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FIELD TRIP GUIDE

E 2

Caves in the Bükk Mountains

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E 2

CAVES IN THE BÜKK MOUNTAINS

/Field-trip guide/

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C O N T E N T S

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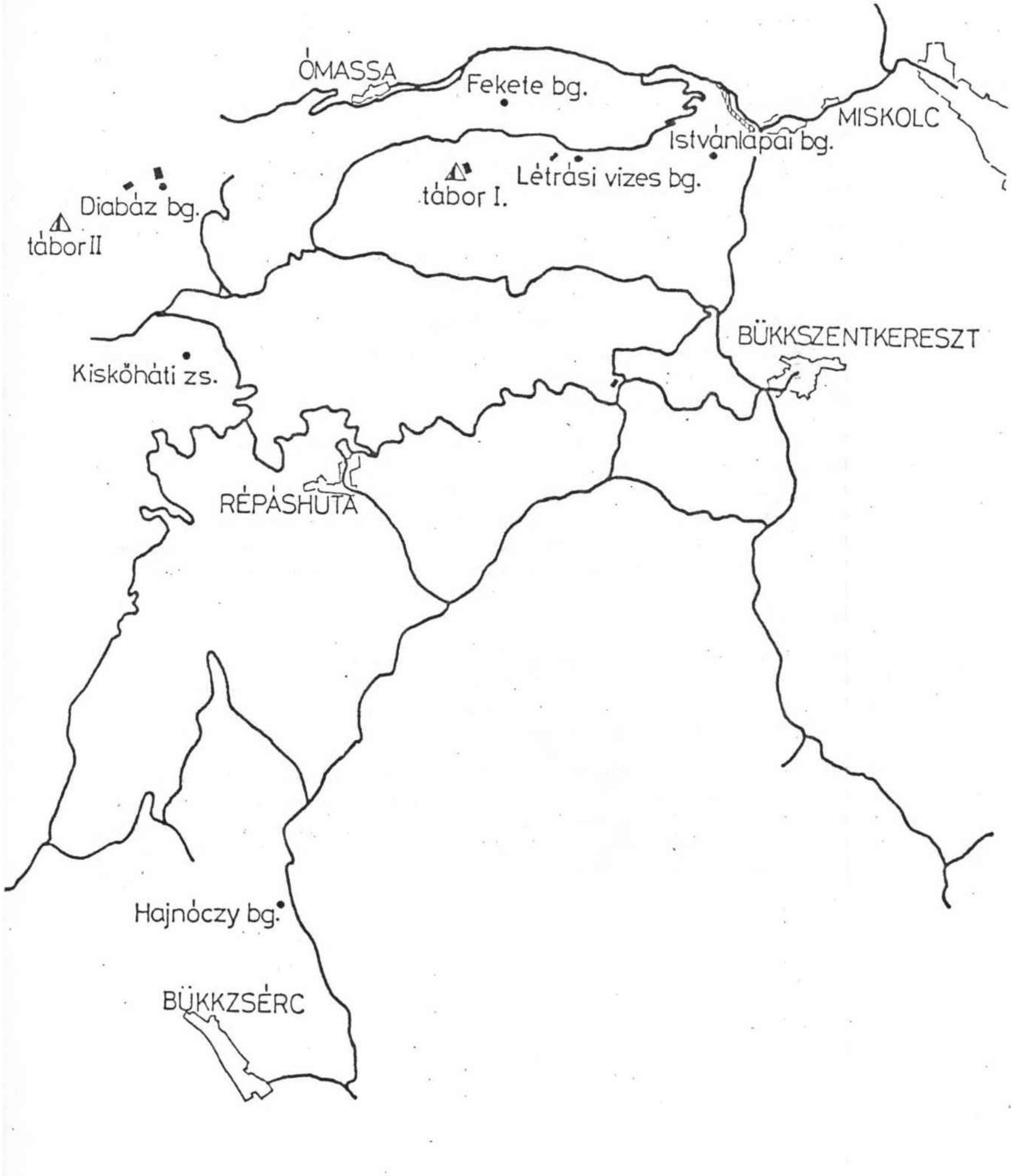
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BÜKKZSÉRC

THE SAINT-STEPHEN CAVE

The cave is situated in the Lillafüred district of Miskolc town, in the steep side of a valley, surrounded by rocky, forest-owergrown hills. The cave entrance is from the park on the valley bottom. With concrete walkways, electric lighting, the cave has been opened to the public.

The developed section to be demonstrated is 17o m long, while the total cave length is 71o m. In the interior parts of the cave the temperature is fairly constant at between 9 and 1o C^{o}.

The cut providing access for the public to the cave is artificial over its entire length. The original entrance, through which Ottokar Kadic explored the whole cave, is situated at a considerably higher level.

Two observations in the cave and their conclusions

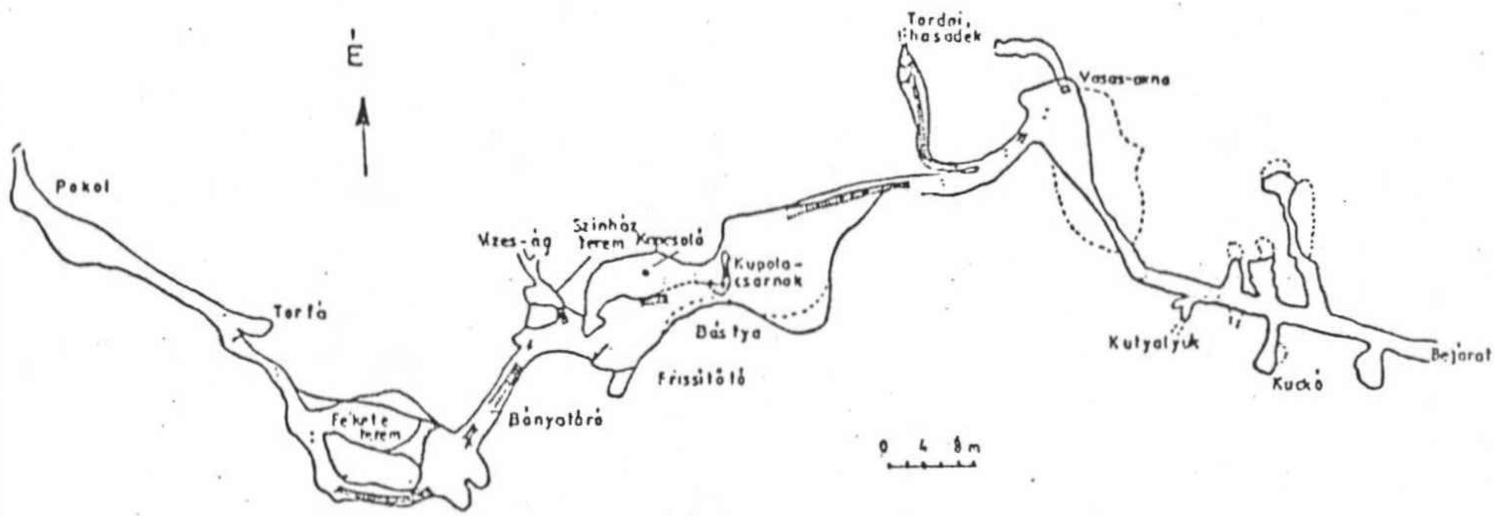
1. In the cupola hall and the theater parts of the cave, troughs are observable on the passage walls, which indicate the position of former water levels. In view of their situation in elevation the water was a cave lake.

2. These troughs are situated above the present valley floor, that is above the highest present water level.

Taking into consideration the degree of fracturing and fissuring of the limestone in which the cave has been formed, a water level at the elevation of the troughs in the present cave above the valley floor is difficult to conceive, but the troughs indicate a stationary water level. This leads necessarily to the conclusion that the cave developed at a time when the valley was not cut to its present depth into the rock.

In the hillside above the cave several residual caves and an about 1 m thick layer of dripstone have been detected. The original cave where the dripstones had formed, collapsed completely. This is also an evidence of cave development before the present topography and contours were formed.

All attempts at downward exploration from the St. Stephen cave have encountered water, specifically flowing water, with a level that fluctuated with the seasons. On occasions the water level rose to above the threshold of the artificial entrance and spilled. A highly pervious karstic reservoir is a situated beyond doubt under the present cave. The reservoir is permanently full, but unexplored as yet.



ISTVÁN - BARLANG

A cave where several thousand bats hibernate these days

The entrance to the Kiskőhát Zsomboly is situated on the northern side of the Kiskőhát Hill, close to the 939 m high peak thereof, at an elevation of 92o m above sea level. Its cross sectional area and dimensions make the cave one of the largest shaft-caves in Hungary.

Anyone with slight experience in the single-rope technique of mountain climbing will find no difficulty in traversing the whole lenght. The wall of the large shaft can be scaled upward by free climbing as well which provides enjoyable sport.

The bell-mouth entrance opens in the sloping hillside. The climbers enter on the lower part thereof in order to avoid rock- and earthfalls. For the bellmouth leading to the vertical shaft, safety considerations suggest a 11 m long rope, while a 29 m long one is needed for the descent into the entrance shaft. At half height in the entrance shaft a window provides access to a lateral shaft leading also to the bottom of the entrance shaft. The bottom is formed of an inclinde debris slope, at the foot of which an unpleasant contraction forces the climber to crawl. A smaller hall after the contraction is followed by the "Giant Hall".

In the development sequence of caves, the Giant Hall is in the "filling-up", "collapsing", deteriorating stage. Regardless thereof or perhaps for this very reason the sight offered is an impressive one.

The debris slope which forms one side of the cave consists of the rock, soil and decaying leaves resulting from the continued caving in of the bell-mouth entrance, washing in of surface soil and dead leaves. The path leads through this debris cone to the shaft dropping from the Giant Hall.

Tumbled rocks and the residues of dripstone flows line the other sides of the cavity. The former dripstone flows are crossed by fissures, some parallel to the crusts, separating two crusts in the interior of the dripstone, some cut through these crusts often perpendicularly.

The destruction of the dripstone flows can presumably be explained by the comminuting effect of glacial freezing. The assumption is not a far-fetched one since winter temperatures still drop frequently below the freezing point at the lower part of the bell-mouth entrance which is often blocked by snowdrifts. In an earlier state of the entrance bell-mouth when the bottom of the cone was not blocked by the falling debris and the mean annual temperature was below the present level, the cold /sub-freezing point/ air flowing without hindrance into the Giant Hall caused the water between the dripstone crusts to freeze, forcing these crusts apart from each other, the heave breaking the crusts usually in a perpendicular direction.

