ACTA CARSOLOGICA	30/2	12	175-180	LJUBLJANA 2001

COBISS: 1.08

MORPHOGENESIS OF THE GARLIKA SHAFT IN CONDITIONS OF THE CONTACT KARST

KONTAKTNA MORFOGENEZA BREZNA GARLIKA

IVO BAROŇ[1]

[1] Department of Geology and Paleontology, Faculty of Science, Masaryk University, Kotlářská 2, 611 37 BRNO, CZECH REPUBLIC, e-mail: eko@sci.muni.cz

Prejeto / received: 15. 9. 2001

Izvleček UDK: 551.44(437.6)

Ivo Baroň: Kontaktna morfogeneza Brezna Garlika

Brezno Garlika leži na robu 2 km dolgi kraški depresije na planoti Silica, Slovaška. Morfologija in položaj vhoda kaže, da je brezno nastalo kot ponor občasnega potoka, kasneje pa je bilo preoblikovano s korozijo pronicajoče vode in mehanskimi procesi. Vhodne dele je deloma preoblikovala tudi zmrzal, kondenzacijska korozija, ter organska korozija.
Ključne besede: Brezno Garlika, Slovaški kras, kontaktni kras, morfogeneza brezna.

Abstract UDC: 551.44(437.6)

Ivo Baroň: Morphogenesis of the Garlika Shaft in conditions of the contact karst

The Garlika Shaft is located in at about 2 km long W-E depression in southern part of the Silica Plateau (the Slovak Karst Biosphere Reservation, Slovak Republic). The origin of the Garlika shaft is different than most of the other shafts of the Slovak Karst plateaus. Formerly a sinkhole of an ephemeral stream has developed to the shaft due to several factors. A thin water film corrosion and a wall water stream corrosion extended the former fissure. Then, after the stream decrease, thin water film corrosion and a tectonic breccia crumbling has modelled the deeper parts of the shaft. The entrance part of the shaft has been influenced with frost weathering, corrosion of the condensed water and corrosive action of lichens, moss and rotting organic detritus.
Key words: Garlika shaft, Slovac karst, contact karst, shaft morphogenesis.

INTRODUCTION

The Garlika Shaft was excavated at the base of the southern slope of the Kamenec Hill in Mokrá lúka area (the Silica Plateau, the Slovak Karst Biosphere Reservation, Slovak Republic) in February 1999. The Mokrá lúka area is an about 2 km long W-E depression with a series of dolines and sinkholes including the Garlika Shaft (Fig. 1). Speleomorphology and the entrance position of the Garlika shaft suggest that the shaft has developed due to different processes than most of the other shafts of the Slovak Karst plateaus. However the origin of a "typical" chasm of the Slovak Karst remains controversial and not really understood.

GEOLOGICAL AND HYDROLOGICAL SETTINGS

The southern neighbourhood of the Garlika Shaft is built up with *argilites* and *tuffites* of

