

palaeontology (*n*) the study of the life of past geological times; the study of fossils (↓).

palaeontological (*adj*).

paleontology (*n*) American spelling of palaeontology (↑). **paleontologic** (*adj*).

biosphere (*n*) that part of the world in which living things are present: the surface of the land, the soil, the seas, and the air.

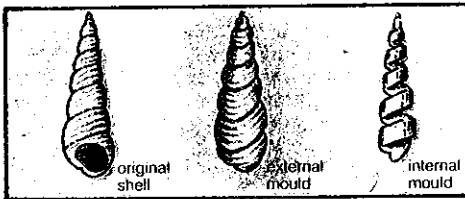
organism (*n*) a living individual plant or animal.

fossil (*n*) the remains of an animal or plant preserved in a rock; a cast (↓) or impression or a trace (↓) of an animal or plant in a rock. **fossil**, **fossilized** (*adj*), e.g. a fossil fish, fossilized wood; **fossilize** (*v*).

fossiliferous (*adj*) containing fossils (↑).

fossil record all the remains of past animal and plant life found in the rocks.

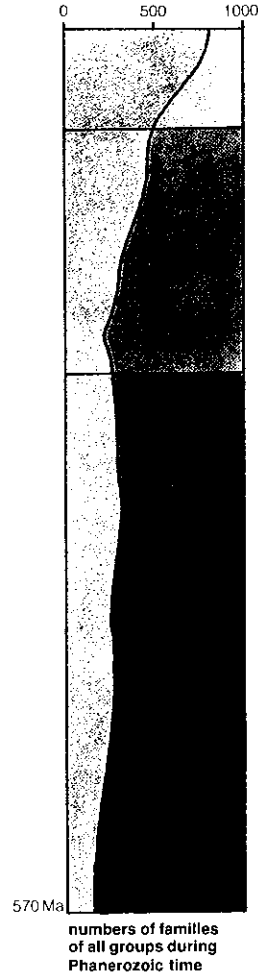
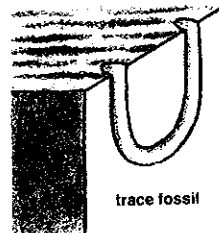
mould (*n*) the impression left in a rock by a fossil (or other object). A mould may be *external* (an impression made by the outside of the fossil) or *internal* (a cast (↓) of the inside of a fossil).



cast (*n*) a copy of a fossil (or other object) formed by the filling in of a mould (↑). A cast may be *internal* or *external*, i.e. of the inside or of the outside of the fossil.

trace fossil a sedimentary structure (p.83) formed by an animal moving across or moving in the sediment when it was being deposited, e.g. tracks, footprints, and burrows (holes made by animals).

fauna (*n*) the animals that live together in any one place or area at a particular time. A *fossil fauna* consists of all the animals that are found as fossils in a particular stratigraphical unit (p.113) – a bed, for example – in a particular area. **faunal** (*adj*). See also **flora** (p.110).



microfossil (*n*) a very small fossil (↑): one that can be seen only with a microscope. Some microfossils are important in stratigraphical palaeontology (p.111), e.g. the Foraminifera (p.104).

micropalaeontology (*n*) the study of microfossils (↑). **micropalaeontological** (*adj*).

microfauna (*n*) a fauna (↑) of microfossils (↑).

taphonomy (*n*) the study of the ways in which fossils (↑) are formed.

taxonomy (*n*) the science of arranging animals and plants, whether living or fossilized (↑), in groups or classes according to their structure.

taxonomic (*adj*).

taxon (*n*) (*taxa*) a taxonomic group or unit of classification, e.g. a genus (↓), a family (↓).

taxonomic (*adj*).

phylum (*n*) (*phyla*) one of the main divisions of the animal or plant kingdom, e.g. Insecta (p.108), Mammalia (p.109).

class (*n*) a division of a phylum (↑).

order (*n*) a division of a class (↑).

superfamily (*n*) a division of an order (↑). Names of superfamilies end in -oidea.

