

## SITUATION OF HUNGARIAN CAVE DIVING IN 1976

At present three organizations are dealing with underwater speleological research in Hungary: the Amphora Cave Diving Sport Club, the Delfin Cave Diving Club and the Nautilus Cave Diving Club. In 1975 these three organizations established the Commission on Subaquatic Speleology of the Hungarian Speleological Society. This decision was confirmed by voting at the general meeting of the Society on April 24, 1976.

The aim of the Commission has been to coordinate the work of organizations dealing with underwater speleological research in Hungary and to serve as a representative body responsible for the development of collaboration between home and foreign organizations in this field. The staff is distributed among the teams working under the Commission as follows:

Amphora Club — 19 persons

Delfin Club — 14 persons

Nautilus Club — 10 persons.

The areas investigated by these teams are as follows:

Amphora Club — Beremend and vicinity, Kossuth Cave, spring crater of Lake Hévíz;

Delfin Club — Molnár János Cave and surroundings of József Hill, Esztramos Hill, Rákóczi Caves;

Nautilus Club — Tapolca's Tavas Cave and vicinity, Baradla-Alsó Cave.

A considerable part of Hungary's underwater caves are of thermal origin and at present most of them still debouch a clear water of high temperature. The cave of the Hévíz spa-lake near Lake Balaton is interesting and significant from the sporting and the economic point of view.

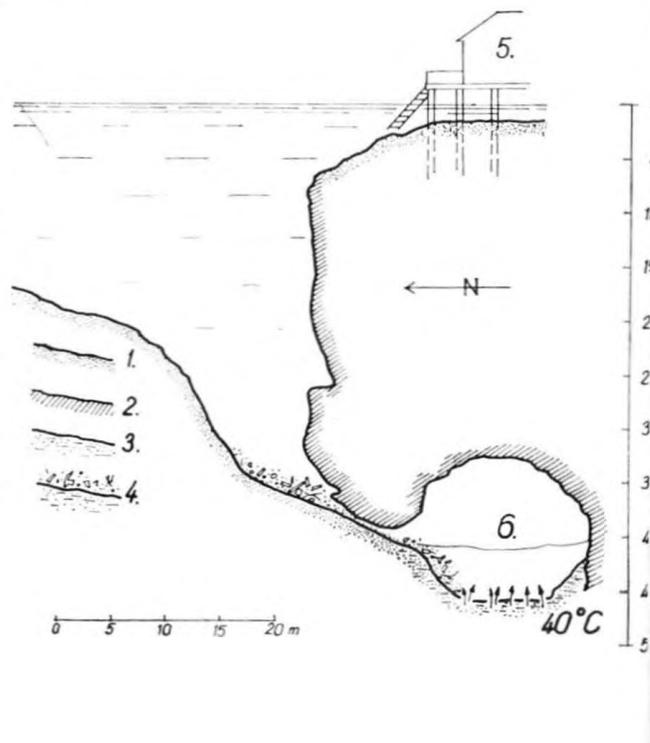
The area around the lake is characterized by a heavily faulted structure and the spring-crater, which is still active at the present time, seems to have been formed along a major fracture line of approximately N-S direction. The spring-crater, which is 36.4 m below the water surface, rests on Pannonian clays and sandstones underlain by Triassic Hauptdolomit. The spring-crater and the chamber associated with it seems to have been formed by the thermal waters ascending along the fracture line and penetrating the clays and sandstones underlying the peaty topsoil. They then carved out the 50 × 70 m springcrater and the associated spring-chamber along existing fissures. The quantity of water welling up from the 46 m deep spring-chamber is 30,000 to 40,000 litres per minute and its temperature at the entrance of the spring chamber is 38.8° C.

*Section of the spring crater in Lake Hévíz. Legend: 1. peaty topsoil, 2. sandstone with claybanks, 3. sludge bed, 4. construction rubbles etc., 5. house of public bath, 6. Amphora spring chamber.*

Exploration by divers was begun on January 25, 1908, when divers of the Fiume Naval Authority carried out dives in Requayrol-Denayrouzen diving dress. In 1953, divers in Dräger diving dress went down the crater, but even they could not penetrate the spring-chamber. Aqualung techniques, developing at an ever increasing rate from the 1950's, enabled the Hungarian divers to attempt to penetrate the spring-chamber. However, their irregular and insufficiently well-organized efforts failed to bring any worthwhile result.

In March 1972 professional divers of Hungary's Flood Control Service worked for more than a month at 38 m depth in the spring-mouth. They tried to clear the slot, plugged by long term accumulated construction rubble, but because of repeated silt collapses they had to stop the operation.

