P

packing. The three-dimensional arrangement of particles[16].

pahoehoe. (Hawaiian.) Lava flows with a smooth or billowy surface in which lava tubes are found[13]. See also lava cave; pseudokarst.

paleokarst. 1. A karstified rock or area that has been buried by later sediments; in some places, ancient caves have been completely filled by the later sediments[10]. 2. A decoupled contemporary system that has experienced tectonic subsidence and lie unconformably beneath clastic cover rocks, occasionally becoming exhumed and re-integrated into the active system[17]. 3. A karst formed in the past under an earlier erosion cycle and often in remote geological times. The karst is preserved by burial or suspension of karstification processes[20]. 4. A karstified surface and the karst features associated with it, such as caves, that have been buried by younger rocks. Paleokarstic features at various scales may be recognized within most carbonate successions. More rarely they may be re-exposed (exhumed) by the effects of later uplift and erosion[9]. Synonyms: (French.) *paléokarst*; (German.) *Paläokarst, foßiler Karst*; (Greek.) *paleokarst*; (Italian.) *paleocarsismo, carsismo fossile*; (Russian.) *paleokarst*; (Spanish.) *paleokarst*; (Turkish.) *eski karst*; (Yugoslavian.) *paleokrś, paleokras, paleokarst*. See also buried karst.

paleokarstic surface. A surface, preserved within a carbonate succession, that was formed by the effects of karst erosion. The presence of a paleokarstic surface indicates that during the deposition of the full rock sequence the young rocks were exposed to the effects of surface (sub-aerial) erosion. During such a non-depositional and erosional phase a full suite of karst features, including caves, could develop[9].

paleomagnetism. Natural remanent magnetization preserved in rock sequences. During rock deposition magnetic minerals are aligned according to the direction and polarity of the earth's contemporary magnetic field. After movement of the magnetic poles, or periodic reversals of polarity, the remanent magnetization is preserved in the rocks and may be measured to aid identification of stratigraphical units and to assess their relative ages[9].

paleontology. The study of life in past geologic time, based fossil plants and animals and including phylogeny, their relationships to existing plants, animals, and environments, and the chronology of the Earth's history[1].

palette. In a cave, a more or less flat protruding sheet of crystalline calcium carbonate spared during solution of the rock on each side of it[10]. See also blade; shield. Synonym: shield.

palygorskite. A cave mineral — $(Mg,Al)_2Si_4O_{10}(OH)\cdot 4H_2O$[11].

pan coefficient. Coefficient to correlate a high rate of evaporation in a pan to an evaporation rate from larger water bodies[16].

panhole. See solution pan.

paragenesis. A type of cave passage development in which erosion of the passage floor is inhibited by the presence of an armoring layer of sediment, such that any dissolutional enlargement is dominantly upwards[9]. Generally, an unproven and unsupported theory.

paragenetic cave. Cave passage, usually of canyon form, believed to be created by paragenesis. Passage formation by paragenesis is normally very difficult to prove, as later sediment removal leaves a passage that looks very similar to the far more common vadose canyon. It is thought that some of the larger canyons in the Flint Mammoth Cave System, USA, may have formed in this way[9].

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parahopeite. A cave mineral — $Zn_3(PO_4)_2 \cdot 4H_2O$[11].

paraphreatic. A paraphreatic passage has an air surface under relatively low flow conditions, when drainage is within the capacity of its downstream continuation, but reverts to being water-filled (phreatic) under conditions of high flow or when the downstream drainage is temporarily impeded[9].

parent material. Material from which soil or sediment was formed[16].

parietal fauna. Pertaining to the inhabitants on the walls of the entrance and twilight zones of a cave[23].

park. (Arizona.) Shallow broad solution depression[10].

particle. The smallest individual constituent of an aggregate[16].

particulate transport. The movement of particles in subsurface water[22].

parting. The separation of sedimentary rock along bedding planes[16]. Synonyms: bedding-plane; bedding-plane parting. See also bedding plane.

partition. 1. A nearly vertical residual rock mass in a cave. 2. A continuous rock span across a cave[10].

partitioning function. A mathematical relation describing the distribution of a reactive solute between solution and other phases[22].

parts per million. An expression of concentration (ppm.) The weight per weight of a solution[16].

passage. 1. Broadly, a passage is any negotiable part of cave system, though the usage is commonly restricted to those elements that tend towards the horizontal rather than vertical or sub-vertical sections. Cave passages very in size and shape, with the latter relating to the mode of origin and providing evidence of the nature of cave development mechanisms. Perhaps the largest passage in the world is Deer Cave, which is up to 170m wide and 120m high, in the Mulu karst of Sarawak[9]. 2. A comparatively small underground opening made along fractures, fissures, and bedding-plane partings by running water but through which it is possible to pass[20]. 3. In a cave, the opening between rooms or chambers[10]. Synonyms: (French.)

galerie; (German.) *Gallerie, Stollen*; (Greek.) *ypohios thiothos*; (Italian.) *cunicolo, galleria*; (Russian.) *hod*; (Spanish.) *galeria*; (Turkish.) *geçit*; (Yugoslavian.) *galerija*. See also chamber; room.

pathogenic bacteria. Disease inducing bacteria[16].

pavement. See limestone pavement.

peat. Decomposed matter, mainly vegetable[16].

pebble. A smooth rounded rock fragment[16].

