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Bats of the Carpathian Region (Rakhiv)
Кажани Карпатського регіону (Рахів)

Cave dwelling bats in the Bihor and in the Padurea Craiului Mountains

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NAGY Z., SZÁNTÓ L., SZODORAY-PARÁDI F. ***Cave dwelling bats in the Bihor and in the Padurea Craiului Mountains.*** — In this paper, we present our results of the research in the caves of Padurea Craiului and the Bihor Mountains region from 1996 untill 2000. We found 18 bat species; the most frequent were *Rhinolophus ferrumequinum, Myotis myotis/blythii*, *Miniopterus schreibersii*. We also discuss the changes of species composition, abundance in some important caves. Our data show the decline of the large nursery and hibernating colonies of the above-mentioned species.

Introduction

The bat fauna from the Western Carpathians is poorly known; this is one of the least investigated regions in Romania. Bihor and the Padurea Craiului Mountains — our research area — is a reach karst region, which contains a large number of caves suitable for bats. Two major river valleys compose this territory, the Crisul Negru and the Crisul Repede. The initial research on bats of these parts of the Western Carpathians was carried out in the 1960's (Dumitrescu *at al.* 1962–1963).

They described only five species, but without mentioning the number of bats, just referring to the presence or absence of the animals, and using two categories: isolated individual and colony. In the early 90's, Hungarian bat workers started a large-scale investigation in the Bihor Mountains (Dobrosi & Gulyas 1997) and they present 13 species but also without mentioning the name of the caves where the bats were observed or the size of the colonies.

Materials and methods

Since 1996, 22 caves were visited, which were selected based on the following criteria: big entrances and the presence of large chambers and corridors. These underground sites are situated between 305 and 700 m a.s.l.

All these caves were visited regularly year to year, in different seasons. For investigation, we use visual census and also mist netting in front of the entrances to roosts, in transitory and summer periods.

During our work, we determined the number of species and individuals, as well as the microclimatic condition of the caves (temperature, humidity).

We tried to establish the seasonal changes in the species composition and abundance in some important caves with high species diversity. At the same time, we investigated roosts of endangered species with unique conservation values.

Results and discussions

In the results of our investigation, we found 18 bat species which were registered in 22 caves during the observation.

1. *Rhinolophus ferrumequinum* (Schreber, 1774)

New data: *Cave Bulz*, 7 ex. 1996.04.20, 276 ex. 1996.10.08, 353 ex. 1996.12.09, 403 ex. 1997.02.28, 114 ex. 1998.10.25, 166 ex. 2000.01.07, 5 ex. 2000.08.13; 60 ex. 2000.09.20, 150 ex. 2000.11.15, *Cave Lesu* 859 ex. 1995.12.08, 709 ex. 1996.01.12, 591 ex. 1996.03.15, 371 ex. 1996.04.05, 225 ex. 1996.04.20, 579 ex. 1996.10.30, 733 ex. 1996.11.20, 804 ex. 1996.12.11, 865 ex. 1997.01.15, 526 ex. 1997.03.19, 54 ex. 1997.04.30, 407 ex. 1997.10.18, 785 ex. 1998.04.03, 354 ex. 1998.10.25, 397 ex. 2000.01.08, 15 ex. 2000.09.20, 541 ex. 2000.11.15, *Cave Gabi* 1 ex. 07.01.2000, *Cave Fata Apei* 9 ex. 2000.01.08, *Cave Ungurului* 89 ex. 1996.10.26, 105 ex. 1997.01.19, *Cave Osoi* 1 ex. 2000.01.20, *Cave Ticlu* 1 ex. 2000.01.20, *Cave Vadu Crisului* 1 ex. 1998.03.28, 150 ex. 1999.02.28, *Cave Dealul Cornii* 7 ex. 1998.10.26, *Cave Astileu* 5 ex. 1996.03.30, 18 ex. 1998.04.12, 4 ex. 2000.01.23, *Cave Igrita* 42 ex. 1996.03.30, 50 ex. 1997.02.10, 15 ex. 1997.10.08, 37 ex. 2000.01.23, 1 ex. 2000.08.13, *Cave Betfia* 110 ex. 1997.11.22, 100 ex, 2000.03.05, *Cave Meziad* 422 ex. 2000.02.15, 4 ex. 2000.06.20, 10 ex. 2000.08.13, 104 ex. 2000.09.21, *Cave Calului* 60 ex. 2000.06.20, *Cave Fagului* 46 ex, 1996.03.31, *Cave Tasad* 20 ex. 2000.06.20, *Cave Stracos* 6 ex. 2000.02.14, *Cave Fanate* 76 ex. 2000.02.16, 20 ex. 2000.06.19, *Cave nr. 27 from Sigistel Valley* 1 ex. 2000.02.17, *Cave Magura* 38 ex. 2000.03.04, 42 ex. 2000.06.19, 70 ex. 2000.09.22, *Cave Coliboaia* 750 ex. 2000.03.04, 3 ex. and 24 death specimens, 2000.06.19, 3 ex. 2000.09.22.

