

G. A. Maximovich (UdSSR)

Underground Karst Lakes
Die unterirdischen Karstseen

Accumulations of water in the bottom depressions of horizontal, inclined, vertical caves, and deep karst channels are called underground lakes.

Both horizontal and inclined caves undergo a limnetic stage of development during the conversion of a running-water cave into a dry cave.

Inclined caves with waterfalls contain euorsive kettleholes of smaller running-water Combet-type lakes as well as corrosive kettlehole lakes.

Horizontal caves are likely to develop dammed Davetash-type lakes, underground running-water Kungur-type lakes, calcite-dammed Domitsky-type (gours), and – in the mudded depressions – Kizel-type lakes.

In sinkholes, karst deep channels, vertical caves, either accumulative kettlehole lakes with a mudded bottom or underground running-water Matsokhi-type lakes occur.

Underground lakes feeding, as it were, on mineral waters are of Pyatigorsk, Bakharden, and Zbrashov types.

Various types of underground lakes are distributed over the following hydrodynamic zones: zone of vertical descending circulation, of suspended (relic of horizontal) running-water, intermediate and horizontal, vertical ascending circulation.

Jan Krasón und Zbigniew Wojcik (Warszawa, Polen)

**The Caves in Granites of the Gebel Harhagit at Arabic Desert
Die Granithöhlen des Dschebel Harhagit in der Arabischen Wüste**

Granitic massive of the Gebel Harhagit lies at the Arabic Desert about 350 km toward SE from Asswan and 50 km toward W from Red Sea coast.

In the year 1959 Jan Krasón during the geological investigation in this region discovered many spherical sinks occurring on the vertical walls and the niches laying under the sinks. The observations showed that these forms are the results of the chemical feldspars corrosion. After the removing of these minerals from the surface of the granite there followed mechanical increase of caverns as a result of the granular desintegration and of blowing off the fragments of the corrosion resistive rocks. Because nowadays the Arabic Desert is near completely deprived of the atmospheric rainfalls the feldspars corrosion occurred in another climatic conditions. Probably the high rainfalls occurred in this area in the time of the glaciation period on the Northern hemisphere. In all probability the rainfalls contained a great quantity of CO₂. These facts caused the formation of niches and of cave weathering of granites.

V. S. Lukin (UdSSR)

**Temperature Anomalies in the Pre-ural Caves and Experience of Their
Quantitative Basing**

The temperature of the numerous caves encountered in the belt of anhydrite-gypsum deposits of the Permian age in the Central Pre-Ural area is in most cases different from that of the enclosing rocks.

A close connection has been recorded between the temperature regime of the caves and the air circulation, the distribution of temperature inside the karsting blocks. There are often and often ice and a permafrost zone in the caves facing the foothills of the slopes and at the bottom of large karst depressions. The caves dated back to the upper zone of aeration as well as the vertical canals and fissures above cold caves are not infrequently noted for their a little higher temperature.

Intensive air exchange between the atmosphere and underground hollows generally accounts for the temperature anomalies.

Along with the influx of heat and cold together with atmospheric air, an important role in the heat balance is also played by the processes of evaporation and condensation of moisture as well as by changes in air density during vertical shifts. For example, an average of 2,13 million large cal. of cold accumulates daily in the Kungur ice cave during winter (ascending) circulation, of which 30% is due to water and ice evaporation, and 3% to a reduced density of the air. During summer (descending) circulation, 1,54 million large cal. of heat are accumulated daily in the same cave (chiefly in the vertical canals) of which 38% is accounted for by the processes occurring in the cave itself (condensation of water vapour, air condensation).

A study of ice caves has helped to build experimental ground refrigerators and an experimental low-temperature vegetable storage cooled by winter draught of air.

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**Development of Horizontal Karst Caves in Plains
Die Entwicklung von Horizontalhöhlen in Ebenen**

The ascending karst massive of limes and gypsums shows the following morphological and hydrogeological stages during cave-development.

The initial *joint-opening* stage is characterised by a water flow along the joints, their expansion resulting in a *slit* stage. The latter is followed by a *channel* stage and then by a *voclues* stage. These stages develop with the karst water under head.

Further uplift and free discharge of the karst water removes the head. Next results a *running-water cave succeeded by a limnetic cave*.

The expansion of the cavities within the cave first involves a *sinter-talus* and later a *caving-cementation* stage.

Further uplift of the area may cause the formation of a two-storeyed cave and, if the occurrence of the cave is not too deep, roof-caving and opening-up of grottoes.

The stages of karst-development are clearly defined by morphological and hydrological features. During each stage new peculiarities appear which may be retained in the stages that follow. These newly-arisen features are fundamental in distinguishing between the stages.

These stages characterise the ascending karst area only, the caves being refilled while descending.

A. A. Ogilvie (UdSSR)

**The Study of Karst Phenomena by Geophysical Methods
Das Studium des Karstphänomens mit geophysikalischen Methoden**

1. In the Soviet Union geophysical methods have been employed for studying karst phenomena since 1935. Since then these methods have been used for carrying out hundreds of investigations in the karst regions of the Urals, the Caucasus, the Crimea, Siberia and other parts of the country. The investigations carried out provided the necessary data, on which projects of hydro-electric stations, railways, highways and other engineering works were based. Their aim also was the draining of mineral deposits and the solving of the water supply question. Geoelectrical methods were chiefly used.