

## A

**abîme.** (French.) 1. An abyss. 2. A wide, deep shaft, in limestone, the walls of which are vertical or overhanging<sup>[10]</sup>.

**ablation.** The wearing away of ice or snow through the process of evaporation<sup>[16]</sup>.

**abney level.** Type of clinometer with a bubble tube used in cave survey to determine vertical angles<sup>[25]</sup>.

**abris sous roche.** (French.) See rock shelter.

**abseil.** 1. (n.) A controlled descent of a rope using friction obtained by either wrapping the rope around the body in a particular way or passing the rope through a carabiner or passing the rope through a descender<sup>[25]</sup>. 2. (v.) To do an abseil<sup>[25]</sup>.  
Synonym: rappel.

**absorption.** The process by which substances in gaseous, liquid or solid form dissolve or mix with other substances<sup>[22]</sup>.

**abyss.** Extremely great depth<sup>[16]</sup>.

**accelerated corrosion.** A localized concentration of solution intensity, produced by factors favoring greater aggressivity of the water in certain parts of the karstland creating differential solution rates and thereby a marked unevenness in the overall erosion of the karstland<sup>[19]</sup>. See also corrosion; alluvial corrosion.

**accessory mineral.** Mineral constituents of a rock occurring in very small amounts<sup>[16]</sup>.

**accidental** An animal accidentally living in a cave<sup>[25]</sup>.

**acclivity.** Ascending a slope<sup>[16]</sup>.

**accretion.** Land addition by sediment deposition of a stream<sup>[16]</sup>.

**accumulation.** Building of new land by addition of sedimentary deposits<sup>[16]</sup>.

**acetylene.** An inflammable hydrocarbon gas, C<sub>2</sub>H<sub>2</sub>, produced by water reacting with calcium carbide. When burned, yields carbon dioxide as well as light<sup>[25]</sup>.

**acid.** Any chemical compound containing hydrogen capable of being replaced by positive elements or radicals to form salts. In terms of dissociation theory, it is a compound which, on dissociation in solution, yields excess hydrogen ions. Acids lower the pH. Examples of acids or acidic substances are hydrochloric acid, tannic acid, and sodium acid pyrophosphate<sup>[6]</sup>.

**acidity.** The property of water having a pH below 4.5 that is caused by the presence of mineral acids. Usually expressed in equivalent amounts of calcium carbonate<sup>[16]</sup>. See also alkalinity; pH.

**acid mine drainage.** Acid waters originating from surface or underground mine workings<sup>[16]</sup>.

**acoustic log.** Geophysical borehole log measuring the speed of sound in rocks to determine porosity<sup>[16]</sup>.

**acoustic resistance.** The product of wave velocity and rock density indicating the

reflective power of a boundary between two strata<sup>[16]</sup>.

**activated charcoal, activated carbon.** A granular material usually produced by the roasting of cellulose base substances, such as wood or coconut shells, in the absence of air. It has an extremely porous structure and is used in water conditioning as an adsorbent for organic matter and certain dissolved gases<sup>[6]</sup>. It is especially useful for adsorbing tracer dyes.

**active cave.** 1. Cave containing a running stream. 2. Cave in which speleothems are growing. (Less common and less desirable usage.) Compare live cave<sup>[10]</sup>.

**active glacier.** Glacier in the stage of actively enlarging and moving as a result of accumulation of precipitation that exceeds the rate of ablation.

**active water.** Water with corrosive properties<sup>[16]</sup>.

**adaptation.** An inherited structural, functional, or behavioral characteristic that improves an organism's chances for survival in a particular habitat<sup>[23]</sup>. See also *mutation*.

**adiabatic.** The property of thermodynamic process with no heat exchange<sup>[16]</sup>.

**adjusted stream.** Stream flowing parallel to the strike of underlying beds<sup>[16]</sup>.

**adsorption.** Adherence of gas molecules, ions, or molecules in solution to the surface of solids<sup>[22]</sup>.

**adsorption isotherm.** A graphical representation of the relationship between the bulk activity of adsorbate and the amount adsorbed at constant temperature<sup>[22]</sup>.

