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aardvark (ant bear, *Orycteropus afer*)
See ORYCTEROPODIDAE.

aardwolf (*Proteles cristatus*) See
HYAENIDAE.

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.

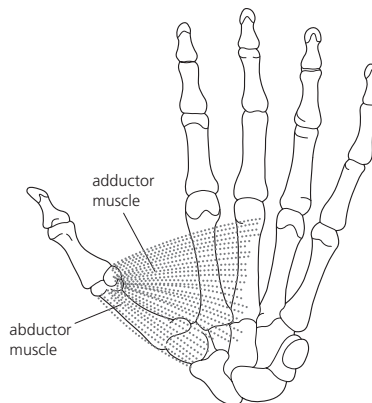
abdomen **1.** In vertebrates, the region of the body that contains the internal organs other than the heart and lungs. In *Mammalia it is bounded anteriorly by the *diaphragm. **2.** In most *arthropods, the hind region (tagma) of the body, which contains most of the digestive tract, the gonads, and the genital openings. In *Crustacea, the abdomen bears limbs which are to a greater or lesser extent segmentally arranged and the abdomen is not homologous with that of *arachnids and *insects. The abdomen usually shows at least some trace of segmentation, though in the course of evolution this has been lost in all but one family of spiders. **3.** In insects, the segments of the body that lie posterior to the thorax. The abdominal segments carry no limbs, although there are appendages (associated with reproduction) on the terminal segments in certain exopterygote and apterygote orders (e.g. *Thysanura). Non-terminal segments may bear appendages

that in some insects function as gills. In the primitive state the abdomen consists of eleven segments, but this number may be very much reduced in advanced insects.

abdominal fins **1.** In fish, *pelvic fins located far back on the belly rather than in the thoracic or jugular position. **2.** Ventral fins located on the abdominal (belly) side of the body.

abduction Movement away from the midventral axis of the body. Compare ADDUCTION.

abductor muscle A muscle that draws a structure (e.g. a limb) away from the centre line of the body. Compare ADDUCTOR MUSCLE.



Abductor and adductor muscles

abiogenesis The development of living organisms from non-living matter, as in the origin of life on Earth, or in the

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concept of spontaneous generation which was once held to account for the origin of life but which modern understanding of evolutionary processes has rendered outdated.

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

abomasum In *Ruminantia, the fourth and final region of the specialized stomach, corresponding to the stomach in other mammals and the zone in which digestion proceeds with the usual mammalian digestive *enzymes.

aboral Away from the mouth; on the opposite side of the body from the mouth in animals that lack clear-cut *dorsal and *ventral surfaces.

Abrocomidae (rat chinchillas; order *Rodentia, suborder *Hystricomorpha) A family of medium-sized, rat-like rodents that have stiff hairs projecting over the nails of the three central digits of the hind feet. The skull is massive and narrow in the facial region, the brain case is rounded, with low occipital crests and short paroccipital processes, and the cheek teeth are *hypsodont. Rat chinchillas live in colonies in burrows or crevices, and can climb trees. They are found only in the Andes from southern Peru to northern Argentina. There are two species in a single genus, *Abrocoma*.

abyssal Applied to the deepest part of the ocean, below about 2000 m. The abyssal zone covers approximately 75% of the ocean floor. *Compare* BATHYAL; NERITIC.

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

Abyssinian roller (*Coracias abyssinica*) *See* CORACIIDAE.

Acanthiza (thornbills) *See* ACANTHIZIDAE.

Acanthizidae (bristlebirds, scrub wrens, fairy warblers, thornbills, white-faces; class *Aves, order *Passeriformes) A family of birds all of which build domed nests. They have thin, pointed bills with *basal bristles, are insectivorous, and vary from being strictly arboreal (fairy warblers) to ground-feeding (scrub wrens). The sexes are usually similar. There are 17 genera, comprising 63 species. (*Acanthiza* (thornbills) are sometimes placed in the *Sylviidae or *Maluridae.) They are found mainly in Australia and New Guinea.

Acanthobdellida (phylum *Annelida, class *Hirudinea) An order of parasitic worms that lack an anterior sucker. *Chaetae occur in the anterior region. There is one genus, *Acanthobdella*; it occurs only on salmon.

