

## READINGS / REFERENCES

1. Ford, D. and Williams, P. 2007. Karst Hydrogeology and Geomorphology. John Wiley & Sons Ltd.
2. Pekcan, N. 2019. Karst Jeomorfolojisi (3. Baskı). Filiz Kitapevi, İstanbul
3. Erinç, S., 2001, **Jeomorfoloji I**, Der Yayınları, İstanbul.
4. Huggett, R.J., 2013. **Fundamentals of Geomorphology**. Third edition.
5. Huggett, R.J., 2015, **Jeomorfolojinin Temelleri** (Çeviri Editörü: Prof. Dr. Uğur Doğan), Nobel Akademik Yayınları, Ankara.

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# Karren

Karren : German

Lapis : French

Lapiaz : Spanish

Karrens are surface erosional features demonstrate channel, hollow, and ridge patterns formed by rain, melting snow, or surface flows on soluble rocks. These formations develop not only on bare rock surfaces but also underground and beneath vegetation cover. Their sizes can range from millimeters to over 10 meters. Large areas of rock surfaces in the field can be covered with karrens.



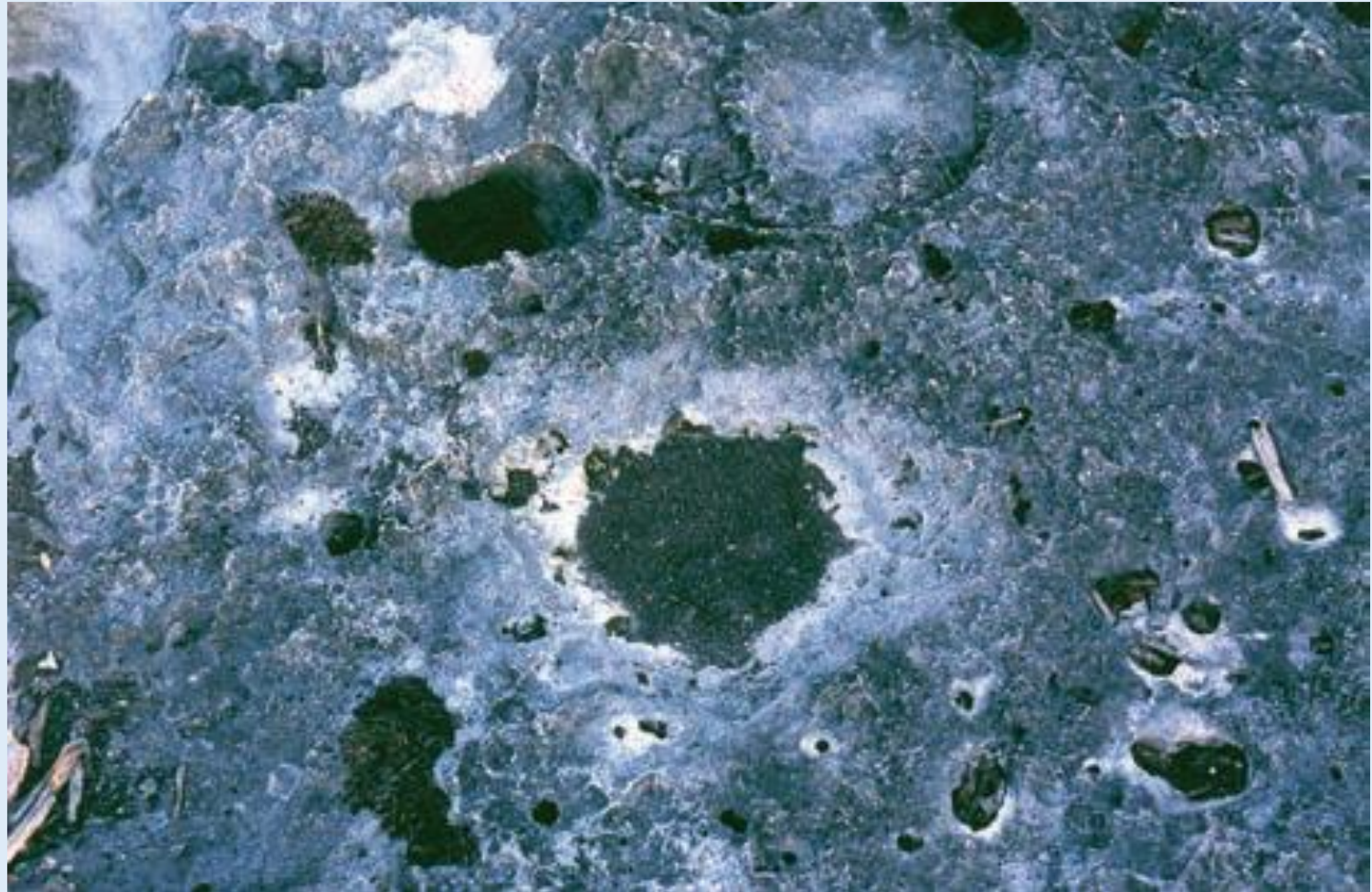
# Karren

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# Karren

## Biokarstic Borings

Nanokarren features, generated or facilitated by microorganisms such as bacteria, cyanobacteria, algae, and fungi, as well as by lichens or roots, typically appearances as pits, boreholes, trenches, and tunnels, commonly smaller than 1 mm in size, under microscopic examination.

