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Cuciulata Pit (Bihor Mountains), a lithological-contact cavern

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Abstract. Cuciulata Pit from the Bihor Mountains is a deep cavern of Romania. It is a unique and stunning network developed up to near 200 m in depth. The cavern appeared between the soluble and insoluble rock formations. The contact between limestone and quartzite rocks is the distinct path of the running water.

History of exploration

In the sixties, the geologist Gheorghe Mantea found the big entrance of the Cuciulata Pit. Then, the discovery fell into oblivion. In the summer of the 1977 year, the Speleological Club “Z” organized two expeditions in the upper valley of the Someșul Cald River. Liviu Vălenaș and Horia Mitrofan re-discovered the pit. They started the exploration and reached a sump opened at 141 m depth. Liviu Vălenaș passed solitary through it and stopped at a second sump opened at -182.5 m. The next day, Liviu Vălenaș, along with Dorel Pop, passed through the second sump

and stopped in front of an impenetrable sump at 186.6 m depth. During exploration between July 21 and 24, 1977, the exploring team did the map of the cavity. Then, Romanian cavers again ignored the pit.

Description

Cuciulata Pit has the entrance at 1400 m elevation in the upper Cow Creek (Pârâul Vacii), a typical sohodol valley from the Someșul Cald river basin, and in a forested area, with large- and medium-sized sinkholes (Figs. 1, 3, 4, 5). It is one of the highest altitudes for a cave entrance in the Bihor Mountains. The Pit entrance is a classic type of letter-box, 16 m long and 4 m wide. A pillar at 14.5 m depth divides the entrance shaft into two branches: P 37 and P 33. Both shafts overhang in the lower part. The entrance shaft has the appearance of a bell. At the bottom of the shaft, it advances into the largest hall of the cavern, 35 m/ 25 m/ 20 m high. Perennial snow covers the high angled floor. After narrow passages at -41.7 m and -49.0 m it descends a small 4 m vertical step among boulders and enters at -63.5 m in the Great Corridor (Marele Culoar). The Great Corridor is a 30-35 degree angled large gallery by 12 m width and 5 m average height. Small verticals, between 2 m and 5.5 m, created exclusively by the accumulations of stone blocks, fragmented the slope. A very tortuous loop in a side of the gallery can help to avoid a low section of the gallery. At -141.5 m in depth, the ceiling suddenly falls to 15 cm from the water surface, and the width of the gallery is only 2 m. The water passing through a small limestone layer created the First Sump. A small fracture, extremely narrow (18 cm) bypasses the sump but is not accessible to cavers.

Beyond of First Sump, it meets the lithological contact with the Liassic quartz bed again. After three extremely spectacular waterfalls, the highest being of 6 m, it reaches the Hall of Waterfalls (Sala Cascadelor), 31 m/ 9 m/ 8 m. After this hall, the water flows on a relative horizontal course. At -174.0 m depth, the gallery receives through a 2.5 m high waterfall, a major tributary of an unknown origin, and its gallery is soon impenetrable. A new sump (Intermediary Sump) opens at -184.5 m and a relatively large gallery continues forward for more 20 m. Gallery ends in a closed sump (Final Sump) at -186.6 m depth.

The Cuciulata Pit is 925 m long and has a 230 m extension on an aerial distance. The significant length of the cavity is due to the rock pillars. They split the cavern into several descending and parallel branches up to 141.5 m in depth. It mentions the presence of sinuous loops generated from uninterrupted rock fractures (Fig. 2).

