

A Glossary of Karst Terminology

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1899-K



A Glossary of Karst Terminology

Compiled by WATSON H. MONROE

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1899-K

*A contribution to the International
Hydrological Decade*



UNITED STATES DEPARTMENT OF THE INTERIOR

ROGERS C. B. MORTON, *Secretary*

GEOLOGICAL SURVEY

V. E. McKelvey, *Director*

Library of Congress catalog-card No. 75-607530

First printing 1970

Second printing 1972

A GLOSSARY OF KARST TERMINOLOGY

Compiled by WATSON H. MONROE

ABSTRACT

This glossary includes most terms used in describing karst geomorphologic features and processes. The terms are primarily those used in the literature of English-speaking countries, but a few of the more common terms in French, German, and Spanish are included, with references to the corresponding English terms where they are available. The glossary also includes simple definitions of the more common rocks and minerals found in karst terrain, common terms of hydrology, and a number of the descriptive terms used by speleologists. The glossary does not include definitions of most biospeleological terms, geologic structure terms, varieties of carbonate rock that require microscopic techniques for identification, or names describing tools and techniques of cave exploration.

INTRODUCTION

This glossary of karst terminology has been compiled mainly from published definitions and suggestions made by the following investigators in karst geomorphology: Reuben Frank and Joseph N. Jennings, Australia; Marjorie M. Sweeting, England; Paul Fénelon, France; Paul W. Williams, Ireland; David Wozab, Jamaica, West Indies; Victor R. Baker, Eugene Borax, Reginald P. Briggs, William E. Davies, John J. Fisher, L. A. Heindl, Harry LeGrand, C. L. McGuinness, George W. Moore, James P. Quinlan, Zane Spiegel, and V. T. Stringfield, United States.

The terms are primarily those used in the literature of English-speaking countries, but a few of the more common terms in French, German, Spanish, and Slavic languages are included, with references to the corresponding English terms. The existing glossaries of geology, geography, and speleology listed in the references have been paraphrased or quoted freely. Authorship has not been cited because the origin of most terms has not been determined.

Although the glossary was originally intended to include only definitions of karst geomorphologic features, it was soon found desirable to include definitions of the more common rocks and minerals found in karst terrain, common terms of hydrology, and a number of the descriptive terms used by speleologists; most biospeleological

terms have been omitted. Also omitted are definitions of geologic structure terms, which are defined in most dictionaries; varieties of carbonate rocks that require microscopic techniques for identification; and names describing tools and techniques of cave exploration.

GLOSSARY

A

- abîme.** (French.) 1. Abyss. 2. Wide, deep shaft, in limestone, the walls of which are vertical or overhanging.
- abris sous roche.** (French.) *See* rock shelter.
- active cave.** 1. Cave containing a running stream. 2. Cave in which speleothems are growing. (Less common and less desirable usage.) *Compare* live cave.
- aeolianite.** *See* eolian calcarenite.
- aeration, zone of.** *See* zone of aeration.
- aggressive water.** Water having the ability to dissolve rocks. In the context of limestone and dolomite, this term refers especially to water containing dissolved carbon dioxide (carbonic acid) or, rarely, other acids.
- aguada.** (Spanish for watering place.) In Yucatán, shallow depression generally covering several hectares used for water supply.
- air pocket.** An enclosed air space between the water surface and the roof of a cave.
- aisle.** An elongated high narrow traversable passage in a cave. *See also* crawl, crawlway; corridor; passage.
- alternative.** Adjective used to designate an intake or resurgence operating only during rainy seasons; in some areas reversible; equivalent to intermittent. Used also as a noun.
- alveolization.** (From the Latin word "alveolatus," meaning hollowed out.) Pitting of a rock surface produced by wind loaded with sand, by water charged with carbonic acid, or by plant roots.
- anastomosis.** A network of tubular passages or holes in a cave or in a solution-sculptured rock. A complex of many irregular and repeatedly connected passages. Synonym, labyrinth.
- anemolite.** A helictite in which the eccentricity is ascribed to the action of air currents.
- anthodite.** A cave formation composed of feathery or radiating masses of long needlelike crystals of gypsum or aragonite, which radiate outward from a common base. *See also* cave flower.
- apron.** A smooth bulging mass of flowstone covering sloping projections from walls of caves or limestone cliffs.
- aquifer.** A ground-water reservoir. Pervious rock that is completely saturated and will yield water to a well or spring.
- aragonite.** A mineral composed of calcium carbonate, CaCO₃, like calcite but differing in crystal form.
- arête and pinnacle karst.** A landscape of naked reticulated saw-topped ridges having almost vertical slopes and a relief of as much as 120 meters. The ridges rise above forest-covered corridors and depressions. Found in New Guinea at elevations of 2,000 meters and more.
- aven.** 1. (French.) A vertical or highly inclined shaft in limestone, extending upward from a cave passage, generally to the surface; smaller than an abîme. Commonly related to enlarged vertical joints. *Compare* cenote; natural well; pothole. 2. (British.) A vertical extension from a shaft in a passage or chamber roof that tapers upward rather like a very elongate cone. *Compare* dome pit.

B

backflooding. Temporarily rising water level in a cave caused by downstream passage being too small to pass an abnormally high discharge. The excavation and reexcavation of some caves is ascribed to the enlargement of a pas-

- sage at or near the water table by gravity flow alternating with periods of calcite precipitation.
- bacon.** Thin, elongated, translucent flowstone having parallel colored bands on or projecting from roofs and walls of some caves. *See also* blanket; curtain; drapery.
- balcony.** Any projection on the wall of a cave large enough to support one or more persons.
- bare karst.** *See* naked karst.
- base level, karst.** *See* karst base level.
- beachrock.** A friable to indurated rock consisting of sand grains of various minerals cemented by calcium carbonate; occurs in thin beds dipping seaward at less than 15°. Also known as beach standstone.
- bed.** A layer in sedimentary rocks; a stratum.
- bedding plane.** A plane that separates two strata of differing characteristics.
- bedding-plane cave.** A passage formed along a bedding plane, especially when there is a difference in susceptibility to corrosion in the two beds.
- bicarbonate.** A salt containing the radical HCO_3^- , such as $\text{Ca}(\text{HCO}_3)_2$.
- biospeleology.** The study of subterranean living organisms, particularly in caves in limestone regions.
- blade.** In a cave, a thin sharp projection jutting out from roof, wall, or floor, of which it is an integral part; generally the remains of a partition or bridge.
- blanket.** A thick layer of dripstone, not translucent. *see also* bacon; curtain; drapery.
- blind valley.** A valley that ends suddenly at the point where its stream disappears underground; some blind valleys have no present-day streams. *See also* half-blind valley; marginal polje.
- blowhole.** 1. A hole on land near the shore through which air and water are forced by incoming waves. 2. (Australia.) A small hole in the surface of the Nullarbor Plain through which air blows in and out with observable force, sometimes audibly.
- blowing cave.** A cave out of which or into which a current of air flows intermittently.
- blowing well.** A well into which and from which air blows with noticeable force owing to changes in barometric pressure or tidal action on the underlying aquifer.
- blue hole.** 1. (Jamaica.) A major emergence where water rises from below without great turbulence. *See also* boiling spring. 2. (Bahamas.) A drowned solution sinkhole.
- bogaz.** (Slavic.) A long narrow chasm enlarged by solution of the limestone. *See also* corridor; struga; ranjón.
- boiling spring.** (Jamaica.) A large turbulent spring. *See also* blue hole.
- bone-breccia.** Cave breccia including much bone.
- botryoid.** A grapelike deposit of calcium carbonate generally found on walls of caves. Synonyms, clusterite; grape formation.
- bourne.** (British.) Intermittent stream in a normally dry valley in chalk country.
- boxwork.** Network of thin blades of calcite or gypsum etched out in relief on the limestone walls and ceiling of a cave.
- branchwork.** A dendritic system of subterranean watercourses having many incoming branches and no visible outgoing ones.
- breakdown.** *See* cave breakdown.
- bridge.** In a cave, a residual rock span across a passage. *See also* natural bridge
- buried karst.** Karst topography buried by younger sediments. *See also* covered karst; paleokarst.

