

## C

**caballing.** The mixing of two water masses to produce a blend that sinks because of it is denser than its original components. This occurs when two water masses have the same density but different temperatures and salinities.

**cable ladder.** A ladder used in vertical caving that is made of two parallel cables with metal rungs held in place on the cables with metal tubes crimped to the cables<sup>[13]</sup>.

**cable way.** A cable stretched across a river from which a cable car is suspended to allow for stream discharge measurements<sup>[16]</sup>.

**caisson.** A protective chamber for the excavation of water submerged unconsolidated sediments<sup>[16]</sup>.

**calanque.** (French.) 1. Cove or small bay. 2. A valley excavated in limestone or formed by collapse of the roof of a cave and subsequently submerged by a rise in sea level<sup>[10]</sup>.

**calc-** Prefix meaning limy; containing calcium carbonate<sup>[10]</sup>.

**calcarenite.** 1. Limestone or dolomite composed of coral or shell sand or of grains derived from the disintegration and erosion of older limestones. Size of particles ranges from 1/16 to 2 millimeters<sup>[10]</sup>. 2. A carbonate rock that consists predominantly (>50%) of sand-sized calcite (or dolomite) particles. Many of the particles are the angular or degraded fragments of fossil shells<sup>[9]</sup>.

**calcareous.** 1. Containing calcium carbonate<sup>[10]</sup>. 2. Descriptive of a rock that contains calcium carbonate<sup>[9]</sup>.

**calcareous tufa.** See sinter.

**calcification.** Replacement of the original hard parts of an animal or plant by calcium carbonate<sup>[10]</sup>.

**calcilutite.** 1. Clastic limestone or dolomite in which the grains have an average diameter of less than 1/16 millimeter; calcareous mudstone<sup>[10]</sup>. 2. A carbonate rock that consists predominantly (>50%) of silt and/or clay size calcite (or dolomite) particles<sup>[9]</sup>.

**calcirudite.** A fragmental limestone in which the particles are generally larger than 2 millimeters<sup>[10]</sup>.

**calcite.** 1. The commoner, more stable, mineral form of calcium carbonate,  $\text{CaCO}_3$ . It is the dominant component of all limestones and, due to its dissolution and reprecipitation by natural waters at normal temperatures, it is also the dominant mineral of chemical cave deposits including stalactites and stalagmites. It is white or colorless when pure but may be stained, most commonly to yellows and browns, by included impurities such as iron oxides. Its uninterrupted growth in a pool may allow development of good crystals, shaped as elongate scalenohedral pyramids of trigonal habit. Growth in stalactites and stalagmites is either in masses of fine parallel or radiating needles, or in a mosaic of larger rhombic crystals, easily identified by their well developed cleavage surfaces. Calcite is also the

dominant vein mineral in limestones<sup>[9]</sup>. 2. A mineral composed of calcium carbonate (CaCO<sub>3</sub>) like aragonite but differing in crystal form; the principal constituent of limestone and other speleothems<sup>[10]</sup>.

**calcite bubble.** A hollow sphere formed by the deposition of calcite around a gas bubble; the interior is smooth, and the exterior consists of small jagged crystals<sup>[10]</sup>.

**calcite flottante.** (French.) See floe calcite.

**calcite raft.** A veneer of reprecipitated calcite forming a sheet over all or part of the surface of a static cave pool in conditions favoring the release of carbon dioxide<sup>[19]</sup>.

**calc-sinter.** See sinter.

**calcium carbonate.** Naturally occurring compound with the chemical formula CaCO<sub>3</sub>. It occurs commonly as the mineral calcite and less commonly as aragonite, and is the major component of carbonate rocks including limestone and marble. It also forms the matrix or cement that holds together many sandstones and other sedimentary rocks<sup>[9]</sup>. See also dolomite.

**calcrete.** (South African.) See caliche.

**calibration.** The experimental evaluation of the scale readings of an instrument against an absolute standard<sup>[16]</sup>.

**caliche.** 1. (Chilean and Peruvian.) A natural deposit of nitrates and other salts precipitated at the soil surface. 2.

(Mexico and Southwestern United States.) Indurated calcium carbonate and other salts found in the soil at the surface in arid and semiarid regions, generally formed by evaporation of lime-bearing waters drawn to the surface by capillary action. 3. In some areas, refers to hardpan resulting from concentration of carbonate in the soil by downward leaching and reprecipitation<sup>[10]</sup>. 4. A deposit of precipitated minerals, mainly calcite or gypsum or both, formed in the soil or near-surface layers in arid and semi-arid zones at the horizon where ascendant capillary water evaporates and salts held in solution are deposited. 5. A similar deposit, formed by precipitation of salts leached from near-surface material and reprecipitated at shallow depths from downward moving waters<sup>[20]</sup>. Synonyms: (French.) *croûte*; (German.) *Kalkkruste*, *Ca-Horizont*; (Greek.) *apóthema oriktón aláton*; (Italian.) *caliche*; (Spanish.) *caliche*; (Turkish.) *kaliçi*. See also hardpan; havara; kafkalla; kankar; kunkar; nari; calcrete.

**callow.** (English.) Top or rubble bed of a quarry.

**canal seepage loss.** Water lost to the subsurface by seepage through the channel bottom or walls<sup>[16]</sup>.

**canale.** (Italian.) Long drowned valley on the Dalmatian coast. Some canali may be drowned poljes<sup>[10]</sup>.

**cáno.** (Spanish.) Stream. See also stream.

**canopy.** 1. Overhanging flowstone that projects from a cave wall. It may be a remnant of a once continuous false floor

or a mass of flowstone that has built steadily outwards to create its own overhang<sup>[9]</sup>. 2. A compound cave formation consisting of flowstone hanging from a sloping wall projection and forming a fringe of shawls or stalactites on the outer edge<sup>[10]</sup>.

**canyon.** 1. A steep-walled chasm, gorge, or ravine cut by running water. 2. A chasm that has been formed by a cave stream. 3. A valley formed by collapse of the roof of a long fairly straight cave; a karst valley<sup>[10]</sup>. Related to corridor. Synonyms: (French.) *canyon, gorge, cañon*; (German.) *Schlucht, Canyon*; (Greek.) *pharangi*; (Italian.) *forra, gola, orrido, canyon*; (Russian.) *kanjon*; (Spanish.) *cañón, garganta*; (Turkish.) *boğaz*; (Yugoslavian.) *klanac, sutjeska, soteska, vintgar*. See also bogaz; chasm; gorge; ravine.

**canyon passage.** 1. A tubular passage (cave) that is formed by underground streams following gently tilted bedding-plane partings or fractures and are eroding channels downward through the rock. Their ceiling heights are greater than their widths. They are similar to surface canyons, but they possess roofs and are generally the same distance apart at the top as they are at the bottom. In Mammoth Cave, most are narrow and winding and may achieve dimensions of 50 feet wide by 100 feet high. If a canyon passage begins forming on an old tube passage, then a keyhole passage may result<sup>[15]</sup>. 2. Also known as vadose canyons, these are cave passages, most commonly formed by continued floor entrenchment or incision, by a free flowing vadose stream. The passage

width at any particular level is determined by the flow of the formative stream, the rate of its downcutting and the effects of any subsequent collapse. Canyon height reflects the stream's downcutting history. It depends upon the vertical distance available for erosional descent to the local base level and the time that erosional downcutting has been active, as well as upon the more obvious but less important influences of flow rate and erosional capacity. Vadose canyons commonly twist and meander sharply, while maintaining roughly parallel vertical sides. In contrast to some meanders in surface streams, underground meanders must generally be imprinted on a bedding plane before entrenchment of the canyon begins. Narrow canyon passages, commonly less than 1 m wide and more than 20 m high, are a particular feature of deep alpine caves. Perhaps the largest canyon passage in the world is that in Škocjanske Jama, Slovenia, which is over 100 m high and 50 m wide<sup>[9]</sup>. See paragenetic cave. See also keyhole passage; passage; tubular passage; vertical shafts.

**capacity.** The property to contain a certain volume or mass<sup>[16]</sup>.

**capacity, carrying.** The capacity of a watercourse to transport solids<sup>[16]</sup>.

**capacity curve.** A graphic presentation of the rate of discharge in a pipe or conduit or through porous material<sup>[16]</sup>.

**capacity, entrance.** The property of a soil to let water infiltrate<sup>[16]</sup>.

**capacity, field; field-carrying; capillary.**

Soil moisture retained by capillarity and not removable by gravity drainage<sup>[16]</sup>.

Synonym: specific retention.

**capacity, ground-water.** 1. The ability of soil or rock materials to hold water. The yield of a pump, well, or reservoir.

**capacity, hydraulic.** The ability of a current of water or wind to transport detritus, as shown by the amount measured at a point per unit of time.

**capacity, infiltration.** The maximum rate at which a soil can absorb precipitation for given conditions<sup>[16]</sup>.

**capacity, self-cleaning.** The capacity of a river to clean its water from pollutants over a given length of water course<sup>[16]</sup>.

**capacity, specific.** The ratio of well discharge to corresponding discharge<sup>[16]</sup>.

**capacity, storage.** 1. The ability of an aquifer to store water<sup>[16]</sup>. 2. The capacity of rivers to store water in their own channels<sup>[16]</sup>.

**capacity, total.** The maximum rate of yield of a well<sup>[16]</sup>.

**capacity, transmission.** The property of a porous medium to conduct fluid<sup>[16]</sup>.

**capacity, well.** The rate at which a well will yield water<sup>[16]</sup>.

**capillarity.** The action by which a fluid, such as water, is drawn up (or depressed) in small interstices or tubes as a result of surface tension.

**capillary action.** The movement of water in the interstices of a porous medium due to capillary forces<sup>[22]</sup>. Synonymous with capillarity, capillary flow, and capillary migration.

**capillary attraction.** The adhesive force between a liquid and a solid in capillarity.

**capillary condensation.** The formation of rings of pendular water around point contacts of grains, and, when the rings around adjacent contacts become large enough to touch.

**capillary conductivity.** 1. The property of an unsaturated porous medium to transmit liquid<sup>[22]</sup>. 2. Coefficient which expresses the extent to which an unsaturated permeable medium allows flow of water through its interstices, under a unit gradient of capillary potential<sup>[22]</sup>.