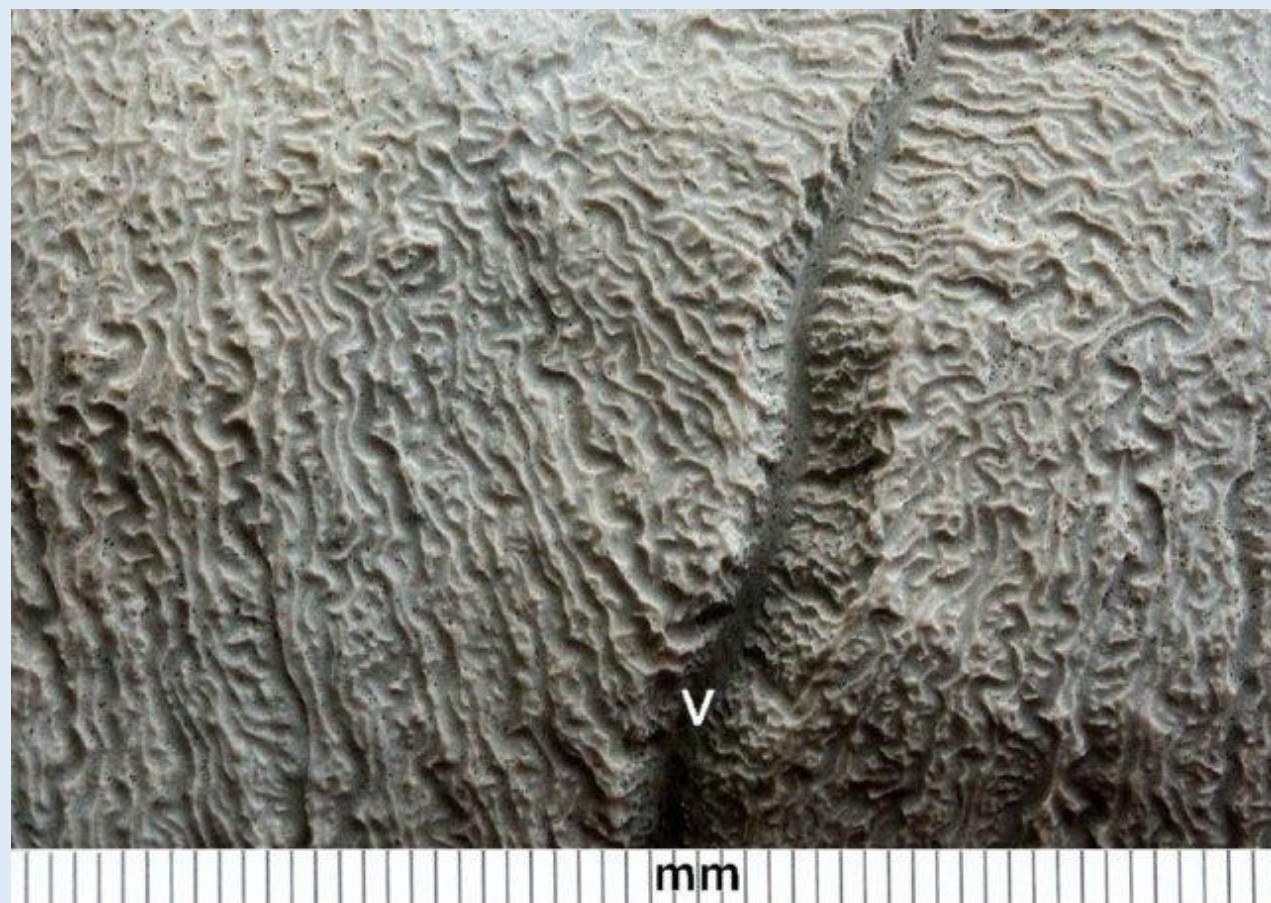


Viles, H. 2009. Biokarstic Processes Associated with Karren Development, In: Karst Rock Features Karren Sculpturing (Eds: Gines et.al.), Zalozba ZRC.

# Karren

## Microrill (Rillensteine)

Microkarren features exhibit various patterns on rock surfaces, consisting of tiny channels and/or micro-spikes, with widths rarely exceeding 1 mm. They are often described to 1 mm-wide rills, possessing rounded bottoms and clustered together in characteristic sinuous or anastomosing configurations on gentle slopes, transitioning to more parallel and straight formations on steeper slopes.



[https://www.researchgate.net/publication/263442023\\_Tropical\\_Monsoon\\_Karren\\_in\\_Australia/figures?lo=1](https://www.researchgate.net/publication/263442023_Tropical_Monsoon_Karren_in_Australia/figures?lo=1)