**advection.** 1. The process whereby solutes are transported by the bulk mass of flowing fluid<sup>[6]</sup>. 2. Phenomenon of cool air mass intruding and interrupting evaporation and causing condensation due to heat loss<sup>[16]</sup>. See also convective transport.

**aeolianite.** See eolian calcarenite.

**aeration.** The process of bringing air into intimate contact with water, usually by bubbling air through the water to remove dissolved gases like carbon dioxide and hydrogen sulfide or to oxidize dissolved materials like iron compounds<sup>[6]</sup>.

**aeration, zone of.** See zone of aeration.

**aerial photograph.** Photograph of the landscape taken from an airplane. Synonym air photo. See also stereo aerial photographs.

**aerobic.** A property of aquatic life forms that can exist only in the presence of oxygen. See also anaerobic.

**age of caves.** The ages of individual caves may vary enormously. In most regions the youngest cave passages have reached their present dimensions during the last 10,000 years, or since the last Pleistocene glacial retreat. In higher latitudes most caves can be related to erosion during the later Pleistocene climatic variations of the last million years, and older caves have

largely been removed by continuing surface lowering. In tropical regions less interrupted erosion conditions have encouraged survival of older caves; the Mulu caves of Sarawak include large passages at least two million years old. Relict caves hundreds of millions of years old may survive in some buried limestones, but are commonly filled with younger sediments (see neptunian deposits), minerals or, very rarely, igneous rocks. These fill materials may themselves be dateable, either on the basis of contained fossil material (including pollen), by comparison with similar rock types that occur at the surface or by isotopic age determination methods identical to those applied to suitable surface rock materials. See also dating of cave sediments<sup>[9]</sup>.

**aggradation.** Land addition through sediment deposition<sup>[16]</sup>.

**aggrading river.** River that is actively elevating its bed by deposition of sediments<sup>[16]</sup>.

**aggregate.** Grain mixture loosely held together<sup>[16]</sup>.

**aggregation.** The formation of aggregates. In drilling fluids, aggregation results in the stacking of the clay platelets face to face; as a result, viscosity and gel strength decrease<sup>[6]</sup>.

**aggressive.** Referring to water which is still capable of dissolving more limestone, other karst rock, or speleothems<sup>[25]</sup>.

**aggressive water.** 1. Water having the ability to dissolve rocks. In the context of limestone and dolomite, this term refers especially to water containing dissolved

carbon dioxide to form carbonic acid or, rarely, other acids. 2. Quality of waters that attack metals and concrete chemically by dissolution<sup>[10]</sup>.

**aggressiveness.** A measure of the relative capacity of water to dissolve rock material. In the context of karstification and speleogenesis this usually concerns the dissolution of limestone or dolomite by the action of dissolved carbon dioxide (carbonic acid), though other acids may also be involved<sup>[9]</sup>.

**aguada.** (Spanish for watering place.) In Yucatán, shallow depression generally covering several hectares used for water supply<sup>[10]</sup>.

**A-horizon.** The topmost eluviated horizon of a soil profile<sup>[16]</sup>.

**aîle.** See aisle.

**air pocket, air bell.** 1. An enclosed air space between the water surface and the roof of a cave<sup>[10]</sup>. 2. Part of a flooded passage where the ceiling rises above the water level to create an air pocket isolated from the rest of the cave<sup>[9]</sup>.

**air separating tank.** A tank in which desorbed gases are separated from a liquid and evacuated by pumping<sup>[16]</sup>.

**air-space ratio.** The ratio of (a) the volume of water that can be drained from a saturated soil or rock under the action of force of gravity to (b) the total volume of voids<sup>[22]</sup>.

**aisle.** An elongated high narrow traversable passage in a cave<sup>[10]</sup>. See also crawl,

crawlway; corridor; passage. Synonyms: (French.) *aisle, aîle*; (German.) *Kluft*; (Greek.) *farangothes ipoyios thiavasis*; (Russian.) *hod*; (Spanish.) *laminador vertical*; (Turkish.) *dar geçit*; (Yugoslavian.) *niša*.

