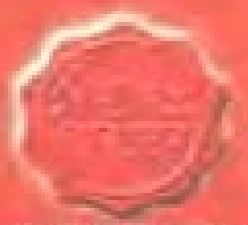
牛津英语百科分类词典系列

Oxford

DICTIONARY OF ECOLOGY

牛津生态学词典

上海外语教育出版社
SHANGHAI FOREIGN LANGUAGE EDUCATION PRESS



牛津英语百科
分类词典系列

Reference books from Oxford are renowned the world over for their quality, authority, and reliability.

牛津生态学词典

本词典系目前为止最完整、最权威的平装生态学词典，其中包括了大量环境科学的内容。本版经过了全面修订和更新，对于广大学生、专业人士以及所有对自然界和我们生活的环境感兴趣的人们都是一本极具价值的参考书。

- 收录词条5 000余
- 涉及动植物生理学、动物行为、进化、环境污染和保护、气候学和气象学、地理学以及海洋学等学科
- 经过全面更新，吸收了这一飞速发展领域的最新研究成果，特别是分子生态学、自然资源保护和生态环境管理等内容
- 收入许多新词条如economic injury level, edge effect, extramobile, hot spot, intermediate disturbance hypothesis, satellite DNA, selfish herd, transfer-RNA, xenology等

"全面覆盖生态学和环境科学"

——英国广播公司"野生生物"节目

ISBN 7-81080-054-X

9 787810 800549 >

定价：18.50元

牛津英语百科分类词典系列

Oxford Dictionary of

Ecology

牛津生态学词典

Michael Allaby

外教社
上海外语教育出版社
SHANGHAI FOREIGN LANGUAGE EDUCATION PRESS

Oxford Dictionary of

Ecology

Michael Allaby

Oxford New York
OXFORD UNIVERSITY PRESS

图书在版编目（CIP）数据

牛津生态学词典 / （英）阿勒比（Allaby，M.）编. —上海：上海外语教育出版社，2001
（牛津英语百科分类词典系列）
书名原文：Oxford Dictionary of Ecology
ISBN 7-81080-054-X

Ⅰ. 牛… Ⅱ. 阿… Ⅲ. 生态学-英语-词典 Ⅳ. Q14-61

中国版本图书馆CIP数据核字（2000）第83323号

图字：09-1999-311号

出版发行：上海外语教育出版社
（上海外国语大学内） 邮编：200083
电　　话：021-65425300（总机），65422031（发行部）
电子邮箱：bookinfo@sflep.com.cn
网　　址：http://www.sflep.com.cn　http://www.sflep.com
责任编辑：杨　帆

印　　刷：常熟市印刷八厂
经　　销：新华书店上海发行所
开　　本：850×1092　1/32　印张 14.125　字数 645 千字
版　　次：2001年2月第1版　2001年8月第2次印刷
印　　数：2 100册

书　　号：ISBN 7-81080-054-X / H·027
定　　价：18.50 元

Oxford University Press. Great Clarendon Street., Oxford OX2 6DP
Oxford New York

Oxford is a trade mark of Oxford University Press

First published 1994 as an Oxford University Press paperback
Second edition 1998

British Library Cataloguing in Publication Data
Data available

Library of Congress Cataloging-in-Publication Data
A dictionary of ecology / edited by Michael Allaby.—2nd ed.
(Oxford paperback reference)
Rev ed. Of: Concise Oxford dictionary of ecology. 1994.
1. Ecology—Dictionaries 2. Environmental sciences—
Dictionaries I. Allaby, Michael. II. Concise Oxford dictionary
Of ecology.
QH540.4.C66 1998 577'.02-dc21 98-9813
ISBN 0-19-280078-7

Published by permission of the Oxford University Press

Licenced for sale in the People's Republic of China only,
not for sale elsewhere.