Acanthocephala (thorny-headed worms) A phylum of bilaterally symmetrical, *pseudocoelomate, worm-like organisms most of which do not have an excretory system; all lack a gut. A retractable proboscis is present, covered with the recurved spines that give the animals their common name. All acanthocephalans are endoparasitic, living in two or three marine or terrestrial vertebrates during their development. There are about 600 species.

Acanthochitonina *See* NEOLORICATA.

Acanthoclinidae (subclass *Actinopterygii, order *Perciformes) Family of small (about 8 cm long), agile fish that inhabit tropical waters of the Indo-Pacific region. They have *pelvic fins reduced to one spine and two soft rays.

Acanthodii Class of primitive, fossil fish that had a true bony skeleton, a *heterocercal tail fin, a persistent *notochord, *ganoid scales, and stout spines in front of the fins. The acanthodians lived from the *Silurian Period to the *Permian

Period and may be related to ancestors of the more modern bony fish.

Acanthopterygii Superorder of bony fish that includes all the spiny-finned fish (e.g. *Perciformes and *Beryciformes).

acanthosoma See POSTLARVA.

Acanthostega See ICHTHYOSTEGA.

Acanthuridae (surgeonfish, doctorfish; subclass *Actinopterygii, order *Perciformes) Large family of slab-sided fish that have a sharp spine on each side of the tail-base (hence the name 'surgeonfish'). The spine is retractable in some species. Many species exhibit striking colour patterns. There are about 80 species, found in all tropical seas; many feed on organisms that cover the surface or rocks, or on sea-grasses.

acari mites See ACARINA.

Acarina (acari mites, ticks; class *Arachnida) Order of small or very small arachnids most of which have a short, unsegmented *abdomen. The body comprises the *capitulum and a *prosoma. In most forms the prosoma is covered by a single carapace (see CEPHALOTHORAX). The respiratory organs are *tracheae. Many species are parasites of medical and veterinary importance, and many are agricultural pests. The Acarina are regarded by many zoologists as an unnatural, polyphyletic group comprising elements derived independently from different arachnid stocks. There are 20 000 known species, 2800 of which are aquatic, including some that are marine.

acarinum A small pouch in the abdomen of Old World carpenter bees of the genus *Xylocopa* (subgenus *Koptortosoma*), which provide protection for symbiotic mites of the genus *Dinogamasus*.

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.

accentors See PRUNELLIDAE.

accessory genitalia (secondary genitalia) Organ of intromission, present only in the males of the order *Odonata. It is situated on the *sternites of the second and third abdominal segments. It has no homologues in the animal kingdom.

accessory respiratory organ A system of air chambers formed by outgrowths from the mouth or gill region of those fish that occasionally leave the water. The uptake of oxygen from the air is facilitated by a dense network of tiny blood vessels in the skin lining these air chambers, and their possession enables such fish as labyrinth fish (*Anabantidae), snakeheads (*Channidae), or air-breathing catfish (*Clariidae) to survive outside water for some considerable time. The *swim-bladder also may serve as an accessory respiratory organ.

Accipiter (sparrowhawks, goshawks) See ACCIPITRIDAE.

Accipitridae (hawks, eagles, buzzards, kites, Old World vultures; class *Aves, order *Falconiformes) The largest family of birds of prey, containing many cosmopolitan genera, especially *Accipiter* (sparrowhawks and goshawks), *Buteo* (buzzards or hawks), *Circus* (harriers), *Elanus* (kites), *Haliaeetus* (fish eagles), and *Pernis* (honey buzzards), which make up nearly half the family. Other genera are more restricted in range, and more than half are monotypic. *Aquila chrysaetos* (golden eagle) has a *Holarctic distribution (there are 10 species of *Aquila*, found world-wide except for S. America and Malaysia). Hawk eagles (10 species of *Spi-zaetus*) occur widely in low latitude forests. Accipiters are generally carnivorous, preying on snails, insects, fish, mammals, reptiles, and birds; but one species,

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Gypohierax angolensis (palmnut vulture), feeds on oil-palm husks. Vultures (seven species of *Gyps*) have reduced talons which aid walking, inhabit open plains, mountains, and forests, feed on carrion, and nest in trees and on crags. There are 63 genera in the family, with more than 200 species.

acclimation 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.

acclimatization 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.

