Karszt és Barlang, Special Issue 1989. p. 17—30. Budapest

THE CAVES OF HUNGARY

Katalin Takács-Bolner — István Eszterhás — Márton Juhász — Sándor Kraus

Young clastic sediments constitute a large share of the geological composition of Hungary; carbonate rocks suitable for karstification only amount to a mere 1.5% of the surface of the country *(Fig. 1)*. Despite the limited expanse of karstic regions, there are more than 2,400 caves registered in Hungary today. Even so, only 77 of them reach 200 m, and a mere 24 stretch to 1 km. Since our karstic regions are mostly of medium height, the vertical extent of the caves is not great: sixty-nine extend to a depth of 50 m, and only 3 are deeper than 200 m.

The number of known caves has increased considerably during the past decade due to systematic field-work and new explorations: compared to the 1,314 known caves in 1977 the present figure is up 85%. The total length of new passages and caves explored during this period exceeds 30 km.

There are many types of caves in Hungary: the number of caves of thermal water origin is significant even by global standards: one-third of our largest caves belongs to this type. The frequency of thermal springs and caves results from the country's geological construction and the above-average geothermic effect: the pressurized karstic waters, stored and warmed in the carbonate masses of the basin floors in the mountain forelands, can only penetrate the surface at the edge of the mountains where the impermeable cover has eroded. The upsurging thermal waters usually mix with the descending karstic waters of the open karstic areas, and the mixing corrosive effect gives rise to the peculiarly formed cave systems.

Due to the most recent rise in elevation of our mountains, the majority of not only caves of warm water origin but also "classic" sinkholes or spring caves of cold water origin have become inactive. Several active water conduit systems are only partially known. Among the cold water caves the value of the small caves formed syngenetically in the travertine deposited by large karst springs is enhanced by their rarity.

Top: Gypsum flowers in the József-hegy Cave, Buda Mts.

Bottom: Red Sea passage in the József-hegy Cave (by I. Czájlik)

The oldest known karstic phenomena in Hungary are the 70—100 million year old karstic surfaces of the Cretaceous period which were exposed during bauxite and manganese mining in the Bakony Mountains. The fossils found in the cave fills prove that our oldest cave was created at the end of the Miocene period; several caves can be dated back to the lower Pleistocene era, while most of our known caves were formed over the past one and a half million years during the middle and upper Pleistocene periods.

Aggtelek Karst

One of the most typical karstic area of Hungary is the Hungarian section of the Gömör—Torna karst region known as the Aggtelek Karst *(Fig. 2)*, found in the Northern Mountain Range, its central mass is constituted of middle-Triassic, so-called wetterstein limestone. In this region some 170 caves are currently known including longest, best known and longest researched cave in the country, the Baradla-Domica Cave System which extends nearly 24 km, 18.8 km of which is in Hungary. It is a "classic" layered water-conducting karstic system with underground streams. It has a catchment basin of some 22 km² whose northern portion is open karst and whose southern part is covered by Pannonian clay and gravel; rainwater enters the system via sinkholes on the border of the karst.

The natural opening of the *Baradla Cave* is near the village of Aggtelek, near the main sinkhole of the Hungarian system; its stream, the Acheron, merges after several hundred meters with the Styx which flows through Domica, originating from the Slovakian part of the catchment basin. The central passage running from Aggtelek to Jósvafő is a rock tunnel about 7 km long, 10 m wide, 7—8 m high, and interrupted in places by monumental halls; currently the cave stream flows along this path only during floods. During the rest of the year the lower cave under Baradla conducts the water to the springs at the mouth of the Jósva Valley. Water tracings in recent years have shown that there exist a so called Long-Lower Cave and a Short-Lower

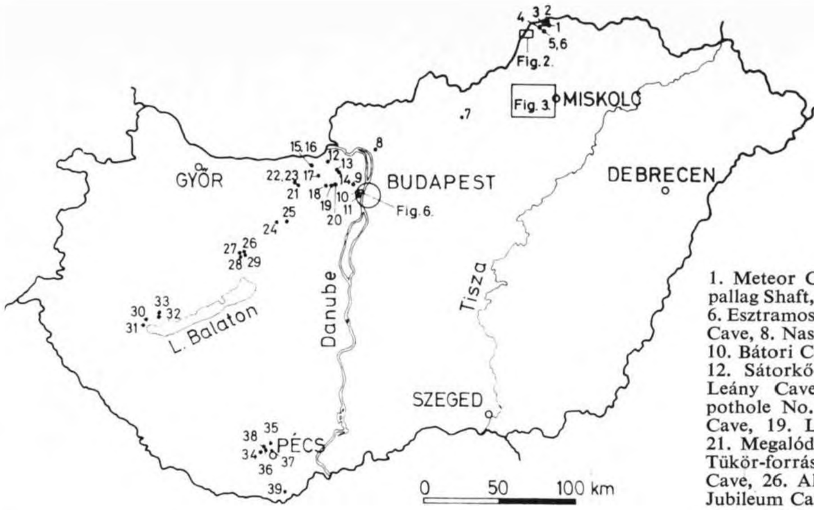


Fig. 1. Geographical distribution of the Hungarian caves mentioned in the text

1. Meteor Cave, 2. Vecsem-bükk Shaft, 3. Szabó-pallag Shaft, 4. Rejtek Shaft, 5. Rákóczi Cave No. 1, 6. Esztramos (Földvári Aladár) Cave, 7. Csörgő-lyuk Cave, 8. Naszály Cave, 9. Solymári-ördöglyuk Cave, 10. Bátori Cave, 11. Budai Vár Cave (Castle Cave), 12. Sátorkő-puszta Cave, 13. Legény Cave, 14. Leány Cave, 15. Jankovich Cave, 16. Öreg-kő pothole No. 1, 17. Pisznice Cave, 18. Szelim-lyuk Cave, 19. Lengyel Cave, 20. Keselő-hegyi Cave, 21. Megalódusz Cave, 22. Angyal-forrás Cave, 23. Tükör-forrás Cave, 24. Gánt Cave, 25. Csákvár Cave, 26. Alba Regia Cave, 27. Csengő Shaft, 28. Jubileum Cave, 29. Három kürtő Cave

Cave, of which the latter has so far been explored to a length of 1 km.

The onset of the formation of the Baradla-Domica Cave System can be dated to the late Pliocene age. Based on separated passage levels and the remains of one-time alluvial fills, several active and accumulative periods can be demonstrated. Corrosion played the central role in the early development of the cave; expert opinions are divided on the role of the corrosive effect of the cave river and the erosive effect of its float in later expansion.

The current natural entrances to the cave have been open since prehistoric times. Archaeological finds reveal that the initial sections at both Aggtelek and Domica were inhabited by neolithic man. Thousands of pottery fragments and bones, remains of dwellings and fireplaces, and dozens of other artifacts attest to the fact that the cave is the major excavation site of the so-called Bükk culture, but numerous finds have been recovered from the early iron Age and the period of the Mongol invasion as well.

The Baradla Cave was first mentioned in writing in 1742, its first map, which shows a 2.2 km wide stretch from the entrance at Aggtelek, was made in 1794. The history of the discovery of the cave goes back to the first part of the 1800s: in 1825 Imre Vass discovered the larger section of the Central passage (some 4.5 km) by breaking through the narrow, waterfilled Vaskapu (Iron Gate). The exploration of the Slovakian Domica Cave in the 1920s is credited to Jan Majko and the two sections were joined in 1932 by linking the water filled passage between them.

In addition to its impressive dimensions, the Baradla-Domica Cave System earned international fame and has appealled to tourists for centuries by virtue of the rich colours and forms of its dripstone formations. These include the rimstone dams of Domica, the forests of stalagmites in the Aggtelek section, the original pure formations in the Jósvafő branch, and the 25 meter giant stalagmite of the Observatory.

The water of the Komlós Spring, wich rises some 400 m from the Jósva Spring, was long thought to originate from the Baradla system since it faithfully reflected the cave floods, much as the Jósva Spring did. However water tracing tests by László Jakucs in 1952 showed conclusively that the spring water originates from another large cave independently of the Baradla. This premis was proved later that year by the discovery of the 8,700 m long *Béke Cave* by the opening of a sinkhole.