本词典(重印本)由牛津大学出版社授权出版。

仅供在中华人民共和国境内销售。

出版说明

随着改革开放的不断深入以及国际交流的日趋广泛，外语学习已经不仅仅局限于语言技能的培养。通过英语获取专业知识、提高专业水平、跟踪学科的最新发展已经成为时代的要求。因此，目前国内急需一批用英语编纂的专业词典。

牛津英语百科分类词典系列是由牛津大学出版社组织编纂的一套工具书。该系列涉及语言学、文学、文化、艺术、社会学、数学、物理学、化学、生物学、医学、食品与营养、计算机等社会科学和自然科学门类近百种，均由造诣很深、经验丰富的专家撰写。作为第一批，我们从中精选了52本，以满足国内读者的需要。词典用浅显的英语，精确地解释了常用的专业词汇，充分体现了牛津大学出版社在出版工具书方面严谨的传统。

该系列词典可作为大专院校各专业的学生以及专业技术人员学习专业知识、提高专业英语能力的参考书。

本社编辑部

From the Preface to the First Edition

Ecology is a relatively new scientitfic discipline. The study of plants and animals must have begun with the realization that living organisms are of different kinds. In the modern sense, however, the life sciences can trace their origin to ideas that were current in Greece around 500 BC and which derived in part from the much older study of medicine. Aristotle (384–322 BC) emphasized the careful observation and description of organisms that is usually accepted as laying the foundation of biology, although the word 'biology' was not introduced until 1802, by the German G. R. Treviranus (or Trevirons) (1776–1837), in the title of his *Biologie oder die Philosophie der lebenden Natur*. J. B. de Lamarck may have introduced the word independently at about the same time.

The study of the relationships among organisms and between them and their abiotic environment shares some of this history. Aristotle was an accomplished naturalist and ecology is descended partly from natural history. 'Ecology' was also coined first in German (as *ökologie*), in 1866 by Ernst Haeckel, but interest in the new subject was overwhelmed by the upsurge in professional and popular fascination with evolutionary theory that followed the publication of Darwin's *Origin of Species*—oddly enough, itself essentially an ecological theory. It was not until the end of the century that attention returned to the relationship between organisms and their environment and what we understand today as the independent discipline of ecology is barely a century old.

In addition to students who plan to become ecologists or to enter some other branch of the life sciences, ecology is now a component of courses taken by geographers, architects, planners, land managers, industrial chemists, civil engineers, and probably many more. It is for them, and also for those with a less formal interest in the subject, that this dictionary has been compiled.

The general subject embraces concepts, and therefore words and expressions, garnered from a wide range of disciplines. In addition to terms pertaining to environmental pollution and conservation and those derived from ecology itself, together with relevant terms from biogeography, animal behaviour, evolutionary theory, and taxonomy, the dictionary also contains terms from plant and animal physiology, climatology and meteorology, oceanography, hydrology, pedology, glaciology, and geomorphology. It also includes brief biographical notes on a number of individuals who have made important contributions to the discipline.

This Dictionary aims to explain concepts and describe processes in sufficient detail to be helpful to the user. This results in a wide variation in the length of entries and, in some cases, the definition of more than one term within an entry (see, for example, the entry for moraine). Such embedded definitions appear in their alphabetical positions as cross-references. Where an entry uses a term defined in its own right, this is indicated by an asterisk before the term (e.g. *till in the entry for moraine). In some cases, words are cross-referenced to entries defined as different parts of speech (an adjective might be cross-referenced to its noun, for example) if the two are so similar as to allow the appropriate entry to be found easily. Other cross-references use the conventional *see*, *see also*, and *compare*. Cross-references are included within entries only where they might be

helpful, in order to control what might otherwise have developed as a proliferation of cross-references that made entries more difficult to read. The dictionary defines a total of about 5000 terms.

MICHAEL ALLABY
Wadebridge, Cornwall

Preface to the Second Edition

It is now four years since the first edition of this Dictionary appeared. Like all young disciplines, ecology is developing very rapidly, and during these years new terms have been introduced and the meaning of others modified. This has made a new edition desirable and I have taken the opportunity to make many revisions. In doing so I have been greatly helped by Robin Allaby, who has scrutinized my revisions and additions and contributed many of his own.

