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## A REVIEW OF THE FAUNA OF HUNGARIAN CAVES

### SUMMARY

Because of their geographical situation, the Hungarian caves are not too favourable for the development of a rich cave fauna. Nevertheless, speleobiological research, carried on for quite a long time now in this country, has shown the presence of troglobiont and troglophilic animals, mainly primitive, in considerable numbers. As a result of detailed speleobiological studies, a total of 435 animal species are at present known from the Baradla Cave. Beside the Baradla, a careful processing of the fauna was carried out in the Abaliget, Mánfa and Meteor Caves as well. Apart from describing the fauna of the above caves, the author reviews the fauna of the major Hungarian caves, from the protozoans up to the mammals, picking out the more interesting indigenous and troglobiont species.

Biospeleological research has a long tradition in Hungary although the intensity of work has varied, with emphasis placed on different aspects. The main orientation has been toward faunistic description with derivative ecological work. In the 1920's and 1930's E. Dudich, with the support of A. Gebhard and E. Bokor made detailed studies of the biology and ecology of the Baradla, Abaliget and Mánfa Caves.

Since that time, new animal species have been found in these caves while the fauna of other caves has been examined. In 1958, again on the initiative of E. Dudich, a Speleobiological Laboratory was set up in the Baradla Cave and a number of specialists embarked on a large-scale sampling program in many caves. This program was aimed mainly at investigating cave-dwelling Protozoa, Nematoda and Collembola with a leading role in the work being taken by I. Loksza. This wide ranging work has greatly advanced understanding of cave-dwelling organisms. Whereas in 1932 Dudich was able to list "still only" 262 animal species, we are now able to list as many as 435.

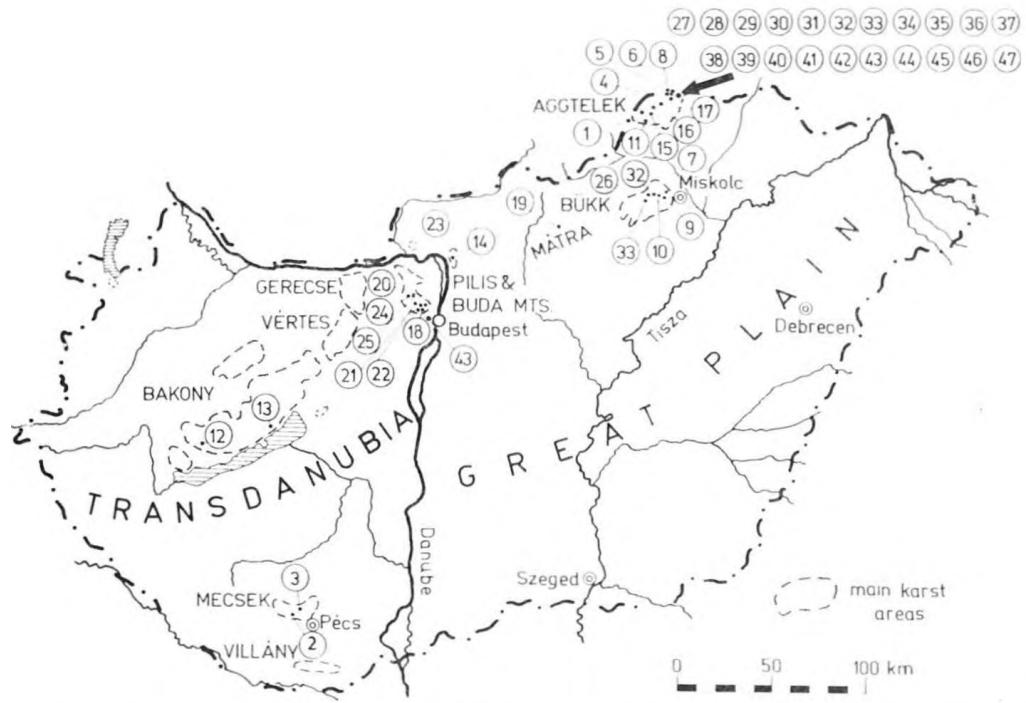
Bajomi has devoted particular attention to the Meteor Cave, discovered in 1961, which has yielded 90 animal species already in work which is by no means complete (Bajomi, 1969). At present the emphasis is placed on the thematico-ecological processing of the material collected earlier rather than in further sampling. The present paper reviews, without any claim to completeness, the fauna of particular interest in Hungarian caves.