C

- 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.
- calc-.** Prefix meaning limy; containing calcium carbonate.

- calcareenite.** 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.
- calcareous.** Containing calcium carbonate.
- calcareous tufa.** *See* sinter.
- calcification.** Replacement of the original hard parts of an animal or plant by calcium carbonate.
- calclutite.** Clastic limestone or dolomite in which the grains have an average diameter of less than 1/16 millimeter; calcareous mudstone.
- calciurite.** A fragmental limestone in which the particles are generally larger than 2 millimeters.
- calcite.** A mineral composed of calcium carbonate, CaCO_3 , like aragonite but differing in crystal form; the principal constituent of limestone.
- 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.
- calcite flottante.** (French.) *See* floe calcite.
- calcrete.** (South Africa.) *See* caliche.
- caliche.** 1. (Chile and Peru.) 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. *See also* kankar, kunkar.
- canale.** (Italian.) Long drowned valley on the Dalmatian coast. Some canali may be drowned poljes.
- canopy.** 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.
- 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.
- 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.
- carbonate.** 1. A salt or ester of carbonic acid; a compound containing the radical CO_3^{-2} , such as calcium carbonate, CaCO_3 . 2. A rock consisting mainly of carbonate minerals, such as limestone or dolomite.
- causse.** (French.) A limestone plateau in the southeastern part of the central massif of France characterized by closed depressions, caves, and avens; 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.
- cave.** 1. A natural underground room or series of rooms and passages large enough to be entered by a man; generally formed by solution of limestone. 2. A similar artificial opening.
- cave blister.** A small pimples-like cave formation, roughly oval in shape, generally loose, and having a core of mud.
- 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.
- cave breccia.** Angular fragments of rock forming a fill in a cave, either cemented together by dripstone or in a matrix of cave earth. *See also* solution breccia.

cave coral. A rough, knobby growth of calcite resembling coral in shape, generally small; found on floor, walls, or ceiling of a cave. Synonym, coral formation. *See also knobstone.*

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.

cave flower. An elongate curved deposit of gypsum or epsomite on a cave wall in which growth occurs at the attached end. Synonyms, gypsum flower; oolopholite.

cave formation. Secondary mineral deposit formed by the accumulation, dripping, or flowing of water in a cave. *See also speleothem.*

cave group. A number of caves or cave systems, not interconnected but geographically associated in some relief feature or particular geological outcrop. *See also cave series.*

cave guano. Accumulations of dung in caves, generally from bats; in some places partially mineralized.

cave ice. Ice formed in a cave by natural freezing of water. Loosely but incorrectly applied to calcium carbonate dripstone and flowstone.

cave-in. 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.

cave marble. Banded deposit of calcite or aragonite capable of taking a high polish. *See also flowstone; onyx marble.*

cave onyx. *See onyx marble.*

cave pearl. Small concretion of calcite or aragonite formed by concentric precipitation around a nucleus. Synonyms, pisolite, pisolith.

cave series. A group of caves of similar morphology in a particular district. *See also cave group.*

cave spring. A spring rising in a 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. *See also cave group, cave series.*

caver. One who explores caves as a sport. Synonyms, potholer; spelunker.

cavern. A cave, often used poetically or to connote larger-than-average size.

cavernous. Containing numerous cavities or caverns.

caving. The sport of exploring caves. Synonyms, potholing; spelurking. 2. A method of mining in which the ore is allowed to cave or fall.

ceiling block. Roughly cubical joint-bounded large block, which has fallen from the ceiling of a cave. *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.

ceiling channel. Sinuous channel developed in the ceiling of a cave, presumably during the phreatic phase of cave development.

ceiling meander. A winding upside-down channel in a cave ceiling.

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. *See also cave breakdown; ceiling block.*

ceiling tube. A half tube remaining in the ceiling of a cave.

cenote. (Spanish, after Mayan tzonet or dzonot.) 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. *See also natural well.*

chalk. Soft poorly indurated limestone, generally light in color; commonly composed of the tests of floating microorganisms in a matrix of very finely crystalline calcite.

chamber. 1. (America.) The largest order of cavity in a cave or cave system; it has considerable length and breadth but not necessarily great height. 2. (England.) A room in a cave.

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.

chert. Light-cream or gray to black rock composed of silica, found occurring as nodules or layers in limestone, or as a replacement of limestone.

chimney. A narrow vertical shaft in the roof of a cave, generally smaller than an aven; a dome pit.

chockstone. A rock wedged between the walls of a cave passage.

choke. Rock debris or cave fill completely blocking a passage.

chute. An inclined channel or trough in a cave.

clay fill. Dry or wet clay that fills a cave passage.

clay filling. According to Bretz (1942), time interval between end of phreatic solution of a cave and beginning of deposition of flowstone.

clint. (England.) Slabs of limestone, parallel to the bedding, forming a pavement. Widened joints, or grikes, isolate individual clints. Synonym, Flachkarren.

closed depression. A general term for any enclosed topographic basin having no external drainage, regardless of origin or size.

clusterite. *See* botryoid.

cockpit. (Jamaica.) 1. Any closed depression having steep sides. 2. A star-shaped depression having a conical or slightly concave floor. The surrounding hill slopes are steep and convex. Cockpits are the common type of closed depressions in a Kegelkarst.

cockpit karst. Tropical karst topography containing many closed depressions surrounded by conical hills. Divided by French and German geographers into several types depending on shape of hills. *See also* cone karst; Halbkugelkarst; Kegelkarst; Spitzkegelkarst; tower karst.

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. *See also* solution breccia.

collapse sink. A closed depression formed by the collapse of the roof of a cave. *See also* doline.

column. A flowstone formation, generally cylindrical, formed by the union of a stalactite and stalagmite. *See also* pillar.

conduit. A subterranean stream course filled completely with water and always under hydrostatic pressure. *See also* siphon.

cone karst. A type of karst topography, common in the tropics, characterized by star-shaped depressions at the feet of many steep-sided cone-shaped hills. A variety of Kegelkarst. *See also* cockpit karst.

conical wall niche. *See* meander niche.

constructive waterfall. A large rimstone dam on a surface stream.

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.

corrasion. Mechanical erosion performed by such moving agents as water, ice, and wind, especially when armed with rock fragments. *See also* corrosion.

corridor. 1. Relatively narrow passageway permitting travel between two larger areas. 2. A fairly level and straight passage that links two or more rooms or chambers in a cave. 3. Intersecting linear depressions on the surface of the land, related to joints or dikes. *See also* bogaz; struga; zanjón.

corrosion. Erosion by solution or chemical action. *See also* corrasion.

coupole. (French.) Cupola or hemispheric hill.

cove. (Southern Appalachians.) Narrow steep-sided karst valley flanking limestone plateaus.

covered karst. A terrane of karst features, usually subdued, resulting from the development of solution features in limestone covered by soil; contrasted with naked karst, which is soil free. *See also* buried karst.

crawl, crawlway. A cave passage that must be negotiated on hands and knees.

crescentic wall niche. *See* meander niche.

