K

kafkalla. A term used in Cyprus for the hardened upper portion of crust of havara[20]. See also caliche; havara.

kame. A stratified glacial sand and gravel deposit forming a small, conical hill[16].

Kamenica, Kamenitza. (German, possibly of Slavic origin; plural, *Kamenice*.) A small depression (a few meters in diameter and several centimeters deep) in a level calcareous surface, enlarged by the solution effect of water collecting between slight undulations. It is developed vertically at first by stagnant water; the steep sides thus evolved then induce the flow of water which flutes the slope and so eventually widens the basin. Sediments and low orders of plant life frequently collect on the even floor, the latter aiding further solution by reactivating the *p*H of the water[19]. Synonyms: (French.) *kamenice*; (German.) *Opferkeßel*; (Greek.) *lakouva, ythrolakkos*; (Russian.) *bljudoe*; (Spanish.) *cuenco, tinajita*; (Turkish.) *erime tavası*; (Yugoslavian.) *kamenica, skalne kotlice, scalba, skalnica*. See also solution pan; water pot.

kankar; kunkar. (Australian.) See caliche.

Kannelierungen. (German.) See Rillenkarren.

kaolin. A common clay mineral[16].

karabiner. See carabiner.

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 into several kinds, the most common of which 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; meandering karren (*Mäanderkarren*) — small winding or meandering channels; round karren (*Rundkarren*) — karren having rounded channels and intervening rounded ridges, probably reexhumed after formation under soil or peat; *Flachkarren — equivalent to the English clint; Bodenkarren* — karren formed beneath the soil[10]. Synonyms: (French.) *lapiés*; (German.) *Karren, Schratten*; (Greek.) *thaktyloglyphae, amaxotrochiae*; (Italian.) *campo solcato*; (Russian.) *karri*; (Spanish.) *lapiaz*; (Turkish.) *erime oluğu*; (Yugoslavian.) *škrape, škripovi, grižine, žlebici, škraplje*.

Karren, free. (German.) Bare karst; water flows unhindered over the limestone surface[3].

Karrenfeld; Karren field. (German.) An area of limestone dominated by karren[10]. These appear as bare karst and consist of the sum of exposed and half-exposed karren, occasionally also of covered karren which have become exposed. They range in size from a few hectares to

a few hundred square kilometers[3]. Synonym: (Turkish.) *erime oluğu alanı.* See also clint; grike.

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 terrane.) A terrane, generally underlain by limestone or dolomite, in which the topography is chiefly formed by the dissolving of rock, and which may be characterized by sinkholes, sinking streams, closed depressions, subterranean drainage, and caves[10]. The term *karst* unites specific morphological and hydrological features in soluble (mostly carbonate) rocks. Morphological features include karren, dolinas (sinkholes), jamas, ponors, uvalas, poljes, caves, caverns, etc. Hydrological features include basins of closed drainage, lost rivers, estavelles, vauclusian springs, submarine springs, more or less individualized underground streams and incongruity of surface and underground divides. *Karst* is understood to be the result of natural processes in and on the earth's crust cause by solution and leaching of limestones, dolomites, gypsum, halite, and other soluble rocks[20]. Synonyms: (French.) *karst*; (German.) *Karst*; (Greek.) *karst*; (Italian.) *carso, carsismo*; (Russian.) *karst*; (Spanish.) *karst*; (Turkish.) *karst*; (Yugoslavian.) *krš, kras*. See also buried karst; cone karst; covered karst; exhumed karst; *Halbkugelkarst*; *Holokarst*; *Kegelkarst*; *Merokarst*; microkarst; naked karst; paleokarst; pseudokarst; relict karst; *Spitzkegelkarst*; subjacent karst; syngenetic karst; thermokarst; tower karst.

karst aquifer. See aquifer, karst.

karst barré. (French.) 1. A karst terrane of limited area completely surrounded by rocks of low permeability[10]. 2. Term for karst areas whose lower part is enclosed and bordered by more or less impervious rocks which impedes ground-water flow out of the karst area. Synonyms: (French.) *karst barré*; (German.) *Riegelkarst*; (Greek.) *phragmenon karst*; (Spanish.) *karst cerrado*; (Turkish.) *setli karst*; (Yugoslavian.) *zagaceni kr̃s(kras), zajezeni kras*.