family (*n*) a division of an order (↑). Names of animal families end in -idae.

subfamily (*n*) a division of a family (↑). Names of animal subfamilies end in -inae.

genus (*n*) (*genera*) a division of a family (↑), containing one or more species (↓). The name of a genus is a Latin word, written with a capital letter, e.g. *Lingula*.

species (*n*) a division of a genus (↑). The members of a species are all very much alike. In living forms they *interbreed* among themselves, i.e. they can become parents of young, who can in turn also become parents. Pairs from different species cannot, on the other hand, produce young. The name of a fossil species is a Latin word, written with a small letter, which comes after the name of the genus, e.g. *Didymograptus murichisoni*.

type (*n*) a fossil that represents the characters of a species (↑), a *holotype*; or a genus (↑), a *genotype*.

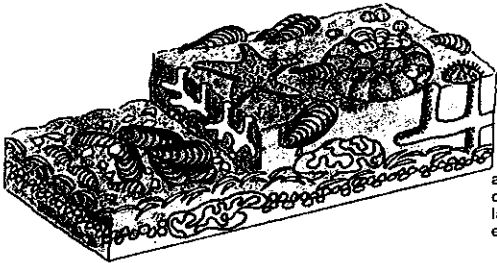
palaeoecology (*n*) the study of fossil animals and plants in relation to the conditions under which they lived – the environment (p.81).

palaeobiogeography (*n*) the study of the way in which animals and plants were arranged in space on the surface of the Earth in the geological past.

habitat (*n*) the environment (p.81) in which an animal or plant lives or lived.

assemblage (*n*) (1) all the fossils that are present in a particular bed or stratum (p.80); (2) the fossils of a species (p.99), or some other small group, from a particular horizon (p.112) or place; (3) a group of fossils found by themselves that are thought to belong to one animal.

fossil community a group of fossils found in the same place where they lived together.



a shell-bed community with lamellibranchs, ammonites, echinoids, etc.

plankton (*n*) all the organisms that float in the sea or in a lake and are carried about by the movement of the water, e.g. Foraminifera (p.104) and Radiolaria (p.104). **planktonic** (*adj*).

microplankton (*n*) the smallest members of the plankton (↑); those that cannot easily be seen with the unaided eye.

phytoplankton (*n*) all the plant forms that float in the sea or in lakes. *See also* **plankton** (↑).

nekton (*n*) all the animals that swim in the sea or in lakes.

benthos (*n*) all the animals and plants that live on the sea floor. **benthonic** (*adj*).

pelagic (*adj*) animals that live in the open sea but not on the sea floor are called pelagic. They include the nekton (↑) and the plankton (↑).



a sessile fossil: a crinoid

aerobic (*adj*) needing free oxygen in order to live or be active. *See also* **anaerobic** (↓).

anaerobic (*adj*) not needing oxygen in order to live or be active. *See also* **aerobic** (↑).

epifauna (*n*) a fauna (p.98) that in life is fixed to another and larger organism (p.98).

epizoon (*n*) an organism of an epifauna (↑).

epizoan (*adj*).

sessile (*adj*) describes an organism (p.98) that is closely attached to a surface, such as the sea floor or another organism. Applied to benthos (↑), 'sessile' means attached to the sea floor.

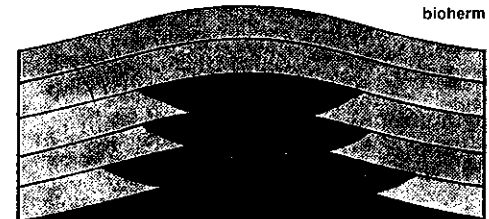
See also **sedentary** (↓).

sedentary (*adj*) describes an organism (p.98) that is attached, as, for example, an oyster.

