edited *Abulfida's Chronicles* in Arabic.

Adler, NATHAN MARCUS (1803-90), chief rabbi, was born at Hanover. Having filled the office of chief rabbi of the duchy of Oldenburg and later of Hanover, he was in 1844 elected chief rabbi of London, where he played an important part in the reunion of the English congregations. He published a Hebrew commentary on the Chaldee paraphrase of the Pentateuch, *Nethinah Lager* (1874; 2nd ed. 1877). See *Jewish Quarterly Review*, July 1890.

Adlershof, tn. and summer resort, Brandenburg, Prussia, 7 m. s.e. of Berlin. Pop. 9,000.

Ad libitum ('according to taste'), a musical term authorizing the use of discretion with regard to the *tempo* of the passage; or, in concerted music, indicating that the part thus marked may be omitted. Also a common expression, meaning 'to an indefinite extent.'

Adlington, par. and vil., N. Lancashire, England, 6 m. N.E. of Wigan; has cotton-spinning, calico-printing, and bleach works. Pop. 4,500.

Admetus, king of Thessaly and husband of Alcestis, who died to deliver her husband from death,

but was rescued from Hades by Hercules. See Euripides's *Alcestis*, Browning's *Balaustion*, Meredith's *Phœbus with Admetus*, and Lowell's *Shepherd of K. Admetus*.

Administration. The work of carrying on the government of a country, which, in a constitutional state, must be done in accordance with the law. The word is also used of the body of men charged with the performance of this work. For the distinction between the administrative and executive functions, see EXECUTIVE.

In countries with a parliamentary constitution, such as Great Britain, the administration is appointed by the head of the state, but is responsible to the legislature, and cannot continue long in office if the latter disapproves. Where the separation of the executive and legislative functions has been carried to extremes, as in the United States, the administration is appointed by and responsible to the head of the state, whose authority, however, depends on the popular vote. In bureaucratic and autocratic states the administration is answerable to public control to a much less extent. In England administrative officials are amenable to the ordinary law, and can be made to answer for wrongful acts like anybody else. In most continental countries this is not so, and their relations with the public are governed by a special code of laws, called *droit administratif*, administered by special courts. See Bluntschli's *Theory of the State* (1892); Goodnow's *Comparative Administrative Law* (1893); Hervieu's *Les Ministres dans les Différents États* (1893); Sidgwick's *Elements of Politics* (1891); Bagehot's *The English Constitution* (4th ed. 1896).

Administration Action, an action instituted for the purpose of having the estate of a deceased

person administered under the direction of the Chancery Division of the High Court of Justice, to which the administration of the estates of deceased persons is assigned by the Judicature Act, 1873. Where the amount or value of an estate does not exceed £500 a county court has now jurisdiction. Formerly any person interested under a will, or on intestacy, could, as a matter of right, commence an administration suit involving frequently great delay and cost; but now the court has power either to order a general administration, or to determine any particular questions without a general administration, as may appear necessary. A further check on administration proceedings is the power which the court now has to order a plaintiff to pay the costs of any action unnecessarily or improperly launched. See Daniell's *Chancery Practice*.

Administrator, in law, is a person appointed formerly by the Ordinary, and now by the Probate Division of the High Court—(1) when a person dies intestate; (2) when a person dies having made a will, but having left no executor. He is then called administrator *cum testamento annexo*. (3) If an executor dies before probate or intestate without having distributed the estate, an administrator *de bonis non* is appointed—*i.e.* of the property not yet distributed. The nearest of kin will generally be appointed administrator, but in default of any other person a creditor can obtain letters of administration. Application for a grant of letters of administration must be made within six months of the intestate's death; otherwise any person assuming to act as administrator will be liable to a penalty of £100, and 10 per cent. on the value of the property taken possession of or in any way administered. The functions of an administrator are in the main the

same as those of an executor; but while the latter can do many acts before obtaining probate of the will, the former, who derives his title from the court, can do nothing before administration is granted to him, except perhaps acts necessary for securing property of a perishable nature, and what are called acts of necessity or humanity—*e.g.* feeding animals, etc. An administrator is allowed a year from the death of the intestate before he is obliged to distribute the estate, so that he may have time to deal with all claims against it. He should as soon as possible advertise in the *London Gazette* and newspapers for persons to pay their debts to, and make claims against, the estate; and until he has done this he cannot safely distribute the property. The office of an administrator, unlike that of an executor, does not upon death devolve upon his legal representatives, but a new administrator must be appointed. An administrator is usually required to give security for good administration. He cannot claim any remuneration for his services or loss of time, but he is entitled to charge his expenses against the estate. See Williams, *On Executors*.

Admirable Crichton, THE.
See CRICHTON, JAMES.

Admiral, chief executive officer, in command of a squadron or fleet. Du Cange says that the Sicilians were the first to use the word with a specific meaning, and that they borrowed it from the nations farther east. It has been in use among maritime countries since the 13th or 14th century. There is reason to suppose that the title of admiral was in general use among the French before it was known in the English service; for in a convention executed at Bruges, in March 1297, Sir William Leybourne is styled 'Admiral of the Sea of the King of England,'

although his official designation at home was 'Captain of the King's Sailors and Mariners.' It was not, in fact, until 1300 that the title was accepted by the English. In that year Gervase Alard, who was in charge of the Cinque Ports fleet in Edward I.'s expedition to Scotland, is described in the wardrobe accounts as Admiral of the Fleet. After that date the designation of 'Captain and Admiral,' and less frequently 'Admiral and Captain,' is commonly found in records of the British navy. In its earliest application the title was only used for the official in supreme command of all the naval forces, and it was not until 1311 that it became of general use in application to all commanders of fleets and squadrons. The functions of admiral had previously been discharged by officers in the king's service known as 'Guardians of the Sea,' 'Leaders and Constables,' 'Justices,' 'Captains and Keepers of the Sea.' The office of Lord High Admiral seems to have been first created about 1406, and vested in John, Earl of Somerset. Owing to feeble legislation and poor administration in regard to the fleet and mercantile marine, the merchants had been reduced to undertake the safeguarding of the seas for themselves in previous years, and for that purpose a body of mercantile admirals had come into existence. Their powers and duties ultimately were merged in the Earl of Somerset, by whom they were all superseded. See ADMIRALTY.

As British fleets grew larger and more numerous, it became necessary to appoint more than one admiral. At first the functions of the subordinate officers of the rank were limited to particular waters, etc.; but presently a systematic subdivision of the rank was recognized, and a vice-admiral and a rear-admiral were appointed.

Increase in the size of fleets necessitated an increase in the number of flag-officers in command of them. It was found convenient to divide the fleets into three squadrons, which were distinguished according to the colours worn by them, and which, at the beginning of the 18th century, were known as the Red, the White, and the Blue—the Red being the senior squadron. For each of these squadrons 3 flag-officers were appointed, so that in respect of each squadron there were then one admiral, one vice-admiral, and one rear-admiral. The senior admiral, however—*i.e.* he who was in a position to command all the other

have the option of retiring at any age at the discretion of the Admiralty.

Admiral (butterfly). See RED ADMIRAL.

Admiralty, the administrative and supreme executive body of the royal navy. The gradual growth in the powers of the Admiralty may be traced from the earliest days of British naval history. Until the beginning of the 15th century the naval affairs of the country were conducted by the King's Council. The functions, though not the title, of admiral had been acknowledged (see ADMIRAL); but the want of a centralized controlling authority

No.	Naval Rank.	Ranking with	Retd. at	Full Pay.	Half Pay.
5	Admirals of the Fleet	Field-marshal	70	£2,190	£1,222 15 0
12	Admirals	General	65	1,825	766 10 0
22	Vice-admirals	Lieut.-general	65	1,460	593 2 6
55	Rear-admirals	Major-general	60	1,095	456 5 0

flag-officers—was called, not Admiral of the Red, but Admiral of the Fleet. In 1805, in compliment to the Navy after the battle of Trafalgar, the new rank of Admiral of the Red, intermediate between that of Admiral of the Fleet and that of Admiral of the White, was established for the first time; though the official announcement incorrectly stated that the king had been pleased 'to restore' the rank. Prior to 1863, it was very exceptional for more than one Admiral of the Fleet to be created. The authorized number of flag-officers of each rank on the active list of the navy in 1910, the relative rank of military officers, the extreme age for compulsory retirement, and the full pay and half (and retired) pay, are given in the accompanying table. Flag-officers are compulsorily retired after seven years' non-service at sea, and

was made manifest by the disasters which in the latter part of the 14th century had befallen British commerce. From 1406 until 1628 there followed successive lords high admirals. The office was then put into commission; and its powers have, with but one or two short intervals, been ever since vested in the Admiralty authorities, now known officially as the 'Commissioners for Executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland,' etc. It is to Henry VIII., however, that we may definitely attribute the reorganization, or rather the establishment, of the Board of Admiralty. The naval business of the country had so far increased as to necessitate new measures in regard to its conduct. Henry VIII., while leaving to the admiral-in-chief his executive functions, gave him an advisory council, which

became known as the Admiralty Board, and created on April 24, 1546, a Navy Board to undertake the civil administration that had hitherto devolved upon the 'keeper of the king's ships.' Subsidiary branches to deal with dockyards, victualling, ordnance, etc., were established; and a surveyor of ships, a treasurer of marine causes, a comptroller of ships, and a clerk of the ships were appointed. Under Edward VI. the constitution was further reorganized. The Admiralty Board and Navy Board were kept distinct, and it was not until 1832 that Sir James Graham succeeded in putting an end to the dual control. Under James I. a council of officers, consisting of men of rank, was established to assist Buckingham, who was then lord high admiral. These officials may be regarded as the forerunners of the Admiralty Board as at present constituted. During the commonwealth affairs were managed by committees of the House of Commons. At the restoration, James, Duke of York, became lord high admiral, and appointed three commissioners to act with the treasurer of the navy, the comptroller, the surveyor, and the clerk of the acts. On his removal by the Test Act of 1673, Charles II., through his Privy Council, assumed for himself the administration of the navy, and conducted it until his death. When James, Duke of York, came to the throne as James II., he did the same until 1688. It was due to his tenure of the office, or at any rate to his influence, that the victualling and transport, which had hitherto been controlled by the Navy Board, were handed over to the separate control of the Victualling Commissioners, who were established in 1683, and the Transport Board, which was constituted in 1689. James was possessed of a very high administrative ability; en-

deavoured to see that the dockyards were conducted honestly; that relief to seamen was given, as it should be, from the 'Chatham Chest;' that the commissioners lived within reach of one another, published the times of their meetings, and received reports on the conduct of officers on their return from a voyage. In 1690 an act was passed confirming the powers of the commissioners; and it was followed, two years later, by a resolution of the House of Commons petitioning the king to appoint commissioners of known maritime experience. In 1701 the office of lord high admiral was revived, but since 1709 it has been in commission, except during a short period from May 1827 to September 1828, when it was held by the Duke of Clarence, afterwards William IV. The great naval victories of the 18th century, under Rooke, Shovel, Byng, Anson, Rodney, Hawke, Howe, and others, drew attention away from the internal workings of the Admiralty administration. In 1782 there were thirteen different departments, whose business was being carried on in different and distant quarters. The corruption was by no means confined to subordinate officials. It spread to such an extent throughout the various branches of the department that, in the case of the *King v. Owen and Mardle* (July 1801), the attorney-general stated that depredations upon the naval stores amounted to £500,000 per annum. In 1801 Lord St. Vincent went to the Admiralty as First Lord, and made many enemies through his zeal and unflinching integrity. During his tenure of office the Commission of Naval Inquiry was appointed, and laid the foundations of improvement in the civil administration of naval affairs. It was not, however, until several years

afterwards that any reform was carried out. In 1832 Sir James Graham, who had become First Lord of the Admiralty two years before, succeeded in bringing about the abolition of the Navy Board and Victualling Board as separate departments. The duties were transferred to five 'principal

stood from the following table. See Sir R. J. Hamilton's *Naval Administration*; Clowes's *The Royal Navy*; Oppenheim's *Administration of the Royal Navy, 1509-1660*.

Admiralty Buildings. The Admiralty Office was the personal office of the lord high admiral, and the chief business was often con-

Relation of the Lords of the Admiralty to the Various Departments.

First Lord.	Financial Secy.	<ul style="list-style-type: none"> Accountant-general. Director of Contracts. All departments as regards financial questions. 	Finance. Works and Civil Personnel.	
	Civil Lord.	<ul style="list-style-type: none"> Director of Works. Accountant-general (pay and allowances). Director of Greenwich Hospital. 		
	Junior Sea Lord.	<ul style="list-style-type: none"> Director of Transports. Director-general of Medical Department. Director of Victualling. Director of Stores (coal). Accountant-general (allowances, table money, etc.). 		Stores.
	Comptroller.	<ul style="list-style-type: none"> Director of Naval Construction. Director of Dockyards. Engineer-in-chief (material). Director of Naval Ordnance (material). Director of Stores (excepting coal). Expense Accounts Branch. 		Material.
	Second Sea Lord.	<ul style="list-style-type: none"> Admiral-superintendent of Naval Reserves (personnel). Engineer-in-chief (personnel). Director-general of Medical Department (personnel). Chaplain of the Fleet. Manning the Navy. D. A. G. Royal Marines. Discipline. 		Personnel of the Navy.
	First Sea Lord.	<ul style="list-style-type: none"> Admiral-superintendent of Naval Reserves (ships). Hydrographer. Director of Naval Ordnance (gunnery and torpedo training establishments). Naval Intelligence Department. Naval Mobilization Department. 		Fleet Organization.

officers' under the direct control of the Board of Admiralty, each department being placed under a superintending lord, who represented it at the Board. These officials consisted of the surveyor of the navy, the accountant-general and the storekeeper-general, the comptroller of victualling and transport, and the physician-general of the navy. The organization as it now stands will be under-

ducted at the private residence of the lord high admiral for the time being—as, for instance, at Warwick House, Holborn, belonging to the Earl of Warwick; and by the Earl of Northumberland at his house in Queen Street, Covent Garden. At various times the office was situated at Derby House, Cannon Row, Westminster, and at Pepys' House in York Buildings. In 1722 Thomas

Ripley built, on the site of old Wallingford House, Whitehall, the present office for the Board of Admiralty. The Lords Commissioners moved into the building in 1725. The building itself and the internal decorations possess a great deal of historical interest. The *Mermaid*, sloop of war, brought six hundred mahogany planks from Jamaica for the doors and woodwork of the interior; and there are not a few pictures and prints, mainly of maritime interest, such as paintings by W. Hodges, R.A., and J. Webber, R.A., made from sketches during their voyages with Captain Cook. Very considerable additions to the Admiralty buildings between Whitehall and St. James's Park were begun in the last years of the 19th century, to provide room for nearly the whole of the departmental offices. The offices of the Medical Director-general, of the Director of Works, of the Civil Engineer-in-chief, of the Royal Marines, and of some other branches, are still housed elsewhere.

Admiralty Court, a court of great antiquity, in which the lord high admiral or his representative exercised limited jurisdiction over matters arising on the high seas. As an instance court, it had an original jurisdiction, both civil and criminal. It also acted as a prize court, but did so only under special commission issued from time to time, until 1864, when, by the Naval Prize Act of that year, the determination of prize cases was made part of its regular jurisdiction. As a criminal court, the instance court had jurisdiction over all offences committed on the high seas which were outside the jurisdiction of the courts of common law—such as murder, piracy, and felony on the high seas. In 1836, when the Central Criminal Court was established, the criminal jurisdic-

tion of the Admiralty Court was transferred to it, the judge of the Admiralty Court being made a member; while by the Admiralty Offences Act, 1844, all offences committed within the jurisdiction of the Admiralty were made triable, as if they had been committed within the country where the offender was in custody. The Admiralty Court had also authority to administer discipline in the royal navy; but since the Naval Discipline Act, 1866, that authority has been exercised by naval courts-martial. On the civil side the jurisdiction of the instance court seems to have been restricted to civil wrongs done on the high seas, to salvage on the high seas, to contracts of respondentia and bottomry, to suits for seamen's wages in cases where there was no contract on which an action could be brought in the other courts, to the restoration of goods piratically seized, and to the cases of Admiralty droits. The law which it administered was the general maritime law, which was based on such codes as the Laws of Oléron, the Gotland Sea Laws, and the Consulate of the Sea. These codes themselves were no part of the law of England; but as they contained much that was valuable with regard to maritime usage, the judges of the Admiralty Court were to a considerable extent guided by them, and much of their substance thus became incorporated in English maritime law. In modern times the jurisdiction of this ancient court was extended and defined by the Admiralty Courts Acts of 1840 and 1861, by the Naval Prize Act already referred to, and by the Merchant Shipping Act, 1854—the provisions of the latter being now re-enacted in the Merchant Shipping Act, 1894. It is also, by the County Courts Act, 1868, the court of appeal from

county courts in cases decided under their Admiralty jurisdiction. In the reconstitution of the courts by the Judicature Acts, 1873 and 1875, the functions of the Admiralty Court were transferred to the High Court of Justice, of which one division, called the Probate, Divorce, and Admiralty Division, consists of two judges who, in addition to probate and divorce business, exercise the jurisdiction formerly exercised by the Admiralty Court. The most numerous classes of Admiralty actions are those relating to damage by collision, to salvage, towage, and pilotage, and to disputes between co-owners of ships. A limited Admiralty jurisdiction was conferred on county courts by the County Courts Admiralty Jurisdiction Act, 1868, and has been extended by subsequent measures. In Scotland the old Admiralty Court has been abolished, and its various powers are now exercised by the Court of Session, the Court of Justiciary, and the sheriff courts. It has recently been laid down by the House of Lords that the maritime law of Scotland is the same as that of England. In Ireland, Admiralty actions are brought in the King's Bench Division of the High Court of Justice. In England, Scotland, and Ireland the ultimate court of appeal for Admiralty, as for other cases, is the House of Lords.—*Vice-Admiralty Courts* are Courts of Admiralty in British possessions which have a jurisdiction similar to that of the Admiralty Division. Under the Merchant Shipping Acts they have various powers—*e.g.* to remove masters of ships, to fine for flying improper colours on board ship, and to apportion salvage awards. They have also jurisdiction in prize, piracy, and certain other cases. Appeals from Vice-Admiralty Courts lie to the Privy Council.

Admiralty Division. See SUPREME COURT.

Admiralty Droits. Derelict ships and other property picked up at sea by British ships, if not claimed, are deemed 'droits of Admiralty.' The property in abandoned goods and ships was vested from an early date in the lord high admiral, and a system grew up by which the finders of derelict property at sea were entitled to nine-tenths of the value, while the lord high admiral took the remaining tenth. In 1673, when the Duke of York resigned the office of lord high admiral, and it was placed in commission, Charles II. endeavoured to appropriate to the crown the tenths of all prizes; but the Admiralty succeeded in maintaining the customs which had been previously observed. On the reorganization of the Admiralty in 1832 the commissioners again maintained their claims; but in 1854, with the passing of the Merchant Shipping Act, the collection of these droits was handed over to the Board of Trade, by which all proceeds are now paid into the public exchequer. See *Black Book of the Admiralty* (Rolls Series).