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

acentric Applied to a fragment of a *chromosome, formed during cell division, that lacks a *centromere. The fragment will be unable to follow the rest of the chromosome in migration towards one or other pole as it has lost its point of attachment to the *spindle.

acephalous Lacking a distinct head.

acetabulum The socket in the *pelvis into which the head of the *femur fits.

acetylcholine (ACh) An acetyl ester of *choline that is involved in synaptic (*see*

SYNAPSE) transmission between nerve cells. It is released from *vesicles by the presynaptic *neuron and diffuses across the *synaptic cleft where it interacts with specific receptors to produce a local depolarization of the postsynaptic membrane, thus enabling the transmission of nerve impulses.

 **SEE WEB LINKS**

- A description of acetylcholine and other neurotransmitters.

acetylcholine esterase An enzyme present within the *synaptic cleft that hydrolyses *acetylcholine to *choline and acetic acid, thus preparing the *synapse for the passage of a new impulse.

acetyl coenzyme A (acetyl Co A) An important intermediate in the *citric-acid cycle, and in *fatty-acid and *amino-acid metabolism.

ACh *See* ACETYLCHOLINE.

acicular Pointed or needle-shaped.

acid According to the Brønsted–Lowry theory, a substance that in solution liberates hydrogen ions (protons). The Lewis theory 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.

acidophilic 1. Refers to the propensity of a cell, its components, or its products to become stained by an acidic dye. **2.** Applied to an organism that inhabits acid environments.

acidopore In formicine ants, a flexible, hair-fringed nozzle.

Acinonyx jubatus (cheetah) *See* FELIDAE.

Acipenseridae (sturgeons; superorder *Chondrostei, order *Acipenseriformes) A family of large, fairly sluggish, bottom-feeding fish that have a low-slung mouth, toothless jaws, four *barbels in front of

the upper jaw, and rows of large plates along the body. They are found in Europe, Asia, and N. America. Most of the 26 species are marine but ascend rivers to spawn. A few species, e.g. the sterlet (*Acipenser ruthenus*), live wholly in fresh water. Sturgeons are very fertile. The processed roe of ripe female common sturgeon (*Acipenser sturio*) and beluga (*Huso huso*) is renowned as caviar (the most valuable caviar is from the beluga).

Acipenseriformes (subclass ***Actinopterygii**, superorder ***Chondrostei**) An order of rather primitive fish characterized by a cartilaginous skeleton, a ***heterocercal** tail fin, and a head with a pointed, protruding ***rostrum** and ventrally located mouth. Extant members of the order either have a naked skin or possess five rows of large, rhomboid, bony scales along the body; a spiral valve is found in the intestinal tract. Apart from the sturgeon and paddlefish the order includes a number of fossil representatives dating back to the ***Carboniferous Period**.

Acochliidiacea (class ***Gastropoda**, subclass ***Opisthobranchia**) An order of molluscs in which individuals are very small and ***benthic**, living between sand grains. The visceral sac is thin and spiculate, and is often much longer than the foot and markedly separate from it. There is no shell. These gastropods are deposit feeders. According to different authorities the order contains three families or only one.

Acoela 1. (class ***Turbellaria**, subclass ***Archoophora**) An order of platyhelminth worms (***Platyhelminthes**) that have no gut cavity or pharynx. **2.** (class ***Gastropoda**, subclass ***Opisthobranchia**) An order of molluscs that possess no shell, ***mantle** cavity, or gills. Respiration is carried out by ***branchiae**. Dorsal outgrowths are quite common, and all have undergone complete ***detorsion**. ***Benthic** and planktonic forms occur. There is only one fossil family recorded, which appeared in the

***Eocene**. According to some authorities, the taxonomic use of 'Acoela' as a molluscan order should be discouraged. It represents an attempt to unite the ***Notaspidea** and ***Nudibranchia**.

acoelomate Lacking a ***coelom**.

acontium In ***Anthozoa**, an extension of a ***nematocyst-bearing *mesentery**, containing a nematocyst, that lies in the gastric cavity but can be protruded through the mouth in order to capture prey and possibly also for defence.

acorn barnacle See BALANIDAE.

acorn worms See ENTEROPNEUSTA.

acoustico-lateralis system The inner-ear region and ***lateral-line** organs located in the skin, forming a sensory system that conveys environmental information to the brain of a fish: the lateral-line organs respond to changes in water pressure and displacement, the inner ear responds to sound and gravity. Generally such a system is found in aquatic lower vertebrates (e.g. lampreys, sharks, bony fish, and one or two amphibians).

acquired characteristics Characteristics that are acquired by an organism during its lifetime. According to early evolutionary theorists (e.g. ***Lamarck**), ***traits** acquired in one generation in response to environmental stimuli may be inherited by the next generation. Thus over several generations a particular type of organism would become better adapted to its environment. The heritability of such characteristics is now discredited.