**capillary fringe.** The lower subdivision of the unsaturated zone immediately above the water table in which the interstices are filled with water under pressure less than that of the atmosphere, being continuous with the water below the water table but held above it by capillary forces<sup>[22]</sup>.

**capillary fringe zone.** The zone above the free water elevation in which water is held by capillary action.

**capillary head.** The potential, expressed in head of water, that causes the water to flow by capillary action<sup>[22]</sup>.

**capillary interstice.** An interstice small enough to hold water by surface tension at an appreciable height above a free water surface, yet large enough to prevent

molecular attraction from extending across the entire opening.

**capillary migration.** See capillary action.

**capillary movement.** The rise of water in the subsoil above the water table by capillarity.

**capillary percolation.** See imbibition.

**capillary potential.** The scalar quantity that represents the work required to move a unit mass of water from the soil to a chosen reference location and energy state<sup>[22]</sup>.

**capillary pressure.** The difference in pressure across the interface between two immiscible fluid phases jointly occupying the interstices of a porous medium caused by interfacial tension between the two phases<sup>[22]</sup>.

**capillary rise.** The height above a free water surface to which water will rise by capillary action<sup>[22]</sup>. Synonymous with height of capillary rise.

**capillary stalagmite.** Hollow stalagmite formed by saturated karst water pushed up through capillaries and small cracks in a sinter crust covering permeable fluvial deposits on the floor of a cave; first reported from Cuba, where such stalagmites are composed of aragonite<sup>[10]</sup>.

**capillary tension.** See moisture tension.

**capillary water.** 1. Water held in the soil above the phreatic surface by capillary forces<sup>[22]</sup>. 2. Soil water above

hygroscopic moisture and below the field capacity<sup>[22]</sup>.

**carabiner.** An oval of steel or aluminum with a movable spring-loaded gate on one side. A locking carabiner is one where the gate is threaded and has a ring that can be threaded over the gate opening to prevent it from opening<sup>[13]</sup>. Synonyms: karabiner; krab.

**carbide, calcium carbide.** A compound ( $\text{CaC}_2$ ) of grayish color that reacts with water to produce acetylene gas and calcium hydroxide  $[\text{Ca}(\text{OH})_2]$ <sup>[13]</sup>. Commonly used by cavers and miners earlier in this century as a means of providing light in caves or mines. Some cavers still prefer carbide lights over electric lights. See also carbide lamp.

**carbide lamp.** A carbide lamp, also known as a miners' carbide lamp or acetylene lamp was introduced into mine use at about 1897. It consists of two chambers, a water tank above and a removable carbide canister below with a connection valve to permit controlled seepage of water into the calcium carbide. The carbide and water react to generate calcium hydroxide  $[\text{Ca}(\text{OH})_2]$  and acetylene gas. The gas is passed through a filter into a tube and through a tiny burner-tip orifice designed for the optimum mixture of air and acetylene. Once ignited, it burns with a brilliant yellow-white flame produced by the incandescence of tiny carbon particles. A reflector concentrates the light in a particular direction<sup>[13]</sup>.

**carbonate.** 1. A salt or ester of carbonic acid; a compound containing the radical

$\text{CO}_3^{-2}$ , such as calcium carbonate,  $\text{CaCO}_3$ .  
2. A rock consisting mainly of carbonate minerals, such as limestone or dolomite<sup>[10]</sup>.

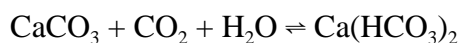
**carbonate-fluorapatite.** A cave mineral —  $\text{Ca}_5(\text{PO}_4, \text{CO}_3)_3\text{F}^{[11]}$ .

**carbonate hardness.** Hardness of water due to presence of dissolved bicarbonates of calcium and magnesium which can be removed by boiling and hence the term ‘temporary hardness.’ Synonyms: (French.) *durété temporaire*; (German.) *temporäre Härte, Carbonathärte*; (Greek.) *parothiki sklipotis anthrakiki sklirotis*; (Italian.) *durezza temporanea*; (Russian.) *karbonatnaja zestkostj*; (Spanish.) *dureza temporal*; (Turkish.) *karbonat sertliđi*; (Yugoslavian.) *turdoóa, trdota*.

**carbonate-hydroxylapatite.** A cave mineral —  $\text{Ca}_5(\text{PO}_4, \text{CO}_3)_3(\text{OH})^{[11]}$ .

**carbonate rock.** A rock that consists of one or more carbonate minerals. Carbonate rock successions (or sequences) are those in which carbonate rock is dominant, but which also contain rocks of other lithology<sup>[9]</sup>.

**carbonic acid dissolution.** Dissolution of calcium carbonate by carbon dioxide in aqueous solution, loosely termed carbonic acid, is the dominant reaction in karst processes, including speleogenesis. The reaction can be considered in several ways but it is most simply represented as:



The reaction is reversible. The solution containing the dissolved reaction product,

usually termed calcium bicarbonate, can lose carbon dioxide to the atmosphere and precipitate calcium carbonate. This process is responsible for the development of speleothems underground and tufa or travertine at the surface<sup>[9]</sup>.

**carnivore.** An animal that lives by eating the flesh of other animals<sup>[23]</sup>. See also *herbivore*; *insectivore*; *omnivore*.

**cascading water.** In reference to wells, ground water which trickles or pours down the casing or uncased borehole above the water level in the well through cracks or perforations<sup>[22]</sup>.

**casing.** Permanent liner of a well<sup>[16]</sup>.

**casing joint.** Welded or threaded connection for tubular casing<sup>[16]</sup>.

**casing, surface.** That part of a well casing that extends above land surface<sup>[16]</sup>.

**catch basin.** 1. A reservoir or basin into which surface water may drain. 2. A basin to collect and retain material from a street gutter that would not readily pass through a sewer system.

**catchment.** (Great Britain.) 1. An area into which surface water may drain. 2. A depression that collects rainwater (e.g., reservoir).

**cation.** An ion having a positive charge and, in electrolytes, characteristically moving towards a negative electrode<sup>[6]</sup>.

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

**cation exchange capacity.** The sum total of exchangeable cations that a porous medium can absorb. Expressed in moles of ion charge per kilogram of soil (or of other exchanges such as clay)<sup>[22]</sup>.

**causse.** (French.) A limestone plateau in the southeastern part of the central massif of France characterized by closed depressions, caves, and avens (jamas); a number of such plateaus in and around the basin of the river Tarn constitute Les Grandes Causses. This region was considered by Cvijić to exemplify karst development intermediate between holokarst and merokarst<sup>[10]</sup>. Synonym: (French.) *causse*; (German.) (*Kalkstein Plateau*), *Cauße*; (Greek.) *karstikón oropédion*; (Italian.) *altopiano carsico*; (Russian.) *izvestnjakovoje karstovoje plato*; (Spanish.) *altiplano carstico*; (Turkish.) *kireçtaşı düzlüğü*; (Yugoslavian.) *krški plato*, *kraški plato*.

**cave.** 1. 'A natural home in the ground, large enough for human entry' is probably the most useful definition. This covers the enormous variety of caves that do occur but eliminates the many artificial tunnels and galleries incorrectly named caves. The size criterion is arbitrary and subjective, but practical, as it eliminates narrow openings irrelevant to explorers but very significant hydrologically, that may be better referred to as *proto-caves*, *sub-conduits* or *fissures*. A cave may be a single, short length of accessible passage, or an extensive and complex network of tunnels as long as the hundreds of kilometers in the Flint Mammoth Cave System. Most caves are formed by dissolution in limestone but *sandstone caves*, *lava caves*, *glacier caves* and

*tectonic caves* also occur. Marginal candidates for use of the name cave include riverbank undercuts and rock shelters of various origins. In some countries a cave is regarded as being a horizontal opening, as opposed to a pothole, which is a vertical opening. This usage is common in England but is not ubiquitous<sup>[9]</sup>. 2. A natural opening formed in the rocks below the surface of the ground large enough for a man to enter. It may consist of a single connected opening or a series of small or large chambers connected by galleries<sup>[20]</sup>. 3. A similar artificial opening<sup>[10]</sup>. Related to cavern. Synonyms: (French.) *grotte*, *caverne*; (German.) *Höhle*, *Grotte*; (Greek.) *speleon*; (Italian.) *caverna*, *grotta*; (Russian.) *pescera*; (Spanish.) *cueva*; (Turkish.) *mağara*; (Yugoslavian.) *pečina*, *peč*, *peštera*, *spilja*, *zijačka*, *jama*. See also active cave; bedding cave; cave system; grotto; sea cave.

**cave balloon.** See cave blister.

**cave blister.** 1. A small pimplelike cave formation, roughly oval in shape, generally loose, and having a core of mud<sup>[10]</sup>. 2. A partly or completely hollow hemispherical to nearly spherical speleothem, usually of gypsum or hydromagnesite, attached to a cave wall. Synonym: cave balloon.

**cave breakdown.** 1. Enlargement of parts of a cave system by fall of rock masses from walls and ceiling. 2. Heaps of rock that have collapsed from the walls and ceiling of a cave, generally called cave breccia<sup>[10]</sup>. 3. Synonym for the collapse of caves, or, in American usage, for the debris produced by collapse<sup>[18]</sup>.

**cave breathing.** A resonance phenomenon in which air currents throb back and forth through constricted passages in a cave with periodicity of a few seconds to a few minutes. Synonyms: (French.) *passage respirant*; (German.) *Grotte mit Resonanz*; (Greek.) *anapneousa ope*; (Italian.) *grotta a soffio alterno*; (Spanish.) *gruta resonante*; (Turkish.) *mağara esintisi*. See also blowing cave.

**cave breccia.** Angular fragments of rock forming a fill in a cave, either cemented together by dripstone or in a matrix of cave earth<sup>[10]</sup>. See also solution breccia.

**cave bubble.** A nonattached hollow sphere, usually of calcite, that has formed around a gas bubble on the surface of a cave pool.

**cave coral.** A rough, knobby growth of calcite resembling coral in shape, generally small; found on floor, walls, or ceiling of a cave<sup>[10]</sup>. Synonym: botryoid; coral formation; cave popcorn. See also knobstone.

**cave cotton.** Thin flexible filaments of gypsum or epsomite projecting from a cave wall. Synonym: gypsum cotton. See also gypsum flower.