**albedo.** The ratio of reflected radiation to total radiation on a natural surface<sup>[16]</sup>.

**algal limestone.** Type of limestone formed by calcium secreting algae<sup>[16]</sup>.

**alkali flat.** A salt covered or heavily saline depression in an arid environment<sup>[16]</sup>.

**alkaline.** Any of various soluble mineral salts found in natural water and arid soils having a pH greater than 7. In water analysis, it represents the carbonates, bicarbonates, hydroxides, and occasionally the borates, silicates, and phosphates in the water<sup>[6]</sup>.

**alkalinity.** The property of water to neutralize acids. Usually expressed in terms of calcium carbonate equivalents<sup>[16]</sup>. See also acidity; pH.

**allochthonous.** Said of material originating from a different locality than the one in which it has been deposited<sup>[16]</sup>. See also autochthonous.

**allochthonous drainage.** Less common synonym for allogenic drainage<sup>[9]</sup>.

**allogene stream.** A surface-water course flowing over a karst terrane, but fed by a spring (or springs) issuing from a non-karst terrane<sup>[20]</sup>. Synonyms: (French.) *rivière allogène (cours d'eau)*; (German.) *allochthoner Fluss* (all. *Wasserlauf*);

(Greek.) *allothigenes ryax*, or *potamos*; (Italian.) *corso d'acqua allogeno*; (Spanish.) *río alóctono*; (Turkish.) *karst disi kökenli akarsu*; (Yugoslavian.) *alogen a rijeka, alogena reka*.

**allogenic.** Formed or generated elsewhere, usually at a distant place<sup>[1]</sup>. See also autogenic; recharge, allogenic; recharge, autogenic.

**allogenic drainage.** Underground karst drainage that is derived entirely from surface run-off that originates on adjacent non-karstic, generally impermeable, rocks. Also allochthonous drainage. See also autogenic drainage<sup>[9]</sup>.

**allogenic valley.** A karst valley incised by a watercourse originating on impervious rock with a volume sufficient for it to traverse a limestone area on the surface. The valley is incised from the limestone contact and with the passage of time the river is increasingly likely to pass underground as the waters enlarge joints. Occasionally such a valley may represent the large-scale collapse of the cavern system along a subterranean stream or the enlarging of a series of karst windows<sup>[19]</sup>.

**alluvial.** Pertaining to or composed of alluvium or deposited by a stream or running water<sup>[6]</sup>. Also applies to material lining the floor of a cave and deposits at the mouth of a spring.

**alluvial apron.** A fan-like plain from the deposition of glacial outwash<sup>[16]</sup>.

**alluvial channel.** River or stream channel bed composed of unconsolidated alluvial material<sup>[16]</sup>.

**alluvial corrosion.** Greater intensity of solution, caused by the passage of water through unconsolidated deposits rich in carbon dioxide, thus increasing aggressivity<sup>[19]</sup>. See also corrosion, accelerated corrosion.

**alluvial fan.** A fan-like deposit of detrital material from steep mountain slopes<sup>[16]</sup>.

**alluvial plain.** A plain formed by the deposition of water borne sediments<sup>[16]</sup>.

**alluvial veneer.** A very thin cover of water borne sediments<sup>[16]</sup>.

**alluvium.** A general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta or as a cone or fan at the base of a mountain slope<sup>[6]</sup>.

**alpine karst.** 1. Karst formed at high latitude, or in polar regions regardless of altitude. 2. Almost synonymous with glaciokarst but restricted to areas of high altitude and relief<sup>[9]</sup>. Synonyms: glaciokarst; nival karst.

**alternative.** Adjective used to designate an intake or resurgence operating only during rainy seasons; in some areas reversible; equivalent to intermittent. Also used as a noun<sup>[10]</sup>.

**alveolar.** 1. Consisting of a honeycomb shape<sup>[16]</sup>. 2. A specific erosional pattern resulting in a cellular structure<sup>[16]</sup>. See also alveolization.

**alveolization.** (From the Latin word ‘alveolatus,’ meaning hollowed out.) Pitting of a rock surface produced by wind loaded with sand, by water charged with carbonic acid, or by plant roots<sup>[10]</sup>. See also alveolar. Synonyms: (French.) *alvéolisation*; (German.) *Aeolisation* ? *Wabenverwitterung*; (Greek.) *kypselothis epiphania*; (Italian.) *alveolizzazione*; (Spanish.) *alveolizacion*; (Turkish.) *çukurlaşma*; (Yugoslavian.) *alveolizacija*.

