DICTIONARY OF THE ENVIRONMENT

Second Edition

MICHAEL ALLABY

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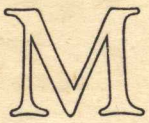

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PREFACE TO THE SECOND EDITION

In the years that have passed since the appearance of the first edition many changes have taken place which have made an extensive revision of the dictionary desirable. It is fortunate, therefore, that the appearance of a second edition has provided an opportunity to scrutinize the book closely and to make such changes as seem necessary.

A number of small errors which crept into the first edition have been corrected, but the principal changes reflect developments in the life and earth sciences and in the attitudes and concerns of environmentalists.

Ecology is still a new discipline. As it has grown, different workers have proposed terms to describe aspects of concern or interest to them, invariably as a kind of shorthand, using a word in place of a phrase or even a sentence. The proliferation of such terms produced much duplication and it was impossible to predict which would enter common use and survive and which would be rejected and forgotten. We have removed from the new edition those terms which seemed promising once, but which now seem merely quaint. At the same time we have introduced those new terms which have come into vogue and have added some terms, not necessarily new ones, which were omitted from the earlier book.

The earth sciences, too, have changed over the last few years, mainly as a result of the examination of cores taken from the deep ocean floor, which have shed new light on the history of the planet and on some of the processes operating within it and upon its surface. We have made a number of changes to take account of recent findings.

Finally, the environmental movement itself has changed. As governments and industries have taken steps to curb the pollution of the environment, while pollution has not been conquered, to some extent it has ceased to be a matter of primary concern. Some environmentalists have seen nuclear power as a major issue over which they must unite: when the first edition was compiled that issue was just emerging. We have included more entries relating to nuclear power, but with some trepidation since interest in it could wane as rapidly as it grew.

The task of revising a dictionary is slow and laborious. I am deeply grateful for the help I have received from my colleagues Ailsa Allaby, Max Hooper and Margaret Palmer, who found time in their busy schedules to check meticulously every detail pertaining to their own disciplines. With their assistance the book has been revised completely. Without their assistance the work might never have been completed at all. Finally, I must thank my colleagues at The Macmillan Press, who have been, as always, cooperative and – more important – endlessly patient.

Michael Allaby
Wadebridge, Cornwall
February, 1982

A

A. Ampere.

a. Atto-.

aa. Hawaiian term describing basaltic lava with a rough, blocky surface.

abaca. Manila hemp (*Musa textilis*). *See Musa.*

abaxial. *See* dorsal.

abiocoen. All the non-living components of the environment.

abioseston. *See* Seston.

abiotic. Non-biological. *See* biotic factors.

ablation. The removal of a surface layer, particularly used for the melting and evaporation of the surface of ice, and also for the removal of loose surface material by the wind (deflation).

abscisic acid. Abscisin.

abscisin (dormin, abscisic acid). An auxin which induces leaf-fall and dormancy in seeds and buds, probably by inhibiting the synthesis of nucleic acid and protein.

absolute age. The age of a rock, mineral or fossil in years, determined as a radiometric age or by counting varves. Radiometric dating involves experimental errors, so such dates are usually quoted with a plus or minus error.

absolute humidity. The amount of water vapour present in a unit mass of air, usually expressed in grams of water per kilogram of air. Also called the humidity mixing rate.

absorbate. *See* absorption.

absorbent. *See* absorption.

absorbing duct. Tube used in a ventilator system to attenuate sound waves while offering low resistance to a continuous flow of air.

absorption. Process in which one material (the absorbent) takes up and retains another (the absorbate) to form an homogenous solution. Absorption may also refer to substances becoming attached to a solid surface by physical forces, but see adsorption. In air, it may refer to the incorporation of a gaseous component of the air into solid surfaces (also called adsorption) e.g. absorption of sulphur dioxide (SO_2) by stone, vegetation, particulate aerosol etc., or the absorption of radiation passing through the air by aerosols or a gaseous component of the air (e.g. of ultra-violet radiation by ozone (O_3) or of infra-red by carbon dioxide (CO_2) or water vapour.) Absorption also occurs in the ocean. The absorption of gases depends on humidity, state of vegetation, temperature and various physical laws. Absorption of light, etc., by air or water may be expressed as the path length in which the intensity is reduced by the factor e ($\simeq 2.73$) or by the reduction of intensity in unit path length.