The importance of frost action during the Ice Age in the destruction of dripstones in the Giant Hall of the Kiskőhát Zsomboly is of interest to note since some attribute the destruction of dripstones to earthquakes. The destruction of dripstones by ancient violent earthquakes is not only an interesting idea but would have even practical implications provided that it could be substantiated.

On the ceiling of the Giant Hall on the part close to the entrance, dripstone formations of interesting shape are observable. In stead of the normal perpendicularly hanging stalactites these are irregular about 0,5 m in length out of plumb and are twisted to corkscrew form. Similar twisted stalactites are observable also in the side chamber at the bottom of the 5o m entrance shaft.

Such "particularly distorted snake-like twisting" dripstones have been described and illustrated by Ernő Balogh in the Miracle Hall in the cave of underground creek at Szolcsva /Erdély, Huda Lui Papara, Ernő Balogh: Cseppkő világ/ World/, Ifjusági Kiadó Bucharest, 1969/

This Miracle Hall is largely circular in shape and there is a strong current of air in it. Ernő Balogh has attributed the particular shape of the stalactites to this strong air current not excluding the possibility of other causes. In the Kiskőhát Cave the distortion may well be due to a similar factor in view of the similarity not only in shape but in the surroundings as well.

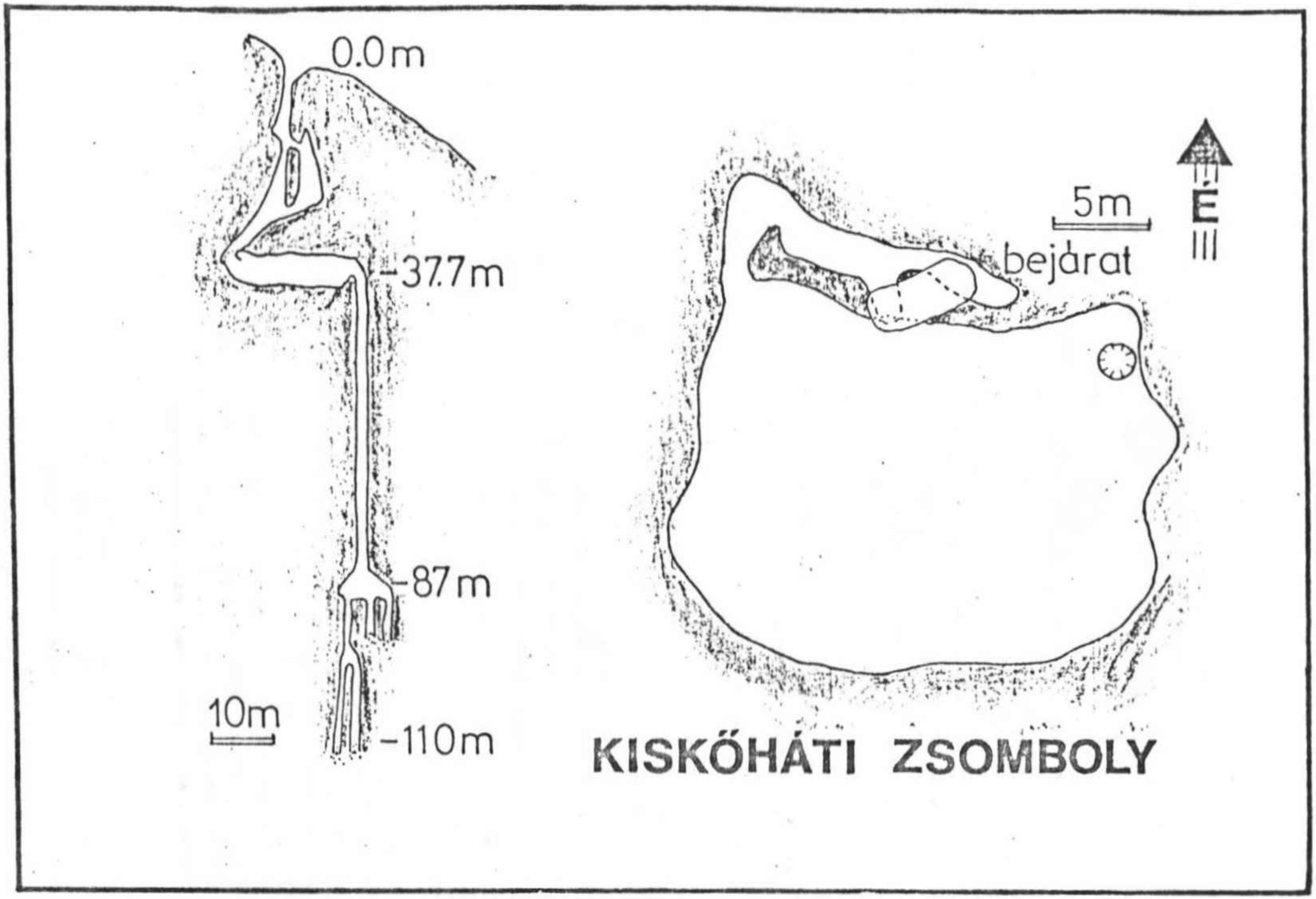
Bats hibernate in the Giant Hall of the Kiskőhát Cave. Returning annually, adhering conspicuously to the same place over the years large masses cling to the walls. According to the bat-counts started in 1985 the largest number was 4383 in the cave on the 14th January 1989. Most of them belonged to the normal and peak-nosed bats.

The counts on some of the hibernating places in the cave have revealed that the number of bats keeps increasing steadily from autumn to spring. In the successive years the count showed the largest figurest to be identical within the accuracy of counting but with a shift in time of up to three weeks. The high-rate variation in the counts around the peak permit no conclusions to be drawn as to the size of the population neither from the counts performed at identical dates in consecutive years nor from spordically scattered data.

The so-called 5o m shaft opens from the Giant Hall and provides a 5o m descent among nice dripstone formations. A small lateral cavity rich in interesting dripstone shapes is found at the bottom of the "5o m shaft".

Under the guidance of János Dancza an attempt was undertaken in the thirties at exploring other passages starting from the bottom of the 5o m shaft. However by methods used in mining works no more than fissures were detected at the cost of considerable efforts.

No sound opinion can be formed on the origins of the cave owing to the total absence of the original configuration. Neither can any opinion be given on the role of the igneous rock belt situated not far from the bell-mouth entrance and extending across the summit of the Kiskőhát Hill in the development of the cave.


0.0m
-37.7m
-87m
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10m
5m
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É
KISKŐHÁTI ZSOMBOLY

FEKETE CAVE

Fekete cave is a periodic sinkhole developed in dolomite, having cave volumes and passage cross sections at least as large as - and maybe even larger than - the limestone caves in the region although the present intake area is substantially smaller than that of the latter. What is the possible explanation?
Let us approach the cave from the direction of the Teknős meadow. The entrance is situated at the end of a ditch running along the bottom of a small valley extending down the slope of the plateau. This is typically a sinkhole by these features and its surface intake area can be determined and identified accurately. Towards the plateau the valley is separated by a few minor sinkholes preventing any water from the plateau in finding access to the valley.

What happened if the sinkholes were filled with impervious material or if they could be removed altogether? In this case the valley would drain an area of considerable magnitude - a major part of the plateau - and convey it to a suitable sinkhole exactly where the present Fekete Cave is situated.

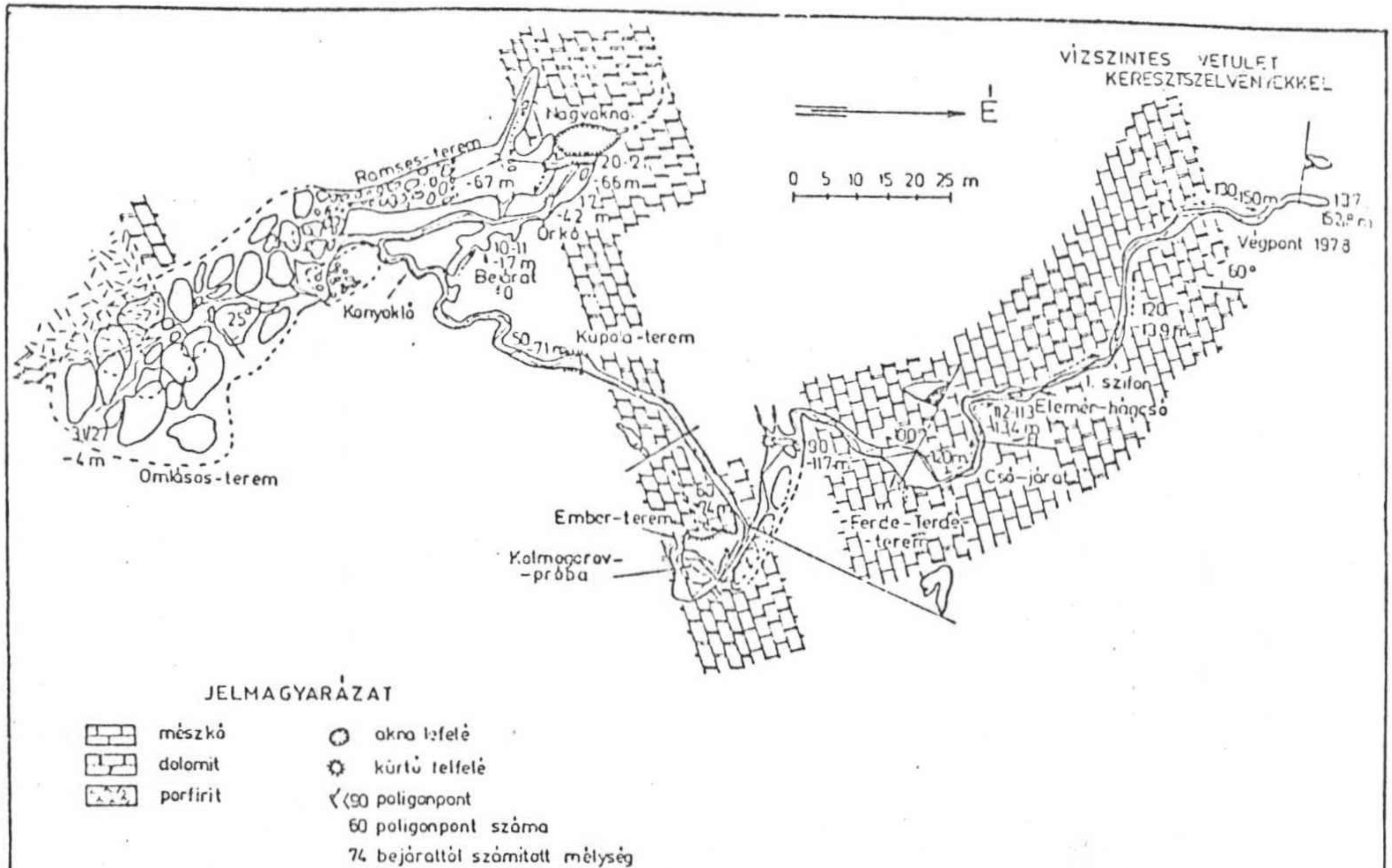
The passages of the Fekete Cave have a total length of more than 1 km and extend to round 15o m depth. The entrance to the main branch of the cave presents no major technical climbing difficulty to persons experienced in single-rope climbing. The lateral passages branching off from the main arm and the upper levels are difficult to approach. Some are definitely dangerous /slides and rock falls/ so no turistic visits are recommended. Sporting free climbers will enjoy a tour to the cave. The mildly overhanging wall of the main shaft consists of solid rock and offers good footholds and handholds so that climbing it ensures a nice adventure.