Karren

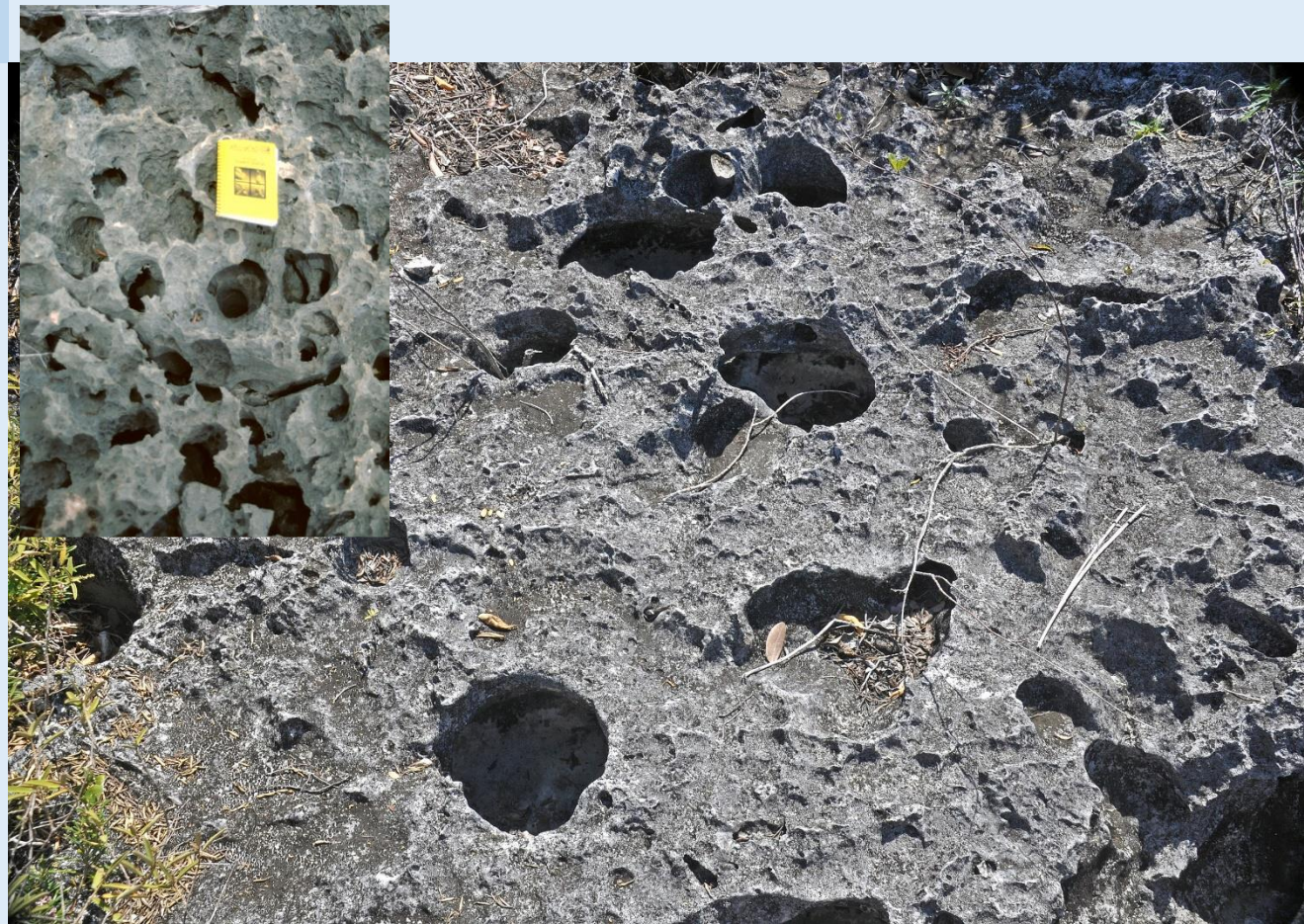
Microrill (Rillensteine)



# Karren

## Solution Pit (Rainpits)

These are small, concave cup-shaped karren characteristics, roughly circular in shape and nearly parabolic or tapering in structure, with diameters ranging from 1 cm to 5 cm and occasionally exceeding depths of 2 cm. They often cluster together and may merge to create a jagged and pitted texture on rock surfaces.



[https://commons.wikimedia.org/wiki/File:Karst\\_pits\\_%28moonscape\\_near\\_Owl%27s\\_Hole\\_Cave,\\_San\\_Salvador\\_Island,\\_Bahamas%29\\_4\\_%2816441714281%29.jpg](https://commons.wikimedia.org/wiki/File:Karst_pits_%28moonscape_near_Owl%27s_Hole_Cave,_San_Salvador_Island,_Bahamas%29_4_%2816441714281%29.jpg)



# Karren

## Solution Pan / Kamenitza

Kamenitzas are bowl-shaped indentations, ranging from 1 cm to 0.5 m in depth and 5 cm to 5 m in width, often appearing as elliptical or circular to extremely irregular in shape. Typically, they feature flat and nearly horizontal bottoms covered with a thin layer of soil, vegetation, or decaying algal remnants, which accelerates the dissolution process. Their edges often project outward, and some may have small overflow outlets.



# Karren

## Solution Pan / Kamenitza



# Karren

## Solution Pan / Kamenitza



Solution Pan / Kamenitza



# Karren

## Trittkarren (Heelprint Karren, Step Karren)

Trittkarren are steps that develop on bare slopes. Trittkarren features create curved headwalls, with flat floors opening downward. A single trittkarren exhibits a flat tread-like area, typically 10 to 40 cm in diameter, accompanied by a sharp backslope or riser, ranging from 3 to 30 cm in height. These features often appear as clusters of heel imprints resembling steps on rocky surfaces. They appear to result from intricate dissolution processes, involving both horizontal and headward erosion caused by the thinning of water sheets flowing over minor slope declines.



<https://de.wikipedia.org/wiki/Trittkarre>