RESULTS OF RESEARCH ON THE BAT FAUNA OF THE VÂRGHIŞ GORGE (EASTERN CARPATHIANS, ROMANIA)

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Abstract. During the period between 2000 to 2004 in the Vârghiş Gorge (Eastern Carpathians, Romania) 23 caves were checked in order to collect chiropterological data. In 16 of them bats or bone materialwere found. Check-up of caves, netting and detectoring were used as methods and the collected bone material was also determined. 17 bat species were identified. The results suggest that an important number of caves are used by bats in different parts of the year.

Key words: Chiroptera, fauna, Vârghiş Gorge, Eastern Carpathians

1. INTRODUCTION

The Vârghiş Gorge is a natural reserve, situated on the northern edge of the Perşani Mountains, in the southern part of the Eastern Carpathians. The first chiropterological data from the area were collected by J. Daday, and published in 1885 and 1887. His data were supervised and corrected by MÉHELY (1900). The same data were published by PASZLAWSZKY (1918). In the 50 researchers from the Speological Institut in Bucharest collected many precious chiropterological data from the Vârghiş Gorge, which data they published in their most important work about the distribution of bats in Romania (DUMITRESCU *et al.*, 1962–1963). They found the presence of 11 bat species in the study area. At the same time they published the monographical description of the Vârghiş Gorge (ORGHIDAN & DUMITRESCU, 1962–1963). After this period, in the second part of the 20th century, there was a serious lack of data. In the last decade some authors published articles about the distribution of bats in Romania (VALENCIUC 1993, 1994, GHEORGHIU *et al.*, 2001), but from Vârghiş Gorge they have data only from the literature.

2. MATERIALS AND METHODS

The Vârghiş Gorge Natural Reserve lying on only 998 hectars is one of the most important karstic areas in the territory, with 125 known caves (Fig. 1). All the caves have an identification number, and many of them a name, too. The geographical coordinates of the central zone of the gorge are: Northern latitude 46º13', Eastern longitude 25º34'. The medium altitude is 750.25 m, with the highest altitude at 945.5 m, and the lowest at 555 m above sea level. The gorge is made of superior cretacic

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limestone. The climate is temperate continental, extremely cold winters and cool summers being characteristic. The medium annual temperature is 6–7ºC, the maximum temperatures are registered in July and August, reaching 34–35ºC. The mean yearly rainfall is 780–820 mm. 77% of the territory of the reserve is covered by wood vegetation, the beech woods being dominant in the north as well as the beech-oak forests in the south. The conifers are represented sporadically by *Picea abies*, *Pinus sylvestris*, *Juniperus communis*. The brushwood in the Eastern part of the reserve is constituted of many species of shrubs: *Coryllus avellana*, *Cornus mas*, *Euonymus europaeus*, *Crataegus monogyna*, *Sambucus nigra.* (AMBRUS & PÉTER, 2003).

The biggest of the caves is the Mereşti (Homoródalmási, Orbán Balázs, no. 14) cave. About this cave was made in 1835 the first cave map in Transylvania (DÉNES, 2002). The length of the cave is 1527 m, the size of the entrance is 6×12 m. In the biggest hall of the cave the maximum height reaches 25 m. The temperature in the deeper parts of the cave is between 9–10ºC. Two other important caves are the Lócsűr (no. 8) and Gábor (no. 20) caves. The Lócsűr cave is 220 m long, the height of the entrance is approximatelly 6 m, and the width is 10 m. The maximum height of the cave is 6 m. The temperature in the final part of the cave is 9ºC. The length of the Gábor cave is 174 m, the size of the entrance is approximatelly 4×8 m. The temperature only in the final part reaches 8ºC, closer to the entrance the effect of the outside temperature results in a wide fluctuation.

All the data presented in this paper were collected by the authors in the period between 2000 to 2004. The aim of the study was updating faunistical data, because our knowledge about bat distribution in the area is really deficient. Additionally, during the study we could make observations about the ecology of some species of bats in the area. The following methods were used: check-up of caves, netting an detectoring. The Mereşti (Orbán Balázs) cave was checked more regularly in different parts of the year. The smaller caves (with length between 6 and 300 m) were checked mainly in winter to count the hibernating bats.