Literature data: Cave Magura and Cave Coliboaia 1949.12.04, Cave Meziad 1953.05.20, Cave Pisnita, Cave Igrita 1955.04.02, Cave Vadul Crisului 1953.05.20, 1955.03.18 (DUMITRESCU *at al.* 1962–1963); Cave Pisnita, Cave Meziad, Cave Magura, Cave Coliboia, Cave Ferice (VALENCIUC 1992–1993); Cave Stracos 7 ex. 1997.02.8, Cave Vadu Crisului 98 ex. 1997.02.15 (BARTI 1997).

Rhinolophus ferrumequinum is present in almost all caves of the territory, with strong colonies in winter, but only with a few small colonies in summer.

Using individual marking with rings in house dwelling summer colonies of the greater horseshoe bats in the lowland in Hungary, our colleagues succeeded to prove that their nursing bats used caves of the Western Carpathians as hibernating sites (Dobrosi & Gulyas 1997). Through our research, we found ten caves with colonies composed of more than 50 specimens, but in the last 5 years their number decreased in some places by 50–90 %, caused by direct human perturbation and non-adequate speleoturism.

2. *Rhinolophus hipposideros* (Bechstein, 1800)

New data: *Cave Bulz*, 1 ex. 1996.04.20, 1 ex. 1996.10.30, 2 ex. 1996.12.09, 3 ex. 1997.04.03, 1 ex. 1997.10.18, 1 ex. 2000.09.20, 4 ex. 2000.11.15, *Cave Lesu* 2 ex. 1995.12.08, 1 ex. 1996.01.12, 1 ex. 1996.04.20, 1 ex. 1996.10.30, 1 ex. 1996.11.20, 2 ex. 1996.12.11, 3 ex. 1997.01.15, 2 ex. 1997.03.19, 1 ex. 1997.10.08, 2 ex. 2000.11.15, *Cave Gabi* 2 ex. 07.01.2000, *Fata Apei Cave* 2 ex. 2000.01.08, *Cave Osoi* 1 ex. 2000.01.20, *Cave Astileu* 1 ex, 1996.03.30, *Cave Igrita* 4 ex. 1996.03.30, 3 ex. 1997.02.10, 2 ex. 1997.10.08, 4 ex. 2000.01.23, *Cave Stracos* 4 ex. 2000.02.14, *Cave Meziad* 18 ex. 2000.02.15, 2 ex. 2000.09.21, *Cave Fanate* 24 ex. 2000.02.16, 6 ex. 2000.06.19, *Cave Barta Sat* 1 ex. 2000.02.16, *Cave nr. 27 from Sigistel Valley* 2 ex. 2000.02.17, Cave Coliboaia 10 ex. 2000.03.04, 1 ex. 2000.06.19, *Cave Magura* 19 ex. 2000.03.04, 1 ex. 2000.09.22, *Cave Calului* 4-6 ex. 2000.06.20, *Cave Tasad* 70 ex. 2000.06.20, *Cave Vadu Crisului* 3 ex. 1998.03.28, 40. ex. 1999.02.28.

Literature data: Cave Igrita and Cave Magura 1949.10.26, Cave Ferice 1949.12.07, Cave Meziad 1953.05.20, Cave Pisnita 1955.03.18, Cave Vadu Crisului1955.03.19. (Dumitrescu at all. 1962–1963); Cave Pisnita, Cave Meziad, Cave Magura, Cave Coliboia, Cave Ferice (Valenciuc 1992–1993); Cave Vadu Crisului 4 ex. 1997.02.15 (Barti 1997).