Admiralty Gulf. (1.) Inlet, N.W. coast, W. Australia, containing Osborne I., and having Port Warrender at its head. (2.) ADMIRALTY INLET, E. arm of Puget Sound, Washington, U.S.A., connecting it with Strait of Juan de Fuca. (3.) ADMIRALTY ISLAND, between Chichakov and Baranov Is. and mainland of Alaska; lat. $58^{\circ} 20' N.$, long. $134^{\circ} 30' W.$ (4.) ADMIRALTY ISLANDS, group, Pacific, N.E. of New Guinea, between lat. 2° and $3^{\circ} S.$, long. 146° and $147^{\circ} E.$; belong to Germany; largest nearly 60 m. long. The islanders are short, and have dark-brown skins and crisp, curly hair. (5.) ADMIRALTY SOUND, 43 m. long, a S. extension of the Strait of Magellan penetrating Tierra del Fuego.

Admittendo clerico, an English writ, issued to the bishop instead of the sheriff, to establish the right of patronage of a benefice.

Admonitionists, the supporters of a Puritan memorial called *An Admonition to the Parliament*, issued by Thomas Cartwright, Professor of Divinity at Cambridge, which university was "seething with Puritanism" then, about 1572; and also of a second document, which similarly urged the advantages of the Presbyterian method of ecclesiastical government as opposed to that of the Church of England. See *Cambridge Modern History*, ii. c. 16, and J. F. Bright's *History of England*, ii. 568.

Adobe (Span., Anglicized into *doby*, pl. *dobies*, in New Mexico), the sun-dried brick of ancient Egypt, Asia, N. Africa, and Spanish America.

Adolphus, or ADOLPH (?1255-98), king of Germany, the son of the Count of Nassau, was elected king of the Romans on the death of Rudolph of Hapsburg (1292); but disgusted with the German princes, he formed an alliance with Edward I. of England. He accepted sums of money from England, but failed to supply the help against France to which he had pledged himself in return. For seizing Meissen and other districts Adolphus was summoned before the assembled princes, and, refusing to obey the summons, was deposed in 1298. In the same year he was killed in battle with his successor, Albrecht.

Adonai, Hebrew name for God. *Adon* means 'lord,' and *Adonai*, plural in form, is probably a 'plural of excellence.' The final *i* means 'my,' but the original possessive signification came to be ignored, as in *monsieur*, *madonna*. See JEHOVAH.

Adoni, or ADWANI, tn., prov. of Madras, India, 64 m. from Bel-

lary; has cotton and silk manufactures, especially carpets. Pop. 30,000.

Adonijah, a son of David, king of Israel, was the next heir to the throne on the death of Absalom, but was set aside in favour of Solomon, who caused him to be put to death (1 Kings 2:22) on the charge of conspiring for the crown.

Adonis, a beautiful youth beloved by Aphrodite. He was slain by a boar, and the goddess's grief was so great that Pluto, the god of Hades, allowed him to spend six months of every year on earth. There is no doubt that he represents the Phœnician deity *Thamuz*, adopted by the Greeks. The mourning for Adonis was a regular rite in many Greek and oriental cities. His story is told by the poet Bion, trans. by A. Lang. See also *Theocritus*, *Idyll xv.*, trans. by Calverley; Shakespeare's *Venus and Adonis*.

—ADONIS GARDENS, small jars containing lettuce and other quickly-growing plants, used by the Greeks in their annual festival of Adonis; typical of short-lived beauty. Plato (*Phæd.*, 276) and Shakespeare (*1 Henry VI.*, i. 6) allude to them; and Isa. 17:10 (R.V. margin) reads 'plantings of Adonis.'—ADONIC VERSE consists of a dactyl and a trochee, and was so called because the songs sung at the festival of Adonis were written in this metre.

Adonis, a small genus of the Ranunculaceæ. *A. autumnalis* (pheasant's eye), found in cornfields in the warmer counties of England and Ireland, is about 12 in. high; flower terminal, small, and bright scarlet with a black centre; flowers in autumn. A larger-flowered variety is cultivated in gardens as *Flos Adonis*. *A. vernalis* has large yellow flowers, opening in early spring.

Adoptianism, a heretical doctrine regarding the person of Christ, allied to the tenets of

Nestorius, which, towards the close of the 8th century, was maintained in Spain by Elipandus, archbishop of Toledo, and by Felix, bishop of Urgel. These held that Christ was the Son of God only in His divine nature; in His human nature He was, like the rest of humanity, but a child of God, becoming the Son by *adoption*. Charlemagne summoned various synods (Ratisbon, 792; Frankfort, 794; Aix-la-Chapelle, 799) to deal with Felix and his teaching. Adoptianism was condemned, and Felix deprived of his bishopric. Its ablest opponent was the English monk Alcuin. See Kurtz's *Church History*, ii., 358.

Adoption, or the admission of an alien to the full rights and privileges of a *gens* or family, is a practice of very ancient date. Its primary motive was that of strengthening the influence of the clan; and it is to this custom that Sir Henry Maine traces the beginning of civilization, for it was by this means that tribal life developed into federal and national life. The law of adoption fills an important chapter of Roman law. A person *alieni juris* (*i.e.* under the *patria potestas* of another) entering a new family was adopted by means of a three-fold fictitious sale (*mancipatio*). If the stranger was *sui juris* (his own master, free of *patria potestas*), he entered the new family by arrogation, which in ancient times was effected by a vote in the *comitia*, who jealously watched such proceedings, lest the last of a *gens* should arrogate himself, and its *sacra* be lost. Simpler modes of arrogation and adoption were employed in later times, especially by Justinian, who decreed (lib. I. tit. xi.) that unless the adopter was an ascendant, the person adopted should not pass out of his natural family. (See Sandars, *Institutes*

of Justinian, Introd.) Exogamy, the custom of taking a wife from an alien tribe, still invariable in some savage races, is one form of adoption; and among the Somalis of N.E. Africa such exogamous marriages, which are only of occasional occurrence, are avowedly made for the purpose of obtaining immunity from the blood-feud existing between the rival tribes. 'Blood-brotherhood' between men of different race, symbolized by an exchange or transfusion of blood, is held to make them thenceforth actual kinsmen. In the life of modern civilized society, adoption has usually no other significance than that of benevolence, but the original idea is still faintly adumbrated when the object in view is to continue a certain line of descent.

Transferred into religious usage from its usual and legal significance, the term adoption is employed by Paul to designate the new filial relation subsisting between Christians and the Father. In the Bible the word does not occur outside the letters of Paul; it is rare in Greek literature, but is found with extraordinary frequency in inscriptions of the Hellenistic period.

Adoptive Acts, those Acts of Parliament which come into force only where they have been adopted by the ratepayers or by the local authority, empowered to do so by the acts themselves. The Vestries Act (1831), the Lighting and Watching Act (1833), the Baths and Wash-houses Acts (1846-82), the Burial Acts (1852-1900), the Public Improvements Act (1860), the Public Health Acts Amendment Act (1890), the Museums and Gymnasiums Act (1891), the Public Libraries Act (1892), and the Private Street Works Act (1892), are adoptive acts. The Infectious Diseases (Notification) Act, formerly adoptive, became compulsory by an Act of 1899.

Adoration, an act of worship. In the Roman Catholic Church it is divided into three kinds, and has correspondingly three different names—*Latria*, when the supreme worship of the Deity is meant; *Dulia*, when it is used in regard to the inferior worship of saints; and *Hyperdulia*, when applied to the veneration of the Blessed Virgin Mary.—*Adoration of the Cross*, a ceremony practised on Good Friday; *Adoration of the Pope*, the homage paid by the cardinals on his election; and *Adoration of the Host*, the supreme act in the celebration of the mass. In Christian art and archæology an *adoration* is a representation of the adoration of the infant Jesus by the Magi. It has been the subject of many pictures.

Adorf, tn., Prussian Saxony, 65 m. s. of Leipzig; manufactures cottons, and mother-of-pearl goods. Pop. 7,000.

Adour (ancient *Aturus*), riv., France, drains the w. half of the n. slopes of the Pyrenees, and flows to the Bay of Biscay; passes through Dax and Bayonne; receives on the right the Midouze, on the left the Gave de Pau. It is navigable about 80 m. up. Length, 207 m.

Adra (*Abdera* or *Abdora* of the Phœnicians), port in Almeria, Spain, 8 m. from Berja, on Mediterranean; has cane-sugar industry, leadmining, and exports grapes. Pop. 10,000.

Adrar. See RIO DE ORO.

Adrastus, a legendary Grecian hero, king, first of Sicyon, and afterwards of Argos, who, with six other heroes, waged the celebrated war of the 'Seven against Thebes,' in which Adrastus alone escaped. A second venture, led by the seven sons of the heroes, the 'war of the Epigoni,' was successful, and Thebes was razed to the ground. (Apollodorus, iii. 6, 7; Pausanias, i., iii., ix.)

Adrenalin. One of the most important advances in pharmacology and therapeutics in recent years has been the discovery of adrenalin, the active principle of the suprarenal gland. These glands have been shown to contain a body which possesses a very powerful action on the organism, and which the glands normally secrete into blood vessels. The active principle was discovered about the same time by a Japanese scientist, Takamine, and an American investigator, Abel. When very small doses are introduced into the system there is a very great increase in the blood pressure, with a slowing and strengthening of the heart beat, these results being due chiefly to a profoundly stimulating action on the non-striated muscle in the walls of the blood-vessels, but also to a stimulating effect on the heart and vaso-motor centre. As a result of the constriction of the blood-vessels the parts supplied by them become blanched. An extremely minute dose suffices to produce this effect if injected into the vein; more is required for subcutaneous injection, and much more to produce the effect by oral administration. It produces its effect when locally applied to different mucous membranes, such as the conjunctiva, nasal and uterine mucous membrane, but it has no action on the unbroken skin. Its action is, as a rule, of very short duration. A remarkable feature is that the vessels of the lungs are in no way influenced by this active principle; another striking feature is the occurrence of glycosuria, due to an increased production of sugar by the liver; the mechanism of this is not fully understood. Its uses are many, and of very great value. If directly applied to a bleeding surface it is a most valuable hæmostatic, and is so used for bleedings from the uterus, nose,

bladder, and eye. A solution of a strength of 1 in 5,000 to 10,000 suffices for this purpose, and in the case of bleeding from the nose it is often applied in the form of a spray. The complete local bloodlessness induced by it is also of great value to the surgeon, more especially in operations on the nose and eye. For this purpose it is often combined with cocaine and other local anæsthetics. Locally applied it is of value in hay fever. It is also valuable as a rapidly-acting stimulant in heart failure due to shock, more especially in chloroform poisoning. In a few cases the internal administration of adrenalin has proved of value in 'Addison's Disease,' but as a rule it has been quite inefficacious in the treatment of this disease. See ADDISON'S DISEASE and SUPRARENAL GLANDS.

Adria, tn., Rovigo, Italy, in the Po delta, 15 m. s.w. of Chioggia; once on the Adriatic, now 14 m. inland. It was an important Etruscan and afterwards Roman port, which flourished till the 12th century. Pop. 16,000.

Adrian, city, Michigan, U.S.A., co. seat of Lenawee co., 60 m. s.w. of Detroit; has flour and planing mills. Pop. 11,000.

Adrian, Emperor of Rome. See HADRIANUS.

Adrian, POPES. ADRIAN I. (772-95) received aid from Charlemagne against Didier, king of the Lombards, and was visited at Rome by the great monarch, whom he afterwards eulogized in Latin verse.—ADRIAN II. (867-72) took part in the struggles between Louis II. and Charles the Bald, and freely used against his opponents the terrors of excommunication. During his term of office the schism between the Eastern and Western Churches began.—ADRIAN III. (884-5) passed a decree restraining the Emperor Charles III. from inter-

fering with the papal election.—ADRIAN IV. (1154-9), Nicholas Breakspeare (d. 1159), was the only English Pope. He was born at Langley, near St. Albans; entered a French house as a menial, but rose to be its abbot. The canons' complaints of his severity resulted in his election as cardinal (1146), and in his mission to the Scandinavian kingdoms; after which, owing to his success as Apostle of the North, he was made Pope (1154). Adrian's pontificate was a constant struggle for the supremacy which Frederick I. stubbornly claimed. See *Dublin Review*, art. by Casartelli, January 1902.—ADRIAN V. (1276) held office only for a month.—ADRIAN VI. (1522-3) had held office as canon of St. Peter's, professor of theology, dean of the Church of Louvain, bishop of Tortosa, cardinal (1517), tutor to Charles v., ambassador to Ferdinand of Spain, and regent of Spain during the minority of Charles v. He tried to arrest the progress of the reformation in Germany, and was unpopular in Rome.

Adrian, ST. (A.D. 300), one of the soldier-saints of the early Christian Church. A member of the Prætorian guard, he was converted through his admiration for the steadfastness of certain Christian martyrs, and was beheaded after torture. His wife, Natalia, was canonized with him, their day of commemoration being Sept. 8.

Adrian di Castello (1460?-1521?), Italian cardinal, who was English ambassador at Rome, and held the bishopric of Hereford and of Bath and Wells. He was implicated in the plot to poison Leo x., and was degraded (1518). Adrian wrote poems and philosophical works.

Adrianople (Turk. *Edirne*; anc. *Uskudama* or *Orestia*), town in Turkey in Europe, capital of the vilayet of the same name, situated on the l. bk. of the Maritsa, at

its confluence with the Tunja. It is an important centre of commerce, and exports silk, wine, wool, cereals, eggs, and tobacco. The principal edifices are the beautiful mosque built by the Sultan Selim II., the Serai (palace), the bridge Michael (built by Byzantine emperors), and a great bazaar. The name dates from the second century, when the Emperor Hadrian enlarged and beautified the town (hence *Hadrianopolis*). It was the capital of the Ottoman empire until 1453—*i.e.* previous to the capture of Constantinople. It was occupied by the Russians in 1829, and here, in September of that year, was signed the treaty of Adrianople, which concluded the war between Russia and Turkey. In the Russo-Turkish war of 1877-8 it was again besieged. Pop. 80,000.

Adriatic Sea (*Mare Adriatico*), or GULF OF VENICE, an arm of the Mediterranean, extending from Venice for 460 m. S.E. to the Strait of Otranto (less than 40 m. wide), lies between the low, sandy beaches of Italy on the W. and the rocky cliffs, islands, and inlets of Dalmatia and Albania on the E. Its general breadth is about 90 m. The depth on the S. is from 550 to 860 fathoms, shoaling to 4 fathoms inshore and 36 fathoms in the centre of the N. part. The colour is green, darker than that of the Mediterranean; the water is very salt. Tides are almost absent; in Venice spring tides rise one or two feet. A current runs up the E. coast and down the W. Navigation is easy for steamers, but frequent heavy gales, with absence of sea-room, make it dangerous for sailing vessels. The Italian coast is well populated, with many small harbours artificially enlarged for the busy trade in agricultural produce. The Dalmatian coast is inhospitable; provisions and even fresh water are scarce. The chief industry is

fishing; the sponge fishery has been recently improved by artificial propagation. The chief ports are Brindisi, Ancona, and Venice; Trieste, Pola, and Fiume; Corfu, Zante, Vostitza, Patras, and Kalamata. The annual wedding of the Doge to the sea on Ascension Day, a ceremony instituted in 1174, symbolized the maritime basis of Venetian prosperity. See *Mediterranean Pilot*, vol. iii., bibliography by Gavazzi; Faber's *The Fisheries of the Adriatic* (1883); F. H. Jackson's *The Shores of the Adriatic—the Italian Side* (1906), and *The Austrian Side* (1908).

Adua, ADOA, or ADOWA, tn., Tigré, Abyssinia, 120 m. S.W. of Massowah. It is an important place for the trade between the coast and the interior. Here Menelik inflicted a crushing defeat on the Italian forces in March 1896. Alt. over 6,300 ft. Pop. 3,000.

Adularia, a clear, transparent, glassy form of potash felspar (see ORTHOCLASE) which is found mainly in the crevices of crystalline schists and gneisses, often in beautifully perfect crystals. It has sometimes a pearly, opalescent reflection or play of colours, and may be included under the semi-precious stones. Also known as *moonstone*. See Streeter's *Gems and Precious Stones*.

Adulis. See ZULA.

Adullam, a cave, or rather 'stronghold,' on the Philistine border of Judah, in which David and four hundred refugees and outlaws took shelter—'every one that was in distress, and every one that was in debt, and every one that was discontented.' See 1 Sam. 22.) Hence ADULLAMITES, a term applied to those Liberals—Lowe was the most notable of about forty—who in 1866 seceded from Russell and Gladstone on the question of parliamentary reform, and voted with the Conservatives. The group was known also as 'the Cave.'

Adulteration ('to debase,' 'to corrupt,' 'to render impure'), a term generally applied to the practice of adding cheaper substances to articles of commerce, or of abstracting from them one or more of their valuable ingredients, for the purpose of making a greater profit. It is not possible to define what constitutes adulteration in such a way as to meet all cases, and no attempt to do so has been made in the Sale of Foods and Drugs Act or in its amendments. The purpose of these enactments is to protect retail purchasers of food and drugs from being defrauded; they do not protect the wholesale buyer, or refer to the sophistication of such articles of commerce as oil, paint, white lead, soap, paper, or coal, which are bought for manufacturing or trade purposes. The common adulterants or impurities are described in connection with the commercial products into which they are introduced. The practice of fraudulent adulteration existed in ancient times; in Athens and in Rome the purity of wine was safeguarded by laws and inspection. In England various measures were taken, from 1267 onward, to prevent the many crude ways in which food and drugs were corrupted—the bakers, 'pepperers,' brewers, and vintners being the chief offenders; and in 1850 the *Lancet* Sanitary Commission instituted extensive investigations into the composition of the various articles of food sold in the metropolis. In 1855 Dr. Hassall published his *Food and its Adulterations*, which included the reports of the commission. Matters were found to be so unsatisfactory that in 1855 a select committee on the adulteration of food was appointed. Dr. Hassall stated in his evidence that he had examined over three thousand samples of the principal articles

of consumption and of many drugs, and that extensive adulteration was present in almost all cases in which it was both practicable and profitable. The committee reported 'that adulteration widely prevails; and not only is the public health thus exposed to danger, and pecuniary fraud committed on the community, but public morality is tainted.' As the result of this inquiry, an Act for Preventing the Adulteration of Articles of Food and Drink was passed in 1860; but it was a useless measure, and no prosecutions were made under it. A second act (1872) was repealed after inquiry by another parliamentary committee, when the Sale of Food and Drugs Act, 1875, was passed. This act, with an amendment (1879), the Margarine Act, 1887, the Sale of Food and Drugs Act, 1899, and the Butter and Margarine Act 1907, are those under which proceedings are now taken. For the purpose of these acts, the expression *food* includes every article used for food and drink by man, other than drugs or water; any article which enters into, or is used in the preparation of, human food; flavouring matters and condiments. The term *drug* includes medicines for internal and external use. The acts specify that no person shall mix, stain, colour, or powder any article of food, or drug, with any ingredient so as to render the article injurious to health, with intent that the same may be sold in that state, or sell the same, under a penalty not exceeding £50 for the first offence; and every offence after the first shall be a misdemeanour for which the person, on conviction, shall be liable to imprisonment for a period not exceeding six months with hard labour. Proof of absence of 'guilty knowledge' is a good defence to a prosecution for the above offences, but not for those described below. No person shall