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.

crust stone. A fragile layer of flowstone covering portions of walls of caves; looks like a flaky crust. Found in some Kentucky caves.

cryokarst. European equivalent of thermokarst.

crystal cave. A cave in which much of the surface of the roof, walls, and floor is covered with well-formed mineral crystals.

crystal pool. In caves a pool, generally having little or no overflow, containing crystals.

cueva. (Spanish.) Cave, especially one that is horizontal or nearly so.

cul-de-sac, dead end. A subterranean passage having only one entry.

cupola. A hemispheric hill of limestone. (French.) Cupole. (German.) Halbkugel.

current marking. Shallow asymmetrical hollows, caused by turbulent waterflow, that are distributed in rather regular fashion over limestone surfaces. *See also* scallop.

curtain. A wavy or folded sheet of flowstone hanging from the roof or projecting from the wall of a cave; often translucent and resonant. *See also* bacon; blanket; drapery.

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. *See also* Karren.

D

daylight hole. A hole in the roof of a cave, reaching the surface.

dead cave. A dry cave in which all solution and precipitation has ceased.

dead end. *See* cul-de-sac.

decalcification. Removal of calcium carbonate from a rock, leaving a residuum of noncalcareous material.

Deckenkarren. (German.) Solutional pendant features in cave ceilings.

decoration. Cave features due to secondary precipitation of calcite, aragonite, gypsum, and other rarer minerals.

diffuse circulation. Circulation of ground water in karst aquifers under conditions in which all, or almost all, openings in the karstified rock intercommunicate and are full of water in the zone of saturation.

dissolution. *See* solution.

dog-tooth crystal, dog-tooth spar. A variety of calcite in the form of sharp-pointed crystals.

doline. A basin- or funnel-shaped hollow in limestone, ranging in diameter from a few meters to a kilometer and in depth from a few to several hundred meters. Some dolines are gentle grassy hollows; others are rocky cliff-bounded basins. A distinction may be made between those formed mainly by direct solution of the limestone surface zone, solution dolines, and those formed by collapse over a cave, collapse dolines, but it is generally not possible to establish the origin of individual examples. Closed depressions receiving a stream are known as swallow holes or stream sinks. In America most dolines are referred to as sinks or sinkholes.

doline lake. A small karst lake occupying a doline.

dolomite. 1. A mineral composed of calcium magnesium carbonate, $\text{CaMg}(\text{CO}_3)_2$. **2.** Rock chiefly composed of the mineral dolomite. Also called dolostone.

dolomitization. The process whereby limestone becomes dolomite by the substitution of magnesium carbonate for part of the original calcium carbonate.

dome pit. "Mammoth Cave possesses several extraordinary vertical cavities of which the arched tops are called domes and the deep bottoms are called pits. The combined names, dome pits, is here used for them." (Davis, 1930, p. 600.)

drapery. A thin sheet of dripstone, equivalent to curtain. *See also* bacon; blanket.

driphole. 1. Hole in rock or clay produced by fast-dripping water. 2. Hollow space surrounded by precipitated material, such as the bottom of a stalactite.

dripstone. Calcium carbonate deposited from water dripping from the ceiling or wall of a cave or from the overhanging edge of a rock shelter; commonly refers to the rock in stalactites, stalagmites, and other similar speleothems; in some places composed of aragonite or gypsum. *See also* flowstone.

dry cave. A cave without a running stream. *See also* dead cave.

dry valley. A valley that lacks a surface water channel; common in the chalk of southern England.

duck-under. 1. A place where water reaches the cave roof for a short distance and can be passed by quick submergence without swimming. 2. In cave diving, a longer stretch of passage where the water is so close to the roof that crawling or swimming beneath the water surface is needed to pass.

dune limestone. (Australia.) *see* eolian calcarenite.

Durchgangshöhle. (German.) *See* through cave.

E

ebb and flow spring, ebbing and flowing well. A spring or flowing well exhibiting periodic variation in volume of flow; the periodicity, which is often irregular, is attributed to siphonic action.

eccentric. Adjective or noun implying abnormal shape in speleothems, such as helictites.

effluent cave. *See* outflow cave.

emergence. Point at which an underground stream comes to the surface. *See also* exurgence; resurgence; rise.

eolian calcarenite. A terrestrial limestone formed by the cementation by carbonates of calcareous coastal dune sand. Often shortened to eolianite. Synonym, dune-limestone. *Compare* beach-rock.

epiphreas, epiphreatic zone. The zone in a cave system, immediately above the phreatic zone, affected morphologically and hydrologically by floods too large for the cave to absorb at once.

estavelle. (French.) An intermittent resurgence or exurgence, active only in wet seasons. May act alternatively as a swallow hole and as a rising according to ground-water conditions.

etched pothole. *See* solution pan.

evorsion. Mechanical erosion by whirling water that may carry sand and gravel; pothole erosion.

exhumed karst. Karst features reexposed by erosion from beneath former covering strata.

exurgence. Point at which an underground stream reaches the surface if stream has no known surface headwaters. *See also* emergence; resurgence.

F

facet. *See* scallop.

fault cave. A cave developed along a fault or fault zone.

fissure cave. A narrow vertical cave or cave passage along a fissure. Fissures widen out to become wells or shaft caves.

flattener. A cave passage, which though wide, is so low that movement is only possible in a prone position. *See also* crawl.

floe calcite. Very thin film of pure calcium carbonate floating on the surface of a subterranean pool of very calm water.

floor pocket. *See* pocket.

flowstone. Deposits of calcium carbonate, gypsum, and other mineral matter which have accumulated on the walls or floors of caves at places where water trickles or flows over the rock. *See also* dripstone.

fluorescein. A reddish-yellow crystalline compound that imparts a brilliant green fluorescent color to water in very dilute solutions; used to label underground water for identification of an emergence.

flute. *See* scallop.

fluviokarst. A predominantly karst landscape in which there is much evidence of past or present fluvial activity.

foiba. (Italian.) 1. A deep wide vertical cavity or the swallow point of a river at the beginning of its underground course. 2. A natural vertical shaft in soluble rock, tending toward cylindrical shape; it may or may not reach the surface. A dome pit.

formation. 1. The fundamental unit in rock-stratigraphic classification, consisting of a distinctive mappable body of rock. 2. *See* cave formation; speleothem.

fossil karst. *See* paleokarst.

free-surface stream. In a cave, a stream that does not completely fill its passage.

fresco. A half-section of a stalactite on the wall of a cave.

fungling. (Chinese.) Isolated limestone hill in alluvial plain, probably similar to mogote.

G

gallery. A rather large, nearly horizontal passage in a cave.

geode. Hollow globular bodies varying in size from a few centimeters to several decimeters, coated on the interior with crystals.

geological organ. A group of solution pipes best seen in the walls of quarries.

glacier cave. Cave in ice formed within or at the base of a glacier.

glaciokarst. A glaciated limestone region possessing both glacial and karst characteristics.

glade. 1. (Jamaica.) An elongate depression, having steep sides, in which a generally flat floor is divided into small basins separated by low divides. 2. (Tennessee.) Limestone pavement having extensive growth of cedar trees.

globularite. Small crystals of calcite tipped with spheres composed of radiating fibers.

gour. *See* rimstone barrage, rimstone barrier, rimstone dam.

grape formation. *See* botryoid.

grike, gryke. (England.) A vertical or subvertical fissure in a limestone pavement developed by solution along a joint. Synonym. (German.) Klufftkarren.

grotto. 1. A small cave, natural or artificial. 2. A room, in a cave system, of moderate dimensions but richly decorated.

ground air. *See* soil air.

ground water. 1. The part of the subsurface water that is in the zone of saturation. *See also* phreatic water. 2. Used loosely by some to refer to any water beneath the surface.

gryke. *See* grike.

guano. *See* cave guano.

gulf. Steep-walled closed depression having a flat alluviated bottom; in some gulfs a stream flows across the bottom.

gushing spring. *See* vauclusian spring.

gypsum. A mineral composed of hydrous calcium sulfate, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$.

gypsum flower. *See* cave flower.