**ammeter.** A meter used to measure the flow of water in a stream channel. Synonym: current meter<sup>[16]</sup>.

**amorphous silica.** Silica with no definite crystalline structure<sup>[16]</sup>.

**analysis, chemical.** Laboratory procedure in water quality determination to identify chemical constituents<sup>[16]</sup>.

**analysis, complete chemical analysis.** Chemical analysis of a water sample for physical, chemical, and bacteriological constituents<sup>[16]</sup>.

**analysis, core.** Petrophysical analysis of a rock core acquired through the process of boring a hole in rock with the intention of producing a core of rock as opposed to chips<sup>[16]</sup>.

**analysis, morphometric.** A geodetic and geometric description of basin, stream network, or sinkhole plain, the purpose of which is to determine the frequency and hierarchy of occurrences<sup>[16]</sup>.

**analysis, sieve.** Mechanical grain size analysis by sieving an unconsolidated material through a series of sieves<sup>[16]</sup>.

**anastomosis.** 1. The development of a network of branching, intersecting, and rejoining channels in a two dimensional system. Anastomosing tubes, or cave anastomoses, which are generally formed due to dissolution by slow, poorly directed, phreatic flow along a bedding-plane parting or fracture in limestone, represent an important element in the early stages of cave development. Individual anastomoses most commonly have a diameter of approximately 100 mm and networks may contain hundreds of tubes. Most anastomoses are abandoned when one channel offers preferential flow conditions so that it increases in size at the expense of others. Such abandoned or relict anastomoses are commonly only exposed by subsequent wall or roof collapse<sup>[32]</sup>. 2. A network of tubular passages or holes in a cave or in a cave or solution-sculptured rock. A complex of many irregular and repeatedly connected passages<sup>[9, 21]</sup>. Synonym: labyrinth; (French.) *anastomose*; (German.) *Labyrinth*; (Greek.) *anastomosis*; (Italian.) *anastomosi*; (Russian.) *labirint*; (Spanish.) *anastomosis*; (Turkish.) *geçit şebekesi*; (Yugoslavian.) *splet kanala*.

**anastomotic cave pattern.** A type of maze cave consisting of tubular passages or holes in a cave or in a solution-sculptured rock. A complex of many irregular and repeatedly connected passages. Synonym: labyrinth.

**anchor.** A fixed object used to secure a man whilst operating a safety rope or for attaching equipment such as ladders or ropes<sup>[25]</sup>.

**anchor ice, ground ice.** Ice that is temporarily attached to the bottom of a river<sup>[16]</sup>.

**anemolite.** A helictite in which the eccentricity is ascribed to the action of air currents<sup>[10]</sup>. The word is derived from wind-control theory of helictite formation<sup>[9]</sup>.

**anemometer.** A device used to measure wind speeds<sup>[16]</sup>.

**angle of contact, wetting angle.** The angle between the liquid phase and solid boundary measured through the liquid phase<sup>[16]</sup>.

**angle of repose.** The natural slope of unsupported granular material<sup>[16]</sup>.

**anglesite.** A cave mineral —  $\text{PbSO}_4$ <sup>[11]</sup>.

**angular.** The property of unconsolidated grains with sharp edges<sup>[16]</sup>.

**angular unconformity.** A geological unconformity with marked difference in dip of the superimposed series<sup>[16]</sup>.

**anhydride.** Anhydrous calcium sulfate,  $\text{CaSO}_4$ <sup>[16]</sup>.

**anion.** A negatively charged ion that migrates to an anode, as in electrolysis<sup>[6]</sup>.

**anion exchange.** Ion exchange process in which anions in solution are exchanged for other anions from an ion exchanger<sup>[6]</sup>.

**anisotropic.** The property of aquifer systems displaying different hydrological

properties in different directions<sup>[16]</sup>. See also anisotropy; anisotropic mass.

