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FIELD TRIP GUIDE

E 5

The caves on the Tés plateau and in the Bakony Mountains

10th INTERNATIONAL CONGRESS OF SPELEOLOGY
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1989 UIS

E 5

THE TÉS PLATEAU AND THE CAVES OF THE BAKONY MOUNTAINS

(Field-trip guide)

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C O N T E N T S

1. GENERAL INTRODUCTION

1.1 Geological Features of the Bakony Mountains

The Bakony Mountains are the largest in Hungary, their area is about 4000 square kilometres. The crests are 300 to 700 metres high. There are no high rocky cliffs, snow-covered peaks - but it is abundant in dense forests covering plateaus, steep flanks and deep valleys.

Most of the rock types building up the ranges are of sedimentary origin (limestone, dolomite, sandstone, conglomerate, loess), volcanic rocks are less common (basalt, basalt-tuff). The outcropping rocks are older along the shore of Balaton and become younger with increasing distance. Palaeozoic rocks are found close to Lake Balaton (Silurian and Devonian shales, and Permian limestone). Mesozoic rocks build up the central and most important parts of the ranges. From this geological epoch a continuous and complete sequence of the rock types is present in the Bakony Mts. Of rather large extent are the Triassic dolomites and limestones and from their main masses - to the north and in many smaller spots - are Jurassic and Cretaceous limestones and marls. The rocks of the Cainozoic era are covering mainly the NW parts of the Bakony (about one third of the total area), forming large "bays", and "islands" - since the uplift of the mountains occurred during this period. Characteristic are the Eocene limestones, the Miocene sandstones, gravels, conglomerates and in the western parts of the ranges Sarmatian limestones. From the age of the shallow Pliocene fresh-water lake period sediments: clay, and sand strata are preserved. At the boundary of the Pliocene-Pleistocene epoch basalt volcanic activity has begun, forming about hundred smaller or larger cones, crests, and blankets and leaving behind from the active period a number of geyserite cones of hydroquarzite.

After marine sedimentation, the Bakony Mountains began to be uplifted during the Alpine orogenic period. The "wedge-structure horst" uplift was interrupted by several phases of regression and lasts still in the present too. A significant part of the mountains became monadnock-like during its uplift. Single blocks are separated by rifts, along which the members were not uplifted evenly. Through faults volcanic activity took place, and geysers also erupted there, and even today thermal and CO2 containing waters emerge along the tectonic lines.

The features of the Mountains are characterised by karstic processes: on the plateaus there are several swallow-holes, but only a few dolines appear and under the surface caves of different type and dimension are found. Peculiar pseudokarstic forms are seen on the basalt plateaus.

1.2 Caves of the Bakony Mountains and their exploration

The Bakony Mountains are one of the richest in Hungary with regard to caves. By the end of 1988 681 caves had been known in this area.Most of them are developed in limestone, dolomite and are of karstic origin (most of them were formed by cold water dissolving, part of them are of thermal-water origin). A considerable number of caves (40 occur in basalt - mainly formed by postgenetic factors, but sygenetic origin is also characteristic). Further, we also know about 41 smaller cavities formed in geyserit by alkaline leaching

BAKONY

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Sokoró
Öreg-Bakony
MÓR
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CELLDÖMÖLK
SPELEOCAMPING - TÉS
Tési-fennsík
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SZÉKESFEHÉRVÁR
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Déli-Bakony
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out. There also exist caves in the Bakony within conglomerate and sandstone.

Cave formation has begun already after the emergence from the sea. During mining activities karstic surfaces were excavated in the surroundings of Urkút village - being the relicts of Cretaceous age karstic processes - called "Palaeokarst of Urkút.

Most of the caves are found on the Tés Plateau, in the Ördög-árok gorge and the Tihany Peninsula. The largest caves are: the Alba Regia Cave in Isztimér (3000 metre long), the Cserszegtomaj Well Cave (2300 m), Tapolca Lake Cave (1010 m); the deepest ones are: the Alba Regia Cave (-200 m), the Csengő shaft Cave (-134 m), the Jubileum Shaft Cave - Tés (113 m).

The caves of the mountain were already known centuries ago as shown by the archaeological finds discovered in them. The Odvaskő Cave - the first one referred to in a written document (in 1037) - is also in the Bakony Mts. Mátyás Bél - in his 1736 description - mentioned briefly several karstic and basalt caves. The scientific research of the caves of the Bakony Mts. began in 1935, due to the activity of Károly Bertalan. Cave exploration prospered very well during the 1970s and 1980s. During this time the largest caves of the Bakony Mountains were discovered and thus the number of the known caves tripled. There was a considerable advance in the dating of cave fills, in karsthydrology, climatology, cave-therapics, speleo-biology, volcano-speleology - a great number of publications were published. Recently five speleo-clubs (-groups) are active (namely: Acheron, Alba Regia, Bakony, Cholnoky and T. Heliktit), and a Volcan-speleological Community and some free-lance researchers work in the area.

1.3 Speleo-camping

The Research Station of the Alba Regia Speleo Club is in Csószpuszta village on the Tés Plateau, the part richest in caves within the Bakony Mts. The establishment is able to serve all the demands of the Group and it is capable of receiving some guests too, but not able to accommodate large numbers of visitors.

For national and international speleo-meetings a temporary camping site is usually organised. In about 100 metres distance form the Station an about 2000 square-metre grossland offers space for camping. The area is roughly triangular, on one side the road to Tés is on the margin the other side borders on the gardens of Csószpuszta and the third is forested; in the center of the site there is the Dobos-hegy Cave entrance - with N° 43 swallow-hole. The lakes in the vicinity of the camp must not be used for bathing!

The site of the speleo-camp is easily accessible by car; a pored road is passing by (the distance from Budapest is 100 km from Várpalota 12 km). The camp can be approached from three directions via dirt-roads. Driving is only problematic under extreme weather conditions. The distance is about 100 to 150 m. Within the camp tents and caravans can be placed together with the cars.

For camping about 1000 squares metres are available, thus 70 to 100 persons can have comfortable conditions but if necessary 250 to 200 persons can be received. In the centre an area will be held free of tents and cars - this will be the site for camp-fire and collective events. On the E side under the large trees in information etc. and a buffet tent; in the N corner toilets and

SPELEOCAMPING – TÉS

1.3

in the SE the lavatories. Electricity supply comes temporarily from the research station (which is sufficient for illumination, sound-technics, projectors, but not for the caravans) water-supply is also provided from the house - for drinking and general purposes. In case of emergency first-aid and cave-rescue are also at disposal in the house.

In a distance of 2 km is located the centre of the village Tés (with shops for food, drinks, post-office, etc.), 12 km Várpalota town (department store, hospital, hotel, tank-station, service for cars, etc.) and these settlements can be reached walking and also by bus or car.

