

### Greftdalen

A tentative description and hypothesis on the development of the karst features in the Greftdalen valley.

An analysis of the karst surface (dolines) suggests that there is not a continuum in the size of the dolines, they fit more in two distinct groups. There is a large group (ca. 100) of smaller dolines, mainly joint dolines, and a small group of (6) large, mainly collapse dolines. It seems unlikely that the large ones can have developed postglacially. The Greftvatnet lake lies in a closed depression, which might well be an overdeepened cirque formation. This lake drains through a comparatively narrow and shallow cave system, but the small stream is captured by larger caves which are situated under the large dolines in the outer part of the valley.

The large cave systems are divided in two parts, which are not yet connected by exploration. The Greftsprekka system, which is partially explored, consists of a complicated combination of vadose (pitches and canyons) and phreatic (tubes) features. The cave may be characterized by relatively complicated geological structures (folds and schist horizons) giving perched watertables and sumps. In spite of a similar geological situation Greftkjelen (Cave of the Lost Waters) is much simpler in construction. This might be due to its closer location to the hillside, giving a higher flow capacity through the limestone mass. This is demonstrated by much more distinct levels (and general) between vadose canyons and phreatic tubes. The extensive phreatic level below "Flower Pot" starts at about 150 m asl. It contains considerable amounts of finer sediments (sand and silt), and might well correspond to a former sea level under some deglaciation(s). The present runoff seems to give misfit streams related to the gigantic canyons in for instance Greftkjelen. This also indicates that the main vadose excavation must have taken place during deglaciations, when the input of water and suspended sediments was at a maximum.

The large dolines lie on a line along the valley bottom. Greftvatnet is situated furthest upstream of them, and it is also the most impermeable, having a visible water table (lake). Furthermore, the caves are mainly situated below the dolines, the most developed ones (largest cross-section) in the downstream direction. These facts may be interpreted as a variant of successive river piracy up along the valley against the Greftvatn lake. This way of "knick-point recession of the water table", as (Warwick (1960)) expresses it, might have been the way the juvenile Greftdalen caves were formed before glaciation and deglaciation processes dominated their development.

This paper is based on cave descriptions and surveys made by Kendal Caving Club and explorations and measurements done during the expedition in 1976. Some details about Greftsprekka are based on explorations done by A. Grønlie, U. Holbye, H. Opsjøn and members of Westminster Speleological group in 1977.