

## AN OVERVIEW OF RESEARCH ON CAVE BATS IN HUNGARY

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Caves form part of the natural habitat for all but three of the 24 bat species of Hungary. Those species which utilize caves — at least the entrance chambers — spend much of the winter there. This group also includes species which use caves in summer for reproducing. Speleobiologically bats are troglophilous animals. The first impression of cave visitors in many places is that bats are the sole representatives of cave fauna. However, the excrements of bats provide ample food for part of the true speleofauna.

The information accumulated up to the turn of the century was summarized by L. Méhely (1900) in a splendid monograph. He collected data from the literature of the previous century and a half of from his own observations made at the Zoological Department of the National Museum. In the five decades following the publication of this monograph Schwalm (1904), Éhik (1924, 1941), Kubacska (1926–1927), Dudich (1930, 1932), Gebhardt (1933), and Vásárhelyi (1939, 1942) made new contributions, most of which were additional data on cave bats.

This author started his investigations of bats in 1950, first as an outside collaborator of the Natural History Museum, with the support of the Museum, and since 1955 as a museologist. In addition to morphological, systematic and paleontological investigations and investigations concerned with tropical bats (not covered here), he studied the distribution of bats (Topál, 1954c, 1959, 1976), their ecology and ethology (Topál, 1962b, 1966). On the advice of professor E. Dudich, he also introduced the first banding of bats in Hungary in 1951, following the example of the Germans. The results of the ringing have only partially been made public (Topál, 1954a, 1954b, 1956, 1962, 1963). Between 1951 and 1965 the number of bats banded exceeded 24,800. This method helped researchers collect much new data on the occurrence and extension of the animals and also on the quantitative aspects, structure, and seasonal changes of their populations. Numerous data has been collected on the wanderings of various bat species, their life-span, and behaviour.

After 1965 the rate of ringing investigations was greatly reduced, and only 940 specimens have been marked in the last twenty years. It was recognized internationally that disturbing hibernating bats for examination and tagging upset their intimate metabolism and thus reduced their chance for successful hibernation, forcing them to leave their safe shelter. In addition, some species also reacted more sensitively to the mere presence of the ring. At the same time a large-scale decline of the European bat population began. This was explained in many places by the wide-spread use of chemical insecticides (DDT et al.) and other toxic chemicals.

The requirements of nature conservation, stricter since the early 1980s, have called for new investigations, primarily in cave habitats. Commissioned by the Speleological Institute, the Hungarian Speleological Society selected 20 caves in 1985 in which to count bats, once each winter and once each summer every year.

Until 1988 out of the 20 selected caves the following were studied: the Baradla and Béke Caves (Dobrosi, 1986, 1987, 1988), the Három-kút Cave, the István-lápa Cave, the Kecske-lyuk and Kőlyuk (Kováts, 1986, Lénárt, 1986, 1988b), the Létrási-vizes Cave (Kováts, 1986, 1987, Lénárt, 1986, 1988a), the Pál-völgy Cave (Takács—Bolner, 1985, 1986, 1988), the Solymár Ördöglyuk (Rajczy, 1987, 1988), the Szoplaki Ördöglyuk (Dobrosi, 1986, 1987, 1988), the Leány Cave (Dobrosi, 1988), the Legény Cave (Dobrosi, 1986, 1988), the Pilis Cave and the Abaliget Cave (Dobrosi, 1987, 1988) and finally in the Pisznice Cave and Shaft No. 1 of the Öreg-kő (Juhász, 1986, 1988).

In addition the Marcel Loubens Caving Group published data on bats from 17 other caves (Lénárt, 1985, 1986, 1987). The Vértess László Group of Tatabánya and the Gerecse Cave Exploration Association (Juhász, 1986, 1988) found bats in 18 other caves. Dobrosi (1987, 1988) counted bats in the Kossuth Cave and some caves of the Mecsek Mountains.

It is worthwhile to compare, where data are available, the present conditions with those of 35, 25 and 15 years ago. The extensive Baradla Cave

with its high chambers has been a den for bats for several centuries. Bats live in Baradla not only during the winter but also during periods in the summer. While earlier investigations in the first part of this century (Dudich, 1930, 1932) only studied the species *Rhinolophus ferrumequinum* and *Rh. hipposideros*, in late October, 1955, the author (Topál, 1962b, 1966) also found *Rh. euryale*. He counted the flights of the individuals of this species out of the cave in the evening and estimated the summer population at a minimum of 700 in late June, 1956. In June, 1965, however, he did not find a single bat in the cave. The information from I. Szenthe and D. Dobrosi (personal communication) point to the resettlement of *Rhinolophus euryale*. In January, 1983, author observed sixty *Rh. ferrumequinum* and twenty *Rh. hipposideros* in the cave. D. Dobrosi counted 91, 90 and 119 *Rh. ferrumequinum* and 19, 32 and 5 *Rh. hipposideros* along the Aggtelek section in February 1986, 1987 and 1988, respectively.