**Protozoa.** Although the Protozoans are the richest group in the number of animal species found in the caves, their investigation has not been pursued until

the last decade. D. Dudich (1932) listed 22 species from the Baradla Cave while Gebhardt (1934) mentioned only 3 species from the Abaliget Cave; a fact probably resulting from the isolation of the water regime of this cave from the surface. More recent work by Varga, Takács and Cs. Bereczky has revealed 123 protozoan species in the Baradla Cave. Of these 34 belong to the Flagellata and 17 to the Amoeboina, one of these being a new species, *Amoeba cavicola* VARGA (Varga, 1963). One of the 51 Testaceans identified in the cave is new also, *Difflugia baradlana* VARGA (Varga, 1963), while two new varieties were discovered, *Difflugia oblonga* var. *curvicollis* VARGA and *Pontigulasia bigibbosa* var. *minor* VARGA (Varga, 1963). Beside these, 3 Heliozoan and 48 Ciliata species occur in the Baradla Cave. The majority of the Protozoans identified are eurytopic forms of wide geographic distribution (Loksza, 1975).

**Platyhelminthes.** The Turbellaria are the most numerous of the Platyhelminthes in streams in underground caves. The presence may be noted of *Polycelis felina* DAL. in the Abaliget Cave and of *P. tóthi* MÉH. and *Dendrocoelides pannonicus* MÉH. in the waters of the Mánfa Cave (Gebhardt, 1937). It is worth mentioning that several of these Trematodes are parasites of the bats living in the caves (Dudich, 1962).

**Nematoidea.** Andrassy identified 23 species found in the Baradla Cave. Four of these are new to science: *Alaimus meyli* ANDRÁSSY (Andrassy, 1961), *Cylindrolaimus baradlanus* ANDRÁSSY, *Dorylaimus bokori* ANDRÁSSY (Andrassy, 1959b) and *Myolaimus amitiae* ANDRÁSSY (Andrassy,



*Geographical location of caves biologically studied. I. Caves studied in detail: 1 Baradla, 2 Abaliget, 3 Mánfa, 4 Meteor; II. Caves studied partially: 5 Öz Shaft, 6 Kifli Shaft, 7 Szeleta, 8 Hideglik Shaft, 9 Forrás Calk-tufa Cave, 10 István, 11 Szabadság, 12 Tapolca's Tavas, 13 Lóczy, 14 Násznép; III. Caves under elaboration: 15 Béke, 16 Kossuth, 17 Magas-hegy, 18 Ferenc-hegy, 19 Ágasvár, 20 Pál-völgy, 21 Szemlő-hegy, 22 Mátyás-hegy, 23 Bátori, 24 Solymári-ördöglyuk, 25 Remete, 26 Kőlyuk, 27 Soltészlik Shaft, 28 Jég No. 1 Shaft, 29 Jég No. 2 Shaft, 30 Favágó Shaft, 31 Útmenti Shaft, 32 Felső-forrástöbör Cave, 33 Csökás-forrás, 34 Banán Shaft, 35 Iskola Shaft, 36 Fenyves Shaft, 37 Töltényes Shaft, 38 Pöttöy Shaft, 39 Róka Shaft, 40 Cickány Shaft, 41 Göte Shaft, 42 Körte Shaft, 43 Vár Cave, 44 Kilátó Shaft, 45 Ürgelik Shaft, 46 Éves Shaft, 47 Magasles Shaft.*

1959a). The same author also described *Nothotylus antricolus* ANDRÁSSY from the Kőlyuk Cave at Mánfa village. Bajomi collected 15 Nematode species in the Meteor Cave, of which the troglobiont, *Mylonchulus cavensis* SCHNEIDER deserves special mention (Bajomi, 1969). The other species are, for the most part, euryoeces also found in similar biotopes on the subaerial surface.