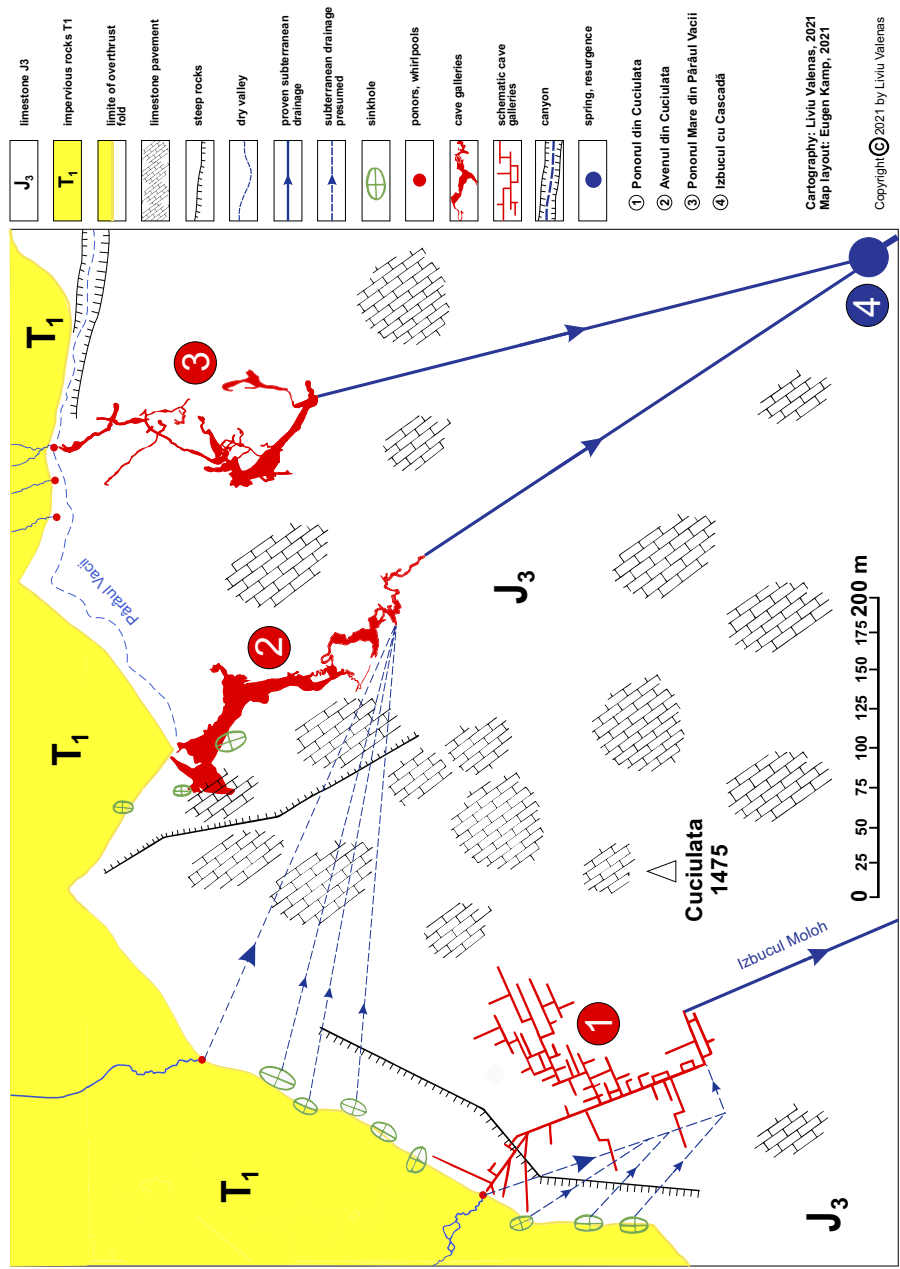


Figure 1. Cuciulata Mountain area, 1: Ponorul din Cuciulata; 2: Cuciulata Pit; 3: Ponorul Mare din Pârâul Vacii. Cartography: Liviu Vălenaș, 2021, map layout: Eugen Kamp, 2021