**cave development.** The inception of cave development in carbonate rocks begins if water can move through the bedrock and commence dissolution. The earliest water movement may be due to mechanisms (including ground-water pumping and ionic diffusion effects) unrelated to those dominating later development. Similarly, inception may include physical and chemical dissolution

(involving removal of carbonates and mineral impurities by water and by strong acids), as well as by the carbonic acid dissolution that dominates later cave growth. Initial water movement can be along primary pores in the rock (in coarse raffle limestones, oolites or chalk), along relatively thin non-carbonate beds within the succession, or along incipient or open fissures (joints, faults and bedding planes). These potential water routes are initially very narrow and water movement is severely restricted and laminar, allowing only very slow dissolutional growth (see gestation), until enlargement beyond the turbulent threshold (breakthrough) permits faster flow and accelerated cave growth. After establishment of turbulent flow conditions the effects of dissolution are augmented by mechanical abrasion and collapse, which expose new rock. During the early development stages a network of narrow openings is formed. Subsequently, geological factors guide the preferential expansion of favorable routes, which capture more of the local flow and enlarge, at the expense of less favorable openings, to form caves. The less favorable fissures are relegated to a subordinate role in transmitting percolation water or, more rarely, in carrying elements of overflow water during floods. Also during the early stages, all voids are water filled but as permeability increases and true hydraulic flow conditions are established, the upper voids drain freely, forming a water table. Almost all caves therefore originate under phreatic conditions but the overall passage morphology is modified during later growth into vadose or phreatic caves, enlarged from the original phreatic



imprint, above or below the water table. Ultimately, cave development evolves towards efficient drainage close to the water table. Passage enlargement then becomes regressive as collapse increases. The stage of a cavernous karst collapsing extensively is relatively rarely achieved, being overtaken at high latitudes and high altitudes by surface lowering, but such collapse can contribute to the chaotic land forms of tropical karst<sup>[9]</sup>.

**cave earth, cave fill.** Insoluble deposits of clay, silt, sand, or gravel flooring or filling a cave passage. In a more restricted sense, cave earth includes only the finer fractions: clay, silt, and fine sand deposits<sup>[10]</sup>. Synonym: cave soil.

**cave ecology.** The study of the interaction between cave organisms and their environment, e.g. energy input from surface, climatic influences<sup>[25]</sup>.

**cave fill.** Transported materials such as silt, clay, sand and gravel which cover the bedrock floor or partially or wholly block some part of a cave<sup>[25]</sup>.

**cave flower.** An elongate curved deposit of gypsum or epsomite on a cave wall in which growth occurs at the attached end<sup>[10]</sup>. Synonyms: gypsum flower; oulopholite. See also anthodite; cave cotton.

**cave formations.** 1. Secondary mineral deposits formed by the accumulation, dripping, or flowing of water in a cave<sup>[10]</sup>. 2. Unsatisfactory term used to include all varieties of calcite, gypsum and other, rarer, mineral cave deposits; therefore a synonym for the equally unwieldy

speleothem or the colloquial term 'stall'<sup>[9]</sup>. See also sinter; speleothem.

**cave group.** A number of caves or cave systems, not interconnected but geographically associated in some relief feature or particular geological outcrop<sup>[10]</sup>. See also cave series.

**cave guano.** Accumulations of dung in caves, generally from bats; in some places partially mineralized<sup>[10]</sup>.

**cave ice.** Ice formed in a cave by natural freezing of water. Loosely but incorrectly applied to calcium carbonate dripstone and flowstone<sup>[10]</sup>.

**cave-in.** 1. The collapse of the ceiling or side walls of a cave or of the land surface into a subterranean passage as a result of undermining or of pressure from above<sup>[10]</sup>. 2. The partial or complete collapse of earth material into a large underground opening, such as an excavation or a mine. 3. The sudden slumping of wall material into a pit. 4. A place where material has collapsed or fallen in or down.

**cave-in lake.** A shallow body of water whose basin is produced by collapse of the ground following thawing of ground ice in regions underlain by permafrost. Synonym: thermokarst lake.

**cave lake.** Any underground lake. The water can be in a partially drained phreatic cave, and may then be the entrance to a sump, or it can be open over its entire surface. In vadose caves lakes are most commonly formed by ponding behind banks of sediment or, in rarer cases, behind very large gour barriers<sup>[9]</sup>.

**cave marble.** Banded deposit of calcite or aragonite capable of taking a high polish<sup>[10]</sup>. See also flowstone; onyx marble.

**cave of debouchure.** Outflow cave.

**cave onyx.** See onyx marble.

**cave pearl.** 1. Carbonate concretion, usually of calcite, that is spherical or irregular in shape, with an internal structure of concentric banding round a central grain. Pearls form in pools of saturated water disturbed by dripping water, so that they are commonly found beneath high avens. Individual pearls may be 1mm or many centimeters in diameter. Movement of the larger ones may become impossible and they can then become cemented to the pool floor. Some caves contain spectacular displays of cave pearls; in Jackson's Bay Cave, Jamaica, they cover large areas of passage floor behind low gour barriers<sup>[9]</sup>. 2. Small concretion of calcite or aragonite formed by concentric precipitation around a nucleus<sup>[10]</sup>. Synonyms: pisolite; pisolith; (French.) *perle des cavernes*; (German.) *Höhlenperlen*; (Greek.) *speleomargarites*; (Italian.) *perle di grotta*; (Russian.) *pescernij zemcug*; (Spanish.) *perla de caverna*; (Turkish.) *mağara incisi*; (Yugoslavian.) *pećinski biseri, jamski biseri*.

**cave pisolite.** See cave pearl.

**cave popcorn.** See cave coral.

**cave postule.** A white, hemispherical wall and roof deposit of calcite<sup>[25]</sup>.

**cave raft.** A thin mineral film, usually of calcite, floating on a cave pool.

**Cave Research Foundation (CRF.)** An organization of cavers united primarily for scientific exploration and study of caves<sup>[13]</sup>.

**cave spring.** See spring, cave.

**caver.** (American.) 1. A slang term for one who engages in the hobby of cave exploration, or caving<sup>[9, 21]</sup>. 2. A person who explores caves in a safe manner while showing respect for the cave (all aspects of the cave), other cavers, and the land above the cave<sup>[13]</sup>. Synonym: spelunker; (British.) potholer. See also speleologist.

**cavern.** 1. Underground opening in soluble rock similar to a cave. When used as a noun, it refers to large openings, but when used as an adjective it tends to refer to rock texture and so to small openings. However, in some countries (e.g., Russia) cavern refers to small openings in a rock<sup>[20]</sup>. 2. A synonym of cave with the implication of large size. 3. A system or series of caves or cave chambers. 4. A cave, often used poetically or to connote larger-than-average size<sup>[10]</sup>. Synonyms: (French.) *caverne*; (German.) *Höhle, Kaverne*; (Greek.) *speleon*; (Italian.) *caverna, grotta*; (Russian.) *kaverna*; (Spanish.) *caverna, cueva*; (Turkish.) *kovuk*; (Yugoslavian.) *kaverna*. See also cave.

**cavern breakdown.** The process of cave enlargement which depends upon the mechanical failure and eventual collapse

of sections of the cavern walls and ceiling<sup>[22]</sup>.

**cavern flow.** Movement, often turbulent, of ground-water flow through caves, coarse sorted gravel, or large open conduits, either by gravity or under pressure.

**cavernicole.** An animal which normally lives in caves for the whole or part of its life cycle<sup>[25]</sup>.

**cavernous.** Adjective used to describe a rock texture in which the rock contains openings generally of a small size<sup>[20]</sup>.  
Synonyms: (French.) *caverneux*; (German.) *kavernös*; (Greek.) *speleothēs*; (Italian.) *con grotte*; (Russian.) *kavernoznij*; (Spanish.) *cavernoso*; (Turkish.) *kovuklu*; (Yugoslavian.) *kavernozan*. See also cavern.

**cavernous karren.** Pitted, rubbly limestone most commonly found in relatively recent and Tertiary limestones of the humid tropics<sup>[3]</sup>. See also covered karren; karren.

**cavernous permeability.** See conduit permeability.

**cavernous rock.** Any rock that has many cavities, cells, or large interstices (e.g., a cliff face pitted with shallow holes resulting from cavernous weathering).

**cavernous weathering.** Chemical and mechanical weathering on a cliff face, in which grains and flakes of rock are loosened so as to enlarge hollows and recesses.

**cavern porosity.** A pore system having large, cavernous openings. The lower size limit, for field analysis, is practically set at approximately the smallest opening that an adult person may enter.

**cavern system.** See cave system.

**cave series.** A group of caves of similar morphology in a particular district<sup>[10]</sup>. See also cave group.

**cave shield.** A semicircular plate of reprecipitated calcite located beneath joints in a cavern ceiling and believed to be formed by the seepage of hydrostatic water along the joint. Two shields form beneath one joint, descending from each side of the opening<sup>[22]</sup>.

**cave soil.** See cave earth.

**cave spring.** See spring, cave.

**cave system.** 1. An underground network of passages, chambers, or other cavities. 2. The caves in a given area related to each other hydrologically, whether continuous or discontinuous from a single opening<sup>[10]</sup>.  
Synonyms: (French.) *réseau souterrain*; (German.) *Höhlensystem*; (Greek.) *speleothēs systema, thiction*; (Italian.) *sistema carsico sotterraneo*; (Russian.) *sistema podzemnih pescer*; (Spanish.) *sistema de cavidades*; (Turkish.) *mağara sistemi, serisi*; (Yugoslavian.) *pećinski (spiljski) sistem, amski sistem*. See also cave; cave group; cave series; cavern.

**caving.** The sport of exploring caves.  
Synonyms: (British.) potholing; spelunking. 2. A method of mining in which the ore is allowed to cave or fall<sup>[10]</sup>.

**cavings.** Rock fragments that fall from the walls of a borehole and contaminate the well cuttings or block the hole. These fragments must be removed by drilling or circulation of drilling fluids before the borehole can be deepened.

**cavitation.** 1. The collapse of bubbles in a fluid, caused by static pressure being less than the fluid vapor pressure. 2. A phenomena of cavity formation, or formation and collapse, especially in regard to pumps, when the absolute pressure within the water reaches vapor pressure causing the formation of vapor pockets<sup>[6]</sup>.