**Rotifera.** Varga identified four Rotifers from the Baradla Cave; two being new species, the Bdelloid *Habrotrocha baradlana* VARGA (Varga, 1963) and *Proales baradlana* VARGA (Varga, 1959) from the Ploima group.

**Annelida.** The aquatic and terrestrial Oligochates and Hirudinoidea found in the Hungarian caves are mostly of no particular interest. For instance widely distributed forms such as *Tubifex tubifex* MÜLL. and the earthworm *Octalasium lacteum* ÖRLEY are common in the Baradla, Abaliget, Mánfa and Meteor Caves (Dudich, 1932; Gebhardt, 1934, 1937; Bajomi, 1969). *Troglochaetus breanecki* DEL., a primitive ancient annelid, lives in the groundwater of the Béke Cave (Andrássy, 1956). A more striking recent discovery has been the new species of earthworm *Allolobophora mozsariorum* ZICSI (Zicsi, 1974) from the Baradla-Alsó Cave. This whitish coloured worm lives with its anterior end burrowed into the silt.

The Enchytraeids of the Baradla and Meteor Caves have become familiar through work by Dózsa-Farkas. This worker determined 3 species from the Meteor Cave and 17 from the Baradla Cave. Four from the latter source are new species; *Cernosvitoviella aggretelekiensis* DÓZSA-FARKAS, *Enchytronia christensenii* DÓZSA-FARKAS (Dózsa-Farkas, 1970), *Fridericia reducta* DÓZSA-FARKAS (Dózsa-Farkas, 1974) and *F. semiseta* DÓZSA-FARKAS (Dózsa-Farkas, 1970). Further two species are new to the Hungarian fauna.

**Crustacea.** The peculiar Ostracod *Candona dudichi* KLIE was found in the Baradla Cave. Several Copepods have been described from there and the Abaliget Cave (Dudich, 1932, Gebhardt, 1934). *Ceuthonectes hungaricus* PONYI and *Elaphoidella pseudojeannelli aggretelekiensis* PONYI (Ponyi, 1958), both from the Baradla Cave, *E. pseudojeannelli* PONYI from the Béke Cave and *E. bajomii* PONYI and *E. meteorii* PONYI from the Meteor cave are all newly described species (Bajomi, 1969).

The blind Anaspidaceans in cave waters are relics of an ancient fauna. Hungarian representatives of the group are *Bathynella hungarica* PONYI from the Béke Cave, *B. h. baradlana* PONYI (Ponyi, 1957) from the cave giving it the subspecific name and *B. chappuisi* DEL. from the Abaliget Cave.

Several troxoglenic terrestrial oniscoids have been found at the mouths of caves. Within the Baradla and Béke Caves and the Szabadság Cave at Égerszög the white blind *Mesoniscus graniger* FRIV. has been found (Dudich, 1932). The Aselloids are represented by *Stenasellus hungaricus* MÉH (Gebhardt, 1934) in the waters of the Abaliget Cave with a subspecies *robustus* in the Mánfa Cave (Gebhardt, 1937).

The Amphipod *Niphargus agtelekiensis* DUDICH is common in the Baradla and Béke Caves. In the Abaliget Cave *Niphargus leopoliensis molnari* MÉH. occurs in the underground stream while *N. foreli gebhardti* SCHELL is restricted to stalactitic basins (Dudich, 1932). *N. l. molnari* MÉH is found in the Mánfa Cave (Gebhardt, 1937) and *N. tatraensis* VRZ. in the Meteor Cave (Bajomi, 1969). All these species are white blind animal and the evolution of separate species within these separate Hungarian caves is worth noting.