We made mistnettings in the mating period, mainly in the second part of August, near the cave entrances, with special chiropterological nests. The specimens caught were identified, measured, weighed and set free. Detectoring using Pettersson D 200 ultrasonic detectors, was carried out near the cave entrances and near the stream which flows across the gorge. For species determination the following works were used: JONES (1993), VAUGHAN *et al.* (1997). The collected bone material was also determined, using determinators of TOPÁL (1969) and FELTEN *et al.* (1973).

3. RESULTS AND DISCUSSION

In the period between 2000 to 2004 we checked 23 caves in the Vârghiş Gorge. We found bats or bone material in 16 of them, 17 species of bats were identified.

3.1. NURSERY COLONY

During the last four years individuals of 15 bat species were observed or captured at the Orbán Balázs cave. In the summer we can find in the cave a nursery colony of greater and lesser mouse-eared bats (*Myotis myotis*, Borkhausen, 1797 and *Myotis blythii*, Tomes, 1857), including up to 2,500 individuals. The birth period in different years is the end of May–first part of June. For comparison, in Bulgaria, in *Myotis myotis* nursery colonies the births occur in the same period, from 18–20 May to 25 June, and at an age of 65 days the young started to leave the roost (PANDURSKA, 1998).

This nursery colony is one of the largests in the area, and needs urgent protection measures, because the cave is relatively easily accessible and a considerable number of tourists visit it in the summer period.

3.2. MATING PERIOD

Mistnettings were made during the mating period, in the second part of August–first part of September, at cave entrances. From 2000 to 2004 specimens of 15 bat species were caught during autumn mistnettings at the Orbán Balázs cave. This fact suggests that the cave also plays an important role in the bats mating activity. The most abundant species were *Myotis myotis*, *Myotis blythii* and *Nyctalus noctula* (Schreber, 1774).

In August 2003 mistnettings were made for the first time at two other caves. The Lócsűr (no. 8) cave is situated at ca. 100 m distance from the Orbán Balázs cave. In this cave the number of caught barbastelles (*Barbastella barbastellus,* Schreber, 1774) was surprisingly high, in total 69 in two consecutive nights. The noctule was the most frequent at this cave in both years (2003 and 2004). At the Gábor (no. 20) cave frequent species were *Myotis myotis* and *Barbastella barbastellus,* and the noctule (*Nyctalus noctula*) was totally absent.

In August 2004 we also made mistnettings at Albert (no. 1) and Kápolna (no. 5) caves; 13, respectivelly 17 bats were caught. Albert cave is 96 metres, Kápolna is 90 metres long.

Sex ratios were calculated when at least 20 individuals from a species were caught in a single night at one cave. The number of adults and juveniles were summed up, because in some species the juveniles can mate successfully in their first year (KOZHURINA & MOROZOV, 1994, ENTWISTLE *et al.*, 1998). ENTWISTLE *et al.* (1998) found that 29% of the juvenile males in *Plecotus auritus,* particularly those in good condition, showed a degree of testicular and epididymal development in their first autumn, at 3 months of age. Sperm production in temperate zone bats reaches a peak in late summer–early autumn, when the females are in oestrus. The bats will mate any time during this period, and mating can continue

right through the winter in many species, during periods of arousal from hibernation (ALTRINGHAM, 1996). Consequently a number of juvenile bats can participate in the mating activity in the year of their birth.

The calculated sex ratios for different species, with three exceptions in *Myotis myotis*, are close to 1:1 (Figs. 2–4). Dates, places of capture and number of individuals are shown in Table 1, in the same order.