In February 1975, two divers of the Amphora Club were the first to enter the spring-chamber. After the necessary financial backing and materials had been obtained, regular exploration and development were started. On average, 8 to 10 divers went down for a 20 minute dive twice a day. A total diving time of about 300 hours between September 1975 and May 1976 was sufficient to survey and map every detail of the spring-chamber accessible to man. Divers found that the spring-water flowed into the crater from a chamber 14 m high and 17 m in diameter. This spring-chamber is split by a silt ridge at a depth of approximately 40 m, with a small depression on the eastern side and a larger one on the west. The divers measured water temperatures of 17.2° C at 43 m depth on the eastern side and 40° C at 46 m depth on the western side. As a consequence of waters of two different tem-



peratures mixing, the water which enters the spring-crater through the slot is at a temperature of 38.8° C connecting it with the spring-chamber. Thus cold water represents only 3 per cent approximately of the total water yield. At the base of the warm-water side may be found a light-brown, gelatinous coat averaging 3 cm in thickness, which has been formed by a thermophilic *Actinomyces* species in association with other bacteria. It can be sampled on the wall of small cavities between marcasite blocks, where the rate of water flow is the highest. Microorganisms forming long white filaments live on the roof of the cave and are probably also bacteria. Filamentous blue algae can be observed over a width of approximately 3 to 4 m on the steep wall of the cave where the warm water wells up to the surface. Freshwater sponges covering areas of 1 to 2 m<sup>2</sup> were found in several places of the crater wall where the water temperature was 26 to 30° C.

At the request of the Research Institute for Water Resources, the divers of the Amphora Club collected water samples. Analyses of these showed the age of the cold water to be approximately 8 thousand years and the warm water 12 thousand years. This period covers the time from the infiltration of precipitation into the soil to re-appearance of the water at the rising.

The interesting underwater Tavas Cave of Tapolca, 10 km from Lake Balaton, occurs at the contact of Sarmatian limestones and the Lajta Limestone (Leithakalk). The temperature of the water at the thermal cave entrance, in the centre of the town of

Tapolca, is 18.6° C. Research work began there in 1957, when several entrances and the initial series of the underwater cave system were explored. In 1960–61, divers of the Hungarian National Defence Sport Association explored 300 m of swimming passage, of which they surveyed 214 m. During their dives they made a black and white underwater film which they presented in Vienna in 1961 at the IIIrd International Speleological Congress.

The recent investigations are carried out by the members of the Nautilus Cave Diving Club. Since 1967 they have explored 7 new air filled chambers and underwater passages of 300 metres. During the explorations, they have developed a new type of air pipe signal-system, not used in Hungary before. This equipment is well applicable in horizontale underwater cave passages at average water depth of 3–4 m. The aim of the exploration in Tavas Cave is to find a connection with the dry Hospital Cave or explore further dry chambers in which curing areas for patients with respiratory diseases could be accommodated.

The water brought to the surface by springs from the cave is collected in a lake, within the municipal area of the town, in which hosts of *Phoxinus phoxinus* live. This cavernophilic fish can be found everywhere in the flooded cave system.

Since 1968 the Delfin Diving Club have also taken part in further investigations thereby promoting the full exploration of the cave. The cave is open to the public but since the entrances to the flooded system are in the "paddling lake stretches", diving is possible only at night.

From the observations and measurements described above, the length of underwater cave can be estimated at several kilometres presenting an enormous challenge to Hungarian cave divers.

One of the thermal springs rising at the foot of József Hill in the heart of Budapest leads to a marvellous underwater cave. Although the existence of the cave had been known as early as 1858, it was not until the Spring of 1972 that divers of the Delfin Club succeeded in penetrating the flooded system. Formed in Upper Eocene marls, the cave is almost entirely under water. So far the explored length is 250 m, the greatest depth 30 m and the temperature of the water, harnessed by the nearby Lukács Bath, is 22° C.

In the north-eastern part of the country, near the Baradla Cave, are three additional underwater caves; the Baradla-Alsó Cave, the Rákóczi Caves of Esztramos and the Kossuth Cave.

During visits abroad, divers of the Amphora Club explored the 100 m long 23 m deep sump in the Csarnóház Cave, Romania. Beyond the sump they penetrated and explored 4.5 km of virgin cave. Again in Romania, members of the Nautilus Club attempted to enter the spring-cave of Izbîndis, exploring the sump for a distance of 140 m.

*Divers surveying the newly discovered Amphora spring chamber in the Lake Hévíz*



Great difficulties have been met with in purchasing diving equipment for the three clubs mentioned here. Nevertheless, all have equipment suitable for carrying out underwater speleological investigations. Single hose regulators of the following types are mainly used: Scubapro Mark II, Scubapro Mark V, Scubapro Mark VII, Dacor Olympic 400, Snark Silver, Amphora Silver, Royal Mistral, P-11, Ukraine II. The same holds true for other equipment e.g. telephone, underwater lamps and photographic facilities. Due to difficulties in buying equipment, the majority is home-made.

A historical review of the work done and a list of the relevant literature were published, together with abstracts in English and Russian, in issue II, 1974, of this periodical.

English translation revised by R.A. Halliwell.