In particular, the Dictionary now includes a small number of entries pertaining to molecular ecology, a subdiscipline which barely existed at all when the first edition was compiled. Its existence and growing importance mark the widening influence molecular biology exerts throughout the life sciences, based on its power to illuminate evolutionary processes and taxonomic relationships at the most fundamental level. Its necessary inclusion here may also amount to a comment on the modern tendency to group the life sciences under two headings: molecules and cells; and organisms and communities. That ecologists are now required to possess some understanding of genetics demonstrates that, in practice, the two groups are inseparable.

Other entries appearing here for the first time reflect the large amount that has been learned in recent years about ecological relationships and, most especially, about conservation and the management of habitats. Not all these terms are new. Some were omitted from the first edition by oversight or because they did not seem to be in such wide use then as they do now.

All the entries in the first edition have been examined afresh and many have been modified. The modifications are often small, but they bring the definitions up to date, in some cases by providing a little more detail.

Despite the changes, the character of this dictionary was formed with the help of those who contributed to the compilation of the first edition: Robin Allaby, Kenneth Gregory, Tim Whitmore, and Kenneth Mellanby. That, and their contribution to it, remain unaltered.

It is with great sadness that I must record the death of Kenneth Mellanby, just before Christmas, 1993. A leading world authority on environmental pollution as well as ecology, Kenneth was a wise and thoughtful adviser. He was also a dear friend.

MICHAEL ALLABY
Wadebridge, Cornwall

Contents

A

AAC (Antarctic convergence) *See* ANTARCTIC POLAR FRONT.

Aapa mires String bogs of circumpolar distribution, found particularly in Fenno-Scandinavia. They are *soligenous mires with ridges, morainic in origin, arranged roughly normal to the slope of the terrain. Water occupies the linear depressions between the ridges.

abaptation The process by which an organism is fitted to its environment as a consequence of the characters it inherits, which have been filtered by *natural selection in previous environments. Because present environments seldom differ greatly from recent past environments, abaptive fitness can resemble *adaptation. In this sense, however, adaptation appears to imply advance planning, or design, which is misleading.

abaxial Of a plant organ, facing away from the axis or main stem (e.g. the lower surface of leaves). *Compare* ADAXIAL.

abiogenesis The development of living organisms from non-living matter, as in the supposed origin of life on Earth, or in the concept of spontaneous generation which was once held to account for the origin of life but which modern understanding of evolutionary processes (*see* EVOLUTION) has made outdated.

abiotic Non-living; devoid of life. *Compare* BIOTIC.

ablation **1.** Removal of snow and ice by melting and by direct alteration from the solid to the gaseous phase (sublimation). The rate of loss is controlled chiefly by air temperature, wind velocity, *humidity, rainfall, and solar radiation. Ablation on snowfields is also influenced by aspect, depth of snow, and the nature of the underlying surface. Ablation *till is the glacial deposit that may be released. The ablation zone of a glacier is that area in which losses, including *calving, exceed additions. **2.** The removal of rock material, especially by wind action.

ablation till *See* ABLATION (1) and TILL.

abrasion (corrasion) The erosive (*see* EROSION) action that occurs when rock particles of varying sizes are dragged over or hurled against a surface. Some common agents of abrasion are the *bed load of streams, rock debris embedded in the bases of *glaciers, and *sand and *shingle transported by wind or waves.

abscission The rejection of plant organs (e.g. of leaves in autumn). This occurs at an abscission zone, where hydrolytic enzymes reduce cell adhesion. The process can be promoted by abscisic acid and inhibited by respiratory poisons, and is controlled in nature by the proportion and gradients of auxin and ethylene. Other hormones may be involved.

absent rings *See* TREE RING.

absolute age (true age) The age of a geologic phenomenon measured in present Earth years, rather than its age relative to other geologic phenomena (*compare* RELATIVE AGE). The term 'absolute age' has been considered rather misleading, as the means for measuring ages (*radiometric dating, *dendrochronology, *varve analysis) are subject to experimental error and the dates obtained are not precise. The alternative term *'apparent age' has been suggested, but nowadays it is usual to link a statement of age with the technique used to determine it, to distinguish that age from an age in calendar or solar years (e.g. to state an age in 'radiocarbon years'). *See also* DATING METHODS.