absorption coefficient. (Acoustics) If a surface is exposed to a field of sound, the ratio of the sound energy absorbed by the surface to the total sound energy that strikes it. An absorption coefficient of 1 would mean that all of the sound energy was absorbed. *See* anechoic.

absorption tower. Structure, usually found in a chemical works, in which a liquid is made to absorb a gas, as in the production of sulphuric acid from sulphur dioxide/trioxide and water.

abstractive use. Of water, a use which removes water so that it is lost temporarily as a resource (e.g. in a cooling tower). A non-abstractive use (e.g. hydro-electric power generation) returns the water almost immediately as surface water.

abyssal. Very deep. Applied to the sea bed and sediments at water depths greater than 2000 m. *Cf.* bathyal. The term may also be applied to the zone in lakes below the depth of effective penetration of light. *See* abyssopelagic.

abyssal gap. A gap in a sill, ridge, or rise separating two abyssal plains through which the sea floor slopes from one plain to the other.

abyssal hill. Relatively small topographic feature of the deep ocean floor, ranging up to 1000 m high and a few kilometres wide.

abyssal plain. A large, flat area of the deep sea floor lying seaward of the continental slope and rise, where gradients become less than 1:1000.

abyssobenthos. *See* benthos.

abyssopelagic. Refers to organisms living at water depths greater than 3000 m. *See* epipelagic, bathypelagic, mesopelagic.

Acacia. Genus of leguminous trees (also known as wattles) of tropical and sub-tropical origin (esp. Australasia) which may form dominant vegetation in arid areas. Many commercial products are derived from acacias, including dyes, perfumes, timber, etc.

acanthite. A major ore mineral of silver, acanthite, Ag_2S occurs in hydrothermal deposits, characteristically with lead, zinc, and copper minerals, which also contain silver by atomic substitution. Acanthite also occurs in supergene deposits. Nearly all the silver produced is a by-product from mining for lead, zinc and copper. Apart from its uses in photography, most industrial applications of silver utilize its high reflectivity and conductivity, as well as its resistance to organic corrodants. *Cf.* argentite.

Acanthocephala. Spiny-headed worms, a phylum of parasitic worms with affinities to the Nematoda. The larvae live in insects or crustacea, and the adults in the gut of vertebrates, to which they cling by means of a spiny proboscis. An example is *Echynorhynchus proteus*, the adult of which lives in ducks and the larva in freshwater shrimps. *See* parasitism.

Acanthodii. A group of extinct fishes, originating in the Silurian Period. They were small fishes, with fins supported by large spines, and were the first vertebrates known to have possessed jaws.

acaricide. Chemical, such as Derris and some organophosphorous, dinitro, and organochlorine compounds used to kill ticks and mites, Acarina.

Acarida. Acarina.

Acarina (Acarida). Mites and ticks, small Arachnida with rounded bodies. Mites are very abundant in the soil, feeding on plant material and invertebrates. Some parasitic mites (e.g. 'red spider') damage crops and can be serious pests, and others cause diseases such as mange in animals. Ticks are blood suckers, some being vectors of diseases such as relapsing fever in man and fowls, Rocky Mountain spotted fever, and louping-ill in cattle and sheep.

acceleration. Rate of change of velocity with time. According to Newton's laws, acceleration × mass = force = rate of change of momentum. Momentum is a vector and motion in a curved path therefore requires the application of a force. In the atmosphere or ocean, vertical motion always requires horizontal acceleration, which results from buoyancy forces.

access agreement. In British planning, an agreement allowing the public access to privately owned land, being open country for open-air recreation. (As defined by the Countryside Commission).