Péclet number. 1. measure of the relative contribution of mechanical dispersion and diffusion to solute transport. It relates the effectiveness of mass transport by advection $\left(-\frac{vx}{D}\frac{\partial C}{\partial x} = -P_e\frac{\partial C}{\partial x}\right)$ to the effectiveness of mass transport by either dispersion or diffusion $\left(P_e = \frac{\partial^2 C}{\partial x^2}\right)$. Péclet numbers below ≈0.4 indicate diffusion/dispersion control; 0.4–6.0 suggest that diffusion/dispersion and advection are in transition and thus approximately equal to each other; and >6.0 indicate advection control. Large Péclet numbers indicate strongly advective systems. 2. A relationship between the advective and diffusive components of solute transport expressed as the ratio of the product of the average interstitial velocity, times the characteristic length, divided by the coefficient of molecular diffusion. Small values indicate diffusion dominance, large values indicate advection dominance[22].

pearl. See cave pearl.

pediment. An inclined erosion surface covered with thin fluvial deposits[16].

pendulite. A kind of stalactite which has been partly submerged[25].

and the submerged part covered with dog-tooth spar to give the appearance of a drumstick.

pellicular water. 1. The film of water left around each grain or fracture surface of water-bearing material after gravity drainage[22]. 2. Water of-adhesion[22]. 3. Water that can be extracted by root absorption and evaporation but cannot be moved by gravity or by the unbalanced film forces resulting from localized evaporation and transpiration[22].

peloid. A microscopic texture. A sedimentary grain composed of micrite carbonate irrespective of origin[20]. Synonyms: (French.) *peloïde*; (German.) *mikroskopisches, sedimentäres Gefüge*; (Greek.) *piloidís*; (Italian.) *peloide*; (Spanish.) *peloide*; (Turkish.) *peloit*. See micrite, pelsparite.

pelsparite. A microscopic texture. A limestone composed of pellets (peloids) in a matrix of cement[20]. Synonyms: (French.) *pelsparite*; (German.) *Pelsarite, Kalkstein gefügt aus Kügelchen ?*; (Greek.) *pelsparítis*; (Italian.) *pelsparite*; (Spanish.) *pelsparita*; (Turkish.) *pelsparit*. See peloids.

pendant, rock pendant. One of a group of isolated similarly proportioned

projections surrounded by a complex of connected cavities in the bedrock ceiling of a cave[10]. Formed by the rapid, differential solution of the surrounding rock[19].

pendular regime. A saturation regime where a porous medium has the lowest possible saturation in the form of pendular rings at grain contacts[16].

peneplain. A degradation surface without relief[16].

pen trace. Ink, magnetic, or photographic line traced on the drum of a recording gage or meter[16].

pepino hill. (Puerto Rican.) 1. Rounded or conical-shaped hill resulting from tropical humid karst action. Term generally replaced in Puerto Rico by mogote. 2. Elongate hill or ridge capped by mogotes[10]. See mogote.

percent saturation. The ratio, expressed as a percentage, of (a) the volume of some fluid (water, gas, or oil) to (b) the total volume of intergranular space (voids) in a given porous medium. Synonymous with degree of saturation[22].

perched ground water. Ground water separated from an underlying body of ground water by an unsaturated zone[6]. See also ground water, perched.

perched karst spring. See spring, perched karst.

perched water table. Unconfined ground water separated from an underlying body of ground water by unsaturated soil or rock. It may be either temporary or permanent.

percolate. To flow through saturated void space[16]. The act of water seeping or filtering through soil or rock without a definite channel[6].

percolation; percolation water. 1. Ground water moving slowly through the micro-fissure network of a limestone, most of which eventually joins a major cave conduit and flows more rapidly. In most environments percolation water enters the limestone through a soil cover. It is therefore high in carbon dioxide and has a major influence on limestone dissolution and later redeposition of calcite speleothems. Percolation water accounts for most of the storage in a limestone aquifer, responds slowly to flooding in comparison to sinkhole water, and is normally of high enough quality to provide a drinking-water supply[9]. 2. The movement in laminar flow under hydrostatic pressure of water through the interconnected, saturated interstices of rock or soil, excluding movement through large openings such as caves and solution channels. 3. The downward movement of water through the unsaturated zone[22]. 4. The downward flow of water in saturated or nearly saturated porous medium at hydraulic gradients of the order of 1.0 or less[22]. 5. The movement of water through saturated interior pore space[16]. Synonym: seepage water.