Although the genesis of the two neighbouring large caves is nearly identical, differences exist in their character. The Béke Cave has no separate lower cave, the cave river runs through the central passage, completely filling it at places. Its passages are narrower and are more like fissures than tunnels; this is probably due to the smaller size of its catchment basin. Dominant among the dripstone formations are the abundant stalactites and drape-

Baradla Lower Cave (Photo P. Borzsák)

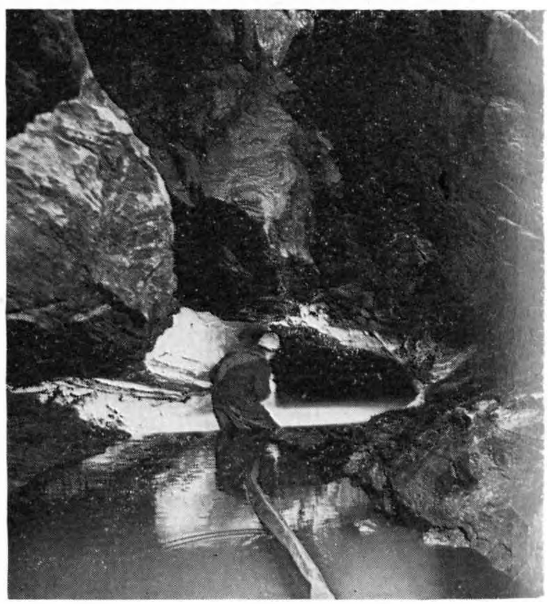
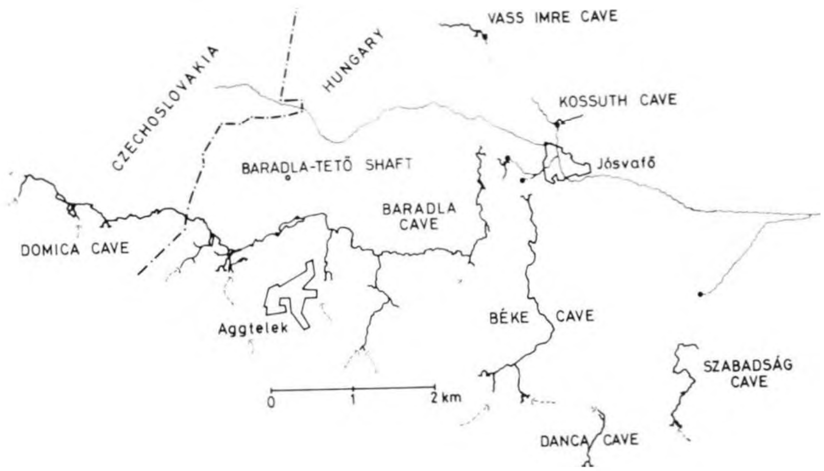


Fig. 2. Surroundings of Aggtelek and Jósvafő with the plans of the six longest caves



ries; the stepwise basins in the river bed created by snowwhite rimstone dams are also fabulous.

The therapeutic effect of the air of the Béke Cave has been proven by extensive investigations. Since the late 1950s its large chambers near the artificial entrance at Jósvafő have been successfully used to cure asthmatic patients.

The third longest system of the Aggtelek Karst is the *Szabadság Cave* near the village of Égerszög. It was discovered in 1954 when its main sinkhole was opened. At present its total length is 2,717 m, its water wells up in the spring belonging to the water-system of the Jósva River, 900 meters away from the known end-point of the cave. The character of the cave changes with the type of rock in which it is embedded. Its limestone first section contains a typical meandering passage-way divided into several levels and decorated with fine stalactites, draperies and spherical precipitations. The segment carved from dolomite is a heavily filled, flat crawlway while its final part in lamellate marly limestone has a keyhole-shaped cross section.

Of the lesser water systems on the southern edge of the karst region which were detected by water tracing, only the *Dance Cava* has been explored, currently to a length of about 1,400 m. Speleologists managed to enter the passages behind the well-known small, intermittently active spring cave through a friable zone in 1981, and in 1983 they reached the sinkhole area of the system by opening a new major tract. The inner segment of the not easily passable, relatively narrow cave carved partly in dolomite is closed off by a siphon of constant water level which protects the enthralling beauty of the dripstone formations inside.

Two other significant stream caves can be found NW of Jósvafő. The intermittently active *Vass Imre Cave* was explored in 1954 through the mouth of the flood waters. The main sinkhole of the cave, detected by water tracing, is the Milada Sinkhole Cave in Slovakia. Of the entire system, presumably stretching to 10 km in length, some 1,000 m is in the Vass Imre Cave, the end of which is blocked by a large breakdown zone. Adorned with finely colored dripstone formations and formations caused by dissolving substances, the cave is the most thoroughly studied karstic phenomenon; it is equipped with a network of telemeters, and there exists a karst hydrological research station nearby.

The underground water passage of the Nagy Tohonya Spring, the *Kossuth Cave*, was also discovered by entering through the mouth of the spring in the breakdown zone in 1956. The bottom of the relatively narrow, fissure-like cave, explored to a length of 800 m, is completely filled by the stream on some places. The end is closed off by an as yet unsurmountable siphon which divers have currently managed to explore to a depth of 30 m. A hydrological peculiarity of the system is that its water is warmer than the surrounding karst springs; this means that the heated waters of the deep karst also mix with it.

There are large karstic springs at the foot of the NE area of the region: the Alsó (Lower) Mountain as well, but researchers have not managed to enter the large cave systems that are assumed to belong to them from either the direction of the springs or that of the sinkholes. The largest known cave of Alsó Mountain is the *Meteor Cave*, currently 650 m long, which was discovered in 1961 when a temporary sinkhole was opened. One of the country's largest cave chambers, the Titans' Hall, can be found at the bottom of the gradually deepening cave. With an approximate area of 90 × 30 m, it is adorned with huge stalagmites, pillars and helictites.

A charakteristic type of cave in the plateau of Alsó Mountain, opening mostly in the side of dolines, is the vertical shaft called here "zsomboly". Due to the friable and loose clay fills in these caves the karst water level has not been reached anywhere yet: therefore, it is still questionable if these caves are linked with the horizontal water-conducting caverns. In the Hungarian part of Alsó Mountain some 50 shafts are known today, nine of them exceeding 50 m in depth.

The deepest known shaft is the *Vecsem-bükk Shaft* found at the border of the country. The shaft, consisting of parallel pits of relatively large cross sectional size, used to be the deepest cave in the

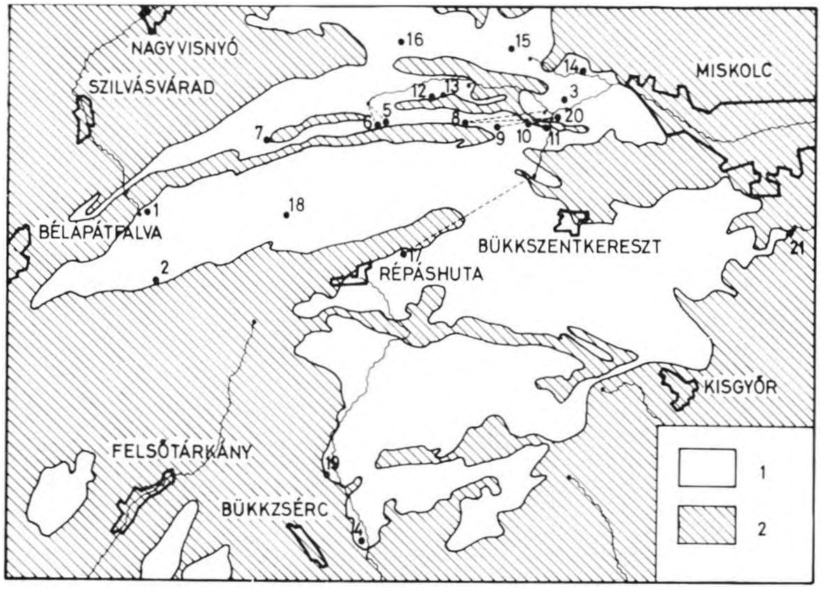


Fig. 3. Bükk Mountains and their important caves. Legend: 1 = karstic surface, 2 = non-karstic area

1. Istállós-kő Cave, 2. Peskő Cave, 3. Szeleta Cave, 4. Suba-lyuk Cave, 5. Bolhás Sinkhole-cave, 6. Jávorkút Sinkhole-cave, 7. Diabáz Cave, 8. Létrási-vizes Cave, 9. Létrás-tető Cave, 10. István-lápa Cave, 11. István Cave, 12. Fekete Cave, 13. Balekina Cave, 14. Kecske-lyuk Cave, 15. Kő-lyuk Cave, 16. Szamentu Cave, 17. Pénz-patak Sinkhole-cave, 18. Kiskőhát Shaft, 19. Hajnóczy Cave, 20. Anna Cave, 21. Miskolctapolcai-tavas Cave.

country measuring 235 m. Its dripstone-decorated middle pit, discovered in 1969, is the largest contiguous pit in the country with its height of 90 m.

The *Szabó-pallag Shaft* situated at a lower level, turned out to be also a system of parallel pits formed along fissures. The explored total length of the pits is 628 m, its known depth is 120 m.

This cave type is less characteristic of the other parts of the Aggtelek Karst. This is why it was such sensational news when the *Baradla-tető Shaft*, at a depth of 89 m, was discovered in 1986, 400 m away from the Baradla Cave.

In the SE forelands of the Aggtelek Karst some cave systems showing signs of thermal water activity can be found. Such activity is evidenced by the abundant mushroom-like or coralloid popcorn-calcites covering the walls of the 74 m deep *Rejtek Shaft* near the village of Bódvaszilas, and by the hydrothermal phenomena in Mt. Esztramos rising on the other side of the Bódva Valley.