absolute dating *See* GEOCHRONOLOGY.

absolute humidity *See* HUMIDITY.

absolute pollen frequency (APF) The expression of *pollen data from sediments, expressed in terms of the absolute numbers (for each species, genus, or family) per unit of volume of sediment

and, where deposition rates are known, per unit of time. In certain circumstances this approach gives clearer information than does the traditional way of expressing pollen data as *relative pollen frequencies (RPF). APFs are particularly useful in site comparisons in which one or more high pollen producers vary. For example, when trees first appear in the regional pollen rain their prolific pollen may, in an RPF method, give the impression of declining herbaceous species, whereas examination by an APF method will show constant values for herb species.

absolute porosity *See* POROSITY.

absorption The uptake of substances, usually nutrients, water, or light, by cells or tissues.

absorption spectrum A graph that shows the percentage of each wavelength of light absorbed by a pigment (e.g. chlorophyll, which absorbs mainly in the red and blue parts of the spectrum).

abstraction (extraction) The artificial removal of water from a well, reservoir, or river.

ABW *See* ANTARCTIC BOTTOM WATER.

abyssal Applied to the deepest part of the ocean, below about 2000 m. The abyssal zone lies seaward of, and deeper than, the *bathyal zone, and covers approximately 75 per cent of the ocean floor. It is the most extensive Earth environment, cold, dark, with slow-moving currents (less than a few centimetres per second), supporting fauna that are typically black or grey, delicately structured, and not streamlined. *Compare* NERITIC.

abyssal fish Fish that live in the deepest part of the ocean, below about 2000 m. Many abyssal species have prominent snouts; a tapering, rat-tailed body consisting of flabby, watery tissue; and a lightweight skeleton.

acceleration *Evolution that occurs by increasing the rate of ontogenetic (*see* ONTOGENY) development, so that further stages can be added before growth is completed. This form of *heterochrony was proposed by E. H. *Haeckel as one of the principal modes of evolution.

accelerator mass spectrometry (AMS) A technique for *radiocarbon dating in which a cyclotron is used to measure directly the number of ^{14}C atoms or the proportion of ^{14}C to ^{12}C and ^{13}C atoms in the sample. Results are obtained much more quickly than by alternative methods.

accessory pigments In *photosynthesis, pigments that can absorb light energy and pass the electrons they emit to primary pigments.

accidental species One of five classes of fidelity used by the *Braun-Blanquet school of phytosociology in the description and classification of plant communities. Accidentals are rare species in the community, present either as chance invaders from another community or as *relicts from a previous community. *Compare* EXCLUSIVE SPECIES; INDIFFERENT SPECIES; PREFERENTIAL SPECIES; and SELECTIVE SPECIES.

acclimation **1.** A response by an animal that enables it to tolerate a change in a single factor (e.g. temperature) in its environment. The term is applied most commonly to animals used in laboratory experiments and implies a change in only one factor. *Compare* ACCLIMATIZATION (1). **2.** *See* ACCLIMATIZATION (2).

acclimatization **1.** A reversible, adaptive response that enables animals to tolerate environmental change (e.g. seasonal climatic change) involving several factors (e.g. temperature and availability of food). The response is physiological, but may affect behaviour (e.g. when an animal responds physiologically to falling temperature in ways that make *hibernation possible, and behaviourally by seeking a nesting site, nesting materials, and food). *Compare* ACCLIMATION (1). **2. (acclimation, hardening)** The changes involving the synthesis of proteins, membranes, and metabolites that occur in a plant in response to chilling or freezing temperatures, which protect tissues or confer tolerance of the cold. The term may also be

applied to a range of physiological adjustments which occur in a plant when it is subjected to unusual environmental conditions.

accommodation (fatigue, synaptic accommodation) The exhaustion of a neurotransmitter at the synapse when a stimulus is repeated frequently. This may result in a decrease in behavioural responsiveness.