sell, to the prejudice of the purchaser, any article of food, or drug, which is not of the nature, substance, and quality of the article demanded, under a penalty not exceeding £20 for the first, £50 for the second, and £100 for any subsequent offence. No person shall sell any compound article of food, or compounded drug, which is not composed of ingredients in accordance with the demand of the purchaser, under a similar penalty. No person shall abstract from an article of food any part of it, so as to affect injuriously its quality, substance, or nature, or sell the same, without making disclosure of the alteration. No person shall be guilty of an offence if he have supplied to the purchaser a notice, by a distinctly written or printed label on or with the article or drug, stating that the same is mixed. The acts further provide for the appointment of public analysts by local authorities; and that any medical officer of health, inspector of nuisances, inspector of weights and measures, or any police constable, may purchase samples under their direction. Any individual may submit any article of food, or drug, to the analyst, and be entitled, on payment of a fee of 10s. 6d., to have it analyzed and reported upon. After the purchase by a public officer is completed, the seller must be notified of the intention to have the article analyzed. The purchaser must offer to have it divided, there and then, into three parts, each part to be securely fastened and sealed: one part is then to be given to the seller, another to the analyst, and the third is to be retained for future reference. Samples may be sent by post to the analyst. Any person refusing to sell any article exposed for sale to any authorized officer is liable to a penalty not exceeding £10. Prosecutions

under the acts must be instituted within twenty-eight days from the time of purchase. The summons must state particulars of the offence alleged, and the name of the prosecutor, and must not be made returnable in less than fourteen days from the day on which it is served. A copy of the analyst's certificate must also be supplied to the defendant. If the defendant can produce a written warranty or invoice to the effect that he purchased the article in question as the same in nature, substance, and quality as that demanded of him by the prosecutor, he may be discharged from the prosecution; but if he proposes to make this a defence, he must send a copy of such warranty or invoice to the prosecutor within seven days after service of the summons, and give the name and address of the person from whom he received it. In the act of 1899 power is given to the Local Government Board or the Board of Agriculture to take samples, in default of a local authority appointing an analyst and putting the acts into force. Should any question arise as to the accuracy of the analyst's certificate or test, either party may request that the third sample be sent to the Inland Revenue Laboratory for analysis. The *British Pharmacopœia*, produced under the authority of Parliament, is the standard by which an opinion is formed as to the purity of drugs. Clauses in the acts refer to the adulteration of special articles. Margarine must not contain more than 10 per cent. of butter fat. Whisky, rum, and brandy may be sold diluted with water to 25 per cent. under proof, and gin to 35 per cent. under proof. Tea must be examined by the commissioners of Customs at the port of landing. Under the Margarine Act, 1887, the word butter means the substance made exclusively from

milk or cream, with or without salt or colouring matter; margarine means all substances prepared in imitation of butter, whether mixed with butter or not. Every package containing margarine must be branded with the name on the top, bottom, and sides, in printed capitals of large size; and retailed parcels must be similarly labelled. Margarine and butter manufactories must be registered, and are subject to inspection. Butter or margarine must not contain more than 16 per cent. of water. The Select Committee on Food Products Adulteration, in their report of July 1896, show clearly that, where the act has been vigorously worked, adulteration has diminished. The number of samples analyzed rose from 14,700 in 1877 to 49,500 in 1898. From 1877 to 1881 the percentage found adulterated was 16·2. In 1898 the percentage was 8·7. Bread is now rarely, if ever, adulterated. The same may be said of sugar, tea, and oatmeal; but milk, coffee, butter, honey, and jams are still largely sold impure. There is no doubt that the adulteration of food-stuffs is less prevalent now than it was thirty years ago, and is not of such a gross character. The addition of alum to bread, of starch or chalk to milk, and of arsenic and lead compounds to colour confectionery, is never heard of; though it has been asserted that large quantities of China clay go to confectioners, and is used to stiffen the 'icing' of cakes. Many admixtures are openly stated as such by the labels on the packets. Some forms of adulteration are claimed to be improvements on the natural article, and are said to be practised in accordance with the taste of the public. The colouring of cheese and butter with annatto is quite harmless; but the public would no doubt prefer to have

their pickles and preserved peas of an inferior colour rather than of an attractive green, due to the presence of copper. Starch and sugar are mixed with cocoa, and the natural fat is removed from it, to make it more palatable and digestible. Chicory is put into coffee because most people prefer it, and sulphuric acid is added to vinegar to make it keep. Many other excuses are given, not the least common being that the adulterant does no harm; but the bulk or weight is always increased materially by the addition of a much cheaper substance. Great harm is done by the addition of water to milk: infants fed on such milk are not sufficiently nourished, and the water is often impure, and productive of disease. Lard, adulterated with cotton-seed oil and refuse beef-fat, was largely imported into the United Kingdom between 1880 and 1890. The economic aspects of adulteration are interesting, and although accurate figures cannot be given, the following are based on recent returns. At least 450,000,000 gallons of milk are consumed per annum in the United Kingdom, valued at £30,000,000. About 10 per cent. of the samples examined were found to be adulterated either by the addition of water or the abstraction of fat, and the loss to the consumer works out at £200,000 paid to the dairyman for added water, and £90,000 paid for fat removed. The total loss to the public who have been served with margarine for butter works out to no less than £470,000; and the publican receives £125,000 per annum for water in lieu of spirits. In 1909 a Congress was held at Paris, which was attended by delegates from all countries. See *The Analyst*; Dr. Hassall's *Food: its Adulterations* (1855); Blyth's *Foods: Composition and Analysis* (3rd ed. 1895).

Adultery. See DIVORCE.

Ad valorem duty is levied in proportion to the value, and not the quantity, of the article imported. It is open to the objection of giving great opportunity to fraud, and is not used in British customs. (See TARIFF.) The *ad valorem* stamp duty, on stocks and shares which are transferred by deed, is levied upon their cash value, and not upon their face value.

Advancement. If a person buys property in the name of another, the legal presumption is that the nominee is merely a trustee for the purchaser; but if the purchase is in the name of a child or other person towards whom the purchaser stands *in loco parentis*, or whom he is legally bound to support, the presumption is that the purchase was intended to be for the benefit or 'advancement' of such child or person. This presumption may be rebutted by evidence of a contrary intention. A power of advancement in a will or settlement enables capital money to be paid to children for their advancement in life.

Advance Note, a draft, generally for a month's wages, given to sailors by shipowners when they sign articles of agreement.

Advent is the season during which preparation is made for the festival of the nativity of Christ. As Advent commemorates the first coming (Lat. *adventus*, 'arrival') of Christ as Saviour, so it anticipates His second coming (see below) as Judge, and the Scripture lessons for the included Sundays are specially chosen so as to direct the thoughts of Christians to that event. The season was originally observed with a rigour almost equal to that of Lent. Since the 6th century Advent has begun the ecclesiastical year (*cf.* Keble's *Christian Year*)—*i.e.* from the Sunday nearest to

St. Andrew's Day (Nov. 30)—except in the Greek Church, with which it counts from St. Martin's Day (Nov. 11).

Advent, THE SECOND. While it was formerly held that the coming of Christ was fourfold—(1) at His nativity; (2) to His disciples at their death (John 14:3); (3) at the fall of Jerusalem (Matt. 24:3 *f.*); (4) at the day of judgment—the term Second Advent is now usually restricted to the last mentioned, when He shall appear 'the second time without sin unto salvation' (Heb. 9:28). The whole subject of His second coming, or *parousia*, forms one of the most perplexing themes in theology, as may be seen not only from the frenzied speculations of those who are bold enough to fix a date (and, when that fails, to proclaim another), but also from the difficulty experienced by sober-minded inquirers in interpreting, and obtaining a sufficiently self-consistent theory from, the various Scripture passages referring to the event. In Matthew, Mark, and Luke it seems to be associated with the fall of Jerusalem, and to be spoken of as something imminent. Occasionally Paul also speaks as if the event were at hand, but again he seems to remove it to the distant future; while the book of Revelation introduces the millennium as having to ensue before the final day. Without doubt many of the prominent passages are interfused with the Messianic expectations of the Jews. It may be held that the idea of a Second Advent is a mere residuum of Jewish eschatology; or, with Augustine and the great majority of orthodox theologians since his time, we may hold that a literal and actual coming is meant; or, with Russell, that the event was one with the fall of Jerusalem; or, lastly, that the coming is a spiritual one—a dispensation rather than an event,

a continued spiritual manifestation of Christ among men, to be completed at the end of the world-process. See Russell's *Parousia*; the N.T. theologies of Beyschlag and Stevens; also ESCHATOLOGY, ANTICHRIST, MILLENNIUM.

Adventists, SECOND. See SECOND ADVENTISTS.

Adventurers, those who risked money in debenture bonds made payable in land confiscated in Ireland on account of the Irish rebellion of 1641. The Act of Settlement (1665) annulled many of the claims, and the adventurers subsequently emigrated to America. See Franck Bright's *History of England*, ii. 773; and R. Lodge *Political History of England*, viii. (1910).

'Merchant Adventurers,' a term applied to the members of certain early incorporated societies — as that founded in 1505 for trading in wool with the Netherlands. Queen Elizabeth's patent to the East India Company in 1600 was entitled 'A Privilege granted by her Majesty to certain Adventurers.' But see further under MERCHANT ADVENTURERS. The name 'Adventurers' was also applied to the contractors who in the 17th and 18th centuries drained the fenny districts of England, in Yorkshire, Lincolnshire, Huntingdonshire, and beside the Thames. See *MS. in the Red Box* (1902).

Advertisement. The modern advertisement is one of the remarkable developments of the press. The earliest regular English newspaper, *The Certaine Newes of This Present Week*, which appeared in 1622, contained no advertising, but thirty years later the *Mercurius Politicus* opened its columns to advertisements for lost articles, situations, etc. Very soon the advantage of using the columns of the Press for commercial purposes was recognized, slowly at the outset, but with an increasing frequency in the

18th century, to which heavy and indiscriminate taxation became the chief impediment. First introduced in 1712, one year before the stamp duty on newspapers, the tax upon advertisements amounted in 1832 to 3s. 6d. for each paragraph, whether large or small, and yielded no less than £170,649. In 1833 the tax was reduced to 1s. 6d. in Great Britain and 1s. in Ireland, and eight years later the revenue had fallen to £128,300, though this sum implies a considerable increase in the total number of advertisements published. Ten years after the reduction, in 1851, the tax yielded £175,094, and in 1853 it was abolished. No fiscal reform, not even the abolition of the stamp duty, has been more thoroughly justified by events. It is hardly possible to conceive of the complex social life of the present day existing apart from the daily newspaper; but the newspaper as we know it could not be carried on without the income derived from the advertisement pages. Comprehensively used, the word 'advertisement' (Fr. *avertissement*, 'warning,' 'information,' 'notification') applies to every form of announcement intended for the public eye. Though the rudiments of advertising have a remote origin, the developments are recent. This is especially true of wall-posters, which many French and German and a few British artists (*e.g.* Sir John Millais, Prof. Herkomer, John Hassall) have made harmonious in colour and of real pictorial value. Enormous sums (£1,000 per week is not an unheard-of figure) are spent by leading firms in bringing their wares into public notice, and some owe their success solely to a constant appeal to the public eye. Schools of advertising, originating in the United States, have now been established in this country; while the advertising expert, or

'schemer,' as he is termed in America, has for some years been employed by large business firms on both sides of the Atlantic, and, in London, by at least one great daily newspaper. But the main function of the one, as of the other—the production of ingenious and attractive advertisements—was anticipated by numerous advertising agencies, which were created by the growth of advertising, and which act as the intermediaries between advertisers and the press, relieving both of a vast amount of clerical labour and multiplied contracts. For their services the agents are usually allowed a special quotation on lineage rates and a varying commission on settled accounts. As a branch of industry, and even of art, advertising now possesses a periodical press of its own, consisting of three weekly papers—the *Advertiser and Social News*, the *Advertisers' Review*, and the *Advertising News*; and five monthlies—the *Advertising World*, *Billposter and Billposters' Journal*, *Billposting and Outdoor Publicity*, *British Advertising*, and *Irish Advertising*. With the view of preserving the rural features of the country, and combating the ugliness and extravagance of certain methods of advertising, there was formed in London, in 1893, a National Society for Checking the Abuses of Public Advertising. A year later the London County Council prohibited what were known as sky signs, and the same body has also regulated and defined the employment of searchlight and flashlight advertisements. Circularization is a favourite modern form of advertising. The tendency in advertising policy is to specialize, making appeals to special classes or localities rather than to the country at large. In America, magazine advertising has reached a pitch unknown in this country, and in the popular magazines the

rates are enormous. In one well-known American journal for women a single page for one issue sells for \$4,000.

The legal effectiveness of advertising has been recognized and sanctioned by various statutes. The *Gazette* is the official vehicle of such announcements as relate to sequestrations, bankruptcies, and so forth, and it is accepted in the courts of law as evidence. But when brought as evidence of other notices not so authorized, such as dissolutions of partnership, the perusal or at least the possession of the paper by the party must be proved. An advertisement may also be allowed in substitution of service of a writ, etc., of which prompt personal service cannot be effected. The master of a general ship, advertising for a voyage as ready to receive goods, is held to be a common carrier, and the advertisement entitles a merchant to bring his goods to the ship, and to insist upon their shipment, unless the vessel has either already been filled or has been actually engaged. It is not illegal to advertise for the recovery of stolen property, but by the Act 24 & 25 Vict. c. 96, s. 102, an advertiser who, besides offering a reward, imports into the public announcement words to the effect that 'no questions will be asked,' is liable to a forfeit of £50 to any informer, and to pay the legal expenses in any action for recovery of that sum. In England some rather curious decisions have been given in respect of the advertisement of rewards. It has been held that if advertisement has been made offering reward for the recovery of lost or stolen property, the person who recovers the property, or furnishes the information which leads to its recovery, is entitled to the reward, whether or not he has seen the advertisement. A further decision compelled the advertiser of

a patent medicine to pay the sum of £100 which he had offered to any one suffering from a cold whom his medicine failed to cure. Advertisements by husbands warning the public against supplying goods to wives are absolutely worthless—the law requiring that a claim for debts incurred by a spouse in name of household requisites can only be resisted if intimation has been given to each individual tradesman. An auctioneer is not rendered liable if a sale by auction which has been publicly announced is, for any reason, postponed or abandoned. If, however, the sale has been advertised as 'without reserve,' and has actually begun, the contract must be fulfilled. In the London metropolitan area it is unlawful for the proprietor of a stage or hackney carriage to suffer any notice, advertisement, or printed bill, etc., to appear upon the outside or inside of such carriage so as to obstruct the light or ventilation, or cause annoyance to any passenger. The disfigurement caused by wall advertisements in many quarters of large towns has also been the subject of much discussion, and some municipalities (*e.g.* Dover, Edinburgh, Glasgow) have obtained powers under private acts to deal with such offences against the amenity of their districts. In Prussia the preservation of landscapes from the introduction of such foreign and offensive features has been made the subject of prohibitory legislation. Urban and rural amenity is to some extent safeguarded in this country by the National Society for Checking the Abuses of Public Advertising, and, in the particular case of the Scottish capital, by the Cockburn Association. A ground of action for damages lies against the person or persons by whom the insertion of a false and discreditable advertisement may have been procured; while in the case of

Morrison *v.* John Ritchie and Co. (Oct. 21, 1902), a jury in the Scottish Court of Session found a newspaper liable in damages for having permitted the publication of a bogus announcement of birth. See *Edin. Rev.*, 1843; Sampson's *History of Advertising* (1874); Moran's *Business of Advertising* (1905); Dill Scott's *The Theory of Advertising* (1904); Calkins and Holden's *Modern Advertising* (1905); MacDonald's *Successful Advertising* (1902); and various numbers of *Notes and Queries*. For advertising agencies, see Browne's *Advertiser's A B C* and Sell's *World's Press*.

Advocate, LORD. The Lord Advocate, or King's Advocate, is the principal law officer of the crown for Scotland. He is always a Privy Councillor, and a member of Parliament and of the ministry, though not in the cabinet. He goes out of office with the government. Along with the Secretary for Scotland he has charge of Scottish legislation in Parliament. His position corresponds generally to that of the Attorney-general for England. He conducts public prosecutions for the crown in Scotland, and is the only competent prosecutor in the High Court of Justiciary, though prosecutions may be conducted by the solicitor-general or the advocates-depute, as his deputies. Private persons may only prosecute with the concurrence of the Lord Advocate. He represents the crown in civil actions, and has statutory powers of suing under the Bankruptcy Act, and with regard to the reduction of patents, and for the protection of the property of lunatics, and in the interests of the public in all cases affecting charities. His concurrence is necessary in many private actions in which public interests are affected. His salary is £5,000 a year, with fees for crown cases, and he is allowed to take private

practice. See Omond's *The Lord Advocates of Scotland* (1883).

Advocates, FACULTY OF. Advocate is the name applied to members of the Scottish bar, who all belong to the Faculty of Advocates. It is also used of a solicitor in Aberdeen. (See *M'Pherson v. Watt*, 3 App. Cas. 254.) The Faculty of Advocates is a constituent part of the College of Justice, founded, at the desire of James V., by an act of 1532, and of which the judges of the Court of Session are senators, and the advocates, writers to the Signet, and others are members. The Faculty elect annually a dean, a vice-dean, and a treasurer, and also the keeper and curators of the Advocates' Library. They appoint counsel for the poor, and make regulations for the examination and admission of candidates. The dean nominates nine examiners, of whom three retire annually. Candidates must pass two private examinations, one in general scholarship and one in law. They must attend lectures on Scots law and conveyancing in a Scottish university, and on other branches of law either in a Scottish or some other approved university or school of law. Finally, they have a public examination, in which they defend a thesis impugned by members of the Faculty, and are then admitted by vote of the Faculty. Advocates have an exclusive right of audience in the Court of Session. As regards their duties, privileges, and liabilities, advocates are practically in the same position as barristers. See **KING'S COUNSEL**.

Advocates' Library, Edinburgh, the largest library in Scotland, and since 1709 one of the copyright libraries in the United Kingdom, was founded in 1682, by and for the use of the Faculty, by which body it is maintained, though it is generously thrown open to persons engaged in *bonâ*

fidè literary work who have obtained permission from the curator. In 1692 the collection contained over 3,000 vols., housed in three small rooms in Parliament Close; but after the great fire of 1700, which partly destroyed the earlier collection, the remaining books were removed to the Laigh (lower) Parliament House (still occupied by the library), and extended by several large additions, of which the latest was completed in 1899. The library contains many examples of early printing, collections of old Scottish MSS., and several historical and literary relics of great interest. In 1910 the number of volumes was estimated at 535,000; the collection of MSS. at 3,150.

Advowson (*Advocatio Ecclesiæ*), in English law the right of a patron to present a clergyman to a benefice on a vacancy. It is a right of property which descends to the heir as real estate, but it may also be vested in trustees, corporations, the whole body of the parishioners, the bishop, or the crown. If the patron is a Roman Catholic, the right to present passes to the University of Oxford or Cambridge, according to the situation of the parish, under Acts of 1606 and 1713; and if the right of presentation belongs to an office under the crown, and the holder of the office is a Roman Catholic, the right devolves for the time being upon the Archbishop of Canterbury, under the Roman Catholic Emancipation Act, 1829. An advowson may be sold, subject to the restrictions contained in the Benefices Act, 1898; but under that act, since Jan. 1, 1899, a right of next presentation cannot be sold. See Phillimore's *Ecclesiastical Law* and **SIMONY**.

Ady, MRS. HENRY. See **CARTWRIGHT, JULIA**.

Adye, SIR JOHN MILLER (1819-1900), English soldier, entered the Royal Artillery; served in the

Adytum

Crimean war, Indian mutiny, and Egyptian expedition of 1882. He was governor of the Royal Military Academy at Woolwich (1875-80), and governor of Gibraltar (1883-6). He published *The Defence of Cawnpore* (1858), *A Review of the Crimean War* (1860), *Recollections of a Military Life* (1895), and *Indian Frontier Policy* (1897).