**cavity.** A solutional hollow in a limestone cave.

**cavity dweller.** A coelobitic organism.

**ceiling block.** Roughly cubical joint-bounded large block, which has fallen from the ceiling of a cave<sup>[10]</sup>. See also cave breakdown; ceiling slab.

**ceiling cavity.** Solutional concavity in the ceiling of a cave. The orientation is determined by joints or a bedding plane<sup>[10]</sup>.

**ceiling channel.** Sinuous channel developed in the ceiling of a cave, presumably during the phreatic phase of cave development<sup>[10]</sup>.

**ceiling meander.** A winding upside-down channel in a cave ceiling<sup>[10]</sup>.

**ceiling pocket.** See pocket.

**ceiling slab, roof slab.** A thin but extensive piece of rock that has fallen from the ceiling of a cave in roughly horizontal limestone<sup>[10]</sup>. See also cave breakdown; ceiling block.

**ceiling tube.** A half tube remaining in the ceiling of a cave<sup>[10]</sup>.

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

**cement.** A microscopic textured nonskeletal void-filling material precipitated on an intragranular or intrasedimentary free surface that holds the material together<sup>[20]</sup>. Synonyms: (French.) *ciment*; (German.) *Zement*; (Greek.) *tsiménto*; (Italian.) *cemento*; (Spanish.) *cemento*; (Turkish.) *çimento*; (Yugoslavian.) *vezivo cement*.

**cementation.** The process of binding granular material together by deposition of cementing material at contact points of grains<sup>[16]</sup>.

**cement grout.** Cement slurry of pumpable consistency<sup>[16]</sup>.

**cement slurry.** Liquid cement suspension<sup>[16]</sup>.

**cementing.** See grouting.

**cenote.** (Spanish. after Mayan *tzonet* or *dzonot*.) 1. Steep-walled natural well that extends below the water table; generally caused by collapse of a cave roof. Term used only for features in Yucatán<sup>[10]</sup>. 2. Steep or vertical sided collapse doline floored by a lake whose surface is at the regional water table. The term originates from the many cenotes in the low karst plateau of Mexico's Yucatan, but has

been applied to flooded dolines in Florida and elsewhere. Probably the most famous cenote is the sacred well of Chichen Itza, Yucatan; it has vertical sides and is 60m in diameter, 30m deep and half full of water<sup>[9]</sup>. Synonyms: (French.) *cenote*; (German.) *cenote*; (Greek.) *voulismeno speleven*. See also jama; natural well.

**centrifuge moisture equivalent.** See moisture equivalent.

**cerussite.** A cave mineral —  $\text{PbCO}_3$ <sup>[11]</sup>.

**chain gage.** Water level measuring device<sup>[16]</sup>.

**chalk.** 1. Used as a proper noun chalk describes a rock unit of Cretaceous age, that consists predominately of relatively soft, white, porous limestone with beds of marl and bands or nodules of flint. The term is used without its initial capital to describe any rock with similar appearance and properties. Generally chalk has a relatively high primary permeability and so rarely develops caves of explorable size, though conduit-water flow does occur. Some harder chalks in northern France and south-eastern England hold explorable active and relict caves, which extend for many hundreds of meters<sup>[9]</sup>. 2. Soft poorly indurated limestone, generally light in color; commonly composed of the tests of floating microorganisms in a matrix of very finely crystalline calcite<sup>[10]</sup>.

**chalcantite.** A cave mineral —  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ <sup>[11]</sup>.

**chamber.** (American.) 1. An enlargement in a cave passage or system, commonly formed at a junction of passages, or

locally in a single passage, where erosion has been enhanced by collapse exposing more rock to dissolution. Maximum chamber size is controlled by the strength and shape of the limestone ceiling. The largest chamber currently known, Sarawak Chamber in Lubang Nasib Bagus, at Mulu, Sarawak, is over 700m long, up to 400m wide and nowhere less than 70m high. It has formed where a large stream eroded sideways as it cut obliquely across the included bedding in unusually massive limestone. It is doubtful whether a much larger chamber could exist without collapse of its roof<sup>[9]</sup>. 2. The largest order of cavity in a cave or cave system; it has considerable length and breadth but not necessarily great height. 3. (British.) A room in a cave<sup>[10]</sup>. Synonyms: (French.) *salle*; (German.) *Halle, Kammer, Dom*; (Greek.) *ypoyios aethousa*; (Italian.) *sala*; (Russian.) *zal*; (Spanish.) *sala, salón*; (Turkish.) *oda*; (Yugoslavian.) *dvorana*. See also room; passage.

**chandelier.** Large variety of gypsum flower, with branching crystal structure that may hang many meters from a cave ceiling. Very rare, except in Lechuguilla Cave of New Mexico<sup>[9]</sup>.

**channel.** Natural or artificial watercourse bounded by banks<sup>[16]</sup>.

**channel characteristics.** Hydraulic properties of stream channel<sup>[16]</sup>.

**chasm.** 1. A deep, fairly narrow breach in the earth's surface; an abyss; a gorge; a deep canyon. 2. A deep, wide, elongated gap in the floor of a cave<sup>[10]</sup>. Related to canyon, corridor. Synonyms: (French.)

*gouffre, fracture ouverte*; (German.) *Kluft*; (Greek.) *chasma*; (Italian.) *fattura beante, canyon*; (Spanish.) *cañon, taso*; (Turkish.) *derin yarıntı*; (Yugoslavian.) *provalija*.  
See also ravine.

**chemical carbonate rock.** Carbonate rock form by the precipitation of mineral matter in situ by chemical or biological processes.

**chemical deposit.** A sediment precipitated out of solution by chemical action<sup>[16]</sup>.

**chemical erosion.** Processes partially synonymous with chemical dissolution, but including any other form of rock breakdown accelerated by chemical changes of the constituent minerals<sup>[9]</sup>.

**chemical equivalent.** The expression of water characteristics such as hardness or alkalinity resulting from several ions in solution in terms of only one equivalent concentration<sup>[16]</sup>.

**chemical mobility.** The tendency of an element to move in a given hydrogeochemical environment<sup>[16]</sup>.

**chemical oxygen demand (COD.)** The measure of readily available oxidizable material contained in a water sample<sup>[16]</sup>.

**chert, chert nodule.** 1. Black, brown or grey rock, consisting of very fine-grained silica, that occurs as horizons of nodules and discontinuous bands, generally less than 200mm thick, within many limestones. It is very hard and almost insoluble in water, so commonly it projects from cave walls where it forms passage or shaft ledges and waterfall

lips<sup>[9]</sup>. 2. Light-cream or gray to black rock composed of silica, found occurring as nodules or layers in limestone, or as a replacement of limestone<sup>[10]</sup>.

**Chézy equation.** An equation used to compute the velocity of uniform flow in an open channel: mean velocity of flow (V) equals the Chézy coefficient © times the square root of the product of hydraulic radius in feet (R) times the slope of the channel<sup>[1]</sup>. See also Froude number; Manning equation; Reynolds number.

**chimney.** 1. Nearly circular shaft rising upwards from the ceiling of a cave towards the surface of the ground; if it does not reach the surface it is termed a blind chimney. If the chimney is formed mainly by solution, it is related to a dome-pit; if formed mainly by collapse of the roof along bedding planes, it is related to cenote<sup>[20]</sup>. 2. A narrow vertical shaft in the roof of a cave, generally smaller than an aven; a dome pit<sup>[10]</sup>. Synonyms: (French.) *cheminée* (aven); (German.) *Schlot, Kamin*; (Greek.) *kapnothochos*; (Italian.) *camino*; (Russian.) *truba*; (Spanish.) *chimenea*; (Turkish.) *bacca*; (Yugoslavian.) *dimnjak*.

**chimneying.** Ascending or descending by means of opposed body and/or limb pressures against two facing walls<sup>[25]</sup>.

**chlorophyll.** A group of pigments producing the green color of plants; essential to photosynthesis<sup>[23]</sup>.

**chock.** A block of metal for use as a chockstone<sup>[25]</sup>.

**chockstone.** A rock wedged between the walls of a cave passage<sup>[10]</sup>.

**choke.** 1. A blockage of inwashed mud, sand or boulders in a cave passage. Most boulder chokes are formed by collapse of a passage roof and may have an open chamber or shaft above them; others are formed by collapse and inwashed debris where a large old passage is cut by a hillside. A passable route through a choke may be opened by excavation, and thereby lead to discovery of new passage — as was done so successfully in Ogof Aven Allwedd<sup>[9]</sup>. 2. Rock debris or cave fill completely blocking a passage<sup>[10]</sup>.

**C-horizon.** Zone of weathered parent material in a soil profile<sup>[16]</sup>.

**chute.** An inclined channel or trough in a cave<sup>[10]</sup>.

**ciénaga.** (Spanish.) Wetland. See also wetland.

**cimolite.** A cave mineral —  $\text{Al}_4(\text{SiO}_2)_9(\text{OH})_{12}$ <sup>[11]</sup>.

**cistern.** A small water reservoir used to collect surface and rain water<sup>[16]</sup>.

**classical karst.** Originally the region called Kras in Slovenia, which gave its name to the karst landscape. Used in this sense about 95% of the classical karst lies in Slovenia, with the remaining 5% extending to Italy. A slightly different area was covered by descriptions of early investigations or karst phenomena, when the name classical karst was applied to a region between Ljubljana, Gorizia and

Rijeka, mainly in Slovenia with some parts in Italy and Croatia<sup>[9]</sup>.

**clastic.** Pertaining to a rock or sediment composed principally of broken fragments that are derived from pre-existing rocks or minerals and that have been transported some distance from their places of origin<sup>[6]</sup>.

**clastic carbonate rock.** Carbonate rock that is made up of carbonate grains (e.g., shells, shell fragments, oolites).

**clastic rock; detrital rock.** A sedimentary rock derived from fragmented other preexisting rock or organic structures<sup>[16]</sup>.

**clastokarst.** Karst phenomena in clastic rocks composed of detrital carbonate material<sup>[20]</sup>. Synonyms: (French.) *clastokarst*; (German.) *Klastokarst?*; (Greek.) *clastokarst*; (Italian.) *carsismo clastico*; (Russian.) *klastokarst*; (Spanish.) *clastokarst*; (Turkish.) *klastik karst*; (Yugoslavian.) *klastokrš klastokras, klastokarst*.