1.4 Programme for the Congress Tours

Monday

8 00 Breakfast in Budapest
8 30 Leave for the Bakony Mountains, Csőszpuszta
11 00 Accommodation in the speleo-camp
12 30 Lunch in the camp
14 00 Tours on the surface and the caves of the Tés Plateau (Alba Regia cave, Bongó chimney, Csengő, Jubileumi and Háromkürtő chimneys)
20 00 Supper in the camp

Tuesday

8 00 Breakfast in the camp
9 00 Tours in caves and on the surface (for those, who have not had the opportunity to visit the caves the previous day, because of descends organised in small groups)
15 00 Lunch in the camp
16 00 Walk in the village Tés (sight-seeing: old wind-mills, industrial historical monuments)
19 00 Supper in the camp
21 00 Camp-fire

Wednesday

8 00 Breakfast in the camp
9 00 Tours on the surface and in caves (in successive groups)
15 00 Lunch in the camp
16 00 Free programme: projecting of slides, films etc.
19 00 Supper in the camp
21 00 Camp-fire

Thuersday

7 00 Breakfast in the camp
8 00 Start: visit at the by thermal-water formed caves of the Bakony Mts. (cca. 320 kms as a round-trip, by bus)
10 00 Tapolca Lake Cave and Hospital Cave
12 00 Keszthely, visit: Festetics Palace Museum
13 00 Lunch in Keszthely
14 30 Cserszegtomaj: Well Cave tour
17 00 Hévíz thermal water lake - swim in the lake
18 30 Return to Csőszpuszta
20 30 Supper

Friday

7 00 Breakfast in the camp

8 00 Leave for visit to the caves formed in volcanic rocks in the Bakony Mts. (about 300 kms by bus)

9 30 Kapolcs: Pokol-lik Cave

11 00 Pula: Cave in basalt

14 00 Lunch in Nagyvázsony

15 00 Swimming in the Lake Balaton - in Zánka village

17 00 Walk: Tihany Peninsula - geyser-cones, geyserite cavities and sight--seeing: historical- and folk-art Museums

19 00 Return to Csőszpuszta

20 00 Supper

Saturday

8 00 Breakfast in the camp

9 00 Tours on the surface and in caves - continuation of the above mentioned programmes

15 00 Lunch in the camp

16 00 Free programme: walks, sight-seeing in Várpalota, Székesfehérvár,cleaning of equipment

19 00 Supper in the camp

21 00 Camp-fire

Sunday

8 00 Breakfast

9 00 Departure from the camp - preparations, packing

12 00 Lunch in the camp

14 00 Farewell and leave for Budapest

2. THE TÉS-PLATEAU

2.1 Speleological research and karst exploration

György Gyurkovits was the first, to mention in a written form caves on the Plateau - he was a cdoperator in the county, of Mátyás Bél; he mentioned the Ördöglik Cave in Bakonynána in one of the years before 1736.

Before the foundation of the Alba Regia Speleological Group only 21 smaller caves were registered in the area of the Plateau (most of them in consequence of the activities carried-out by Károly Bertalan) - today as a total 114 caves are known on the Plateau, several of these exceed the depth of hundred metres Alba Regia Cave with a length of 3 kilometres is the longest in the Bakony Mountains.

The members of the Alba Regia Speleo Club set an aim: to explore the caves of the Tés Plateau in a complex speleological- and karstmorphological manner. One condition of the success of such activities was the establishment of a permanent research-base. In 1965 we got the propriety of the recent house and. since then a continuous developing and broadening took place. Thus our Station offers accommodation, vestuary, lavatories, an exhibition room, chemical- and biological lab, a mechanical workshop, a garden and several other outfits (the total area being 1700 m^2) and at the same time it is also the centrum of the cave rescue-team.

A TÉSI-FENNSÍK

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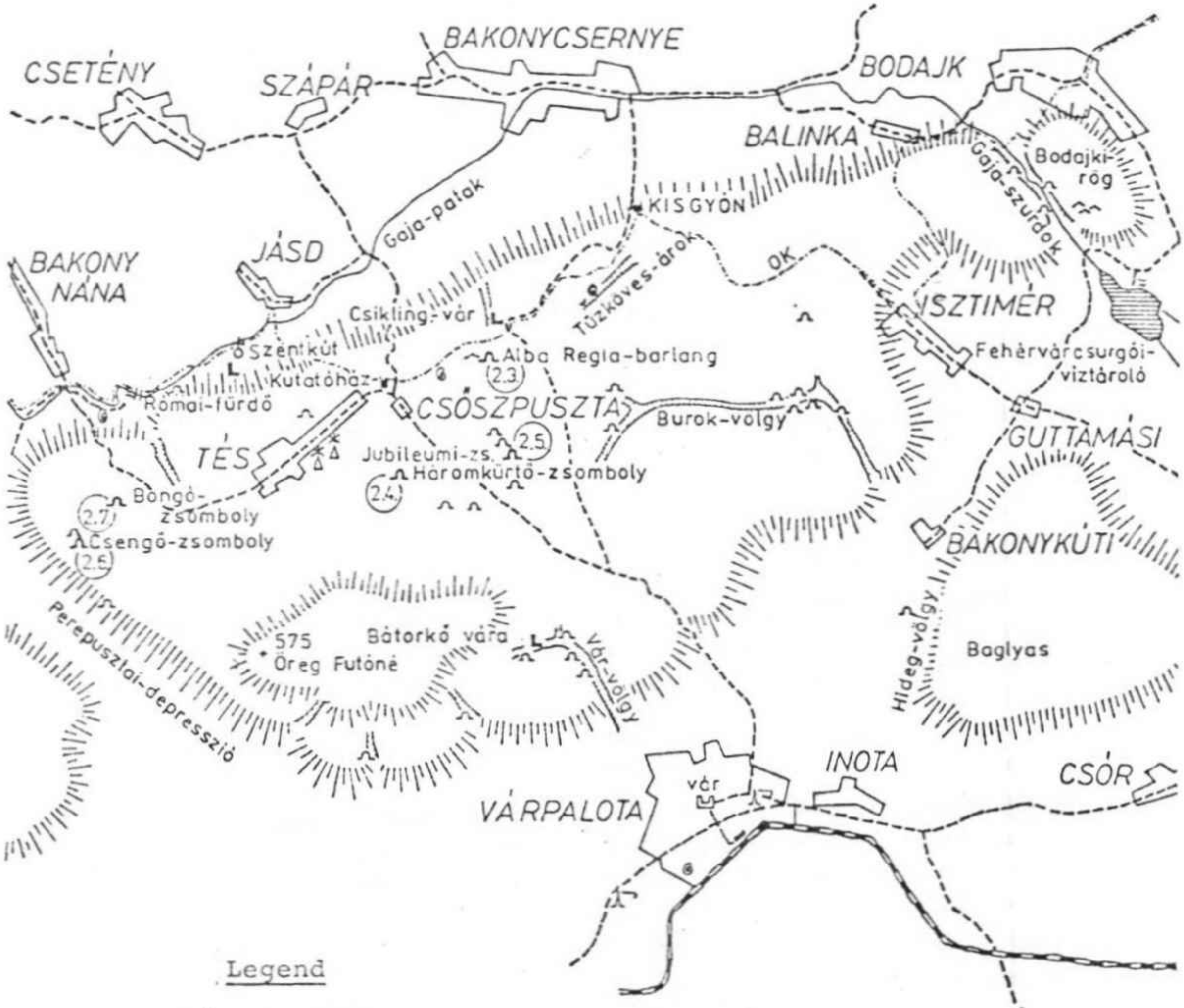