karst base level. Level below which karstification does not or has not taken place[10]. Synonyms: base level of karstification[20]; (French.) *niveau de base karstique*; (German.) *Korrosionsniveau*; (Greek.) *basis apokarstoseos*, or better '*patoma apokarstoseos*'; (Italian.) *livello di base della attività carsica*; (Spanish.) *nivel de base kárstico*; (Turkish.) *karstlaşma tabani*; (Russian.) *bazis karsta*; (Yugoslavian.) *baza krškog procesa, baza karstifikacije, baza zakrasevanja*.

karst breccia. See collapse breccia; solution breccia.

karst bridge. A natural bridge or arch in limestone[10].

karst couvert. (French.) See covered karst.

karst fens. 1. Marshes developed in sinkhole terrain; swampy solution fens[10]. 2. Marsh or swamp formed by plants overgrowing a karst lake or seepage. Synonyms: (French.) *marais karstique*; (German.) *Karstsumpf* ?; (Greek.) *karstikon elos*; (Italian.) *palude o*

acquitrinio carsico; (Russian.) *karstovoje boloto*; (Spanish.) *laguna karstica*; (Turkish.) *karst batakl*ığı; (Yugoslavian.) *lokva, kal*.

karst fenster. See karst window.

karst fossile. (French.) See buried karst.

karst hydrology. 1. The branch of hydrology dealing with hydrological phenomena on and in regions and areas composed totally or in part of rocks which are soluble in water, such as limestones, dolomites, gypsum, and halite[20]. 2. The drainage phenomena of karstified limestones, dolomites, and other slowly soluble rocks[10]. Synonyms: (French.) *hydrologie karstique*; (German.) *Hydrologie des Karsts*; (Greek.) *karstike hydrologia*; (Italian.) *idrologia carsica*; (Russian.) *gidrologija karsta*; (Spanish.) *hidrología kárstica*; (Turkish.) *karst hidrolojisi*; (Yugoslavian.).

karst inselberg. A residual hill of soluble rock in a polje[20]. Synonyms: (French.) *inselberg karstique*; (German.) *Karstinselberg (Hum, Mogote)*; (Greek.) *karstiki martyres lophi*; (Italian.) *rilievo carsico residuo*; (Russian.) *karstovij ostanec*; (Spanish.) *relieve kástico residual*; (Turkish.) *karst tepesi*; (Yugoslavian.) *hum*.

karst lake. 1. Lakes on karst surface, frequently connected with ground water; lakes in subterranean hollows (caves and caverns)[20]. 2. A large area of standing water in extensive closed depression in limestone[10]. Synonyms: (French.) *lac de karst*; (German.) *Karstsee*; (Greek.) *karstiki limni*; (Italian.) *lago carsico*; (Russian.) *karstovoe ozero*; (Spanish.) *lago kãrstico*; (Turkish.) *karstik gölü*; (Yugoslavian.) *krško (krasko) jezero*.

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[10].

karst noyé. (French.) See drowned karst.

karst nu. (French.) See exposed karst.

karst plain. 1. Large flat surface in karst formed by erosion and corrosion[20]. 2. A plain on which closed depressions, subterranean drainage, and other karst features may be developed. Also called karst plateau[10]. Synonyms: (French.) *plateau karstique*; (German.) *Karstebene, Karstrandebene, Korrosionsfläche*; (Greek.) *karstikon pedhion*; (Italian.) *piano carsico*; (Russian.) *karstovaja ravnina*; (Spanish.) *llanura kárstica*; (Turkish.) *karst ovası*; (Yugoslavian.) *krška zaravan, površ, kraški ravnik*. See also marginal polje.

karst polje. See polje.

karst pond. Closed depression in a karst area containing standing water[10].