Few Diplopod species are found. *Allotyphloiolus polypodus* LOKSA is found in the Forrás Cave at Lillafüred (Loksa, 1962) while the troglophilic *Orobainosoma flavescentia* LATZ and *Archiboreoilius pallidus* BRADE-BIRKS live in the Násznép Cave of the Naszályhegy (Loksa, 1970). *Brachydesmus troglobius* DADAY, first described in 1889 (Gebhardt, 1934), occurs in great numbers in the Abaliget Cave. Much rarer there are *Hungarosoma bokori* VERH. and *Orobainosoma hungaricum* VERH.

**Chilopoda.** Most of the Chilopods in Hungarian caves are trogloxenic. The exception to this is *Lithobius stygius infernus* LOKSA found in the Bátori Cave in the Buda area as well as the Mátyás-hegy, Pál-völgy, Szemlő-hegy, Ferenc-hegy and Remele Caves in the same region (Loksa, 1948).

Out of the representatives of **Diplura**, the species *Plusiocampa spelaea* STACH occurring in the Baradla and Szabadság Caves deserves to be mentioned (Loksa, 1961). *P. breviantennata* LOKSA lives in the Tavas Cave and the Lóczy Cave at Tapolca. In addition to it, there are two troglophilic species: *Eutrichocampa paurociliata* LOKSA in the Lóczy Cave and *Campodea augens* SILV. in the Tavas Cave (Loksa, 1960). The niche of Mánfa is inhabited by *C. grassii* SILV. and *C. staphylinus* WESTW. (Gebhardt, 1937).

**Collembola.** Numerous representatives of Collembola live in the caves concerned, e.g. 18 in the Baradla, 12 in the István Cave, 10 in the Abaliget Cave and 9 in the Meteor Cave. Their overwhelming majority are troglophilic elements. In the present review only the endemic and troglobiont species are listed: *Neanura dudichi* LOKSA and *Onychiurus kadiči* LOKSA occurring in the Öz Shaft (Loksa, 1967; Bajomi, 1968). *O. schoenvíszkyi* LOKSA in the Kifli Shaft and the Meteor Cave (Loksa, 1967; Bajomi, 1969) and *O. microchaetus* LOKSA in the Násznép Cave (Loksa, 1959). The Öz Shaft of

the Alsó-hegy is inhabited by *Arrhopalites hungaricus* LOKSA, the Kifli and Hideglik Shafts are by *A. furcatus hungaricus* LOKSA (Bajomi, 1968). In the Meteor Cave lying close to the afore-mentioned karst shafts there is *A. hungaricus intermedius* LOKSA (Bajomi, 1969; Loksa, 1969). The species *A. bifidus* STACH can be found in the István, Forrás and Szabadság Caves (Loksa, 1961, 1962). The Baradla Cave accommodates, among other forms, the species *Arrhopalites agtelekiensis* STACH. *Hypogastrura cavicola* BÖRN. occurs in the Forrás and Meteor Caves, *Folsomia antricola* LOKSA in the Meteor and Szabadság Caves (Loksa, 1959), *Pseudosinella argentea* LOKSA in the Lóczy Cave (Loksa, 1960), whereas *P. agtelekiensis* STACH is an inhabitant of the Baradla and Szabadság Caves (Loksa, 1961). In addition, the occurrence of *Oncopodura égerszögensis* LOKSA in the Szabadság Cave deserves attention to be paid to (Loksa, 1961).

**Lepidoptera.** Typical representatives of hemitrogliphile butterflies in the Hungarian caves are *Scolopteryx libatrix* L. and *Triphosa dubitata* L. (Dudich, 1932; Gebhardt, 1934, 1937; Bajomi, 1969).

**Coleoptera.** The coleopteric fauna of the Hungarian caves is very poor, just a few blind carabuses are known. In the Baradla Cave there is *Duvalites hungaricus* CSIKI (Dudich, 1932), in the István and Kecske Caves *D. gebhardti* BOKOR (Loksa, 1962) in the Meteor Cave *D. hungaricus silicensis* CSIKI (Bajomi, 1969). In the Szabadság Cave *Atheta spelaea* ER. occurs (Loksa, 1961).