István PLÓZER  
National Water Authority  
H-1095 Budapest  
Kvassay J. u. 1.  
HUNGARY

Kinga SZÉKELY

## INSTITUTIONS AND RESEARCH-WORKERS DEALING WITH SCIENTIFIC INVESTIGATION OF CAVES AND KARST AREAS IN HUNGARY

### I. Government Institutes, University Departments and State Enterprises

*1. Mining Research Institute, Mining Hydrological Branch* (Bányászati Kutató Intézet, Bányavizvédelmi Osztály)  
H-1037 Budapest, Mikoviny u. 2-4. Tel.: 687-260.  
*Topics:* fundamental and applied research devoted to karst water control in mines; karst hydrogeology; karst hydraulics; technology, equipment and systems of karst water control.  
*Director:* Dr. A. Schmieder, head of research department  
*Staff:* I. Bagdy, works engineer; Mrs. Ö. Gessler, research associate; I. Havasy, research associate; Dr. Zs. Keserü, senior scientist; G. Szilágyi, research associate; T. Willems, senior scientist

*2. Hungarian Geological Institute* (Magyar Állami Földtani Intézet)  
H-1143 Budapest, Népstadion út 14. Tel.: 837-940  
*a) Department of Hydrology*  
*Topics:* hydrogeology of the karstic and non-karstic mountain areas of Hungary and the problem of karst features hidden deep underground.  
*Director:* Dr. L. Szébenyi, head of research department, geologist  
*Staff:* Dr. P. Müller, research associate, geologist, I. Venkovits, geologist  
*b) Museum*  
*Topic:* Pleistocene vertebrates  
Dr. L. Kordos, research associate, geologist

*3. Transdanubian Research Institute of the Hungarian Academy of Sciences* (Magyar Tudományos Akadémia Dunántúli Tudományos Intézete)  
H-7601 Pécs, Kulich Gyula út 22. Tel.: 10-489  
*Topic:* speleoclimatology.  
Dr. I. Fodor, senior scientist, candidate of sciences

*4. National Nature Conservancy Office, Speleological Institute* (Országos Természetvédelmi Hivatal Barlangtani Intézet)  
H-1121 Budapest, Költő út 21. Tel.: 366-744.  
*Topics:* Establishment of a National Cadastral Register of Caves and continuous registration of new entries in it. Development of plans for selected research subjects of outstanding importance. Co-ordination of speleological research works conducted in various scientific institutions with existing plans of research, exploration and cave-harnessing. Checking works stipulated in licences for the exploration and utilization of caves given to social organizations. Development, construction, equipment and operation of selected caves and/or fulfilling the duty of technical supervision in nature conservancy matters in caves given over to other organizations for operation. Collecting and evaluating reports on speleological research and on exploratory activities

and submitting proposals as to the relevant forms of utilization. The Institute performs its technical supervision of nature conservancy in caves in a close cooperation and coordination with the governmental and nongovernmental organizations interested.  
*Director:* I. Saskó, director in charge  
*Staff:* G. Magyari, geologist; T. Borza, geologist

*5. Research Centre for Water Resources Development, Institute for Hydrology* (Vízgazdálkodási Tudományos Kutató Központ Vízrajzi Intézet)  
H-1095 Budapest, Kvassay Jenő u. 1. Tel.: 140-620  
*a) Department of Subsurface Hydrology, Karst Water Section*  
*Topics:* hydrogeology and hydrology connected with karst and nonkarstic springs, and fundamental research in hydraulics. Study of the effects of human intervention. Expertises for mine objects, water supply, etc. connected with karst water.  
*Staff:* Dr. Gy. Dénes, research associate, geographer; Á. Lorberer, research associate, geologist; Dr. Ö. Ráday, research associate, geographer; L. Maucha, research associate, geologist; Dr. I. Sárváry, research associate, engineer  
*b) Hydrological Network Department, Karst Water Section*  
*Topics:* operation of the national karst water observation network and data collecting. The works are carried on by the staff of the Gellérthegy Laboratory of Karst Hydrology.  
*c) Data Bank Department*  
*Topic:* primary processing and storage of the data of the national karst water observation network  
*Staff:* Dr. I. Sugár, research associate, geologist  
Coordination of the works conducted at the above three departments is done by Dr. T. Böcker, candidate of sciences, scientific adviser.

*6. Historical Museum of Budapest, Prehistorical and Ancient Section* (Budapesti Történeti Múzeum, Ős- és Ókor történeti Osztály)  
H-1053 Budapest, Károlyi Mihály u. 16. Tel.: 173-893  
*Topic:* Paleolithic research  
*Staff:* Dr. M. Gábori, department head, doctor of historical sciences  
Mrs. M. Gábori, senior scientist, candidate of sciences

*7. Natural History Museum, Geological-Paleontological Department* (Magyar Nemzeti Múzeum Őslénytár)  
H-1088 Budapest, Múzeum krt. 14-16. Tel.: 337-171  
*Topic:* research devoted to Pliocene-Pleistocene vertebrates  
Dr. D. Jánosy

*8. Hungarian National Museum, Archeological Department* (Magyar Nemzeti Múzeum Régészeti Osztály)  
H-1088 Budapest, Múzeum krt. 14-16. Tel.: 130-678  
*Topic:* Paleolithic research  
Dr. T. V. Dobosi