percolation water. Autochthonous karst water which permeates directly through karst limestone without using a surface watercourse[19].

perennial spring. See spring, perennial.

perennial yield. Sustained yield[16].

periodic spring. see spring, periodic.

perforation. Holes or openings in well casing to permit water inflow into a well[16].

permafrost. Ground that is perennially below the freezing point of water[16].

permafrost karst. A nonkarst term. A pseudokarst developed in areas of permafrost due to melting of ice and frozen ground in a manner superficially similar to the solution of carbonate material in water. A general term embracing intrapermafrost karst, subpermafrost karst, and suprapermafrost karst[20]. (French.) karst de permafrost; (German.) *Permafrost Karst ?, Pseudokarst*; (Greek.) *karst monímou paghtoú*; (Italian.) *pseudo-carsismo di permafrost*; (Spanish.) *karst de permafrost*; (Turkish.) *aldatıcı don karstı*; (Yugoslavian.) *permafrost kr̃s (kras, karst)*.

permafrost table. The upper limit of permafrost[16].

permanent hardness. Noncarbonate hardness[16].

permanent wilting point. Saturation at which permanent wilting occurs[16].

permeability. See hydraulic conductivity; permeability, intrinsic .

permeability barrier. See barrier, permeability.

permeability coefficient. The rate of flow of water through a unit cross-sectional area under a unit hydraulic gradient at the prevailing temperature (field permeability coefficient) or adjusted to a temperature of 15NC[22].

permeability, effective. The observed permeability of a porous medium to one fluid phase under conditions of physical interaction between this phase and other fluid phases present[22].

permeability, intrinsic. 1. A measure of the ability of a medium to transmit a fluid through a porous medium. It is a function of the medium only and is proportional to the mean grain size diameter. 2. A measure of the relative ease with which a porous medium can transmit a fluid under a potential gradient and is a property of the medium alone[22]. 3. The property of a porous medium itself that expresses the ease with which gases, liquids, or other substances can pass through it[22].

permeability, relative. 1. The ratio of the effective permeability for a given flow phase to the intrinsic permeability of the porous medium[22]. 2. The ratio of the effective and specific permeabilities[22]. 3. The ratio of permeability of one immiscible phase to intrinsic permeability in multiphase flow[16].

permeability, specific. The permeability measured when the rock contains only one fluid[22].

permeability tensor. Permeability in an anisotropic medium[16].

permeability, transverse. Permeability measured perpendicular to the axis of a core sample[16].

permeameter. A device used to measure the permeability of small samples[16].

pervious. Permitting fluids to pass[16].

petrography. The science of describing and identifying rocks[16].

***p*H**. A measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity. Originally stood for the words, potential of hydrogen[6].

phonolite. A type of volcanic rock, common as lava flows in some areas, that is capable of supporting the formation of extensive lava caves, including those on Mount Suswa in Kenya[9].

photogeology. The interpretation of aerial photographs for geological purposes[16].

photogrammetry. The preparation of maps and measurements from stereoscopic aerial photographs[16].

photosynthesis. The process by which green plants convert carbon dioxide and water into simple sugar. Chlorophyll and sunlight are essential to the series of complex chemical reactions involved in the process[23].

phreas, phreatic water. (From the Greek word meaning well.) 1. The zone of saturated rock below the water table, within which all conduits and sub-conduits are water filled (sometimes referred to as the flooded, phreatic or saturated zone). Commonly the phreatic zone is considered as being subdivided into an upper (shallow phreatic) zone and a lower stagnant phreatic zone[9]. 2. Water in the zone of saturation; water below the water table[10]. See also bathyphreatic, bathyphreatic zone, ground water, phreas.

phreas, dynamic. A phreatic zone or part of a phreatic zone where water moves fast with turbulence under hydrostatic pressure[25].

phreatic cave. 1. Cave conceived and developed by dissolution, usually below the water table, where all voids are water filled within the phreas. Phreatic caves may include loops deep below the water table, particularly in dipping limestone with widely spaced bedding-related fissures. Higher fissure densities, sub-horizontal geological guidance, or greater karstic maturity encourage shallow phreatic development just below the water table. Progressive abondonment of phreatic caves is usually in a downward sequence, as erosionally lowered valley floors intersect lower levels of the flooded system. Active phreatic cave segments, left perched for geological reasons after a general water-table lowering, are relatively common. Characteristics of phreatic caves are blind dissolution pockets on walls and ceilings, branching and looping of passages, and overall switchback gradients as phreatic flow

may be uphill under pressure. The most common passage, and overall switchback gradients as phreatic flow may be uphill under pressure. The most common passage form is a tube, though cross-sectional shape reflects local geological factors. A classic active phreatic cave is that behind the Fontaine de Vaucluse in France, while Hölloch, Switzerland, is a major system consisting mostly of relict phreatic passages[9]. 2. Cave passage developed in the phreatic zone and still actively forming. Passages often appear as tubes.