access order. In British planning, an order allowing the public access to privately owned land, being open country where an access agreement is impracticable or is not adequately securing public access to the land for open-air recreation. (As defined by the Countryside Commission).

accessory species. (Ecol.) Species which occurs in one-fourth to one-half of a stand.

accessory mineral. A mineral occurring in small amounts in a rock and disregarded in the classification of that rock (which is based on essential minerals). Accessory minerals can yield evidence about the origin of the rock (e.g. the presence of metamorphic (see Metamorphism) minerals in a sandstone suggests a provenance , at least in part, from a metamorphic belt).

accidental species. A species which occurs in less than one-fourth of a stand.

acclimatisation. The process of adapting to abiotic environmental conditions, by phenotypic (*See* phenotype) rather than genetic variation.

accretion. (Meteor.). The attachment of airborne material to fixed or falling or flying objects. Ice accretion occurs on wires, hailstones or aircraft wings when the air contains supercooled cloud droplets, drizzle or rain, and is particularly dangerous on the rigging of ships in polar regions or on TV masts on hills in winter. Pollution accretion is exemplified by smoke deposition on window frames, ventilation intakes, etc., where the airflow is swift and curved.

Acer. Genus of maple trees and shrubs found in temperate regions. They yield charcoal, timber and maple sugar. (*A. saccharum*).

acetaldehyde (CH_3CHO). A direct oxidation product of ethyl alcohol which can be further oxidised to acetic acid. An important raw material for certain organic compounds.

acetate film. Non-inflammable cinema film based on cellulose acetate.

acetic acid ($CH_3.COOH$). The acid in vinegar, and an important raw material obtained from wood, acetylene or alcohol.

acetone (CH_3COCH_3). An important laboratory and industrial solvent. It is very volatile and is also miscible with water.

acetylcholine (Ach). Substance released in minute amounts when impulses arrive at many nerve endings, so 'passing on' the nerve impulses to other nerve cells or effectors (e.g. muscles). Its effects disappear rapidly after secretion because it is destroyed by the enzyme cholinisterase.

acetylene (C_2H_2). A colourless, poisonous hydrocarbon gas, prepared historically in the laboratory by the action of water on calcium carbide. It is used for welding, acetic acid synthesis, and as a starting material for many chemicals, e.g. PVC.

achene. A dry, one-seeded fruit which does not split open (e.g. buttercup fruit). Dispersal may be aided by wings (e.g. Sycamore), plumes (e.g. Old Man's Beard) or hooks (e.g. Wood Avens).

***Achira* (*Canna edulis, C. indica*).** Plant cultivated for its starchy root, first domesticated in Peru some time prior to 2200 BC. Today *C. edulis* is still cultivated for its root and the tops are sometimes fed to cattle. It is also known as 'Queensland arrowroot'.

achondrite. Stony meteorite, without chondrules.

acicular. Having the form of needles, used especially for elongated crystals.

aciculilignosa. Needleleaf forest and bush. Evergreen, coniferous vegetation.

acid. (*a*) (Geol.) *See* acidic. (*b*) (Chem.) *See* pH. (*c*) (Colloquial) Lysergic acid diethylamide.

acid dipping. Immersion of a metal in a tank of suitable acid or acids to remove scale from and clean the surface. Often produces hazardous fumes and acid mists.

acid droplets. Minute liquid particles, emitted by certain industrial processes, which act as condensation nuclei. *See* sulphuric acid.

acidic (acid). (Geol.) A term applied to igneous rocks containing more than a high percentage (commonly set at 65%) of silica (SiO_2) in their chemical composition. Most of the silica is in the form of silicate minerals, such as feldspars, micas, and amphiboles, but the excess silica manifests itself in the presence of 10% or more free quartz. Granite, rhyolite, and obsidian are all acidic rocks. In petrology, acidic is contrasted with intermediate, basic and ultrabasic, but not with alkaline.

acidophile. Calcifuge.

acid refractory. Furnace lining materials which are composed mainly of silica, designed to resist acid slags. *See* Bessemer process.

acid soot (acid smut). Particles of carbon, held together by water that is acidic through combination with sulphur trioxide. The carbon particles are emitted during combustion, and the soot particles are roughly 1 to 3 mm in diameter.