Legend

- waterfall
- geological exposure of special interest
- burial mound
- beach
- windmill
- filling station

Our wide-ranging activity is basically centred on the exploration of caves. As a consequence of our activities more than hundred caves became known on the plateau (not to mention other caves discovered in the broader surroundings of the area). The discovery of the large caves refuted former opinions - according to which there cannot be large caves in the Bakony Mts.About all the caves discovered a thorough description was prepared. From the very beginning of the activities of our group we are carrying out a variety of hydrological investigations, including field-work and lab tests. A continuous part of our activity is the increasing of the number of our instruments - by purchasing and also by constructing new ones. Of importance are also the biological research works - along which 293 species of cave-dwelling animals were found in caves and by a specific method more-and-more cave micro-fungi are bred for specification purposes. We are also involved in speleo climatology and radiation measurements, rock, mineral and soil analysis, volcano-speleology (the latter one is naturally not limited to the Tés Plateau).

For collecting experience we toured in most of the cave-bearing areas of Hungary and several caves abroad. All we know is ditrsibute with pleasure among our visitors; we hold lectures popularising caving, and publish in scientific- and popular-science bulletins.

2.2 Sites to be visited and how to reach these from Csőszpuszta

Wind-mills: This industrial monument is in the center of Tés, just behind the house Táncsics street 17; it is called Held mill. Another mill is behind the house No.32 in the same street - called Őzi mill, but it is not open for visits. Access: on the main paved road, distance 2.5 km.

Szent-kút: In a distance of 800 m, from Jásd village, direction NW,on the right-hand side of the Gaja stream - it is a famous chapel for pilgrimage,built close to a karstic spring. Open-air Masses are held here; in the park: an exceptionally fine statue of the Holy Virgin. To the W in a distance of about 250 m: is an Early Iron-age motte and mound. Szent-kút is on the blue-indicated touring-route, the distance from Tés: is 4.5 km.

Csikling-vár (fortress) W of Isztimér strongly destroyed ruins of a castle. Hardly anything is known about its history. To the N in the valley - the ruins of a very old settlement and to S close to the forest lonely burial mounds are found. Distance from Tés: is 3 km - walk alone the blue-labeled tourist path to the Hamuház hunters' hut and then "blue L".

Bátorkő-vár: In the surroundings of Várpalota (N), the valley is rich in small caves, niches (they number 19). The ruins of the romantic castle stand on the top of a cliff. Very little is known about its history.Walk along the main road to the Királyszállás bus stop, then red cross indicated path, distance 7.5 km.

Római-fürdő (Roman baths): Although formed entirely by nature. E of Bakonynána village, in the valley of the Gaja stream's gorge. From the waterfall and rock-pool there is the Savanyú Jóska Cave (the "Robin Hood of the Bakony Mts.") in a distance of only 200 m, along a path. Upstream of the stream, on the right-hand side the well-maintained dirt road leads to the outcrop of Middle Cretaceous rock. Road: blue sign, distance 6 km.

Burok-valley: In the surroundings of Isztimér: the longest of the Bakony Mts. Its length is 12 km. It is actually a very scenic open anticline flanked by steep sides and with 38 small caves. It is a protected area - because of its geological and botanical values. The upper end of the valley can be reached by walking first to the Királyszállás bus-station and then on a paved road through the forest - distance is 6 km.

Tüzköves-árok: It is a well-known Jurassic rock outcrop in the surroundings of Bakonycsernye. From the quarry 117 ammonites (among these 41 new specise) were described by Gy. Prinz. Even today very atractive fossils can be collected on the site. On the blue sign distance: 5 km.

Gaja-gorge: It is the 3 km long part of the canyon. It is an extremely attractive landscape and there are 14 caves within it. The path runs along a game protection area - where many boars, deers and moufflons are found. At the lower end of the valley a storage lake is well-suited for fishing and swimming too. Road: blue-labeled to the Bodajk Pioneers' Camp and the main road. Distance is 19 km.

2.3 Alba Regia Cave (3000 m long, 200 m ceep)

In the surroundings of Isztimér village, 600 m to the S from the Hamuház hunters'hut, on the W plateau of the Köves-domb (hill) there are two entrances separated by 60 m. Both of the entrances are locked by iron bars. The cave was formed in Triassic- and Jurassic limestone; it is a swallow-hole cave having temporarily active sinkholes. Most of the passages are inclined by 20 to 25 °. It ranks third in Hungary - by its depth and the largest in the Bakony Mts.

The cave is rather wet and muddy, the very narrow passages cannot be avoided by any of the tours within - thus use sturdy water-proof and durable robes. In the few vertical parts there are built-in ladders so no ropes are required for the visit. In the parts lower than the so-called Kupola-hall: the CO_2 content of the air is 3 to 4 per cent.

Within the cave four different tours might be recommended:

1. Short-tour between the entrance in ploughland and Zeus' Heart section: - it passes through the about 120 m long passage rich in dripstone formations and descending to a depth of about 45 m. Required time for the tour: approximately 1 hour.