In Mt. Esztramos small amounts of high-quality iron ore was mined in the Middle Ages. Now there is a quarry on its peak. The web of mine tunnels and shafts in the limestone mass exposed dozens of small and large cavities, the most important of them being the *Rákóczi Cave no. 1* at the lowest level. The series of chambers carved out along a fissure system reaches a height of 30—40 m and stretches to the same depth under the present level of the karst water. Its walls are decorated with dripstones and popcorn-calcites. The superposition of various types of formations indicates the repeated rise and fall of the karst water level.

Quarrying on top of the mountain also exposed scores of caves including the *Esztramos (Földvári Aladár) Cave*. Among its rich formations, the most beautiful are the accumulations of tiny ponds formed by dripping waters and the dripstones covered by soft white moonmilk. From the red clay fill of small caves destroyed by quarrying, rich fossil finds of small mammals from the Pliocene — Lower Pleistocene were recovered.

Bükk Mountains

The karst region of the country richest in caves is the Bükk Mountains which consist of complex geological construction, mostly of Triassic sedimentary rocks. There are 830 caves recorded here. Most of these are intermittently active or completely inactive sinkhole caves or deteriorating fossil spring caves *(Fig. 3)*.

The excavation of the caves in the Bükk began early this century with the archaeological investigations at the large fossil debourchures. Nearly all these caves with wide entrances and generally one single huge chamber provided some paleolithic finds. The best known are the *Istállós-kő Cave* and *Pes-kő Cave* on the western edge of the Nagy-fennsík, which contains remnants of the Aurignacien culture, the *Szeleta Cave* near Lillafüred whose stone tools belong to the "szeletian" culture which got its name after this cave, and the *Suba-lyuk* near the village of Cserépfalu in the Southern Bükk where some skull fragments were recovered besides the finds of the moustérien culture.

The largest sinkhole caves of the Bükk are related to the Middle Triassic anisusian limestone belt which stretches across the northern part of the Nagy-fennsík and is bounded by porphyrite on the north and argillite and diabase on the south. The western part of the limestone strip conducts water to the springs in Garadna Valley separating the Nagy- and Kis-fennsik, its eastern part directs water to the springs near Lillafüred.

The largest known cave belonging to the system of the Garadna Spring is the *Bolhás Sinkhole-cave*. Speleologists reached its first stretch in 1953. Together with the sections explored in 1977—79, it is now 2,500 m long. The central passage of the cave runs northward and then westward and is interrupted by several gravel and clay siphons and water-filled sections; several narrow side passages heavily filled with deposits join to it at the bottom of the entrance shafts and the currently known endpoint.

The *Jávor-kút Sinkhole-cave*, a mere 400 m away was also discovered in 1953. The 906 m of known cave length shows strong tectonic preformation. The end point of the fissurelike passage network is only 130 m away from the end zone of the previously discussed cave. Further research is hindered by siphons of steady water level at both ends of its active stream section *(Fig. 4)*

The geological interest of the *Diabáz Cave* in Bánkút at the western end of the limestone stretch is that the joining of the limestone and the non-karstifying diabase of volcanic origin is exposed at several points. The 1 km long, 153 m deep cave was discovered in 1975 when a temporary sinkhole was opened and is the fourth deepest cave in the Bükk Mountains. The hydrological peculiarity of the cave is that its lower-level passage conducts the water westward in floods whereas at other times the water flows eastward at a bit deeper level.

Only a few segments of the presumably large cave system in the eastern part of the limestone belt are known. The western member of this system is the *Létrási-vizes Cave* which opens on the border of limestone and argillite. The exploration of the layered labyrinthine sinkhole cave stretching NNE began in the 1950s. At present time its length is about 3 km. Its endpoint is at a depth of 90 m and is filled by a small lake from where the water flows towards the springs in the eastern part of Garadna Valley and the northern part of Szinva Valley.

The next member of the presumably contiguous system is the *Létrás-tető (Szepesi) Cave* whose inactive entrance shafts join a subhorizontal water conduit explored in 1962. Both ends of this level branch are blocked by siphons. The eastern downstream siphon has been explored by divers down to a depth of 166 m from the entrance.

The *István-lápa Cave* was discovered 1 km away from the above discussed cave in 1964 when a temporary sinkhole was opened; it is the longest known cave of the Bükk extending 4,100 m and is the country's deepest at 250 m. Its tiered shafts join the spatious level passage at deeper than 200 m. Its active western water-conducting branch is interrupted by siphons which are filled with water most of the year. Characteristics of its river bed are the fine solution pockets. The known part of its eastern branch is mostly an inactive upper level that joins the river passage with a deep pit.

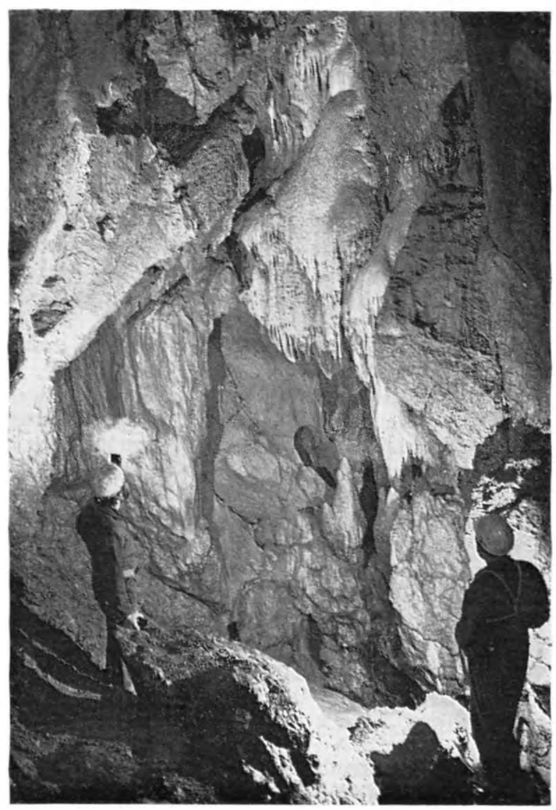
The lowest member of the system is the *István Cave* whose mouth is by the main road in the Szinva Valley. Most of the known passages of the 711 m long cave are also inactive; the developed section is popular among tourists.

Only one significant cave is known in the dolomite strip stretching across the northern border of the Nagy-fennsík. The *Fekete Cave* of Tekenős, found when opening a temporary sinkhole in 1975, is the third deepest cave in the Bükk at a depth of 163 m. The total length of its passages is approximately 1,000 m. The cave provides excellent insight into the geological construction of the region: the rock embedding the shafts is dolomite and Lower Triassic limestone with argillite, the lowest part reaches the Upper Permian limestone, and at some points even the formations of Triassic porphyrite volcanism are exposed.

None of the caves in the limestone mass of the Kis-fennsík on the northern side of the Garadna Valley reaches 1 km in length. The best known of these lesser caves is the intermittent spring cave of the *Kecske-lyuk*, the *Kő-lyuk*, famous for its cave-bear remains, and the *Szamentu Cave* which contains the largest chamber in the Bükk and was explored in 1967.

Part of the water system in the argillite region in the SW foreland of the Nagy-fennsík are drained by the sinkholes of the limestone strip jutting as far

Chamber in the Diabáz Cave, Bükk Mountains (Photo: P. Borzsák—A. Prágai)



as Répáshuta; the water is led to the springs wellings at the southern foot of the mountain. The best known of these sinkholes is the *Pénz-patak Sinkhole-cave* explored in 1953 whose deepest point at 128 m is closed off by a siphon of constant water. Its level may change as much as 42 m a year which indicates that the other water conduits are little developed or heavily blocked.

The names of several sinkhole caves with pits include, quite incorrectly, the word shaft although only a single "classical" shaft is known in the mountain. The *Kis-kőhát Shaft* opening on the southern edge of the Nagy-fennsík is 114 m deep; between the spatious double entrance pits only one of which opens to the surface, and the 50 m shaft with dripstones leading to the lowest point there is a huge hall. The cave opening relatively high above sea level and having an average annual temperature of 4—6 °C, gives winter shelter to thousands of bats.

The largest known cave of the Southern Bükk is the *Hajnóczy Cave* in the side of Mt. Odor on the border of the southwestern argillite and southeastern Triassic — mostly cherty — limestone area. Its initial section was discovered by student speleologists in 1971, and regular research has currently extended its known length to over 2,200 m. The cave has been closed since its discovery and can only be visited with research teams. It is a real gem in the Bükk Mountains because of its interesting corrosive forms, intact dripstone formations, monumental chambers connected by imposing fissure passages, and paleontological finds on the upper level.