Where oil-burning installations have metal chimneys, acid soot can acquire iron sulphate, which makes brown stains on materials and damages paintwork. Acid soot emissions can be reduced by using low-sulphur fuels, by reducing the air flow to minimise sulphur trioxide formation, by making flues airtight, by insulating chimneys, by raising the temperature, etc.

acoustic. Refers to properties or characteristics connected with sound, e.g. the acoustic qualities of an auditorium. It is not used to refer to people, where the term is acoustical (e.g. acoustical engineer).

acoustical. *See* acoustic.

acoustic reflex. The mechanism by which the mammalian ear protects itself against sounds that are too loud, by adjusting the connecting muscles that regulate the relative positions of the ossicles.

acquired character. Variation in an organism which appears as a response to environmental influence. *See* Lamarck.

Acrania (Cephalochordata). The lancelets, small, fish-like ciliary feeders, forming a small sub-phylum of the Chordata which may be similar to the ancestors of fish. They have poorly developed heads, no brain, bone or cartilage, and nephridia as excretory organs. *Branchiostoma* (*amphioxus*) is a living representative and *Jaymoytius* a Silurian form.

Acraniata. Invertebrata.

acre-foot. The volume of any substance required to cover one acre of a surface to a depth of one foot, equal to 43560 cubic feet, (1232.75 cu m).

Acrididae. The short-horned grasshoppers, whose antennae are shorter than their bodies. Some (e.g. the locust, *Locusta migratoria*) although commonly solitary, under certain conditions develop a gregarious and migratory form which causes incalculable harm to crops. *See* Orthoptera.

acrodont. *See* Thecodont.

acrosome. Projection on the head of a sperm which contains enzymes which play a part in the fusion of egg and sperm.

acrylic resins. A group of synthetic resins, obtained by polymerisation (*See* polymer) of acrylic acid-derived monomers. They are transparent, resistant to light, weak acids, alkalis and alcohols, but are attacked by oxidising acids, chlorinated hydrocarbons, ketones and esters. They are used widely in industry and consumer products.

actinomorphic (radially symmetrical). Applied to animals (e.g. Coelenterata and Echinodermata) and flowers (e.g. buttercup) which have more than one plane of symmetry. Sessile animals are commonly actinomorphic. *Cf.* bilaterally symmetrical.

Actinomycetes. Group of bacteria with cells arranged in fine filaments. Important constituents of the soil, where they assist in the decomposition of organic matter. *Streptomyces griseus* produces the antibiotic streptomycin.

actinomycin. Antibiotic which blocks the synthesis of RNA by combining with DNA. It is produced by some Actinomycetes.

Actinopterygii. A large group of fishes containing the great majority of present-day bony fishes and many fossil forms. They are characterised by having the paired fins supported by horny finrays, with no skeletal axis. *See* Choanichthyes, Teleosti, Osteichthyes.

Actinozoa (Anthozoa). Class of marine Coelenterata including the sea anemones, stony corals, sea pens and 'Dead Men's Fingers' (*Alcyonium digitatum*). Some species are solitary, some colonial. The medusa stage typical of other Coelenterates is absent in the Actinozoa. *See* Hydrozoa, Scyphozoa.

activated alumina. Granular, porous form of aluminium oxide capable of absorbing (*See* absorption) water oil vapour or certain other substances from gases or liquids. Used in pollution control, chromatographic analysis, and as a catalyst.

activated carbon. Forms of carbon with a high adsorptive (*See* adsorption) capacity for gases, vapours and colloidal solids. The property is achieved by heating to 900°C with steam or carbon dioxide, giving a porous particle structure. Used for odour, fume and other pollution control.