phreatic decline. The downward movement of the water table[16].

phreatic fluctuation. The fluctuation of the water table[16].

phreatic lift. An active or abandoned phreatic conduit that carries or carried water upwards in a downstream direction[9].

phreatic line. See seepage line.

phreatic rise. The upward movement of the water table[16].

phreatic surface. See water table.

phreatic water. That part of the underground water in a karst limestone which lies within the zone of permanently saturated rock — the phreatic zone. Caves formed within this zone are known as *phreatic caves*[19].

phreatic zone. 1. Those parts of the earth's crust in which all voids are filled with water under pressure greater than atmospheric[22]. 2. That part of the earth's crust beneath the regional water table in which all voids, large and small, are ideally filled with water under pressure greater than atmospheric[22]. When discussing a karst setting, it is preferable to use the term, phreatic zone, so as to avoid confusion regarding chemical saturation. Synonym: saturated zone. See also zone of saturation.

phreatobia. An animal association found in water separating grains of sand or fine gravel[25].

phreatobite. An inhabitant of groundwater, often exhibiting troglomorphy, but not limited to karst systems. Many examples of amphipods and other crustaceans abound[23].

phreatophyte. Desert plants with deeply penetrating roots reaching the water table mainly along stream courses[16].

physiography. The science of the origin and evolution of land forms[16].

phytometer. A device used to measure the transpiration of plants embedded in soil[16].

piedmont plain. A plain extending outwards from the base of a mountain system[16].

piezometer. A devise used to measure ground-water pressure head at a point in the subsurface[22].

piezometric head. The sum of the pressure and elevation head[16].

piezometric limit. The point within a given flow path below which the flow direction is influenced by hydrostatic pressure. In cases where flow is confined to a planar structure, the piezometric limit can be identified as a point where the flow path changes from a dip-oriented to a strike-oriented trend. The piezometric limit is determined both by discharge rate and geometry of the openings. Used to describe karst aquifers with a discontinuous piezometric surface[14].

piezometric surface. 1. The imaginary surface to which water from a given aquifer will rise under its full static head[10]. 2. Defined by the elevation to which water will rise in artesian wells or wells penetrating confined aquifers[16]. See also potentiometric surface.

pigment. A chemical substance that imparts color to an object by reflecting or transmitting only certain light rays and absorbing all others. For example, a substance that absorbs all but green rays appears green. An object that contains no pigment, on the other hand, appears white because it reflects all light rays and absorbs none. Many troglobites have lost all their pigment[23].

pillar. 1. Remnant of bedrock joining the cave floor and ceiling. Not to be confused with a column, which is a calcite deposit. Pillars are common in phreatic caves, formed by complexly looping ground-water flow, but may also be left as small oxbow cores of vadose origin. A spectacular group of pillars occurs in the ill-named Chamber of Columns in the Sof Omar cave, Ethiopia[9]. 2. A column of rock remaining after solution of the surrounding rock. 3. A stalactite--stalagmite that reaches from roof to floor in a cave; more properly termed a column. 4. A tall thin stalagmite that does not reach the roof of a cave[10]. See column; rock pillar.

pinnacle karst. 1. Tropical karst characterized by vertical rock blades fretted sharped by dissolution. It is practically indistinguishable from arête karst and tsingi, and includes the varieties known as shilin. The Pinnacles in the Mulu karst of Saraway have rock blades up to 50m high projecting through the rain forest canopy[9]. 2. A tropical landscape of bare reticulated saw-topped ridges having almost vertical slopes and a relief of as much as 120 meters. The ridges rise above forest-covered depressions and corridors. Found in New Guinea at elevations or around 2,000 meters[20]. Synonyms: (French.) *karst à pinacles*; (German.) *Pinnacle Karst*; (Greek.) *karst koriphón*; (Italian.) *carsismo a pinnacoli*; (Turkish.) *sivritepeli karst*. Compare cone, cupola, tower karst.

pinnacles. These are a particularly mature form of karren. The side walls are grikes with Rinnenkarren cutting across one another to form sharp edges and peaks that can reach several meters in height. Generally, pinnacles need a long period time to form. They are common in the tropics and can attain great sizes[3]. Often, they are covered. See also debris karren.

pipe. 1. A generally small, sub-cylindrical, vertical hole developed in an unconsolidated sedimentary deposit by

the washing away of all or part of its fines content. Some pipes develop above points on a carbonate-rock surface, such as joint intersections, where ground-water seepage is locally concentrated. Pipes in chalk include cylindrical and conical masses of clay and sand that are neptunian fills of dissolutional dolines, shafts and caves; all shapes and sizes are commonly referred to as chalk pipes[9]. 2. Small cylindrical hole in unconsolidated sediments, caused by removal of fine material by water[10]. 3. A closed tubular conduit for fluid transport[16].