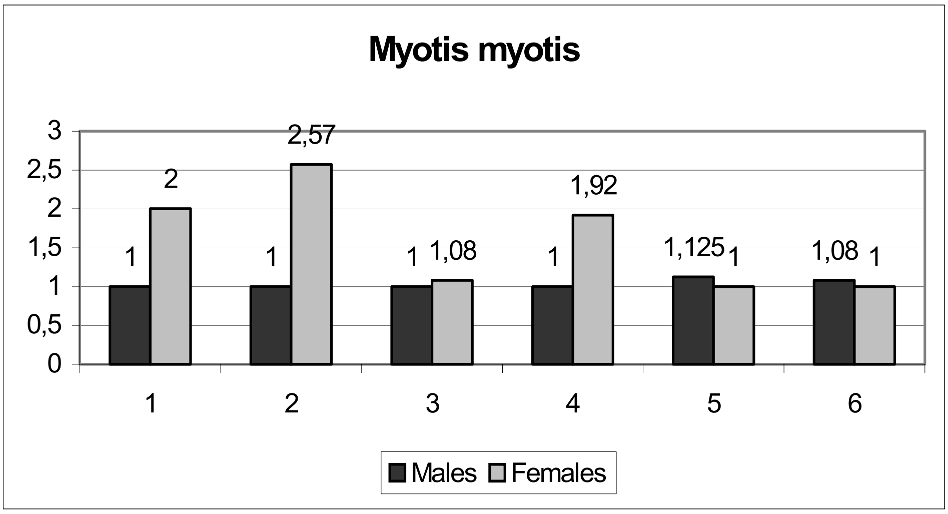

Fig. 2. – Sex ratios of *Myotis myotis* during autumn mistnettings.

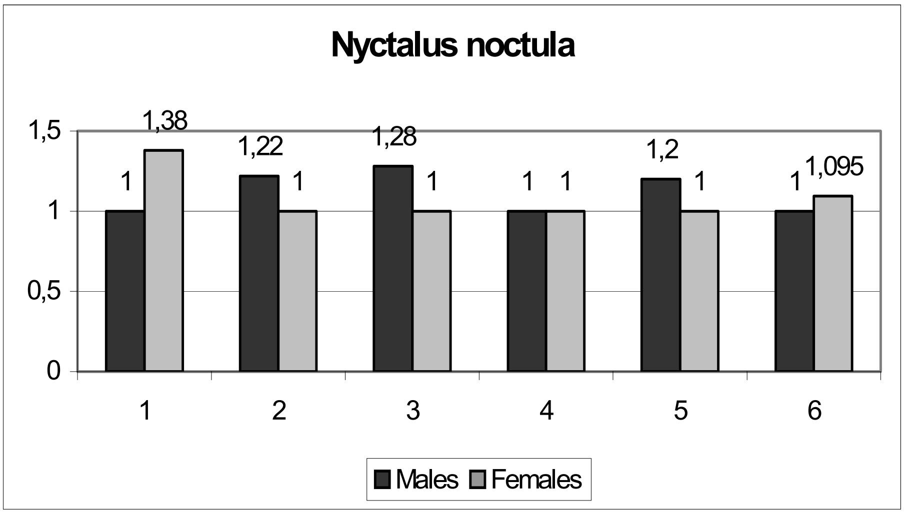

Fig. 3. – Sex ratios of *Nyctalus noctula* during autumn mistnettings.

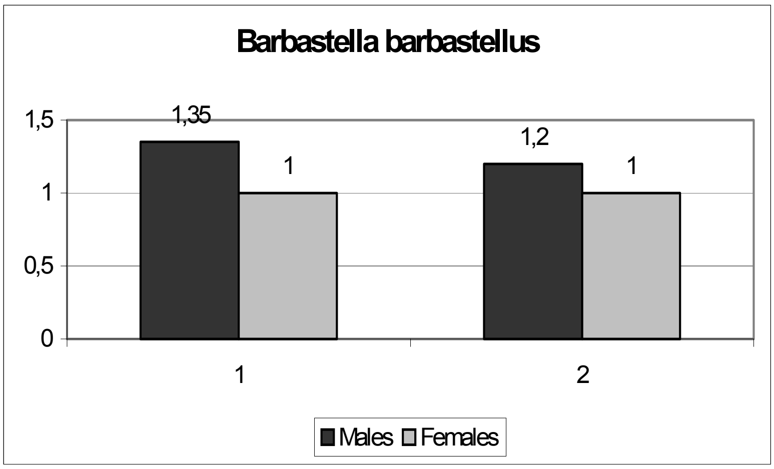

Fig. 4. – Sex ratios of *Barbastella barbastellus* during autumn mistnettings.

The results of the mistnettings carried out in August and September show the fact that some of the caves from the gorge play an important role in the bats mating activity. It is surprising the important number of captured noctules, a tree-dwelling bat, at cave entrances, but they probably use the crevices from the large entrancy parts of the caves for mating. The differences in species composition at different caves may suggest that certain species have their preferred mating places in a relatively restricted area with many suitable roosts (*e.g.*, large number of noctules at the Orbán Balázs and Lócsűr caves, and their total absence at the Gábor cave; considerable number of barbastelles at the Lócsűr cave).