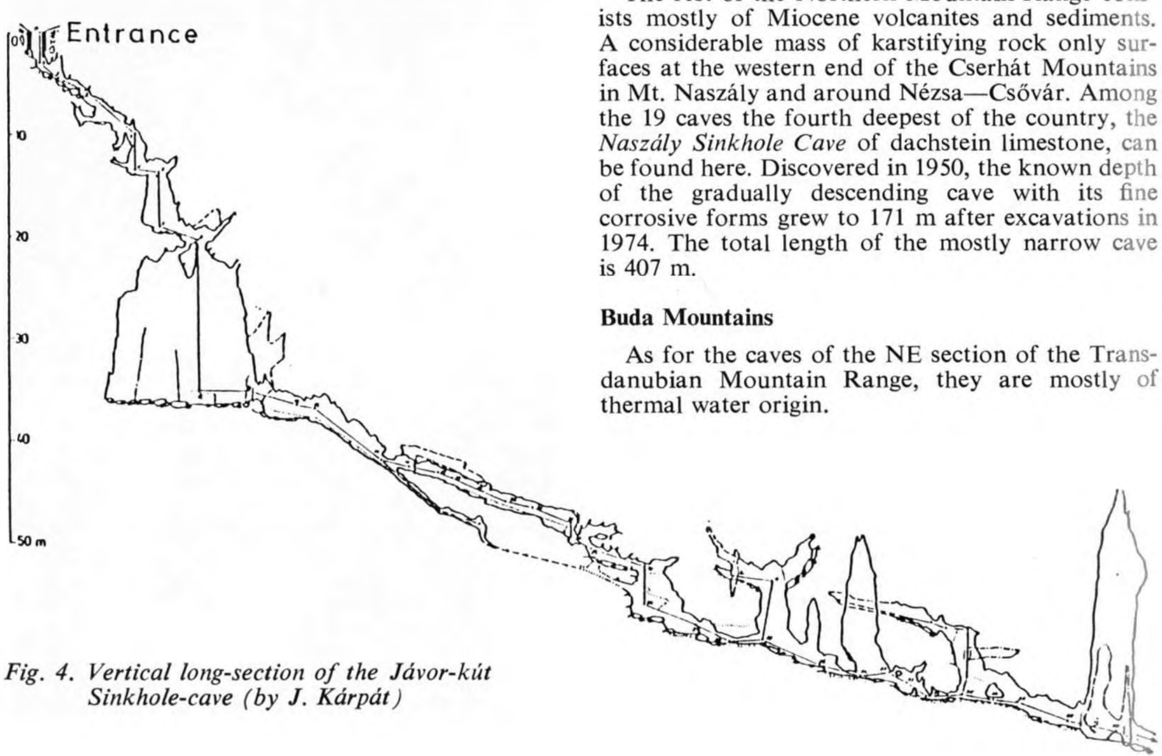


Fig. 4. Vertical long-section of the Jávor-kút Sinkhole-cave (by J. Kárpát)

During the precipitation of the freshwater limestone masses connected to the large karst springs of the mountain-range, they enclosed small cavities, so-called travertine caves. Some can be found in the western and southwestern border of the mountain-range in Mónosbél and Eger, but most of them are located at the NE foot of the Nagy-fennsík, in Lillafüred. Here, in the side of the travertine hill deposited by the waterfall of the Szinva River, there are several smaller cavities, and the caves of the inside of the hill are artificially linked into the contiguous system of the *Anna Cave*. Its first cavities were discovered in 1833 while digging a gallery for water, and it was soon opened to the public. The rooms of the 600 m long labyrinth offer extraordinary natural sights with its travertine walls covered roots and other plant remnants.

In the southeastern foreland of the Bükk Mountains thermal waters have been found by deep borings at several places. The natural tapping point of this thermal karstic water flow system is in Miskolc-Tapolca which got its name from the group of thermal springs at the foot of the mountain. Some of these springs welled up in the *Miskolc-Tapolca Tavas Cave*, already known in the last century. The thermal water lakes filled the bottom of the cave system which opened with tall chimneys to the surface. The cave was converted into a popular cave bath in 1959. Recent expansion work has exposed new parts in the system partly filled with water.

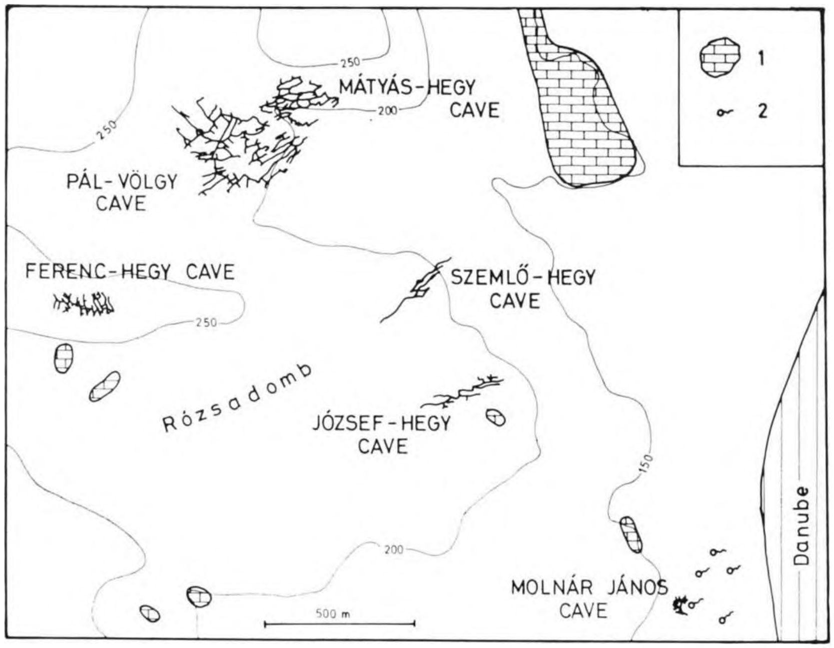
Cserhát Mountains

The rest of the Northern Mountain Range consists mostly of Miocene volcanites and sediments. A considerable mass of karstifying rock only surfaces at the western end of the Cserhát Mountains in Mt. Naszály and around Nézsa—Csővár. Among the 19 caves the fourth deepest of the country, the *Naszály Sinkhole Cave* of dachstein limestone, can be found here. Discovered in 1950, the known depth of the gradually descending cave with its fine corrosive forms grew to 171 m after excavations in 1974. The total length of the mostly narrow cave is 407 m.

Buda Mountains

As for the caves of the NE section of the Transdanubian Mountain Range, they are mostly of thermal water origin.

Fig. 5. Geographical location of caves in the Buda Hills. Legend: 1 = travertine, 2 = wram karstic spring



The largest cave systems of thermal water origin in Hungary are in the Buda Mountains surrounding the capital from the NW with an area of 150 km² *(Fig. 5)*. Its karstifying rocks include Triassic dolomites and limestones and considerable amount of Eocene limestones and marls. The thermal water effect can be demonstrated for almost all of the currently known 160 caves. The cave systems of the heavily divided mountain range show strong tectonic preformation. Most of the large caves have the plan of a labyrinth. The majority of caves carved out by the mixing corrosion effect of ascending warm waters and descending cold karst waters were explored by quarrying in the first part of this century. The mountain section densest in caves is the Rózsadomb in the capital's second district where the five largest systems can be found within a single km².

The largest is the *Pál-völgy Cave* discovered in 1904; its total length nears 7 km after the 1980 excavations which makes it the third longest cave in Hungary. The network passage, covering an area of 500 × 350 m; contains fissure-like, relatively wide passages in Eocene limestone. Its typical formations include walls rich in spherical forms and metamorphosed "silicified" rock zones which stretch along the roof of the passages and shape peculiar cross sections. The largest amount of warm water precipitations are the calcite plates. It contains a relatively large amount of dripstone, unlike the rest of the Buda caves. The entrance section built for tourism has been a favourite destination for outings for decades.

The *Mátyás-hegy Cave* opening in the neighbouring quarry exists a mere 20—30 m away from the northeast termination point of the previously discussed system; the two most probably formed one large system at one time. The spatious ENE-WSW main passages, with the same forms as the previous cave, gradually sink deeper and deeper toward SE in accord with the slant of the rocks. The lowest level of the bare system of nearly 5 km length, lacking warm water precipitations and dripstones, exposes the Triassic cherty limestone base to the Eocene limestone. An intermittent river bed dissolved by the surface waters leads to a lake which marks the karst water level.

The *Szemlő-hegy Cave* was also discovered by quarrying in 1930. It was the first of the Buda caves whose profusion of precipitations in the shape of bunches of grapes and cauliflowers suggested its thermal water origin to specialists. Our typical warm water mineral accumulations such as the popcorn-calcites, cave cauliflower, and calcite plates were first described in this cave. The known length of the system is 2.2.km and constitutes two parallel wide main passages; its most spectacular sections were opened to the public in 1986.

The highest-lying system of Rózsadomb is the *Ferenc-hegy Cave* found while digging canals in 1933. Its maze of passages amounts in length to 4 km and covers a small area of 120 × 250 m. Its passages are fissure-like, relatively narrow, with some large spherical cavities on the upper level. Its walls abound in yellowish white bunches of popcorn-calcites some have been penetrated by later thermal water flows in form of "thermal water pipes".