**anisotropic mass.** A mass having different properties in different directions at any given point<sup>[22]</sup>.

**anisotropic steering.** Anisotropic structures (anisotropies) in the rock like schistosity, inclusions and fractures which can deviate or 'steer' the direction of fractures subsequently developed.

**anisotropy.** The condition of having different properties in different directions<sup>[22]</sup>.

**annual frost zone.** The top layer of ground subject to annual freezing and thawing<sup>[16]</sup>.

**annual mean.** The mean value taken over all events that have occurred during a year such as precipitation, river stages, water-table levels<sup>[16]</sup>.

**annulus.** The annular space between drill pipe and casing or between casing and the borehole wall<sup>[16]</sup>.

**anomaly.** The deviation from normally expected findings, especially in exploration geophysics indicating a change in subsurface environmental conditions<sup>[16]</sup>.

**antecedent precipitation index.** A precipitation index that is based on the amount of previous precipitations<sup>[16]</sup>.

**antecedent-soil moisture.** The degree of water saturation in the soil prior to a precipitation event<sup>[16]</sup>.

**antecedent stream.** A stream having established its course before occurrence of orogenic events that would later alter the general drainage pattern<sup>[16]</sup>.

**antenna** (plural antennae). A feeler; an appendage, sensory in function, that occurs in pairs on the heads of crustaceans, insects, and certain other animals<sup>[23]</sup>.

**anthodite.** 1. Radiating crystals of aragonite, mostly sharp needles 1–20 mm long. They occur sporadically in some caves but they may also be spectacularly abundant, with clean white crystals growing all over the rock and calcite surfaces. Carlsbad Caverns (USA) and Grotte de Moulis (France) have fine anthodite displays<sup>[9]</sup>. 2. A cave formation composed of feathery or radiating masses of long needlelike crystals of gypsum or aragonite, which radiate outward from a common base<sup>[10]</sup>. See also cave flower.

**anthropocentric definitions.** Definitions of caves or parts of caves that include accessibility by human explorers as one of their limiting conditions. Most well known among these is the definition published by the International Speleological Union, that 'A cave is a natural underground opening in rock that is large enough for human entry' (see proto-caves)<sup>[9]</sup>.

**anticlinal valley.** A valley that is established along the axis of an eroded anticline<sup>[16]</sup>.

**anticline.** Upfolded stratum<sup>[16]</sup>.

**apthitalite.** A cave mineral —  
(K,Na)<sub>3</sub>Na(SO<sub>4</sub>)<sub>2</sub><sup>[11]</sup>.

**apparent ground-water velocity.** See  
specific discharge.

**appendage.** An arm or other limb that  
branches from an animal's body<sup>[23]</sup>.

**approach segment.** That part of a  
hydrograph curve before onset of  
precipitation<sup>[16]</sup>. See also hydrograph.

**apron.** A smooth bulging mass of  
flowstone covering sloping projections  
from walls of caves or limestone cliffs<sup>[10]</sup>.

**aquatic.** Living in water. Aquatic cave  
animals include amphipods, isopods,  
crayfish, planarians, fish, and blind  
salamanders<sup>[23]</sup>. See also *terrestrial*;  
*marine*.

**aqueduct.** A conduit to convey water,  
usually above ground<sup>[16]</sup>.

**aquiclude.** A formation which, although  
porous and capable of storing water, does  
not transmit it at rates sufficient to furnish  
an appreciable supply for a well or spring.  
See also confining unit<sup>[22]</sup>.

**aquifer.** 1. A formation, group of  
formations, or part of a formation that  
contains sufficient saturated permeable  
material to yield significant quantities of  
water to wells and springs<sup>[6]</sup>. 2. A  
ground-water reservoir. 3. Pervious rock  
that is completely saturated and will yield  
water to a well or spring. Historically the  
term has been applied to beds favoring  
early cave development, probably

synonymous with some inception  
horizons<sup>[18]</sup>.

**aquifer, artesian.** A confined aquifer  
where the potentiometric surface rises  
above the top of the aquifer bed<sup>[16]</sup>.

**aquifer, coastal.** An aquifer in a coastal  
region open to salt-water intrusions<sup>[16]</sup>.

**aquifer, flowing artesian.** An artesian  
aquifer in which the water, under  
hydrostatic pressure rises above the land  
surface.