Acrania See BRANCHIOSTOMIDAE; CEPHALOCHORDATA.

Acrididae (short-horned grasshoppers, locusts; order ***Orthoptera**, suborder ***Caelifera**) Cosmopolitan family of small to large, short-horned grasshoppers among which ***stridulation** is common, the males and some females rubbing a

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row of pegs on the hind femora against a toughened vein of the forewing (tegmen). They have three-segmented tarsi and antennae which are shorter than the fore femora, and hind legs modified for jumping (saltatorial). There are tympanal organs (ears) at the base of the abdomen. The female has a short *ovipositor and lays eggs in the soil, or sometimes in decaying wood. All species are plant feeders and a number are important agricultural pests, most notably the locusts. Lubber, spur-throated, slant-faced, and band-winged grasshoppers are members of the family, which is the largest of the Caelifera and contains some 10 000 known species.

Acridotheres (mynas) See STURNIDAE.

Acrobatidae (pygmy possums, pygmy gliders; order *Diprotodontia (or *Marsupialia), superfamily *Phalangeroidea) A family containing three genera of mouse-sized marsupials, some of which have gliding membranes.

acrocentric Applied to a *chromosome in which the *centromere is located nearer to one end than to the other. During the *anaphase stage of cell division, movement of an acrocentric chromosome towards one pole results in the chromosome being shaped like a 'J', as opposed to the normal 'V' shape of a metacentric chromosome (in which the centromere is in the middle).

Acrochordidae (wart snakes and file snakes; order *Squamata, suborder *Serpentes) A family of primitive snakes with ridged scales that do not overlap. There are nasal openings on top of the snout. Usually they are found in brackish water, but occasionally offshore. They rarely come on to land. There are two species, found in India, Sri Lanka, some Indo-Australian islands, and northern Australia.

Acrocodia (Asian tapir) See TAPIRIDAE.

acrodont Applied to the condition in which the teeth are fused to the bones. Compare THECODONT; PLEURODONT.

Acroechinoidea (subphylum *Echinozoa, class *Echinoidea) A taxonomic rank, between the subclass and superorder levels, that comprises a *monophyletic group consisting of all *Euechinoidea except for the *Echinothurioida.

acromion In *Mammalia, a ventral extension of the spine of the *scapula. It articulates with the *clavicle if a clavicle is present.

Acropomatidae (subclass *Actinopterygii, order *Perciformes) A very small family of marine tropical (Indo-Pacific) fish, comprising only three species. A characteristic of this family is the anterior location, close to the *pelvic-fin base, of the vent (anus).

acrosome A thin-walled *vesicle that forms a cap on the head of a *spermatozoon. On contact with an *ovum it bursts, releasing powerful hydrolytic *enzymes which cause a localized softening of the *vitelline membrane, thus facilitating fertilization.

Acrotretida (phylum *Brachiopoda, class *Inarticulata) An order that comprises two suborders of brachiopods which are usually circular or semicircular in outline. The shell is either phosphatic or punctate calcareous. The *pedicle opening is restricted to the pedicle valve. The *shell beak is marginal to subcentral in position.

Acrotretidina (class *Inarticulata, order *Acrotretida) A suborder of inarticulate brachiopods that have phosphatic shells. Throughout life they are attached to the sea-bed by a *pedicle. They first appeared in the Early *Cambrian. There are three superfamilies, seven families, and about 50 genera.

ACTH See ADRENOCORTICOTROPHIC HORMONE.

actin A *globular protein of relative molecular mass 60 000 which is a major component of *microfilaments generally, and which is especially important in the *myofibrils of striated muscle cell.

Actiniaria (sea anemones; class *Anthozoa, subclass *Zoantharia) An order of solitary polyps that lack skeletons. They have numerous *tentacles and paired *mesenteries. There are about 200 living genera, comprising 700 species.