The Buda cave richest in mineral accumulations is the *József-hegy Cave;* it was only discovered in

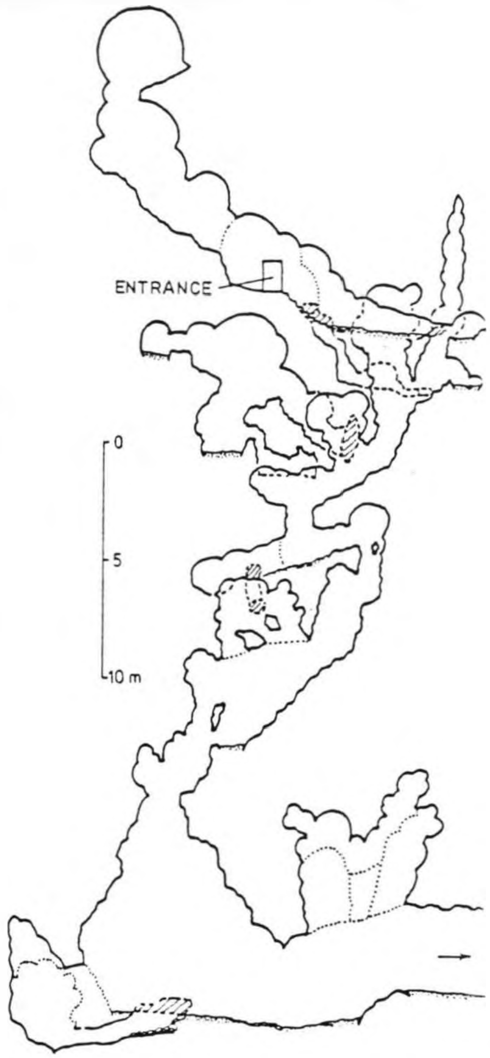


Fig. 6. Long-section of the Sátorkő-puszta Cave (by M. Juhász)

1984. This system consists of wide E-W passages and huge halls, large for caves of thermal water origin; it is 4.3 km long and was discovered during construction works. Its main passage level is some 50 m below the surface and is covered with a wealth of snowwhite gypsum, popcorn-calcites and fragile needle of aragonite; rare large gypsum crystals grow on the ceiling in addition to twining gypsum flowers and hair-thin gypsum threads. In order to protect its formations, the cave can only be researched and visited with special permission.

The only significant active thermal water cave of the mountain range is also in Rózsadomb. The air-filled upper entrance of the *Molnár János Cave* was already known in the last century, and divers explored some 400 m of its underwater stretches. The mixing of components of different temperatures can be demonstrated in the water of the spring cave feeding the Lukács bath.

At the northern edge of the Buda Mountains near Solymár, the *Solymári-ördöglyuk* (Devil's Hole) is the only large cave with a natural entrance. The spatial labyrinth of some 2 km length was carved in Triassic dachstein limestone; its spherical cavities and some areas of popcorn-calcites also indicate its thermal water origin. One of its chimneys was a sinkhole during the Pleistocene as evidenced by fossil bones found in the fill; in its lower rooms a mound of bat guano accumulated several meters high.

Another cave formed in dachstein limestone is the *Bátori Cave* with its opening on top of Mt. Hárs; it was known by neolithic man as demonstrated by the archaeological finds of its entrance hall. This small, 300 m long cave adorned with fine strings of spherical cavities and popcorn-calcites is of special cultural-historical interest. At one time ore mining occurred in some of its passages: in the Middle Ages and later in the 18th—19th centuries veins of high concentration iron and some silver and gold which derived from the dissolution of the ore content in the sandstone of the cover of the limestone were mined.

The genesis of the *Castle Cave* which stretches under the surface of the Castle Hill of Buda is unique: its caverns were carved by a younger generation of thermal springs in the lower level of freshwater limestone deposits of warm water origin. In the Middle Ages the residents of the Castle deepened the small, flat caves for use as cellars, and before World War II a continuous labyrinthine system was formed from them and other artificial cellars for use as air-raid shelters. Its total length is currently 3.3 km.

Pilis Mountains

The Pilis Mountains were built from Triassic carbonates and are attached to the Szentendre—Visegrád andesite mountain in the NE. Within them 150 caves are known today, all of them shorter than 500 m.

The most famous cave of the region is the *Sátorkő-puszta Cave* which opens near the mining town of Dorog. Discovered by quarrying in 1946, it is a typical cave of purely thermal water origin. A bizarre chain of spherical cavities constitutes the 350 m long cave as if we were inside a bunch of grapes. When it was discovered, its walls were covered by a profusion of popcorn-calcites, aragonite needles, and, mainly in the lower great hall, thick gypsum accumulations; unfortunately, by today several lootings have left the cave almost empty *(Fig. 6)*.

The longest known cave in the Pilis is the 403 m long *Legény Cave* opening at the foot of the escarpment of the Csévi cliffs. According to the archaeological finds, its wide entrance gave shelter to several prehistoric groups of people from the Neolithic age. Its chambers are connected by shafts and narrow passages into a maze. Its formations suggests that the original thermal water cave also functioned as a karstic spring cave at a time.

Gerecse Mountains

The karstic central mass of the Gerecse Mountains is made of Triassic carbonate rocks, in the south there is dolomite, giving gradually way to typical thick-layered dachstein limestone toward the north. Smaller areas of Jurrassic limestone and in patches Eocene and Pliocene-Pleistocene limestone can also be found here.

In the heavily broken fault-block mountain divided by basins filled with tertiary sediments no large cave system is known. Except for a few temporary sinkholes the caves are inactive due to the subsequent uplift and the sinking of the erosion base. As both warm and cold waters acted in the region in forming caves, the set of forms of the caves is widely varied. Especially due to research work in the past two decades the number of known caves exceeds 200 now.

Among the caves of thermal water origin in the Öreg-kő of Bajót, an outstanding archaeological site is the *Jankovich Cave* with its impressive entrance hall and wide chimney leading to the surface. Not far is the 40 m deep *Öreg-kő pothole no. 1*, in the lower room of which fine groups of barite crystals with several cm could be studied earlier.

The 500 m long multi-storeyed passage system of the *Pisznice Cave* in the central part of the mountain contains parallel horizontal passages and sizeable cupolas with spherical cavities. Earlier the cave housed a colony of several thousand bats, the guano was excavated in the 1870s.

North of Tatabánya, on the edge of Kő-hegy we find one of the region's archaeologically most intriguing caves, the 40 m long hall of *Szelim-lyuk*. The *Lengyel Cave* of a total length of 550 m and a depth of 73 m opens on the plateau of the mountain. In it the formations created by mixing corrosion can be studied well. The cave is infamous for its extremely high CO_2 content (up to 5.6%).

The deepest cave of the mountains was found in the Keselő-hegy quarry east of Tatabánya in 1976. The *Keselő-hegy Cave* is about 500 m long and 115 m deep. The walls of the fissure-like shafts and halls are at places adorned by fine aragonite crystals.

In the geological conservation area of the Kálvária-domb of Tata, a Mesozoic block rising like a horst from the younger sediments of the Tata—Bicske rift separated from the central mass of the Gerecse, is found the *Megalódusz Cave*. The main spectacle of the 260 m long and 23 m deep cave system, besides the blanket-like calcite coating, is the hundreds of Megalodus-shells petrified finely on the walls.

As coal mining in Tatabánya reduces the karst water level, the *Angyal-forrás Cave* and *Tükörforrás Cave* in Tata ran dry over the past few decades. The peculiarity of these two spring caves is that most of their passages were carved out in cemented Oligocene gravel.

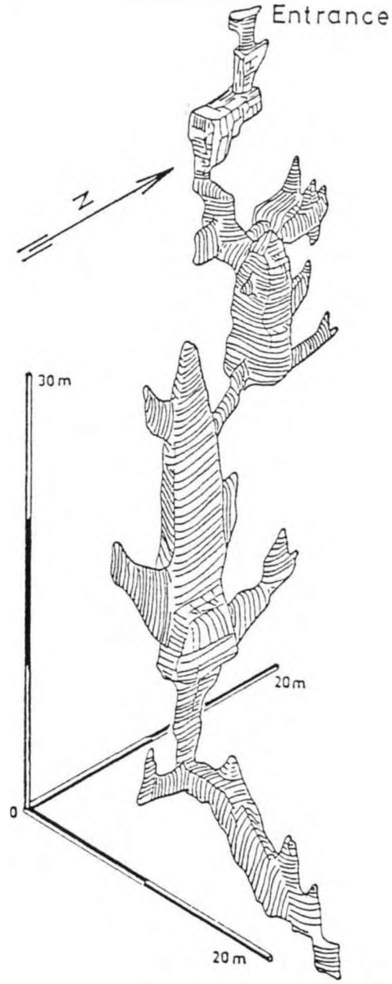


Fig. 7 Three-dimensional map of Csengő Shaft (by J. Kárpát)

Vértes Mountains

In the Vértes Mountains built mostly of Triassic dolomite only few and small caves were formed due to the resistance of the rock to karstification. Of the known 72 caves the largest is the 106 m long multilevelled *Gánt Cave*. Now inactive, it used to have a spring and now has interesting erosive and corrosive forms. Since the excavations of 1926 in the 90 m long *Csákvár Cave* it is famous for its paleontological finds all over Europe.