**claustrophobia.** An irrational fear of being in a closed space<sup>[25]</sup>.

**clay.** 1. A rock or mineral fragment or a detrital particle of any composition smaller than a very fine silt grain, having a diameter less than 1/256 mm (4 microns, or 0.00016 in., or 8 phi units.) This size is approximately the upper limit of size of particle that can show colloidal properties. 2. A loose, earthy, extremely fine-grained natural sediment or soft rock composed primarily of clay-size or colloidal particles and characterized by a considerable content of clay minerals and

subordinate amounts of finely divided quartz, decomposed feldspar, carbonates, ferruginous matter, and other impurities. It forms a plastic, moldable mass when finely ground and mixed with water, but retains its shape on drying, and becomes firm, rocklike, and permanently hard on heating or firing. 3. A term that is commonly applied to any soft, adhesive, fine-grained deposit (such as loam or siliceous silt) and to earthy material, particularly when wet (such as mud). 4. A term used by the International Society of Soil Science for a rock or mineral particle in the soil, having a diameter less than 0.002 mm (2 microns).

**clay ball, clayball.** A chunk of clay released by erosion of a clayey bank and rounded by wave action.

**clay boil.** A mud circle that suggests a welling-up or heaving of the central core.

**clay colloid.** 1. A clay particle having a diameter less than 1 micron (0.001 mm.)  
2. A colloidal substance consisting of clay-size particles.

**clay fill.** Dry or wet clay that fills a cave passage<sup>[10]</sup>.

**clay filling.** Time interval between end of phreatic solution of a cave and beginning or deposition of flowstone<sup>[10]</sup>.

**clayey sand.** 1. An unconsolidated sediment containing 50–90% sand and having a ratio of silt or clay less than 1:2.  
2. An unconsolidated sand containing 40–75% sand, 12.5–50% clay, and 0–20% silt.

**clayey silt.** 1. An unconsolidated sediment containing 40–75% silt, 12.5–50% clay, and 0–20% sand. 2. An unconsolidated sediment containing more particles of silt size than of clay size, more than 10% clay, and less than 10% of all other coarser sizes.

**clay loam.** A soil containing 27–40% clay, 20–45% sand, and the remainder silt.

**clay marl.** 1. A whitish, smooth, chalky clay. 2. A marl in which clay predominates.

**clay mineral.** One of a complex and loosely defined group of finely crystalline, metacolloidal, or amorphous hydrous silicates, essentially of aluminum.

**claypan.** A dense, heavy, relatively impervious subsurface soil layer that owes its hardness to a relatively higher clay content than that of the overlying material from which it is separated by a sharply defined boundary.

**clay parting.** 1. Clayey material between a vein and its wall. 2. A seam of hardened carbonaceous clay between or in beds of coal, or a thin layer of clay between relatively thick beds of some other rock (e.g., sandstone).

**clay plug.** Fine flood deposits in a cut off river meander<sup>[16]</sup>.

**clean sand.** Sand with little or no clay content<sup>[16]</sup>.

**cleavage.** The tendency to cleave or split along definite parallel planes, which may be highly inclined to the bedding. It is a



secondary structure and is ordinarily accompanied by at least some recrystallization of the rock.

**climate.** The average weather conditions of an area, including temperature, rainfall, humidity, wind, and hours of sunlight, based on records kept for many years<sup>[23]</sup>.

**climatic factor.** A factor influencing hydrologic parameters due to the local climate<sup>[16]</sup>.

**clinometer.** An instrument for measuring vertical angles or angles of dip<sup>[25]</sup>.

**clint.** (British.) 1. Flat or sloping bare limestone outcrops (limestone pavements) weathered into straight-sided or furrowed blocks and ridges of limestone which are separated by deep clefts or solutionally widened joints (grikes) that often crisscross<sup>[20]</sup>. 2. Slabs of limestone, parallel to the bedding, forming a pavement. Widened joints, or grikes, isolate individual clints<sup>[10]</sup>.  
Synonym: (French.) *lapiaz*; (German.) *Flachkarren, Karrenfeld*; (Greek.) *pethion amaxotrochion thactyloglyphon*; (Italian.) *campo carreggiato*; (Russian.) *karrovoe pole*; (Spanish.) *campo de lapiaz, lenar*; (Turkish.) *pürtüklü, oluklu*; (Yugoslavian.) *škrapari, škraplje*. See also grikes; karrenfeld; lapies; limestone pavement.

**clog, to.** The action of blocking fluid flow paths, especially around a well bore<sup>[16]</sup>.

**clogger.** A type of ascender without a handle; used with a karabiner to keep it securely on the rope<sup>[25]</sup>.

**closed depression, closed basin.** 1. Any karst hollow with internal drainage, including dolines, uvalas, poljes, cockpit and all varieties of blind karst valleys, of both small and large scales<sup>[9]</sup>. 2. A general term for any enclosed topographic basin having no external drainage, regardless of origin or size<sup>[10]</sup>.

**closed karst.** A karst terrane that is covered by sediments. Synonyms: (Russian.) *skrytyĭ karst* or *zakrytyĭ karst*. See also buried karst; interstratal karst; mantled karst.

**closed traverse.** A traverse which begins and ends at survey points with known co-ordinates and orientation or at the same point<sup>[25]</sup>.

**cloud.** Large masses of coralloid or botryoidal calcite, deposited under water, with each mass reaching 200–800mm in diameter. Famous examples hang above the Lake of the Clouds in Carlsbad Caverns, New Mexico<sup>[9]</sup>.

**clusterite.** See botryoid.

**coarse.** Composed of or constituting relatively large particles.

**coarse sand.** 1. A geologic term for a sand particle having a diameter in the range of 0.5–1 mm (500–1000 microns, or 1 to zero phi units.) 2. An engineering term for a sand particle having a diameter in the range of 2 mm. 3. A soil term used in the U.S. for a sand particle having a diameter in the range of 0.5–1 mm (the diameter range recognized by the International Society of Soil Science is 0.2–2 mm).

**coarse silt.** A geologic term for a silt particle having a diameter in the range of 1/32 to 1/16 mm (31–62 microns, or 5 to 4 phi units).

**cockpit.** (Jamaican.) 1. Any closed depression having steep sides. 2. A star-shaped depression having a conical or a lightly concave floor. The surrounding hill slopes are steep and convex. Cockpits are the common type of closed depressions in a *kegelkarst*<sup>[10]</sup>.

**cockpit karst.** (Jamaican.) 1. Term describing an area containing numerous scattered, yet closely spaced dolines; generally a tropical karst land form. The corresponding Yugoslav term may more accurately be translated as ‘pock-marked’ karst. 2. Tropical karst topography containing many closed depressions surrounded by steep-sided conical hills. Divided by French and German geographers into several types depending on shape of hills<sup>[10]</sup>. Synonyms: (French.) *karst cockpit*; (German.) *Turmkarst*, *Kegelkarst*; (Greek.) *dolinovrithes karst*; (Italian.) *campo carsico a doline*; (Spanish.) *karst esponja*; (Turkish.) *düdenli karst*; (Yugoslavian) *boginjavi krš*, *kozavi kras*. See also cone karst; *Halbkugelkarst*; *Kegelkarst*; *Spitzkegelkarst*; tower karst.

**coefficient of compressibility.**

Compressibility is the aptitude of the soil to be deformed. It is expressed by means of a coefficient which is the ratio between a void ratio decrease from  $e_0$  to  $e$  and an increase in effective stress. The value  $a_v = e_0 - e / \Delta p$  represents the coefficient of compressibility for the range  $p_0$  to  $p_0 + p$ .

Units are usually  $\text{cm}^2/\text{kg}^{[21]}$ . See also coefficient of volume compressibility.

**coefficient of permeability.** An obsolete term that has been replaced by the term hydraulic conductivity<sup>[6]</sup>.

**coefficient of storage.** See storage coefficient.

**coefficient of transmissivity; coefficient of transmissibility.** An obsolete term replaced by the term transmissivity.

**coefficient of volume compressibility.** The compression of a clay (aquitarde) per unit thickness, due to a unit increase of effective stress, in the load range exceeding preconsolidation stress. It is expressed by the equation

$$m_v = \frac{a_v}{1 + e_0}$$

in which  $e_0$  is the initial void ratio. Units are usually  $\text{cm}^2/\text{kg}^{[21]}$ . See also coefficient of compressibility.

**cohesion.** Shear resistance at zero normal stress. An equivalent term in rock mechanics is intrinsic shear strength.

**coliform organism.** A microorganism, the concentration of which is used as an indication of the degree of biological pollution of water<sup>[16]</sup>.

**collapse breccia.** A mass of rock composed of angular to rounded fragments of limestone or dolomite that has formed as the result of the collapse of the roof of a cave, of an underlying cave, or of an

overhanging ledge<sup>[10]</sup>. See also solution breccia.

**collapse chamber.** An underground chamber containing notable quantities of collapsed material. The term is commonly abused in describing the origin of cave chambers floored by collapse debris. Though wall and roof collapse are common modifying processes in larger chambers, it is important to remember that such collapse cannot form a chamber, as it can only take place into a pre-existing cavity<sup>[9]</sup>.

**collapse sink; collapse sinkhole.** 1. A variety of closed depression that forms by collapse of the rock above an existing cave passage or chamber<sup>[9]</sup>. 2. A closed depression formed by the collapse of the roof of a cave<sup>[10]</sup>. See also doline.

**collapse of caves.** Collapse and breakdown of cave walls and ceilings are continuing aspects of cave development and modification. Massive unfractured limestone can easily span a void of over 100m, but thinly bedded, closely jointed, faulted or poorly lithified limestone may collapse into very small passages. Collapse is a significant component of cave erosion. As well as simple falls of unsupported rock forming connections between passages, the collapse process exposes more rock surface area for potential dissolution. As rates of collapse are measured on a geological time scale collapse in natural caves offers a negligible threat to explorers, in comparison to the dangers of roof collapse in mines<sup>[9]</sup>.

**collector well.** A central well with horizontal sections of screened collector pipe arranged radially to increase yield<sup>[16]</sup>.