karst river. 1. A river (or stream) flowing in a karstic area, either on the surface of the ground or through an underground cave system[20]. 2. A river that originates from a karst spring[10]. Synonyms: (French.) rivière karstique; (German.) *Karstfluß*; (Greek.) *karstikós potamós*;

(Italian.) *corso d'acqua carsico*; (Russian.) *karstovaja reka*; (Spanish.) *río kárstico*; (Turkish.) *karst nehiri*; (Yugoslavian.) *krška rijeka, kraska reka*.

karst seep. Place where karst ground water oozes out at the surface of the ground; sometimes overgrown and then forming a karst fen[20]. Synonyms: (French.) *suitement karstique*; (German.) *Karstgrundwaßer-Austritt*; (Greek.) *karstiki thiaroi*; (Russian.) *visacivanie karstovih vod*; (Spanish.) *zona de absorción*; (Turkish.) *karst sızıntısı*; (Yugoslavian.) *močilo*.

karst shaft. A vertical or steeply-sided natural opening a few tens to a few hundred meters deep, formed by solution or erosion of vertical or sub-vertical fractures or fissures by down flowing surface water. Such a pit, formed from above, may connect with a chimney formed from below. Synonyms: (French.) *karst shaft*; (German.) *Schacht, Schaft*; (Greek.) *karstikós lákkos*; (Italian.) *voragine, inghiottitoio*; (Russian.) *karstovaja sahta*; (Spanish.) *sima*; (Turkish.) *karst bacası*; (Yugoslavian.) *jama*. Related to dolina, jama, obruk, pit.

karst sous-jacent. (French.) See interstratal karst.

karst spring. See spring, karst.

karst topography. Topography dominated by features of solutional origin[10]. Geomorphically, the dominant features usually but not always obviously present, are sinkholes and caves. In tropical regions, karst towers (e.g. mogotes) may also dominate the landscape.

karst valley. 1. Valleys in karst are normally distinctive due to the lack of integrated surface drainage. Most are either blind (due to being closed where the drainage sinks underground), headless or pocket (where a river emerges from a spring) or dry (where surface flow has been lost due to underground capture). The exception is the allogenic valley, where a river completely traverses a karst, normally because underground conduits at or below valley floor level are immature. Fine examples of allogenic karst valleys are Dove Dale in the Peak District and France's Tarn Gorge[9]. 2. Elongated solution valley in limestone[20]. 3. Valley produced by collapse of a cavern roof[10]. Synonyms: (French.) *vallée karstique*; (German.) *Karsttal, Karstgaße*; (Greek.) *Karstikı kilás*; (Italian.) *valle carsica*; (Russian.) *karstovaja dolina*; (Spanish.) *valle kárstico*; (Turkish.) *karst vadisi*; (Yugoslavian.) *krška (kraska) dolina*.

karst vert. See subsoil karst.

karst water. Water discharged from karst springs which posses characteristics, primarily that of calcium content, indicating solution during the passage of that water across and through karst limestone. That part of karst spring water which is derived from watercourses sinking into the rock (and therefore originates mainly on impermeable rock) is said to be *allogenic*; that which derives from precipitation over the karst area alone is said to be *autochthonous* - the distinction between resurgence and exsurgence waters[19].

karst well. Term applied to features that result from the solution enlargement and rounding of joints (grikes) to produce cylindrical pits[8]. See also grike; joint.

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[10]. 3. A through opening in natural limestone walls, formed by the joining of karst grottos as a result of dissolution processes[20]. Synonyms: (French.) *fenêtre karstique*; (German.) *Karstfenster*; (Greek.) *karstikon parathyron*; (Italian.) *finestra carsica*; (Russian.) *karstovoe okno*; (Spanish.) *dolina en ventana*; (Turkish.) *karst penceresi*; (Yugoslavian.) *krsko (krasko) okno*.

karstic. Occasionally used as the adjective form of karst[10] and pertaining to karst landforms or processes[19].