piping. 1. A process whereby a cavity or small conduit is developed in an unconsolidated soil due to progressive sediment removal by seepage water. The cavity develops headwards, as the fines are removed first and the coarser material is then washed out of the growing cavity[9]. Definition 1 is often incorrectly applied to the formation of sinkhole development — the migration of smaller particles through openings created by larger particles is of no consequence in terms of sinkhole development and should not be confused as such. 2. Formation of a passage by water under pressure in the form of conduits through permeable materials when the hydraulic head exceeds a certain critical value[10]. 3. The mechanical washout of caves in gravels, soils, loess, etc., and shows evidence of associated collapse.

pisanite. A cave mineral — $(Fe,Cu)SO_4 \cdot 7H_2O$[11].

pisolite, pisolith. See cave pearl.

pit. A deep hole, generally circular in outline, having vertical or nearly vertical walls[10]. See also jama; pothole (definition 2); shaft.

pitch. Vertical or sub-vertical shaft or cave waterfall that normally requires rope, ladder or equipment to pass; a term used by British cave explorers[9].

piton. 1. (French.) Limestone hill having sharply pointed peak[10]. 2. A solid or folded metal spike, of steel or other alloy, to be driven into a crack in the rock to form an anchor[25].

pitot tube. A device used to measure flow velocity via pressure differences[16].

pitted plain. Plain having numerous small closely spaced closed depressions[10].

plan. A plot of the shape and details of a cave projected vertically onto a horizontal plane at a reduced scale[25].

planarian. A flatworm. A relatively simple wormlike animal with a flattened ribbonlike body, a distinct head end, and a mouth located more or less centrally on the underside of the body[23].

plane of weakness. Surface or narrow zone with a shear (or tensile) strength lower than that of the surrounding material.

planimeter. An instrument that automatically determines irregular areas on a map[16].

plateau. An elevated level land surface[16].

Pleistocene. An epoch of the Quaternary period, after the Pliocene of the Tertiary and before the Holocene; also the corresponding worldwide series of rocks. It began two million years ago and lasted until the start of the Holocene some 8,000 years ago[1].

plunge pool. A swirlhole, generally of large size, occurring at the foot of a waterfall or rapid, on the surface or underground[25]. See also swirlhole.

pocket. Solution cavity in ceiling, floor, or walls of a cave, shaped like the interior of a round-bottomed kettle; unrelated to joints or bedding[10]. See also spongework.

pocket valley. 1. The reverse of a blind valley, extending headwards into the foot of a calcareous massif. The upstream end is terminated by a cliff, frequently lunate, from whose base emerges a subterranean karst stream meandering across a flat, steep-sided valley below the resurgence[19]. 2. A valley that begins abruptly and has no headwaters, having formed from and below the site of a spring[9].

pocket storage. Water storage in depressions on the land surface[16].

podzol. A light colored soil, usually found in forest regions[16].

point-bar deposit. Sedimentation on the inside of a meander loop of a river or stream channel[16].

point of inflection. The point where a curve changes slope[16].

point source. Any discernable, confined, or discrete conveyance from which pollutants are or may be discharged, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft[22].

poise. A measure of viscosity.

pokrytyj karst. (Russian.) See covered karst.

polarization. The migration and separation of ions to the electrodes in a direct current electrolyte process giving rise to higher overall resistance[16].

polje. (Slavic word for field.) 1. A large, flat floored depression in karst limestone, whose long axis is developed parallel to major structural trends and can reach tens of kilometers in length. Superficial deposits tend to accumulate on the floor. Drainage may be by either surface watercourses (when the polje is said to be open) or swallow holes (a 'closed' polje.) Their development is encouraged by any impedance in the karst drainage[19]. 2. Polje or karst polje signifies the flat-bottomed lands of closed basins which may extend over large areas, as much as 1,000 km^2. The flat floor of the polje may consist of bare limestone, of a nonsoluble formation (and so with rolling topography), or of soil. The polje will show complex hydrogeological characteristics such as exsurgences, swallow holes, estavelles, and lost rivers. In colloquial use, the term polje is applied to flat-bottomed lands which are overgrown or are under cultivation[20]. 3.