The name Fekete that is Black cave deserves some explanation. All the caves in the region but virtually in the entire area of the Bükk Range are in a white rock that is limestone. The black colour of the walls in this particular cave was surprisingly new to the first explorers and induced them to call the cave "black".

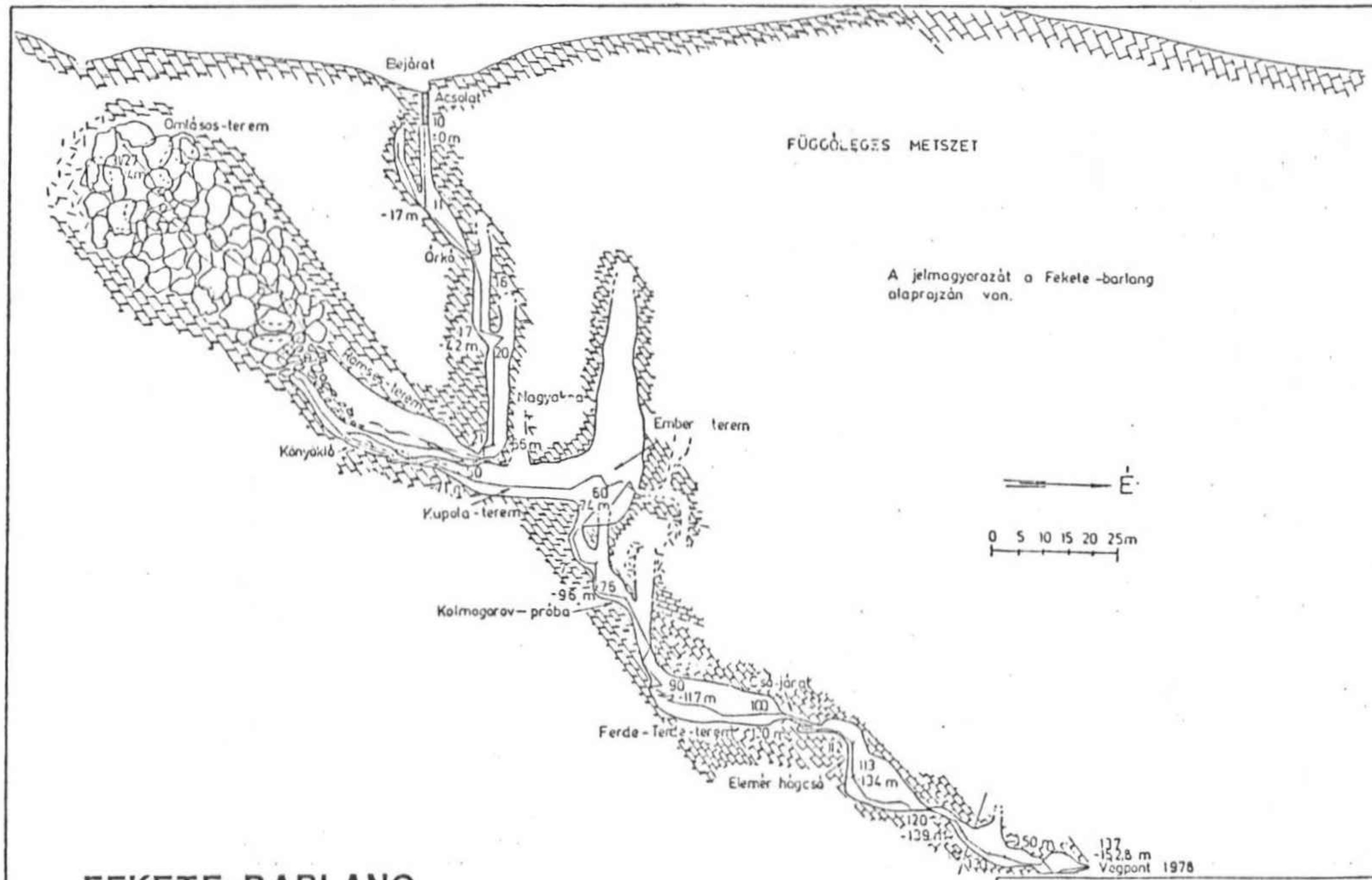
Geology

The entrance is in dolomete a black rock consisting of 3o-8o cm beds. On a sectional plane perpendicular to the interface the bedding planes show a zigzag pattern that is reminiscent of a cranial suture called stylolythic in geology. When struck the dolomite emits a characteristic odour due to the organics liberated from the rock by the blow.

The rock face visible in the concreted entrance shaft to the cave is a structural fault plane. The bedding planes are sub-normal to this plane and run contraty to a person looking into the shaft. The strike of the beds here is 6o degrees while the dip /the angle included with the horizontal/ is 7o degrees. The deeper layers dip more steeply approaching the vertical in some places. The lower parts of the cave are no more in dolomite but in older limestone layers.



FEKETE-BARLANG



FEKETE-BARLANG

Development of the cave

The cave entrance was built in 1989 forthe Management of the Bükk National Park.

The descent to the cave may appear excessively large and unnecessary for purely access purposes. However at smaller cross section the impressive fault plane along which the mouth of the sinkhole cave had developed would have been impossible to display.

The design adopted was alone suited to demonstrate the geological fact that the stream bed was earlier cut much deeper and that the water submerged at the foot of a major rock wall. Later - in modern times - the former sinkhole became filled up. The arch built above the entrance shaft is intended to prevent

- leaves branches from dropping into the cave shaft and to form a fill differring from the original one,
- people or animals from falling accidentally into the cave and
- sediment from being washed into the cave at times of heavy rains or by melting snow.

LÉTRÁS WET CAVE

Introduction

The Létrás Wet Cave is one of the scientifically best explored caves in Hungary. It is therefore deemed advisable to summarize briefly, before the description proper, the achievements attained so far and to attach a brief list of literature to help those interested in our scientific results.

Review of scientific results

The cave is situated in North-Hungary, in the part of the Bükk Mountains with the greatest number of caves. A natural entrance and an artificial one cleared in 1971 provide access, but these have been closed for nature conservation reasons.

The first report on the cave dates back to 1951, although the natural sinkhole had been open long ago.

Regular explorations by our cave parties have been started in 1955. The total length of passages explored thus far on the various horizons in the cave is round three km. Measured by the length of passages the cave is the sixth in Hungary, but the first in the Bükk Mountains. The difference in elevations within the cave is 9o m.

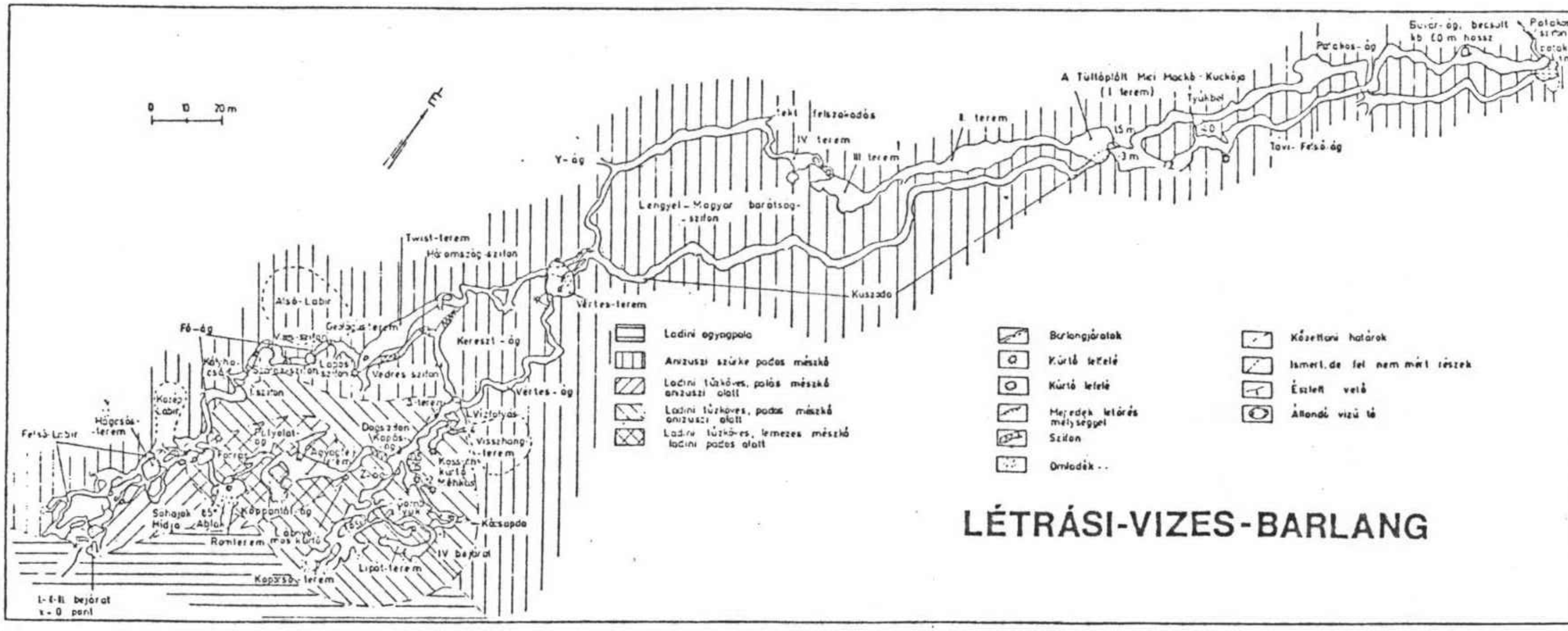
The cave belongs presently to the most extensively explored karst formations in Hungary. The bulk of the scientific advances is summarized in two graduation papers and two theses presented for the Ph.D. degree.