The presence of the little horseshoe bat is sporadic, its number in caves is rarely more than 10 (the maximum was 40), we found this species in the third part of the totally investigated underground sites. They are more frequent in winter, like the greater horseshoe bat.

3. *Rhinolophus euryale* (Blasius, 1853)

New data: *Cave Bulz*, 4 ex. 1996.04.20, 5 ex. 1996.08.02, *Cave Calului* 6–8 ex. 2000.06.20, *Cave Meziad* 1 ex. 2000.06.19.

Rinolophus euryale is almost missing from the territory, its number decreases year by year. In the last years it was found only in summer, but in the beginning of the 90's this species was shown from 6 places with small groups of 10–20 specimens in winter and the biggest colony was formed by 200 bats in summer (Dobrosi & Gulyas 1997). They mostly occur together with *Miniopterus schreibersii.*

4–5. *Myotis myotis* (Borkhausen, 1797) / *Myotis blythii* (Tomes, 1857)

New data: *Cave Bulz*, 250 ex. 1996.04.20, 500 ex. 1996.08.02, 75 ex. 1996.10.30, 5 ex. 1997.01.15, 182 ex. 1997.04.03, 250 ex. 1998.10.25, 4 ex. 2000.07.01, 1.600–1.800 ex. 2000.08.13, 120 ex. 2000.09.20, *Cave Lesu*, 498 ex. 1995.12.08, 1783 ex. 1996.01.12, 3596 ex. 1996.03.15, 3580 ex. 1996.04.05, 1695 ex. 1996.04.20, 34 ex. 1996.10.10, 134 ex. 1996.10.30, 488 ex. 1996.11.20, 1085 ex. 1996.12.11, 2942 ex. 1997.01.15, 3226 ex. 1997.03.19, 918 ex. 1997.04.30, 32 ex. 1997.10.18, 3443 ex. 1998.04.03, 1 ex. 1998.07.25, 96 ex. 1998.10.25, 1.700 ex. 2000.01.08, 82 ex. 2000.09.20, 541 ex. 2000.11.15, *Cave Fata Apei* 4 ex. 2000.01.08, *Cave Ticlu* 6.000 ex. 1996.07.24, 1 ex. 2000.01.20, 610 ex. 2000.08.12, *Cave Vadu Crisului* 30 ex. 1999.02.28, *Cave Astileu* 600 ex. 1998.04.12, 200–250 ex. 2000.08.12, *Cave Igrita* 30 ex. 1996.03.30, 8 ex. 1997.02.10, 3 ex. 2000.01.23, *Cave Betfia* 300 ex. 1997.11.22, 800 ex. 1998.06.19, 130 ex. 2000.03.05, *Cave Stracos* 2 ex. 2000.02.14, *Cave Meziad* 44 ex. 2000.02.15, 1.500 ex. 2000.06.20, 3.500 ex. 2000.08.13,

Cave Fagului 4 ex, 1996.03.31, *Cave Fanate* 9 ex. 2000.02.16, *Cave nr. 27 from Sigistel Valley* 3 ex. 2000.02.17, *Cave Magura* 18 ex. 2000.03.04, *Cave Coliboaia* 5 ex. 2000.03.04, 400–450 ex. 2000.06.19.

Literature data: Cave Pisnita (1953.06.25), Cave Ferice (1957), Cave Onceasa (1956.06.04), Cave Meziad 1953.05.20) (Dumitrescu *at al.* 1962–1963); Cave Tasad 1 ex. 1997.02.08 (Barti 1997).

Beside the greater horseshoe bats, the most common species is *Myotis myotis/blythii* forming large hibernating and nursery colonies of 500–6,000 specimens. In this paper, we consider the two species together because the difficulties of the correct determination. We were able to distinguish the two species only when they were caught by mist netting. During the investigation, we met them in 15 caves, but in most of the caves the presence of bats was accidental, the big colonies inhabited the same shelters in every year. The roosts used by bats in the summer and winter are different, we met more frequently nursery/breeding colonies in the territory. Here is one of the biggest hibernacula with more than 3.500 "big myotis", and one of the largest nursery colony up to 6,000 specimens in Romania.