activated carbon processes. Japanese processes for removing sulphur dioxide from flue gases. There are three processes: (a) Water washing, in which the gas is absorbed on dry activated charcoal and the charcoal washed with water to give dilute sulphuric acid or gypsum; (b) Gas desorption, in which the gas is absorbed dry and then desorbed (*See* desorption) to give sulphur dioxide; (c) Steam desorption, in which the gas is absorbed dry, then desorbed to give sulphur dioxide.

activated charcoal. Activated carbon.

activated manganese oxide process. Japanese process for removing sulphur dioxide from flue gases by dry absorption to produce ammonium sulphate.

activated sludge. The active material, consisting largely of protozoa and bacteria, used to purify sewage. When mixed with aerated sewage, the sludge organisms break down the organic matter in the sewage, using it as food, and multiply, thus producing more activated sludge.

active factors. The factors which supply energy and nutrient for the active operation of natural processes in plants.

active transport. The passage, accompanied by the expenditure of energy, of a substance from a region of low concentration to one of high concentration (i.e. against the concentration gradient). This usually occurs across cell membranes.

activity. The total flow of energy through a system in a unit of time.

actual vegetation. Vegetation that actually exists at the time of observation, regardless of the character, condition and stability of its constituent species.

Aculeata. Ants, bees and wasps. Hymenoptera most of which are parasitic. Gall wasps induce the formation of galls on oak and other plants. Many Parasitica (e.g. Ichneumons) lay their eggs in the eggs, larvae or pupae of other insects, and play an important role in controlling pests, esp. Lepidoptera.

adamantine. *See* lustre.

adaptation. (*a*) Evolutionary: The fitness of a structure, function or entire organism for life in a particular environment (e.g. the webbed feet of water birds). The process, brought about by natural selection, of becoming so fitted. (*b*) Physiological: The modification of an organism in response to environmental conditions, e.g. an increase in specific enzyme production by bacteria in response to the presence of certain substrates. (*c*) Sensory: A reduction in the excitability of a sense organ which is continuously stimulated. *See* adaptive radiation.

adaptive radiation. The evolution from primitive stock of divergent forms, each adapted to survive under different conditions (e.g. on the Galápagos Islands, the 14 species of 'Darwin's finches', each with a different mode of life, must all have evolved from an ancestral species which colonised the islands from the mainland).

adaxial. (Bot.) Upper. Towards the axis. *See* ventral.

adenine. *See* DNA, RNA.

adenosine di (tri) phosphate. *See* ATP.

adiabatic. Occurring without a gain or loss of heat by the system involved.

adiabatic lapse rate. The rate of decrease of temperature with height of a parcel of air rising without exchange of heat (by mixing or conduction) with surrounding air, but taking at each height the ambient pressure. It is deduced from the equations of state, hydrostatic equilibrium, and adiabatic change. If, in the adiabatic ascent, the parcel has the same temperature as the surroundings, no buoyancy force will result from vertical displacement and the lapse rate of temperature in the surroundings is adiabatic, and neutral. A larger, or super-adiabatic lapse rate is unstable, and a smaller one stable. The adiabatic lapse rate for unsaturated air, usually called the dry adiabatic lapse rate, and denoted by Γ, has the value $(\gamma - 1)g/\gamma R \simeq 9.86°\text{C km}^{-1}$, where γ is the ratio of the specific heats of air ($\simeq 1.4$), g is gravity and R is the gas constant for air.

adipose tissue. *See* connective tissue.

adit. In mining, a horizontal or nearly horizontal opening from the surface to the ore. Adits are used for access and for draining mines.

adjustment. The behavioural response of organisms to a change in environmental conditions.

adobe. (N. American usage) Fine rock flour deposits produced by ice abrasion of recent glaciation and transported by wind to the site of deposition. Used for brick making, so that the term has also come to mean a sun-dried brick. *See* rammed earth.