H

Halbhöhle. (German.) *See* rock shelter.

Halbkugelkarst. (German.) Tropical karst topography containing dome-shaped residual hills surrounding depressions, a kind of Kegelkarst. Also called Kugelkarst.

half-blind valley. Blind valley in which the stream overflows in floodtime when the swallow hole can not accept all the water.

half tube. Trace of a tube remaining in the roof or wall of a cave. *See also* tube.

hall. In a cave, a lofty chamber which is much longer than it is wide. *See also gallery.*

hanging blade. A blade projecting down from the ceiling. *See also blade.*

hardness. Property of water that prevents lathering because of the presence of cations, mainly calcium and magnesium, which form insoluble soaps.

haystack hill. (Puerto Rico.) In the tropics, rounded conical hill of limestone developed as a result of solution. Term being replaced by *mogote*.

helictite. A curved or angular twiglike lateral projection of calcium carbonate having a tiny central canal, found in caves. Synonym, *eccentric stalactite*.

heligmite. An eccentric growing upward from a cave floor or from a shelf in a cave. A curved or angular thin stalagmite.

holokarst. Cvijić's term for a karst area like that of the Dinaric Karst of Slovenia. Such areas have bare surfaces on thick deposits of limestone that extend below sea level, well-developed Karren, dolines, uvalas, poljes, deep ponors, and extensive cave systems; they have little or no surface drainage. *Contrast merokarst.*

hoya, hoyo. (Spanish.) A very large closed depression. Used in Puerto Rico for doline, in Cuba for polje.

hum. Karst inselberg. Residual hill of limestone on a fairly level floor, such as the isolated hills of limestone in poljes. In some tropical areas, used loosely as synonym for *mogote*.

hydraulic conductivity. The ability of a rock unit to conduct water under specified conditions.

I

ice cave. 1. A cave, generally in lava or limestone, in which the average temperature is below 0°C., and which ordinarily contains perennial ice. Ice may have the form of stalactites, stalagmites, or flowstone. 2. *See glacier cave.*

inflow cave, influent cave. Cave into which a stream flows or formerly entered.

intake area, recharge area. The surface area in which water is absorbed into an aquifer eventually to reach the zone of saturation.

inverted siphon. *See water trap.*

J

jama. 1. (Slavic.) Vertical or steeply inclined shaft in limestone, known as *abime* or *aven* in France and as *pothole* in England. 2. Any crevice.

joint-plane cave. A cavity high in relation to width developed along steeply dipping joint planes.

K

Kamenitza. (German, possibly of Slavic origin; plural, *Kameritze*.) *See solution pan.*

kankar, kunkar. (Australia.) *See caliche.*

Karren (German) Channels or furrows, caused by solution on massive bare limestone surfaces; they vary in depth from a few millimeters to more than a meter and are separated by ridges. In modern usage, the terms are general, describing the total complex of superficial solution forms found on compact pure limestone. Classified by Bögli (1960) into several kinds, of which the most common are: *Rillenkarren*, shallow channels separated by sharp ridges 2-3 centimeters apart; *Rinnenkarren*, flat-bottomed grooves several centimeters apart; *Kluftkarren*, joints enlarged by solution; *Spitzkarren*, large deep grooves extending down from steep spires or pinnacles; *Mäanderkarren*, small winding or meandering channels; *Rundkarren*, Karren having rounded channels and intervening rounded ridges, probably reexhumed after formation under soil or peat; *Fachkarren*, equivalent to English *clint*; *Bodenkarren*, Karren formed beneath the soil. Synonym, *lapiés*.

Karrenfeld. (German.) An area of limestone dominated by Karren.

karst. (Internationally used term, originally the German form of the Slavic word *kras* or *krš*, meaning a bleak waterless place; it is the German name for a district east of Trieste having such terrain.) A terrain, generally underlain by limestone, in which the topography is chiefly formed by the dissolving of rock, and which is commonly characterized by Karren, closed depressions, subterranean drainage, and caves. *See also* buried karst; cone karst; covered karst; exhumed karst; Halbkugelkarst; holokarst; Kegelkarst; merokarst; microkarst; naked karst; paleokarst; pseudokarst; Spitzkegelkarst; subjacent karst; syngenetic karst; thermokarst; tower karst.

karst barré. (French.) A karst of limited area completely surrounded by rocks of low permeability.

karst base level. Level below which karstification does not take place.

karst breccia. *See also* collapse breccia; solution breccia.

karst bridge. A natural bridge or arch in limestone.

karst fens. Marshes developed in sinkhole terrain; swampy solution fens.

karst fenster. *See* karst window.

karst hydrology. The drainage phenomena of karstified limestones, dolomites, and other slowly soluble rocks.

karst lake. A large area of standing water in extensive closed depression in limestone.

karst margin plain. A plain generally on limestone between higher country of limestone on one side and of less pervious rocks on the other, but having a cover of impervious detritus, which allows surface drainage. Synonym, Karstrandebene.

karst plain. A plain on which closed depressions, subterranean drainage, and other karst features may be developed. Also called karst plateau.

karst pond. Closed depression in a karst area containing standing water.

karst river. A river that originates from a karst spring.

karst spring. A spring emerging from karstified limestone. *See also* emergence; exurgence; resurgence; rise.

karst topography. Topography dominated by features of solutional origin.

karst valley. 1. Elongate solution valley.
2. Valley produced by collapse of a cavern roof.

karst window. 1. Depression revealing a part of a subterranean river flowing across its floor, or an unroofed part of a cave. 2. A small natural bridge or arch which can be seen through.

karstic. Occasionally used as the adjective form of karst.

karstification. Action by water, mainly chemical but also mechanical, that produces features of a karst topography, including such surface features as dolines, Karren, and mogotes and such subsurface features as caves and shafts.

karstland. A region characterized by karst topography.

Karstrandebene. (German.) *See* karst margin plain.

katavothron. (Greek.) A closed depression or swallow hole.

Kegelkarst. (German.) A general term used to describe several types of tropical humid karst characterized by numerous, closely spaced conical, hemispherical, or tower-shaped hills having intervening closed depressions and narrow steep-walled karst valleys or passageways. *See also* cockpit karst; cone karst; Halbkugelkarst; tower karst.

keyhole. A small passage or opening in a cave; in cross section, rounded at the top, constricted in the middle, and rectangular or flared out below.

knobstone. Speleothem, larger, more pronounced, and more widely separated than cave coral.

kras, krš. A Slavic word meaning bleak, waterless place, from which the term karst is derived. *See also* karst.

Kugelkarst. *See* Halbkugelkarst.