3.3. HIBERNATION

The Orbán Balázs cave is also an important hibernacula for *Myotis myotis* and *Myotis blythii* species. The number of specimens shows a serious fluctuation, even when comparing the same periods of the winter. The biggest number of hibernating “big *Myotis*” individuals (1292) was found in February 2003.

The cave is one of the most important wintering places in Romania for the lesser horseshoe bat (*Rhinolophus hipposideros*, Bechstein, 1800), the maximum counted number of specimens was 169 (in February 2004).

Comparing the number of hibernating animals in different years in the Orbán Balázs cave a very wide fluctuation is visible. The cave has large passages and halls, and due to disturbation and microclimatic changes the bats probably find refuge in hidden places, where we cannot observe them, or in caves from the vicinity.

The smaller caves were visited mainly in winter 2002–2003, when we tried to check twice the majority of the caves, in December and in February. These caves were

used as hibernacula by *Barbastella barbastellus* , *Plecotus auritus* (Linnaeus, 1758), *Eptesicus serotinus* (Schreber, 1774) and *Myotis nattereri* (Kuhl, 1818), species which are more resistant to low temperature. The lesser horseshoe bat was present in general in the deeper parts of the caves. The most frequently observed species in winter 2002–2003 were *Rhinolophus hipposideros* and *Barbastella barbastellus* (present in 7 respectively 6 caves). The winter checks of smaller caves suggest their importance as hibernacula for certain species. They are visited rarely by tourists and speleologists, and they can offer suitable and undisturbed roosts for an important number of bats.

3.4. BONE MATERIAL

Important recent and subfossil bone material was found in the following caves: Albert (no. 1), Kápolna (no. 5), Lócsűr (no. 8), Bronz (no. 10), Orbán Balázs (no. 14) Csontos (no. 35), Kőfalas (no. 36), Vízkelet (no. 45) and Cseréptálas (no. 105).

The deposits found at the entrance part of the Orbán Balázs cave provide the most important information. In an approximately half a meter of sand and gravel sediment thousands of pipistrelle skeletons were found. The fact that in Romania there are only 6 caves in which significant pipistrelle colonies, consisting of thousands of individuals are or were hibernating, shows the importance of the finding. The place of the bones and their relative intact condition show that the skeletons were on their primary place, so the decomposition of the carrions took place on their actual position. We collected two samples, the first from the upper 15 centimetres of the deposit, the second from the next 15–20 centimetres. After the separation of the bone material the species were determined and the minimum number of individuals in the case of each species, based on the number of bones (*e.g.*, mandibula, humerus, radius, etc.) represented in most samples.

Table 3

Species composition of the bone material from the Orbán Balázs cave

<table>
<tr><th>Species</th><th>Sample 1</th><th>%</th><th>Sample 2</th><th>%</th></tr>
<tr><td>Pipistrellus pipistrellus</td><td>1243</td><td>97,72</td><td>1205</td><td>97,89</td></tr>
<tr><td>Miniopterus schreibersii</td><td>6 ad.
6 juv.</td><td rowspan="10">2,28</td><td>8 ad.
5 juv.</td><td rowspan="10">2,11</td></tr>
<tr><td>Myotis myotis</td><td>3 ad.
7 juv.</td><td>6 juv.</td></tr>
<tr><td>Myotis blythii</td><td>2 ad.</td><td>3 ad.</td></tr>
<tr><td>Myotis bechsteinii</td><td>1</td><td>1</td></tr>
<tr><td>Myotis nattereri</td><td>1</td><td>–</td></tr>
<tr><td>Vespertilio murinus</td><td>–</td><td>1</td></tr>
<tr><td>Nyctalus noctula</td><td>–</td><td>1</td></tr>
<tr><td>Plecotus auritus</td><td>1</td><td>–</td></tr>
<tr><td>Barbastella barbastellus</td><td>1</td><td>1</td></tr>
<tr><td>Total no. of specimen/sample</td><td>1271</td><td></td><td>1231</td><td></td></tr>
</table>

The species composition suggests that the bone material came from hibernation colonies which occupied the parts of the cave close to the entrance. This fact is indicated by the extremly high percentage of pipistrelles and the total absence of *Rhinolophus* species, which are present in the deeper and warmer parts of the cave. At the same time this percentage shows the massive presence of pipistrelles at that time. However, for unknown reasons these hibernating pipistrelle colonies disappeared from the cave. They are not attested by the literature (MÉHELY, 1900, DUMITRESCU *et al.*, 1962–1963, ORGHIDAN & DUMITRESCU, 1962–1963), and during our observations pipistrelle colonies were absent from the caves of the gorge. In the bone material collected in the deeper parts of the cave *Myotis myotis* were present everywhere, and rare findings were the subfossil *Myotis emarginatus* (Geoffroy, 1806) and *Myotis bechsteinii* (Kuhl, 1818) skulls.