6. *Myotis bechsteinii* (Kuhl, 1817)

New data: *Cave Lesu* 1 ex. 1997.10.18, 1 ex. 2000.09.20, *Cave Coliboaia* 1 ex. 2000.06.19.

7. *Myotis emarginatus* (Geoffroy, 1806)

New data: *Cave Ungurului* 1 ex. 1996.10.26, *Cave Lesu* 3 ex. 1997.04.30.

8. *Myotis mystacinus* (Kuhl, 1817)

New data: *Cave Lesu* 1 ex. 1995.12.08, 1 ex. 1996.04.20, 2 ex. 1997.03.19, 2 ex. 1997.04.30.

9. *Myotis brandtii* (Eversmann, 1817)

New data: *Cave Lesu*, 1 ex. 1996.11.20, 3 ex. 1997.10.18, 1 ex. 2000.01.08.

In 1996, it was the second record for this species in the country and the first for the Romanian part of the Carpathian Mountains.

10. *Myotis mystacinus* (Kuhl, 1817) / *Myotis brandtii* (Eversmann, 1817)

New data: *Cave Lesu*, 1 ex. 1997.01.15, 4 ex. 2000.01.08, 2 ex. 2000.11.15.

11. *Myotis daubentoni* (Kuhl, 1819)

New data: *Cave Bulz* 1 ex. 1996.10.08, 1 ex. 2000.09.20, *Cave Lesu*, 1 ex. 1996.10.10, 1 ex. 1996.11.20, 2 ex. 1996.12.11, 1 ex. 1997.01.15, 10 ex. 1997.03.19, 4 ex. 1997.04.30, 4 ex. 2000.11.15.

12. *Myotis dasycneme* (Boie, 1825)

New data: *Cave Lesu* 1 ex. 1996.04.05, 2 ex. 1996.04.20, 4 ex. 1996.10.30, 1 ex. 1996.11.20, 2 ex. 1996.12.11, 2 ex. 1997.01.15, 7 ex. 1997.03.19, 1 ex. 1997.04.30, 1 ex. 1997.10.18, 2 ex. 2000.01.08, 2 ex. 2000.09.20, *Cave Bulz* 1 ex. 1996.10.08.

13. *Myotis nattererii* (Kuhl, 1818)

New data: *Cave Lesu* 1 ex. 2000.09.20, *Cave Bulz* 1 ex. 1996.10.08, *Cave Igrita* 1 ex. 1996.03.30.

14. *Eptesicus serotinus* (Schreber, 1774)

New data: *Cave Lesu* 1 ex. 1996.03.15, 2 ex. 1996.12.11, 1 ex. 2000.01.08.

15. *Plecotus auritus* (Linnaeus, 1758)

New data: *Cave Vadu Crisului* 1 ex. 1997.10.07, *Cave Lesu* 1 ex. 1996.10.09, 1 ex. 1996.10.30, 1 ex.1996.12.11, 1 ex. 1997.01.15, 3 ex. 2000.01.08, 2 ex. 2000.09.20.

Literature data: Cave Meziad, 1953.05.20. (Dumitrescu et al. 1962–1963).

16. *Barbastella barbastellus (*Schreber, 1774)

New data: *Cave Lesu* 8 ex. 1995.12.08, 2 ex. 1996.01.12, 1 ex. 1996.04.05, 1 ex. 1996.11.20, 2 ex. 2000.01.08, *Cave Fata Apei* 2 ex. 2000.01.08, *Cave Meziad* 4 ex. 2000.02.15.

Barbastella barbastellus was found during the hibernation and we have poor knowledge about its distribution patterns. Until this time, this bat's presence was shown in just 4 places in the Southern and Eastern Carpathians in a very small number. For distribution area in the country, we described 4 new locations in the western karst regions. Our experience shows that this species is more frequent; sometimes we found winter colonies of 50 specimens.

17. *Pipistrellus pipistrellus* (Schreber, 1774)

New data: *Cave Meziad* 200 ex. 2000.02.15, 1 ex. 2000.06.20.

18. *Nyctalus noctula* (Schreber, 1774)

New data: *Cave Meziad* 2 ex. 2000.02.15.