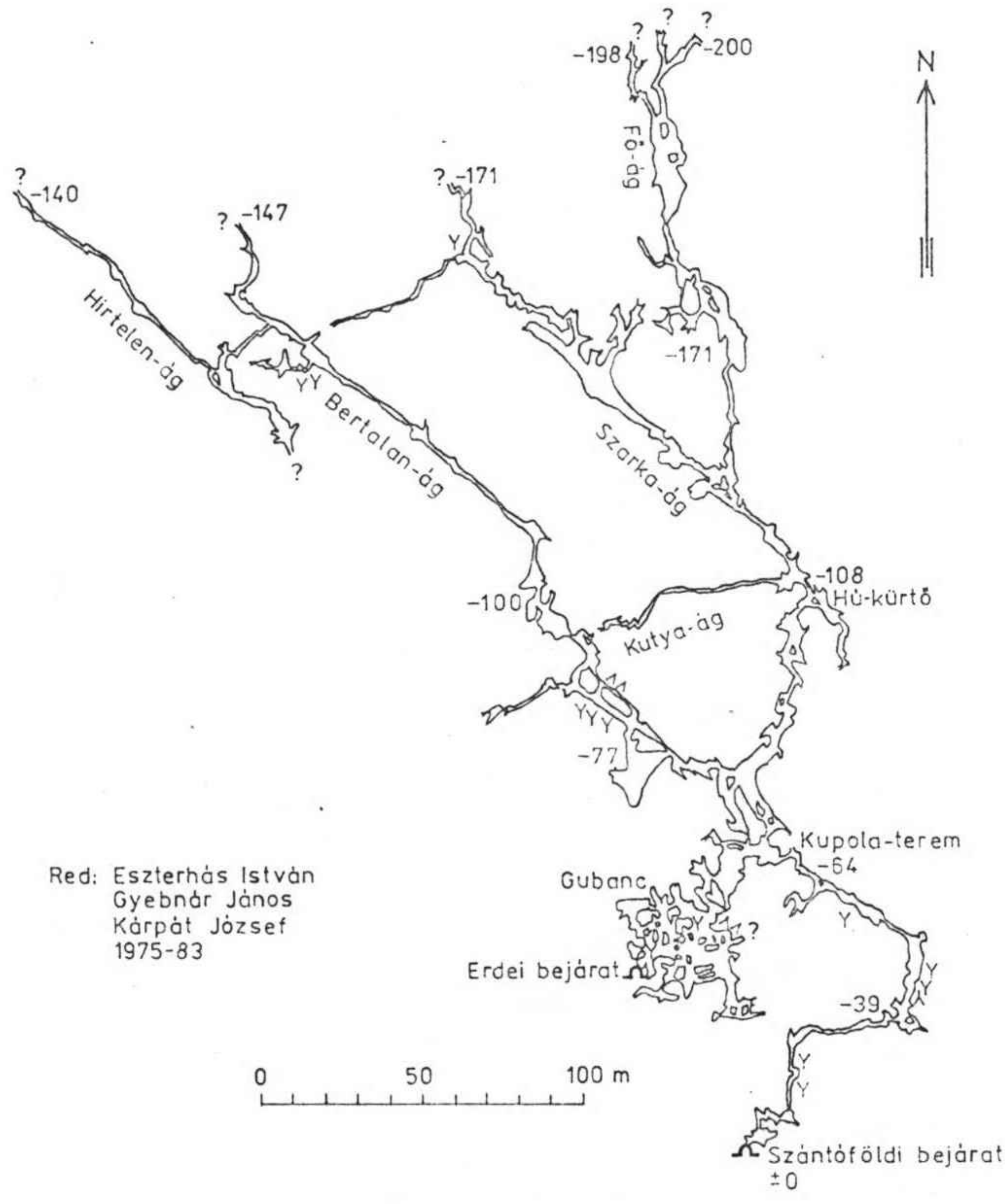
2. Entrance in the forest to the Kupola-hall and to the exit in ploughland - medium long tour: the most spectacular parts of the cave will be visited. After the entrance shaft a very complex three-dimensional "labyrinth" or maze follows. There are dripstones too, but the most amazing part of the visit is the extremely sophisticated passage-system itself. From the maze one comes to the deepest point of the tour: the Kupola-hall - which is reached through the Maze of Collapes broad slopes (-64 m). From this point we carry on towards the other entrance, ascending by crossing the mostly mud-smeared U-shaped syphon, and the Oblique-hall. Then we come to the Dripstone-corridor and Zeus' Heart. From this site we follow the route described in tour 1 - up to the exit. The time necessary for the tour: about 2 hours.

3. Entrance in the ploughland through the Kupola-hall to the right-hand end of the cave - long tour: it will lead to the deepest part of the cave, and

ALBA REGIA – BARLANG

plan

2.3.



Red: Eszterhás István
Gyebnár János
Kárpát József
1975-83

the most various cross-sections will be shown (i.e. clover-, flat-, aven, divided tunnel, leafshaped etc.). Touring time about 3 to 4 hours.

4. Entrance from the forest to Kupola hall and Bertalan passage - long tour: by passing through the Maze it will give an impression about its complex character. Then the Rhinoceros and the Gate of Torments has to be conquered. The next part is the pothole, very rich in dripstone-formations. Of interest are also the straight Long-Corridor being 130 metres and the muddy syphons, which are rather narrow, will represent the end-point of that part of the cave. The touring time 3 to 4 hours.
The number of participants is about 10-15 persons for the short- and medium long tours and only 5 to 6 cavers for the long ones.

2.4 Háromkürtő-pothole (360 m long, 105 m deep)

From the southern end of Csőszpuszta (belonging to Tés village) to SW in a distance of about 1.2 km, in the ploughland surrounded by some trees is the entrance of a large-, temporarily active swallow-hole. From the bottom of the swallow-hole the shaft-cave, formed in Triassic limestone, starts. From the swallow-hole actually two chimneys reach the surface; they were artificially opened. The Háromkút chimney is preformed by tectonic lines and the cave was formed by dissolution and by regressive erosion. The cavity has morphologically two parts: a maze of chimneys reaching close to the surface and a vertical shaft-set interconnected with it. The most interesting parts are: large tectonic rifts, chimneys and tubes and the 30 m high shaft of the Fekete-dóm; only sparse and senile-stage dripstones are present in the vertical shaft-cave.

Beyond the entrance there is a zone of narrow parts, and the lower parts of the cave is dirty and water dripping rather fast is also present. Thus appropriate clothing is necessary for the tour, and also 20 m of rope for safety is a requirement for the descend into the Large Cleft and in the Black (Fekete) dome. Simultaneously only 7 to 8 persons forming a group should enter it for a tour. The tour lasts for about 2 hours.

Under the narrow part about 15 m beyond the entrance comes the Maze which is complicated including the Háromkürtő-hall, after which it was named. From the T-shaped part of the Maze - through an eroded shaft - a cleavage along a bedding-plane: the so-called Alpine Wall Hall can be reached. From this point - through a crossing bedding-plane torn apart: the Large Cleft leads into the ceiling of the Black Dome, which is 30 m high. The ascend leads along cave--walls resembling lace-work, to the bottom of the Black dome - which is not the true bottom - already at a depth of 80 m below the surface. Among the large rock-boulders dovering the bottom we can penetrate into the Red and into the Shower Hall. Here we find the (present) end-point of the vertical shaft - in dense dripping of water and in sticky mud: 105 m below the level of the entrance.