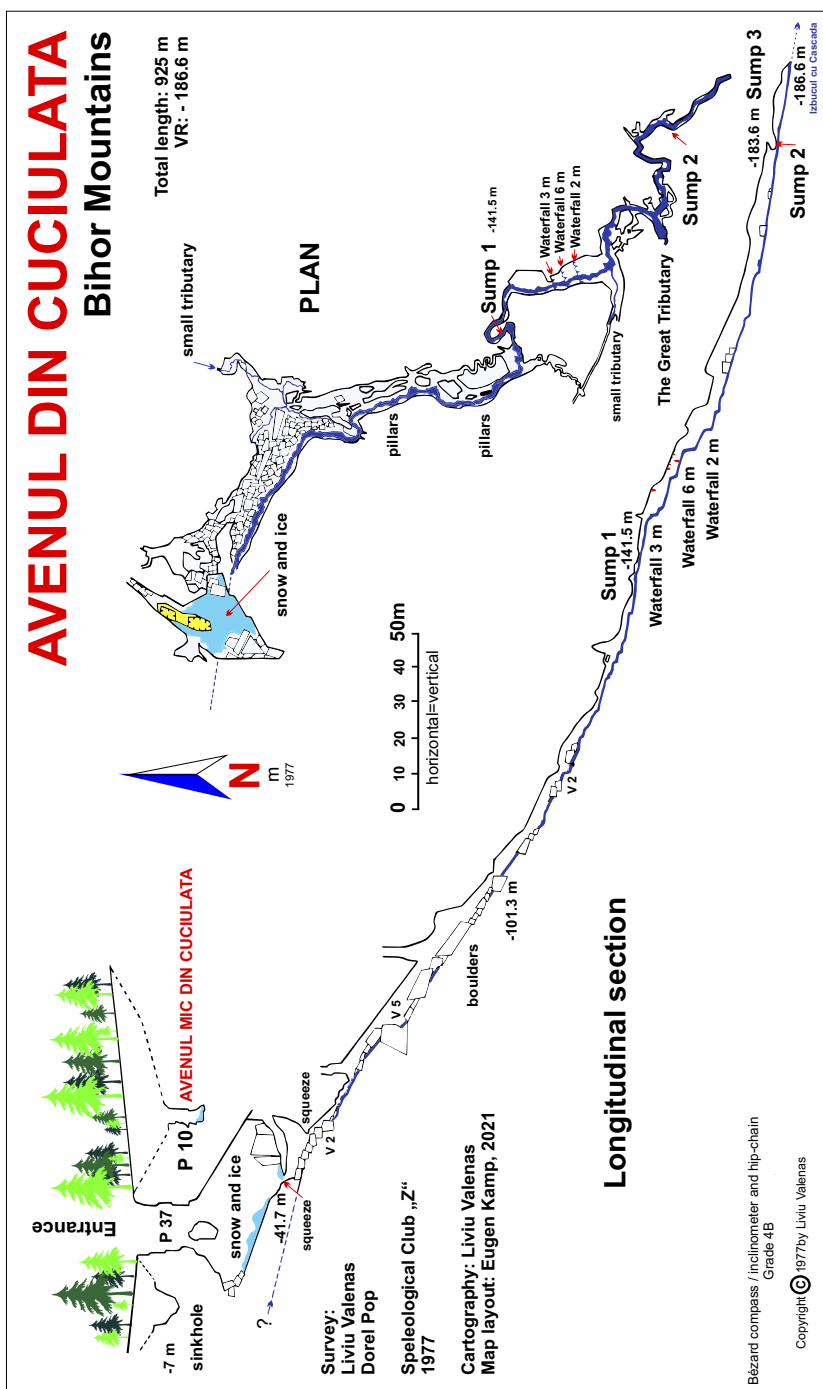


Figure 2. Cuciulata Pit (Avenul din Cuciulata), survey: Liviu Vălenaş and Dorel Pop, cartography: Liviu Vălenaş, map layout: Eugen Kamp, 2021

Geology and Tectonic

Lithologically, Cuciulata Pit begins on the contact between layers of limestone of Malm (J1) age and quartzite of Werfenian (T1) age (Fig. 3). The last one belongs to an older thrust layer glided over limestone. Moreover, the water eroded partially one gallery under the quartzite unit. At -40 m, the cavity intercepts another quartzite layer of Lower Liassic age (Hettangian – J1) in a normal stratigraphic relationship with the limestone of Malm (J3) age. The watercourse follows the lithological contact up to -174 m and then passes through the limestone of Malm (J3) age up to the last sump at 186.6 m in depth. The quartzite is a sandstone made of quartz granules and other elements as plagioclase crystals, biotite and opaque minerals. It mentions the lack of the Upper and Middle Liassic layers, especially of the Toarcian marlstone. This situation is common to the Bihor Mountains. As for the limestone of Malm (J3) age, the main cavern developed on obvious lithological diastems and joints. The proximity of the Cuciulata Pit to 200 m of the banatites massif of Vlădeasa supports the idea of a certain crystallization of limestone of Malm age (J3).