The bone material collected in the smaller caves of the gorge probably represent the remains of individuals perished during hibernation. For this reason frequent species were *Barbastella barbastellus*, *Eptesicus serotinus*, *Myotis bechsteinii*, *Myotis nattereri*, *Myotis myotis*, species which are resistant to low temperature, and many caves in the gorge are suitable for them.

An interesting deposit consisting of pellets of tawny owl (*Strix aluco*) were found in the cave no.105, which presents the long period diet of the owl. Remains of *Nyctalus noctula*, *Myotis myotis*, *Myotis blythii* and *Eptesicus serotinus* were present in the pellets. The high percentage of *Nyctalus noctula* probably shows that in the mating period, when they come in considerably large number to the Orbán Balázs and other caves of the gorge, they represent an important seasonal food source for owls.

The data collected during the last years suggest that in the study area there are many important roosts used by bats in different periods of the year. Unfortunately the colonies of *Miniopterus schreibersii* (Kuhl, 1817) and *Rhinolophus ferrumequinum* (Schreber, 1774) attested by the literature (DUMITRESCU *et al.*, 1962–1963), disappeared from the Orbán Balázs cave, and nowadays this two species are represented occasionaly by a few individuals.

During the next years the checking of other caves in the Vârghiş Gorge can supply new important faunistical and ecological data.

4. SUMMARY

The Vârghiş Gorge is a natural reserve situated in the southern part of the Eastern Carpathians, Romania. The gorge is an important karstic area, with 125 caves. During the period 2000–2004 23 caves were checked, and in 16 of them bats or bone material were found. 17 bat species were identified.

The biggest of the caves, the Orbán Balázs (no. 14) cave, is populated by bats all the year round. In summer there is a nursery colony of *Myotis myotis* and *Myotis blythii* species in the cave, including up to 2,500 individuals. In winter the cave is an important hibernating place for the "big *Myotis*" species and for *Rhinolophus hipposideros*. During the mating period individuals of 15 bat species were captured at the cave entrance, which shows the importance of the cave in this period, too.

The smaller caves (with length between 11 and 300 m) are used by bats as mating roosts or hibernacula. The most importants of them are the Lócsűr (no. 8) and Gábor (no. 20) caves.

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ANNEX 1

Date and place of observations, number of specimens:
Abbreviations: vo. – visual observation; mn. – mistnetting; det. – detectoring; bm. – bone material

Rhinolophus ferrumequinum (Schreber, 1774)
Orbán Balázs cave (24.02.2002 – vo. – 1 specimen, 27.12.2002 – vo. – 2, 15.02.2003 – vo. – 3, 20.02.2004.–vo.–1)

Rhinolophus hipposideros (Bechstein, 1800)
Orbán Balázs cave (26.02.2000 – vo. – 48, 17.08.2000 – vo. – 3, 17.02.2001 – vo.– 77, 18.08.2001 – det., 15.09.2001 – det., 06.10.2001 – vo.–2, 17.11.2001. – vo.-32, 24.02.2002 – vo.-114, 21.09.2002 – vo.- 6, 27.12.2002 – vo.-119, 15.02.2003 – vo.-132, 23.08.2003 – mn-1, 20.02.2004-vo.-169), Albert (nr.1) cave (16.02.2003 – vo.-1), Lócsűr (no.8) cave (27.12.2002 – vo.6, 15.02.2003 – vo.-5,

20.02.2004-vo.- 2), Cave no.9 (17.12.2002 – vo.-10), Bronz (nr.10) cave (16.02.2003 – bm.), Cave no.12 (28.12.2002 – vo.-1, 16.02.2003 – vo.-1, 21.02.2004-vo.- 1), Gábor (no.20) cave (28.12.2002 – vo.-5, 16.02.2003 – vo.-4, 21.02.2004-vo.- 8), Cave no.27 (17.12.2002 – vo.-2), Csontos (no.35) cave (23.08.2003 – bm)