accretion **1.** The process by which an inorganic body grows in size by the addition of new particles to its exterior. **2.** The accumulation of sediments from any cause, representing an excess of deposition over *erosion. **2.** The addition of material to the edge of a continent, thus enlarging it

accumulated temperature A surplus or deficit of temperature with respect to a defined mean value and expressed as an accumulation over a given period (e.g. a month, season, or year). For example, a datum value of 6°C is used as a critical temperature for sustained vegetation growth, against which accumulated surpluses or deficits may be measured.

accumulation zone That part of a *glacier where the mean annual gain of ice, *firn, and snow is greater than the mean annual loss The zone consists of stratified firn and snow together with ice from frozen melt water. Its lower boundary is the *equilibrium line.

accumulator In plant *succession studies, a *pioneer plant species whose activities are claimed to enrich the *abiotic environment with nutrients.

-aceae A standardized suffix used to indicate a family of plants in the recognized codes of classification (e.g. Rosaceae, the rose family).

acephalous Lacking a distinct head.

acervulus An asexual structure, bearing conidia (i.e. thin-walled, asexual spores), that is formed by certain fungi parasitic (*see* PARASITISM) in plants. It consists of a mat of fungal tissue which bears a layer of conidiophores (i.e. specialized hypha that bear conidia); initially formed within the plant tissues, it later breaks through to the surface to release conidia.

achene A small, usually single-seeded, dry, *indehiscent *fruit.

acicular Pointed or needle-shaped.

acid According to the Brønsted–Lowry theory (proposed in 1923 by both J. N. Brønsted in Copenhagen and T. M. Lowry in Cambridge, who were working independently of one another), a substance that in solution liberates hydrogen ions or protons. The Lewis theory (proposed by G. N. Lewis, also in 1923) states that it is a substance that acts as an electron-pair acceptor. An acid reacts with a base to give a salt and water (neutralization), and has a *pH of less than 7.

acidic dye A dye which consists of an organic *anion that combines with and stains positively charged macromolecules. It is used particularly for staining cytoplasm. *Compare* BASIC DYE.

acidic grassland A grassland that occurs on *acid soil; it is usually derived from former woodland as a consequence of centuries of grazing and, to a lesser extent, burning. In Britain and much of north-western Europe the dominant grasses are species of *Agrostis* (bent) and *Festuca* (fescue). This type of vegetation is most extensive in upland areas, but the associated plant species tend to be different, and the name 'grass heath' is considered more appropriate.

acidophile An *extremophile (domain *Archaea) that thrives in environments where the pH is below 5.0.

acidophilic **1.** Refers to the propensity of a cell, its components, or its products to become stained by an *acidic dye. **2.** *See* ACIDOPHILOUS.

acidophilous (acidophilic) Applied to 'acid-loving' organisms (i.e. organisms which grow best in acidic habitats).

acid precipitation *Precipitation that has a *pH lower than about 5.0, which is the value produced when naturally occurring carbon dioxide, sulphate, and nitrogen oxides dissolve into water droplets

in clouds. The increased acidity may be caused naturally (e.g. by gases and *aerosols ejected by a volcanic eruption) or by *anthropogenic emissions (e.g. from the burning of fuel). The effects of acid precipitation on vegetation, soils, and surface waters are complex, their severity depending on the form of deposition (e.g. acid rain washes rapidly from plant surfaces, but may affect soil; acid mist tends to coat leaves, making it more harmful than rain), and the pH and natural buffering of the soil and water into which it falls. *See* BUFFER.

acid rain *See* ACID PRECIPITATION.

acid rock *Igneous rock that contains more than about 60 per cent silica (SiO_2) by weight, most of the silica being in the form of silicate minerals, but with the excess of about 10 per cent as free quartz. Typical acid rocks are granites, granodiorites, and rhyolites. *See also* ALKALINE ROCK; *compare* BASIC ROCK and INTERMEDIATE ROCK.

acid soil *Soil that has a *pH less than 7.0. Degrees of soil acidity are recognized. Soil is regarded as 'very acid' when the reaction is less than pH 5.0. The *USDA lists five standard ranges of soil acidity (less than pH 4.5, extremely acid; 4.5–5.0, very strongly acid; 5.1–5.5, strongly acid; 5.6–6.0, medium acid; and 6.1–6.5 slightly acid). Surface *soil horizons of acid *brown earths have a reaction of pH 5.0 or less.