Large flat-floored closed karst depression, with sharp slope breaks between the commonly alluviated floor and the marginal limestone. Streams or springs drain into poljes and outflow is underground through ponors. Commonly the ponors cannot transmit flood flows, so many poljes turn into wet-season lakes. The form of some poljes is related to the geological structure, but others are purely the projects of lateral dissolution and planation. The Dinaric Karst has many poljes; the Livansko polje is around 60km long and 7km wide. The word is Slovene (common also to other Slav languages) for a field, reflecting the agricultural value of the alluvial polje floor soils[9]. Synonym: interior valley; (French.) *polje*; (German.) *Polje*; (Greek.) *polye*; (Italian.) *polje*; (Russian.) *polje*; (Spanish.) *polje*; (Turkish.) *gölova, polye*; (Yugoslavian.) *polje*. See also karst polje.

pollutant or contaminant. Includes, but is not limited to, any element, substance, compound. or mixture including disease causing agents, which after release into the environment and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingesting through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation. Physiological malfunctions (including malfunctions in reproduction or physical deformation in such organisms or their offspring[22].

polluted water. Water that has become contaminated by sewage or other contaminants such that the water quality has become severely degraded.

pollution. 1. Specific impairment of water quality by agricultural, domestic, or industrial wastes (including thermal and atomic wastes), to a degree that has an adverse effect upon any beneficial use of water[22]. 2. The addition to a stored body of water of any material which diminishes the optimal economic use of the water body by the population which it serves, and has an adverse effect on the surrounding environment[22].

pollution abatement. All measures taken to prevent or to protect against pollution[16].

polygonal karst. 1. A karst area where the surface is completely pitted with closed depressions, the divides of which form a crudely polygonal network. Especially common in humid tropical cone-karst terrain, but also found in well-formed temperate doline-karst terrain[10]. 2. A type of karst in which numerous closed depressions are separated by dividing ridges that impose a crudely polygonal appearance upon the landscape[9].

pond. A small body of surface water[16].

ponded water. Water held in a depression by a barrier[16], such as breakdown in a cave system.

ponor. (Slavic.) 1. Hole or opening in the bottom or side of a depression where a surface stream or lake flows either partially or completely underground into the karst ground-water system. A sea-ponor is where sea-water flows or is

drawn into an opening by a vacuum in karstified rock[20]. 2. Hole in the bottom or side of a closed depression through which water passes to or from an underground channel[10]. Synonyms: (British.) *swallet, swallow hole, stream sink*; (French.) *ponor, aven, gouffre, perte*; (German.) *Schlund, Saugloch, Schlinger, Ponor*; (Greek.) *katavothra*; (Italian.) *inghittitoio, capovento*; (Russian.) *ponor*; (Spanish.) *sumidero, ponor, pérdida*; (Turkish.) *su yutan*; (Yugoslavian.) *ponor, utok, požiralnik, pivka*. See also swallow hole.

ponornica. See lost river.

pool deposit. Crystalline material deposited in an isolated pool in a cave[10].

population. Individuals of a species in a given locality which potentially form a single interbreeding group separated by physical barriers from other such populations (*e.g.*, populations of the same species in two quite separate caves)[25].

pore. Small void space in rock or unconsolidated material of soil particles. See also interstice[16].

pore deposit. Mineral matter deposited on the interior of a cave from water entering the cave so slowly through pores and cracks that it does not form drops[10].

pore entry radius. The radius of a flow channel at pore entry, usually smaller than the average pore radius[16].

pore pressure. The pressure of water in pores of a saturated medium[16].

pore space. 1. The total space not occupied by solid soil or rock particles[22]. 2. The space occupied by voids containing gases or liquids in soil or rock samples[16]. See also interstice; porosity; porosity, effective; porosity, primary; porosity, secondary.

pore velocity. See velocity, average interstitial.

porosimeter. A device used to measure porosity[16].

porosity. 1. The ratio of the aggregate volume of interstices in a rock or soil to its total volume; generally stated as a percentage[10]. 2. The ratio, usually expressed as a percentage, of the total volume of voids of a given porous medium to the total volume of the porous medium[22]. 3. The volume percentage of the total bulk not occupied by solid particles[22]. See also porosity, effective; porosity, primary; porosity, secondary; porosity, tertiary.

porosity, absolute. Porosity established by taking into account all interconnected and nonconnected or isolated void volumes[16].

porosity, effective. 1. The ratio, usually expressed as a percentage of the total volume of voids available for fluid transmission to the total volume of the porous medium[22]. 2. The ratio of the volume of the voids of a soil or rock mass that can be drained by gravity to the total volume of the mass[22]. 3. The amount of interconnected pore space and fracture openings available for the transmission of fluids, expressed as the ratio of the volume of interconnected pores and

openings to the volume of rock. See also porosity; porosity, primary; porosity, secondary; porosity, tertiary.

porosity, primary. Porosity of some lithological material that developed while the rock was forming. See also interstice; pore; pore space; porosity; porosity, effective; porosity, secondary.

porosity, secondary. Porosity of some lithologic material that has developed after the rock was initially formed, such as joints and fractures, and may be capable of enlargement by dissolution processes. See also pore; pore space; porosity, effective; porosity, primary; porosity, tertiary.