19. *Miniopterus schreibersii* (Kuhl, 1817)

New data: *Cave Bulz* 250 ex. 1996.04.20, 280 ex. 1996.07.02, 190 ex. 1996.10.12, 378 ex. 1996.10.30, 168 ex. 1997.04.03, 150 ex. 1998.10.25, 200 ex. 2000.08.13, 120 ex. 2000.09.20, *Cave Lesu* 4 ex. 1996.03.15, 1 ex. 1996.04.05, 10 ex. 1996.04.20, 1 ex. 1996.10.09, 1 ex. 1997.04.30, *Cave Astileu* 1 ex. 1996.03.30, 250 ex. 1998.04.12, 1.300 ex. 2000.08.12, *Cave Ticlu* 200 ex. 2000.08.12, *Cave Betfia* 360 ex. 1997.11.22, 190 ex. 2000.03.05, *Cave Meziad* 140 ex. 2000.02.15, 3.000 ex. 2000.06.20, 1.700 ex. 2000.08.13,

Cave Coliboaia 750 ex. 2000.06.19, *Cave Magura* 5 ex. 2000.06.19, 54 ex. 2000.09.22, *Cave Fanate* 350 ex. 2000.06.19.

Literature data: Cave Igrita, Cave Moneasa, 1950.08. Cave Magura 1949.10.26, 1949.12.04, Cave Fanate, Cave Ferice 1949.12.07, 1954.07.30, Cave Meziad 1953.05.20, Cave Pisnita 1955.03.18. (Dumitrescu *at al.* 1962–1963).

In the last decades, the population of *Miniopterus schreibersii* has declined in Romania, hibernating colonies decreased by 90 % as far as we know at this moment. In the Bihor and Padurea Craiului Mountains, long winged bats are present all year, we know three important nursery and two hibernating colonies.

These last hibernaculas are unique in Romania, with more than 100 wintering specimens. In summer and nursery colonies, we found together with the *Myotis myotis/blythii*, and in the southern parts of the Carpathians they have mixed colonies also with *Myotis capaccinii*. In the research area, they disappeared from 4 caves since 1950, but we found 5 new locations in the investigated area.

Conclusion

As a result of our investigation, we found 18 species in the underground shelters of the Bihor and Padurea Craiului Mountains. Besides these species, the literature mentions the presence of *Pipistrellus nathusii* (Dobrosi & Gulyas 1997), so there is a total of 19 species.

The most important of them from the point of view of the protection and frequency are *Miniopterus schreibersii*, *Rhinolophus ferrumequinum*, *Rhinolophus hipposideros,* and *Myotis myotis/blythii*. They form large colonies, and like in most parts of Europe, the populations of these species start to decline dramatically in the last decades in Western Carpathians as well. The nursery and hibernating colonies are present mostly in caves, which are often visited by tourists, and they are continuously under the pressure of human perturbation.

Some other species: *Myotis mystacinus*, *M. emarginatus*, *M. bechsteinii*, *M. nattereri* were observed by mist netting, in spring and autumn.

The other species increase diversity of hibernating bats in caves, including *Eptesicus serotinus*, *Plecotus auritus*, *Myotis dasycneme*, *M. daubentonii*, *M. brandtii*, *Barbastella barbastellus, Nyctalus noctula*, and *Pipistrellus pipistrellus*.

These species appear occasionally and in small number in winter period, with the exception of the pipistrelle bat. We found this species hibernating in one cave in the Bihor Mountains, where it formed a colony of 200 individuals in the crevices of one artificial wall, built relatively close to the entrance of the cave.

Myotis brandtii is recorded first for the bat fauna of the Carpathians, and *Myotis mystacinus, Eptesicus serotinus*, *Pipistrellus pipistrellus* are described also for the first time in the caves of the Bihor and Padurea Craiului Mountains.

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Резюме

Нодь З., Санто Л. , Шодорай-Параді Ф. Кажани — мешканці печер гірських масивів Біхор та Падурея-Краюлуй. — Представлено результати досліджень в печерах регіону Падурея-Краюлуй та Гір Біхор, преведених з 1996 до 2000 рр. Всього виявлено 18 видів кажанів, серед яких найчисельнішими були *Rhinolophus ferrumequinum, Myotis myotis/blythii* та *Miniopterus schreibersii*. Дискутуються зміни видового складу та чисельності кажанів в деяких найголовніших печерах. Отримані дані свідчать про зменшення великих літніх материнських та зимівельних колоній зазначених видів.