acme zone **(peak zone, flood zone, epibole)** Informally, a body of strata that contains the maximum abundance of a particular fossil taxon occurring within the stratigraphic range of that taxon, and after which the zone is named.

acquired characteristics Characteristics that are acquired by an organism during its lifetime, according to early evolutionary theorists (e.g. *Lamarck and *Buffon). Lamarck further suggested a kind of directional, non-random evolution, in that *traits acquired in one generation as a result of behavioural changes in response to environmental stimuli would be transmitted to the *gametes and inherited by the next generation. Thus, over several generations, a particular type of organism would become better adapted to its environment. The kinds of acquisition envisaged by Lamarck and their heritability are now discredited, although *organic selection simulates them.

acre A unit of area, the British statute acre being equal to 0.4047 ha (4840 square yards or 10 square *chains). Originally, unenclosed land and later enclosed, cultivated land; as a measure, probably the area that could be ploughed in a day by a yoke of oxen (and therefore varying according to the type of soil). In Britain, historically a woodland acre varied from forest to forest, but was always larger than the statute measure. *Assarts were surveyed at the statute measure.

acrocarpous moss A type of moss in which the archegonia (i.e. female sex organs), and hence the *capsules, are borne at the tips of stems or branches. Acrocarpous mosses may branch extensively; once they have fruited, branches take over the erect growth. *Compare* PLEUROCARPOUS MOSS.

acropetal Growing or developing upwards from the base or point of attachment, so that the oldest parts are at the base and the youngest are at the tip. *Compare* BASIPETAL.

acropetal movement The movement of substances within the plant toward its root and shoot apices. *Compare* BASIPETAL MOVEMENT.

acrotelm The upper layer of a peat *bog, in which organic matter decomposes *aerobically and much more rapidly than in the underlying, *anaerobic catotelm. As litter accumulates at the surface the size of the catotelm increases, because the thickness of the acrotelm is limited to depth at which aerobic respiration can occur. Although the rate of decomposition per unit volume of material is much greater in the acrotelm than in the catotelm, a point is reached at which the difference in volume between the two layers is such that the total rate of decomposition in the catotelm is equal to that in the acrotelm. This limits the thickness to which the bog can grow. Should there be a

climate change (e.g. an increase in precipitation) growth can resume. Bogs therefore preserve a record of climatic conditions.

actinium series *See* DECAY SERIES.

actino- A prefix that means 'radiating', derived from the Greek *aktis, -inos*, meaning 'ray'.

actinomorphic Radially symmetrical, as is a daisy flower.

actinomycete **1.** A mycelium-forming bacterium of the order Actinomycetales. **2.** Any bacterium of the Actinomycetales.

actinomycosis Any disease of humans or other animals in which the causal agent is an *actinomycete.

actinorrhiza *See* ROOT NODULE.

action spectrum A graph of the efficiency of different wavelengths of light in promoting a given photoresponse, as in *photosynthesis or heliotropism.

activation energy **(energy of activation)** The energy that must be delivered to a system in order to increase the incidence within it of reactive molecules, thus initiating a reaction. It is an important feature of *enzymes that they greatly lower the activation energy of many metabolic reactions.

activator A metal ion that functions in conjunction with either an *enzyme or its *substrate in order to bring about a reaction.

active chamaeophyte *See* CHAMAEOPHYTE.

active dispersal *See* DISPERSAL

active immunity Resistance to a disease that is acquired by an animal as the result of the production of *antibodies in response to *antigens produced by the disease organism while inside the host animal.

active layer A seasonally thawed surface layer, between a few centimetres and about 3 m thick, that lies above the permanently frozen ground in a *periglacial environment. It may be subject to considerable expansion on freezing because of the water contained, and this is especially the case if silt-sized particles dominate, with important engineering implications. *See also* MOLLISOLS and PERMAFROST.