**colloid.** Extremely small solid particles, 0.0001 to 1 micron in size, which will not settle out of solution. It is intermediate between a true dissolved particle and a suspended solid which will settle out of solution<sup>[6]</sup>.

**column.** 1. A subsurface dripstone formation produced by the union of a stalactite and a stalagmite in a cave<sup>[20]</sup>. 2. A flowstone formation, generally cylindrical, formed by the union of a stalactite and stalagmite<sup>[10]</sup>. Not to be confused with pillar. Synonyms: (French.) *colonne*, *pillier stalamitique*; (German.) *Tropfstein-Säule*; (Greek.) *stalaktitike stele*; (Italian.) *colonna (stalagmitica o stalattitica)* (Russian.) *kolonna*; (Spanish.) *columna*; (Turkish.) *sütun*; (Yugoslavian.) *stup*, *steber*, *stolpīc*. See also pillar.

**comminution.** The reduction of a substance to a fine powder; pulverization; trituration.

**community.** All the plants and animals that live in a particular habitat and are bound together by food chains and other interrelations<sup>[23]</sup>.

**compaction.** A decrease in the volume of a mass of sediments from any cause. In general, compaction may be regarded as the decrease in the thickness of sediments, as a result of an increase in vertical compressive stress, and is synonymous with 'one-dimensional consolidation,' as used by engineers. The

term compaction is applied both to the process and to the measured change in thickness. In thick fine-grained beds, compaction is a delayed process involving the slow escape of pore water and the gradual transfer of stress from neutral to effective. Until sufficient time has passed for excess pore pressure to decrease to zero, measured values of compaction are transient<sup>[21]</sup>. See also compaction, residual; compaction, specific.

**compaction, residual.** Compaction that would occur ultimately if a given increase in applied stress were maintained until steady-state pore pressures were achieved, but had not occurred as of a specified time because excess pore pressures still existed in beds of low diffusivity in the compacting system. It can also be regarded as the difference between (1) the amount of compaction that will occur ultimately for a given increase in applied stress, and (2) that which has occurred at a specified time<sup>[21]</sup>. See also compaction; compaction, specific.

**compaction, specific.** The decrease in thickness of deposits, per unit of increase in applied stress, during a specific period of time<sup>[21]</sup>. See also compaction; compaction, residual.

**compass.** An instrument with a magnetic needle which is free to point to magnetic north. For survey the needle is either attached to a graduated card or can be read against a graduated circle to measure the angle in degrees from the north clockwise<sup>[25]</sup>.

**competition.** The struggle between individuals or groups of living things for

common necessities, such as food or living space<sup>[23]</sup>.

**complete well penetration, fully penetrating.** 1. The property of a well that penetrates an aquifer completely from the upper confining bed or water table to the lower confining bed<sup>[16]</sup>. 2. A well that is completed over the whole thickness of the aquifer to allow radial production over its entire completed length<sup>[16]</sup>.

**compressibility.** The relative change in volume with pressure of water or aquifer matrix<sup>[16]</sup>.

**compressive stress.** Normal stress tending to shorten the body in the direction in which it acts.

**compromise boundary.** 1. A plane interface between two crystals which evolved by mutual interference of their respective growing faces. This interface is a face of neither crystal. 2. A microscopic texture<sup>[20]</sup>.

**concentration gradient.** The change in solute concentration per unit distance in solute. Concentration gradients cause *Fickian diffusion* (spreading) of solutes from regions of highest to regions of lowest concentrations. In slowing moving ground water, this is the dominant mixing process<sup>[22]</sup>.

**concretion.** The localized deposition of mineral matter going out of solution in sediments or tuffs, usually nodular or irregular in shape<sup>[16]</sup>.

**condensation.** The transition from vapor to liquid state<sup>[16]</sup>.

**condensation nucleus.** A small solid particle around which condensation occurs<sup>[16]</sup>.

**condensation water.** Atmospheric moisture deposited inside caves when the surface temperature of the exposed rock falls below the dew point of circulating air<sup>[19]</sup>.

**conduit; karst conduit.** Relatively large dissolutional voids, including enlarged fissures and tubular tunnels; in some usage the term is restricted to voids that are water-filled. Conduits may include all voids greater than 10mm in diameter, but another classification scheme places them between arbitrary limits of 100mm to 10m. Whichever value is accepted in a particular context, smaller voids are commonly termed sub-conduits<sup>[9]</sup>.

Synonyms: (French.) *conduite forcée*; (German.) *Druckleitung (Leitung)*; (Greek.) *siphon*; (Italian.) *condotta forzata*; (Spanish.) *conducto saturado*; (Turkish.) *yeraltısı yolu, mecra*. See also pressure flow tube; stream tube; siphon.

**conduit flow; karst conduit flow.**

Underground water flow within conduits. Conduit flow is generally turbulent, but can also be laminar<sup>[9]</sup>.

**conduit permeability.** Sometimes referred to as cavernous permeability, this is a measure of the efficiency with which a particular aquifer transmits water through conduits (see permeability)<sup>[9]</sup>.

**conduit porosity.** That part of the porosity within an aquifer (usually a karst aquifer) that is a function of the presence of conduits<sup>[9]</sup>.

**cone of depression.** A depression of the potentiometric surface in the shape of an inverted cone that develops around a well that is being pumped. It defines the area of influence<sup>[6]</sup>. Synonym: cone of pressure relief (applied to artesian aquifers only).

**cone of impression.** A rise of the potentiometric surface in the shape of a cone that develops around an injection well<sup>[22]</sup>.

**cone karst.** 1. A karst landscape dominated by low conical (or hemispherical) hills that forms only in wet tropical climates. The type example is Gunung Sewu in Java. Individual hills are remarkably uniform, each some few hundred meters in diameter and around 50m high. Between them lie broken valleys, dolines or cockpits, draining into sinkholes. Erosion that seems to be initiated in valley systems develops in such a way that the valleys break up into dolines, but the mechanisms leading to uniform shaping of the hills are not fully understood. The widespread cone karst in China is mostly known as fengcong, and its hills are generally more conical than hemispherical in profile<sup>[9]</sup>. 2. A type of karst topography, common in the tropics, characterized by star-shaped depressions or dolines at the feet of many steep-sided cone-shaped hills; narrow steeply-walled valleys may be present<sup>[10, 20]</sup>. A variety of *Kegelkarst*. Synonyms: (French.) *karst à pitons*; (German.) *Kegelkarst, Turmkarst*; (Greek.) *konoethes karst*; (Italian.) *carso di torri, carsismo con forme residuali coniche*; (Russian.) *karst s koniceskimi ostancami*; (Spanish.) *karst de conos*; (Turkish.) *konili karst*; (Yugoslavia.)

*stožasti krš, čokasti kras stožčsti, kras.*  
See also cockpit karst. Compare: cupola karst, pinnacle karst, and tower karst.

**confined.** A modifier which describes a condition in which the potentiometric surface is above the top of the aquifer<sup>[22]</sup>.  
Synonymous with artesian.

**confined aquifer.** 1. An aquifer bounded above and below by confining units of distinctly lower permeability than that of the aquifer itself. 2. An aquifer containing confined ground water. Generally, a confined aquifer is subject to pressure greater than atmospheric<sup>[6]</sup>.

**confined water.** Water separated from the atmosphere by impermeable rock stratum<sup>[16]</sup>.

**confining bed.** A body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers<sup>[22]</sup>. Synonymous with confining unit.

**confining unit.** 1. A hydrogeologic unit of impermeable or distinctly less permeable material bounding one or more aquifers and is a general term that replaces aquitard, aquifuge, aquiclude<sup>[22]</sup>. 2. Means a body of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers<sup>[22]</sup>. Synonymous with confining bed.

**confining zone.** A geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection zone<sup>[22]</sup>.  
See confining unit.

**confluence.** Junction point of streams<sup>[16]</sup>.

**conformal mapping.** The transposition and solution of plane flow problems in a complex plane<sup>[16]</sup>.

**conglomerate.** Rock consisting of large well rounded waterworn particles<sup>[16]</sup>.

**conical wall niche.** See meander niche.

**conjugate joints or faults.** Two sets of joints or faults that are formed under the same stress conditions (usually shear pairs).

**conjunctive use.** The use of both surface water and ground water<sup>[16]</sup>.

**connate water.** Water entrapped in the interstices of a sedimentary or extrusive igneous rock at the time of its deposition<sup>[22]</sup>.

**consequent river.** A river flowing down the original slope of geologic beds or general slope of topography<sup>[16]</sup>.

**conservation.** The use of natural resources in a way that assures their continuing availability to future generations; the wise use of natural resources.

**consolidation.** 1. The binding of grains by cementing material to solid matrix<sup>[16]</sup>. 2. The gradual reduction in the water content (void ratio) of a saturated soil, as a result of an increase in the pressure acting on it, because of the addition of overlying sediments or the application of an external load. A laboratory test commonly known as a one-dimensional consolidation test (odometric test), is

performed on soil samples to evaluate consolidation. From such a test, the coefficient of consolidation,  $c_v$  usually expressed in  $\text{cm}^2/\text{sec}$ , is calculated as the ratio

$$c_v = \frac{K \cdot l}{m_v \cdot \gamma_w}$$

where  $K$  is the hydraulic conductivity,  $m_v$  is the coefficient of volume compressibility, and  $\gamma_w$  is the unit weight of water. The theory of consolidation leads to a relation between degree of consolidation and time:

$$U\% = \frac{c_v \cdot t}{H^2}$$

In this expression  $U$  is the degree of consolidation or the percentage of total consolidation occurring in some time  $t$ ;  $c_v$  is the coefficient of consolidation; and  $H$  is half of the sample's thickness when the odometric test is performed<sup>[21]</sup>.

**consolidated rock.** Rock that has become hard and coherent through compression and lithification<sup>[16]</sup>.

**constant-temperature zone.** The area of a cave where air temperature is unchanging throughout the year and approximates the average annual temperature aboveground<sup>[23]</sup>. See also *zonation*.

**constructive waterfall.** A large rimstone dam on a surface stream<sup>[10]</sup>. See rimstone dam. Synonyms: (French.) *chute incrustante*; (German.) *Waßerfall, inkrustierender?, Sinter...?, Sinterbecken*; (Greek.) *katarráktis*; (Italian.) (*vasche d'incrostazione*); (Spanish.) *dique*

*travertínico*; (Turkish.) *düşüm*;  
(Yugoslavian.) *slap, prečaga*.