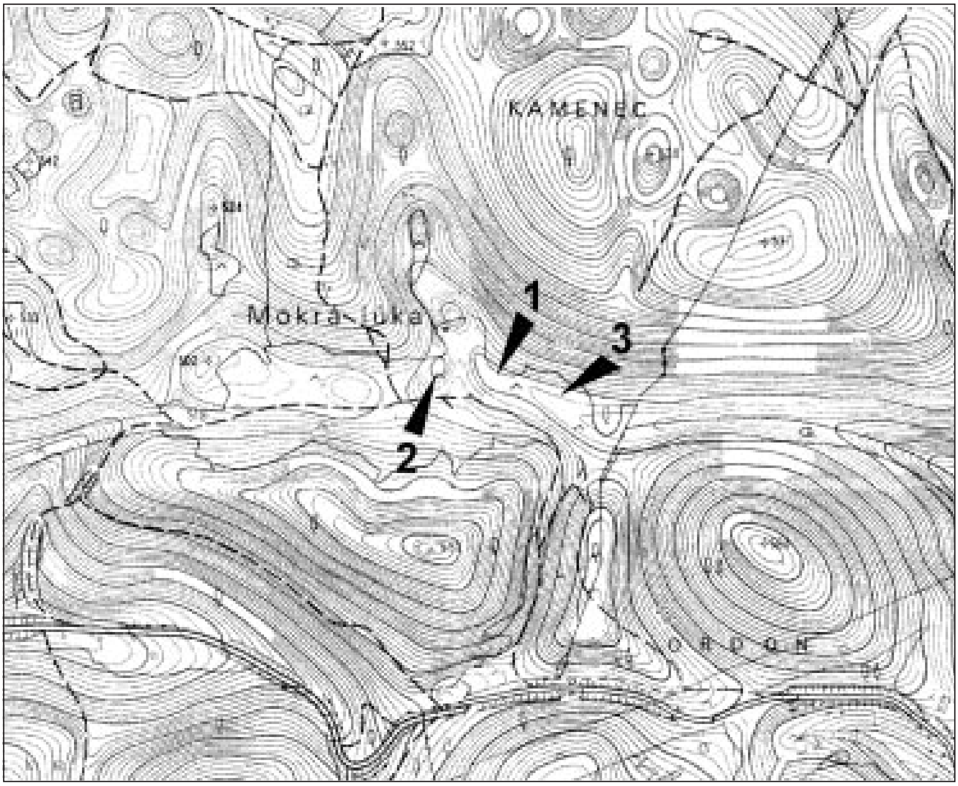

Fig. 1: Location of the Garlika shaft and geological sketch of the Mokré lúky area. Garlika (1) and Ponorná (2) shafts, Pri čerešni sinkhole (3), argilites and tuffites (A), Reifling and "Pseudoreifling" limestone (R), Riff Wetterstein limestone (W-r), stony and loamy colluvium (Q), Steinalm limestone (S), Gutenstein dolomite (G-d), Gutenstein limestone (G-l).

Ladinian age (Triassic) overlaid by loamy-stony and stony *slope sediments* of Pleistocene and Holocene age. The shaft is developed in the *Reifling and "Pseudoreifling" limestones* (Pelsonian - Cordevolian, Triassic), that are to the north substituted by very clean *Riff Wetterstein limestone* (Fig. 1).

Short ephemeral streams coming from the southern non-karstic area are sinking in the E-W depression of the Mokré lúky sinkholes (e.g., Ponorná Shaft, Garlika Shaft, Pri čerešni sinkhole) along the NE-SW and N-S joints. These sinkholes are probably connected with a hypothetical drainage system of the Gombasecká-Silická Ladnica caves.

SPELEOMORPHOLOGY

The entrance of the Garlika Shaft has a hemispherical profile and it is surrounded with three rock walls about 2 m high (Fig. 2). A small plateau (N of the shaft) lies at the same level as a top of the walls.

The entrance part 9 m deep has a bag-like shape about 1m in diameter (section 75-225°). It is developed along 75/72° fault similarly as the rest of the shaft. It was filled with the recent organo-detritic material (leaves, tree branches, humus, etc.) to the depth between 5 and 9 m (sections A-A´, B-B´) before excavating. The cross section of the shaft was rounded here. Remnants of

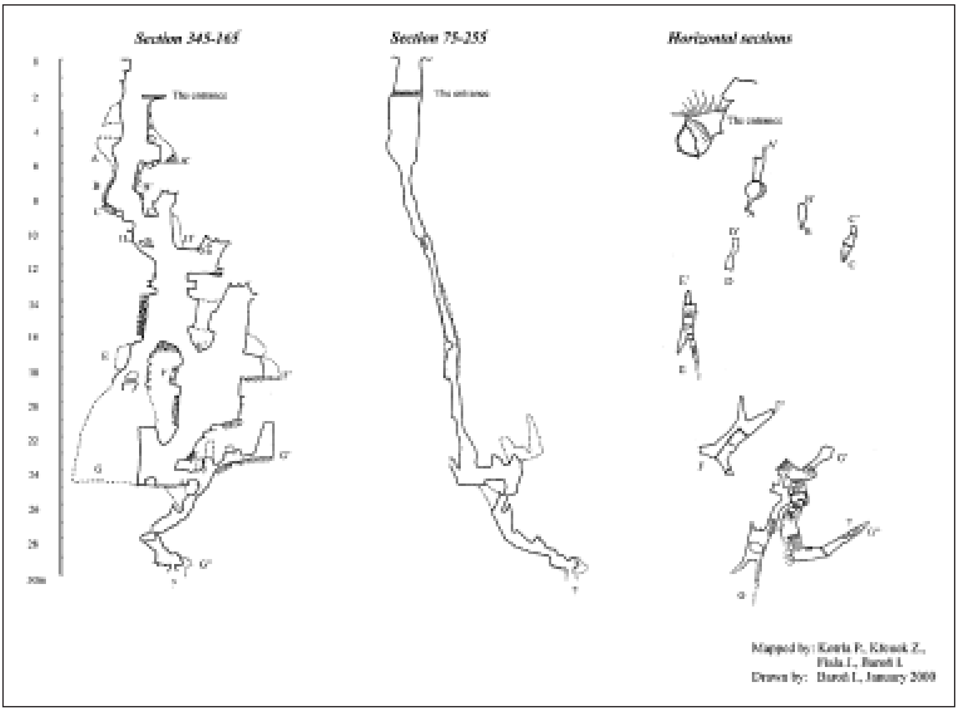

Fig. 2: Map of the Garlika shaft.

2nd World War bomb material were exhumed in the depth of 6,5 m below the surface. The width of the shaft narrows markedly downward and get a shape of narrow crevice from about 8m below the surface. There is a very small chamber 5 meters high, developed on crossing of the fissure 75/72° and a crushed zone 130/80° thick 0.6 m, in the depth at 20 m (section F-F´). Brownish muddy material probably of subcutaneous or surface origin was observed in the southern part of the dome (along the crushed zone).