Round one-third of the morphological intake area of 1,83 square km is covered with Ladinian limestone. The area covered with Carmian clay shale overlain by Quaternary debris is comparable in size. Carmian igneous formations and Carmian limestone alternate over the rest of the area. The cave opens at the boundary between the clay shale and the Ladinian limestone, the greater part of the intake area proper lying on the non-karstified terrain.

Along the main orientation of the cave the dip of the layers increases from 18 to 55° dipping towards N-NNE throughout.

The strike of the faultlines is N-S, or NNE-SSW.
The main orientation of the cave is controlled by the dip of the rock beds and the strike of the faultlines in combination. The cave developed in the Pleistocene and Holocene ages by corrosion, then by erosion, followed again by corrosive and gravitational action.

The ephemeral cave streams on the IV-the level below the surface and the Lake indicate the highest karst water level in the area. The water from the cave emerges in the springs of the Szinva and Garadna Valleys several kilometres away. The waterlevel in the Lake fluctuates by about 3 metres.



LÉTRÁSI-VIZES-BARLANG
Ladini agyagpala
Anizuszi szürke pados mészkő
Ladini tűzköves, palás mészkő anizuszi alatt
Ladini tűzköves, pados mészkő anizuszi alatt
Ladini tűzköves, lemezes mészkő ladini pados alatt
Barlangjáratok
Kürtő felfelé
Kürtő lefelé
Meredek letörés mélységgel
Szifon
Omladék
Kőzettani határok
Ismert, de fel nem mért részek
Észlelt vető
Állandó vizű tó
0 10 20 m
Kuszoda
Vértes-terem
Vértes-ág
Kereszt-ág
Twist-terem
Háromszög-szifon
Y-ág
Lengyel-Magyar barátság-szifon
IV terem
III terem
II. terem
A Túltáplált Mei Mackó-Kuckója (I terem)
Tyúkbél
Tavi-Felső-ág
Patakos-ág
Patakos-szifon
Alsó-Labir
Fő-ág
Vedres szifon
Lapos szifon
Felső-Labir
Hágcsás-terem
Kassai-kürtő
Visszhang-terem
Kásapda
IV bejárat
Lipót-terem
Romterem
Sohajok Hídja
Ablak
Köppentő-ág
L-I-II. bejárat
x = 0 pont

The analyses on the dripping waters in the cave provided positive evidence of infiltration even in summer, the rate of which is about one-tenth of the peak in spring. The transmissivity coefficent has been estimated at 10^{-1} to 10^{-5} m/s. The cave conveys simple karst waters.

On the basis of temperature data the entrance section of the cave is round 200 m long. The temperature fluctuations here attain 5 to 6 °C whereas within the cave no more than 0,5 °C. The highest temperature registered so far in the cave was +11,6 °C while the lowest was -1,6 °C. The highest rate of temperature change was a rise of 3 °C within two days, induced by a storm rainfall in summer. The normal air temperature in the cave is 5,5 °C. At 60 cm depth below the point of temperature measurement the rock is cooler by 0,5 to 1,0 °C than the atmosphere in the cave, depending on location and rock material.

According to the solid-body tracer measurements performed in the cave and its surroundings, the highest radon activity is observable around the Lake, with values around 6 KBq/m^3. The radon originates presumably from the water of the non-karst springs which find access to the cave by surface and underground paths alike.

The bats in the cave belong to the Myotis oxignatus blithy, the Rhinopholus hipposideros and Rhinopholus ferrum-equinum species but others occur also sporadically. According to the results of the bat counts since 1975, the numbers decreased steadily up to 1984 by about 3o to 4o %, although the decrease in some populations was even more pronounced. Since 1984 the trend is positively rising again but the level attained is but 85 % of the original value.

The CO_2 concentrations measured were 500 to 1600 ppm in the external parts of the cave and up to 0,4 % in the interior sections.

The cave has been explored by the "Marcel Loubens" Cave Exploration Group who made also the measurements and observetions possible.

Guide through the cave

Let us adopt a route following the flow of water.

Entrance is throught the right-hand /not closed/ passage of the sinkhole. To the left the guano-filled, slippery, muddy passages of the "Upper Labyrinth" can be mounted. To the right the flow of water is indicated by spectacular ripples and erosion marks. A small steel bridge and the first ladder lead to the "Ladder Hall". Leaving the ladder to the left, the view opens on the clayey, older, more interesting formations of the "Upper Labyrinth".

The "Ladder" Hall developed at the boundary of the plate and bedded Ladinian limestone along a preformed tectonic feature or layer interface.

The wooden ladder at the end of the hall leads down into the "Main Arm" /the

"Zebra Wall"/ to the left into the "Middle Labyrinth" while upwards to the "Cambric Arm". The "Main Arm" presents views of folds and cuts in the shaley Ladinian limestone, further of large masses of cold-water peastone. After a few tens of metres we arrive at the first debris syphon. Formerly a winter passage through the syphon provided access to the interior of the cave but a by-pass has been found around it. To the left we can mount into the "Lower Labyrinth" whence several "windows" offer glimpses of the "Main Arm".

From the "Ladder Hall" we continue upward into the "Cambric Arm". The descending chimney leads to the "Main Arm" while the left-hand passage to the "Middle Labyrinth". A steel bridge /the "Bridge of Sighs" and a small steel ladder lead to the "Window". /Before the Bridge of Sighs the dripstones with corroded ends are worthy of being inspected/. A steel ladder makes the "Ruin Hall" accessible which consists of tumbling boulders. The passages of the "Zebra Corridor" developed in folds by caving. /In this way along with the erosion-, layer interface and tectonically preformed passages, the fourth genetic type, i.e., caving is also encountered/. Corroded passages, locally with corrasion ornamentation will be found in the "Vértes Arm". The soil thermometers embedded in sandy clay are visible to the left.

Bifurcation. The "Koppantál Arm" is visible to the right, the "Clay Head Hall" to the left. All these are in thin-bedded, shaley Ladinian limestone, thick limestone beds appearing in the upper part of the "Koppantál Arm" only. A series of soil thermometers are at the top of the "Claywall", with a radon detector above them.

At the end of the hall we pass a dripstone gate /the "Maxi Contraction"/ into a passage forcing us to crawl. A small hole, the top of the "Footprint chimney", becomes shortly visible. Proceeding straight ahead we reach in a right-hand bend to the "Cadaver syphon" /Floorboard/. Negotiating the liquid mud /boards help/ we enter the "Kapás Arm". Following the course of water to the left the wonderful dripstone formation /the "Beehive"/ becomes visible in a right-hand branch. The Létrás Creed and the Highway are exactly overhead. Several chimneys open from here upward and downward alike. One of these is accessible also through the "Rock Trap" /see later/.

The "Kapás Arm" terminates in the "Triangle Hall". Upward to the right through the "Kossuth Chimney" and a short passage we find the "Kutas Contraction" and the "Echo Hall" /accessible to small built explorers only/. From the left a small rivulet enters the "Triangle Hall" embedded in conspicuos sediment adhering to the wall. The bottom of the hall contains the "Cross Arm" which is passable by crawling. The water enters from the "Echo Hall" and discharges to the Main Arm through a syphon.

We mount the permanent steel ladder to the "Vértes Arm", named after the paleoarcheologist László Vértes. The "Wonder Syphon", the "Gravel Classifier" and the "Vértes Hall" follow next. /Caution is needed before the hall since the narrow passage leads to the lower, crawling part/.

The "Vértes Hall" is formed by the merger of the lower, creek passage and the upper senile passage. The path takes us among boulders to the lower section, the "Crawler" in the continuation of the "Main Arm". Turning left, the largest cavity of the cave, the "Twist Hall" opens up which continues in the "Geologist Hall". After several hundred metres of crawling we arrive at the "Creek Arm" which is passable only in cold winters or after a prolonged dry period.

From the "Vértes Hall" we proceed through the "Vértes Arm", sometimes upright, sometimes on all fours, on cherts and between dripstones. To the left the dripstones in the lateral "Y branch" are of interest. We enter the fourth hall of the Vértes Arm and arrive at the "Polish-Hungarian Friendship" syphon, thence to the "Rock Bridge" and "Curved Dripstone" halls. /Explorations followed a reverse sequence starting from the "Crawler"/. The spectacular dripstones are interesting formations, since bi - and trifurcating stalactites and stalagmites occur here equally. Unfortunately, the evidences of vandalism are eyesores, leaving often only the ruins of the dripstones. The last hall was named "The Den of the Overfed Winnie the Phoo". A debris cone leads to the continuation of the "Vértes Arm", the "Upper Arm". The path is unsafe, so we continue downward among boulders, to the lower level, into the "Creek Arm", over strongly eroded ripples. At the "Lower Tongue" rock needle we mount again through the "Chicken Bowels" into the Upper Arm. The spectacular dripstones, stone flows, the traces of dissolution and faultplanes are worthy of being mentioned here. A clay slope descends to the "Lake" representing the end of the cave.

The water from the "Lake Branch" enters from the left through the "Diver's Arm" syphon. An about 300 m long passage is known to exist behind the syphon but this is accessible for one or two weeks alone in several years when the "Diver's syphon is open. /The latter was named to commemorate the first diving passage in 1976/.
Some of the water tumbles down from the surface through a sinkhole in the vicinity of the concrete dam. The about 3 m deep lake "dries up" in very long, cold winters alone, nevertheless, neither we, nor the divers could negotiate it thus far.

The lake is crossed with the help of the mounted holds, to return through the "Creek Arm" back to the Den of the Overfed Winnie the Phoo. The path therefrom to the "Cadaver Syphon" has been described already.

The route takes herefrom through the "Kapás Arm". At a trifurcation the only possible route is to the left, through the "Z Arm". Crossing this we arrive among the tumbling rocks of the "Coffin Halls" into a blind /blocked/ passage.

With free climbing we mount to a balcony in a spectacular tectonic fissure whence a steel ladder leads to the bottom of a shaft. /To the left a small hole the "Button-hole" opens into the "Ferenc Papp Arm" which incorporates two halls, the "Rock Trap" and the "Lipót"./ Mounting an additional steel ladder and climbing a few metres in a chimney we leave the cave through the new entrance.

To summarize, in conventional cave dress, with lighting equipment for about 4 to 5 hours, virtually the entire cave can be toured. The dripstones are of medium level, corrosional, erosional, tectonic, layer interface and caving forms are equally visible over short distances. Visitors are requested to avoid the installed thermometers, drip receptors, radon detectors, water gauges, dripstone markings, further to conserve the living organisms and dripstones.