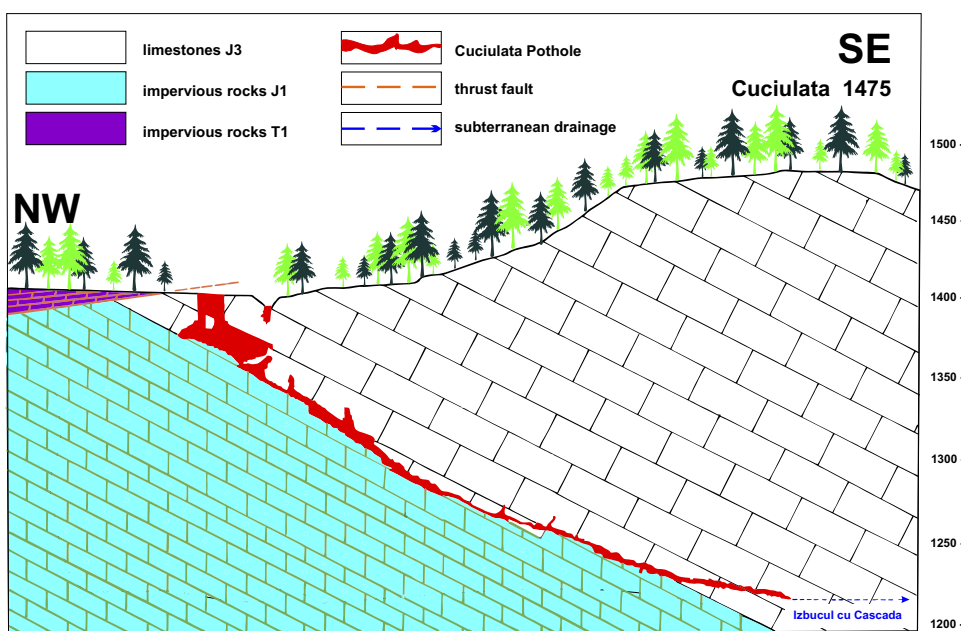


Figure 3. Geological and hydrogeological section of Cuciulata Mountain (graphics: Liviu Vălenaș, 2021)



Figure 4. The entrance of Ponorul din Cuciulata cave (Photo by Liviu Vălenaș, 2014)

Morphology and Genesis

The profile of the underground network looks like closer to an angled cave. The sole particularity of the Cuciulata Pit is its entrance shaft (P 37). The cavity has the origin in a deep phreatic pattern, inclusively the entrance shaft. Later, the water-course passed to vadose flow.

Hydrogeology

The origin of the underground river in Cuciulata Pit is the meteoric water drained in the sinkholes near the entrance in pit. As a result of the water markings in the area made between, the karstic waters drainage is more complicated than the scheme imagined by us in 1978 (Figs. 6, 7). So, the subterranean course in Ponorul din Cuciulata appeared in Izbulcul Moloh (Peștera cu Apă din Cheile Someșului Cald) resurgence, situated at 700 m air distance from the final sump of Ponorul din Cuciulata and a vertical range of 125 m (SILVESTRU, 1995). The colouring appeared after 35 hours, the average flowing speed: 20 m/hour. The colouring made in 1994 in Cuciulata Pit demonstrated, in exchange, that this great descending cave had another resurgence: Izbulcul cu Cascadă in the canyon of the Someșul Cald, situa-



Figure 5. Ponorul din Cuciulata, the Main Gallery (Photo by Liviu Vălenaș, 2014)

ted at 500 m distance and at a vertical range of only 13.4 m (SILVESTRU, 1995). Fluorescein appeared in the resurgence in only two hours and 15 minutes, a flowing speed extremely high: 256.6 m/h. Izbucul cu Cascadă is also joined by the important ponor-cave from Pârâul Vacii, the final sump in the cave being at 450 m air distance from the spring and only at 10 m vertical range. Here the colour has