Very narrow passage separates this dome from the accessible shaft bottom situated in the depth of 24-30 m (the section G-G´-G´´). The bottom is developed along the same faults as the dome, except a corridor (G´-G´´). The corridor was formed on crushed zones 80/85° and 150/55°, thick 0.7 and 0.35 m. Deepest point of the Garlika Shaft has a character of inaccessible strait, which lay in the depth of 30 m below the surface.

MORPHOGENETIC PROCESSES

The faults, along which the shaft developed, were formerly extended by *corrosion of ephemeral stream* (Fig. 3).

Then, the bag-like shape of the entrance shaft was modelled by *frost weathering*, *corrosion of the condensed water and corrosive action of lichens*, *moss* or *rotting organic detritus*. Corrosive action of rotting organic detritus could, due to the carbon dioxide release, play the same role in bag-like modelling of the entrance shaft as e.g. melting snow filling in high mountain shafts.

A *thin water film corrosion* and a *wall water stream corrosion* extended the former fissure in the deeper parts of the shaft. A *tectonic breccia crumbling* and *diffused corrosion* extended the shaft along the crushed zones. Crossing of the crushed zones is characterised by higher water conductivity. This is a reason why we can observe brownish mud material on the walls here and small dissolution doline above such a crossing.

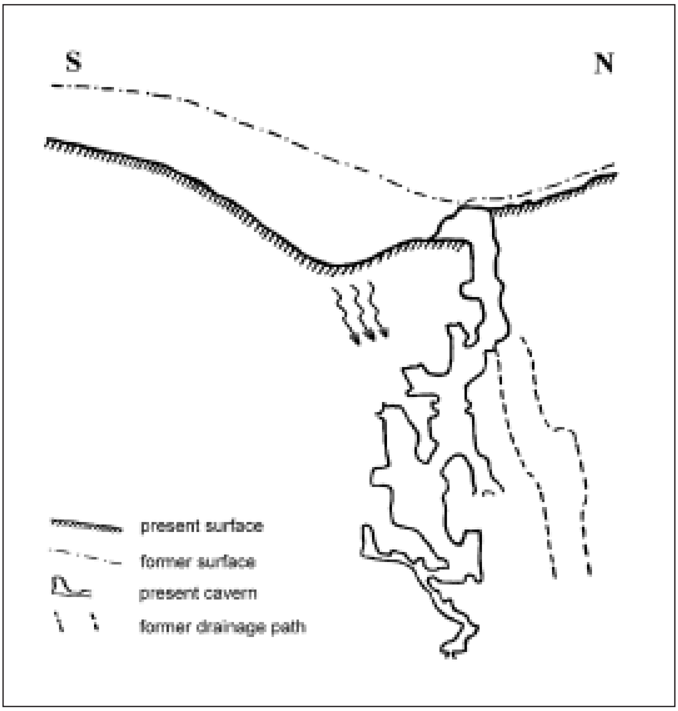

Fig. 3: Sketch of the Garlika shaft development.

CONCLUSIONS

The Garlika Shaft represents a former sinkhole, which was later re-modelled by several morphogenetic processes. The ephemeral stream had sunk along a fissure at place of the present shaft entrance. A shape of the entrance, towering above the terrain, evidences a former level of the surface. Later, the stream decreased. It attacked the karst bedrock at a place of the recent doline, where the crushed zones had been crossing. The relief has been deepening backward the stream direction. The abandoned part of the shaft was re-modelled due to morphogenetic factors mentioned above.

REFERENCES

Kankula J., 2000: Priepast' Garlika.- Spravodaj Slovenskej speleologickej spoločnosti, 2000 (1): 49-51.

Mello J. et al., 1996: Geologická mapa Slovenského krasu.- Regionálne geologické mapy Slovenska 1:50 000, Geologická služba SR, Bratislava.

Mello J. et al., 1997: Vysvetlivky ku geologickej mape Slovenského krasu 1:50 000.- Vydavatel'stvo Dionyza Štúra, Bratislava, 255 s.

Stibrányi G. & Gaál L., 1984: Ponorná priepast' v Slovenskom krase.- Slovensky kras, XXII: 157-167.

KONTAKTNA MORFOGENEZA BREZNA GARLIKA

Povzetek

Vhodni del brezna je bil do nedavnega (1999) zapolnjen s prstjo in vejevjem. Po odkopu zamaška so brezno raziskali do globine 30 m, kjer se konča v neprehodni razpoki. Brezno leži na robu doline Mokra Luka, ki je 2 km dolga kraška depresija orientirana v smeri vzhod-zahod. V dolini je več vrtač in občasnih ponorov. Garlika je nekdanji ponor občasnega potoka, ki se je kasneje zaradi zakrasevanja vzdolž doline umikal nazaj proti smeri toka. Oblika in položaj vhoda v brezno kažeta na nivo tal v času, ko je potok še ponikal v brezno.