active pool That part of a *biogeochemical cycle in which the nutrient element under consideration is exchanged rapidly between the *biotic and *abiotic components. Usually the active pool is smaller than the *reservoir pool, and it is sometimes referred to as the 'exchange' or 'cycling' pool.

activity Broadly, the rate or extent of a change associated with some substance or system. For example, it may be the tendency of a metal high in the electromotive series to replace another metal lower in the series (e.g. magnesium displacing copper from most of its compounds). It may also be used to describe the rate of decay of atoms by radioactivity.

actual evapotranspiration ***(AE)*** The amount of water that evaporates from the surface and is transpired by plants if the total amount of water is limited. *Compare* POTENTIAL EVAPOTRANSPIRATION.

actualism The theory that present-day processes provide a sufficient explanation for past geomorphological phenomena, although the rate of activity of these processes may have varied. The theory was first clearly expressed in 1749 by G. L. L. de *Buffon, who proposed an age for the Earth of about 75 000 years, and was developed by James Hutton (*see* UNIFORMITARIANISM). As 'actualism', it came to be generally accepted as a result of the much more convincing arguments advanced by Sir Charles Lyell (1797–1875) in *his Principles of Geology* (published 1830).

aculeate Prickly, pointed. The term is applied to organisms that are armed with a sting (e.g. insects of the hymenopteran division Aculeata, which have stings). The word is derived from the Latin *aculeatus*, meaning 'stinging', from *acus*, needle.

acuminate Tapering to a point.

acute **(of disease)** Applied to a disease that develops rapidly and is of short duration; symptoms tend to be severe.

adaptation **1.** Generally, the adjustments that occur in animals in respect of

their environments. The adjustments may occur by *natural selection, as individuals with favourable genetic traits breed more prolifically than those lacking these traits (genotypic adaptation), or they may involve non-genetic changes in individuals, such as physiological modification (e.g. *acclimatization) or behavioural changes (phenotypic adaptation). *Compare* ABAPTATION. **2. (evol.)** That which fits an organism both generally and specifically to exploit a given *adaptive zone (e.g. wings allow birds to fly, whereas the hooked beak and sharp talons of birds of prey are more specialized adaptations well suited to a predatory way of life). The word also implies that the feature has survived because it assists its possessor in its existing *niche. *Compare* EXAPTATION. **3.** A decrease over time of the frequency of the impulses leaving a sensory receptor when a stimulus is repeated frequently. *See* ACCOMMODATION and HABITUATION.

adaptedness The condition of being adapted, as distinct from the process of *adaptation.

adaptive breakthrough Evolutionary change by the acquisition of a distinctive *adaptation that permits a population or taxon to move from one *adaptive zone to another. At the most extreme such moves might be from water to land or from land to air.

adaptive pathway A series of small adaptive steps, rather than a single large one, which leads from one *adaptive zone across an environmental and *adaptive threshold into another adaptive zone. In effect, small changes accumulate so that the organism is virtually pre-adapted (*see* PRE-ADAPTATION) to enter the new zone.

adaptive peaks and valleys Features on a symbolic contour map that shows the *adaptive value of genotypic combinations. Such a map will usually display adaptive peaks and valleys occurring at points where the adaptive value is relatively strong or weak. The population of a given *species will therefore be distributed more densely at the adaptive peaks and more sparsely at the valleys.

adaptive radiation **1.** A burst of evolution, with rapid divergence from a single ancestral form, that results from the exploitation of an array of *habitats. The term is applied at many taxonomic levels (e.g. the radiation of the mammals at the base of the *Cenozoic is of ordinal status, whereas the radiation of *'Darwin's finches' in the *Galápagos Islands resulted in a proliferation of species). **2.** A term used synonymously with *cladogenesis by some authors. (Such a use is misleading, because cladogenesis involves the division of one species into two and adaptive radiation imposes no such constraint.)

adaptive threshold The limit imposed on the *adaptation of a taxon within a particular *adaptive zone (e.g. the fins of a flying fish are adapted for gliding flight, but the fish can remain airborne for only a limited time, because it is incapable of powered flight).