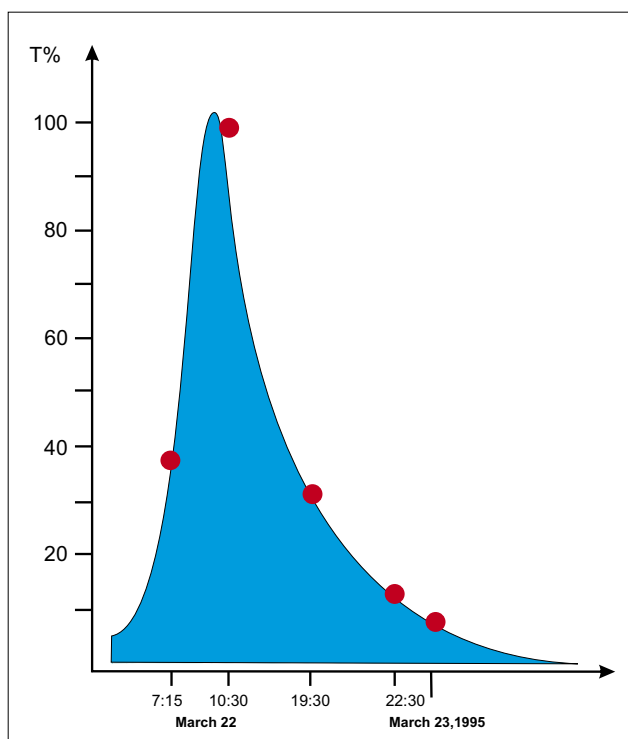


Figure 6. Graph of the tracer output at Izbulul cu Cascadă spring for the input in Cuciulata Pit, credit by Emil Silvestru, 1995

travelled in 12 hours, the average flowing speed being: 37.5 m/h (SILVESTRU, 1995). Concerning the origin of the important tributary from -174.0 m in Cuciulata Pit, we suppose that it comes from swallow hole located at 200 m North-West of the pit. In conclusion we are dealing in the searched zone with two different systems of drainage, there is no hydrological connection between Ponorul din Cuciulata and Cuciulata Pit. The nearing to these ponor-caves of the Someșul Cald canyon did not allow the organization of a unique drainage system.

Climatology

The temperature inside the Cuciulata Pit is between zero and 4.8 degrees Celsius and the humidity is over 90%.

Mineralogy

A study of minerals does not exist. It would be tempting to search an amazing cave developed at the contact of limestone of Malm (J3) age with the quartzite of

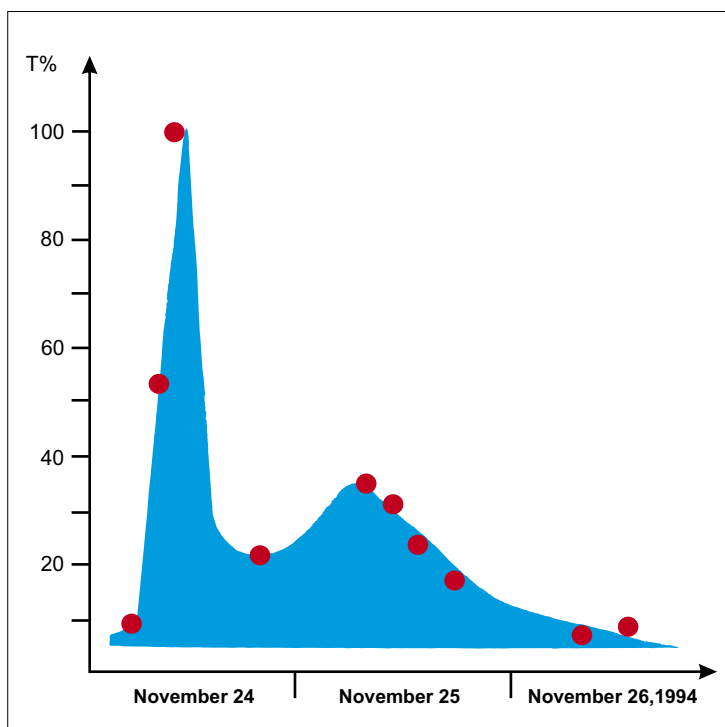


Figure 7. Graph of the tracer output at Izibucul Moloh (Peștera cu Apă din Cheile Someșului Cald) spring for the input in Ponorul din Cuciulata, credit by Emil Silvestru, 1995

Lower Liassic (J1) age. For sure, it exists the chance to find a new kind of minerals because of the neighboring of the banatites massif of Vlădeasa.

Ponorul din Cuciulata

In the immediate vicinity of Cuciulata Pit (Avenul din Cuciulata) there are two more strongly descended slope-caves: Ponorul din Cuciulata and Ponorul Mare from Pârâul Vacii. But they do not make a unique morphological and hydrogeological system, belonging to two different resurgences: Izibucul Moloh (Peștera cu Apă din Cheile Someșului Cald) and Izibucul cu Cascadă.