Bakony Mountains

The SW unit of the Transdanubian Mountain Range, the Bakony, with the Balaton Highland and the Keszthely Mountains attached to it from S—SW is the second karst region richest in caves. Now 580 caves are known here. Besides the carbonate rocks — Triassic limestones and dolomites as well as Jurrassic, Cretacean and Eocene limestones — the rate of non-karstifying rocks is also high in the geological composition of the mountain range. Most of the caves are small, inactive, slowly accumulating. The majority of the known active systems are sinkhole caves explored over the past 20 years; along the SE periphery inactive and active warm or tepid water caves can also be found.

The largest cave system of the Bakony is the *Alba Regia Cave* in the Tési Plateau covered by a thin layer of loess. Speleologists reached the cave by opening a temporary swallet. As a result of continuous exploratory work, its length is now in excess of 2,500 m, and at —200 m it is the country's third deepest cave. Its main passages with a typical flattened cross section, following the direction of the slanting of the lower Jurrassic limestone, form step-like levels at 10—20 m from each other. The investigation of the lower regions is hindered by the high CO_2 concentration up to 4%.

Several temporary sinkholes of the Tési Plateau continue in sinkhole caves, passable for man. These caves characterized by rows of vertical pits are called also "zsomboly" (shaft) here. So far the *Csengő Shaft* in the vicinity of Kistés has been explored to the greatest depth: its —134 m bottom reached in 1987 is closed off by a syphon of constant water. The typical plum-stone cross-section of the pits and the huge fault plane visible on the lower level suggests the structural preformation of the cave *(Fig. 7)*. Other shafts of the Tési Plateau reach down beyond 100 m: the 121 m deep *Jubileum Shaft* was discovered in 1981, the 105 m deep *Háromkürtő Shaft* in 1975.

The genesis and set of formation of the *Cserszegtomaj Well Cave* opened at a depth of 51 m in 1931 when digging for a well on the SW edge of the Keszthely Mountains go back to one-time hot springs and specific geological conditions. In the Pliocene a thick layer of sand settled on the karstified surface of the Triassic dolomite, which became cemented into impermeable sandstone over the times. The upsurging thermal waters dissolved the upper layer of the dolomite; the 2.3 km long horizontal crawlway maze filled with dolomite powder preserved the negative of the one-time dolomitic surface.

The present-day debourchure of these warm springs is in the *Héviz Spring Cave* opening 38 m below the surface of the Hévíz Lake, an internationally acclaimed spa at the foot of the mountain. Divers explored the spring cave in 1975 by gradually removing the debris accumulated at the bottom of the spring crater and overcoming the powerful current of the debourchure. Both the cold and warm karst springs coming from the dolomite well up on the muddy floor of the nearly spherical spring hall 17 m in diameter in the sandstone. The temperature on the west side is 40° C and on the east side 17° C.

The mixing of the welling-up warm and tepid waters and cold karst waters carved out mostly maze-like horizontal passage networks in the young Sarmatian limestone of the Tapolca Basin wedged amidst three parts of the mountain range. Well-diggers discovered *Tapolcai-tavas Cave* in 1902, which was soon opened to tourism. The exploration of its underwater sections began in 1957. Now the system is known to a length of 1 km. Some 150 m NW of the cave, below the town's municipal hospital, the similar but practically dry *Kórház (Hospital) Cave* has been successfully used to cure asthmatic patients.

The preventive reduction of the karst water level for the sake of bauxite mining some 25 km away has greatly affected the wet caves of the region: in Tapolca the water level sank by 2 m, at Hévíz a significant drop in temperature and yield can be seen.

Mecsek Mountains

In the complex geological composition of the Mecsek Mountains containing volcanic and sedimentary rocks nearly 100 caves are known, some of which are not of karstic origin. Apart from karstic patches, a sizeable karst can be found in the western pait of the mountain. This karst region mostly of middle Triassic limestone has intermittently active, shaft-like sinkholes and active spring caves with streams.

The largest and best-known cave of the area, the *Abaliget Cave*, a popular excursion site, is also used for speleotherapy. With a total length of 1,750 m, the active system consisting of a central passage and two side passages has spectacular corrosive and erosive forms, with fine dripstones in the Great Hall. Of its rich fauna, the Stenasellus hungaricus, the blind crab of Abaliget is the most famous.

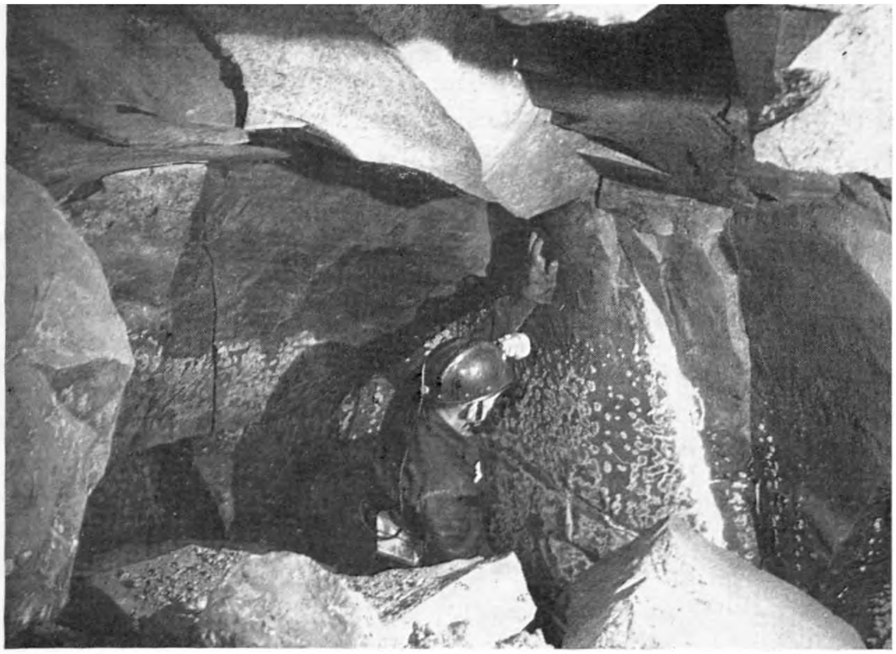
The springs of the 253 m long *Mánfa-kőlyuk* and the 150 m long *Vízfő Cave* of Orfű have been used for water supplies. The *Tettye* travertine cave formed partly naturally and partly artificially is found in freshwater limestone in the area of Pécs. Its voluminous spring is used to contribute to the town's water supplies.

Of the shafts, the *Jószerencsét Shaft* excavated to a depth of 52 m is worthy of note.

Villány Mountains

The southernmost mountain range of the country is the Villány Mountains consisting mostly of Triassic dolomite, Jurrassic and Cretacean limestones. Its most noted caves can be found in the Beremend block in the foreland of the mountain.

Quarrymen found dozens of caverns and pits of thermal water origian partly filled with tepid karst waters even today in the small limestone block rising a mere 50 m above the surrounding plain. The largest of them is the *Beremend Crystal Cave* opened in 1984. The intricate network of caverns stretching 700 m in length is adorned by spherical cavities, snowwhite popcorn-calcites and aragonite needles, and the rare milky white lumps of huntite. The fossil finds of the upper levels suggest that during its development the cave system reached the fill of a one-time open fissure. Similar filled up fissures containing fossils of chronological importance are known at other points of the mountain as well.



Mineral formations on the walls of Pula Basalt Cave (Photo: I. Gönczöl)

Non-karstic caves of Hungary

At present over 200 non-karstic caves are know in Hungary. They occur in almost all mountain regions of the country including mountains of volcanic rocks (basalt, andesite, rhyolite, geysirite, etc.) as well as of sandstone, conglomerate or calceomica. There are especially many in the Bakony (97) and the Mátra (21) Mountains.

Although Hungarian non-karstic caves cannot compete in size with karstic ones, as the largest of them *(Csörgő-lyuk)* is only 230 m in length, the variety of their genesis and of their base rock types makes this group of caves highly interesting.

There are some syngenetic caves in volcanic rocks, although on a small scale. The *Explóziós-üreg* (explosion cavity, 2 m) in the basaltic rock of the Castle-hill of Szigliget on the shore of Lake Balaton, or the *Sámsonházi-hólyagbarlang* (bubble cave of Sámsonháza, 3 m) are simple gas bubbles of regular shape. The underwater *Halász Árpád Cave* (72 m) in Kab Hill, a gas bubble series formed in the interval between two subsequent effusions is a more complex one. Caves formed by gas and steam explosions are also known to exist: the *Gödrös Explosion Cave* on the Tihany Peninsula (16 m), the *Kis-kő Cave* near the town of Salgótarján (30 m), the basalt cavity of *Baglyas-kő* (13 m) and the *Függő-kő Cave* at Mátraszőlős (3 m).