adaptive type A population or *taxon that has distinctive adaptive attributes, expressed as a particular morphological theme, characteristic of a particular *habitat or mode of life. In evolutionary terms, the appearance of a new adaptive type is frequently followed by radiations that yield variants; these partition the environment and exploit it more effectively.

adaptive value (Darwinian fitness, fitness, selective value) The balance of genetic advantages and disadvantages that determines the ability of an individual organism (or *genotype) to survive and reproduce in a given environment. The environment, and the competition or struggle for survival within it, determine which individuals are fittest to achieve this, the 'fittest' being the individual (or genotype) that produces the largest number of offspring that later reach reproductive maturity. Such *natural selection has been described as 'the survival of the fittest'. *See also* SELECTION.

adaptive zone The abstract area that a taxon occupies by virtue of its *adaptations, when it is considered together with its associated environmental regime(s), *habitat, or *niche. The adaptive specialization that fits the taxon to its

environment, and hence the adaptive zone, may be narrow (as with the giant panda, which eats only certain types of bamboo shoots) or broad (as with the brown bear, which is omnivorous).

adaxial Of a plant organ, facing towards the axis or main stem (e.g. the upper surface of leaves). *Compare* ABAXIAL.

additive genetic variance *See* HERITABILITY.

additive tree A phylogenetic (*see* PHYLOGENY) tree in which the genetic distance between any two *nodes is proportional to the *branch lengths connecting them.

adenine A *purine base found in *nucleic acids. *See also* CYTOSINE, GUANINE, and THYMINE.

adiabatic Applied to the changes in temperature, pressure, and volume in a *parcel of air that occur as a consequence of the vertical movement of the air, and without any exchange of energy with the surrounding air. *See also* DRY ADIABATIC LAPSE RATE and SATURATED ADIABATIC LAPSE RATE.

adnate Applied to two organs that are attached to one another by most or all of their width (e.g. the gill and stipe of an agaric fungus or the leaf and stem of a plant). *Compare* ADNEXED.

adnexed Applied to two organs that are attached to one another by only part of their width. *Compare* ADNATE.

adobe A silty *clay, often calcareous, that is found in dry, desert-lake basins. This fine-grained sediment is usually deposited by desert floods which have eroded wind-blown *loess-deposits. It is widely used locally as a building material. The term is of Spanish origin.

adpressed Pressed close (e.g. as conifer leaves may be pressed close to the stem of the plant)

adret Applied to the south-facing slopes of Alpine valleys, which receive a high degree of insolation as a result of their aspect. Cultivation and settlement patterns often favour such slopes. *Compare* UBAC.

adsorption The physical binding of a particle of a particular substance to the surface of another by adhesion or penetration. In soils it is the attachment of an ion, molecule, or compound to the charged surface of a particle, usually of *clay or *humus, where it may be subsequently replaced or exchanged. Ions carrying positive charges (e.g. those of calcium, magnesium, sodium, and potassium) become attached to, or adsorbed by, negatively charged surfaces (e.g. those of clay or humus).

adsorption complex Various materials of the soil, mainly *clay and *humus and to a lesser degree other particles, that are capable of adsorbing ions and molecules.

advection The horizontal transfer of heat by means of a moving gas (usually air).

adventitious Growing from an unusual position (e.g. roots from a leaf or stem).

advertisement A form of *display in which an individual makes itself as conspicuous as possible. It is used most commonly by male animals holding a *territory, in order to ward off rivals and to attract females.

AE *See* ACTUAL EVAPOTRANSPIRATION.

-ae A standardized suffix used to indicate a class of plants in the recognized codes of classification.

aeolian (eolian) Wind-borne; applied to the processes of erosion, transport, and deposition of material due to the action of the wind at or near the Earth's surface. Aeolian processes are at their most effective when the vegetation cover is discontinuous or absent.

aeolianite Generally, the sedimentary products of wind (aeolian) deposition, which are cemented to make a rock.

aerial mycelium The part of a *mycelium that is held aloft from the *substrate.

aerobe *See* AEROBIC (2).

aerobic **1.** Of an environment: one in