See also **sessile** (↑).

biocoenose (*n*) an assemblage (↑) of organisms (p.98) that live together as one community (↑).

biolith (*n*) a deposit of organic (p.17) material or material formed by the activities of organisms.



bioherm (*n*) an organic deposit (p.80) built largely or entirely of the remains of fixed organisms (p.98); a fossil reef (p.38). A bioherm is usually shaped like a small hill. It is a special type of biolith (↑).

biostrome (*n*) a mass of organic material in the form of a sheet or bed (p.80) built by sedentary organisms (↑, p.98) that have been preserved in place. *See also* **bioherm** (↑).

biogenic (*adj*) produced by organisms (p.98).

stromatolites (*n*) rounded sedimentary structures (p.83) formed by the plants called algae (p.110), which live in water. The oldest stromatolites are of Pre-Cambrian age (p.114) and are among the oldest fossils known.

evolution (*n*) the process by which new forms of living things can develop from earlier forms by passing on small changes from one generation to the next. **evolutionary** (*adj*), **evolve** (*v*).

adaptation (*n*) a character of an organism (p.98) that fits it for a particular environment (p.81); (2) the process by which an organism (p.98) is changed to become more fit for its environment (p.81). **adaptive** (*adj*), **adapt** (*v*).

natural selection the process that according to Darwin's theory controls which members of a population of animals or plants will live to produce young and pass on their genes (p. 156) to the next generation.

adaptive radiation the development of new species (p.99) that takes place when the descendants of a taxon (p.99) evolve (↑) by natural selection (↑) in fitting themselves to various environments (p.81).

mutation (*n*) a discontinuous change in a gene (p. 156) or an organism (p.98) that can be inherited, i.e. passed on to its descendants. **mutate** (*v*).

ancestral (*adj*) referring to organisms (p.98) from which later organisms are descended.

ontogeny (*n*) the course followed by the life history of an individual animal or plant.

phylogeny (*n*) the course followed by the evolution (↑) of a species (p.99) or other taxonomic (p.99) group. **phylogenetic** (*adj*).

diversity (species) the range of variation that is shown by a species (p.99).

diversification (*n*) the process of becoming more diverse, that is, more different. **diversify** (*v*).

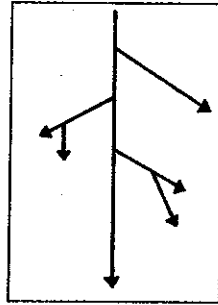
lineage (*n*) a line of descent from earlier members of the same or a similar group of animals or plants; a series of fossils that show a course of evolution (↑).

divergence (*n*) the development of a new population of organisms from an earlier one.

diverge (*v*), **divergent** (*adj*).

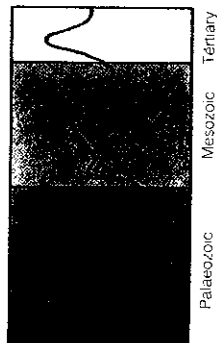
radiation (*n*) the evolutionary divergence (↑) of a group of species. **radiate** (*v*), **radiating** (*adj*).

extinction (*n*) the dying out of a (whole) group of animals or plants. **extinct** (*adj*).

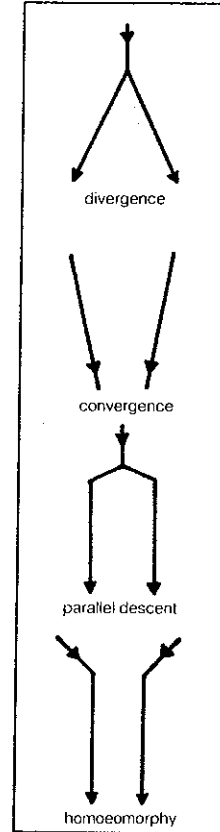


phylogenetic tree

extinctions and appearances of new forms during



+ 10 -



convergence (*n*) the development of similar forms in different groups of plants or animals at different places or at different times because of the effects produced by similar environments on their separate evolutions (↑). **convergent** (*adj*).

polyphyletic (*adj*) a group of organisms (p.98) is polyphyletic if its members have evolved (↑) from different series of earlier forms by convergent evolution (↑).

trend (*n*) the evolution (↑) of a particular structural feature within a group of organisms (p.98).