Actinistia 1. *See* CROSSOPTERYGII. 2. *See* COELACANTHIMORPHA.

Actinoceratida (class *Cephalopoda, subclass *Nautiloidea) A large order of predominantly *orthoconic cephalopods that have large *siphuncles. Large amounts of siphuncular and *cameral deposits are present. Most are assumed to have been *nektonic. The actinoceratids ranged in age from Early *Ordovician to lower *Carboniferous.

Actinopodea (subphylum *Sarcomastigophora, superclass *Sarcodina) A class of *Protozoa that are typically spherical *amoebae with radiating *pseudopodia. They are free-living in freshwater and marine environments.

Actinopodidae *See* TRAPDOOR SPIDERS.

Actinopterygii (ray-finned fish; class *Osteichthyes) A subclass of ray-finned fish, that includes the majority of living bony fish of sea and fresh water. The fins are composed of a membranous web of skin supported by a varying number of spines and soft rays. This subclass includes a diversity of fish types, ranging from the sturgeon and paddlefish to the eel and tuna. They first appeared during the *Devonian Period.

Actinozoa *See* ANTHOZOA.

action potential *See* ALL-OR-NOTHING LAW.

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 dispersal *See* DISPERSAL.

active evasion Fleeing a predator in order to avoid being eaten.

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 whilst inside the host animal.

active site Part of an *enzyme molecule, the conformation of which is such that it binds to the *substrate or substrates to form an enzyme–substrate complex. The conformation is not absolute and may alter according to reaction conditions.

active transport The transport of substances across a membrane against a concentration gradient. Such processes require energy, the source often being the hydrolysis of *adenosine triphosphate (ATP). *Protein or *lipoprotein carrier molecules are believed to be involved in the process.

actomyosin A complex of the proteins *actin and *myosin in an approximately 3:1 ratio. It is formed *in vivo* in muscle cells, or *in vitro* from purified extracts.

Aculeata (wasps, ants, bees; order *Hymenoptera, suborder *Apocrita) Division of Hymenoptera in which the *ovipositor has lost its egg-laying function and is modified as a *sting. The sting has been lost in some *aculeates (e.g. formicine ants) and is reduced or absent in some bees (e.g. the Andrenidae and Meliponini). *Compare* PARASITICA.

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aculeate Prickly, pointed. The term is applied to organisms that are armed with a *sting (e.g. members 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.

acute stress response See FIGHT OR FLIGHT REACTION.

adambulacral In *Echinodermata, applied to the ossicles and spines that occur at the outer ends of the ambulacral plates (see AMBULACRUM), with which they alternate.

Adapidae (suborder *Strepsirhini (or *Prosimii), infra-order *Lemuriformes) An extinct family of lemur-like animals; most were small, but a few had heads 10 cm or more long. The brain case was small with temporal crests and smooth cerebral hemispheres, and the tympanic ring was included in the *bulla. Dentition was full and the *incisors were not *procumbent, but in *Adapis* species the *canines were incisiform, the *molars resembling those of some modern lemurs. The skeleton was adapted for grasping, leaping, and perching. Old World adapids (e.g. *Adapis* and *Pronycticebus*) probably resembled lemurs and lorises, to which they may be ancestral. They were distributed in Europe and N. America in the *Eocene.

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 environmental 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.** Sensory adaptation involves a decrease over time of the frequency of the impulses leaving a sensory receptor when a stimulus is repeated frequently. See ACCOMMODATION; HABITUATION.

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.** Term used synonymously with *cladogenesis by some authors.

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 'fittest' is the individual (or genotype) that produces the largest number of offspring that survive to maturity and reproduce.

adaptive zone A *taxon that 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).

adder (*Vipera berus*) See VIPERIDAE.

additive genetic variance See HERITABILITY.

adduction Movement towards the mid-ventral axis of the body. Compare ABDUCTION.

adductor muscle A muscle that draws a shell or limb of an animal towards the median axis of the body. An adductor muscle closes the shell valves in *Bivalvia and the carapace valves in *Cirripedia. Compare ABDUCTOR MUSCLE.

adecticous In arthropods, having non-articulated, often reduced mandibles that in most species are not used for escape from the pupal cocoon.

adelphoparasite A parasite (see PARASITISM) that has as its host a species closely related to itself, often within the same family or genus.