porosity, tertiary. Porosity caused by solutional enlargement of secondary porosity. See also pore; pore space; porosity; porosity, effective; porosity, primary; porosity, secondary.

porous. Having numerous interstices, whether connected or isolated.

porous medium. Any medium containing interdispersed void space[16].

porthole. A nearly circular natural opening in a thin rock wall in a cave[10]. See also window.

potable water. Water that is suitable for human consumption[22].

potamology. The study of streams.

potential. Any of several different scalar quantities, each of which involves energy as a function of position or of condition; e.g., the fluid potential of ground water[22].

potential density. 1. The density of a unit of water after it is raised by an adiabatic process to the surface, i.e., determined from in-situ salinity and potential temperature[22]. 2. Density that would be reached by a compressible fluid if it were adiabatically compressed or expanded to a standard pressure[22].

potential drop. The difference in total head between two equipotential lines[22].

potential evapotranspiration Evapotranspiration occurring under adequate soil-moisture supply at all times for given temperature and humidity conditions[16].

potential flow. Irrotational flow occurring in a conservative force field or potential field[16].

potentiometer. An instrument used to measure voltage differences[16].

potentiometric field. As used in karst hydrology, a discontinuous highly irregular surface representing the static ground-water head as indicated by the level to which water rises in a selected piezometer. In some piezometers, the water-level rise will be greatly different from other piezometers (either higher or lower) or may be non-existent all together.

potentiometric surface. An imaginary surface representing the total static head of ground water and defined by the level to which water will rise in a

piezometer[22]. Replaces the term piezometric surface.

pothole. 1. A single shaft, or an entire cave system that is dominantly vertical. It is also used to describe a single erosional bowl or moulin, rounded mainly by the swirling current, in a stream bed[9]. 2. A small rounded hole pipe worn into the bedrock of a streambed, or on the coast, or at a waterfall, by sand, gravel, and stones spun around by the current in evorsion or mill action[20]. 3. Term used in England for vertical or steeply inclined shaft in limestone[10]. Synonyms: (French.) *marmite de géant, aven*; (German.) *Kolk, Strudelloch*; (Greek.) *strongíli opí is petróthi kítin révmatos*; (Italian.) *marmitta dei giganti*; (Russian.) *karstovaja sahta*; (Spanish.) *marmita de gigante, pilancón*; (Turkish.) *dev kazan*ı; (Yugoslavian.) *erozioni kotas*. See also pit; shaft.

potholer. (British.) Explorer of openings in karst formations with emphasis on vertical and steep openings; somewhat of a slang term[20]. Synonyms: (French.) *spéléologue*; (German.) *Speläologe, Höhlenforscher*; (Greek.) *erevna karstikon engelon*; (Italian.) *speleologo*; (Spanish.) *espeleólogo, explorador de simas*; (Turkish.) *dev kazanc*ı; (Yugoslavian.) *speleolog, jamar*. See speleologist, caver.

potholing. 1. The process of scouring holes in rock in stream beds or near the strand line by rapid rotation of trapped pebbles or cobbles; evorsion[10]. 2. (British.) See caving.

pozo. (Spanish.) See sima.

preadapted. Possessing adaptations that would contribute to survival in a habitat other than the immediate one because of similarities in living conditions in the two habitats. Insects that live in leaf litter on the forest floor, for example, may be pre-adapted to cave life[23].

precipitation. 1. Water precipitating in liquid or solid form from the atmosphere[16]. 2. The growth and development of crystals from solutions that are supersaturated with respect to various minerals.

precipitation excess. That part of precipitation that contributes directly to runoff[16].

precipitation gage. An instrument used to measure the amount of precipitation per unit area[16].

predator. An animal that lives by capturing other animals for food[23]. See also *prey*.

pressure. The force exerted across a real or imaginary surface divided by the area of that surface.

pressure cell. A pressure measuring and transducing device[16].

pressure cell. The pressure difference occurring between two points along a stream line in a flow system[16].

pressure flow tube. Gallery with water flowing under pressure including differential gravity head and artesian pressure[20]. Synonyms: (French.) *galerie en conduite forcée*; (German.) *Druckströmungsröhre, Karstgerinne*;

(Greek.) *ypoghion ytnatagogos, ypopiesin*; (Italian.) *condotta forzata*; (Russian.) *karstovij kanal s napornimi vodami*; (Spanish.) *galería (o tubo) saturada*; (Turkish.) *basınçlı su mecrası*; (Yugoslavian.) *kanal s vodom pod tlakom*. See also conduit; streamtube.

pressure head. Hydrostatic pressure expressed as the height of a column of water that the pressure can support at the point of measurement[22]. See also head, static; pressure, hydrostatic.