**consumer.** Any living thing that is unable to manufacture food from nonliving substances, but depends instead on the energy stored in other living things<sup>[23]</sup>. See also *carnivore*; *decomposers*; *food chain*; *herbivore*; *omnivore*; *producers*.

**consumptive use.** The quantity of water used annually by crops or natural vegetation due to transpiration, tissue building, and evaporation from adjacent soil<sup>[16]</sup>.

**contact load.** The solid material in sliding or rolling contact with a stream bed<sup>[16]</sup>.

**contact spring.** See spring, contact.

**contaminant.** 1. An undesirable substance not normally present or an unusually high concentration of a naturally occurring substance in water or soil<sup>[22]</sup>. 2. Any physical, chemical, biological, or radiological substance or matter in water<sup>[22]</sup>. See also pollutant.

**contaminant plume.** An elongated body of ground water containing contaminants, emanating and migrating from a point source within a hydrogeologic unit(s)<sup>[22]</sup>.

**contaminate.** To introduce a substance that would cause (a) the concentration of that substance in the around water to exceed the maximum contaminant levels; or (b) an increase in the concentration of that substance in the ground water where the existing concentration of that substance exceeds the maximum contaminant levels<sup>[22]</sup>. See also pollutant.

**contamination.** The addition to water of any substance or property preventing the use or reducing the usability of the water. There is no specific limits, since the degree of permissible contamination depends upon the intended end use, or uses, of the water<sup>[6]</sup>. Sometimes considered synonymous with pollution.

**continuous stream.** A stream that is continuous in space from source to discharge point<sup>[16]</sup>.

**contributing region.** That region which contributes to well discharge in inclined water-table flow<sup>[16]</sup>.

**control.** The combined effect of channel characteristics (area, shape, slope, roughness) on rating curve<sup>[16]</sup>.

**conulite.** A hollow, cone-shaped speleothem formed when a conical depression is drilled in cave mud by falling water. Subsequent erosion may remove the mud, isolating the calcite lining of the depression<sup>[10]</sup>.

**convective diffusion.** See mechanical dispersion, coefficient.

**convective transport.** The component of movement of heat or mass induced by thermal gradients in ground water<sup>[22]</sup>. See also advection.

**convection.** The process whereby heat is carried along with the flowing ground water<sup>[22]</sup>.

**convergence.** Net horizontal inflow of moisture per unit area<sup>[16]</sup>.

**cooling water.** Water used only for cooling purposes<sup>[16]</sup>.

**cool spring.** Spring water temperature below mean annual surface temperature<sup>[16]</sup>.

**coprolite.** The fossilized excrement of vertebrates such as fishes, reptiles, and mammals, larger than a fecal pellet, measuring up to 20 cm in length, characterized by an ovoid to elongate form, a surface marked by annular convolutions, and a brown or black color, and often composed largely of calcium phosphate; petrified excrement<sup>[1]</sup>.

**coprophage.** A scavenger which feeds on animal dung, including guano<sup>[25]</sup>.

**coquina.** Porous limestone composed of broken shell fragments<sup>[16]</sup>.

**coralloid speleothem.** Any variety of microcrystalline, coralloid or botryoidal calcite deposit that is distinguished by curved outer surfaces and curved internal structures. Large examples, including clouds, are formed under water. Smaller varieties, also known as cave coral and cave popcorn, are splash deposits, or are precipitated onto cave passage walls from mists or thin surface films of saturated water<sup>[9]</sup>.

**corrasion.** Mechanical erosion performed by such moving agents as water, ice, and wind, especially when armed with rock fragments<sup>[10]</sup>. See also corrosion.

**corridor.** 1. Long, narrow chasm enlarged by action of water and into which surface runoff or stream may flow; may be



located along a fault plane, fissure, joint or between two beds. *Struga* (Slavic) refers to such a corridor along a bedding plane in a carbonate formation<sup>[20]</sup>. 2. Relatively narrow passageway permitting travel between two larger areas. 3. A fairly level and straight passage that links two or more rooms or chambers in a cave. 4. Intersecting linear depressions on the surface of the land, related to joints or dikes<sup>[10]</sup>. See also bogaz; struga; zanjón. Related to chasm; bogaz. Synonyms: (French.) *gouffre absorbant*; (German.) *Karstgaße*; (Greek.) *apocheteftikos karstikos agogos*; (Italian.) *dolina allongata*; (Russian.) *coridor, hod*; (Spanish.) *callejón*; (Turkish.) *koridor*; (Yugoslavian.) *struga, bogaz*.

**corrasion.** Abrasion of the rock floor and walls of a stream channel by rock debris carried in the water<sup>[9]</sup>.

**corrosion.** 1. Chemical action of water containing carbonic acid (also humidic, nitric, and other acids) on limestones and dolomites causing partial solution and related chemical changes in the rocks<sup>[20]</sup>. 2. Erosion by solution or chemical action<sup>[10]</sup>. 3. The act or process of dissolving or wearing away metals<sup>[6]</sup>. See also accelerated corrosion; alluvial corrosion; corrasion; solution. Compare aggressive water. Synonyms: (French.) *corrosion*; (German.) *Korrosion*; (Greek.) *chemeke thiavroses*; (Italian.) *dissoluzione, corrosione*; (Russian.) *korrozija*; (Spanish.) *corrosión*; (Turkish.) *eritme, yenme, kemirilme*; (Yugoslavian.) *korozija*.

**corrosive.** Property of aggressive water.

**coupole.** (French.) Cupola or hemispheric hill<sup>[10]</sup>.

**cove.** (Southern Appalachians.) Narrow steep-sided karst valley flanking limestone plateaus<sup>[10]</sup>.

**covered karren.** Any karren that is covered by soil. Draining water is oversaturated with respect to CO<sub>2</sub> so that corrosion is extensive<sup>[3]</sup>. See also wave karren; root karren; cavernous karren.

**covered karst.** 1. A fossil or currently developing karst in karst limestone which underlies superficial deposits or other rock, and which may produce landforms at the surface which reflect subsurface karstification<sup>[19]</sup>; contrasted with naked karst, which is soil free. See also buried karst; interstratal karst; mantled karst; subsoil karst; sulfate-reduction karst. 2. A generally subdued karst landscape developed where carbonate rocks are affected by dissolutive processes beneath a soil cover (see bare karst)<sup>[9]</sup>. Synonyms: (French.) *karst couvert*; (German.) *Bedeckter karst*; (Greek.) *kekalymenon karst*; (Italian.) *carso coperto*; (Russian.) *pokrytyĭ karst, pokritij karst*; (Spanish.) *karst cubierto*; (Turkish.) *örtülü karst*; (Yugoslavian.) *pokriveni krš, pokriti kras*.

**cow's tail.** A length of rope used as a safety when crossing a reelay<sup>[25]</sup>.

**crack.** 1. Tight joint<sup>[16]</sup>. 2. A small fracture (i.e. small with respect to the scale of the feature in which it occurs).

**crandallite.** A cave mineral —  
CaAl<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>5</sub>·H<sub>2</sub>O<sup>[11]</sup>.

**crawl, crawlway.** A cave passage that is large enough to be negotiated on hands and knees<sup>[10]</sup> or so small as to require a caver to squeeze through on his/her back or belly<sup>[13]</sup>.

**creek, brook.** Watercourse of lesser volume than a river.

**crenate wall niche.** See meander niche.

**crest line.** Line connecting crests<sup>[16]</sup>.

**crest segment.** The top part of a hydrograph<sup>[16]</sup>.

**crest-stage indicator.** A mechanical gage that preserves the indication of highest water level rise<sup>[16]</sup>.

**crevice.** Opening in a rock formation or glacier<sup>[16]</sup>.

**crevice karst.** An intricate irregular crevice system that has formed by solution widening of closely spaced joints. Crevices may be as much as 6 meters across and 20 meters deep. Especially well developed near rivers in lowland New Guinea<sup>[10]</sup>.

**critical depth.** The depth of flow in open channels when specific energy is minimum<sup>[16]</sup>.

**critical depth flume.** Venturi or Parshall flume for discharge measurements<sup>[16]</sup>.

**critical flow.** Open channel flow with Froude Number equal to unity<sup>[16]</sup>. See also Froude Number.

**crooked hole.** Borehole deflected from the vertical<sup>[16]</sup>.

**cross bedding.** Oblique deposition of thin beds with respect to the main planes of stratification<sup>[16]</sup>.

**cross fault.** A geologic fault that is oblique or at right angles to the strike direction of the beds.

**cross section.** 1. Vertical section of a geologic profile<sup>[16]</sup>. 2. A section of a cave passage or a chamber across its width<sup>[25]</sup>.

**crust stone.** A fragile layer of flowstone covering portions of walls of caves; looks like a flaky crust. Found in some Kentucky caves<sup>[10]</sup>.

**crustaceans.** The large class of animals that includes lobsters, crayfish, amphipods, isopods, and many similar forms. Crustaceans typically live in water and have many jointed appendages, segmented bodies, and hard exoskeletons<sup>[23]</sup>.

**cryokarst.** 1. A non-karstic term. Land surface with closed depression (usually small and shallow) formed by alternate freezing and thawing of permafrost or ground-ice overlying different rock, including limestone. The term 'cryokarst' is more common in Europe while the term 'thermokarst' is used in America<sup>[20]</sup>. 2. A karst-like periglacial, or formerly periglacial, landscape superimposed upon unconsolidated, superficial deposits. Cryokarst is characterized by small depressions or pits that develop due to settlement of overlying deposits into voids formed by the melting of entrapped

ice. Also known as thermokarst<sup>[9]</sup>.  
Synonyms: (French.) *cryokarst*,  
*thermokarst*; (German.) *Thermokarst*,  
*Cryokarst*; (Greek.) *thermokarst*; (Italian.)  
*criocarsismo*; (Russian.) *temokarst*,  
*criokarst*; (Spanish.) *criokarst*,  
*thermokarst*; (Turkish.) *don karsti*;  
(Yugoslavian.) *toplotni kŕš temokarst*.