Adytum (Gr. 'not entered') was the inmost chamber, in Greek temples where oracles were given or mysteries performed, which could only be entered by the priests and the initiated.

'**A. E.**,' the pen-name of George W. Russell, Irish poet, born at Lurgan in 1867. His brief volumes—*Homeward: Songs by the Way* (1894) and *The Earth-Breath* (1897)—contain work of remarkable beauty. See Yeats, in *Treas. of Irish Poetry* (1900); and Lord Lytton, in *Nat. Rev.*, May 1899.

Æ, in shipping. See LLOYD'S REGISTER.

Æacus, son of Zeus and Ægina, and king of the island Ægina; and grandfather of the hero Achilles; so famous for righteousness that after death he was made one of the judges of the dead, the others being Minos and Rhadamanthus.

Æby, CHRISTOPH THEODOR (1835-85), Swiss anatomist, became professor of that subject at Berne in 1863, and subsequently held the same post at Prague. Among his contributions to science is a useful method of craniometry. He published *Eine neue Methode zur Bestimmung der Schädelform von Menschen und Säugethieren* (1862), *Die Schädelformen des Menschen und der Affen* (1867), *Ueber das Verhältniss der Mikrocephalie zum Atavismus* (1878), and other works.

Ædiles, magistrates of ancient Rome, who were entrusted with the care of public buildings, streets, markets, weights and measures, etc.; they fixed the prices of food-stuffs, were the

custodians of the decrees of the senate and of the people, and maintained public order. Two ædiles of the people were created in B.C. 494; in 388 two patrician or 'curule' ædiles were added; and Cæsar appointed others (B.C. 45) to administer the corn supply. The public games and spectacles were arranged by the ædiles. See Mommsen's *Hist. of Rome* (new ed., 5 vols. 1894).

Ædui, or HÆDUI, a Celtic people of Central Gaul, between the Arar (Saône) and the Liger (Loire). In B.C. 52 they were conquered by Cæsar.

Æetes, or ÆETA, in Greek mythology, son of Helios and Perseis, was king of Colchis (Æa) when Jason, the leader of the Argonauts, sought the golden fleece. His daughter Medea (called by the poets Æetis) assisted Jason to obtain the prize, and left Colchis as his wife. She subsequently returned, and restored her father to the throne, which his brother Perses had seized.

Ægades Islands (Ital. *Egadi*, 'goat islands'), three islands off the w. coast of Sicily—Marittimo (ancient *Hiera*), reaching 2,245 ft. in Monte Falcone; Favignana (anc. *Ægusa*), 1,070 ft.; and Levanzo (anc. *Phorbantia*), 850 ft. Total area, 70 sq. m. Pop. 6,500, who carry on tunny fishing. Here, in 241 B.C., C. Lutatius Catulus defeated the Carthaginians, and terminated the first Punic war.

Ægean Sea, the N.E. division of the Mediterranean, between Greece, Turkey, and Asia Minor. Its waters are relatively shallow, and studded with islands (the Greek Archipelago), and its shores are greatly indented. The greatest depth, between Samos and Chios, is only 640 fathoms.

Ægeus, in classic mythology, father of Theseus; king of Athens, where he introduced the cult of Aphrodite. When he was driven from the throne by his nephews

the Pallantidæ, Theseus, who was being educated at the court of his grandfather Pittheus at Trœzen, and was in ignorance of his origin, restored his father to the throne. When Theseus went to Crete to deliver Athens from the tribute to Minos, he promised his father he would hoist a white sail on his return, as a signal of safety. But in the intoxication of his victory he forgot his promise, and his father, perceiving the black sail, thought that his son had perished, and threw himself into the sea, which, from this event, received the name of the Ægean.

Ægilops ('hard grass,' 'goat grass'), hard dwarf annual grasses native to the south of Europe, now included in the genus *Triticum* (wheat). *A. ovata* is supposed by some to be the source from which wheat originated; it is capable of considerable improvement under cultivation. See WHEAT.

Ægina. (1.) An isl. and tn. of anc. Greece, in the Saronic Gulf, midway between Attica and Argolis; inhabited in historic times by Dorians, and then a place of great commercial importance. About 500 B.C. it was the chief seat of Greek art, and its standard of coinage obtained in most of the Dorian states. Area, 40 sq. m. Pop. (isl.) about 10,000, (tn.) 4,700. In 429 B.C. the Athenians, its keenest rivals, seized the island and expelled its inhabitants. The Ægina Marbles, now in the Glyptothek at Munich, were discovered (1811) in the ruins of the temple of the local goddess Aphæa, near the town of Ægina. (2.) GULF OF, or SARONIC GULF, between the peninsulas of Attica (n.) and Argolis (s.), Greece; length, 45 m. It contains many islands and good harbours.

Ægir, a jotun or giant of the Norse Sagas, whose journey to Asgard is chronicled in Snorri Sturluson's *Edda*. Understood also as a sea-god, or spirit of the

flood; and in this sense Carlyle (*Heroes*, Lect. 1) identifies Ægir with the 'Eager' of the river Trent.

Ægirite, or ÆGIRINE, a mineral belonging to the group of pyroxenes; a silicate of soda and iron. It is frequently found in the rocks known as phonolites and nepheline syenites. It crystallizes in the monoclinic system, is dark green in colour, pleochroic, and easily fusible under the blow-pipe.

Ægis, in mythology, the cloud surrounding the thunderbolts of Zeus; thence the shield of Zeus, Apollo, and Athena. (See *Iliad*, v. 738 ff.) In ancient art it is shown as a mantle fringed with serpents, that of Athena bearing Medusa's head. The word is now used as a symbol of protection or patronage.

Ægisthus, son of Thyestes and cousin of Agamemnon. While the latter was away besieging Troy, Ægisthus became the paramour of Clytæmnestra, Agamemnon's wife. On Agamemnon's victorious return they murdered him; but some years afterwards, Orestes, son of Agamemnon, returned from Phocis, where he had taken refuge, and slew the guilty pair. Homer in the *Odyssey* gives the earliest version of his story, which was also treated by Æschylus in the *Agamemnon* and *Choephoræ*, by Sophocles in *Electra*, and by Euripides in his *Electra*.

Ægium, tn., anc. Greece, one of the twelve towns of Achaia, and its capital after the destruction of Helice. According to legend it was the birthplace of Zeus. Here Agamemnon mustered the Greek chiefs against Troy. The modern town is Vostitsa.

Æglé, a genus of Indian and African trees, of the order Rutaceæ (orange order). *A. marmelos* is the source of the bael or bhel fruit.

Ægospotami, riv.; Thracian Chersonesus, falling into the Hellespont. In its estuary, in 405 B.C., the Spartans crushed the naval power of Athens.

Ægrotat, a medical certificate granted to students in English universities, to show that illness prevented due attendance to duties; colloquially, 'an æger.' An 'ægrotat degree' may be granted to an honours student who is prevented from taking his final examination by illness.

Ægyptus, son of Belus and twin-brother of Danaus, who ruled Arabia, and conquered the land to which he gave his name. He had fifty sons, in fear of whom Danaus, with his fifty daughters, fled to Argos. But Ægyptus's sons followed him to ask his daughters severally in marriage. He granted their request, but ordered his daughters to murder their husbands on the wedding-night. All but Hypermnestra, *splendide mendax*, obeyed (*vide Hor. Odes*, III. 11).

A.E.I.O.U., the initial letters of the motto for the imperial device of the unhappy Emperor Frederick III., second of the Hapsburg dynasty: Lat. *Austrial est imperare Orbi Universo*, or Ger. *Alle Erde ist Oesterreich unterthan*, 'Austria is to rule all the world.'

Æken, or HIERONYMUS, JEROM VAN (1462-1516), a Flemish painter of the Van Eyck school, known as Jerom Bosch from his birthplace, s'Hertogenbosch. The galleries of Madrid, Antwerp, and Berlin contain examples of his work, which is characterized by a grotesque but ingenious style. Breughel was greatly influenced by him.

Ælfigar, EARL (d. c. 1062), son of Leofric, Earl of Mercia, and the 'Lady Godiva' of legend. He and his father assisted Edward the Confessor against Earl Godwin. Outlawed by the Witan in 1055, he took refuge in Ireland, thereafter invading Herefordshire

with Welsh allies. Succeeded as Earl of Mercia in 1057.

Ælfheah, or ST. ALPHEGE, Anglo-Saxon bishop of Winchester in 984, and Archbishop of Canterbury in 1006; in 1011 taken prisoner by the Danes and killed. St. Alphege Day in the English Church is April 19.

Ælfred. See ALFRED.

Ælfred Ætheling, son of Æthelred II. and Emma; taken with his brother Edward (afterwards the Confessor) to their uncle, Richard the Good of Normandy. In 1036, on the death of Canute, the claims of Ælfred and Edward to the English throne were set aside by the Witan. Ælfred landed at Dover with a force of Normans, but was attacked and captured by Earl Godwin, who cruelly blinded him; he died from his injuries at Ely.

Ælfric (c. 1000), old English homilist, called from his *Latin Grammar*, 'Grammaticus.' His identity is, however, imperfectly established; for although it is certain that Wright and Freeman were wrong in confusing this writer with Ælfric, Archbishop of Canterbury (995-1005), and almost certain that he was not that Ælfric who was Archbishop of York (1032-51), there are few facts known regarding his career, nor can we trace his rise to any higher title than that of abbot. A disciple of Bishop Æthelwold, whose life he wrote, Ælfric had as a patron Æthelmaer, the munificent ealdorman of Devonshire, and presided in turn over two of the latter's monastic foundations—Cerne, in Dorset, and Ensham, near Oxford. The date of his death, as that of his birth, is unknown. Besides his *Grammar*—first printed at the end of Somner's *Anglo-Saxon Dict.* (1659), and edited by Zupitza (1880)—there are attributed to Ælfric various translations, epistles, and treatises

(one of these astronomical), together with the pleasing *Colloquium*. But he is best known as the most advanced writer in Old English prose by his *Homilies*, two series of which were edited by Thorpe for the Ælfric Society (1844-6), and a third (*Saints' Lives*) by Skeat for the Early English Text Society (1881). The Ælfric Society existed from 1842 to 1856.

Ælia Capitolina, the name given by the Emperor Hadrian to the city which he built near the ruins of Jerusalem after the Jewish rebellion of 132-135 A.D.

Ælianus, CLAUDIUS (c. 250 A.D.), a native of Præneste, Italy, who was the author of two works which have survived—a history in fourteen books, the *Varia Historia*; and a work on the peculiarities of animals, the *De Animalium Natura*. Ed. by Hercher (Teubner Series, 1864-6).

Ælius ARISTIDES, ASCLEPIADES. See ARISTIDES, etc.

Ælla (ELLA), died 588, first king of the Deirans, an East Anglian tribe, whose name, and especially those of his race (Angli) and kingdom (Deira), are commemorated in the legendary tale of Pope Gregory and the English captives in the market-place at Rome.

Ælred OF RIEVAULX (1109-66), historian, native of Hexham; educated with the family of David I. of Scotland; afterwards a monk of the Cistercian monastery of Rievaulx, Yorkshire; author of *Lives* of Edward the Confessor, King David, and Queen Margaret of Scotland.

Æltre, tn., E. Flanders, Belgium, 12 m. w. of Ghent. Pop. 7,500.

Æmilian Road, THE, a highway made in B.C. 187 by Marcus Æmilius Lepidus, Roman consul. It ran from Rimini, on the Adriatic, through Bononia (Bologna), in a N.W. direction to Placentia (Piacenza), on the R. Po, being the continuation of the Flaminian Way from Rome to Rimini.

Ænaria, Italy. See ISCHIA.

Æneas, son of Anchises and Aphrodite (Venus), next to Hector the chief hero of the Trojans in the famous war. He survived the fall of Troy, and Homer clearly regards him as reigning there after the Greeks departed; but later legend makes him wander far and wide. In his wanderings he visited Epirus, Sicily, and Carthage, where he loved and deserted Dido, who committed suicide. On his arrival in Latium, the king Latinus promised him his daughter Lavinia in marriage; but a former suitor, the Italian hero Turnus, would not give way. War followed, in which Turnus fell. Then Æneas married Lavinia, and established his kingdom at Alba Longa, but soon fell in war against the natives. His son Iulus—from whom the Julian family in Rome claimed descent—succeeded him; and Romulus, the actual founder of Rome, was descended in the direct line from Iulus and Æneas.

Æneas Silvius. See PIUS II.

Æneid, Virgil's epic, in twelve books, setting forth the wanderings of Æneas. The poem has been translated into English several times, among others by Gawin Douglas (c. 1513), Dryden (1697), Conington (1870), both in prose and in poetry (*à la Marmion*), William Morris (1876), and J. W. MacKail (prose) 1885.

Æng, or AN. (1.) River and town, Kyauk-pyu dist., Arakan, Lower Burma, 19° 45' N. (2.) Pass through Arakan Yoma Mts. between Burma and Arakan.

Æolian Harp, a sounding-board on which are strung several gut-strings of different thickness; these are tuned to the same note, and give its various harmonics when made to vibrate by the wind. Its invention is ascribed to St. Dunstan, but in its present form it is not thought to have existed before the 17th century. Thom-

son (*Castle of Indolence*) and Coleridge (*Æolian Harp*) describe its charms.

Æolian Islands. See LIPARI IS.

Æolian Mode, in music. See MODE.

Æolians, one of the main divisions of the Greek race, who originally dwelt in Thessaly, and thence spread over Bœotia and other districts of N. Greece; they also colonized the island of Lesbos, and many places in the N.W. of Asia Minor, the coast district of which was known as Æolis.

Æolic Dialect is generally looked upon as the oldest form of Hellenic speech. It is usually divided into four dialects, the chief of which is the Lesbian, because it was carried to great perfection in the lyric writings of Alcæus and Sappho. It threw out the aspirate or rough breathing, and was smoother than Doric.

Æolipile (Lat. 'ball of Æolus'), a hollow metallic ball rotating about its vertical axis, with horizontal armlike tubes projecting radially, and having their free ends bent round in a tangential direction. When the water in the globe is heated, and steam rushes out of the tubes, rotation is set up. (Cf. BARKER'S MILL.) The æolipile was invented by Hero of Alexandria about 120 B.C.

Æolotropic or **Anisotropic** bodies are those whose properties with regard to elasticity, heat, electricity, etc., are not the same in all directions. See ISOTROPIC.

Æolus (Gr. 'fleet'), in Greek mythology, the god of the winds and ruler of the Æolian (Lipari) Is., where he kept the several winds immured in a cave. According to euhemeristic interpretation, Æolus was an ordinary mortal, the first chief of the Æolians.

Æon, a cosmological term signifying an age, an indefinitely long period of time, an era; chiefly used rhetorically. Also, in Gnostic doctrine, a divine emanation

partaking of the eternal duration of God, having a specific and independent activity in providential history.

Æpinus, FRANZ MARIA ULRICH THEODOR (1724-1802), German physicist, was appointed professor of physics at St. Petersburg in 1757. He made important researches in electricity and magnetism, and published *Tentamen Theoriæ Electricitatis et Magnetismi* (1759), and *Reflections on the Distribution of Heat on the Earth's Surface* (1761), and a *Treatise on the Electricity of Minerals* (1762).

Æpyornis, a gigantic wingless bird found as a fossil in Madagascar, was 12 to 14 ft. in height, and the egg was one foot in length. See MOA.

Æqui, an ancient Italian race who inhabited the upper valley of the Arno. For centuries they were constantly at war with Rome, but were finally subdued about B.C. 300. Their name appears frequently in Cæsar's *Commentaries on the Gallic War*.

Ærarium, the public treasury of ancient Rome, on the Capitoline Hill. It contained all important state papers, the laws engraved on brass, the standards of the legions, and the state money and accounts.

Aerated Waters. The term includes both natural and artificial products, consisting in the main of water containing more or less saline and flavouring matters, and charged with an excess of carbon dioxide. The natural aerated waters are often called mineral waters, on account of the mineral salts dissolved in them. The best-known natural waters are those of Carlsbad, Vichy, Selters, and Apollinaris. All these waters are highly charged with carbon dioxide, and effervesce when drawn from the spring. The principal medicinal ingredients of each water are as follows:—*Carlsbad*, sulphate and

carbonate of soda. *Vichy Water* varies slightly in composition according to the spring from which it is drawn, but the waters are all alkaline, owing to the presence of sodium carbonate. *Selters* (Seltzer) *Water* contains a large quantity of common salt; it is alkaline, from the presence of sodium carbonate. *Apollinaris Water* is slightly alkaline, and when bottled at the spring for export has some of the carbon dioxide which escapes from the water at the spring pumped back into it.

In making artificial aerated waters, carbon dioxide is first prepared by acting on whiting or chalk with sulphuric acid. This action takes place in a vessel fitted with an agitator, which is kept in motion. The gas next passes into a metal vessel containing water, termed the purifier. The object of the purifier is twofold—first, to wash the gas; and next, to retain any splashes of whiting or acid which might be carried over by the violence of the action. The purified gas is next conducted to a gas-holder, where it is stored until required. The ordinary gas-holder is a wooden tub containing water; a metal bell-like receiver floats in the water, being suspended by a counter-weight. By means of a pump the gas and water are forced under pressure into a metal vessel, in which they are thoroughly mixed by an agitator. The pump is so arranged that it draws both the gas from the holder, and water or other liquid from the containing vessel, by alternate strokes. From the mixer the aerated liquid passes to the bottling-machine, where it is mechanically bottled and corked, or otherwise closed under pressure. There are many different machines in use for the preparation of these beverages, but all of them, though differing in particulars, are based on the principles described. Various additions are

made, either to the bottle before filling, or to the liquid in bulk before aeration. Soda water is very often only plain aerated water, but for medicinal purposes it should contain fifteen grains of bicarbonate of soda to the gallon, while potash water should contain a similar amount of potassium bicarbonate. Lemonade is prepared by aerating water with the addition of a syrup containing either citric acid or tartaric acid, and flavoured with essence of lemon. A number of other beverages are prepared in a similar manner, the difference depending on the flavouring essence used.

The gasogene or seltzogene is a household machine for producing aerated water. It consists of two glass globes of different sizes welded together, but communicating with each other; and a metal top, possessing a tap with lever handle, and a glass tube passing to the bottom of the larger globe. This top is removed; the lower globe is filled with water, and proportionate quantities of dry bicarbonate of soda and tartaric acid (or bisulphate of potash instead of the acid, as being cheaper) are introduced into the upper globe; the top is then screwed down, and the seltzogene is inclined, so as to allow the water to flow from the lower to the upper globe till the latter is about one-third filled. The action of the acid on the soda is thus established, and is continued until the gas by its own pressure has become dissolved in the water, when the water can be drawn off by pressing the lever, exactly as with the siphon. A more recent introduction is the sparklet. This is a bottle with a hollow removable screw top, for holding a soft steel capsule containing liquid carbon dioxide sufficient to aerate the bottle of water. The top is removed, the bottle filled with water, a capsule placed in the

neck, and the top screwed down on it so that the capsule comes in contact with a sharp steel point, which pierces it, and the gas which escapes is conveyed by the tube to the bottom of the water. A brisk shaking assists the aeration, which is accomplished in a few minutes.