transient (*n*) a stage in the phylogeny (↑) of a species; a stage in any closely spaced evolutionary (↑) series (p.159).

homoeomorphy (*n*) the occurrence of similar forms (shapes) in members of the same phylum (p.99).

explosive evolution a diversification (↑) that for a time takes place much more rapidly than at other times; e.g. the very rapid evolution of the fishes in the late Silurian and early Devonian (p.114).

evolutionary burst = explosive evolution (↑).

quantum evolution the sudden appearance within a short space of geological time of large taxonomic (p.99) units, e.g. orders (p.99). See also **explosive evolution** (↑).

speciation (*n*) the production of new species (p.99) by the splitting or division of earlier species in the course of evolution (↑).

bioseries (*n*) an evolutionary (↑) series of fossils. It may be a series (p.159) of whole individuals or a series of specimens that show trends in particular features.

cladogenesis (*n*) the development of species (p.99) by division of the line of descent. See *diagram*.

cladistics (*n*) a cladistic classification is one that is based on the branching pattern (the *cladogram*) of the evolution of a group of animals. Groups that have separated from each other more recently are put closer together than those that have separated at earlier times. This type of classification is unlike those that have been used in the past.

stratigraphy (*n*) the study of stratified rocks (p.80), their nature, their occurrence, their relationships to each other and their classification.

stratigraphical, stratigraphic (*USA*) (*adj*).

historical geology the study of the history of the Earth. It includes stratigraphy (↑).

Uniformitarianism (*n*) the view that geological processes were of the same kind in the past as they are today and produced similar results.

See also **Catastrophism** (↓).

Catastrophism (*n*) the view, no longer held in geology, that the history of the Earth has to be explained by a series of violent events or catastrophes. See also **Uniformitarianism** (↑).

succession (*n*) the order in which rock-groups appear. When a succession is set out in the form of a table the beds (p.80) are shown with the oldest at the bottom and the youngest at the top.

superposition (*n*) the order in which rocks are placed one above the other. The *principle* or *law of superposition* is that in a layered succession (↑) of rocks the lower beds (p.80) will be the older and the upper beds will be the younger (unless the rocks have been turned upside down).

time plane a surface within a series of sedimentary rocks that marks a particular moment in geological time.

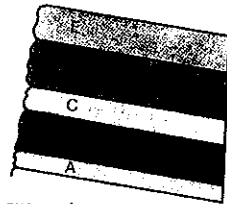
horizon (*n*) (1) a plane of stratification (p.80) that was once horizontal and continuous; (2) a time plane (↑) within a sedimentary series (↓) or a bed (p.80) (usually a thin bed) that contains characteristic fossils or has a characteristic lithology (p.85).

sequence (*n*) a succession (↑) of bedded rocks; the stratigraphical (↑) order in which beds appear.

cyclic sequence a sequence (↑) of sediments (p.80) repeated in a particular order, e.g. sandstone – shale – limestone. A cyclic sequence is commonly the result of marine transgression (p.119) and regression (p.119).

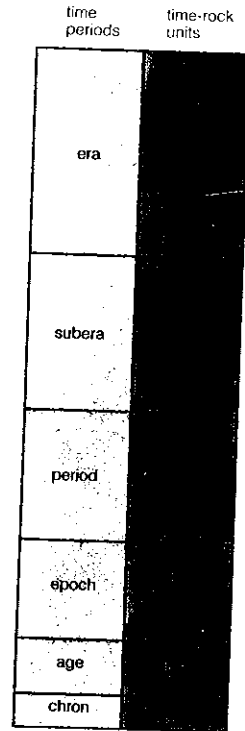
cycthem (*n*) a unit of a cyclic sequence (↑).

rhythmic sequence a cyclic sequence (↑) on a small scale.



succession

bed A is the oldest
bed E the youngest
(if not inverted)



aeon, eon (*n*) the largest division of geological time. An aeon is made up of several eras (↓).

era (*n*) a division of geological time; made up of several periods (↓) or sub-eras (↓).

sub-era (*n*) a division of an era (↑).

period (*n*) a large division of geological time; it corresponds to a system (↓).

epoch (*n*) a division of geological time; part of a period (↑); it corresponds to a series (↓).

age (*n*) a division of geological time; part of an epoch (↑); it corresponds to a stage (↓).

chron (*n*) the smallest division of geological time; part of an age.

chronostratigraphical (*adj*) a chronostratigraphical unit is a division of the geological column (↓) that is based on geological time.