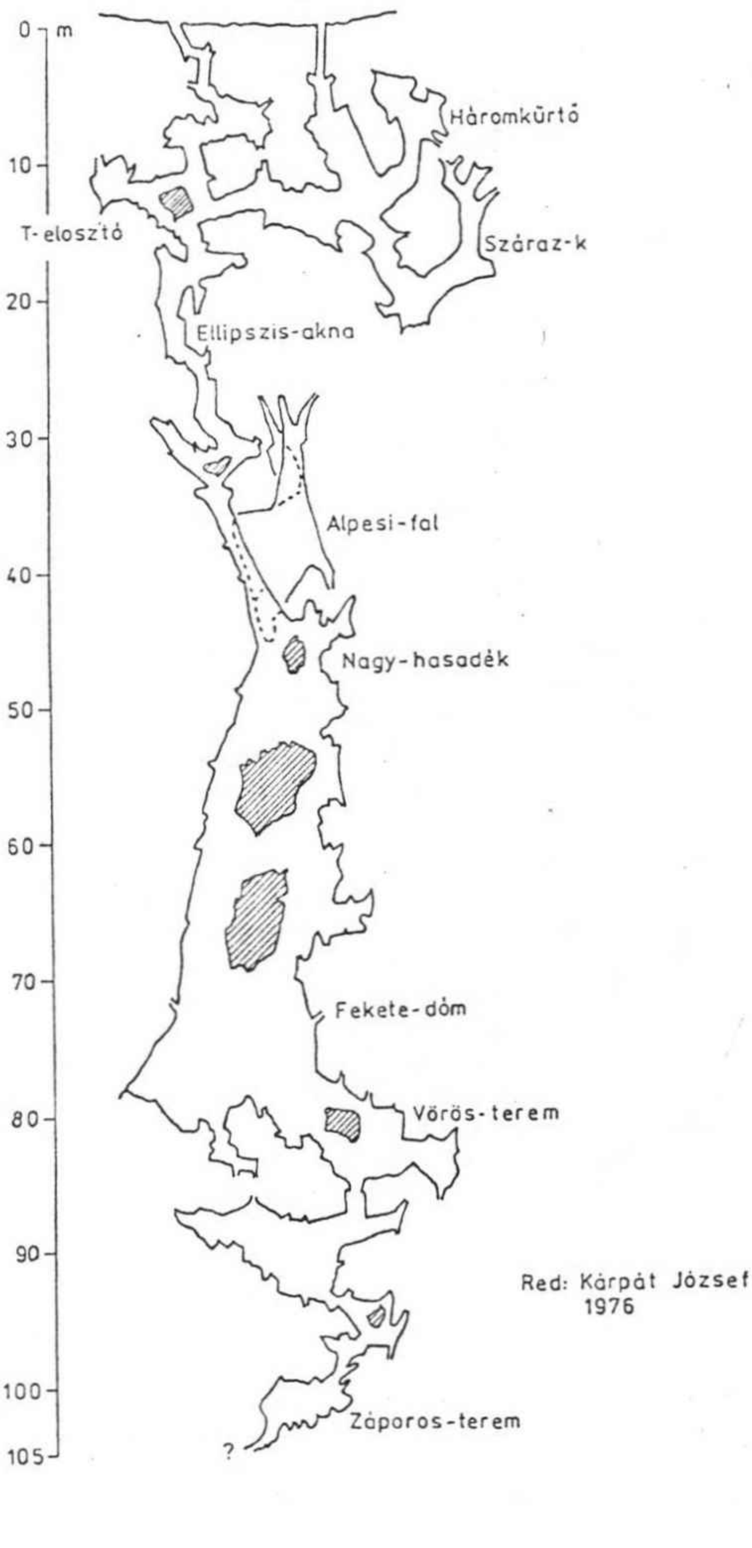
2.5 Jubileumi-pothole (220 m long, 113 m deep)

In the upper-gently dipping part of the Tábla-völgy (valley) in the surroundings of Tés towards E in one of the tectonically preformed series of swallow-holes there is the orifice of the vertical chaft (code number: I-29). The temporary swallow-hole with its shaft-system formed in Upper Triassic dolomitic limestone, offers a very spectacular natural geological profile down to a depth of 113 m. The parallel tectonic joints were widened mainly by cor-

HÁROMKÜRTŐ - ZSOMBOLY

profile along 225° - 45°

(2.4.)

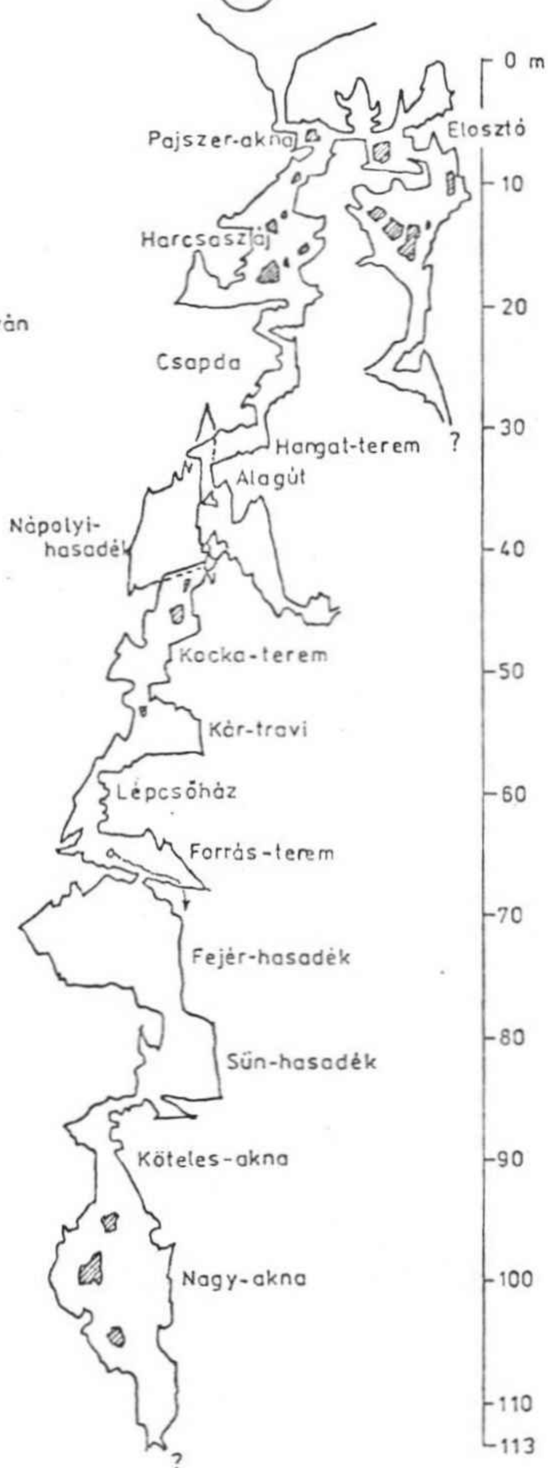


JUBILEUMI-ZSOMBOLY

profile along 200° - 20°

(2.5)

Red: Eszterhás István
1982



rosion to become large enough for the access of human beings. Characteristic the vertical shaft are the 50 to 100 cm wide and 5 to 10 m long vertical clefts. There are no dripstone formations in it, instead a variety of wall--forms are worth seeing.