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THE DIABASE CAVE

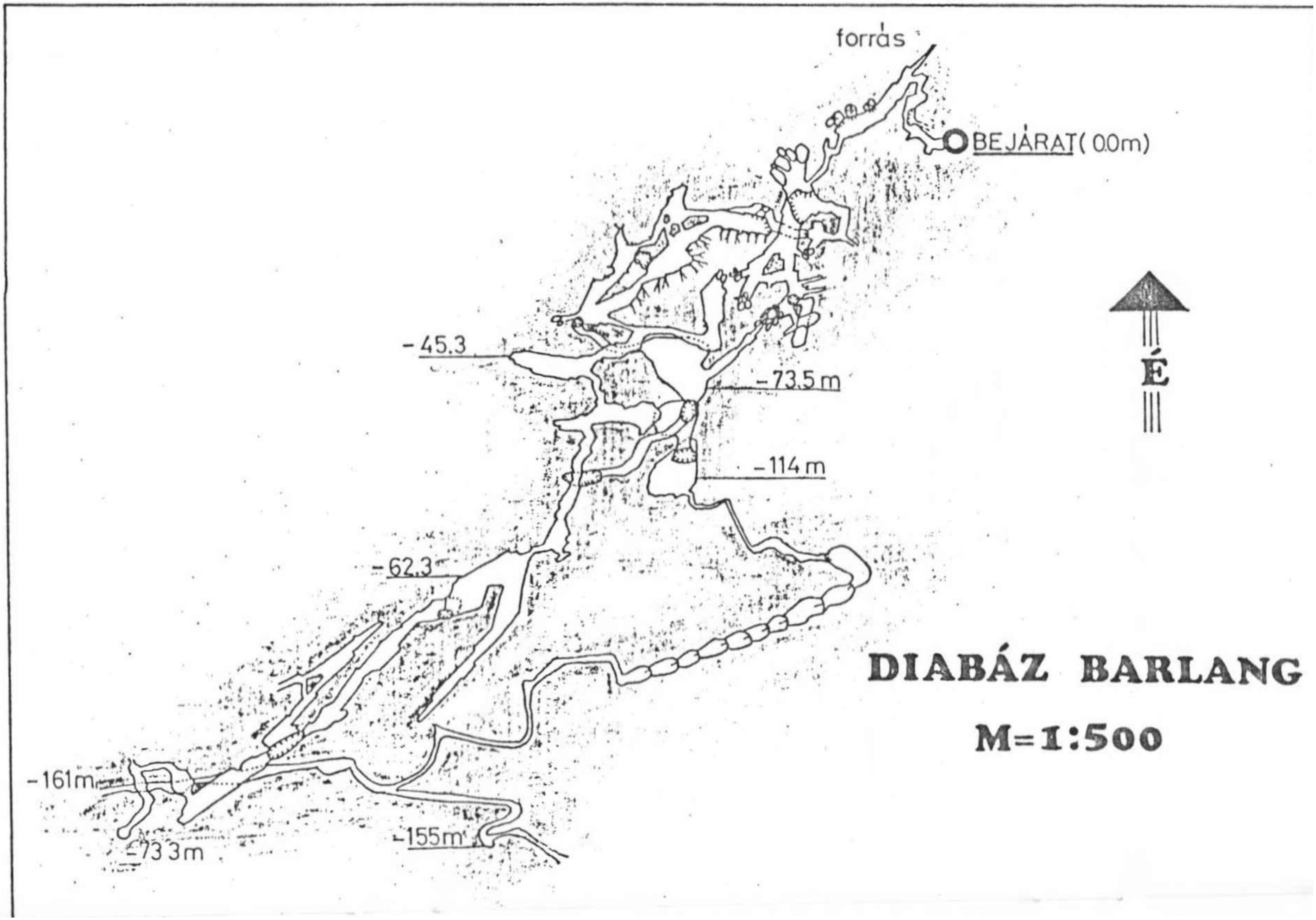
The history of the Bánkut Sinkhole extends back to 1963 when the Miskolc "Miners" have succeeded under the guidance of Sándor Várszegi in clearing the sinkhole along the path of water and in descending to four metres depth in the narrow twin shaft thereof. The changeover from insignificant cavity to the Diabase Cave i.e., the discovery of the extensive cave system is associated with the name of many explorers.

As early as 1975 Joseph Szabó an explorer from Miskolc working alone, excavated the section to which the "Miners" have penetrated earlier. Later in July the two man-team of Peter Börcsök and István Szenthe failed similarly in advancing farther. Stimulated by the challenge and believing in the success of exploration several teams have been invited to this area. In September a new entrance was opened at the foot of the rock wall through which succeeded in penetrating into the cave. In autumn working regularly during week-ends the presently know length of the cave has been explored gradually. The most outstanding success was registrered on the 13th to 14 th September when a 3oo m long new passage called the "Szép Arm" was discovered with its chimneys and contractions.

The total length of the cave has attained 533 m by 1976 while the greatest difference in elevations was 156 m.

The new name "Diabase Cave" was prompted by the fact that the cave passages penetrate repeatedly non-karstic diabase rock. The cave itself developed along the interface between the karstified limestone and the diabase rock which is of considerable geological interest. Similarly interesting is the presence of Pannonian Age pebbles which is regarded an evidence of the by now eroded sediments covering the elevated parts of the Bükk Plateau.

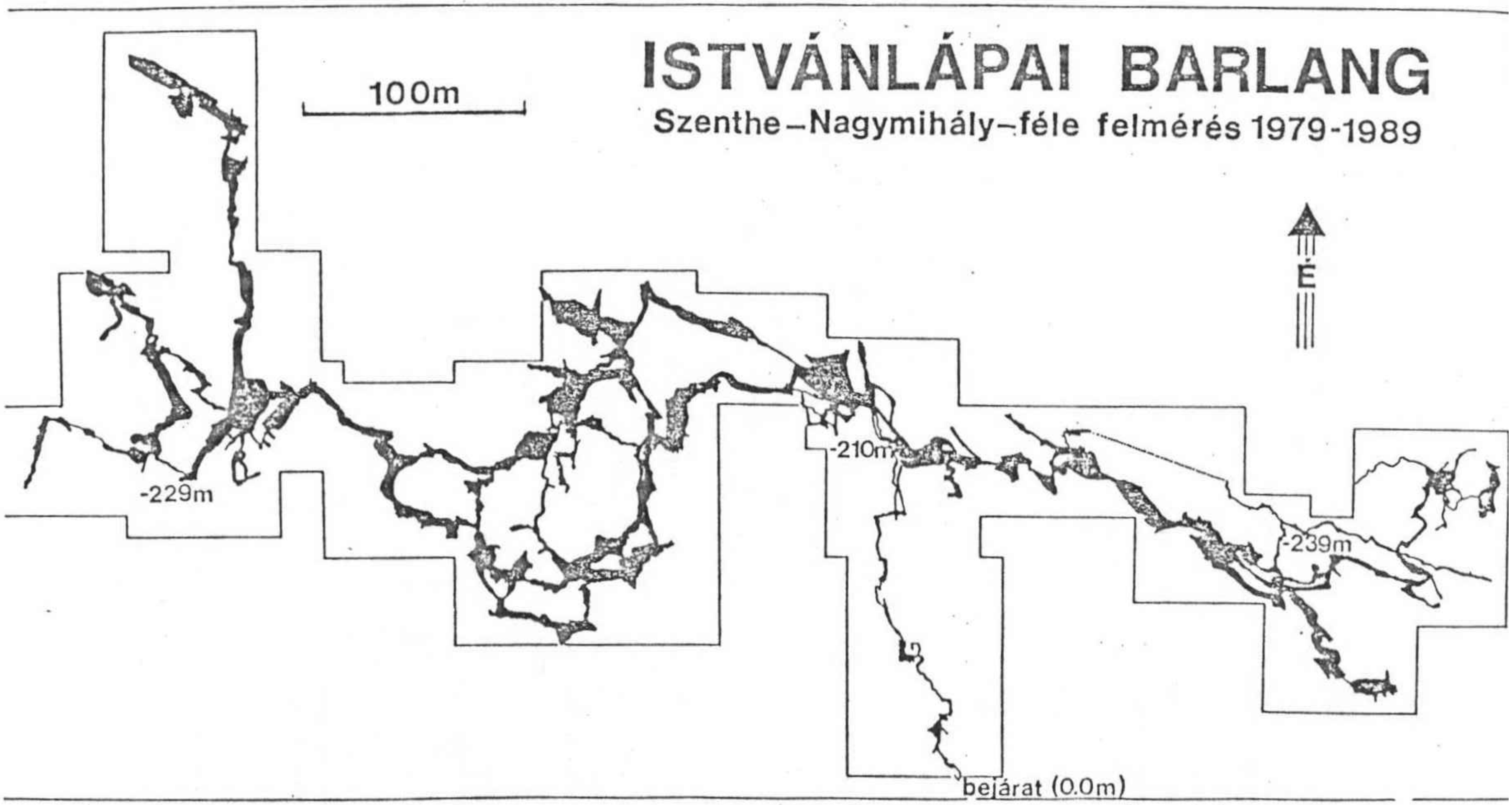
The spring of permanent yield emerging 25 metres below the surface is also an interesting feature of the Diabase Cave.


forrás
BEJÁRAT (0.0m)
É
-45.3
-73.5 m
-114 m
-62.3
-161m
-73.3m
-155m
DIABÁZ BARLANG
M=1:500

THE ISTVÁN-LÁPA CAVE

The cave exploration group Ottó Herman from Diósgyőr under the guidance of Lajos Gyenge started clearing the trough at elevation 544 m above sea level at István-Lápa rising above Lillafüred in 1958. The site was abandoned soon in favour of more promising projects. The debris from the collapsed site was cleared in autumn 1963 and the continuing downward passage filled with debris was discovered next year at 14 m depth. The periodic draft perceived was considered an evidence of a wide network of passages leading towards the Létrás Summit. In October 1964 Lajos Gyenge has reported already that they succeeded in exploring between September 27 and October 4 the István-Lápa sinkhole to a depth of 15o m. The stone dropped at the end continued rolling but in the absence of rope ladders farther descent was impossible. The efforts were resumed on the 24th October Saturday at 19 hours, equipped with five lo m long rope ladders, ropes and a telephone line was installed. The descending party consisted of nine persons, one remaining on telephone duty on the surface. Around midnight four young team members returned the others working at 15o m depth on excavating a blockage. Sledge hammers were used to widen narrow passages. The party descended by crawling in a long narrow fissure and attained a depth of 19o m. The fissure continued but the explorers returned calling on their last reserves. On December 1964 they descended to 22o m depth already. Here they encountered the karst water table and two horizontal passages but owing to the brevity of time and the lack of proper equipment these could be inspected but superficially. In the interest of further explorations a telephone network was installed in the cave and a log cabin was erected on the hillside in January, 1965. The length explored increased to altogether 13oo m by March which was extended by an additional 5oo m after breaking through the syphon at the western end of the cave. The group of the Budapest Vörös Meteor headed by Peter Simsa joinded the explorations. According to Lajos Gyenge the explored sections reached down to round 24o m depth and attained a total length of 1787 m in 1966. The lower part of the cave was inundated for the greater part of the year and in the vast system presumed no new discoveries could be recorded over the next ten years. The "Eastern Arm" terminates is a huge shaft while the "Western Arm" is blocked by a series of syphons. Frogmen explorers from Debrecen dived into syphon No. 4 in 1975 and succeeded in advancing 3o metres at 15 m depth be below the prevailing water level. However the debris on the bottom rose to the ceiling calling for excavation to penetrate farther. The Cave Exploration Group of the Students' Scientific Union at the Miskolc University of the Heavy Industry has plotted, supplemented and corrected the map of the cave replaced the destroyed ladders and carried out geological and hydrological observations in the seventies. In 198o they succeeded in exploring new large passages of several hundred metres length which opened downward from the main arm.