Aeration (in plants). Leaves are the special organs set apart for the absorption of gases, as well as for the transpiration of water-vapour and the expiration of other gases. Gases can only be absorbed by the cells of leaves or other parts of the plant when these gases are in a state of solution; and in the larger plants the great number of cells and compactness of structure would make it impossible for all but the surface cells to procure the necessary aeration. Hence an extensive system of irregular passages between the cells has been developed, communicating with the outer air by minute openings between the surface cells or through larger breaks in the cork layers. In the case of submerged water plants, the gases are already dissolved in the water surrounding the leaves; but in the case of land plants, the gases contained in the atmosphere are dissolved by the sap which saturates the cell-wall. A small amount of nitrogen is absorbed, but chiefly oxygen and carbon dioxide are taken in by the leaves; both of the latter are also exhaled. Carbon dioxide is absorbed not only by the leaves but by all parts of the plant's surface which contain chlorophyll. It is a food, being indeed the source of most of the carbon, that element which constitutes so large a bulk of the solid constituents of all plants. Under certain circumstances small quantities of ammonia, sulphur dioxide, and sulphuretted hydrogen are also absorbed by the leaves of plants. See also ABSORPTION and TRANSPIRATION.

Aerial Ropeways. See ROPEWAYS.

Aeroclinoscope, a weather indicator consisting of a pillar with movable arms, by which the variations of the barometer and the direction of the wind can be signalled.

Aerodynamics, the science which treats of the motions, properties, and mechanical effects of air and other gases when in motion. See HYDROKINETICS, HYDROSTATICS, KINETICS, and AEROPLANES.

Aerolites (Gr. 'air-stones'), metallic or stony masses of matter falling from the sky, known as 'fireballs,' 'falling or shooting stars,' 'meteoric stones,' 'thunderbolts,' etc. Such a phenomenon was considered incredible by scientists even to the beginning of the 19th century. Then, however, such men as Sir Joseph Banks, Howard (*Phil. Trans.* for 1802), Biot, and Cuvier, following the German Chladni, took the matter up, and in 1809 a report announced that the 'fact had been established in physical science' (*Mémoires de l'Institut*, vol. vii.). Most aerolites are covered with a blackish glaze, as if fused during their passage through our atmosphere. Some are chiefly 'meteoric iron,' others are almost entirely of stone; others, again, are a mixture of stone and iron. Gassendi, in 1627, saw one fall in Provence which weighed 59 lbs. In 1620 a mass of meteoric iron which fell in the Punjab was forged into a sword for Jehangir, one of the Indian emperors; and in 1492, in Alsace, a huge stone of 270 lbs. fell near Ensisheim, where part of it is still shown. Most of the sacred stones of antiquity were no doubt aerolites—such as the shield of Mars in ancient Rome; the primitive image of Diana at Ephesus, which 'fell down from Jupiter;' and the black stone of Mecca, the sacred Kaaba of the

Mohammedans. Livy, Plutarch, and Pliny have distinct references to aerolites; and a Chinese record of 616 B.C. mentions one which killed ten men. Probably the largest on record is that which fell in Brazil, and is said to weigh over six tons. Reichenbach, the German physicist, concluded that at least 4,500 aerolites of all sizes fall every year; that their composition closely resembles that of the plutonic rocks; and that their mean specific gravity is rigorously equal to that of our earth.

The 'fireball,' a brilliant meteor rushing through the air with an average velocity of more than 30 miles a second, seems to be an aerolite which escapes contact with our planet. In 1887 a large fireball passed from the Irish Sea over the whole of Ireland at a height of about 20 miles. About a century previously, in 1783, another grand specimen crossed Europe in a south-easterly direction from the North Sea to the Mediterranean, with a light 'greater than the moon at full;' the height was estimated at 50 miles, and the velocity 30 miles a second.

The most familiar form of the aerolite is the 'shooting star,' occurring frequently as single stars and sometimes in groups. The chief instance is the great group called the November meteors (see LEONID METEORS), issuing, as they seem to us, from the constellation Leo. Another group, the Taurids (from the constellation Taurus), are generally mixed with fireballs. Both of these groups are seen in November. Many similar groups of 'radiants' are now known to astronomers, and are named from the constellations in which they appear, as the Perseids and Pegasids in August, the Orionids, Aurigids, Lyraids, etc.

As to the origin of meteorites or aerolites there was formerly much discussion. Physicists now regard them as mere fragments of

the innumerable interplanetary bodies which form a part of the solar system. See works already cited, and Chladni's *Ueber Feuermeteore* (1820), Morogues' *Mémoire sur les Chûtes des Pierres* (1812), Arago's *Popular Astronomy*, Brit. Assoc. *Report on Meteors*, Fletcher's *An Introduction to the Study of Meteorites* (Brit. Museum Handbook), Bonney's *Story of our Planet* (1893), Lockyer's *Meteoric Hypothesis* (1890).

Aeronautical Society of Great Britain was founded in 1866, under the presidency of the Duke of Argyll, thus being the oldest body of its kind in the world. Its objects are to give a stronger impulse to the scientific study of aerial navigation in all its branches; to promote the intercourse of those interested in the subject at home and abroad; and to aid with advice and instruction those studying the principles upon which aeronautical science is based. In furtherance of these objects, it holds quarterly and monthly meetings for the reading of papers, and to bring its members in contact with one another. It also possesses one of the finest aeronautical libraries in the country. From its foundation the society has made a special study of dynamic flight, giving it the priority over ballooning. The Annual Reports of the society (twenty-three in number), which were succeeded in 1897 by the *Aeronautical Journal*, a quarterly publication, may be said to form the basis of modern aeronautical science. Other publications of the society include the 'Aeronautical Classics'—reprints of the rare and valuable writings of the pioneers. During the last half-century every British name of any note in the science has been included in its members' roll, including Wenham, Glaisher, Stringfellow, Brearey, Moy, Hargrave, Maxim, and Pilcher. The

society's gold medal, the highest award known in the aeronautical world, has been awarded twice only—to the Wright Brothers and to Professor Octave Chanute. *Offices*—53 Victoria Street, Westminster, S.W. See under AERONAUTICS.

Aeronautics is the term used to designate the entire science of aerial navigation. Aviation is specifically limited to denote flight in machines that are heavier than the air. See AEROPLANES. A free-flying or spherical balloon, also called an aerostat, is an apparatus with an envelope which is filled with a gas whose specific gravity is lighter than the atmosphere near the surface of the earth. It cannot be steered by the pilot, and is practically at the mercy of the air currents. See BALLOONS. A dirigible balloon usually has an elongated envelope, and is equipped with a motor, propellers, and rudder, with which it can be steered at will against a moderate wind. See DIRIGIBLE BALLOONS. Kite balloons, used almost exclusively in Germany, for military purposes, are a combination of the elongated balloon and kite principles. See KITE. A parachute is a scientifically constructed umbrella-like apparatus which, by compressing the air systematically, regulates the descent of a body heavier than the air. An aeronaut is a person who sails in any of the various forms of air-craft. An aviator is one who flies in machines that are heavier than air.

Though it is said that Lorenzo deGusmann constructed a lighter-than-air apparatus at Lisbon in 1685, which succeeded in raising itself from the ground by means of the lifting power of hot air, the real science or art of aeronautics definitely dates from 1783, when the Montgolfier brothers, at Annonay in France, constructed

their first balloons. They, and their co-workers, Charles, Pilatre de Rozier, Robert, and the Marquis d'Arlandes rapidly developed the spherical balloon to a state of efficiency which practically has not been improved upon to this day. In the balloon used by MM. Robert and Charles in 1783 there were present all the details of a modern balloon with the exception of the guide-rope and the ripping-cord. In all of Europe, and principally in France, ballooning became a great fad and object of scientific inquiry, but languished in 1812 owing to a number of untoward accidents. In the meantime it had been adapted to military uses, and a balloon company with a ballooning school was instituted in France. On June 13, 1794, the French at Mauberge, in a battle with the Austrians, for the first time used an aerial vessel in warfare. It proved exceptionally useful for purposes of reconnaissance, and aroused a superstitious dread in the ranks of the enemy. In the meantime General Meusnier, an exceptionally far-sighted officer of the French army, had been studying the resistance of the air, and had planned an elliptical dirigible airship, which in the main included all the important principles involved in the modern dirigible. It is probable that he would have carried out his scheme if he had not been killed fighting the Prussians at Mayence in 1793. The King of Prussia had such respect for the general's scientific attainments that he ordered the firing to cease until Meusnier's body had been buried. When Napoleon, in 1799, closed the French ballooning school and disbanded the two companies, the airship in warfare sank out of sight.

After the early years of the nineteenth century the science of aeronautics was left almost

entirely to showmen. In the interval meteorologists used the balloon to obtain remarkable atmospheric data, and several powers utilized the apparatus in their military operations, notably the United States during the Civil War and the French at the siege of Paris. But the improvements were insignificant and the science was popularly held in contempt. A passing interest was aroused by Giffard in France, who in 1852 constructed an airship with a small steam engine of 5 H.P., with which he succeeded in navigating. Paul Haenlein in Germany shortly afterwards managed to propel a dirigible by means of a gas engine, the first in history to be so used. It is believed that if he had been able to utilize modern motors, and had filled his envelope with hydrogen instead of coal gas, he would have achieved relatively the same results as the Lebaudys. Another great impetus was given to the science by the French army officers Renard and Krebs, in 1885, who described a figure eight in their dirigible and returned to their starting-point. Modern dirigibles are but slightly superior to 'La France,' the airship they evolved. Contemporary popular interest in the science of aeronautics dates from 1898, when Santos-Dumont, the wealthy young Brazilian, performed his spectacular feats. Immediately ballooning became the sporting fad in France, and spread rapidly over the Continent and England. Aero clubs were established throughout Europe, and the various governments established aeronautical military divisions. Numerous airships of the dirigible type made their appearance, and many balloon factories were established. During the last few years spherical balloons have been common everywhere in France. In Germany every considerable com-

munity has its aero club. In Europe the clubs in the various sections of a country are federated divisionally and are banded together under a national organization. The aero clubs of the world are combined in an organization known as the Federation Aeronautique Internationale. In France, Germany, Italy, Russia, and other countries the aero clubs are encouraged by the government, and in some instances receive subsidies and form an aeronautic military reserve to be called upon in time of war. In every club it is required that the person who guides a balloon be certified as a pilot, according to a system of examination involving a series of practical demonstrations in the air by day and by night, as well as the approval of the candidates' theoretical knowledge by a board of experts. In the local, sectional, national, and international contests, held every year, only pilots of record are permitted to participate. In the United States there are now about 300,000 aero club members scattered throughout the land, who individually or collectively own over 200 balloons. The United States, France, Germany, Italy, Great Britain, Russia, and other countries own one or more aerial warships of the dirigible type, as well as numerous spherical balloons.

The effort to fly by means of heavier-than-air craft antedates all other experiments in aerial navigation. The first authentic instance is recorded in 67 A.D.

One of the early students of heavier-than-air machines was the celebrated painter, Leonardo da Vinci, whose sketches are still in existence and indicate an extraordinary technical knowledge of the mechanical problems involved. The first aeroplane to fly by mechanical propulsion was invented by an Englishman named Henson, who in 1843 flew under

power of a 20 H.P. steam engine. Sir Hiram Maxim built a machine in 1888 which was practically successful, and Ader flew in Paris in 1900. Langley, who began experimenting in 1885, managed to fly over the Potomac in 1896. The Wright brothers, following along the lines of Lilienthal and Langley, made their initial flights under motor power in 1903. For recent history, see AEROPLANES.

Aerophore, a tanklike respirator into which the air from the lungs passes, where it is purified by chemicals contained in the tank, and is made fit to be breathed again. It is carried on the back by firemen entering burning buildings.

Aeroplanes. Flying-machines are distinguished from balloons and dirigibles in being 'heavier than air,' and consequently raised and supported by dynamic means alone, by the reaction of the air on surfaces driven through it. Although the first practicable flying-machine was built and flown so long ago as 1809 by Sir George Cayley, in England, no definite results were achieved until the last decade of the 19th century. Progress was so long delayed by two causes: firstly, the lack of information relating to the laws of air resistance; and, secondly, the want of suitable motive power of sufficient lightness. The lightest motor known to Sir George Cayley—Boulton and Watt's steam engine—weighed but little under 200 lbs. per H.P. It was not until the development of the internal combustion engine, which, in its latest form, weighs as little as 3 lbs. per H.P., that power-driven flight became possible. (For early history of flying, see AERONAUTICS.)

The difficulty of discovering accurate information regarding the laws of air resistance to bodies moving through it, which constitutes the science known as aerodynamics, proved an equally

effectual bar to the development of the flying-machine until recent years. This difficulty is due mainly to the practical invisibility and tenuity of the air, and to the fact that in motion it is a most irregular and turbulent fluid. The methods of research in aerodynamics, brought to a state of perfection by Professor Langley in America, by Professor Dines and Sir Hiram Maxim in England, and by M. Eiffel in France, are twofold: firstly, by mounting the bodies to be tested on the long arm of a whirling-table rotating at high speed; or, secondly, by placing them in an artificially produced current of air. By varying the shape and position of the body, it has been possible, by employing delicate recording instruments, to obtain fairly accurate information on the most important laws of aerodynamics. Nevertheless, this science may justly be described as remaining in a state of infancy, though it may be expected that valuable and reliable knowledge will be gained from the work pursued in the aerodynamical laboratories now established in various countries, chief among which are those in the National Physical Laboratory at Teddington, at Koutchino in Russia, and the laboratory founded by M. Deutsch in Paris.

Among the most important phenomena of the air that bear directly on the problems connected with flying-machines are the following:—

Save at very high altitudes, but particularly in the vicinity of the earth's surface, the wind—which is simply air in motion—has the most extraordinary variations in speed, fluctuating constantly, and almost instantaneously, from nearly dead calm to a very high velocity. Langley's experiments showed, to take one example, that a wind blowing at an average velocity of 25 miles an hour fluct-

uated, within the course of a single minute, from 36 to 0 miles an hour. Similar instantaneous variations occur in the direction, both horizontal and vertical, of the wind, amounting to as much as 20° . It has not yet been determined whether these variations form a portion of a uniform wave-movement or pulsation in the atmosphere, or whether they offer any explanation of some of the more mysterious phenomena of bird-flight, such as the soaring of the condor.

Further, the atmosphere diminishes in density in proportion to the altitude; and the average velocity of the wind increases constantly with the height. Both these phenomena will probably render navigation impossible at heights exceeding 15,000 ft.

Although the same broad principle—viz., the reaction of the air on surfaces driven through it—applies in general to dynamic flying-machines, these can nevertheless be divided into three classes according to the means whereby this principle is applied. (1.) The *Helicopter*, sustained by the rotation of horizontal propellers. (2.) The *Ornithopter*, sustained by flapping wings as in the most common form of bird-flight. (3.) The *Aeroplane*, sustained by the reaction of the air on passive surfaces driven through the air.

The *Helicopter* was the first type of flying-machine to be designed on scientific lines—by Leonardo da Vinci, about the year 1500. In spite of continuous attempts since made to build a practical machine of this class, only two instances can hitherto be recorded of a helicopter raising a man from the ground. But as, in both cases, the height attained above the ground amounted only to a few inches, the helicopter cannot be said to have met with any success as yet. The machines referred to were both built in

France: by Cornu at Lisieux in 1908, and by Breguet-Richet at Douai in the same year. Machines of this type are raised by the rotation of one or more horizontal propellers; forward movement is effected either by inclining the axis of these propellers or by an ordinary vertical propeller.

Mechanically, the helicopter is less efficient than the aeroplane, and seems to offer little or no prospect of success, although it may possibly prove useful as an adjunct to the aeroplane proper.

The *Ornithopter*, or machine driven by the action of wings reciprocated like those of a bird or an insect, has met with even less success hitherto, no single machine of this type having even flown—with the exception of a few diminutive models (those of Penaud in France, Kress in Germany, and Hargrave in Australia)—although many have been designed from the time of Leonardo da Vinci onwards. In this case, the difficulty seems to be chiefly one of the transmission of power, the mechanism necessarily being extremely complicated. From a theoretical point of view, the ornithopter, however, is considerably more efficient than the aeroplane; and, having lately aroused much attention, seems to offer a fair chance of success in the future, either in itself or used as propelling mechanism.

The third type, the *Aeroplane*, has been developed with such extraordinary rapidity as to have become, within the years since its practical inauguration in 1906, not merely the single type of a successful flying-machine, but almost a recognized method of locomotion and transport. It was with an *aeroplane* that the first flight in history was made by the French engineer, Ader, in 1891. Again at Satory, in France, Ader made a second flight in private on a steam-driven aeroplane (now

preserved at the Conservatoire des Arts et Metiers in Paris) on Oct. 17, 1897. On Dec. 17, 1903, the Brothers Wright, in America, made their first power-flight; while the very first public flight was made in France by Santos-Dumont on Sept. 14, 1906.

Before it was possible to produce a power-driven aeroplane, experiments over a long course of years were made with aeroplanes not provided with propelling apparatus, and known as *gliders*. The first glider was built in 1809 by Sir George Cayley, and successfully flown, though not with a man on board; but the experiments in the gliders made by the German engineer, Otto Lilienthal from 1889 onwards, may be said to form the actual inception of the present-day aeroplane. Until his death in 1897, Lilienthal made over 2,000 glides, and brought about many improvements in design. His work was continued in England by P. S. Pilcher, and in the United States by O. Chanute, Herring, and the Brothers Wright.

Essentially, the aeroplane may be compared to a kite in which the pull of the string is replaced by the thrust of the propeller. In its earliest form the aeroplane consisted of a flat surface moved through the air in a position slightly inclined from the horizontal; in its forward movement the plane experiences resistance from the air. As this resistance is directed partly on the under side, it will be partly converted into a lifting force. Of these two forces—head resistance or drift, and the lifting or sustaining force or lift—the first, being unproductive, must be reduced as far as possible; the second, lift, must, on the other hand, be raised to the highest possible degree.

This end is achieved by employing, instead of flat surfaces or planes, surfaces curved in the

direction of flight. Curved surfaces were first used by Cayley in 1809, but were scientifically utilized for the first time by Lilienthal from 1889 onwards. The curved surface has less head resistance than a plane, and gives more lift. The reason for this is apparent from Figs. 1 and 2, which are drawn from photographs of the action of the air on (1) a plane, and (2) a curved surface. In the first case whirls and eddies are produced in the rear of the surface, the discontinuity extending far to the rear; in (2) the streamlines of the air hug both surfaces of the curve very closely, and flow away evenly. In each case a cushion of inert air is formed at the point of impact, which prevents the air current from impinging directly on the leading edge.

The air first striking the surface, near its leading edge, must necessarily blow away to the rear, thus interfering with the direct impact of the air on the middle and posterior parts of the surface; consequently, the area of greatest pressure is situated nearer the leading edge. In practice the area of greatest pressure is normally situated between one-third and one-fourth of the dimension of the surface from its forward edge.

Any alteration in the angle of the surface causes this centre of pressure to move forwards when the angle is reduced or speed increased, backwards when speed falls or the resistance is augmented. At the same time the centre of gravity of the system remains fixed. It is this constant shifting of the centre of pressure which forms the chief obstacle to stability in flight; for perfect stability the centres of gravity and pressure should always coincide. In order to re-establish equilibrium between the two, the aeroplane is provided with a tail or other supplementary stability surfaces. Thus, nowadays, stabil-

ity is established by altering the centre of pressure (a method introduced by Chanute and the Brothers Wright) instead of the former dangerous method of altering the centre of gravity (Lilienthal, etc.).

The curve or camber of aeroplane surfaces is usually parabolic, the leading edge being re-

a deeper curve than biplanes; and the general tendency in modern design is to reduce both curvature and angle of incidence.