The cavity is in several parts dirty and narrow, thus sturdy robes are required for the visit. In the somewhat dangerous parts iron ladders are fastened and so only for the Large Cleft - close to the end of the cave - is a rope of 30 m length required. At the same time only two groups - consisting of 5 to 6 persons are allowed to enter the cave. The time required for the tour is about 3 hours.

In the first 15 metres following the entrance shaft two rather narrow parts are present - the Pajszer-shaft and the Harcsaszáj - or those wo could pass through these, no further difficulties should be expected in the following passages. The most spectacular sites are the Nápolyi-cleft at a depth of 40 metres and in the Vak-shaft parallel to the former the Alagut and the T--shaped cleavages connecting the two former ones. At a depth of 65 m there is the Forrás Séring Hall with a temporary spring and interconnected parallel rifts, in several places perforated, leading into the Sün-(Hedgehog)-Cleft which is rather dangerous for the robes because of its spiny walls. From the 85 m deep bottom of the Sün-Cleft a sloping corridor leads into the upper part of the largest rift-shaft (Large Cleft). The 28 m deep, 1 times 10 m cross--section cleavage is blocked at several places by wedged-in stone boulders and the deepest point is a pseudo-bottom 113 m under the entrance; only after its penetration can new, greater depths expected.

2.6 Csengő pothole (340 m long, 134 m deep)

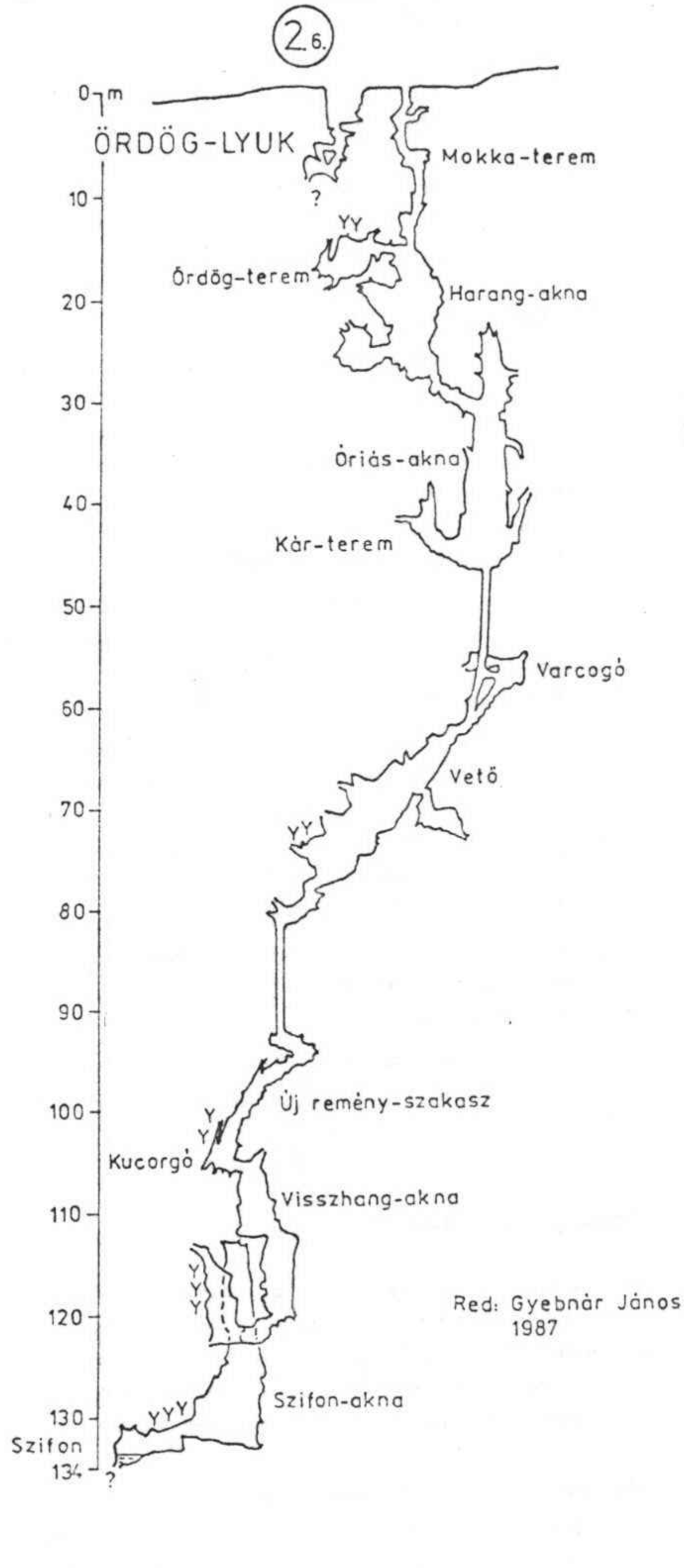
In the surroundings of Bakonynána (in a distance of about 400 m from the Csengő-hegy watching tower, direction 283 $^{\circ}$, in the centre of a clearing in the forest) in the immediate neighbourhood of the Ördög-lik Cave, under geologically rather complicated circumstances - the contact of Triassic, Jurassic and Cretaceous strata - has the shaft-cave developed. It probably forms a single system with the Ördög-lik Cave - but there is not yet access through the cavities plugged by debris. The deepest vertical shaft cave known until now consists of vertical chimneys, tilted halls and - within the artificially excavated pseudo-bottoms - steel securing structures. Only in some places (beautiful) dripstone formations can be observed; real sights are the dimensions of shafts, the shiningly clean walls being dissolved to lace-work-like forms, the fault-planes, and friction tectonic forces demonstrating.

In spite of the built-in ladders of the chimney: only well trained rock--climbers should enter it (at the necessary sites steel-nails with eye are found), with ropes. Simultaneously only two groups (5 to 6 members each) can perform the tour. Simple cave-robes and climbing- and descending tools are necessary + 8 ropes, 20 to 30 m of length each. The tour lasts for about 2 hours.

From the entrance a narrow slit leads into the Mikka hall and after that the Hamvas shaft and the Hál'isten hall will be reached. From the latter on the side the Ördög hall with dripstone decoration can be reached and downwards there is a descend into the 10 m deep Harang shaft. From its bottom - through a narrow rift - the upper zone of the 30 m high Óriás-shaft can be approached.

CSENGŐ-ZSOMBOLY

profile along 210° - 30°



Into the óriás-shaft one descends via an iron ladder - aided by securing ropes - and in the meantime marvelling at the nice erosion-forms. The bottom is a pseudo one, in 1981 the cutting-through of it succeeded. From the "steel-tunnel" built in by 55^{o} tilt matching a fault-plane an oblique and broad passage leads to a depth of 80 m, the end of which is again a pseudo-bottom of 12 m thickness. The cutting-through and the lineing it with steel was finished in 1987. The oblique passage under the pseudo-bottom gives access to the Visszhang-shaft from which again one can descend into the 20 m deep Szifon-shaft, where again nice dripstone formations are met with. From the bottom from it a small corridor starts which is temporarily blocked by a water-filled syphon; the depth is here 134 m below the entrance.