adenine A *purine base which occurs in both *DNA and *RNA.

adenohypophysis In vertebrates, part of the *pituitary gland that is derived from the *hypophysial sac during the development of the *embryo. It has two parts: the pars distalis, which forms the anterior lobe of the pituitary; and the pars intermedia (absent in some mammals and in birds), which forms part of the posterior lobe. Compare NEUROHYPOPHYSIS.

adenosine A *nucleoside formed when *adenine is linked to *ribose sugar.

adenosine diphosphate (ADP) A high-energy phosphoric ester, or *nucleotide, of the *nucleoside *adenosine. It can undergo *hydrolysis to adenosine monophosphate and inorganic phosphate, the reaction releasing 34 kJ/mol of energy at *pH 7.

adenosine triphosphate (ATP) A high-energy phosphoric ester, or *nucleotide, of the *nucleoside *adenosine which functions as the principal energy-carrying compound in the cells of all living organisms. Its *hydrolysis to *ADP and inorganic phosphate is accompanied by the release of a relatively large amount of free energy (34 kJ/mol at *pH 7) which is used to drive many metabolic functions.

ADH See VASOPRESSIN.

adherens junction A cell junction that is commonly observed in epithelial (see EPITHELIUM) cells (e.g. those lining the intestine and those in cardiac muscle cells). At these junctions the *cell membranes of the neighbouring cells are

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separated by a space of 15–25 nm which is filled with a filamentous material. Beneath this, anchoring the junction to the cell cytoplasm, are loosely structured mats of fibres, 7 nm in diameter, thought to be actin filaments. It is thought that these junctions may provide mobility in the regions of the cells in which they are located.

adipose Pertaining to fat.

adipose eyelid The thickened yet transparent skin that overlies the eyes of some animals. Some fish have adipose eyelids (e.g. certain herring and mullet species); apart from a small central aperture, it covers most of the eye, giving the fish a 'bespectacled' appearance.

adipose fin In some fish (e.g. members of the salmon, catfish, and a few other families), a type of second dorsal fin in the form of a small flap of fatty tissue covered with skin and lacking supporting rays.

adipose tissue *Connective tissue that contains large cells in which fat is stored.

admirals See NYMPHALIDAE.

adoption Investing parental care on a juvenile to which the adopter is unrelated. In some cases, observed in several species, the adoptee may belong to a different species (e.g. companion animals cared for by humans).

adoption gland An abdominal gland possessed by larvae of the rove beetle (*Staphylinidae) *Atemeles pubicollis* that releases an attractant pheromone which stimulates brood-keeping behaviour in *Formica polyctena* ants. The adult beetle lays its eggs in the nest of the ants; when the larvae hatch the pheromone induces the ants to raise them as though they were their own.

adoral On the same side of the body as the mouth.

ADP See ADENOSINE DIPHOSPHATE.

adrenal gland In vertebrates, an organ that secretes certain hormones. Many vertebrates possess multiple adrenal glands, but in mammals there is one gland close to each kidney. In tetrapods, each gland consists of a central medulla and an outer cortex. The medulla secretes adrenalin and noradrenalin, hormones needed when the animal is in an excited state and must engage in strenuous activity (e.g. fighting or fleeing; see FIGHT OR FLIGHT REACTION). The cortex secretes sex hormones and other hormones concerned with regulating the water and salt balances of the body.

adrenalin (adrenaline, epinephrine) A hormone secreted by the adrenal medulla and largely responsible for the 'fight or flight' response in mammals (see FIGHT OR FLIGHT REACTION). It stimulates the breakdown of glycogen, thus raising the blood-sugar level, it mobilizes free fatty acids, and it has a variety of effects on the cardiovascular and muscular systems.

adrenergic Of nerve endings, secretion of the neurotransmitters adrenalin or noradrenalin into the synapse on the arrival of a nerve impulse. Adrenergic nerve endings are characteristic of the sympathetic nervous system.

adrenergic system See NEUROTRANSMITTER.

adrenocorticotrophic hormone (ACTH) A polypeptide hormone, secreted by the anterior lobe of the pituitary gland, which stimulates the synthesis and secretion of hormones by the adrenal cortex.

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.

aedeagus Intromittent organ or penis of males of most insect groups, which is