ADP. *See* ATP.

adsere. That part of a sere which precedes its development into another at any time before the climax stage is reached.

adsorption. The physical or chemical bonding of molecules of gas, liquid or dissolved substance to the external surface of a solid or the internal surface if the material is porous in a very thin layer. *See* absorption.

advanced gas-cooled reactor (agr). Nuclear reactor using enriched uranium dioxide as a fuel, gaseous carbon dioxide as coolant, and graphite as a moderator. Operating temperatures are higher than those in the earlier Magnox reactor being about 675°C.

advanced waste treatment. Any process for the treatment of waste water that follows other physical, chemical or biological treatments and aims to improve the quality of effluent prior to re-use or discharge. The term often refers to the

removal of nitrate and phosphate plant nutrients. *See* eutrophication, primary treatment, secondary treatment.

advection. Transport by motion of the air, water or other fluid. Advection has the same general meaning as convection, but is used particularly to refer to horizontal transport by wind of something carried by the air (e.g. pollutants, heat, fog, etc.)

advection fog. *See* fog.

adventitious. Applied to parts of plants which arise in unusual positions (e.g. roots which grow from stems, buds produced elsewhere than in the axils of leaves).

adventive (casual) plant. An introduced or alien plant growing unaided by Man, but not permanently established.

AEC. Atomic Energy Commission (US).

Aegypiinae. Sub-family of Old World vultures. *See* vulture.

aeolian deposit (eolian deposit). A sediment deposited after being carried by the wind.

aeon. Eon.

aeration. Any process where a substance becomes permeated with air or another gas. It is usually applied to aqueous liquids being brought into intimate contact with air by spraying, bubbling or agitating the liquid. Refers esp. to oxygen required by fishes, and other aerobic aquatic organisms or to soil aeration.

aerator. A device for introducing air into a liquid.

aerial plankton. Spores, bacteria and other micro-organisms floating in the air.

aeroallergen. Pollen or organic dust which cause hay fever and other allergic conditions.

aerobic. Living or active only in the presence of oxygen.

aerobic respiration. Process whereby organisms, using gaseous or dissolved oxygen, release energy by the chemical breakdown of food substances. *See* respiration.

aerobiosis. Biological processes that require oxygen.

aerodynamic drag. The force required to move a solid body through air. At low speeds, when flow is laminar, the drag is viscous and proportional to the speed. When the body leaves a turbulent wake, the drag is due to the creation of kinetic energy and is proportional to the square of the speed. At speeds greater than sound, energy of shock and sound waves is the predominant form of energy created and the drag is proportional to a higher power of the speed.

aerodynamic roughness. The aerodynamic roughness of a surface depends on the size of the roughness elements which cause the retardation of the air. The roughness height corresponds to the height of the wakes of the roughness, and below it the logarithmic profile does not apply.

aerogenerator. Machine with fast-moving wind-driven rotor blades used to generate mechanical power. *See* windmill, Darrieus generator, Grandpa's Knob generator, Savonius rotor. Historically, the power was used to grind corn or pump water from wells or dykes, conversion to electrical energy is now more common.

aerosol. Dispersion of solid or liquid particles of microscopic size in gaseous media. The particles are so small that their fall speeds are small compared with the vertical component of the air motion. Haze and cloud are the commonest atmospheric aerosols, fall speeds being fractions of 1 cm per second. Aerosol is used colloquially as an abbreviation for 'aerosol spray', or for liquid 'atomisers' which produce a liquid aerosol. *See* Rayleigh scattering.

aestidurilignosa. Mixed evergreen and deciduous hardwood forest.

aestilignosa. Broadleaf deciduous forest and bush in which the trees are leafless in winter.

aestivation. (*a*) (Zool.) The dormancy of certain animals (e.g. lungfish) during the dry season, the summer, or a prolonged drought. (*b*) (Bot.) The folding of parts of a flower bud. *See* hibernation.

aetiology. The science of the cause or origin of disease.

after-blow. In the Bessemer process (now rapidly becoming obsolete) for making steel, phosphorus is removed by continuing to blow air after the carbon has been consumed. It can be a cause of pollution from steel mills.

afterburner. In incinerators, a burner located so that the combustion gases are made to pass through its flames to remove smoke and smells.

after-ripening. The period of chemical and physical change undergone by the embryos of certain seeds (e.g. Hawthorn) after they apparently are fully

developed, without which they will not germinate. A similar phenomenon may occur in bulbs and tubers.

aftershocks. A series of smaller shocks following an earthquake of large magnitude and occurring fairly close to the focus of the main shock.