The about lo m deep braced entrance excavated at the time that the István Lápa sinkhole was discovered, was replaced by a new entrance blasted at a few metres distance from the old one. At a distance of 3o m from the debris covered entrance section some crawling is necessary to reach Shaft No.I, involving a 15 m


ISTVÁNLÁPAI BARLANG
Szenthe–Nagymihály–féle felmérés 1979-1989
100m
É
-229m
-210m
-239m
bejárat (0.0m)

rope secured descent. The passage widens thereafter and climbing down the ladder installed in Shaft No.II, we arrive at the largest part of the shaft system the Indian Bridge. After an additional descent mostly on steel ladders we step onto a small landing whence we have to descend additional eight metres to the bottom of the shaft. The route continues over the 2-3 m high vertical Giant Steps which lead down into a hall and thence to a 2o m shaft with an installed ladder. The lower part of the shaft called the Snail, can be avided through a chimney branching off around the middle of the shaft. We are on the 14o m level already whence several crawls through contractions take us to 211 m depth in the shaft system. The horizontal passage there bifurcates into the eastern- and Western Arms. Relative to the shaft both arms are readily accessible, their dimensions are impressive the hall dimensions attaining over 3o to 4o m. The first hall in the Eastern Arm is called the Camp which is followed by a second hall and a 6 m ladder. At the bottom of the ladder a 35 m long sand syphon is encountered to the left which is followed by a minor lateral passage. To the right a rocky then clayey steep slope leads up to two huge halls of which the second has dimensions justifying the "Five Zil" name /ZIL being a Russean-made truck/. A short crawl from the vast cave hall through the so-called "4o m shaft" takes us into a round 2oo m long, winding, bifurcating passage which terminates in a syphon. The passage and the shaft are completely inundated by the karst water which rises in wet periods. The several hundred metres long gradually narrowing, rising passage which resembles a creek bed originates above the 4o m shaft and is called the Meteor Arm.

The Western Arm opens first into two large halls followed by the 12 m long Syphon No.1 and the shorter Syphon No.2, both filled with water over the greater part of the year. The 3o m long Syphon No.3 and the 7o m long Syphon No.IV are very large but resisted penetration by swimming so far.

The István-Lápa Cave forms part of the vast cave network in the Bükk Mountains, the present or at least part existence of which is highly probable and which is defined by the geological primary structure running along the Jávorkut-Létrástető-Lillafüred trace. The so-called Anisusian limestone belt which karstifies readily and countains many karst features is bounded on its northern side by porphyry and dolomite while on the southern side by Ladinian clay-shale, cherty limestones and diabase. All evidence points to the fact that the Létrás Wet Cave, the Létrás-summit Cave, the István-Lápa Cave and the István Cave form an intercommunicating system, the presumable connection between them being unexplored as yet.

The István-Lápa Cave developed also in the Anisusian limestone, although some differences are detectable in the forms of appearance. To a depth of 15o m below the entrance the wide former sinkhole shaft follows a North-South oriented fault which is intercepted by the fissure across the Létrás Summit bearing East-West. At the 15o m level the North-South faultline is spilt up into several fissures, presumably as a consequence of a lateral thrust to which it was exposed at the 16o m level. This is where the dark manganese cover appears which covers large surfaces in the lower parts of the cave. In the Eastern Arm the limestone displays greyish, red and yellow-brown hues. The rocks along the Western Arm are grey in colour, finely crystalline and are often dotted with brown, reddish-brown and white limestones.

Hydrogeological considerations lead to the conclusion that the István-Lápa Cave is in all probability drained towards the valley of the Szinva Creek, the syphons being filled with karst water. Descending waters are encountered in the shafts, their influence being readily traced to 15o m depth, whereafter the percolating water finds access to the Horizontal Arm through several fissures. The Eastern Arm is not an active, live passage, only the 4o m shaft is filled periodically by the rising karst water table. The Western Arm on the other hand is an active passage of rivulets. The streamflow therein is 7oo to 8oo litres/ min. but may attain several cubic metres per minute after storm rainfalls. In extended dry periods it may run dry completely. The creek bed is largely filled with gravel. The running water has excavated, scoured many potholes with sizes surpassing 5 metres across. Noteworthy features in the Western Arm are the four large syphons of which the 7o m long fourth is the most impressive. In rainy weather these syphons become filled with water blocking the passage and making any exploration impossible. Several shafts extend downward from the so-called Large Hall at the beginning of the Western Arm. These convey the water presumably to the lower, yet unexplored horizons. The probable course there is under the Eastern Arm, connecting to the presently accessible level below the 4o m shaft.

The lycopodium spores of 2,5 kg weight and the 25 litres of fluoresceine dye introduced into the syphon in the Eastern Arm of the István-Lápa Cave emerged to the surface in widely scattered springs of different types. The spores were detected after four days in the Anna Spring while after five days in the St.György and Lake springs at Diósgyőr. In the return ditch from the Soltész garden few spores were only detected while the dye appeared alone in the Esperanto spring. These communication studies have revealed that the intake areas of the springs are located not exclusively in the Anisusian limestone belt but also in several minor, closed catchments.

THE HAJNÓCZY CAVE

The students of the Joseph Hajnóczy high school at Tiszaföldvár have been gathering since 1963 at summer exploration camps at Odor Castle Hill in the southern parts of the Bükk Mountains. These camps have included among others cave exploration groups associated since 1971 with the Hungarian Society of Karst and Cave Exploration, MKBT. The exploration area is the surroundings of Odor Castle.

Cave explorations have been concentrated between 1963 and 1971 on the Odor Castle dripstone cave. The cave exploration group of the Customs Service has explored in 1962 under the guidance of Gyula Szilvássy a 18o m long section of this cave. The students from Tiszaföldvár have charted since additional 3o-35 metres.

Chance has also contributed to the discovery of the Hajnóczy Cave in 1971. A few days before camp closure the leader of the cave group was called away and thus the students could not work in the Odor Castle dripstone cave. One of the "foxholes" noted during earlier excursions was opened instead. Working hardly for three days they succeeded in enlarging the narrow entrance and on the 25th July, 1971 they entered through the Niagara the Ballroom, penetrating as far as the Miracle Hall. The discovery of the Hajnóczy Cave was accomplished by András Ádám, Anna Báldi, István Gál, Gyula Hegedüs and László Pödör.

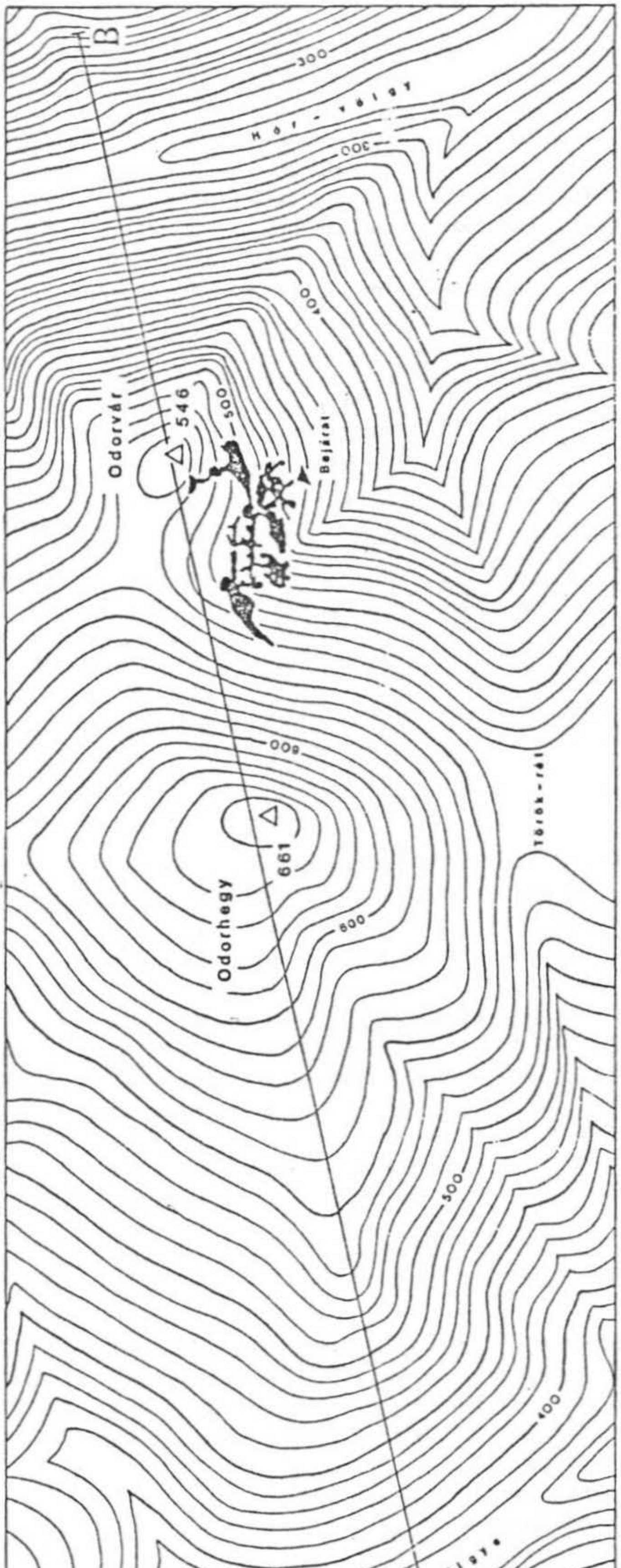
Site and geology of the cave

The entrance to the cave is situated at round 14o m distance from the peak of the Odor Castle, at an elevation of 46o m above sea level. The rock had been formed in cherty and chert-free Ladinian limestone /Balogh, 1964/. Although this formation is predominant on the eastern side of Hór Valley, it appears also somewhat to the south of Odor Castle on the eastern part of Fény Cliff. The western side of Hór Valley - to the north of Hosszu Valley - consists of dark-grey Lower Ladinian clay shale and sandstone /Balogh, 1964/. Tectonic forces have thrust this older rock on the younger limestone - forming a geological inversion /SCHMIDT/. The extent of overthrusting is demonstrated by the overwhelmingly shale debris cones in parts of Hajnóczy Cave where the shale is presently absent on the surface. An example thereof is the western end of the Galery, the Strutting.