The greatest pressure, and therefore the chief lifting-force, being situated near the forward edge, whereas the rear portion does comparatively little work, aeroplanes must consequently

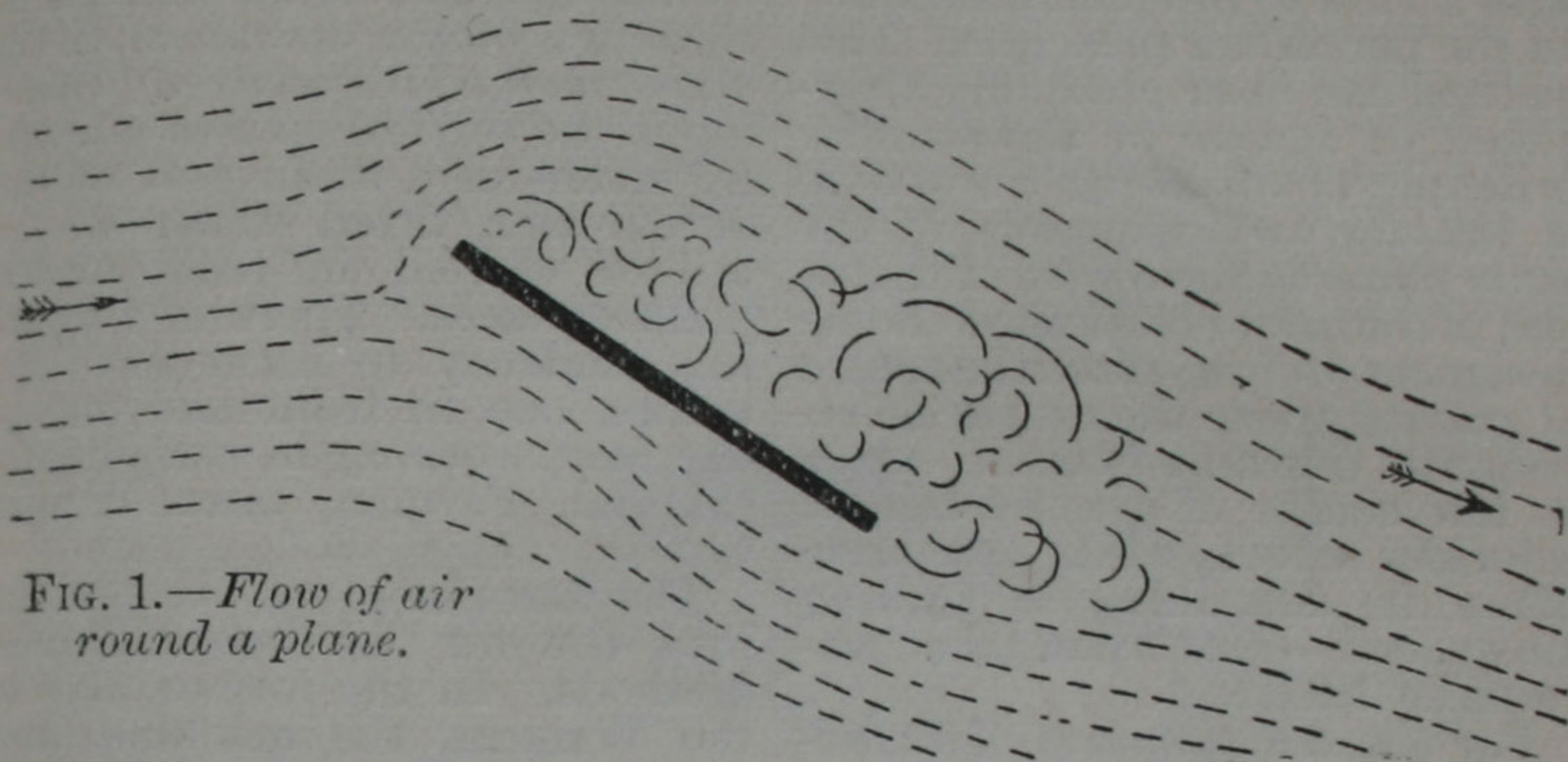


FIG. 1.—*Flow of air round a plane.*



FIG. 2.—*Flow of air about a curved surface.*

latively thick and blunt, and tapering gradually off to the trailing edge to ensure an even flow of air. In some cases the leading edge is inclined at a distinct negative angle (Phillips, Hargrave, Dunne, and in many birds' wings). The depth of the curve is in inverse proportion to the size of the carrying surface.

Monoplanes consequently have

possess their greatest dimension transversely to the direction of flight. In practice, the span of aeroplane surfaces compared to their fore-and-aft dimension is about 6 to 1. In order to prevent too great a span, which would lead to constructional difficulties, F. H. Wenham first proposed, in 1866, to use two or more surfaces superposed at suitable distances.

This has led later experimenters to build biplanes, triplanes, and multiplanes, as distinguished from the monoplane or single-surface aeroplane.

An important consideration in aeroplane design is the position of the centre of gravity. In the earliest designs the centre of gravity was placed as low as possible, with a view to producing stability on the pendulum principle. This method has been gradually abandoned in favour of the sounder principle of disposing the centre of gravity approximately in the same plane as the centre of thrust and in the line of resistance. Some designers, in fact, place the centre of gravity above the centre of resistance (Esnault-Pelterie, etc.). A low centre of gravity has an injurious effect while the aeroplane is describing a turning movement — *i.e.* when the machine is 'banked.'

For the maintenance of stability supplementary surfaces are carried. For preserving longitudinal stability a tail is added, consisting of one or more fixed horizontal surfaces. In order to obtain sufficient leverage for counteracting injurious alterations in the centre of pressure on the main planes, this tail must be situated as far as possible from the main surfaces (some machines, such as the early Wright type, were not provided with a tail, but in their case the forward elevator, carried well out to the front, fulfilled the same functions.) For maintaining lateral stability three devices are employed. (1.) The main surfaces are raised at their lateral extremities, forming a dihedral angle. First proposed by Cayley and later adopted by Langley, this method has since been rejected as unsatisfactory. (2.) By 'warping' the rear extremity of the main surfaces — *i.e.* by twisting them so that one is raised while the other is depressed (first

practically employed by the Brothers Wright). (3.) A modification of (2), in which small balancing planes or flaps are employed. This device, first utilized by Blériot and Farman, has since come into general use. Steering to right and left is effected by means of an ordinary vertical rudder, usually carried on the tail, and often assisted in its action by the operation of the above methods of control. Steering in the vertical plane is effected by means of a horizontal rudder or elevator, fitted either to the tail or carried in front of the main surfaces. There is a growing tendency to carry two elevators, one in front and one in the rear, working in conjunction (Maxim, Farman, later Wright type).

The aeroplane may be started into the air by two different methods. In the former, due to the Wrights, the machine, provided with runners or skids, is shot along a temporary rail by the action of a heavy weight caused to fall from a tower or derrick. The second method, originating in France, is to run the machine on wheels along the ground until it has gained sufficient velocity to rise, which is often accomplished within less than 100 ft. For landing, the majority of aeroplanes are provided, in addition to wheels, with skids to take the shock.

Forward motion is obtained by one or more propellers driven by an internal combustion motor. In the majority of monoplanes the propeller revolves in front of the carrying surface; in the greater number of biplanes in the rear, its position being determined by structural consideration. Twin propellers are more rarely used. Occasionally metal is employed in the construction of propellers; more often wood. The diameter varies from 6 to 8 ft., the number

of revolutions from 600 to 1,500 per minute. The motive power varies from 20 to 100 H.P., the average being somewhere near 50 H.P., but there seems little room for doubt that this average will be very considerably reduced as time goes on. An aeroplane designed to carry a single passenger is obviously highly over-powered with an engine developing more than 20 H.P.; at the same time, for large machines carrying a greater number of passengers, 100 H.P. is not excessive. Powerful engines will undoubtedly be employed, since any increase in

fusiform section, with a blunt entering edge tapering towards the rear.

The framework of the main planes usually consists of two or more main transverse spars, on which the longitudinal curved ribs are built up. The planes are double-surfaced: fabric being tightly stretched over the upper as well as the lower surface, the upper surface as a rule having the greater camber. Great care is taken to make both surfaces as smooth as possible, since any irregularity sets up great resistance.

In a biplane the upper and

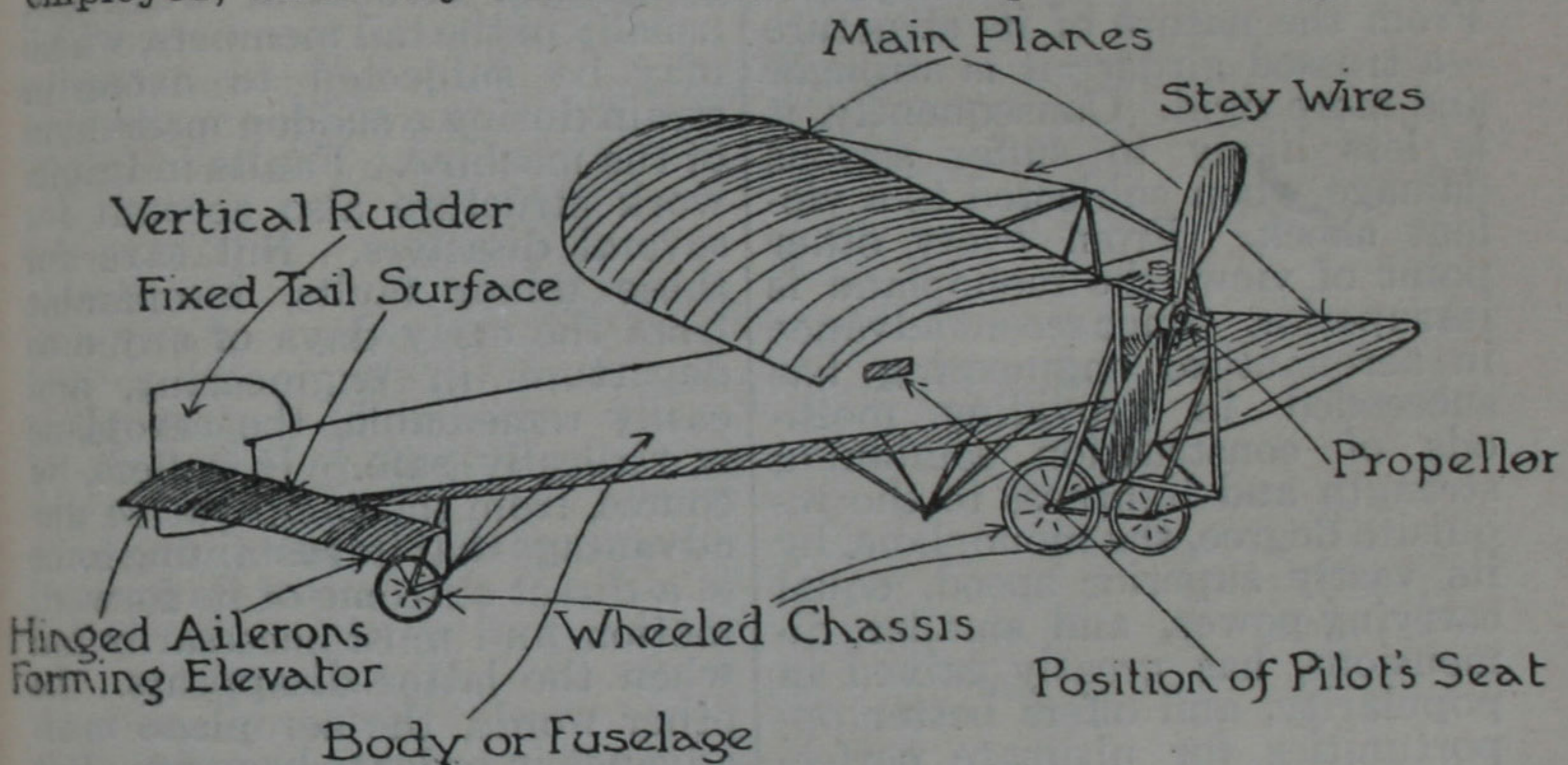


FIG. 3.—Blériot Monoplane.

speed above the average requires an excess of power beyond all proportion to the results attained.

With the exception of the driving mechanism, wood is the chief material employed in aeroplane construction, the tougher and lighter varieties only being used. Spruce, hickory, and ash are perhaps the most frequent materials for the framework. Weight for weight, the best qualities of these woods are undoubtedly greatly superior in strength to the finest metals, besides being more suitable in other respects for aeroplane construction. Practically all the woodwork employed is of

lower planes are connected by means of vertical struts, strongly cross-braced with piano wire; the whole skeleton forming a fairly rigid girder. The body, or fuselage, is built in the same fashion, and forms a rigid trussed girder on which the tail and steering surfaces are mounted, and which contains the motor and the pilot. The body is finally mounted on a chassis, or carriage, rolling on pneumatic-tyred wheels protected by skids. The fabric for covering the surfaces is usually rubber-proofed to render it impervious to air, and to protect it from moisture. Generally, the body is

also covered in with fabric so as to diminish air-resistance to the lowest possible degree. Modern design tends as far as possible to eliminate wires in construction, since their vibration, in flight, produces enormous head-resistance. In this particular the biplane suffers from a disadvantage compared to the monoplane, in which the only wires employed are those used to stay the wings, and even for this purpose steel ribbons are often substituted.

Of the two types of aeroplane in use, the biplane has only one advantage over the monoplane. From the nature of its structure—a trussed girder—it is stronger and more rigid. Consequently, it is less likely to suffer serious damage when subjected to a violent shock. From every other point of view, the monoplane is its superior. Since recent advance in aeronautical engineering has succeeded in providing methods of construction combining strength and lightness to the requisite degree, the monoplane, by its vastly superior speed, equal carrying-power, and smaller dimensions, has greatly gained in popularity, and offers better opportunities for ultimate perfection. The biplane carries a loading of from $2\frac{1}{2}$ to $3\frac{1}{2}$ lbs. per sq. ft. of surface; the monoplane from $3\frac{1}{2}$ to 6 lbs. per sq. ft. The load per horse-power in each case is from 30 to 40 lbs. In speed the biplane ranges from 35 to 45 miles per hour, as against 40 to 60 miles per hour attained by the monoplane.

In neither type, however, has anything like finality in design been attained, so that any attempt to define their respective capabilities would be premature. Nor is it possible to say whether the aeroplane will ultimately prevail in its present form. The invention of gas turbines or other improved forms of motive power,

the discovery of another and more efficient means of propulsion than the screw propeller, may profoundly modify the design or even the principle of flying-machines.

In spite of a series of fatal accidents, the principle of the aeroplane may be said to have proved essentially sound. Such accidents as have occurred have, in fact, been due not to fundamental defects, but to small imperfections in design, and to constructional faults. The majority of fatal accidents have been caused by partial structural weakness, usually in the tail members, which may be subjected to excessive strain during a sudden manoeuvre of the machine. Faults in framework structure also account for several disasters. But save for these minor faults, inseparable from the early days of any new departure in engineering, and easily remediable, the aeroplane is radically safe. It suffers, of course, from the comparative disadvantage that its sustaining force is a direct outcome of its forward motion, and must necessarily fail when the latter disappears. In other words, the aeroplane must advance in order to keep up. But a breakdown of the motor does not therefore imply disaster; on the contrary, a well-balanced aeroplane, when the motive-power fails, acts as a glider, with a gliding-angle not greater than 1 in 8. Consequently, although, on the motor stopping, the machine assumes a descending trajectory, the actual rate of fall is slow, so that the pilot, who preserves control over his machine, has time to choose a suitable landing place. It is obvious, therefore, that when flying over difficult or densely-populated country it is preferable to fly at a considerable altitude. From a height of 5,000 ft., for instance, the aeroplane can land anywhere within a radius of 8 miles.

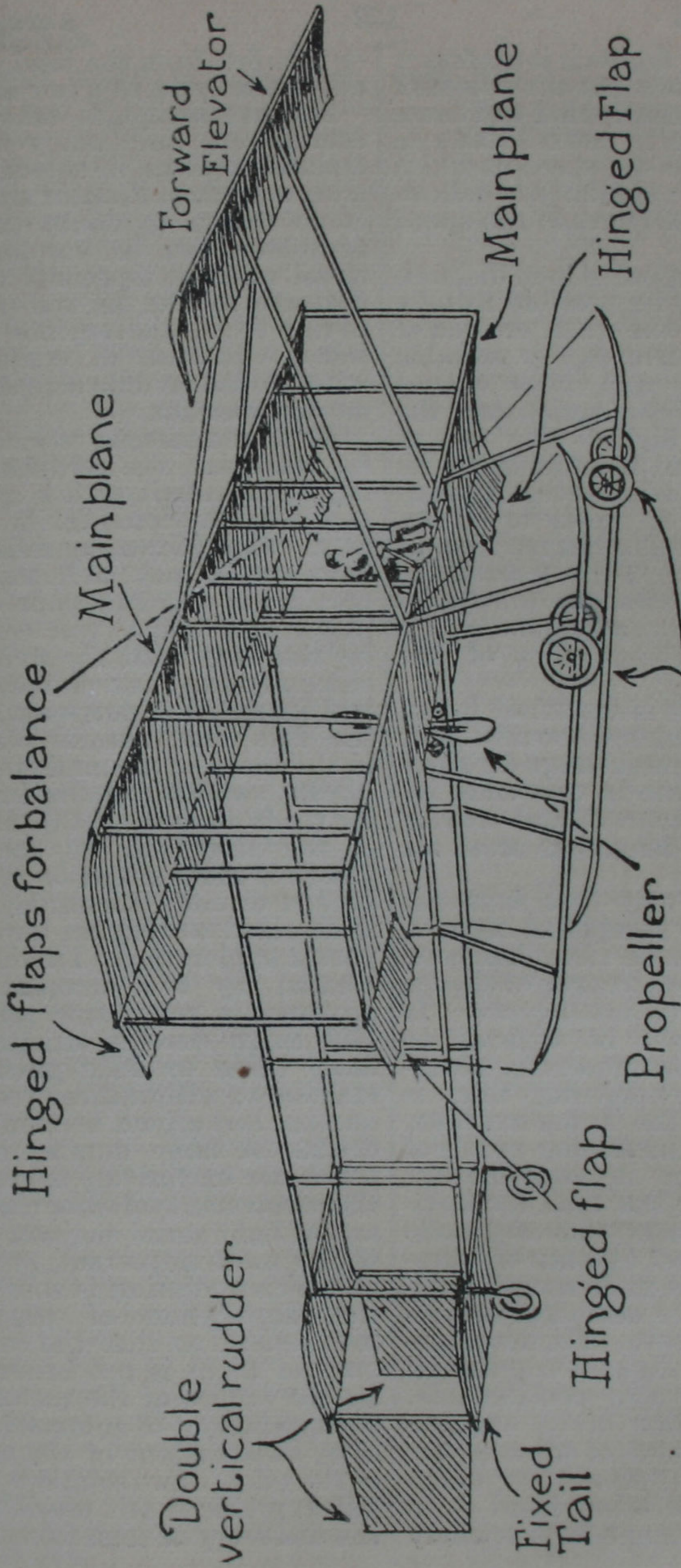


FIG 4.—Farman Biplane.

In making flights it is necessary to take into account the action of the wind. A side-wind will cause an aeroplane to make leeway in proportion to the speed at which it is blowing; similarly, a following wind will increase the speed of flight.

For the purpose of long-distance flights it may be possible to take advantage of the wind, or even of several air-currents, by suitable manœuvring, and thus extend both the radius of action and the velocity of flight. The art of navigation in the air is in its infancy, and offers severe difficulties as yet. In misty or cloudy weather the pilot has recourse to the compass. This instrument is, however, extremely unreliable when fitted on an aeroplane, owing to the disturbing effect of the magneto.