Ponorul din Cuciulata is situated at 350 m South-West of the entrance to Avenul din Cuciulata on the mountain Cuciulata, too, and at the same altitude, 1400 m as Cuciulata Pit. It was discovered in July 1977, too, by the Speleological Club „Z”. The exploration and survey were entirely made that year by Liviu Vălenaș, Horia Mitrofan, Dorel Pop, Nicolae Sasu, Nicolae Paul and Éva Györfi. In September 1977, the explorations were joined by a team of the Speleological Club of Dabrowa Górnicza, Poland.



Figure 8. Ponorul din Cuciulata, the Intersection Hall (Photo by Liviu Vălenaș, 2014)

Ponorul din Cuciulata is a continuously descending cave, developed generally on two levels (Figs. 8-10). Here and there, a small intermediate floor appears complicating the system of galleries even more, is one of the most maze caves in Romania. The 3,140 m of galleries fit in a rectangle of only 200×150 m! The cave is continuously descending, having a final river with quite a big flow. It is not known where this course of water comes from; there are only two possibilities: it comes either from the river which gets lost at the entrance or from a nearby slope. In the middle sector, the cave presents a network of galleries, relatively horizontal, narrow, low and maze. In this sector, there is also the only large hall in the cave, 57 m long, 16 m wide and 12 m high.

The galleries are excavated only on fractured lines, the layering faces playing an absolutely minor role. The unique entrance is at the end of a small pocket valley, 10 m wide and 5 m high. Right under the entrance portal, a short gallery climbs up to +10 m. From the end of the entrance hall, the cave branches out in a T shape. The North-East branch ends after 40 m.

The southern branch is narrow and meandering; after a 3 m vertical it presents a bigger one of 6.6 m. At its basis, there is a hall 14 m long and 14 m wide, too, Intersection Hall. From here a complex of extremely branching maze galleries go North-East, the CSER Galleries. Only this sector has a 1,500 m development.



Figure 9. Ponorul din Cuciulata, the Secondary River in the CSER Galleries (Photo by Liviu Vălenaș, 2014)

From the Intersection Hall, the Main Gallery continues towards South-East, meandering, relatively narrow, with several verticals up to 8 m. It is run by an active which comes from the infiltration water from CSER Galleries. Some sumps are avoided through fossil loops. In the terminal portion you get to the main active which makes