Description of the cave

Following the narrow entrance, after a few metres crawling a few narrow, steep steps lead to the Niagara where the path bifurcates: to the north through the Houseroof into the Ruin Hall while descending over the 60° slope of the Niagara towards the east into the Ballroom. This part of the cave displays clear signs of development along bedding planes, in that

- the roof and floor of the cave depart gradually from each other,
- the cave assumes a typically labyrinth pattern and
- the NNE-SSW oriented faults and those perpendicular thereto predominating in


B
300
Hór-völgy
300
400
Odorvár
546
500
Bejárat
600
661
Odorhegy
600
Török-rét
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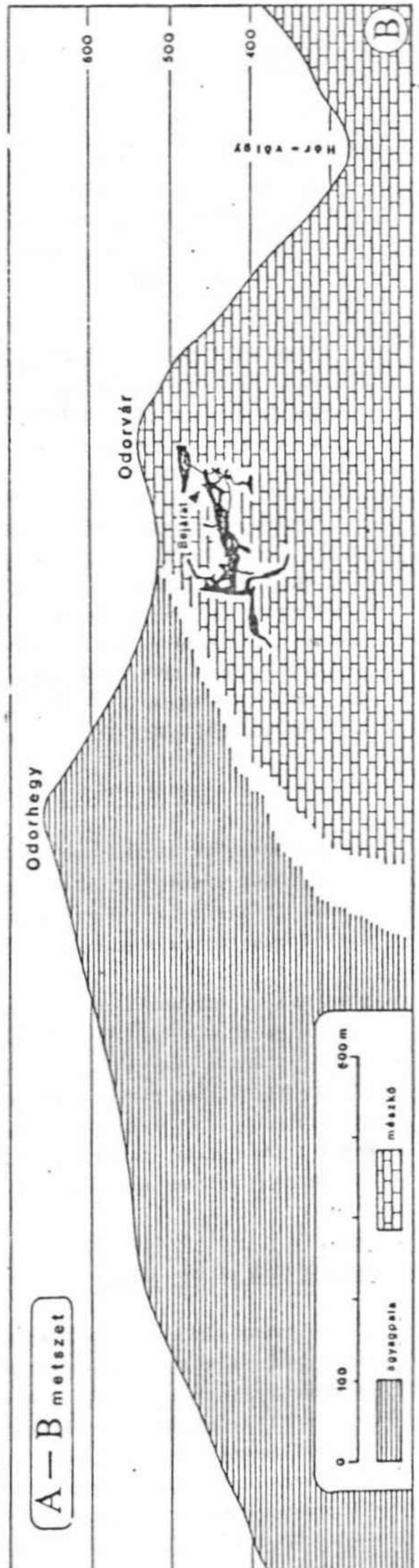
Cseresznyés-patak völgye
A


A—B metszet
m
600
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400
300
Odorhegy
Odorvár
Bejárat
Hór-völgy
A
B
0
100
agyagpala
mészkő

Odor Castle, are observable here too, and the passages developed along these main directions.

Proceeding further from the Ballroom, we attain the Miracle Hall where a small funicular cavity accomodates the most spectacular dripstones in the cave part terminating in the line of the Large- and Flat Halls. Crawling in SE direction we enter the Lower- and Uppar Smoky Halls, named so after the black, soot-like cover on the walls which consists according to the analyses at the Teachers' College at Eger, of calcium sulphate and iron carbonate containing 31 % $CaCO_3$ and 8,4 % Fe.

Returning via the chute along the Smoky Hall to the Miracle Hall, a narrow passage provides access to the eastern end of the Flat Hall where we perceive the dripstone nursery, including the Amphora. The view is offered by the 1-2 cm long helictites of a few mm diameter hanging from the overhead rock. The Flat Hall, as its name implies is only 5o-6o cm high, forcing us to crawl towards the Large Hall. On the eastern wall we perceive groups of calcite crystals, called "porcupines". The hall is crossed by NNW-SSE fissures along which rows of dripstone developed.

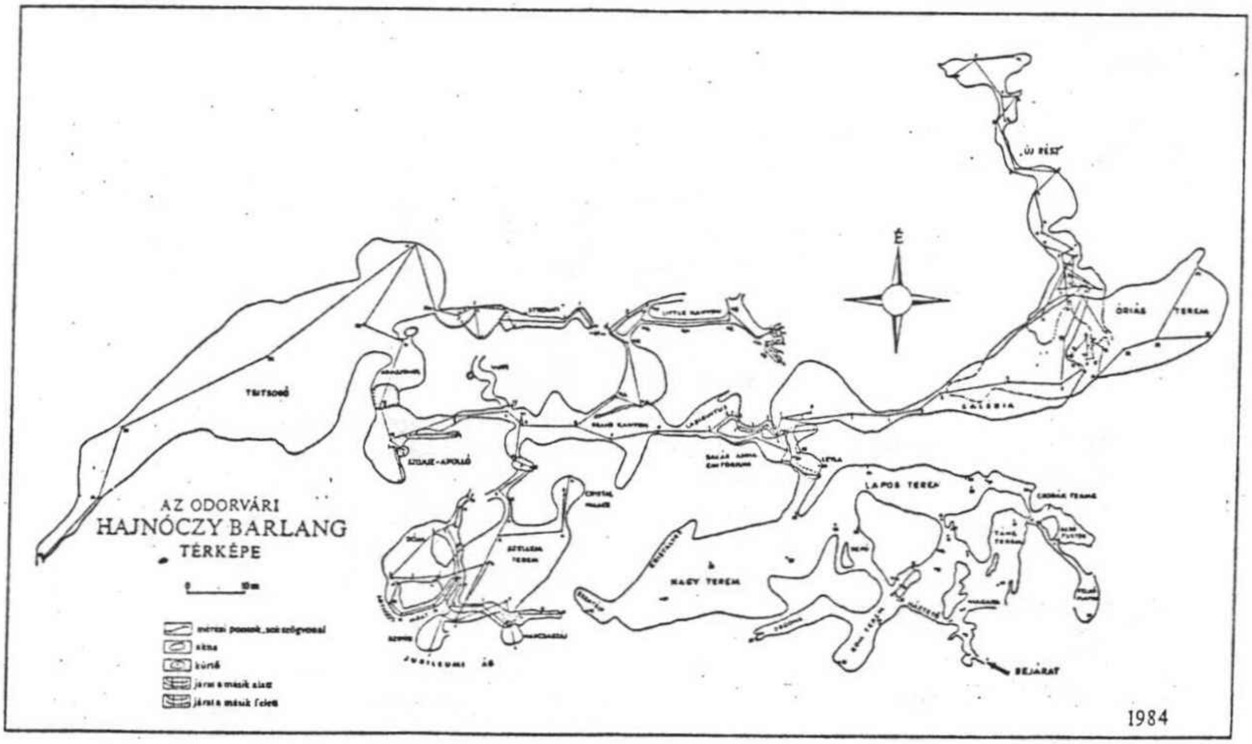
On the side towards the Large Hall, the Flat Hall terminates in a NNE-SSW "hedge" at the end of which a well developed, curved stalagmite is found.

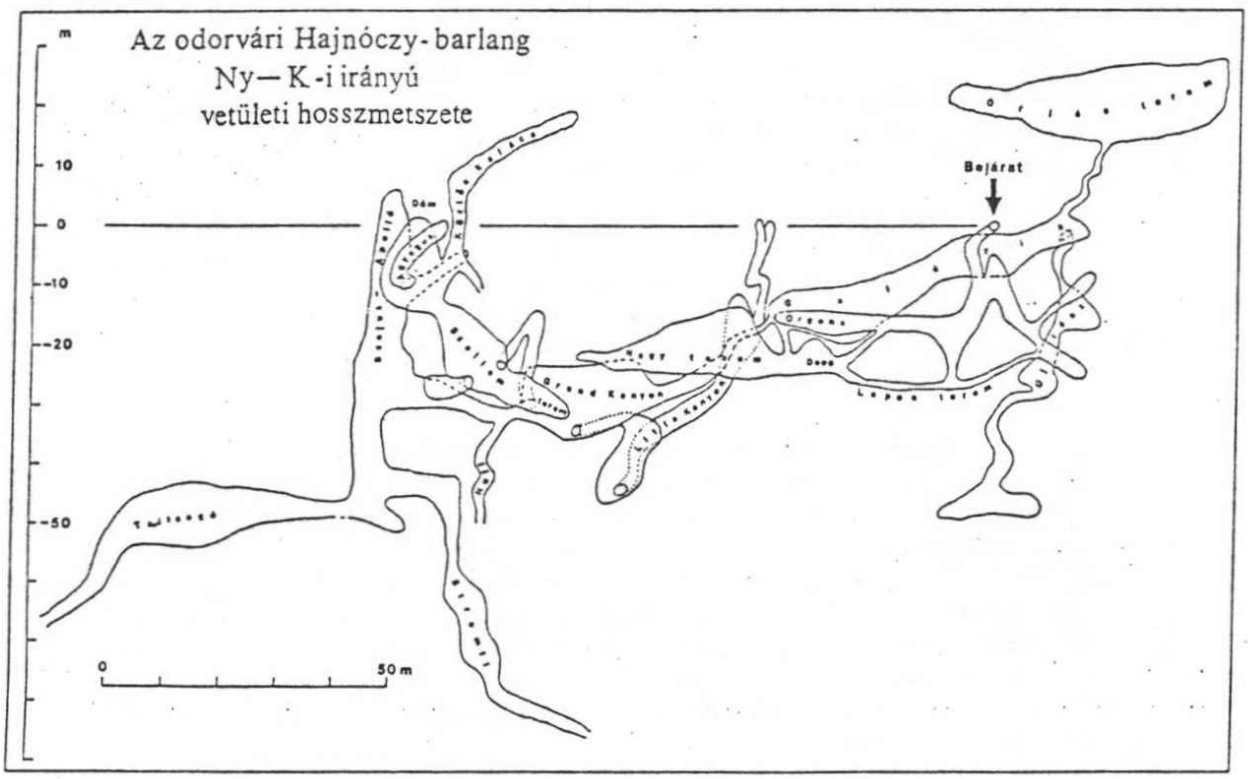
On the western side of the Flat Hall, the paths joins the one which traverses towards the west first the Ruin Hall, the with a slight detour the Organ Hall, to terminate in the Depot. The drape-like formation in the Organ Hall emits on striking a pleasant tone, thence the name.