Myotis myotis (Borkhausen, 1797)
Orbán Balázs cave (19.10.1997-bm., 17.08.2000 – mn.-21, 18.08.2001 – mn.-9, 15.09.2001 – mn.-14, 03.05.2002 – mn.-7, 04.05.2002-bm., 13.08.2002 – mn.-10, 14.08.2002 – mn.-25,13-14.08.2002-bm., 21.09.2002 – mn.-11, 21.08.2003 – mn.-19, 23.08.2003 – mn.-52, 16.08.2004-mn.-10, 17.08.2004-mn.-41, 18.08.2004-mn.-34, 20.08.2004-mn.-5), Gábor (no.20) cave (22.08.2003 – mn.-13, 16.08.2004-mn-3, 17.08.2004-mn-14, 19.08.2004-mn.-13), Lócsűr (no.8) cave (19.10.1997.-bm., 22.08.2003 – mn.-25, 23.08.2003 – mn.-8, 16.08.2004-mn-4, 17.08.2004-mn.-7, 18.08.2004-mn.-6, 19.08.2004-mn.-12), Cseréptálas (nr.105) cave (19.08.2001– bm.), Kápolna (no.5) cave (18.08.2004-mn.-4)

Myotis blythii (Tomes, 1857)
Orbán Balázs cave (17.08.2000 – mn.-4, 18.08.2001 – mn.-10, 15.09.2001-mn.-5, 03.05.2002 – mn.-1, 04.05.2002-bm., 13.08.2002 – mn.-5, 14.08.2002 – mn.-4,13-14.08.2002-bm., 21.09.2002 – mn.-3, 21.08.2003 – mn.-6, 23.08.2003 – mn.-19, 16.08.2004-mn.-2, 17.08.2004-mn.-5, 18.08.2004-mn.-5), Gábor (no.20) cave (22.08.2003 – mn.-6, 19.08.2004-mn.-4, 20.08.2004-mn.-3), Lócsűr (no.8) cave (22.08.2003 – mn.-4, 23.08.2003 – mn-7, 17.08.2004-mn.-7, 18.08.2004-mn.-6, 19.08.2004-mn.-6, 20.08.2004-mn.-1), Cseréptálas (nr.105) cave (19.08.2001-bm.), Albert (nr.1) cave (19.08.2004-mn.-4), Kápolna (no.5) cave (18.08.2004–mn.-3)

Myotis myotis* / *Myotis blythii
Orbán Balázs cave (26.02.2000 – vo.-654, 17.08.2000 – vo.-80, 17.02.2001 – vo.-272, 26.05.2001 – vo.-~2000, 18.08.2001 – vo.-150, 15.09.2001 – vo.-500, 06.10.2001 – vo.-37, 17.11.2001. – vo.-312, 24.02.2002 – vo.-706, 03.05.2002 – vo.- ~1100, 21.09.2002 – vo.-158, 27.12.2002 – vo.-969, 15.02.2003 – vo.-1292, 20.02.2004-vo.- 899), Lócsűr (no.8) cave (27.12.2002 – vo.-7, 15.02.2003 – vo.-3, 20.02.2004-vo.- 8), Cave no.9 (17.12.2002 – vo.-2), Gábor (no.20) cave (28.12.2002 – vo.19, 16.02.2003 – vo.-14, 21.02.2004-vo.- 12),

Myotis bechsteinii (Kuhl,1818)
Orbán Balázs cave (17.08.2000 – mn.-1, 18.08.2001 – mn.-3, 04.05.2002-bm., 14.08.2002-bm., 15.02.2003-bm., 21.08.2003 – mn.-4, 23.08.2003 – mn.-8, 17.08.2004-mn.-6), Lócsűr (no.8) cave (22.08.2003 – mn.-6, 23.08.2003 – mn.-7, 17.08.2004-mn.-2, 18.08.2004-mn.-6, 19.08.2004-mn.-5), Gábor (no.20) cave (16.08.2004-mn.-1, 17.08.2004-mn.-2, 19.08.2004-mn.-1), Albert (no.1) cave (19.08.2004-mn.-2), Kápolna (no.5) cave (18.08.2004-mn.-2)
Myotis nattereri (Kuhl, 1818)
Orbán Balázs cave (05.04.2002-bm., 15.02.2003 – bm.), Cave nr.23 (27.12.2002 – vo.-1, 15.02.2003 – vo.-1), Gábor (no.20) cave (19.08.2004-mn.-1)