2.7 Bongó pothole (170 m long, 37 m deep)

In the surroundings of Bakonynána, 2 kilometres to the S, in the Kánkut--Forest close to its end at the Borsó-föld: it was explored in a swallow-hole (code number I-110). The natural vertical shaft intersects the three Middle Createceous Albian horizons (Orbitoline, Micro-fauna and Requienia limestone). A morphological feature of the formation is the following: the subsequent shafts are not superimposed above one another, instead they the side-by-side, with windows connecting the neighbouring shafts.

Though there is a built-in ladder in the main shaft there is still need for a rope of about 25 to 30 m, and also for descending- and climbing tools and obviously for cavers' robes. At the same time 7 to 8 cavers might tour in the cavity-system. The time necessary is about 1 hour.

From the Eloszto - the first space under the entrance - in a depth of about 10 to 15 m two parallel shafts open. The large one is the Requienia shaft (depth 25 m, cross-section 3 times 5 m). On an iron ladder and by rope aided one descends to the bottom of stone debris, seeing fossils protruding from the rock-matrix. From the Requienie-Shaft an active, waterfilled syphon can be reached, presently the deepest point of the shaft (37.2 m).

Into the 20 m Lyukas Shaft one can pass through the bottom of the Requienia Shaft, respectively through an upper "window", and from here into further three smaller shafts and chimneys.

The Bongó-shaft - giving name for the system - consists of a 21 m deep, 2.5 m in diameter "tube", into which we can enter through an artificially broadened window.

3. CAVES OF THERMAL WATER ORIGIN

During the bus tour - in the W part of the Bakony Mts. - some of the caves formed by thermal water activity will be visited. The tour lasts for about 12 hours and covers some 320 kilometres. The visited area is strongly dissected by tectonic lines. Along these rifts the karstic-origin waters being heated-up in the depths of the crust formed caves along their ascending branches.

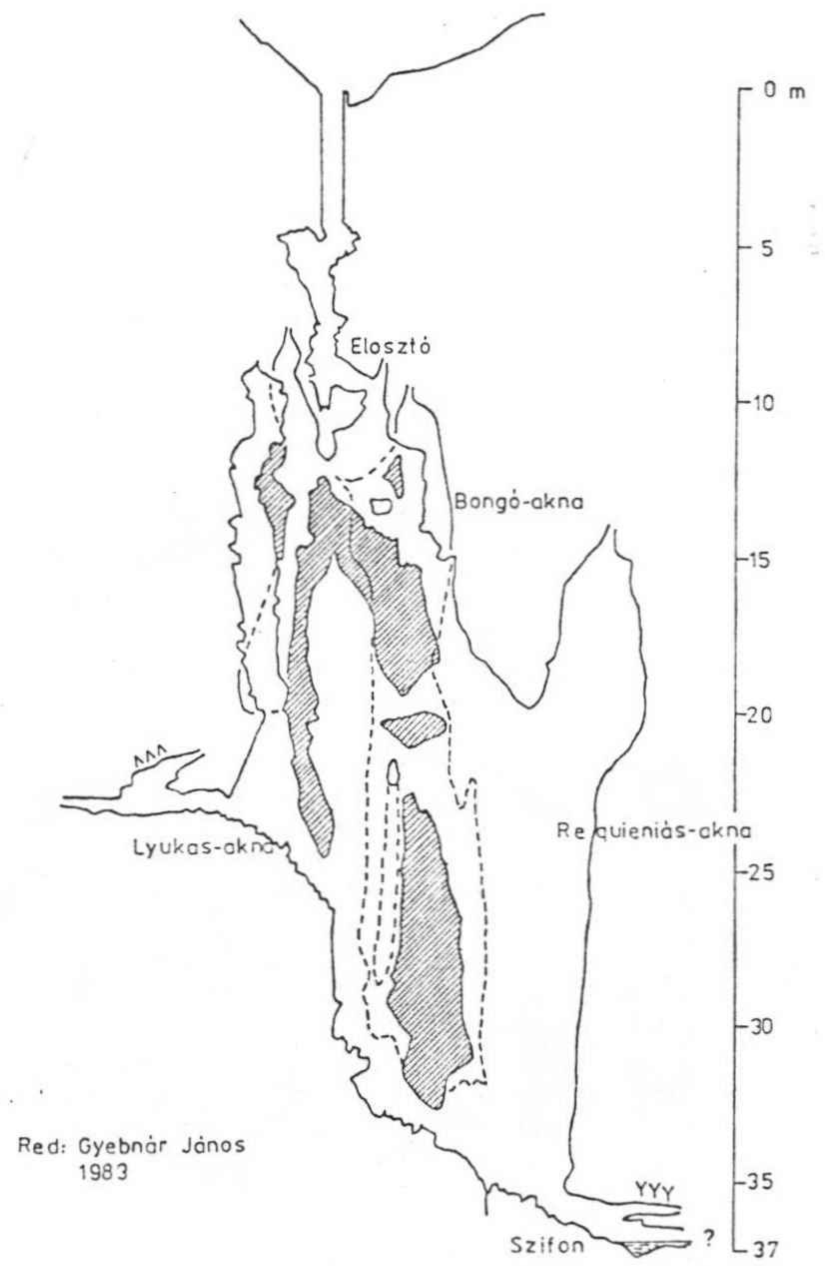
3.1 Tapolca Lake-cave (1010 m in length and 18 m deep)

It is in the downtown of Tapolca city. A man-made sloping shaft leads into the cavity-system formed in Sarmatian limestone. The passages filled originally

BONGÓ-ZSOMBOLY

profile along 255° - 75°

(2.7)