L

labyrinth. *See* network.

lake. As used in speleology, a body of standing water too deep to walk across.

lapiés. (French; sometimes spelled lapiaz.) *See* Karren.

lava cave. A cave in a lava flow, generally formed by gas blistering the surface or by lava flowing out from beneath a solidified crust, forming a tube or tunnel. *See also* pseudo karst.

level. 1. Within a cave, a group of passages developed in the same horizontal plane. 2. The altitudinal relation of a cave floor to an outside surface.

light hole. (Jamaica.) Fossil or abandoned swallow hole.

lime. Calcium oxide, CaO; used loosely and incorrectly in referring to limestone.

lime sink. *See* sinkhole.

limestone. A sedimentary rock consisting chiefly of calcium carbonate, CaCO₃.

limestone pavement. A bare plane surface of limestone, parallel to the bedding, commonly divided into blocks (clints, Flachkarren) by solutionally widened joints (grikes, Klufthkarren), and pitted by solution pans.

limestone sink. *See* sinkhole.

live cave. Cave in which there is river action or active deposition of speleothems. *Compare* active cave.

localized circulation. Circulation in karst aquifers in which the water moves in certain preferred zones and does not occupy all or most of the openings below this level.

lost river. In a karst region, a surface stream that enters an underground course.

lycopodium spores. Spores of *lycopodium claratum*, which can be used in natural or dyed color as a label in studying ground-water movement in karst areas.

M

marble. 1. Limestone recrystallized and hardened by heat and pressure. 2. Commercially, any limestone that will take a high polish.

marginal polje. Flat limestone plain which is surrounded by higher country but is bordered on one side by impervious rock. *Compare* blind valley.

marl. Unconsolidated sedimentary rock consisting largely of calcium carbonate and clay; usage varies from calcareous clay to earthy limestone, and in some parts of the United States, the term has been used for any unconsolidated sedimentary rock containing fossil shells.

maze cave. *See* network.

meander. In a cave, an arcuate curve in a channel formed by lateral shifting of a cave stream. *See* coiling meander; meander niche.

meander niche. A conical or crescent-shaped opening in the wall of a cave, formed by the downward and lateral erosion of a stream on the floor of a passage.

merokarst. Defined by Crjić to indicate imperfect karst topography as found on thin, impure, or chalky limestone where surface drainage and dry valleys are present in addition to some karstic features. *Contrast* perfectly formed holokarst.

Mexican onyx. *See* onyx marble.

microkarst. Karst topography in which all surficial features are small; an area dominated by minor karst features.

minor karst features. *See* Karren; rill; solution pan.

Mischungskorrosion. (German.) Dissolving of limestone by water derived from the mixing of two saturated waters that differ in carbon dioxide partial pressure. Such a mixture is undersaturated because a nonlinear relation exists between calcite solubility and the partial pressure of carbon dioxide. (Bögli, 1964)

mogote. A steep-sided hill of limestone, generally surrounded by nearly flat alluviated plains; karst inselberg. Originally used in Cuba in referring to residual hills of folded limestone in the Sierra de los Organos but now used internationally for karst residual hills in the Tropics.

moonmilk. A white plastic calcareous cave deposit composed of calcite, huntite, or magnesite. From Swiss dialect moonmilch, elf's milk. Corrupt spelling mondmilch is common.

mud stalagmite. Stalagmite composed principally of clay or sandy clay and commonly less than 30 percent calcium carbonate.

N

naked karst, bare karst. Karst topography having much exposed bedrock.

natural arch. A rock arch or very short natural tunnel; contrasted with natural bridge, which spans a ravine or valley.

natural bridge. A rock bridge spanning a ravine and not yet eroded away.

natural tunnel. A nearly horizontal cave open at both ends, generally fairly straight in direction and fairly uniform in cross section.

natural well. (Jamaica.) A vertical shaft in limestone, open to the surface and having water at the bottom; similar to a cenote.

nested sinkholes. (American.) *See* uvala.

network. A complex pattern of repeatedly connected passages in a cave system. Synonym, labyrinth.

nip. An undercutting notch in rock, particularly limestone, along a seacoast between high and low tide levels, produced by erosion or solution.

O

ojo, ojo de agua. (Spanish.) An artesian spring in limestone regions, especially one forming a small pond; a vauculian spring.

onyx marble. Translucent layers of calcium carbonate from cave deposits, often called Mexican onyx or cave onyx; used as an ornamental stone.

Opferkessel. *See* solution pan.

oulopholite. *See* cave flower.

outflow cave. Cave from which stream flows out or formerly did so. Synonym, effluent cave.

ouvala. (French.) *See* uvala.

P

paleokarst. 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.

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. *See also* blade; shield.

panhole. *See* solution pan.

park. (Arizona.) Shallow broad solution depression.

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

passage. In a cave, the opening between rooms or chambers.

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.

pepino hill. (Puerto Rico.) 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.

permeability. The ability of a rock or soil to permit water or other fluids to pass through it. *See also* hydraulic conductivity.

phreas, phreatic water. (From the Greek word meaning well.) Water in the zone of saturation; water below the water table.

phreatic surface. *See* water table.

phreatic zone. The region below the water table, in which rock is saturated with water.

piezometric surface. The imaginary surface to which water from a given aquifer will rise under its full static head. Also called potentiometric surface.

pillar. 1. A column of rock remaining after solution of the surrounding rock. *See also* rock pillar. 2. A stalactite-stalagmite that reaches from roof to floor in a cave; more properly termed a column. 3. A tall thin stalagmite that does not reach the roof of a cave.

- pipe.** Small cylindrical hole in unconsolidated sediments, caused by removal of fine material by water.
- pipng.** 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.
- pisolite, pisolith.** *See* cave pearl.
- pit.** A deep hole, generally circular in outline, having vertical or nearly vertical walls. *See also* pothole (definition 2); shaft.
- piton.** (French.) Limestone hill having sharply pointed peak.
- pitted plain.** Plain having numerous small closely spaced closed depressions.
- 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.
- polje.** (Slavic word for field.) In areas of karst topography, a very large closed depression, in some places several kilometers long and wide, having a flat floor either of bare limestone or covered by alluvium, and surrounded by generally steep walls of limestone. Synonym, interior valley.
- polygonal karst.** 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.
- ponor.** (Slavic.) Hole in the bottom or side of a closed depression through which water passes to or from an underground channel. *Compare* swallet, swallow hole.
- pool deposit.** Crystalline material deposited in an isolated pool in a cave.
- 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.
- porosity.** The ratio of the aggregate volume of interstices in a rock or soil to its total volume; generally stated as a percentage.
- pothole.** A nearly circular natural opening in a thin rock wall in a cave. *See also* window.
- pothole.** 1. A small rounded hole worn into rock in a streambed, at a waterfall, or near sea level by sand, gravel, and stones being spun around by force of the currents; a natural mill. 2. Term used in England for vertical or steeply inclined shaft in limestone. *See also* pit; shaft.
- potholer.** (British.) *See* 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. 2. (British.) *See* caving.
- pozo.** (Spanish.) *See* sima.
- pseudokarst.** Karstlike terrain 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.

R

Randpolje. An enclosed plain at the edge of a karst area receiving surface water from the nonkarstic area. The water drains out through underground passages in the karst area. The plain is thus completely enclosed by higher ground. *Compare* blind valley; karst margin plain.

recharge area. *See* intake area.

residual clay. Clay or sandy clay remaining on a rock surface after removal of calcium carbonate by solution. *Compare* terra rossa.

resurgence. Point at which an underground stream reaches the surface and becomes a surface stream. In European literature, the term is reserved for the reemergence of a stream that has earlier sunk upstream; the term *exsurgence* is applied to a stream without known surface headwaters.

rice paddy. In a cave, a terraced rimstone pool.

rift. A long narrow high cave passage controlled by joints or faults.

rill. Small solution groove on surface exposures of limestone; most common in arid or semiarid areas.