Myotis daubentonii (Kuhl, 1819)
Orbán Balázs cave (17.08.2004-mn.-1), Albert (no.1) cave (19.08.2004-mn.-1), Lócsűr (no.8) cave (22.08.2003 – mn.-2, 23.08.2003 – mn.-3), Gábor (no.20) cave (22.08.2003 – mn.-1, 16.08.2004-mn.-2), Csontos (no.35) cave (23.08.2003 – bm.), Near Vârghis stream (24.08.2003 – det.)

Myotis emarginatus (Geoffroy,1806)
Orbán Balázs cave (17.08.2000 – mn.-1, 15.02.2003.-bm., 23.08.2003 – mn.-3, 18.08.2004-mn.-1), Lócsűr (no.8) cave (23.08.2003 – mn.-1, 16.08.2004-mn.-1), Kápolna (no.5) cave (18.08.2004-mn.-1), Gábor (no.20) cave (19.08.2004-mn.-1)

Myotis mystacinus (Kuhl, 1819)
Orbán Balázs cave (17.08.2000 – mn.-1, 23.08.2003 – mn.-1, 17.08.2004-mn.-1), Lócsűr (no.8) cave (23.08.2003 – mn.-2), Gábor (no.20) cave (16.08.2004-mn.-1, 19.08.2004-mn.-3)

Barbastella barbastellus (Schreber, 1774)
Orbán Balázs cave (26.02.2000 – vo.-1, 17.08.2000 – mn.-2, 04.05.2002-bm., 13-14.08.2002-bm., 27.12.2002 – vo.-5, 15.02.2003 – vo.-5, 21.08.2003 – mn.-3, 23.08.2003 – mn.-14, 17.08.2004-mn.-1, 18.08.2004-mn.-4, 20.08.2004-mn.-4), Albert (no.1) cave (19.08.2004-mn.-6), Kápolna (nr.5) cave (18.08.2004-mn.-7), Lócsűr (no.8) cave (15.02.2003 – vo.-1, 22.08.2003 – mn.-47, 23.08.2003 – mn.-22, 16.08.2004-mn.-3, 17.08.2004-mn.-4, 18.08.2004-mn.-14, 19.08.2004-mn.-9, 20.08.2004-mn.-2), Gábor (no.20) cave (28.12.2002 – vo.-3, 16.02.2003 – vo.-4, 22.08.2003 – mn.-10, 21.02.2004-vo.- 3, 16.08.2004-mn.-1, 17.08.2004-mn.-2, 19.08.2004-mn.-2), Cave nr.23 (27.12.2002 – vo.-5, 15.02.2003 – vo.-3, 20.02.2004-vo.- 3), Cave no.25 (16.02.2002 – vo.-1), Csontos (no.35) cave (23.08.2003 – bm), Kőfalas (no.36) cave (20.08.2003 – bm), Vízkelet (no.45) cave (15.02.2003 – vo.-10)

Plecotus auritus (Linnaeus, 1758)
Orbán Balázs cave (17.08.2000 – mn.-1, 17.02.2001 – vo.-1, 04.05.2002 – bm.), Lócsűr (no.8) cave (15.02.2003 – vo.-1, 16.08.2004-mn.-1, 17.08.2004-mn.-1, 18.08.2004-1), Bronz (no.10) cave (04.05.2002 – bm.), Gábor (no.20) cave (28.12.2002 – vo.-2, 22.08.2003 – mn.-4, 21.02.2004-vo.-2, 17.08.2004-mn.-1, 19.08.2004-mn.-1), Cave nr.23 (27.12.2002 – vo.-1, 15.02.2003 – vo.-1)
Plecotus austriacus (Fischer, 1829)
Orbán Balázs cave (15.09.2001 – mn.-1, 21.09.2002 – mn.-1), Lócsűr (no.8) cave (18.08.2004-mn.-1), Gábor (no.20) cave (17.08.2004-mn.-1)