karstification. 1. The processes of solution and infiltration by water, mainly chemical but also mechanical, whereby the surface features and subterranean drainage network of a karstland are developed to form a karst topography, including such surface features as dolines, karren, and mogotes and such subsurface features as caves and shafts. An area currently or formerly undergoing karstification, and thus characterized by karst landforms, is said to be karstified[19]. 2. The process by which karst is formed. The term has been given a wide range of meaning, from almost a synonym or corrosion of soluble rocks by water to a term comprising all processes responsible for the development of karst features including, besides corrosion, such phenomena as mechanical erosion, jointing, and faulting[20]. Synonyms: (French.) *karstification*; (German.) *Verkarstung*; (Greek.) *apokarstosis*; (Italian.) *carsificazione*; (Russian.) *karstoobrazovanie*; (Spanish.) *karstificación*; (Turkish.) *karstlaşma*; (Yugoslavian.) *okršavanje, zakrasevanje, karstifikacija*.

karstland. A region characterized by karst topography[10].

Karstrandebene. (German.) See karst margin plain.

katavothron. (Greek.) A closed depression or swallow hole[10].

Kegelkarst. (German.) A general term used to describe several types of tropical humid karst characterized by numerous, closely spaced cone-, hemispherical-, or tower-shaped hills having intervening closed depressions and narrow steep-walled karst valleys or passageways[10]. See also cockpit karst; cone karst; *Halbkugelkarst*; tower karst.

keld. See rising.

kernmantel rope. A rope with a plaited sheath around a core of parallel or twisted strands[25].

krab. See carabiner.

keyhole passage; keyhole. 1. This very descriptive name derives from the cross-sectional shape of a cave passage that consists of a phreatic tube with a vadose canyon cut in its floor. It is the classic

example of a two-phase cave passage that originated and began its development in the phreas and was then modified by vadose entrenchment. As this sequence is the result of water table lowering by normal surface erosion, keyholes are common. Some keyholes are so small that the lower slot is impassable and the caver has to squeeze along the upper tube; others are very large. Spectacularly long is the 5km of keyhole forming the Fissures in Castleguard Cave, Canada. A tube 6m in diameter tops an irregular tapering canyon 15m deep that must be traversed on sloping ledges at mid-level[9]. 2. 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[10]. They appear as keyholes when viewed in cross section. They are formed when underground streams flowing in a tubular passage begin downcutting to form a canyon passage[15]. See also canyon passage; passage; tubular passage; vertical shaft.

klinkenberg effect. The slip of gas molecules at the pore wall giving apparently higher permeability than would be obtained by liquid measurements[16].

Kluft. See aisle.

Kluftkarren. (German.) See grike.

knobstone. Speleothem, larger, more pronounced, and more widely separated than cave coral[10].

knots. Various methods of securing or tying ropes or webbing material together by cavers[13]. See also prusik knot; prusiking.

kras; krš. A slavic word meaning bleak, waterless place, from which the term karst is derived[10]. See also karst.

Kugelkarst. See *Halbkugelkarst*.

kunker. See caliche.

REFERENCES

1. Bates, R. L. and J. A. Jackson. 1980. Glossary of Geology. American Geological Institute. Falls Church, Va. 751 pp.

2. Bear, J. 1979. Hydraulics of Groundwater. McGraw-Hill Inc. New York, NY. 569 pp.

3. Bögli, A. 1980. Karst Hydrology and Physical Speleology. Springer-Verlag. Berlin, West Germany. 284 pp.

4. Daoxian, Y. 1985. New Observations on Tower Karst. Paper presented at the 1st International Conference on Geomorphology (Manchester, England). 14 pp.

5. Dreybrodt, W. 1988. Processes in Karst Systems: Physics, Chemistry, and Geology. Springer-Verlag. New York, N.Y. 288 pp.

6. Driscoll, F. G. 1986. Groundwater and Wells. Johnson Division. St. Paul, Minn. 1089 pp.

7. Ford, D. C. and P. W. Williams. 1989. Karst Geomorphology and Hydrology. Unwin Hyman Inc. Lakeland, Fla. 601 pp.

8. Jennings, J. N. 1985. Karst Geomorphology. Basil Blackwell Inc. New York, N.Y. 293 pp.

9. Lowe, D. and T. Waltham. 1995. A Dictionary of Karst and Caves: A Brief Guide to the Terminology and Concepts of Cave and Karst Science. Cave Studies Series Number 6. British Cave Research Association. London, Britain. 41 pp.