See also **lithostratigraphical** (↓).

biostratigraphical (p.117).

system (*n*) one of the major stratigraphical (↑) divisions of the geological column (↑); it corresponds to a geological period (↑).

series (*n*) a stratigraphical division within a system (↑); it corresponds to an epoch (↑).

stage (*n*) a stratigraphical division within a series (↑); it corresponds to an age (↑).

lithostratigraphical (*adj*) a lithostratigraphical unit is one that is based on lithological (p.85) characters rather than on geological time or fossils. See also **chronostratigraphical** (↑).

biostratigraphical (p.117).

rock-stratigraphical (*adj*) = lithostratigraphical (↑).

group (*n*) a lithostratigraphical term (↑) for a rock unit consisting of two or more formations (↓) that are next to each other in a succession (↑) and are related to each other.

formation (*n*) a term for the basic lithostratigraphical (↑) division.

member (*n*) a lithostratigraphical (↑) term for a part of a formation (↑).

bed (*n*) the smallest lithostratigraphical (↑) division. See also p.80.

geological column a diagram that shows the divisions of geological time and the succession (↑) for a given area.

Precambrian, Pre-Cambrian (*n. adj*) the period of time before the Cambrian (↓), i.e. from the formation of the Earth until about 570 million years ago: about 4000 million years.

Proterozoic (*n. adj*) (1) one of two aeons (p. 113) into which the Precambrian (↑) is divided, ranging from 2500 to 570 million years ago. (2) the whole of the Precambrian.

Archaean (*n. adj*) (1) the earlier of two aeons (p. 113) into which the Precambrian (↑) is divided, covering the period from the formation of the Earth until 2500 million years ago; (2) the whole of the Precambrian.

basement complex, basement a general term for igneous (p. 62) or metamorphic (p. 90) rocks, usually Precambrian (↑), which cover a wide area and on which rest unmetamorphosed (p. 90) sediments of later age.

Phanerozoic (*n. adj*) the stratigraphical systems from the Cambrian (↓) to the Recent (↓).

Palaeozoic (*n. adj*) the era of geological time that ranges from 570 to 230 million years ago. It is divided into the Lower Palaeozoic, consisting of the Cambrian (↓), Ordovician (↓), and Silurian (↓) periods, and the Upper Palaeozoic, consisting of the Devonian (↓), Carboniferous (↓), and Permian (↓) periods.

Cambrian (*n. adj*) the earliest period of the Palaeozoic era, dating from about 570 million years ago to 500 million years ago.

Ordovician (*n. adj*) a period of the Palaeozoic Era (↑), dating from 500 to 435 million years ago.

Silurian (*n. adj*) a period of the Palaeozoic Era (↑), dating from 435 to 400 million years ago.