Miniopterus schreibersii (Kuhl, 1817)
Orbán Balázs cave (17.08.2000 – vo.-5, 18.08.2001 – vo.-10, 15.09.2001 – vo.-20, 04.05.2002 – bm, 13.08.2002 – bm., 21.09.2002 – vo.-2, 23.08.2003 – mn.-2, 20.02.2004.-vo.-1, 17.08.2004-mn.-1)

Pipistrellus pipistrellus (Schreber, 1774)
Orbán Balázs cave (04.05.2002 – bm., 13-14.08.2002 – bm., 15.02.2003 – bm., 23.08.2003 – mn.-2, 17.08.2004-mn.-1), Lócsűr (no.8) cave (22.08.2003 – mn.-1, 23.08.2003 – mn.-1, 16.08.2004-mn.-1), Gábor (no.20) cave (19.08.2004-mn.-1)

Eptesicus serotinus (Schreber, 1774)
Orbán Balázs cave (17.08.2000 – mn.-5, 18.08.2001 – mn.-1, 24.02.2002 – vo.-1, 03.05.2002 – mn.-1, 13.08.2002 – mn.-1, 15.02.2003 – vo.-1, 23.08.2003 – mn.-1, 17.08.2004-mn.-3, 18.08.2004-mn.-2), Lócsűr (no.8) cave (22.08.2003 – mn.-2, 16.08.2004-mn.-1, 19.08.2004-mn.-1), Gábor (no.20) cave (28.12.2002 – vo.-3, 16.02.2003 – vo.-3, 22.08.2003 – mn.-4, 21.02.2004-vo.- 2, 16.08.2004-mn.-1, 17.08.2004-mn.-3, 19.08.2004-mn.-1), Cave nr.23 (15.02.2003 – vo.-1), Cave no.45 (15.02.2003 – bm.), Cave nr.105 (19.08.2001– bm.), Near Vârghis stream (24.08.2003 – det.)

Vespertilio murinus (Linnaeus, 1758)
Orbán Balázs cave (18.08.2001 – mn.-1, 13-14.08.2002 – bm.)

Nyctalus noctula (Schreber, 1774)
Orbán Balázs cave (17.08.2000 – mn.-31, 18.08.2001 – mn.-11, 13.08.2002 – mn.-1,13.08.2002 – bm., 21.08.2003 – mn.-16, 23.08.2003 – mn.-20, 24.08.2003 – det, 16.08.2004-mn.-2, 17.08.2004-mn.-3, 18.08.2004-mn.-9, 20.08.2004-mn.-1), Lócsűr (no.8) cave (22.08.2003 – mn.-17, 23.08.2003 – mn.-32, 16.08.2004-mn.-8, 17.08.2004-mn.-24, 18.08.2004-mn.-17, 19.08.2004-mn.-33, 20.08.2004-mn.-44), Gábor (no.20) cave (17.08.2004-mn.-1), Cave nr.105 (19.08.2001– bm.), Near Vârghis stream (13.08.2002 – det., 24.08.2003 – det.)

ANNEX 2

Abbreviations used in tables:

RHF – ***Rhinolophus ferrumequinum*** (Schreber, 1774)
RHH – ***Rhinolophus hipposideros*** (Bechstein, 1800)
MYM – ***Myotis myotis*** (Borkhausen, 1797)
MYB – ***Myotis blythii*** (Tomes, 1857)
MBE – ***Myotis bechsteinii*** (Kuhl,1818)
MYS – ***Myotis mystacinus*** (Kuhl, 1819)
MEM – ***Myotis emarginatus*** (Geoffroy,1806)
MDA – ***Myotis daubentonii*** (Kuhl, 1819)
MYN – ***Myotis nattereri*** (Kuhl,1818)
PIP – ***Pipistrellus pipistrellus*** (Schreber, 1774)
ESE – ***Eptesicus serotinus*** (Schreber, 1774)
NYN – ***Nyctalus noctula*** (Schreber, 1774)
VMU – ***Vespertilio murinus*** (Linnaeus, 1758)
MIS – ***Miniopterus schreibersii*** (Kuhl, 1817)
PAR – ***Plecotus auritus*** (Linnaeus, 1758)
PAS – ***Plecotus austriacus*** (Fischer, 1829)
BAR – ***Barbastella barbastellus*** (Schreber, 1774)