pressure, hydrostatic. The pressure exerted by the weight of water at any given point in a body of water at rest[22].

prey. A living animal that is captured for food by another animal[23]. See also *predator*.

prism storage. The storage of water in a river channel or reservoir in prism above the original water level[16].

prismatic compass. A compass with a prism attached so that the compass card can be read at the same time as the compass is directed into the line of sight to a distance point[25].

probe. A sensing instrument used to take measurements at the interior of a relatively unaccessible system[16].

producers. Green plants, the basic link in any food chain; by means of photosynthesis, green plants manufacture the food on which all other living things ultimately depend. They are available in the cave community only in the twilight zone, or as debris that falls or washes in. A few types of bacteria also manufacture food from nonliving substances and therefore serve as producers in some cave communities[23]. See also *consumer*.

projected section. The result of projecting a section composed of several parts with differing directions onto a single plane. Usually the plane is vertical along the general trend of the cave. The horizontal distance apart of points is not correct, only the vertical, so that slopes are distorted[25].

proto-cave. Natural void that links a potential input point and an output point within an aquifer, but which is still too small to be entered by man[9].

prusik knot. A knot tied by looping a smaller diameter rope around a larger standing line (rope) that has the property of sliding with no load on the knot, but will hold when it is loaded (e.g. when the weight of a caver is applied)[13]. See also ascender; mechanical ascender; prusiking; standing line.

prusik sling. A sling fastened by a prusik knot to the rope[25].

prusiking. The art of ascending a standing line (rope) by a caver with prusik knots[13] as opposed to the use of a mechanical ascender. See also ascender; knots; mechanical ascender; prusik knot; standing line.

pseudokarren. These are karren appearing features that form mostly on insoluble, silicate rocks by means of weathering processes. They appear as a rounded type of Rinnenkarren and less frequently as an

atypical form of solution pan[3]. See also karren; Rinnenkarren; solution pan.

pseudokarst. 1. Terrane with features similar to karst but formed in nonsoluble rocks, as by melting of permafrost or ground ice, collapse after mining, and by outflow of liquid lava from beneath its solidified crust[20]. 2. Karst-like terrane produced by a process other than the dissolving of rock, such as the rough surface above a lava field, where the ceilings of lava tubes have collapsed. Features of pseudokarst include lava tunnels, lava tubes, lava stalactites, and lava stalagmites[10]. 3. A landscape containing karst-like features such as caves and dolines, but not formed by bedrock dissolution as in true karst. Pseudokarst embraces volcanic landscapes with lava caves, cryokarst or thermokarst formed by ground-ice melting in a permafrost environment, and situations where mechanical soil piping has occurred, producing depressions and pipes, as occur commonly in areas of loess cover[9]. Synonyms: (French.) *pseudokarst*; (German.) *Pseudokarst*; (Greek.) *psevthokarst*; (Italian.) *pseudocarsismo*; (Russian.) *psevdokarst*; (Spanish.) *pseudokarst*; (Turkish.) *aldatıcı karst*; (Yugoslavian.) *pseudokŝ, pseudokras, pseudokarst, navidezni kras*. See lava cave, lava karst, pahoehoe.

pseudo-breccia. A type of limestone resembling a breccia, in which angular limestone fragments are cemented together by limestones of different composition. Pseudo-breccias are common in many preserved limestone sequences and may owe their origin to the dissolutional removal of originally interbedded and interstitial sulfate minerals followed by break-up and redistribution of the residual carbonate component[9].

psychrometer. 1. An instrument used for measuring relative humidity. The simplest sling psychrometers consist of two thermometers mounted on a rotating frame. One thermometer's bulb is kept moist, the other dry. By comparing the "wet bulb" and "dry bulb" readings of the two thermometers after they have been whirled in the air, one can determine the relative humidity. An electric fan is used to ventilate the wet bulb in many psychrometers[23]. 2. Apparatus designed to measure relative humidity indirectly[16]. See also *hygrometer*.

puddle. Water collecting in very small surface depressions[16].

pumping test. A test designed to determine aquifer characteristics by pumping a well and plotting the drawdown curves of observation wells for comparison with theoretical curves.

pupa (plural pupae). The inactive stage in the life history of certain insects during which the larva undergoes a gradual reorganization of its tissues in the process of becoming an adult. See also *metamorphosis*.

pycnometer. A bottle with an accurately determined volume for density determinations[16].

pyrite. Iron sulfide mineral (FeS_2) also known as iron pyrites and fool's gold. Pyrite occurs in trace amounts in many sedimentary rocks. It may be locally

common in dark carbonaceous limestone and in thin non-carbonate beds such as shales, coals and wayboards. Pyrite may break down spontaneously, with or without bacterial mediation, to form sulfates, particularly sulphuric acid, that may be involved in early speleogensis[9].

pyrrhotite. A cave mineral — FeS[11].

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