10. Monroe, W. H. (Compiler). 1970. A Glossary of Karst Terminology. Geological Survey Water-Supply Paper 1899-K. U.S. Geological Survey. U.S. Government Printing Office. Washington, D.C. 26 pp.

11. Moore, G. W. and G. N. Sullivan. 1978. Speleology: The Study of Caves. Cave Books. 2nd Edition. St. Louis, Missouri. 150 pp.

12. Mylroie, J. E. 1984. Hydrologic classification of caves and karst. Groundwater as a Geomorphic Agent. R. G. LaFleur, Editor. Allen & Unwin. Inc. Boston, Mass. pp. 157–172.

13. NSS. 1982. Glossary of caving terms used in this manual. Caving Basics. J. Hassemer, Editor. National Speleological Society. Huntsville, Ala. pp. 124–125.

14. Palmer, A. N. 1972. Dynamics of a sinking stream system: Onesquethaw Cave, New York. National Speleological Society Bulletin. 34. pp. 89–110.

15. Palmer, A. N. 1981. A Geological Guide to Mammoth Cave National Park. Zephyrus Press. Teaneck, N.J. 196 pp.

16. Pfannkuch, H. O. 1971. Elsevier's Dictionary of Hydrogeology. American Elsevier Publishing Company. Inc. New York, N.Y. 168 pp.

17. Quinlan, J. F. 1978. Types of Karst with Emphasis on Cover Beds in their Classification and Development.

Unpublished Ph.D. Dissertation. The University of Texas at Austin. 323 pp.

18. Quinlan, J. F., P. L. Smart, G. M. Schindel, E. C. Alexander, A. J. Edwards, and A. Richard Smith. 1991. Recommended administrative/regulatory definition of karst aquifer, principles for classification of carbonate aquifers, practical evaluation of vulnerability of karst aquifers, and determination of optimum sampling frequency at springs. Hydrology. Ecology. Monitoring. and Management of Ground Water in Karst Terranes Conference (3rd. Nashville. Tenn. 1991). J. F. Quinlan and A. Stanley, Editors. National Ground Water Association. Dublin, Ohio. pp. 573–635.

19. Sweeting, M. M. 1973. Karst Landforms. Selected Glossary. Compiled by K. Addison. Columbia University Press. New York, N.Y. 362 pp.

20. UNESCO. 1972. Glossary and Multilingual Equivalents of Karst Terms. United Nations Educational. Scientific. and Cultural Organization. Paris, France. 72 pp.

21. UNESCO. 1984. Guidebook to Studies of Land Subsidence due to Ground-Water withdrawal. Prepared for the International Hydrological Programme. Working Group 8.4. J. F. Poland, Editor. United Nations Education. Scientific and Cultural Organization. Paris, France. 305 pp. (plus appendices).

22. USGS. (date ?). Federal Glossary of Selected Terms: Subsurface-Water Flow and Solute Transport. Prepared by the Subsurface-Water Glossary Working Group. Ground-Water Subcommittee. Interagency Advisory Committee on Water Data. Dept. of the Interior. U.S. Geological Survey. Office of Water Data Coordination. 38 pp.

23. William R. Elliott, Ph.D. of the Natural History Division of the Missouri Department of Conservation. The list of definitions were obtained directly from the ***Biospeleology*** web site:

www.utexas.edu/depts/tnhc/.www/biospeleology

which is based on *The Life of the Cave* by Charles E. Mohr and Thomas L. Poulson (1966, McGraw-Hill) with additions from Dr. Elliott.

24. Clark, I. and P. Fritz. 1997. Environmental Isotopes in Hydrology. Lewis Publishers, Boca Raton, Fla. p. 174.

25. Australian Speleological Federation. 1996. Cave and Karst Terminology. The list of definitions were obtained directly from the Western Australia Speleology web site:

http://wasg.iinet.net.au/terminol.html

which contains a listing of terminology commonly used in Australia.