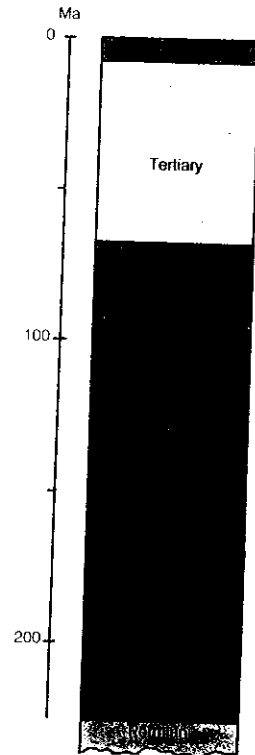
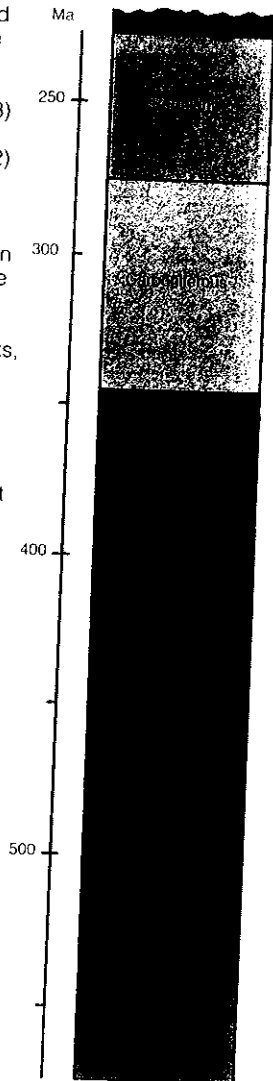
Devonian (*n. adj*) a period of the Palaeozoic Era (↑), dating from 400 to 345 million years ago.

Carboniferous (*n. adj*) a period of the Palaeozoic Era (↑), dating from 345 to 280 million years ago. In the USA it is divided into the Mississippian (below) and the Pennsylvanian (above).

Mississippian (*n. adj*) see **Carboniferous** (↑).

Pennsylvanian (*n. adj*) see **Carboniferous** (↑).

Permian (*n. adj*) the latest period of the Palaeozoic Era (↑), dating from 280 to 230 million years ago.



Mesozoic (*n. adj*) the era between the Palaeozoic (↑) and the Cainozoic (↓), ranging from 230 to 65 million years ago. It is made up of the Triassic, Jurassic, and Cretaceous periods.

Triassic (*n. adj*) the earliest period of the Mesozoic Era (↑), ranging from 230 to 195 million years ago.

Trias = Triassic (↑).

Jurassic (*n. adj*) one of the three periods of the Mesozoic Era (↑), ranging from 195 to 140 million years ago.

Cretaceous (*n. adj*) the youngest of the three periods of the Mesozoic Era (↑), ranging from 140 to 65 million years ago.

Cainozoic, Cenozoic (*n. adj*) the era of geological time that follows the Mesozoic (↑), ranging from 65 million years ago to the present. It is made up of the Tertiary and Quaternary sub-eras (↓).

Tertiary (*n. adj*) the sub-era between the Cainozoic era (↑) and the Quaternary sub-era (↓), ranging from 65 million years ago to 2 million years ago. It is divided into two periods, the Palaeogene and the Neogene, and five epochs: the Palaeocene, Eocene, Oligocene, Miocene, Pliocene, Pleistocene, and Holocene.

Palaeocene (*n. adj*) see **Tertiary** (↑).

Eocene (*n. adj*) see **Tertiary** (↑).

Oligocene (*n. adj*) see **Tertiary** (↑).

Miocene (*n. adj*) see **Tertiary** (↑).

Pliocene (*n. adj*) see **Tertiary** (↑).

Palaeogene (*n. adj*) the earlier of the two periods of the Tertiary sub-era (↑). It consists of the Palaeocene, Eocene, and Oligocene epochs (↑).

Neogene (*n. adj*) the later of the two periods of the Tertiary sub-era (↑). It consists of the Miocene and Pliocene epochs (↑).

Quaternary (*n. adj*) the period from 2 million years ago to the present; a subdivision (sub-era) of the Cainozoic Era (↑). It is divided into two epochs: the Pleistocene (↓) and Holocene (↓).

Pleistocene (*n. adj*) an epoch of the Quaternary sub-era (↑); the time of the last ice age.

Holocene (*n. adj*) the latest epoch of the Quaternary sub-era (↑); it includes the present time.

Recent = Holocene (↑).

orogenic period a period of mountain-building.
See also p. 132.

Caledonian (*adj*) relating to a period of mountain-building in Ordovician and Devonian times (p. 114). The general trend of the Caledonian structures is north-east – south-west.

Caledonides (*n*) the former range of mountains that was formed during the Caledonian orogeny (↑), reaching from Norway to Scotland and Ireland.