The altitude is measured by an aneroid barometer, usually self-recording. Special maps for aeronautical use are in existence, indicating contours, land-marks, light-houses, dangerous areas for landing, etc.

From the very first days the value of the aeroplane, from a military point of view, has been realized, not as a weapon of offence so much as of intelligence. It would, in fact, be difficult to imagine a better means for scouting and reconnoitring than is afforded by the flying-machine. Its gradually increasing radius of action renders it available for strategical no less than for tactical reconnaissance; its easy mode of progress and absence of vibration allow the most accurate observations to be made and sketch-maps to be drawn. For despatch-carrying over difficult country its usefulness is also considerable. On the question of its employment for purposes of offence, it is impossible to pronounce definitely. On the other hand it is practically immune from artillery

or rifle fire from the land, especially when flying at a fair altitude.

Military aeroplane schools are established, and many officers trained as pilots, in several countries, notably in France; and there is no reason to doubt that the aeroplane can be employed in naval warfare, especially if it be designed to land on, and possibly to rise from, the surface of the water. Its use in conjunction with the less mobile dirigible also merits attention.

As a commercial vehicle, and for transport, the aeroplane, owing to its relatively low carrying power, is restricted in its usefulness. With increasing reliability, however, it may well assume a portion of the functions of the motor car. Such will certainly be the case with the flying-machine regarded as a pleasure craft and for sporting purposes. From the fact that natural obstacles in the shape of mountains, rivers, forests, swollen torrents, impassable roads, do not exist in the case of the aeroplane, its use as a means of communication in rough broken country is assured, and it is destined to play an important part in exploration. The industry created by the aeroplane has grown at a very rapid rate. In 1907 there were in existence at most three or four practicable machines; within three years the number had grown to many hundreds. A large number of factories are exclusively engaged in the construction of these machines and of light aerial engines.

The most important problems of which a solution is sought are the duplication of propelling mechanism, so that the continuance of flight is not interrupted by the failure of the motor, and the attainment of automatic stability, independent of the control of the pilot. Two solutions of the latter problem are possible: (1) the discovery of some form of sur-

face that shall be inherently stable; and (2) by regulating the controlling surfaces by some automatic means as the gyroscope. Finally, there is a tendency to reduce the power required for flight to a much lower level by improvements in design. There seems no valid reason, in fact, why flight should not ultimately be achieved with a 3 or 4 H.P. engine, although the achievement of flight by the muscular power of a man alone appears doubtful of realization.

CHIEF AVIATION RECORDS.

- 1897, Oct. 17.—Ader flies 1,000 ft. at Satory, France. First flight by a human being.
- 1903, Dec. 17.—The Bros. Wright make a 59-sec. flight at Dayton, U.S.A.
- 1905, Oct. 4.—The Bros. Wright fly 24½ m. in 38 min. 3 sec., at Dayton.
- 1906, Aug. 22.—A. Santos Dumont rises from the ground. First public flight in Europe.
- 1908, Jan. 13.—H. Farman makes the first circular flight (1,093 yds.) in Europe, at Issy, France. Wins £2,000 Grand Prix d'Aviation for accomplishing a circuit of 1 kilo.
- May 30.—H. Farman flies with a passenger 1,360 yds., at Ghent, Belgium. First public passenger flight.
- Oct. 30.—H. Farman makes the first cross-country flight from Châlons to Rheims—16½ miles.
- Dec. 31.—Wilbur Wright flies 77½ m. in 2 hr. 20 min. 23 sec., at Le Mans, France.
- 1909, July 25.—L. Blériot flies from Calais to Dover. Wins *Daily Mail* £1,000 prize.
- Aug. 27.—H. Farman flies 112 m. in 3 hr. 4 min. 56 sec., at Rheims.
- Aug. 29.—H. Farman carries two passengers for 6.21 m., at Rheims.

- 1910, Apr. 27, 28.—Louis Paulham flies from London to Manchester (150 m.) with one halt, in 4 hr. 2 min. Wins £10,000 prize offered by *Daily Mail*.
- May 29.—Glenn Curtiss flies from Albany to New York (150 m.) with two halts, in 2 hr. 54 min. (= 51 m. p. h.).
- June 2.—Hon. C. S. Rolls flies from Dover to Calais and back without alighting.
- July 9.—At Rheims, Mamet flies 1 h. 38 m. 20 sec. with two passengers on his monoplane.
- July 10.—L. F. Morane flies 20 kilo. at Rheims at an average speed of 66 m. p. h.
- July 10.—M. Olieslaegers flies 245 m. at Rheims in 5 hr. 3 min. 5 sec.
- Aug. 3.—M. Chavez attains height of 5,850 ft. at Blackpool.
- Aug. 29.—At Douai, France, Bréguet flies with five passengers on his biplane.
- Dec. 18.—At Buc, France, H. Farman makes a flight of 8 h. 12 m. 54 sec. duration.
- Dec. 18.—T. Sopwith flies from Eastchurch, Isle of Sheppey, to Beaumont in Belgium, 169 miles, and wins the 'De Forest' prize of £4,000.
- Dec. 21.—At Pau, France, Legagneux flies 320.6 miles in 5 h. 59 m. on a Blériot monoplane (53.6 m. p. h.).
- Dec. 21.—At Etampes, France, Mlle. Dutrieux flies 104 miles in 2 h. 35 m.
- Dec. 21.—Lieut. Camerman, with a passenger, makes a cross-country flight from Montigny to Châlons and back without alighting—144 miles in 4 h. 2 m. 30 sec.
- Dec. 26.—At Los Angeles, California, Hoxsey attains a height of 10,400 feet.
- Dec. 30.—At Buc, France, Tabuteau flies 362.8 miles in 7 h. 48 m., winning the Michelin prize.
- Dec. 31.—At Farnborough,

Cody flies 4 h. 47 m., covering 189'3 miles, and winning the British Empire Michelin prize.

See F. W. Lanchester's *Aerodynamics* and *Aerodnetics*; Sir Hiram Maxim's *Natural and Artificial Flight*; S. P. Langley's *Experiments in Aerodynamics* and *The Internal Work of the Wind*; H. W. L. Moedebeck's *Pocket-Book of Aeronautics*; O. Chanute's *Progress in Flying-Machines*; O. Lilienthal's *Der Vogelflug*; Capt. Ferber's *Progrès de l'Aviation*; G. Eiffel's *Résistance de l'Air*; S. Drzewiecki's *Helices Aériennes*; F. von Loessl's *Luftwiderstandsgesetze*; Renard's *L'Aviation*; D. Riabouchinsky's *Institut Aérodynamique*; R. Soreau's *Navigation Aérienne*; G. Wellner's *Dynamischer Flug*.

Aeroscope, an apparatus for collecting microscopic objects (dust, etc.) from the air. It consists of a glass collecting vessel smeared with glycerin, through which a stream of air is drawn by an inspirator. As the air passes through, the particles of dust adhere to the film of glycerin. Since the amount of air passing through in a given time is known, it is possible to find out the degree of its purity by examination of the particles.

Aerostatic Press, an apparatus by which the pigments are extracted from dyewoods: a solvent is forced through the wood by atmospheric pressure.

Aerostatics. See HYDROSTATICS.

Aerotherapeutics, a method of treating disease by varying the pressure of the surrounding atmosphere, or by modifying its composition, or by change of climate. Atmospheric pressure may be varied in an air-tight chamber, a good example of which is the air-lock used by workmen employed in caissons. Two methods of treatment have been adopted: (1) administering compressed air

by means of a mask fitting tightly to the mouth — not a successful method; (2) compressed air baths, the patient being placed in an air-tight iron chamber, and filtered air pumped in till the added pressure is two-thirds of an atmosphere. He remains in this two hours. Some discomfort is at first felt in the pharynx and ears, but the result is claimed to be that, after some time, muscular power is augmented, appetite generally improved, and weight almost invariably gained. The temperature is not materially affected. Lung diseases, such as asthma, chronic bronchitis, and emphysema, are sometimes benefited.

The term is also applied to treatment by change of climate: phthisical patients are benefited by residence in a dry climate—either warm, as the Canaries, Egypt, the Mediterranean islands, Algeria, Australia, S. California; or in high and cold altitudes, as at Davos (5,200 ft.), St. Moritz (6,000 ft.), or high and warm, as at Colorado Springs (6,022 ft.), Kimberley (4,002 ft.), Colesberg (4,407 ft.), Bloemfontein (4,500 ft.), and many other places. Sea voyages have often proved beneficial. At such places as Nordrach in Germany, and Nordrach-on-Dee in Scotland, without elevation or any particular advantage of climate, open-air exercise and generous dieting have greatly improved many patients, and have shown that much benefit can be obtained by adopting hygienic measures at home. See OXYGEN.

Aerschot, tn., Brabant, Belgium, on river Demer, 9 m. N.E. of Louvain; taken in 1705, 1746, and 1793 by the French. Important junction on the railway line Antwerp-Aachen. Pop. 7,500.

Aertsen, AVERTSEN, or AERT-TOZEN, PIETER (surnamed *De lange Pier*) (1508-75), painter;

born at Amsterdam, and studied under Allart Claasz. His best-known works are altar-pieces—*e.g.* at Delft, *The Nativity* and *The Offerings of the Magi*; at Amsterdam, *The Death of the Virgin*; and at Antwerp, a *Crucifixion*.

Aeschi, large vil., on s. side of Lake Thun, canton Berne, Switzerland. Favourite summer resort. Pop. 1,400.

Æschines (389–314 B.C.), Attic orator, and the chief opponent of Demosthenes. His policy was to help Philip of Macedon to become head of a confederacy of all Greece, while Demosthenes's aim was to crush Philip and keep the Greek states independent; but even though Æschines was in the pay of Philip, we need not believe that his action was influenced solely by corrupt motives. In 347 Æschines was a member of an embassy which made a temporary peace with Philip, and for the next ten years upheld his cause at Athens. After Philip's decisive victory in 338 at Chæronea, he brought a charge against Ctesiphon, a friend of Demosthenes, which was only decided in 330, and resulted in his own exile. (See DEMOSTHENES.) He retired to Rhodes, where he taught rhetoric. Three of his speeches survive—*In Timarchum*, *De Falsa Legatione*, *In Ctesiphontem*. Editions: text only, Blass (Ger.), 1896; with notes, Benseler (Ger.), 1855–60; *In Ctesiphontem* only, Gwatkin and Shuckburgh (Eng.), 1890; and see S. H. Butcher's *Demosthenes* (1881), and Demosthenes's *De Corona*.

Æschylus (525–456 B.C.), son of Euphorion, the earliest of the three great Athenian tragic poets. His career as a dramatist began in 499 B.C., and lasted practically until his death. In 490 he fought against the Persians at Marathon, and again in 480 and 479 at Salamis and Plataea. In 476 he visited Syracuse, at the request of its ruler Hiero, and seems

to have spent much of the rest of his life in Sicily. He died at Gela, and was buried there. The chief note of his style is grandeur of thought and imagery, with a magnificence of language which sometimes verges on bombast, and a deep religious feeling. He largely developed Attic drama—which had before consisted of monologues divided by choric songs—by introducing a second and a third actor, and is said to have introduced scenery and stage appliances. He wrote ninety plays, of which seven are extant—the *Supplices*, *Prometheus Vinc-tus*, *Septem contra Thebas*, *Persæ*, *Agamemnon*, *Choephoræ*, and *Eumenides*, of which the three last form a trilogy, or series of three plays on one subject. The *Persæ* is remarkable as a play dealing with contemporary history; the *Agamemnon* as being unsurpassed by any play, ancient or modern, for tragic force. Editions: text only, Wecklein (Ger.), 1885–93; Sidgwick (Eng.), 1900; with notes, Paley (Eng.), 1879; *Agamemnon*, *Choephoræ*, *Eumenides*, Sidgwick, 1887–92; *Persæ*, Prickard, 1889; *Septem c. Thebas*, Verrall, 1887; *Supplices*, Tucker, 1889; *Prometheus* and *Persæ*, Weil (Fr.), 1884. Eng. trans.: in verse—Swanwick, 1881; Campbell, 1890; Browning (*Agamemnon* only), 1879; in prose—Paley, 1871; (verse) E. D. A. Morsehead (Golden Treasury Series, 1901); and (prose) Headlam (1909).

Æsculapius (called ASCLEPIOS by the Greeks), the son of Apollo and Coronis according to later story, but spoken of by Homer as a mortal, whose sons were present with the Greek army at Troy. In any case, he was regarded as the founder of the art of healing, and in later times was worshipped as a god, especially at Epidaurus, where his temple served many of the purposes of a modern hospital; and the same was the case in other

places. A guild called Asclepiadæ (sons of Asclepius) claimed descent from him, and the monopoly of medical knowledge. Their principal seats were at Cos and Cnidus. See Frazer's edition of *Pausanias* (1898); also Pater's *Marius the Epicurean* (1885).

Æsculus. See HORSE-CHEST-NUT.

Æsir, the plural form of *As* or *Ass*, is the name given to an order of mighty beings in the Scandinavian and Teutonic mythology—the children of Odin, of whom the most famous were Thor, Freyr, Balder, Bragi, Heimdall. There were also corresponding female demigods—*e.g.* Frigga and Idun. These divinities waged warfare against the Vanir and against the Giants. Their country is known as Asgard.

Æsopus, or ÆSOP (probably B.C. 620–560), a celebrated Greek fabulist. Certain writers (Vico, in his *Scienza Nuova*, etc.) deny the personal existence of Æsop altogether, owing to the uncertainty attaching to the authorship of many fables attributed to him. But the general conclusion seems to be that Æsop was a real person—a Phrygian by birth, a contemporary of the 'seven sages,' and a slave to several masters until set free by Jadmon of Samos. Thereafter he visited Cræsus at Lydia, and went on an embassy to Delphi, where he was murdered. Nevertheless it has been proved that certain stories traditionally attributed to Æsop have a far more ancient origin, and are, indeed, the common property of all Eastern nations—*e.g.* *The Lion and the Mouse*, and *The Dispute between the Stomach and the Members*, which have been shown by Brugsch and Maspero to be identical with certain fables found on Egyptian papyri. It has, indeed, been maintained that they are all of Arabian and Persian origin, and that Æsop is the Gre-

cian figure corresponding to the Arabic Lukman or Lokman. None of Æsop's fables have come down to us in the original Greek, if there was ever such a compilation in existence; but two authors—Babrius in Greek, and Phædrus in Latin—have preserved many of them. In the middle ages there were three principal collections published, including many spurious fables: (1) that of Maximus Planudes, a monk of Constantinople, in the latter part of the 14th century; (2) one published at Heidelberg (1610); and (3) one discovered in ms. at Florence, probably a century older than that of Planudes. There is a statue to Æsop in the Villa Albani at Rome.

Æsopus, CLAUDIUS or CLODIUS, a celebrated Roman tragic actor, a friend of Cicero, and of equal merit with his contemporary Roscius, the comedian. He left a large fortune to his son—that worthless Æsop who is fabled to have boastfully dissolved in vinegar a pearl worth £10,000, in order to provide a costly drink.

Æsthesiometer (Gr. 'measure of perception'), an instrument used for estimating the sense of touch in any part of the body. Two points are applied to the part, and the minimum distance is recorded at which they are felt as two points, and not as one.

Æsthetic, Æsthetics. By æsthetics is meant primarily a theory of the beautiful as exhibited in works of art. That is to say, æsthetics, considered on its objective side, has to investigate, first, the function of art in general as expressing the beautiful, and the nature of the beauty that is so expressed; and, second, the special functions of the several arts, and the special aspects of the beautiful with which they are severally concerned. Æsthetics, therefore, has to discuss, among others, such topics as these:

the relation of art to nature and life; the distinction of art from nature; the relation of natural to artistic beauty; the conditions and nature of beauty in a work of art; the distinction of beauty from truth, from utility, and from moral goodness; the classification of the fine arts; the conditions and limitations of artistic representation or production in the several arts—i.e. the kinds of beauty the several arts are fitted to represent—and so on. Æsthetic theory is thus distinguished from art criticism by its more abstract character, or by the importance—relatively much greater in the former than in the latter—of the scientific as compared with the artistic interest. Art criticism is concerned primarily and mainly with the appreciation of particular works of art; whereas æsthetic theory seeks rather to formulate the more abstract and fundamental conceptions, distinctions, and principles which underlie all such criticism. Æsthetic theory is thus one remove further from the actual works of art and their immediate appreciation. It is not, however, on that account to be regarded as quite severed from, or discontinuous with, art criticism. For although in æsthetics the scientific interest in the statement of principles has become, in a sense, of even primary importance, yet science would degenerate into pedantry if the artistic interest did not retain its vitality. In fact, art criticism is, in this respect, simply a mean between æsthetic science on the one hand and intelligent appreciation on the other. And as appreciation at the one extreme does not sink to the level of featureless sensation, so, too, knowledge at the other does not aim at an abstractness that is indifferent to all artistic content.

A second main subject of inquiry may be included in æsthetics—viz. the investigation, on the sub-

jective side, of the æsthetic consciousness. By this is meant an inquiry into the psychological nature, origin, and development of æsthetic judgment and æsthetic emotion or sentiment—in other words, a theory of taste and the pleasures of taste. This second inquiry is obviously dependent on the first, and subordinate to it, since we cannot define the sense of beauty apart from the beauty of which it is the sense. It is to be observed that psychological æsthetics may investigate the process and conditions of artistic *production*, as well as of artistic perception or *appreciation*.

The two most important contributions of classical antiquity to general æsthetic theory are, on the one hand, those discussions in Plato and Aristotle of the value of art and the relation of art to nature, that centre round the conception of art as imitative; and, on the other hand, an insistence on the more formal conditions of artistic excellence, such as the unity of the work of art as a whole, and the due proportion of the parts that make up the whole. The most important single work on æsthetic theory in antiquity is Aristotle's *Poetics*, in which the theory of poetic art (and mainly tragedy) is discussed both on its objective and on its subjective side. See ARISTOTLE.

In the modern period, the greatest and most continuous development of æsthetic theory has taken place in Germany. The valuable work of Lessing in his *Laocoön* and his dramatic criticism was followed in 1790 by Kant's epoch-making *Critique of Judgment*, in which, for the first time, the sphere and object of the æsthetic judgment—in other words, the general nature of the beautiful—were clearly defined. Most of the great German thinkers since Kant's time have dealt in some fashion with æsthetic theory.

Hegel's *Lectures on Æsthetics* is perhaps the greatest work on the whole subject, aiming, as it does, at determining the nature of the ideal or the beautiful, and exhibiting the manner of its concrete realization throughout the whole scope of art. Herbart and Fechner, again, seek to bring an exact psychology to bear upon the problems of æsthetic science; while in no philosophy is the place of art more exalted than in that of Schopenhauer. Later German writers on the subject have been Lotze, Carrière, and F. T. Vischer.

The British writers on æsthetics of the 18th century, such as Hutcheson, Hume, Home, Alison, Burke, were concerned primarily and mainly with the psychological investigation of the æsthetic emotions. No work on æsthetics as a whole, has been produced in Britain which can compare with the works of the great German writers and their successors. See Bosanquet's *History of Æsthetic*, with the bibliography; and Sully's article on Æsthetics in the *Encyc. Brit.* Most of the leading works above mentioned are translated (see, for example, LESSING, KANT, and HEGEL). For a more concrete work on art theory, see Baldwin Brown's *Fine Arts* (2nd ed. 1902). The most striking recent work on the subject is that of the Italian, Benedetto Croce (Eng. trans. 1909).