The proportion of postgenetic caves in Hungarian volcanic rocks is much greater. Part of them are linked to the edge of the plateaus formed by basalt on loose rocks and are created by the special denudation of such hills. A shortage of matter, brought about by the pressure of the basalt layer, underground linear erosion, karstification and deflation, results in the gradual collapse of the basalt rim and in the formation of caves. The best examples of these caves are found in the Bakony Mountains: *Remete Cave* (40 m) in Tátika Hill, *Pokol-lik* (51 m) in Bondoró Hill, *Vadlány-lik* (24 m) in Kovácsi Hill, but the only ice cave in Hungary, *Sárkány Cave* in Szentgyörgy Hill also belongs to this group.

Movement along fault lines and incasion created the largest non-karstic caves. *Csörgő-lyuk* (230 m) in the Mátra Mountains was formed in rhyodacite tuff, the *Pula Basalt Cave* (151 m) in the Bakony Mountains and the caves of Szilváskő-Rift in the Medves—Ajnácskő Mountain (with several caves of 20—50 m in a 300 m long, 5—10 m deep open rift) were created in basalt, while the three caves of Vasas cleft (total length: 58 m) in the Pilis Mountains was formed in andesite agglomerate.

Pseudocaves created by boulders falling on each other form only minor cavities in Hungary (in Kovácsi Hill, in Tátika Hill, in Kis-kő Hill, etc.)

Weathering produced only minor caves both in volcanic rocks and in sandstones, conglomerates. *Likas-kő* in the Velence Hills was formed in quartzite (this cave is the oldest recorded non-karstic cave from 1295); *Sziklakonyha* in Somló Hill was formed in basalt; the *caves of Kő-hegy* in the Kál Basin and those of Jakab Hill in the Mecsek Mountains came into being in sandstone, while the caves of Ajka Hill are in conglomerate.

Deflation produces eaves-like caves, like the *Nyereg-hegyi-eresz* on the borderline of basalt tuff and geysirite on the Tihany Peninsula, or the *Kő-lyuk* of Kishartyán formed in sandstone and later expanded by man in the Cserhát Mountains.

Geysirite caves comprise a genetically distinct group. They are partly syngenetic as regards the "lining" of their source pipe or the source cone embracing the central cavity, and partly postgenetic, regarding their dissolved niches and walls. There are over 40 geysirite caves recorded on the Tihany Peninsula. The most important ones are the *Spring Cave* in the centre of the village of Tihany, the spring cave of Csúcs-hegy and the cavities of Aranyház.

Mineral formations primarily occur in caves created in volcanic rocks. They are partly the various crystals of the minerals of the rocks encasing the caves, but partly are precipitations from solutions formerly occupying the caves or from infiltrating waters.

At present, research on non-karstic caves in Hungary is being carried out by a special team, the Volcano-Speleological Group of the Hungarian Speleological Society.

Katalin TAKÁCS-BOLNER
geologist
Institute of Speleology
Budapest
Attila út 111.
H–1012

István ESZTERHÁS
teacher
Isztimér
Köztársaság út 157.
H–8045

Márton JUHÁSZ
technician in geology
Institute of Speleology
Tatabánya
Csokonai út 13.
H–2800

Sándor KRAUS
geologist
Budai XI. Sportegyesület
Budapest
Ságvári Endre út 30.
H–1039

REFERENCES

ALMÁDY Z. (1988): A tatai Kálvária-domb és környékének karsztjelenségei. – *Karszt és Barlang, I. p. 3–14.*

BALÁZS D. (1961): A Szabadság-barlang. – *Karszt- és Barlangkutató, II. p. 61–75.*

DÉNES GY. (1961): A Meteor-barlang feltárása. – *Karszt- és Barlangkutató, II. p. 83–85.*

DÉNES GY. (1977): The Caves of Hungary. – *Karszt és Barlang, Spec. Issue, p. 19–26.*

DUDICH E. (1932): Az Aggteleki-cseppkőbarlang és környéke. – *Bp.*

FABER L. (1977): Új barlang a Gerecsében. – *Karszt és Barlang, p. 67.*

GÁBORI M. (1977): Archeological Results of Investigation in Hungarian Caves. – *Karszt és Barlang, Spec. Issue, p. 43–48.*

GÖNCZÖL I. (1986): A Vértes-hegység barlangkataszteri felmérése. – *Karszt és Barlang, II. p. 115–118.*

HAZSLINSZKY T. (1981): Abaligeti-barlang. – *Tájak Korok Múzeumok kiskönyvtára, 77.*

HAZSLINSZKY T. (1981): Anna- és István-barlang. – *Tájak Korok Múzeumok kiskönyvtára, 90.*

HAZSLINSZKY T. (1985): Die Höhle von Szemlő-hegy. – *Tájak Korok Múzeumok kiskönyvtára, 204 A.*

HEGEDŰS F.–SZLABÓCZKY P. (1979): A Miskolc-Tapolcai-barlangfürdő geológiai felmérése. – *Karszt és Barlang, p. 13–16.*

HORVÁTH GY. (1974): Újabb feltárások a Tapolcai Tavas-barlangban. – *Karszt és Barlang, II. p. 65–68.*

JAKUCS L.–KESSLER H. (1962): A barlangok világa. – *Sport, Bp.*

JAKUCS L.–DÉNES GY. (1975): Aggteleki karsztvidék. Útikalauz. – *Sport, Bp.*

JUHÁSZ A. (1962): A Létrástetői-barlang. – *Karszt és Barlang, II. p. 45–50.*

JUHÁSZ M. (1986): A Pisznice-barlang megismerésének története. – *Karszt és Barlang, II. p. 105–114.*

KALINOVITS S. (1984): Molnár János-barlang. – *Magyarország barlangtérképei, 5.*

KÁRPÁT J. (1981): Újabb feltárások a Bakonyban. – *Karszt és Barlang, p. 56–57.*

KÁRPÁT J. (1981): Cserszegtomaji-kútbarlang. – *Magyarország barlangtérképei, 1.*

KÁRPÁT J. (1982): Alba Regia-barlang. – *Magyarország barlangtérképei, 2.*

KÁRPÁT J.–TAKÁCSNÉ BOLNER K. (1983): Pál-völgyi-barlang. – *Magyarország barlangtérképei, 3.*

KÁRPÁT J. (1986): Jávorkúti-víznyelőbarlang. – *Magyarország barlangtérképei, 6.*

KESSLER H. (1985): Pálvölgy Cave. – *Tájak Korok Múzeumok kiskönyvtára, 39 A.*

KOLLÁR K. A. (1979): Az esztramosi Rákóczi-barlangok víz-alatti részeinek kutatása. – *Karszt és Barlang, p. 17–20.*

KORDOS L. (1984): Magyarország barlangjai. – *Gondolat, Bp.*

KÓSA A. (1963): A szögligeti Rejtek-zsomboly. – *Karszt és Barlang, II. p. 66–70.*

LEÉL-ÖSSY S. (1954): A Magas Bükk geomorfológiája. – *Földr. Ért., III. 2. p. 350–354.*

LEÉL-ÖSSY S. (1954): A pilisi Legény- és Leány-barlangok. – *Földr. Ért., III. 3. p. 594–602.*

LÉNÁRT L. (1976): Tektonikai vizsgálatok a Létrási-Vizes-barlangban és környezetében. – *Karszt és Barlang, p. 9–14.*

LÉNÁRT L. (1981): Adalékok a lillafüredi mésztufabarlangok kutatásához. – *Karszt és Barlang, p. 1–8.*

OLASZ J. (1976): Az ország legnagyobb dolomitbarlangja: a Fekete-barlang. – *Karszt és Barlang, p. 57–58.*

RÓNAKI L. (1970): Vízfő-forrás és barlangjának kutatása. – *Karszt és Barlang, I. p. 25–30.*

SÁRVÁRY I. (1969): A Létrás-Istvánlápai-barlangrendszer. – *Karszt és Barlang, II. p. 53–56.*

SZABÓ P. Z. (1961): A Mecsek és a Villányi-hegység barlangjai. – *Karszt- és Barlangkutató, I. p. 3–20.*

SZENTHE I. (1970): Sikeres feltáró eredmények a Vecsembükki-zsombolyban. – *Karszt és Barlang, I. p. 15–16.*

SZÉKELY K.–TARDY J. (1985): Vár-barlang. – *Tájak Korok Múzeumok kiskönyvtára, 224.*

SZILÁGYI F. (1982): A Baradla rövid-alsó-barlangjának feltárása. – *Karszt és Barlang, II. p. 65–70.*

VAJNA GY. (1973): A rejtélyes Bátori-barlang. – *Gondolat, Bp.*

VARGA CS. (1978): Az Odor-vári Hajnóczy-barlang. – *Karszt és Barlang, p. 7–10.*

VIDICS Z.-né (1983): Új feltárás a Danca-barlangban. – *Karszt és Barlang, p. 19–24.*

(For the caves of thermal water origin see p. 38)