Ag. Silver.

agar-agar. Gelatinous substance derived from certain seaweeds, used as a bacteriological culture medium, as a thickening agent in foodstuffs, and in pharmaceutical products.

Agaricaceae. Agarics.

agarics (Agaricaceae, gill fungi). A group of basidiomycete fungi characterised by the production of spores on gills (e.g. common mushrooms and toadstools).

agate. A form of chalcedony.

Agave. Genus of American plants. *A. americana* produces large quantities of sap which, fermented, gives *pulque*, the Mexican national drink from which *mescal* is distilled. Other species are cultivated for their fibre.

ageostrophic. A form of motion in air in which the horizontal pressure gradient force is not in balance with the deviating (coriolis) force due to the wind velocity. Ageostrophic motion cannot be deduced from the pressure field, and may be caused by friction, acceleration (either linear or due to curvature) or changing pressure field. It is necessarily associated with vertical motion and the creation of clouds and weather.

agglomerate. A rock composed of fragments of volcanic material with a preponderance of pieces greater than 2 cm in diameter. Some agglomerates are bedded and were sedimented out after ejection of the fragments from a vent. Others (vent-agglomerate) are vent fillings.

agglomeration. The gathering together of particles (e.g. smoke particles in air under the influence of ultrasonic radiation). *Cf.* flocculation.

aggradation. The raising of the level of the land surface by the accumulation of deposited material.

aggregate. Construction material made from particles, most commonly of crushed stone. For road construction (*see* pavement) UK regulations require particles to have a diameter between 0.075 mm and 38 mm, depending on the use

to which they are put, and be well graded (*see* sorting). For surfacing layers the aggregate must bond well with bitumen.

aglycon. *See* glycosides.

Agnatha. The lampreys, hagfishes and their extinct relatives. A class, or sub-phylum, of primitive, jawless, fish-like vertebrates. *See* Cyclostomata.

agonistic behaviour. Threatening or otherwise aggressive behaviour of an animal toward another of the same species.

agora. In ancient Greek cities, a public open space at the centre of the city, of no special shape, used as a market place and meeting place. It developed into a place for sporting activities and eventually into the plaza, campo, piazza, etc. that survive in many modern Latin towns.

AGR. Advanced gas-cooled reactor.

agric. Depositional (B) soil horizon containing clay and humus. Formed by cultivation. *See* soil horizon.

agricultural revolution (Neolithic revolution). The introduction of agriculture to supplement hunting and gathering in Neolithic times, around 10000 to 8000 BC. This made food much more readily available and meant that less space was needed to support a given population, so it permitted a great increase in the human population. The term 'agricultural revolution' may also be applied to the introduction of mechanisation, enclosure and other improvements in agriculture that occurred much more recently (18th century in England).

agronomy. The study of rural economy and husbandry.

Agung, Mount. Mount Agung.

aid. (*a*) *A*rtificial *I*nsemination by *D*onor, used widely in livestock breeding. (*b*) Assistance given by developed to developing countries in economic or technical form. US AID is the US *A*gency for *I*nternational *D*evelopment, the major US organisation concerned with aid projects in developing countries.

air conditioning. The process of bringing atmospheric or other air to specified conditions of cleanness, temperature and humidity for use in buildings. In industrial countries this is often a prodigiously energy-intensive process. In poor countries it is more usually achieved by draughts, humidifiers and wind traps.

air, conservative properties of. Conservative properties of air.