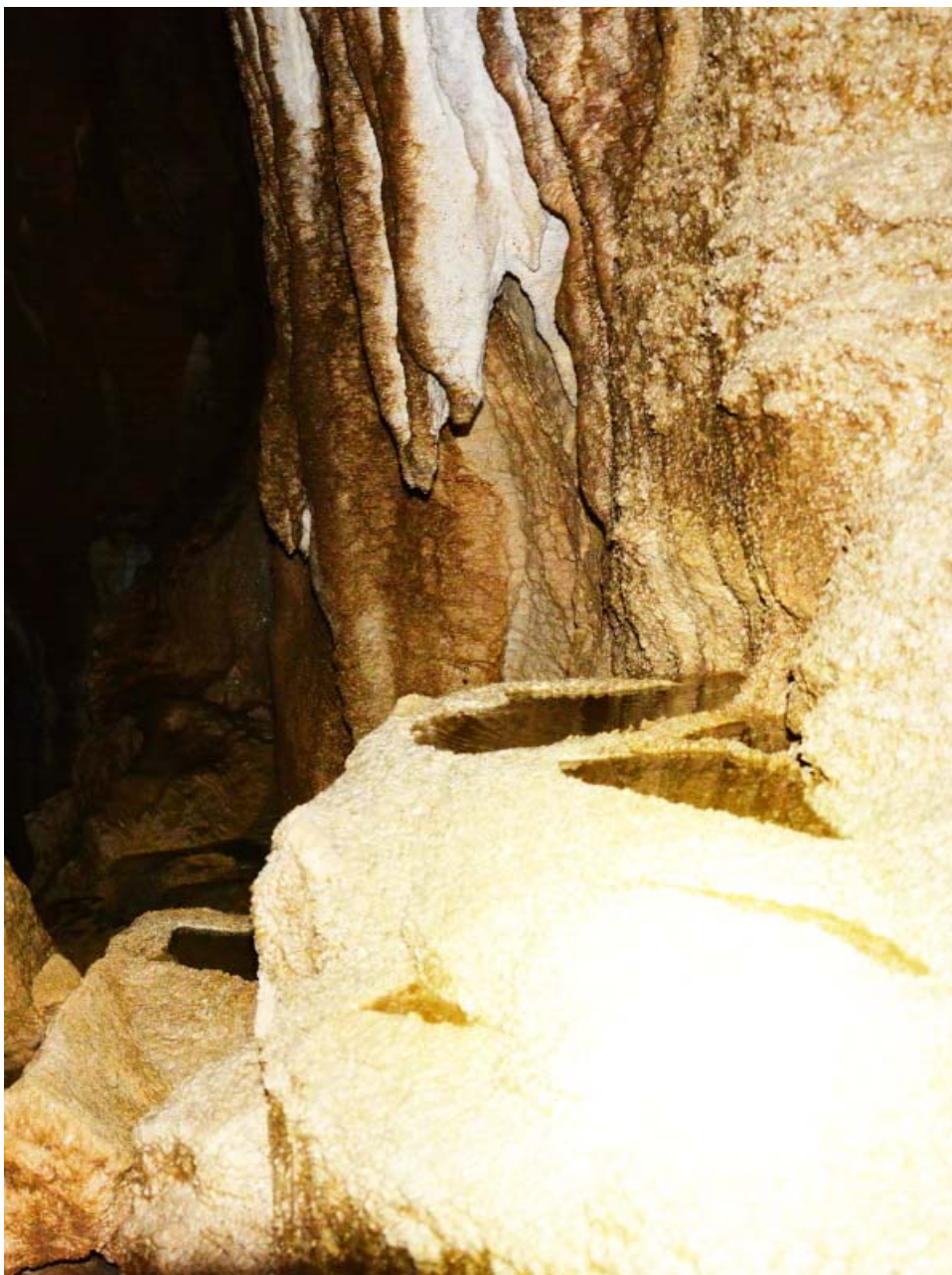


Figure 10. Ponorul din Cuciulata, rimstones in the CSER Galleries (Photo by Liviu Vălenaș, 2014)

a surprisingly sudden elbow towards North-East. At 350 m from the entrance, a gravel clogged final sump, at -75 m, stops any advancement. In this portion, several very narrow fossil galleries have the tendency to pass over the sump but they also end up hopelessly. The sudden elbow of the main active towards North-East set forth in 1977 the hypothesis that Ponorul Cuciulata could be a side network of Cuciulata Pit. But the colouring made in 1995 showed that the final drainage of the cave is done in Izbulul Moloh Peștera cu Apă din Cheile Someșului Cald. In other words, the idea that Ponorul din Cuciulata and Avenul din Cuciulata would form a single morphologic and hydrologic system proved to be wrong. The provenance of the final course from Ponorul din Cuciulata (average flow 15 l/s) is unknown. It probably gathers the waters from the slope at the entrance and from the dolines at its South. We do not see another provenance. In the CSER Galleries there is one more subterranean course, 50 m long, which gets lost separately, through a whirlpool. It probably confluent with the main course after the -75 m sump.

Ponorul Mare from Pârâul Vacii

Ponorul Mare from Pârâul Vacii (1,371 m length, VR: -117 m), discovered by the same Speleological Club „Z” in July 1977. It is situated at only 230 m West - North-West of the entrance of Cuciulata Pit (Avenul din Cuciulata) at 1305 m altitude. It is also relatively maze cave and contains some large halls and several siphons, the final drainage of the subterranean river is in Izbulul cu Cascadă. At the end of a small pocket valley, three entrances, an 8 m pit included, there opens into a narrow gallery in bare rock, fragmented by several verticals of 3 m, 5.5 m and 4.5 m. At the marking -33 m (in report with the 8 m deep pit) the gallery was found in 1977 totally clogged with river deposits. After 1980, the Speleological Club „Politehnica” of Cluj-Napoca, disabstracted this terminus and explored a complex of galleries, relatively labyrinthine, descending, displayed in an air length of 179 m. It turns out that this cave forms only one hydrogeologic and morphologic unit together with Cuciulata Pit. Of note is that the Speleological Club „Politehnica” of Cluj-Napoca continued in the 1980s the explorations of this cave and renamed it abusively and contrary to the recognized world rules as „*Peștera Fisura Neagră*”.

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