**aquifer, karst.** An aquifer in which the  
flow of water is or can be appreciable  
through one or more of the following:  
joints, faults, bedding-plane partings, and  
cavities — any or all of which have been  
enlarged by dissolution<sup>[18]</sup>.

**aquifer, leaky.** An aquifer overlain or  
underlain by semipermeable strata from  
or into which water will flow<sup>[16]</sup>.

**aquifer stimulation.** A type of  
development that is done in  
semiconsolidated and completely  
consolidated formations to alter the  
formation physically to improve its  
hydraulic properties<sup>[6]</sup>.

**aquifer storage.** Gas storage in an  
aquifer<sup>[16]</sup>.

**aquifer system.** A body of permeable and  
poorly permeable material that functions  
regionally as a water-yielding unit; it  
comprises two or more permeable beds  
separated at least locally by confining  
beds that impede ground-water movement  
but do not greatly affect the regional



hydraulic continuity of the system; includes both saturated and unsaturated parts of permeable material<sup>[22]</sup>.

**aquifer test.** A test to determine hydrologic properties of the aquifer involving the withdrawal of measured quantities of water from or addition of water to a well and the measurement of resulting changes in head in the aquifer both during and after the period of discharge or additions<sup>[6]</sup>.

**aquifere epikarstique.** See epikarst zone.

**aquifuge.** A formation which has no interconnected openings or interstices and therefore neither stores nor transmits water<sup>[22]</sup>. See also confining unit.

**aquitard.** A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer; a leaky confining bed. It does not readily yield water to wells or springs, but may serve as a storage unit for ground water<sup>[22]</sup>. See also confining unit.

**aragonite.** 1. A relatively rare form of calcium carbonate ( $\text{CaCO}_3$ ), chemically identical to the more common calcite but of orthorhombic crystal form. Its pure form is metastable in the cave environment, where calcite forms preferentially. It is relatively abundant in some caves due to the presence of impurities, notably strontium, that distort the carbonate lattice and favor aragonite growth. The commonest form seen in caves as small radiating crystals (anthodites) that develop in humid caves, where surfaces are covered by a moisture film but not by flowing water. 2. A

mineral composed of calcium carbonate,  $\text{CaCO}_3$ , like calcite but differing in crystal form<sup>[10]</sup>. 3. An unstable orthorhombic carbonate mineral,  $\text{CaCO}_3$ <sup>[16]</sup>.

**ardealite.** A cave mineral —  $\text{Ca}_2(\text{SO}_4)(\text{HPO}_4)\cdot 4\text{H}_2\text{O}$ <sup>[11]</sup>.

**area of influence of a well.** The area surrounding a pumping or recharging well within which the potentiometric surface has been changed<sup>[22]</sup>.

**arête and pinnacle karst.** A landscape of naked reticulated raw-topped ridges having almost vertical slopes and a relief of as much as 120 meters. The ridges rise above forest-covered corridors and depressions. Found in New Guinea at elevations of 2,000 meters and more<sup>[10]</sup>. Both pinnacle karst and arête karst are varieties of limestone landscape formed under equatorial rain forest cover. They are characterized by vertical sided blades of bare rock fretted by dissolution<sup>[9]</sup>.

**argillaceous.** The property of rocks containing clay in non-negligible proportions<sup>[16]</sup>.

**argillaceous limestone.** Limestone containing considerable amounts of clay<sup>[16]</sup>.

**arid.** The property of dry climates and regions with a net deficiency of moisture<sup>[16]</sup>.

**arrival time.** 1. The time of arrival in subsurface flow tracing for the first tracer pulse to arrive at a discharge location. 2. The time of arrival in geophysics for the

first seismic wave to arrive at a geophone<sup>[16]</sup>.

**artefact.** A product of human manufacture or art, e.g. tools of bone, stone, etc., paintings, engravings. In caves, tools are often buried in sediment. (Scientific attention should be drawn to the finding of artefacts in caves<sup>[25]</sup>.)