Continuing from the Depot and avoiding a huge, tumbling boulder we enter the Large Hall of 48 m length, 14 m greatest width and 5 to 8 m height. The most impressive part of the hall is the Sanctuary at the northern end. The walls of the small cupola-shaped cavity are covered by grape-like aggregations of calcite crystals while the floor is decorated by a number of miniterates.

A 11 m long and 4o to 6o cm wide fissure at the western end of the northern wall is covered on both sides with calcite crystals. These have a greatest edge length of 3,5 cm, the sides inclined between 23 and 60°. Their size increases steadily downward. The dissolution marks visible on the sides of the crystals are evidences of submergence after development.

From the Large Hall the Leila Passage provides access to the Galery with the largest accumulation of dripstones in the entire cave. The presence thereof was indicated by the strong draft emerging from the almond-shaped orifice at the end of Leila passage. Removing the debris in 1973-74 provided access to this part. Continued explorations substantiated the assumption that this debris cone developed at the intersection of several passages. At the first exploration the Galery was freely passable, slight excavation provided entrance to the Crypt, the Golgota and the Labyrinth but access to the Venus Hall situated above these could be forced in 1986 only. The latter resembles strongly the Little Canyon to be described subsequently.


AZ ODORVÁRI
HAJNÓCZY BARLANG
TÉRKÉPE
É
ÓRIÁS TEREM
LAPOS TEREM
NAGY TEREM
BEJÁRAT
1984


Az odorvári Hajnóczy-barlang
Ny—K-i irányú
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m
10
0
-10
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Bejárat
Dóm
Nagy terem
Grand Kanyon
Lapos terem
0
50 m

The Galery is 7o m long, 1-8 m wide while its height varies between 4 and 13 m.

The spectacular richness of the Galery in dripstones is due to the fact that the foor is formed by vertical bedding planes conveying larger volumes of water. The typical dripstone dimensions are 6 to 15 cm diameter and 18o-31o m height.

An interesting feature of these dripstones is that their vertical sections are not rectangular but form rounded, irregular zig-zagging bands.

From the sediment sample taken from the NE end of the Galery, Dr. László Kordos succeeded in identifying a vole species called Savinian the age of which is presumably the Lower horizon of the Middle-Pleistocene /Kordos, 1976/.

The "New Part" explored in 1979 starts from the northern part of the eastern end of the Galery. The section is round 19o m long and descends to a depth of 56 m below station 8 in the Galery.

This part of the cave differs slightly from those described so far, in that it developed in thinly bedded limestone, contains many contractions, little dripstones and evidences of flows.

In the deepest part of the New Part, called the Rekettyés /Shrub/, it was noted with interest that the CO_2 concentration was highest /1,2-1,8 % by volume/ in a zone of about 1,8 to 2,3 m above the floor, rather than at the floor itself.

A climb between caved in rocks weighing several tons apiece leads from the eastern end of the Galery to the Giant's Hall which is 62 m long, 16 m wide and 14 m high.

Proximity of the surface is indicated by the bunches of 2o to 4o cm long, reddish fine roots hanging down from the roof. Presently this is the driest part of the cave but the earlier abundance of downseeping precipitation is indicated by the hip-size stalagmites found here, as well as by the "Winter Forest" dripstone flow on the southern wall.

The steep, round 80° chimney starting virtually from the roof of the Hall leads to the András Szabó Hall. This small cavity is to our present knowledge closest to the terrain surface, as revealed by the soil discovered in a side cavity and the 3-5 cm diameter roots therein. The main ornament in the Hall is the Tinkling Bell, a formation resembling a beehive covered with hundreds of 1 to 2 cm miniterates. The name originated from the tinkling sound of the minute dripstones rolling down the sides.

An interesting feature of the Giant's Hall is the "bat nest" excavated by dripping water it the guano of considerable thickness.

Farther parts of the cave are accessible from the western end of the Galery. Through the Crypt, the Golgota and the narrowest passage of the cave - the Vice - we reach the Labyrinth, a mass of rocks, formed presumably of the caved-in floor of a former passage above.

Emerging from the Labyrinth, the view opens on the 42 m long, in places 13 to 15 m high Grand Canyon bordered by steep walls, from 1,5 to 7,5 m apart. This section of the cave differs radically from the former in character. Cannelures are observable on the steep side walls while dripstones are virtually absent. Narrow, low passages to be crossed by craqling abound here but wider rooms, cavities have regularly developed at the intersection of several passages. Chimneys joining at the end of the passage rech to round 6 to 8 m above the Strutting.

This lateral is poor in dripstones and other formations but its orientation stimulates further explorations.

Returning to the middle of Grand Canyon we mount a debris cone consisting of limestone and shale. The Mária chimney opens from the top of the debris cone and bifureates into the Anniversary branch explored in 1981 /The Hajnóczy cave was discovered in 1971/.

The Anniversary branch just like the Grand Canyon, is relatively poor in formations but the existing ones are very spectacular. The Three Graces in the Ghost Hall, the Haystack of numerous thin dripstones, the Crystal Palace lined with 2 to 6 cm calcite crystals, the remains of a creek preserved in the southern part of the Hall and the Catfish Mouth are all evidences of the beauty of the underground world, compensating the explorers for the difficulties of access.

Serious climbing is needed to enter the higher parts of the Anniversary branch thus the Dome which is hardly illuminated by the acetylene gas lamp. In the twisted passage called the Braided Cake we find erosion pots which are virtually absent in other parts of the cave.

Returning to the Grand Canyon we pass the Hufi Shaft, through which we can descend into the scundest section of the cave, into an abandoned stream bed. The 14 m long section is blocked on both ends by clayey plugs but includes nevertheless two well developed meanders.

A few metres later towards the west, the Grand Canyon bifurcates. To the left is the Soyus-Apollo section which contains one of the most impressive formations in the cave, called the Lace Castle while to the right we enter the Comsomol, to which an iron ladder facilitates descent. On the right-hand wall are the wonderful Horse Teeth excaveted into the dripstone layer covering the wall by the still abudantly dripping water. These horse-teeth range from 2 to 4, up to 8-9 cm in size, with the larger ones situated towards the bottom of the wall, indicating that their development is due mainly to the mechanical action of the falling droplets. On the northern side of the horse-tooth wall we find several metres long, well developed canelures.

The shaft continues in an additional shaft which took two camp periods to clear, and which takes us to the depest point of the cave as mentioned before.

Proceeding north-west from the Comsomol Hall we enter the largerst hall in the Hajnóczy Cave, the Quagmire, named after the plastic clay covering its floor. The Quagmire is 87 m long, up to 27 m wide and 3 to 8 m high.

In the north-eastern end of the hall we arrive at the 35 m deep and 77 m long series of shafts, the upper section of which consists of two parallel passages. A rope ladder is needed to descend into the first, but protruding solid cherts provide good holds for secured climbing. The two passages merge after 19 m with an additional 9,5 m long section requiring again a rope ladder to reach an intermediate bottom. The shaft widens to about 5 by 2 m cross section. A side fissure followed by a round 4,5 m drop leads to the chute inclined at 28 °C which is accessible also from the shaft opened in summer 1978 in the Comsomol Hall. The deepest point of the Hajnóczy Cave, 98 m below the entrance and at 117 m distance therefrom is at the end of this shaft.

Passing the entrance to this series of shafts on the southwestern part we arrive first at the most spectacular pair of dripstones in the cave, the marble. white Pieta. The path continues in the side of the basin to the west of the center of the Quagmire which originated from a slide. The age of the slide can be estimated from the fact that there is a 1 m diameter and about 80 cm tall dripstone block in the 6 to 8 m long basin. Together with the formation above, called the Mother-in-law's Tongue, or the Heart of the Cave, this dripstone developed from seepage water.

The path takes us further along a nice formation, the Angel, to the Snow Slope, the whitness of which is preserved by crossing it in socks only.

A few steps, though in over ankle deep clay, take us to the end of the Hajnóczy Cave explored up to 1988.

Following the explorations in 1971, the aim was concentrated on widening the passages. The draught observed in places was the main orienting feature and indicated the Galery, the Giant's Hall, the Grand Canyon, the Quagmire and the Soyus-Apollo, the most impressive parts of the cave.

Scientific work started by mapping under the guidance of Emily Kocsis in 1972. The air duct network of the Hajnóczy Cave was studied in details by Gábor Miklós and Joseph Városi who established therefrom some important avenues of exploration /1975/. Proceeding in these directions, the New Part was discovered in 1979.

Closely related to the exploration of air currents, the climate of the cave was also studied. As a later member of this team János Domján has published several papers and articles on this subject. The investigations by János Mucsi - later Dr. J. Mucsi - and László Mucsi were also related to this subject who studied the therapeutic effectiveness of the Hajnóczy Cave beginning with the mid-eighties. The soil types developed over the parent rocks including the cave were studied by L. Mucsi, the professional report having aroused considerable interest in 1989.

The presence of radon in the cave atmosphere has been detected and measured continuously since 1978 by the physicists of the institute ATOMKI under the guidance of dr. György Somogyi. After his death in 1987 this work has been carried on by his co-workers.

Analyses and studied on the cave sediments have been started virtually in the wake of explorations first by dr. László Kordos, then by his disciple János Hir.

Geological studies on the cave and the collection and analysis of dripping waters in the cave have been started in 1977 under the guidance of Csaba Varga.

Several hundred black-and-white and colour photographs, as well as slides have been collected over the years by István Szlankó, Gábor Miklós, János Domján and Csaba Varga. The bulk of this material is conserved at the Tiszazug Museum at Tiszaföldvár and two representative folios have been compiled by Gábor Miklós.