Rillenstein. (German.) Microsolution grooves and pitting on rock surface.

rimstone. Calcareous deposits formed around the rims of overflowing basins, especially in caves.

rimstone barrage, rimstone barrier, rimstone dam. A wall-shaped deposit that impounds pools of water in caves, around springs, and in cascades of streams saturated with calcium bicarbonate. *Synonym*, gour.

rimstone pool. Pool kept in place by a rimstone dam.

rise. (Jamaica.) Spring rising from fractures in limestone. Point at which an underground stream comes to the surface.

rising. *See* emergence; exsurgence; resurgence.

rock fall. *See* cave breakdown.

rock pendant. *See* pendant.

rock pillar. A residual isolated mass of bedrock linking the roof or overhanging wall and floor of a cave, in contrast with a column, which is composed of dripstone or flowstone. *See* column; pillar.

rock pinnacle. A tall sharp projection of bedrock rising from the floor of a cave.

rock shelter. Shallow cave under an overhanging rock ledge. Many sea caves are rock shelters. Also found in limestone and other rock types where streams have undercut their banks at bends, or where there has been abrasion by blowing sand. Common in tropical areas at places where a secondarily hardened layer of limestone forms a ledge that projects over unindurated limestone.

roof crust. Flowstone deposited on ceilings of caves from thin films of water, which have crept over the rock from pore or crack sources.

roof slab. *See* ceiling slab.

room. A part of a cave system that is wider than a passage. *Synonym* (England.), chamber.

S

sand pipe. *See* solution pipe.

sand stalagmite. A stalagmite formed on sand and made of calcite-cemented sandstone.

saturation, zone of. *See* zone of saturation.

scaling chip. A thin small rather irregular piece of limestone, commonly crumbly, which has fallen from the ceiling or wall of a cave. A form of cave breakdown.

scaling plate. A small flat piece of rock of rectangular or polygonal shape, that has fallen to the floor of a cave. A form of cave breakdown in thin-bedded impure limestone cut by closely spaced joints.

scallop. Oval hollow having an asymmetric cross section along its main axis. Scallops form patterns on the walls of caves and in streambeds and were used by Bretz to determine direction of flow of turbulent water, since they are steeper on the upstream side. Commonly called flutes in America.

scar. (Northern England.) Steep rock cliff in limestone country.

sea cave. A cave or cleft in a sea cliff eroded by waves or currents or dissolved by water. *Compare* niw.

shaft. 1. A cylindrical tube generally steep sided, that forms by solution and (or) collapse. 2. A vertical passage in a cave. *See also* pit; pothole (definition 2).

shake, shakehole. (England; sometimes spelled shackhole.) 1. Term used mainly by cavers to indicate a doline, especially one formed by subsidence. 2. Hole formed by solution, subsidence, and compaction in loose drift or alluvium overlying beds of limestone.

shawl. Simple triangular-shaped curtain.

sheet. A thin coating of calcium carbonate formed on walls, shelves, benches, and terraces by trickling water.

shield. A disk-shaped speleothem standing edgewise at a high angle.

sima. (Spanish.) Natural well that has vertical sides.

- sink, sinkhole.** (American.) General terms for closed depressions. They may be basin, funnel, or cylindrical shaped. *See also closed depression; doline; swallet, swallow hole.*
- sinkhole plain.** (American.) Plain on which most of the local relief is due to closed depressions and nearly all drainage is subterranean.
- sinkhole pond.** (American.) Small lake in closed depression in limestone, due to an impervious clay floor or to intersection of depression with the water table.
- sinking creek.** A small stream that disappears underground. *See also lost river; swallet, swallow hole.*
- sinter.** A mineral precipitate deposited by a mineral spring, either hot or cold. Siliceous sinter, consisting of silica, is also called geyserite and florite; calcareous sinter, consisting of calcium carbonate, is also called tufa, travertine, and onyx marble.
- siphon.** In speleology, a cave passage in which the ceiling dips below a water surface. *See also water trap.*
- slump pit.** A hollow in the clay fill of a cave floor caused by erosion beneath the fill.
- soil air.** The air that fills soil and rock interstices above the zone of saturation.
- solution.** 1. The change of matter from a solid or gaseous state to a liquid state by combination with a liquid. 2. The result of such change; a liquid combination of a liquid and a non-liquid substance.
- solution breccia.** A mass of rock composed of angular to rounded fragments of rock that have accumulated by solution of surrounding or underlying carbonate. *See also collapse breccia.*
- solution lake.** A lake whose origin is attributed largely to solution of underlying rock.
- solution pan.** Shallow solution basin formed on bare limestone, generally characterized by flat bottom and overhanging sides. Synonyms, Kamenitza; Opferkessel; panhole; tinajita.
- solution pipe.** A vertical cylindrical hole attributable to solution. often without surface expression, filled with debris, such as sand, clay, rock chips, and bones. Synonym, sand pipe. *See also geologic organ.*
- solution scarp.** Escarpment formed by more active solution of lower area or by corrosional undercutting of the base of the escarpment.
- solution subsidence.** Any subsidence due to solution of underlying rock but particularly the subsidence of parts of a formation into hollows or pockets of an immediately underlying soluble formation.
- sótano.** (Spanish for cellar or basement.) Term used in Mexico for deep vertical shafts in limestone, which may or may not lead to a cave.
- spelean.** Of, pertaining to, or related to caves.
- speleogen.** A secondary cave structure formed by dissolving, such as a dome pit or a scallop.
- speleologist.** A scientist engaged in the study and exploration of caves, their environment, and their biota.
- speleology.** The scientific study, exploration, and description of caves and related features.
- speleothem.** A secondary mineral deposit formed in caves, such as stalactite or stalagmite. Synonym, cave formation.
- spelunker.** *See caver.*
- spelunking.** *See caving.*
- Spitzkegelkarst.** (German.) Tropical karst topography containing sharply pointed residual limestone hills.
- splash cup.** The shallow concavity in the top of a stalagmite.
- spongework.** A complex of irregular interconnecting cavities with intricate perforation of the rock. The cavities may be large or small.
- spring.** Any natural discharge of water from rock or soil onto the surface of the land or into a body of surface water.
- squeeze.** A narrow passage or opening just passable with effort. Differs from flattener in that there is little spare space in any direction.

stalgalite. A general term including stalactite and stalagmite. Superseded by dripstone.

stalactite. A cylindrical or conical deposit of minerals, generally calcite, formed by dripping water, hanging from the roof of a cave, generally having a hollow tube at its center. From Greek word meaning exude drops.

stalagmite. A deposit of calcium carbonate rising from the floor of a limestone cave, formed by precipitation from a bicarbonate solution through loss of CO₂. The water drops on the stalagmite from above. From Greek word meaning drip. *See also* dripstone.

stalagmite, capillary. *See* capillary stalagmite.

steephead. A deeply cut valley, generally short, terminating at its upslope end in an amphitheater, at the foot of which a stream may emerge.

straw stalactite. Thin tubular stalactite, generally less than a centimeter in diameter and of very great length (examples as long as 4 meters); also called soda straw.

stream sink. Point at which a surface stream sinks into the ground. *See also* ponor; swallet, swallow hole.

streamtube. A cave passage completely filled, or formerly filled, with fast-moving water and whose ceiling and walls normally possess scallops.

struga. (Slavic.) A corridor formed along a bedding plane in karst country.

subjacent karst. Karst landscape in non-carbonate rocks due to presence of karstified rocks beneath the surface formation.

submarine spring. Large offshore emergence, generally from cavernous limestone, but in some areas from beds of lava.

subsidence. Lowering of the surface of the ground because of removal of support. Caused in karst areas by subterranean solution or collapse of caves.

subterranean river. Underground stream of flowing water, not necessarily large.

sumidero. (Spanish.) 1. A swallow hole. 2. In Latin America, any closed depression caused by solution.

sump. 1. A water trap. 2. A pool of underground water or point on an underground stream that has a submerged extension, the nature of which has not been determined.

suspended water. *See* vadose water.

swallet, swallow hole. (England.) A place where water disappears underground in a limestone region. A swallow hole generally implies water loss in a closed depression or blind valley, whereas a swallet may refer to water loss into alluvium at a streambed, even though there is no depression. *See also* ponor; sink, sinkhole; stream sink.

syngenetic karst. Karst developed in eolian calcarenite where lithification of dune sands and production of karst phenomena occurred simultaneously.