Hercynian (*adj*) relating to the period of mountain-building that took place in late Palaeozoic times (p. 114) in Europe.

Variscan (*adj*) (1) = Hercynian (↑); (2) relating to a period of mountain-building from the Carboniferous (p. 114) to the Triassic (p. 115).

Kimmerian (*adj*) relating to a period of mountain-building that took place in Jurassic times (p. 115) in Europe.

Alpine (*adj*) relating to the period of mountain-building in the Tertiary period (p. 115) that formed the Alps in Europe.

Taconic (*adj*) relating to a period of mountain-building that took place in late Ordovician times (p. 114) in North America.

Acadian (*adj*) relating to a period of mountain-building that took place in ? late Devonian to end Permian times (p. 114) in North America.

Appalachian (*adj*) relating to a period of mountain-building that took place in late Palaeozoic times in North America.

Laramide (*adj*) relating to a period of mountain-building that took place in late Cretaceous (? Jurassic) to early Eocene times (p. 115) in North America.

synorogenic (*adj*) taking place at the same time as a period of mountain-building.

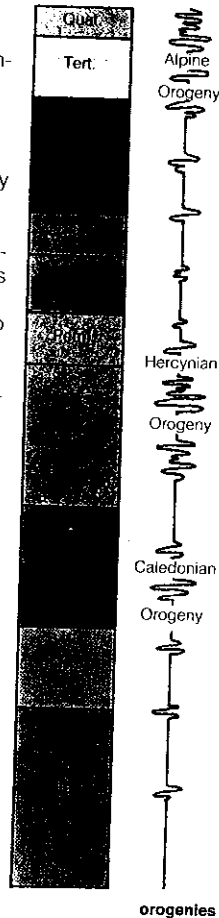
post-orogenic (*adj*) taking place after a period of mountain-building.

syntectonic (*adj*) taking place at the same time as a period of deformation (p. 122).

synkinematic (*adj*) = syntectonic (↑).

post-tectonic (*adj*) taking place after a period of deformation (p. 122).

postkinematic (*adj*) = post-tectonic (↑).



biostratigraphical (*adj*) a biostratigraphical unit is one that is based on fossils rather than on lithological (p. 85) characters or on geological time. See also **lithostratigraphical** (p. 113), **chronostratigraphical** (p. 113).

zone (*n*) a biostratigraphical (↑) division: a stratigraphical division (p. 111) with characteristic fossils. One of the fossils present – the zone fossil – gives the name to the zone. **zonal** (*adj*).

hemera (*n*) a small unit of geological time as marked by the rise and fall of a particular species fossil. The word is not now in common use. **hemeras**, -ai, -ae (*pl.*)

epibole (*n*) a stratigraphical term for the rocks deposited during a hemera (↑); i.e., the time-rock unit corresponding to a hemera. The word is not now in common use.

correlation (*n*) in stratigraphy, the matching of rocks of a particular age that are found in one place with other rocks found elsewhere. Fossils (p. 98) are generally used for stratigraphical (p. 112) correlation.

correlate (*v*).

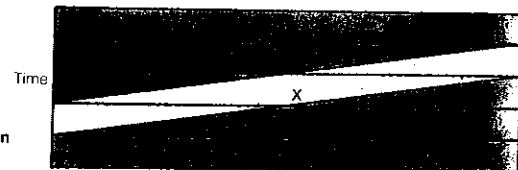
provenance (*n*) the source area of the materials that form a sedimentary rock; the nature of the rocks from which it has been formed.

facies (*n*) (*facies*) the general characters of a sedimentary rock, especially those that indicate the environment (p. 81) in which it was deposited.

lithofacies (*n*) a facies (↑) that is characterized by a particular rock type.

biofacies (*n*) a facies (↑) that is characterized by a particular assemblage (p. 100) of fossils.

diachronous (*adj*) 'across time'. A word used to describe a bed (p. 80) or a stratigraphical unit that is of different ages in different places and cuts across the time planes.



a diachronous formation
X is older than A than B