**Diptera.** Dudich listed 42 species from the Baradla Cave, Gebhardt 37 species from the Abaliget Cave and 29 species from the Mánfa Cave. Most of them, however, are trogloxenic or troglophilic elements. The commonest families of flies in the Hungarian caves are: *Sciaridae*, *Phoridae*, *Helomyidae* and *Sphaeroceridae*. The following forms may be considered troglobiont species: *Lycoria (Sciara) ofencaulis* LDF. and *L. baradlania* KNÉZY in the Baradla Cave and *Pseudostenophora antricola* SCHM. in the Abaliget Cave (Gebhardt, 1934).

**Arachnoidea.** There are several orders representing Arachnoidea in the Hungarian caves. A typical representative of the Hungarian troglobiont fauna is the species *Eukoenenia austriaca vagvoegyi* SZALAY living in the Baradla, Szabadság and Meteor Caves (Szalay, 1956; Dózsa-Farkas, Loksa, 1970).



*Niphargus agtelekiensis* DUDICH (Photographed by the author)

Of the representatives of **Phalangiidea**, the species *Crosbycus bükkensis* LOKSA (Loksa, 1962) occurring in the Forrás Cave of the Bükk Mountains is troglobiont, while *Nemastoma chrysomelas* HERM., a species common in the Baradla, is troglophilic (Dudich, 1932). **Spiders (Araneidea)** are represented in the Baradla by two troglobiont species: *Porrhomma errans* BL. and *P. rosenhaurei* L. KOCH. (Dudich, 1932). The second species is present in the Meteor and Mánfa Caves as well. The subspecies *P. rosenhaueri hungaricum* LOKSA is endemic in the Kőlyuk Cave. The subspecies *Lepthyphantes pisai bükkensis* LOKSA was described from the same cave (Loksa, 1970).

Troglobiont representatives of **Acaridea** occurring in a relatively great number in the caves are the following: *Eugamasus magnus* var. *cavernicola* TRÄG. in the Baradla (Dudich, 1932), *Myianotoetus dyonychus* OUDEMANS in the Meteor Cave, *Oribella cavatica* KUNST in the Öz and Kisfö Shafts of the Alsó-hegy as well as *Schviebea cavernicola* VITZTHUM which also occurs in the Öz Shaft. Hydrophilic acaruses are represented by *Soldanellynx chappuisi* WALT. in the Abaliget Cave and the Szabadság Cave of Égerszög (Dudich, 1962).

**Molluscs.** Troglophilic forms are represented by the species *Pisidium casertanum* POLI occurring in the Baradla, Abaliget and Mánfa Caves (Dudich, 1932; Gebhardt, 1934, 1937). The species *Paladihiopsis (Lartetia) hungarica* SOÓS living in the Abaliget Cave and *P. gebhardti* H. WAGN. in the Mánfa Cave are blind, troglobiont, water-dwelling gastropods (Gebhardt, 1934, 1937). *Daudebardia hungarica* L. SOÓS, a half-shelled gastropod, is troglobiont and indigenous to the Baradla (Dudich, 1932). The gastropod *Oxychilus glaber* FER. occurs frequently in the entrance parts of the Hungarian caves.

**Fish (Pisces).** Interesting is the occurrence of *Phoxinus phoxinus* L. in the Tavas Cave of Veszprém-tapolca, where a peculiar cave-dwelling form of this species, differing in size, colour and physiological characteristics from its subaerial counterparts, has developed (Dudich, 1962).

**Mammals (Mammalia).** Hosts of bats occur in the Hungarian caves, among which *Myotis oxygnathus* MONTIC (Gebhardt, 1934, 1937; Bajomi, 1968), *Myotis myotis* (Dudich, 1934), *M. bechsteinii* LEISL (Bajomi, 1968), *Rhinolophus hipposideros* BECHST. (Dudich, 1934; Bajomi, 1968) and *Miniopterus schreibersi* NATT. (Dudich, 1934) are the most frequent forms.

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