T

terra rossa. Reddish-brown soil mantling limestone bedrock; may be residual in some places.

terraced flowstone. Shallow rimstone pools on outward-sloping walls. *See also* rimstone barrage, rimstone barrier, rimstone dam; constructive waterfall.

thermokarst. A pitted periglacial or former periglacial surface in superficial deposits, produced by settling or caving of the ground after melting of ground ice. Synonym, cryokarst.

thermokarst pit. Steep-walled depression formed by thermokarst processes.

threshold. That part of a cave system to which light penetrates in some degree.

through cave. Cave through which a stream runs from entrance to exit or formerly did so. Synonym, (German.) Durchgangshöhle.

tidewell. *See* ebb and flow spring, ebbing and flowing well.

tinajita. (Spanish.) *See* solution pan.

torca. (Spanish.) Large closed depression, more or less circular; a doline.

torricellian chamber. A submerged air-filled chamber of a cave at a pressure below atmospheric pressure, sealed by water, having an air-water surface above that of adjacent free air-water surfaces.

tourelle. (French.) A little tower; applied to small flat-topped buttes of limestone in karst areas. Contrasted with pitons, which have pointed tops, and with coupoles, which have rounded tops.

tower karst, Turmkarst. Karst topography characterized by isolated limestone hills separated by areas of alluvium or other detrital sand; towers are generally steep-sided forest-covered hills, and many have flat tops.

tracers. Materials, such as chemicals, dyes, radioactive salts, and light insoluble solids introduced into underground waters to determine points of egress of the water and its velocity.

trap. *See* siphon; water trap.

travertine. Calcium carbonate, CaCO_3 , light in color and generally concretionary and compact, deposited from solution in ground and surface waters. Extremely porous or cellular varieties are known as calcareous tufa, calcareous sinter, or spring deposit. Compact banded varieties, capable of taking a polish, are called onyx marble or cave onyx.

troglobite. An animal living permanently underground in the dark zone of caves and only accidentally leaving it.

troglydite. A human cavedweller.

troglophile. An animal habitually entering the dark zone of a cave but necessarily spending part of its existence outside such as some species of bats.

troglophobe. An animal or person unable physically or psychologically to enter the dark zone of a cave or other underground area.

trogloxene. An animal entering a cave for various reasons but not living there permanently.

tube. A smooth-surfaced cave passage of elliptical or nearly circular cross section.

tufa. *See* sinter; travertine.

tunnel. *See* natural tunnel.

turlough. (Ireland.) A depression in limestone or in glacial drift over limestone that is liable to flood either from excess surface runoff or from rising ground water. From the Irish words *tuar loch*, meaning dry lake.

Turmkarst. (German.) *See* tower karst.

U

underground river. *See* subterranean river.

upside-down channel. *See* ceiling channel.

uvala. Large closed depression formed by the coalescence of several dolines; compound doline. *See also* canyon; karst valley; valley sink.

V

vadose water. Water in the zone of aeration; water above the zone of saturation.

valley sink. (American.) An elongated closed depression or series of interconnecting depressions forming a valleylike depression. *Compare* karst valley; uvala.

vauculian spring. A large spring or exurgence of an underground river, generally from limestone, that varies greatly in output and is impenetrable except with diving apparatus. Synonym, gushing spring.

vug. A small cavity in rock usually lined with crystals. Adjective, vuggy. *See also* geode.

W

wall block. A roughly cubical joint-controlled large block of limestone or dolomite, which has rotated outward from a cave wall. *See also* cave breakdown; wall slab.

wall pocket. *See* pocket.

wall slab. A thin but large block of rock, which has fallen outward from the wall of a cave in limestone in which the dip is nearly vertical. *See also* cave breakdown.

wang. Malayan name for polje.

water table. The upper boundary of an unconfined zone of saturation, along which the hydrostatic pressure is equal to the atmospheric pressure.

water trap. A place where the roof of a chamber or passage of a cave dips under water but lifts again farther on. Synonym, trap.

well. 1. A shaft or hole sunk into the earth to obtain water, oil, gas, or minerals. 2. A deep vertical rounded hole or shaft in the floor of a cave or at the bottom of a closed depression.

window. 1. In speleology, a natural opening above the floor of a passage or a room, giving access to an adjoining cavity or to the surface; larger and less symmetrical than a porthole. 2. The opening under the arch of a small natural bridge. 3. *See karst window.*

Z

zanjón. (Spanish.) In Puerto Rico, solution trench in limestone. Zanjones range from a few centimeters to about 3 meters in width and from about 1 to 4 meters in depth. Apparently they form by the widening and deepening of joints by solution. *See also becaz; corridor; struga.*

zone of aeration. The zone in permeable soil or rock that is above the zone saturated with water; the zone of vadose water.

zone of saturation. The zone in permeable soil or rock that is saturated with water; the phreatic zone.

Zwischenhöhle. (German.) Cave in which a river passage, or former river passage, is entered from above or laterally and which can be followed upstream and downstream some distance but not to daylight.

CLASSIFICATION OF TERMS

Caves, depositional features

anemolite	flowstone
anthodite	formation
apron	fresco
bacon	gour
balcony	grape formation
blanket	gypsum flower
bone breccia	helictite
botryoid	heligmite
breakdown	knobstone
calcite bubble	moonmilk
calcite flottante	mud stalagmite
canopy	onyx marble
capillary stalagmite	oulopholite
cave blister	pillar
cave breakdown	pisolite, pisolith
cave breccia	pool deposit
cave coral	pore deposit
cave earth, cave fill	rice paddy
cave flower	rimstone barrage, rimstone barrier,
cave formation	rimstone dam
cave marble	rimstone pool
cave onyx	rock fall
cave pearl	roof crust
ceiling block	roof slab
ceiling slab	sand stalagmite
chockstone	scaling chip
choke	scaling plate
clay fill	shawl
clusterite	sheet
column	shield
conulite	speleothem
crust stone	splash cup
crystal pool	stagalmitite
curtain	stalactite
decoration	stalagmite
drapery	stalagmite, capillary
driphole	straw stalactite
dripstone	terraced flowstone
eccentric	wall block
floe calcite	wall slab

Caves, erosional and solutional features

anastomosis	hanging blade
blade	keyhole
boxwork	palette
canyon	partition
cave-in	pendant
ceiling cavity	pillar
ceiling channel	pocket
ceiling meander	porthole
ceiling pocket	rock pendant
ceiling tube	rock pillar
collapse breccia	rock pinnacle
conical wall niche	scallop
crested wall niche	slump pit
current marking	speleogen
Deckenkarren	spongework
dome pit	tube
driphole	upside-down channel
facet	wall pocket
floor pocket	well
flute	window
half tube	