**cryptokarst.** A karst term used to describe  
(a) the result of subsurface removal of  
limestone taking place beneath permeable  
loess resulting in a loss of limestone and  
subsequent slow subsidence of the loess  
without noticeable surface expression, (b)  
the initial effects of intergranular solution  
of rock when there is practically no  
movement of water from microcavity to  
microcavity, (c) the karst that develops in  
chalk beneath a mantle of its residual clay  
and chert, and (d) pockets in limestone  
which are filled with terra rossa or other  
residual material and which may be  
actively forming, arrested in  
development, or 'inherited'. Because this  
term has been used for at least four  
different meanings, it is recommended  
that it be abandoned<sup>[17]</sup>.

**cryptozoa.** The assemblage of small  
terrestrial animals found living in  
darkness beneath stones, logs, bark, etc.  
Potential colonizers of caves<sup>[25]</sup>.

**crystal cave.** A cave in which much of the  
surface of the roof, walls, and floor is  
covered with well-formed mineral  
crystals<sup>[10]</sup>.

**crystal pool.** In caves a pool, generally  
having little or no overflow, containing  
crystals<sup>[10]</sup>.

**cuesta, hogback.** A nonsymmetrical ridge  
due to a gently dipping stratum<sup>[16]</sup>.

**cueva.** (Spanish.) Cave, especially one that  
is horizontal or nearly so<sup>[10]</sup>.

**cul-de-sac; dead end.** A subterranean pas-  
sage having only one entry<sup>[10]</sup>.

**cumulative production.** The sum total of  
volumetric discharge of a well since  
production began<sup>[16]</sup>.

**cupola.** A hemispheric hill of limestone<sup>[10]</sup>.  
See also cone karst; cupola karst; mogote;  
pinnacle karst; tower karst. Synonyms:  
(French.) *cupole*; (German.) *Halbkugel*.

**cupola karst.** A type of karst topography  
common in the tropics in which the  
residual hills rise in hemispherical or  
dome-capped mounds from intervening  
depressions or sinkholes<sup>[20]</sup>. See also  
cone karst; cupola; pinnacle karst; tower  
karst. Synonyms: (French.) *karst à*  
*cupules, coupole*; (German.) *Kegelkarst*;  
(Greek.) *konoidhes karst*; (Italian.)  
*carsismo con forme residuali a cupola*;  
(Spanish.) *karst de cupulas*; (Turkish.)  
*kubbeli karst*; (Yugoslavian.) *kupolni kŕš*  
(*kras*).

**cupula** (plural cupulae). A jellylike rod  
projecting into the water from a  
neuromast, part of a fish's or amphibian's  
lateral line system. Vibrations in the  
water cause the cupula to move, thus  
setting off nervous impulses that enable  
the animal to detect nearby movements in  
the water<sup>[23]</sup>. [Not to be confused with  
*cupola*.]

**current marking.** Shallow asymmetrical hollows, caused by turbulent waterflow, that are distributed in rather regular fashion over limestone surfaces<sup>[10]</sup>. See also scallop.

**current meter, current counter.** A device used to measure the current velocity directly at a given point<sup>[16]</sup>. Synonym: ammeter.

**curtain.** 1. Sinuous, thin sheet (or sheets) of dripstone formed on the roof or walls of a cave or behind a waterfall<sup>[20]</sup>. 2. A wavy or folded sheet of flowstone hanging from the roof or projecting from the wall of a cave; often translucent and resonant<sup>[10]</sup>. See also bacon; blanket; drapery. Related to helictite and speleothem. Synonyms: (French.) *draperie stalagmitique*; (German.) *Sinterfahne*; (Greek.) *parapetasma stalaktitikon*; (Italian.) *cortina stalattitica*; (Russian.) *zanavesj*; (Spanish.) *bandera, cortina*; (Turkish.) *perde*; (Yugoslavian.) *sigasta zavjesa, sigasta zavesa*.

**curve, backwater.** A water surface profile in a stream or channel above a constriction or impoundment<sup>[16]</sup>.

**curve, concentration.** The rising limb on a hydrograph curve<sup>[16]</sup>.

**curve, desorption.** Curve of moisture content verses soil moisture tension<sup>[16]</sup>.

**curve, drawdown.** A plot of drawdown with radial distance from a well<sup>[16]</sup>.

**curve fitting.** The fitting of experimental data points to a theoretical type curve<sup>[16]</sup>.

**cutter.** 1. (Tennessee.) Solution crevice in limestone underlying residual phosphate deposits. 2. A karren-like groove formed beneath the soil, more commonly referred to as subsoil karren<sup>[10]</sup>. See also karren.

**cuttings.** Rock chips loosened from the bottom of a borehole by drilling<sup>[16]</sup>.

**cyanotrichite.** A cave mineral —  $\text{Cu}_4\text{Al}_2(\text{SO}_4)(\text{OH})_{12}\cdot 2\text{H}_2\text{O}$ <sup>[11]</sup>.

**cycle.** Regular periodic occurrence of an event<sup>[16]</sup>.

## REFERENCES

1. Bates, R. L. and J. A. Jackson. 1980. Glossary of Geology. American Geological Institute. Falls Church, Va. 751 pp.
2. Bear, J. 1979. Hydraulics of Groundwater. McGraw-Hill Inc. New York, NY. 569 pp.
3. Bögli, A. 1980. Karst Hydrology and Physical Speleology. Springer-Verlag. Berlin, West Germany. 284 pp.
4. Daoxian, Y. 1985. New Observations on Tower Karst. Paper presented at the 1st International Conference on Geomorphology (Manchester, England). 14 pp.
5. Dreybrodt, W. 1988. Processes in Karst Systems: Physics, Chemistry, and Geology. Springer-Verlag. New York, N.Y. 288 pp.
6. Driscoll, F. G. 1986. Groundwater and Wells. Johnson Division. St. Paul, Minn. 1089 pp.
7. Ford, D. C. and P. W. Williams. 1989. Karst Geomorphology and Hydrology. Unwin Hyman Inc. Lakeland, Fla. 601 pp.
8. Jennings, J. N. 1985. Karst Geomorphology. Basil Blackwell Inc. New York, N.Y. 293 pp.
9. Lowe, D. and T. Waltham. 1995. A Dictionary of Karst and Caves: A Brief Guide to the Terminology and Concepts of Cave and Karst Science. Cave Studies Series Number 6. British Cave Research Association. London, Britain. 41 pp.
10. Monroe, W. H. (Compiler). 1970. A Glossary of Karst Terminology. Geological Survey Water-Supply Paper 1899-K. U.S. Geological Survey. U.S. Government Printing Office. Washington, D.C. 26 pp.
11. Moore, G. W. and G. N. Sullivan. 1978. Speleology: The Study of Caves. Cave Books. 2nd Edition. St. Louis, Missouri. 150 pp.
12. Mylroie, J. E. 1984. Hydrologic classification of caves and karst. Groundwater as a Geomorphic Agent. R. G. LaFleur, Editor. Allen & Unwin. Inc. Boston, Mass. pp. 157–172.
13. NSS. 1982. Glossary of caving terms used in this manual. Caving Basics. J. Hassemer, Editor. National Speleological Society. Huntsville, Ala. pp. 124–125.
14. Palmer, A. N. 1972. Dynamics of a sinking stream system: Onesquethaw Cave, New York. National Speleological Society Bulletin. 34. pp. 89–110.
15. Palmer, A. N. 1981. A Geological Guide to Mammoth Cave National Park. Zephyrus Press. Teaneck, N.J. 196 pp.
16. Pfannkuch, H. O. 1971. Elsevier's Dictionary of Hydrogeology. American Elsevier Publishing Company. Inc. New York, N.Y. 168 pp.
17. Quinlan, J. F. 1978. Types of Karst with Emphasis on Cover Beds in their Classification and Development.

- Unpublished Ph.D. Dissertation. The University of Texas at Austin. 323 pp.
18. Quinlan, J. F., P. L. Smart, G. M. Schindel, E. C. Alexander, A. J. Edwards, and A. Richard Smith. 1991. Recommended administrative/regulatory definition of karst aquifer, principles for classification of carbonate aquifers, practical evaluation of vulnerability of karst aquifers, and determination of optimum sampling frequency at springs. Hydrology. Ecology. Monitoring. and Management of Ground Water in Karst Terranes Conference (3rd. Nashville. Tenn. 1991). J. F. Quinlan and A. Stanley, Editors. National Ground Water Association. Dublin, Ohio. pp. 573–635.
  19. Sweeting, M. M. 1973. Karst Landforms. Selected Glossary. Compiled by K. Addison. Columbia University Press. New York, N.Y. 362 pp.
  20. UNESCO. 1972. Glossary and Multilingual Equivalents of Karst Terms. United Nations Educational, Scientific, and Cultural Organization. Paris, France. 72 pp.
  21. UNESCO. 1984. Guidebook to Studies of Land Subsidence due to Ground-Water withdrawal. Prepared for the International Hydrological Programme. Working Group 8.4. J. F. Poland, Editor. United Nations Education, Scientific and Cultural Organization. Paris, France. 305 pp. (plus appendices).
  22. USGS. (date ?). Federal Glossary of Selected Terms: Subsurface-Water Flow and Solute Transport. Prepared by the Subsurface-Water Glossary Working Group. Ground-Water Subcommittee. Interagency Advisory Committee on Water Data. Dept. of the Interior. U.S. Geological Survey. Office of Water Data Coordination. 38 pp.
  23. William R. Elliott, Ph.D. of the Natural History Division of the Missouri Department of Conservation. The list of definitions were obtained directly from the *Biospeleology* web site:  
[www.utexas.edu/depts/tnhc/.www/biospeleology](http://www.utexas.edu/depts/tnhc/.www/biospeleology)  
which is based on *The Life of the Cave* by Charles E. Mohr and Thomas L. Poulson (1966, McGraw-Hill) with additions from Dr. Elliott.
  24. Clark, I. and P. Fritz. 1997. Environmental Isotopes in Hydrology. Lewis Publishers, Boca Raton, Fla. p. 174.
  25. Australian Speleological Federation. 1996. Cave and Karst Terminology. The list of definitions were obtained directly from the Western Australia Speleology web site:  
<http://wasg.iinet.net.au/terminol.html>  
which contains a listing of terminology commonly used in Australia.