Besides the sporadic appearance of other bat species, in the 1950s the Pál-völgy Cave was the permanent hibernation place of small populations of *Myotis blythi oxygnathus* and *Rhinolophus hipposideros*. According to the recent detailed observations of the Bekey Cave Exploration Group (Takács-Bolner, op. cit.), although the known length of the cave has grown multifold in 30 years, the number of *Myotis* has decreased a catastrophic extent. Recently only 13 and 10 hibernating specimens were found in two countings, while from 1951 to the spring of 1955 (during four winters) altogether 680 specimens were banded there (Topál, op. cit.). Between 1955 and 1972 they only numbered between 7 to 19 during single day observations. The number of *Rhinolophus hipposideros* hibernating there during the winters of 1951–52 and 1952–53 was altogether 59, and in the winters of 1953–54 and 1954–55 103 (comprising 16 and 15 days of survey, respectively, Topál, op. cit.). Most recently, very detailed investigations in the second half of February, 1986, counted 113 individuals and in late February, 1988, 107 individuals. This by no means represents a decline compared with the population 30 years ago, and even some growth is noticed. It is worthwhile to note that in Western Europe this was the very species which suffered the greatest loss during the last several decades.

The Szoplaki Ördöglyuk was an important winter den of several species of bats in the 1950s and 1960s. When intensive ringing began, the population was estimated to be between eight and ten thousand. Later there was some decline and the number fluctuated seasonally between 3000 and 6000. The higher number of individual bats was invariably observed in January–February (Topál, op. cit.). Some years later, in January, 1983, the number of hibernating animals was around 300. The majority were *Myotis blythi oxygnathus* mixed with a smaller number of *Myotis myotis*. *Miniopterus schreibersi*, the second commonest species 30 years ago, had totally disappeared from the cave. According to

I. Szenthe (personal communication), in 1985 he counted about 1700 hibernating animals and in early March of 1986, the population consisted of 700 bats. In early February, 1988, D. Dobrosi (op. cit.) observed about 650 bats (most of them *Myotis blythi*) in the cave. It is hoped that if they are not disturbed frequently during the winter, their population will remain permanently at this level in this once so important hibernating place.

The Pisznic Cave, Gerecse Mountains, was an important bat den in the 1950s. At the time this was the third known breeding place of *Rh. euryale* (along with the Baradla and Miskolc-tapolca Caves, Topál, 1962a, 1962b, 1963). In late July to early August, 1957, this species comprised about a quarter of the total population (more than 800 out of 3,300 individual bats, counted during their evening flight). In addition, *Myotis myotis* and (in smaller numbers) *Miniopterus schreibersi* also mated here. It was then demonstrated that by the end of August 200 individuals of the total population had left the cave in the evenings, and not returned. Thus, by September, only a few *Miniopterus* remained there. In November hardly any bat hibernated in the cave. In mid-June, 1971 (before the young were born), the number of adults reached a thousand, but in late July, 1973 (calculating most of the young into the population), the counting at the evening flight yielded a maximum of 750 individuals, only a third of the number recorded 17 years ago. In the summer of 1976, 20 to 30 bats of the *Rh. euryale* species could be seen in the cave. Juhász (1986, 1988) and the members of the Gerecse Cave Exploration Association of Tatabánya noted 54 and 8 bats in January, 1986, and February, 1988, respectively. No bats were seen, however, in the September, 1988 counting. In 1986 the survey of the above mentioned speleologists was extended to 190 caves in the Gerecse Mountains, but the results were equally poor. The counts in the winter and summer of 1988 found bats in only four other caves.

In the 1950s it was proved (Topál, 1956, 1962a, 1962b, 1966) that the Abaliget Cave was an important den for Transdanubian *Myotis blythi oxygnathus* (1,500–2,000 individuals hibernated there annually), for *Miniopterus schreibersi* (in late May, 1954, they had a nursery colony of 600), and also for *Rhinolophus ferrumequinum* (150 hibernating individuals). The most common species at the time, *Myotis blythi oxygnathus*, has virtually disappeared from this cave, and *Miniopterus schreibersi*, the second most frequent species, no longer is represented. These facts are shown by D. Dobrosi (1987, 1988). At the same time there has been no decrease in the number of *Rhinolophus ferrumequinum* compared with the 1954 population of 150 specimens. However, compared to the figure of March, 1987, the survey of March, 1988, showed decline.

There was no comparative data available for the cave selected for investigation and mentioned below. In the Három-kút Cave, as indicated by the

observations of Kováts (*op. cit.*), Lénárt (*op. cit.*) and this author, several hundreds or even thousands of bats spend the summer there. Beside *Myotis myotis* and *Myotis blythi oxygnathus*, several hundreds of *Miniopterus* were known to live there. The latter species seems to be disappearing from all of Hungary although, still relying on the data of the mentioned observers, the Kecske-lyuk still functions as a summer den of this species.

In some respect, these investigations need some supplementary work. However, the opportunity for making regular countings, allowing the estimation of hibernating and the summer populations, should be taken advantage of in many different areas of the country. Thus, there would be a data-base for noting prior differences and future changes. In addition to the caves mentioned in the study, it would be useful to include the previously neglected Kács, Alba Regia, and perhaps the Mátyás-hegy and Ferenc-hegy Caves along with the major caves used for hibernation.

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