Caves, kinds

abîme	Halbhöhle
abris sous roche	ice cave
active cave	jama
aven	joint-plane cave
bedding-plane cave	labyrinth
blowing cave	lava cave
cave	live cava
cave group	maze cave
cave series	natural tunnel
cave system	network
crystal cave	rock shelter
cueva	sea cave
dead cave	shaft
dry cave	sima
Durchgangshöhle	sótano
fault cave	through cave
fissure cave	tunnel
glacier cave	Zwischenhöhle

Caves, parts

air pocket	flattener
aisle	folba
aven	gallery
branchwork	grotto
bridge	hall
cavern	lake
cavernous	level
chamber	light hole
chasm	meander
chimney	meander niche
chute	passage
corridor	rift
crawl, crawlway	room
cul-de-sac	shaft
daylight hole	siphon
dead end	squeeze
dome pit	streamtube
duck-under	threshold

Chemical, mineral, and rock terms

aeolianite	eolian calcarenite
aggressive water	floe calcite
aragonite	fluorescein
beachrock	geode
bicarbonate	globularite
calc-	guano
calcarenite	gypsum
calcareous	hardness
calcareous tufa	kankar, kunkar
calcilutite	karst breccia
calcirudite	lime
calcite	limestone
calcite flottante	marble
calcrete	marl
caliche	Mexican onyx
carbonate	moonmilk
cave guano	onyx marble
cave ice	residual clay
cave marble	rimstone
cave onyx	sinter
chalk	solution breccia
chert	terra rossa
collapse breccia	tracers
dog-tooth crystal, dog-tooth spar	travertine
dolomite	tufa
dune limestone	vug

Hydrologic terms

aeration, zone of	permeability
aggressive water	phreas, phreatic water
alternative	phreatic surface
aquifer	phreatic zone
blowing well	piezometric surface
blue hole	ponor
boiling spring	porosity
cave ice	recharge area
cave spring	resurgence
conduit	rise
diffuse circulation	rising
doline lake	saturation, zone of
ebb and flow spring, ebbing and flowing well	sinkhole pond
effluent cave	sinking creek
emergence	soil air
epiphreas, epiphreatic zone	spring
estavelle	stream sink
exsurgence	submarine spring
free-surface stream	subterranean river
ground air	sump
ground water	suspended water
gushing spring	swallet, swallow hole
hydraulic conductivity	tidewell
inflow cave, influent cave	torricellian chamber
intake area	trap
inverted siphon	underground river
karst hydrology	vadose water
karst river	vauclosian spring
karst spring	water table
localized circulation	water trap
lost river	well
ojo, ojo de agua	zone of aeration
outflow cave	zone of saturation

Karst, depression features

aguada	doline
blind valley	dry valley
bogaz	etched pothole
bourne	geological organ
calanque	glade
canale	gulf
canyon	half-blind valley
cave-in	hoya, hoyo
cenote	Kamenitza
closed depression	Karrenfeld
cockpit	karst bridge
collapse sink	karst fens
corridor	karst fenster
cove	karst lake

K24 CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

karst margin plain	Randpolje
karst pond	rill
karst valley	Rillenstein
karst window	rock shelter
Karstrandebene	shake, shakehole
katavothron	sima
lapiés	sink, sinkhole
lime sink	sinkhole plain
limestone sink	sinkhole pond
lost river	solution lake
marginal polje	solution pan
minor karst features	steephead
natural arch	stream sink
natural bridge	struga
natural tunnel	sumidero
natural well	swallet, swallow hole
nested sinkholes	thermokarst pit
nip	tinajita
Opferkessel	torca
ouvala	tunnel
panhole	turlough
park	uvala
pit	valley sink
polje	wang
ponor	window
pothole	zanjón
pozo	

Karst, hill features

constructive waterfall	mogote
coupole	pepino hill
cupola	piton
fungling	scar
haystack hill	solution scarp
hum	tourelle

Karst, kinds

arête and pinnacle karst	Halbkugelkarst
bare karst	holokarst
buried karst	karst
causse	karst barré
cockpit karst	karst plain
cone karst	karst topography
covered karst	karstland
crevice karst	Kegelkarst
cryokarst	limestone pavement
exhumed karst	merokarst
fluviokarst	microkarst
fossil karst	naked karst
glaciokarst	paleokarst

pitted plain	syngenetic karst
polygonal karst	thermokarst
pseudokarst	tower karst
Spitzkegelkarst	Turmkarst
subjacent karst	

Karst forms, minor

bogaz	Karren
clint	lapiés
corridor	limestone pavement
current marking	Opferkessel
cutter	rill
Deckenkarren	sand pipe
etched pothole	scallop
facet	solution pan
flute	solution pipe
grike	tinajita
gryke	zanjón
Kamenitza	

Miscellaneous terms

base level, karst	kras, krš
bed	limestone pavement
bedding plane	<i>lycopodium</i> spores
biospeleology	pipe
blowhole	potholer
blowing well	potholing
calc-	sand pipe
cave	solution pipe
cave-in	spelean
caver	speleologist
cavernous	speleology
caving	spelunker
clay filling	spelunking
fluorescein	troglobite
formation	troglogyte
Karrenfeld	troglophile
karst	troglophobe
karst base level	trogloxene
karstic	

Processes

alveolization	evorsion
backflooding	karstification
calcification	Mischungskorrosion
corrasion	pipng
corrosion	potholing
decalcification	solution
dissolution	solution subsidence
dolomitization	subsidence

SELECTED REFERENCES

- American Geological Institute, 1957, Glossary of geology and related sciences: Washington, Am. Geol. Inst., Natl. Acad. of Sci.-Natl. Research Council Pub. 501, 325 p.
- 1960, Supplement to the glossary of geology and related sciences: Washington, Am. Geol. Inst., 72 p.
- Bögli, Alfred, 1960, Kalklösung und Karrenbildung, *in* Internationale Beiträge zur Karstmorphologie: Zeitschr. Geomorphologie, Supp. 2, p. 4-21.
- 1964, Mischungskorrosion, ein Beitrag zum Verkarstungsproblem: Erdkunde, v. 18, no. 2, p. 83-92.
- Bretz, J Harlan, 1942, Vadose and phreatic features of limestone caverns: Jour. Geology, v. 50, no. 6, p. 675-811.
- Cullingford, C. H. D., ed., 1953, British caving—an introduction to speleology: London, Routledge and Kegan Paul, Ltd., 468 p. (2d ed., 1962.)
- Davis, W. M., 1930, Origin of limestone caverns: Geol. Soc. America Bull., v. 41, p. 475-628.
- Fénelon, Paul, 1968, Vocabulaire français des phénomènes karstiques: Mémoires et Documents, Centre de Recherches et Documentation Cartographiques et Géographiques, Nouvelle Série, v. 4, p. 13-68.
- Muma, M. H., and Muma, K. E., 1944, A glossary of speleology: Natl. Speleol. Soc. Bull. no. 6, p. 1-10. *Also in* Pinney, Roy, 1962. The complete book of cave exploration: New York, Coward-McCann, Inc., p. 207-233.
- Stamp, L. D., ed., 1961, A glossary of geographical terms: New York, John Wiley and Sons, Inc., 539 p.
- Trimmel, Hubert, 1965, Speläologisches Fachwörterbuch (Fachwörterbuch der Karst- und Höhlenkunde): Vienna, Landesverein für Höhlenkunde in Wien und Niederösterreich, 109 p.