**artesian.** Synonymous with confined.

**artesian aquifer.** Synonymous with confined aquifer. See aquifer, artesian.

**artesian flow.** Flow through a confined aquifer where the elevation of the overlying aquiclude is locally depressed so that the entire aquifer is saturated and the flow is under hydrostatic pressure. Some maze cave development in cavernous limestones may be due to artesian flow, which is commonly related to synclinal fold structures<sup>[9]</sup>.

**artesian spring.** See spring, artesian.

**artesian well.** A well deriving its water from a confined aquifer in which the water level stands above the ground surface<sup>[6]</sup>. Synonym: flowing artesian well.

**arthropods.** Animals with jointed legs and hard external skeletons (exoskeletons). The group includes insects, crustaceans, spiders, millipedes, and several other types of animals commonly found in caves<sup>[23]</sup>.

**artificial discharge.** The discharge of ground water by pumping wells<sup>[16]</sup>.

**artificial recharge.** Recharge at a rate greater than natural, resulting from deliberate or incidental human activities<sup>[6]</sup>.

**ascender.** A mechanical device used by cavers who are either ascending or are descending through a vertical opening in a cave (e.g. vadose shaft) that uses a cam to grip a rope while downward pressure is being applied to the device<sup>[13]</sup>. See also mechanical ascender; prusiking; prusik knot.

**association.** A relatively stable community of different species living in a characteristic habitat<sup>[25]</sup>.

**atmometer.** An instrument used to measure evaporation intensities<sup>[16]</sup>.

**atmosphere.** A gaseous envelope of the earth that contains and transports air and water in vapor and condensed form<sup>[16]</sup>.

**attapulgitic clay.** A colloidal, viscosity-building clay consisting of hydrous magnesium aluminum silicates and used principally in salt-water drilling fluids<sup>[6]</sup>.

**attrition.** The wearing away of rocks by friction<sup>[16]</sup>.

**auger.** A rotary drilling device where the dry cuttings are removed continuously by helical grooves on the drill pipe<sup>[16]</sup>.

**aurichalcite.** A cave mineral —  
 $(\text{Zn,Cu})_5(\text{CO}_3)_2(\text{OH})_6$ .

**autochthonous.** Property pertaining to sedimentary material originating and

deposited at about the same location<sup>[16]</sup>.  
See also allochthonous.

**autochthonous drainage.** Less common  
synonym for autogenic drainage<sup>[9]</sup>.

**autogenic, authigenic.** Formed or  
generated in place<sup>[1]</sup>. See also allogenic;  
recharge, autogenic; recharge, allogenic.

**autogenic drainage.** Underground karst  
drainage that is derived entirely by  
absorption of meteoric water into the  
karst rock surface<sup>[9]</sup>. Synonym:  
autochthonous drainage. See also  
allogenic drainage.

**available water.** The water available to  
plants in the soil zone as defined by the  
interval between field capacity and  
wilting point<sup>[16]</sup>.

**aven.** 1. A hole in the roof of a cave  
passage that may be either a rather large  
blind roof pocket or a tributary inlet shaft  
into the cave system. A feature described  
as an aven when seen from below may  
equally be described as shaft when seen  
from above, and the naming of such a  
feature commonly depends purely upon  
the direction of exploration. Many avens  
close upwards to impenetrable fissures  
but may still be important hydrological  
routes; few caves are without them. In  
parts of France, aven is equivalent to the  
British term, pothole<sup>[9]</sup>. 2. (French.) A  
vertical or highly inclined shaft in  
limestone, extending upward from a cave  
passage, generally to the surface; smaller  
than an abîme. Commonly related to  
enlarged vertical joints. Compare cenote;  
natural well; pothole. 3. (British.) A  
vertical extension from a shaft in a

passage or chamber roof that tapers  
upward rather like a very elongate  
cone<sup>[10]</sup>. Compare dome pit.

**average interstitial velocity.** See velocity,  
average interstitial.

**azimuth.** The true bearing of a survey line,  
determined by measurement from an  
accurate survey or by observations of sun  
or stars<sup>[25]</sup>.

**azonal soil.** Soils without distinct layering  
in horizons<sup>[16]</sup>.

**azurite.** A cave mineral —  
 $\text{Cu}(\text{CO}_3)_2(\text{OH})_2$ <sup>[11]</sup>.

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