THE LONGEST CAVES OF HUNGARY

	Length in meters 1977.	1988.	Geographical setting
1. BARADLA—DOMICA CAVE SYSTEM	25,000	23,916	Aggtelek Karst
2. BÉKE CAVE	8,743	8,743	Aggtelek Karst
3. PÁL-VÖLGY CAVE	1,200	6,753	Buda Mountains
4. MÁTYÁS-HEGY CAVE	4,200	4,770	Buda Mountains
5. JÓZSEF-HEGY CAVE	—	4,300	Buda Mountains
6. ISTVÁN-LÁPA CAVE	2,940	4,100	Bükk Mountains
7. FERENC-HEGY CAVE	4,000	4,000	Buda Mountains
8. LÉTRÁSI-VIZES CAVE	2,200	2,900	Bükk Mountains
9. SZABADSÁG CAVE	2,717	2,717	Aggtelek Karst
10. ALBA REGIA CAVE	925	2,560	Bakony Mountains
11. BOLHÁS SINKHOLE-CAVE	510	2,500	Bükk Mountains
12. CSERSZEGTOMAJ WELL-CAVE	800	2,300	Keszthely Mountains
13. HAJNÓCZY CAVE	1,234	2,250	Bükk Mountains
14. SZEMLŐ-HEGY CAVE	1,962	2,201	Buda Mountains
15. SOLYMÁRI-ÖRDÖGLYUK CAVE	2,000	2,000	Buda Mountains
16. ABALIGET CAVE	991	1,750	Mecsek Mountains
17. LÉTRÁS-TETŐ CAVE	1,660	1,500	Bükk Mountains
18. DANCA CAVE	—	1,390	Aggtelek Karst
19. BORÓKÁS No. 4 SINKHOLE-CAVE	1,000	1,000	Bükk Mountains
20. FEKETE CAVE	1,000	1,000	Bükk Mountains
21. VASS IMRE CAVE	1,000	1,000	Aggtelek Karst
22. BARADLA ALSÓ CAVE	400	1,000	Aggtelek Karst
23. DIABÁZ CAVE	533	1,000	Bükk Mountains
24. TAPOLCAI-TAVAS CAVE	1,000	1,000	Balaton Highland
25. JÁVOR-KÚT SINKHOLE-CAVE	907	906	Bükk Mountains
26. KOSSUTH CAVE	633	800	Aggtelek Karst
27. VIKTÓRIA CAVE	800	800	Bükk Mountains
28. ISTVÁN CAVE	350	711	Bükk Mountains
29. BEREMEND CRYSTAL-CAVE	—	700	Villány Mountains
30. MEXIKÓ-VÖLGY SINKHOLE-CAVE	700	700	Bükk Mountains
31. METEOR CAVE	500	650	Aggtelek Karst
32. KÓRHÁZ CAVE	380	640	Balaton Highland
33. SZABÓ-PALLAG SHAFT	—	628	Aggtelek Karst
34. VÉNUSZ CAVE	600	600	Bükk Mountains
35. LENGYEL CAVE	400	550	Gerecse Mountains
36. KESELŐ-HEGY CAVE	260	500	Gerecse Mountains
37. PISZNICE CAVE	247	500	Gerecse Mountains
38. SZELETA SHAFT	—	500	Bükk Mountains
39. SZIRÉN CAVE	500	500	Bükk Mountains
40. KŐ-LYUK CAVE	350	484	Bükk Mountains
41. HARCSASZÁJÚ CAVE — BAGYURA CAVE	225	440	Buda Mountains
42. MOLNÁR JÁNOS CAVE	351	414	Buda Mountains
43. NASZÁLY SINKHOLE-CAVE	—	407	Cserhát Mountains
44. LEGÉNY CAVE	350	403	Pilis Mountains
45. EZÜST-HEGY No. 3 CAVE	400	400	Pilis Mountains
46. KECSKE-LYUK CAVE	400	400	Bükk Mountains
47. SZAMENTU CAVE	400	400	Bükk Mountains
48. KOPASZGALY-OLDAL No. 2 CAVE	350	350	Aggtelek Karst
49. LÁNER OLIVÉR CAVE	—	350	Bükk Mountains
50. SÁTORKŐ-PUSZTA CAVE	350	350	Pilis Mountains
51. VÁR-TETŐ CAVE	—	350	Bükk Mountains
52. BÁTORI CAVE	300	339	Buda Mountains
53. EDERICS CAVE	—	338	Keszthely Mountains
54. KIS-KŐHÁT SHAFT	—	330	Bükk Mountains
55. RÁKÓCZI CAVE No. 2	200	324	Aggtelek Karst
56. BALEKINA CAVE	—	300	Bükk Mountains
57. PÉNZ-PATAK SINKHOLE-CAVE	221	300	Bükk Mountains
58. SPEIZI CAVE	—	300	Bükk Mountains

THE DEEPEST CAVES OF HUNGARY

	Depth in meters *1977.*	*1988.*	*Geographical setting*
1. ISTVÁN-LÁPA CAVE	243	250	Bükk Mountains
2. VECSEM-BÜKK SHAFT	245	235	Aggtelek Karst
3. ALBA REGIA CAVE	210	200	Bakony Mountains
4. NASZÁLY SINKHOLE-CAVE	60	171	Cserhát Mountains
5. LÉTRÁS-TETŐ CAVE	166	166	Bükk Mountains
6. FEKETE CAVE	140	163	Bükk Mountains
7. DIABÁZ CAVE	153	153	Bükk Mountains
8. CSENGŐ SHAFT	—	134	Bakony Mountains
9. METEOR CAVE	132	131	Aggtelek Karst
10. BÁNYÁSZ CAVE	130	130	Bükk Mountains
11. PÉNZ-PATAK SINKHOLE-CAVE	128	128	Bükk Mountains
12. BOLHÁS SINKHOLE-CAVE	80	125	Bükk Mountains
13. JUBILEUM SHAFT	—	121	Bakony Mountains
14. SZABÓ-PALLAG SHAFT	130	120	Aggtelek Karst
15. TOKOD-ALTÁRÓ No. 1 CAVE	—	120	Gerecse Mountains
16. HAJNÓCZY CAVE	117	117	Bükk Mountains
17. BARADLA—DOMICA CAVE SYSTEM	116	116	Aggtelek Karst
18. KESELŐ-HEGY CAVE	115	115	Gerecse Mountains
19. KIS-KŐHÁT SHAFT	110	114	Bükk Mountains
20. BORÓKÁS No. 2 SINKHOLE-CAVE	110	110	Bükk Mountains
21. KOPASZGALY-OLDAL No. 2 CAVE	110	110	Aggtelek Karst
22. MÁTYÁS-HEGY CAVE	106	108	Buda Mountains
23. HÁROMKÜRTŐ SHAFT	105	105	Bakony Mountains
24. PÁL-VÖLGY CAVE	—	104	Buda Mountains
25. JÓZSEF-HEGY CAVE	—	103	Buda Mountains
26. BORÓKÁS No. 4 SINKHOLE-CAVE	102	102	Bükk Mountains
27. SPEIZI CAVE	96	96	Bükk Mountains
28. JÁVOR-KÚT SINKHOLE-CAVE	112	94	Bükk Mountains
29. NAGYKŐMÁZSA-VÖLGY SINKHOLE-CAVE	94	94	Bükk Mountains
30. ALMÁSI SHAFT	93	93	Aggtelek Karst
31. LÉTRÁSI-VIZES CAVE	85	90	Bükk Mountains
32. VÁR-TETŐ CAVE	90	90	Bükk Mountains
33. BALEKINA CAVE	—	89	Bükk Mountains
34. BARADLA-TETŐ SHAFT	—	89	Aggtelek Karst
35. SZELETA SHAFT	110	87	Bükk Mountains
36. MEXIKÓ-VÖLGY SINKHOLE-CAVE	80	80	Bükk Mountains
37. RÁKÓCZI CAVE No. 1	87	79	Aggtelek Karst
38. TEKTONIK SHAFT	76	76	Aggtelek Karst
39. REJTEK SHAFT	74	74	Aggtelek Karst
40. LENGYEL CAVE	73	73	Gerecse Mountains
41. TÁBLA-VÖLGY CAVE	78	73	Bakony Mountains
42. CSIPKÉS SHAFT	75	73	Bakony Mountains
43. LÁNER OLIVÉR CAVE	—	72	Bükk Mountains
44. REMÉNY SHAFT	70	70	Mecsek Mountains
45. KESELŐ-HEGY No. 11 CAVE	—	70	Gerecse Mountains
46. LEGÉNY CAVE	—	63	Pilis Mountains
47. HÁRMASKÚT SINKHOLE-CAVE	—	62	Bükk Mountains
48. VÉRTES LÁSZLÓ CAVE	56	62	Gerecse Mountains
49. BORÓKÁS No. 3 SINKHOLE-CAVE	55	60	Bükk Mountains
50. EZÜST-HEGY No. 3 CAVE	60	60	Pilis Mountains
51. ÚTMENTI SINKHOLE-CAVE	60	60	Bükk Mountains