Æstheticism. Primarily, attachment to the principles of æsthetics; the word, however, has come to be applied to extravagant devotion to trifling forms of beauty, which frequently develops into whimsical absurdities, such as have been ridiculed in the opera *Patience*, and in Du Maurier's *Punch* cartoons. Among the promoters of a saner æstheticism were Ruskin, Leighton, Millais, and Morris.

Æstivation. (1.) In zoology a summer sleep, not uncommon in animals which inhabit climates

where the summer is very hot and dry, especially in the case of forms requiring a considerable degree of moisture, or whose habitat is fresh-water ponds. Thus, both land and water tortoises frequently retire into cavities of the ground during heat and drought, and there remain till the recurrence of the rainy season. The African fish *Protopterus* in the dry season constructs mud nests, in which several months may be spent; the nests have been dug up and brought to Europe without detriment to their contents. The phenomenon is entirely comparable to hibernation. (2.) In botany, the arrangement of leaves in the bud with relation to one another. The term is applied chiefly to flower-buds; and as the æstivation of buds is usually constant for the same flower, and often for the same genus or even order, the study is important in classification.

Æt. or Ætat, abbreviation for *ætatis anno*, 'in the year of his age.'

Aetas, or INAGTAS, a race of Negritos (pigmy blacks) inhabiting Luzon, in the Philippine Islands. They are closely allied to the Andaman Mincopies; average height is from 4 ft. 6 in. to 4 ft. 8 in.; crisp black hair and negro-like features; skull brachycephalic; legs calfless, and feet turned inwards. They are strictly monogamous; wear almost no clothing; build rude huts in sequestered places; weapons, short spears, bows, and poisoned arrows; fiercely opposed the invading Malay Tagals, but are now a mere persecuted remnant.

Ætheling, or ATHELING, in Anglo-Saxon times meant, at first, one of noble (*æthel*) birth, and, later, from the 9th to the 11th century, a prince of the blood-royal. The title is specially associated with Edgar, grandson of Edmund Ironside.

Æther, in Greek mythology, son of Chaos and Darkness, one of the elementary substances out of which the universe was formed; in later times the wide expanse of heaven, the abode of the gods.

Æther, or **ETHER**. The universal medium through which electro-magnetic waves—*i.e.* heat, light, etc.—are propagated in space. The propagation of light has been shown by numberless experiments to possess all the characteristics of the propagation of a wave. It travels with a definite speed, taking a little over eight minutes to travel from the sun to the earth. For most of this eight minutes it is travelling through space in which there is no material substance. We therefore assume that there is some medium in this space through which the wave is transmitted, and in which the energy of the wave is stored. This medium is called æther or ether. Formerly, light was looked upon as a purely elastic wave and the æther as an elastic medium. Thus the emission of light from a source, and its transmission through the æther, was exactly like the agitation of a point in a jelly, and the transmission of that agitation through the substance of the jelly. This crude conception will explain those properties which are common to all waves, but will tell us nothing of the special characteristics of light waves.

The electro-magnetic theory of Maxwell, and the subsequent experiments of Hertz and a host of others, culminating in the development of wireless telegraphy, have made it quite clear that light waves are electro-magnetic waves. From this point of view, therefore, the æther is simply the medium through which electric and magnetic attractions and repulsions take place. A charged body is the source from which

start a system of lines of force (see **ELECTROSTATICS**), and these lines of force have some of the characteristics of stretched elastic cords—*e.g.* if the charged body oscillates for any reason, the lines of force do not oscillate with the body as a rigid mass, but waves pass along the lines, just as waves would pass along a stretched indiarubber cord when one end is oscillated. These waves are electric waves, but as we know that a change in electric force is always accompanied by a change in magnetic force, the electric waves must be accompanied by a similar series of magnetic waves. The two together form electro-magnetic waves. Electro-magnetic waves are transmitted through matter as well as through space; and consequently it has been usual to look upon æther as a quasi-material substance, which can be located and which can flow like ordinary matter. When waves are travelling in the surface of water, the flow of water will produce an effect on the rate at which the waves travel. Is any such flow discernible in the æther? Sir Oliver Lodge tried to detect it between two parallel discs which were whirled at a very high speed, but his experiments showed that the discs did not appear to drag the æther with them at all. Michelson and Morley then carried out a classical experiment. They argued that if matter does not drag æther with it, the æther must be streaming past the earth and any apparatus on it at a rate which should be easily detected. No such flow could be detected, and it would therefore appear that the earth carries along an 'atmosphere' of æther with it. The results of the experiments of Lodge and of Michelson and Morley are therefore flatly contradictory.

The phenomenon of the aberration of stars gives equally puz-

zling results. To understand aberration, imagine a rifle-bullet shot through a railway carriage perpendicular to it. If the carriage is still, the line joining the holes made by the bullet in the two sides of the carriage will point straight to the rifle. If the carriage is moving, it will have travelled forward a little distance while the bullet is passing from the one side to the other. The second bullet-hole will therefore be a little behind the first, and the line joining the holes will point a little in front of the rifle. The tangent of the angle between the line joining the holes and the actual path of the bullet is equal to $\frac{v}{V}$, where v is the speed of the carriage and V that of the bullet. Light is the counterpart of the bullet and a telescope the counterpart of the carriage. While the light is travelling from one end of the telescope to the other, the earth with the telescope on it has moved forward a certain distance in its orbit, and therefore the telescope has to be tilted forward through an angle whose tangent is $\frac{v}{V}$, where v is the speed of the earth in its orbit and V is the speed of light. v is 18 miles a second and V 186,500 miles per second, and therefore a star in a direction perpendicular to the plane of the earth's orbit should be apparently deflected forward through an angle whose tangent is $\frac{18}{186,500}$. Experiment exactly agrees with this, and all is simple unless the telescope be filled up with some other material. Airy filled his telescope with water, and as the speed of light in water is only $\frac{3}{4}$ what it is in air, the angle of deflection of the star should be $\frac{4}{3}$ times as large. Airy found it to be exactly the same.

To explain this, it is supposed

that the æther is carried along with the matter, and that it has a velocity $\left(1 - \frac{1}{n^2}\right)$ times that of the matter, n being the refractive index of the matter. Fizeau tested this hypothesis by trying to detect any such carrying along of the æther in flowing water. His experiment corroborated Airy's hypothesis, and showed that the velocity of light in the moving body was increased by a fraction $\left(1 - \frac{1}{n^2}\right)$ of the velocity of the body. We have therefore: from Lodge, there is no drag of the æther near a moving body; from Michelson and Morley, the earth drags an atmosphere of æther with it; and from Airy and Fizeau, a transparent body carries the æther with it with a definite fraction of its own speed. The first two results can be reconciled by supposing that when a body is moving relative to the æther it is shortened by a small amount in the direction of motion. The shortening required is so small that it could not be detected by mechanical means. Perhaps the most straightforward way of dealing with the results is to say that æther cannot be located like matter, and that therefore no such thing as motion of æther is conceivable. The waves will depend solely on the position and relative motion of the source and receiver. Refraction and dispersion are usually explained by considering the action of the light wave on the electrons in the refracting material. Exactly the same mechanism would lead to the required increase in velocity of the light in a moving material. Consequently, we do not need to suppose any actual motion of the æther to explain Airy's and Fizeau's results. Thus all the phenomena can be explained by the known laws of

the interaction of electric charges, and so it seems likely that the conception of a universal medium with quasi-material properties will be abandoned, and that all electro-magnetic waves will be expressed in terms of electric and magnetic lines of force. The conception of the æther has probably been more fruitful, both in experiment and speculation, than any other idea in the whole history of physics. In fact, it is hardly too much to say that from the time of Faraday the history of æther has been the history of physics. See the published papers of Kelvin, Stokes, Larmor, and Osborne Reynolds; also Larmor's *Æther and Matter*, and Campbell's *Modern Electrical Theory*.

Æthionema, cruciferous perennial dwarf plants from S. Europe; best grown in the rock garden. They form tufts, with many pink and lilac flowerets.

Æthrioscope, an instrument designed by Leslie in 1817 for the purpose of measuring changes of temperature produced by radiation. It consists of a differential thermometer, with both bulbs contained in a cup-shaped mirror, and one of them in its focus. By this instrument slight variations of temperature, due to changes in the condition of the sky, are also estimated.

Ætiology. See ETIOLOGY.

Action, a Greek painter contemporary with Alexander the Great. His masterpiece was *The Marriage of Roxana and Alexander*; it was exhibited at the Olympic games. The picture is described in detail by Lucian (*de Merced. Cond.* 42), and was reproduced by Raphael.

Actius. (1.) A Roman general, the last successful defender of the Roman empire; born in Mœsia. Early in life he was handed over to Alaric as a hostage, and became familiar with the tactics of the

barbarians. As commander-in-chief of the armies of the Western Empire, he kept Italy, Spain, Britain, and Gaul in peace from 433-450 A.D. In 451 he succeeded in checking the advance of Attila in the great battle in the Catalaunian plains, near Châlons, but was murdered (454) by Valentinian, who suspected him of aiming at the throne. (See Gibbon's *Decline and Fall*, c. 33 and 35.) (2.) Surnamed 'The Atheist,' and leader of the Anomœan sect of Arians, who are sometimes called after him Aetians. Ordained deacon in 348, he was present at the first synod of Sirmium, when he defeated in argument the bishops Basilius and Eustachius, of the Homoiousian party. In 356, from fear of Constantius II., he left Antioch for Alexandria; but in 361 he was recalled by Julian the Apostate, from whom he received an estate in Lesbos and a position in the court at Constantinople, where he died in 370. His work *De Fide* was refuted by Epiphanius.

Ætna. See ETNA.

Ætolia. Division of ancient Greece, bounded E. by the Ozolian Locrians, S. by the Corinthian Gulf, W. by the Achelous R., and N. by Epirus and Thessaly. In ancient times the inhabitants appear to have been equal in culture to the rest of the Greeks, and their chief city Calydon was famous in the legends. In historical times, however, they, like their neighbours the people of Acarnania, were semi-barbarous. In the 3rd century B.C. they were united in an important league, which was joined by several cities in the north of Greece. They allied themselves with Antiochus III., king of Syria, against the Romans, and on his defeat became virtually subject to Rome. After 146 B.C. they were included in the province of Achaia. See Holm's *Hist. of Greece*; and for the league, Freeman's *Hist.*

of Federal Government. Ætolia, along with Acarnania, now forms a prov. (nomarchy) of N. Greece; area 3,013 sq. m., pop. 142,000.

Ætolikon, AITOLIKON, or ANATOLIKO, fort. tn., Acarnania and Ætolia, Greece, 6 m. N.W. of Missolonghi. Pop. 5,500.

Afanasiev, ALEXANDER NIKOLAIEVITCH (1826-71), Russian author and scholar, born in the government of Voronezh; was in the civil service until 1862. His principal work, *The Poetical Views of the Slavs about Nature* (3 vols. 1865-9), is a storehouse of information about Slav mythology. He published also Russian *Popular Tales* (4 vols. 2nd ed. 1873), many of which have been translated into several European languages.

Afar, tribe. See DANAKIL.

Afer, used by Milton for the south-west wind which blows from Africa over Italy. Cf. 'Levanter,' a name given for a similar reason to the east wind in the Levant.

Afer, DOMITIUS, of Nemausus (Nîmes), a celebrated Roman orator; prætor A.D. 25. He gained the favour of Tiberius by accusing Claudia Pulchra, cousin of Agrippina, A.D. 26. See Quintilian, xii. 11; Tacitus, *Annales*, iv. and xiv.

Affenthaler, a red wine which takes its name from the village of Affenthal in Baden.

Affettuoso, an Italian musical term indicating a tender and affecting style; it lies between *adagio* and *andante*, and is frequently joined with these terms. *Affetto* and *con affetto* are used in the same sense.

Affidavit, a written statement of facts made upon oath, or affirmed, before a magistrate or commissioner for oaths. Generally an affidavit should be confined to matters within the knowledge of the deponent, but in some cases (e.g. in interlocutory applications) he may speak 'to the best of his knowledge and belief.' In contentious cases evidence at

a trial is nearly always oral; but in the Chancery Division parties sometimes agree to try a case by affidavit, and the use of affidavits is almost universal in interlocutory and non-contentious business in that division. Leave may be obtained to cross-examine a deponent upon his affidavit. Affidavits are required by statute, both in Scotland and England, in support of certain claims, or in proof of accounts and other statements, especially in connection with bankruptcy and matters affecting the public revenue. In the Scottish courts affidavits have never been so much favoured as in the Chancery courts in England. They are practically only used for establishing a *prima facie* case to be afterwards proved. Affidavits may be made abroad before the British consul or an official of a British embassy.

Affiliation. The word denotes the claim made by or on behalf of a child against a male adult for an acknowledgment of paternal responsibilities. On an affiliation summons taken out either before or after the birth of an illegitimate child—but if after, then within twelve months of its birth or the last payment for its maintenance—the father may be ordered by the magistrates to pay the mother a weekly sum not exceeding five shillings until the child is sixteen. The mother's evidence as to paternity must be corroborated, and an appeal lies to quarter sessions. Funeral expenses of the child, and confinement expenses, may be allowed. The Bastardy Acts do not apply to Scotland, where the father and mother are jointly liable at common law to support an illegitimate child; but the mother may sue the father in the sheriff court, and obtain aliment to the extent of about £8 a year. See Sandars, *Law and Practice of Orders of Affiliation*; Fraser, *On Parent and Child*.

Affinity, the relationship, in law, between a husband and the blood relations of his wife, and between a wife and the blood relations of her husband. Marriages within the degrees of affinity prescribed by the Prayer Book are null and void under Lord Lyndhurst's Act of 1835. The act does not apply to Scotland, where the table of affinity is based on Leviticus, by two statutes of 1567. (See DECEASED WIFE'S SISTER.)

Affinity, CHEMICAL, is the term expressing the specific attraction of particular atoms or groups for each other by which chemical compounds are formed. Its actual nature is unknown, though probably dependent on the presence of 'electrons' in the atoms, and its relative value in different cases is greatly obscured by other causes, notably by the mass of the acting bodies. The relative avidity of acids for bases, or proportion in which a base distributes itself between different acids, has been found to be the same as that of their electric conductivities, which are believed to be in proportion to the degree of their dissociation into ions; so that the affinity of the acid may be an effect of the same cause. See EQUILIBRIUM and ELECTROLYSIS.

Affirmation, a solemn declaration made in the prescribed legal form as required by the Oaths Act, 1888. By that act any person may now affirm, instead of taking an oath, provided he states that he objects to the latter, either because he has no religious belief, or because the taking of an oath is contrary to his religious belief. A false affirmation is punishable as perjury. Quakers and Moravians were given the right to affirm in 1833. See also OATH.

Affleck, SIR EDMUND (1723-88), rear-admiral in the British navy; in 1778 was appointed to the *Bedford*, which took part in the

engagement off Cape St. Vincent (1780). Affleck's services in the W. Indies under Rodney and Hood (1782-4) gained him a baronetcy and the rank of rear-admiral.

Afforestation is the transformation of habitable land into a *foresta* or wilderness, whether accompanied by the planting of trees or not—a distinction still observed in the title of the Department of Woods and Forests. Afforestation may be carried out with two very different ends in view. In the formation of the New Forest (Hampshire) by William I., and of various 'forests' by other Norman kings, certain districts were denuded of their inhabitants in order to provide a 'chase' for royal sportsmen; and the makers of 'deer forests' in the Scottish Highlands in modern times are actuated by similar motives. What is aimed at in such instances is the creation of huge *forestæ*, in which wild animals may roam about at will, ultimately to provide sport; and the mountainous wastes in Scotland which are reserved and *created* for deer-stalking are never 'afforested' in the secondary sense of the term. Afforestation of this order means the systematic planting of large tracts of land, which may have been previously treeless, or which may have recently been denuded of wood by fire or by the woodman's axe. This kind of afforestation is largely practised, under government supervision, in India, Germany, Norway, Sweden, and N. America. In England this matter has since 1889 been under the control of the Board of Agriculture; and in 1902 a departmental committee was appointed to inquire into the management and planting of woodlands in Great Britain. See further under FORESTRY; and consult the publications of the Scottish Arboricultural Society, J. S. Gamble's *Manual of Indian Timbers* (1881),

and various books by John Croumie Brown published between 1887-92. Afforestation for the rearing of game in England is dealt with in Sir M. Hale's *Hist. of the Common Law of England*.

Affray, the fighting of two or more persons in a public place, to the terror of His Majesty's subjects. It is a misdemeanour.

Affre, DENIS AUGUSTE (1793-1848), archbishop of Paris (1840), a wise and moderate man in a time of intense political strife, was shot at the barricades (June 24, 1848) while making an appeal for peace. He left several theological works. See Cruice's *Vie de D. A. Affre* (1849).

Affronté, AFFRONTANT, or AFFRONTED, in heraldry said of the figures of men or animals which are placed full-face to the spectator, also (but rarely) of figures which are represented facing each other in profile.

Affry, LOUIS AUGUSTIN PHILIPPE, COMTE D' (1743-1810), Swiss statesman, appointed landamman (chief magistrate) 1803, and again in 1809, when Napoleon claimed the protectorate over the Swiss Confederacy. His judicious conduct, as well as the personal favour in which he was held by Napoleon, was of the greatest service to Switzerland at this critical period.

Afghanistan, inland country of Asia, bounded on E. and S. by India and Baluchistan, on N. and N.E. by the Russian and Chinese empires, and on the W. by Persia. Its length from W. to E., between Khorassan and the Punjab, is 600 m., but about 900 m. to the Chinese borders; its breadth is from 450 to 500 m.; area about 250,000 sq. m.; and pop. about 5,000,000.

As a 'buffer state' between the Russian and British empires, the precise limits of its territory have been settled by treaty, and locally demarcated by several boundary commissions. By the Anglo-

Russian treaty of September 1907, Russia declared that Afghanistan was without the Russian sphere of influence and undertook to act in all political relations with Afghanistan through the British government. The Russo-Afghan border-line starts from Zulfikar, on the Hari-Rud, runs through the Badghais district, and, leaving Panjdeh to Russia and Meruchak to Afghanistan, terminates on the Amu Daria at Khamiah. Thence it is formed by the Amu Daria and the Ab-i-Panj up to Lake Victoria, whence it follows the crest of the Nicholas range, between the Great and Little Pamirs, to a peak in the Sarikol, the meeting-place of Russian, Afghan, and Chinese dominions. The Sarikol range, N. and S., separates the Little Pamir from the Chinese Pamir. From the Wakhjir Pass, where the British, Afghan, and Chinese spheres meet, the Indo-Afghan border follows the Hindu-Kush to the Dora Pass, and then to the divide between the Bashgol and Chitral Rs. From the Kabul R. it follows the Safed Koh to the Caiwar Kotal, and thence S. to the junction of the Gumal and Kundar Rs. From this point Afghanistan borders with Baluchistan for 800 m. to Koh-i-Malik Siah, where Persian, Afghan, and British territories converge.

The chief mountain range is the Hindu-Kush, with its prolongation the Koh-i-Baba. To the E. are the Sulaiman Mts., forming the watershed of the Indus, and the Safed Koh. The whole country forms part of the Iran plateau, and has a general elevation of 2,000 to 4,000 ft. The hydrographic systems belong to the inland basins of the Aralo-Caspian (Amu Daria, Murghab, and Hari-Rud), the Hamuns of Seistan (Helmand, Harud, etc.) and the Indian Ocean through the Indus (Kabul, Kuram, and Gumal). The climate is con-