KESZTHELYI-HEGYSÉG & TAPOLCAI-MEDENCE

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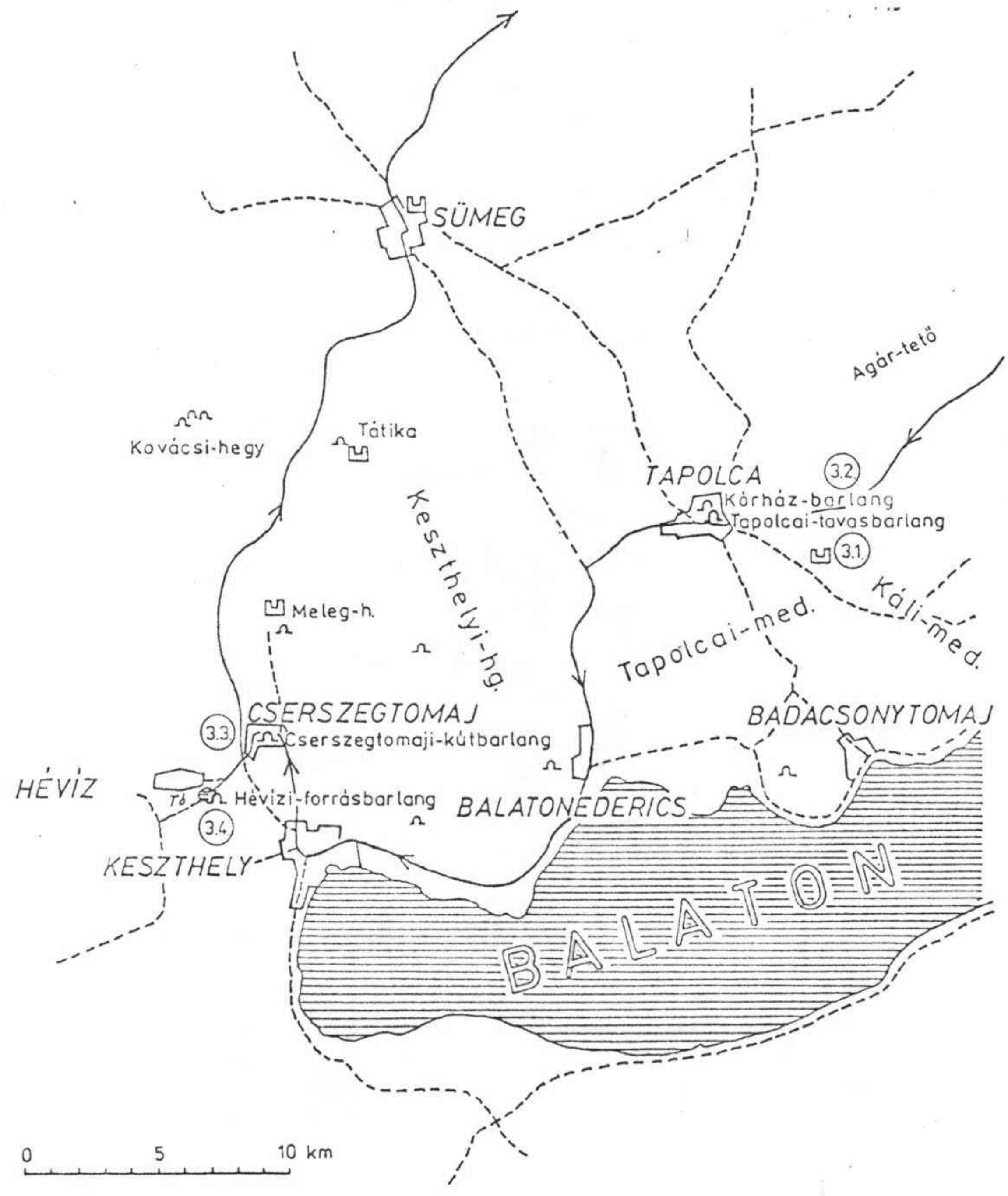

by air are 352 m long - about 150 m used to be filled partly by water, providing a channel for small-boat tours, which became only partly wet, because of the dewatering activities of the mines in the area. Those lower parts of the cave - being explored in a length of about 700 m - which are still under water, can only visited by aqualung diving expeditions. Water temperature is 18 °C.

3.2 <u>Hospital (Kórház) Cave (800 m long, 12 m deep)</u>

Mainly under the plot of the Town Hospital, also in Sarmatian limestone. Most probably it forms a single system with the Lake Cave. From the Hospital the Cave can be visited by an elevator; it is used for the treatment of discases of the respiratory system. The underground hospital is in the dry and broad cavities of the cave. In the passages discovered recently: small, but deep lakes reflect light.

3.3 <u>Cserszegtomaj Well Cave (2300 m long, 52 m deep)</u>

The cave is next to the church and cemetery of the village; it was formed in the contact area of the Triassic limestone and Upper Pannonian cherty sandstone. The cavity-system was dissolved by the former thermal-water sources in the underlying bed of the dolomite into which dolomite caved in certain places. Today most of the passages are dry since the thermal water has already long ago left the area. The complex system of maze consists mainly of very narrow corridors and some shall halls.

3.4 <u>Spring-cave of the Héviz Lake (27 m long, depth of the deepest point under the surface of the lake is 46 m)</u>

The Héviz Lake is actually a crater-funnel filled by thermal water by which it was also - long ago - formed. The south wall of the crater is a very steep sandstone wall and the other one a debris-slope deepening gradually. At the deepest point of the lake the entrance of the so-called "Amphora-Hall" (the cave itself) is to be found - broadening inward into a spherical space.On the bottom of it the 17 °C cold water spring and the 40°C thermal springs are found. During the tour only the Lake will be visited.

4. <u>CAVES IN VOLCANIC ROCKS</u>

Along the S and W side of the Bakony Mts by the side of basins formed by subsidence and on the margin of Pliocene- and Pleistocene active basalt volcanoes were formed. Morphologically mainly nappes developed, eroded to mesas up to the present. The known caves were mostly formed along the joints dissecting the basalt strata and developed as post-genetic cavities according to specific erosional factors. During the post-volcanic activity in the Tihany Peninsula many silica-containing thermal springs existed, which deposited geysrite and built-up spring-cones with smaller spring-caves.

4.1 <u>Pokol-lik Cave in Kapolcs (52 m long, average height 2 m)</u>

Close to the village, at the SE flanks of the Bondoró-Hill basalt the cave is found. It developed behind a block of the rock being detached and tilted

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from the margin of the main rock-mass. The detached rock - with a curvature - sank into the marly layers under the basalt and thus the unique hydrological system of the cave was formed: a spring and a temporarily swelling-up lake in it. In the 23 m long, rather spacious main corridor the Neolithic age man dwel-led and subsequently it gave shelter on several occasions to local peoples.

4.2 Pula Basalt Cave (151 m long, 22 m deep)

In the neighbourhood of Pula village, within the flattening-out basalt cover of the Kab-Mountain is the maze-like, rifting upward cave. Under the ba-salt highly carbonaceous banks were dissolved through karstic processes basalt blocks were falling into the downward converging rifts. In the lower zone of the cave the basalt of a former eruption is found, while there is lava thou-sands of years younger, in the upper parts. Between the two a metamorphic sial-lic stratum of about 0.5 m thickness indicates the former land surface. On the walls interesting mineral deposits are visible.

4.3 Tihany Peninsula

The most attractive formations of the area are the geyserite-caves. We will visit some of the most spectacular caves from the 40 known geyserite cones. These do not exceed the height of 20 m. Their walls are mainly built up of hydroquarzite, which precipitated from spring water and partly through its alkaline re-dissolving. Cavities formed in basalt tuff and then enlarged for cultic purposes are also present on the peninsula. In addition to particular natural features is the area rich also in historical sites and monuments.