ACADEMIE ROU MAINE

ISSN 0301-9187

TRAVAUX DE L'INSTITUT DE SPÉOLOGIE «ÉMILE RACOVITZA»

TIRÉ À PART

1868-1947

TOMES XXXIII, 1998 - XXXIX, 1999

EDITURA ACADEMIEI ROMÂNE

THE DISTRIBUTION OF BATS IN ROMANIAN CAVES (I)

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This paper presents the first results of a larger project regarding the distribution of Chiroptera in the caves of Romania. The investigations were made in certain areas of the Apuseni Mountains (Transylvania), and in the Meridional Carpathians. The presence of the species of Chiroptera is presented in the UTM codes. Some data regarding the frequency of the species in the investigated areas and their abundance are discussed.

Keywords: Chiroptera, Romania, Caves, distribution, UTM codes.

1. INTRODUCTION

The first notes concerning the presence of some species of Chiroptera in the Romanian fauna were made by B i e 11 z [1] and M e h e 1 y [5] in the second half of the 19th century. Pazslawsky [6] and Călinescu [2] continued the research of their predecessors. D u m i t r e s c u [3] put together the existing data and added many personal observations obtained during a period of more than ten years and so achieved a complex taxonomic study on the spreading of Chiroptera in Romania. Professor Valenciuc made an essential contribution to the knowledge of the bat fauna. He published many papers on the biology, anatomy, ecology and protection of bats.

In 1962-1963 the list of the species of Chiroptera from Romania included 27 present-day species and 4 fossil species from the Cromerian fauna. Since three new species have been added to the list: *Plecotus austriacus* Fischer 1829 [10], *Pipistrellus savii* Bonaparte 1837 [8] and *Myotis brandtii,* that is mentioned for the first time in this paper.

Recently, Valenciuc [12, 13] compiled a list of bats locations and their UTM codes for each' species. There are still many areas that have not yet been investigated so the distribution list of the Chiroptera in Romania is still open. Moreover, there never was systematic activity to evaluate the bat populations in caves, buildings or forests, because it would have required time consuming and constant activity and many human resources.

This paper presents our results and personal research completed between May 1999 and December 1999. The following areas have been covered:

Trav. Inst. Spéol. «émile Racovitza», t. XXXVII-XXXVIII, p. 223-230, Bucarest, 1998-1999

- Bihor Mountains - Crişul Negru Valley,
  - Gârdişoara Valley,
  - Crăiasa Valley,
  - Bulz Valley,
  - Sighiştel Valley.
- Pădurea Craiului Mountains - Vida Basin,
  - Mniera-Aştileu Basin,
  - Iada Basin.

- Meridional Carpathians - Peştera Liliecilor from Monastery Bistriţa.

The identification of the living species was made in their habitats, based on the morphological characterstics. For dead individuals or skeleton remains, the identifications were made in the laboratory on the basis of skull characteristics examined with a binocular microscope. In both cases the measurements were made with the vernier caliper. Several determination keys typical for the European bats were used [7, 9].

The UTM (Universal Transversal Mercator) codes, used for the biogeographical map were based on the biocartographic code elaborated by Lehrer [4].

2. NEW DATA CONCERNING THE SITUATION OF THE CHIROPTEROLOGICAL FAUNA IN ROMANIA

The results presented in Table 1 and in Fig. 1 allowed us to add new elements to the distribution of the Chiroptera in Romania. Based on our data and also on bibliographical information concerning the distribution in Europe and status of the species discussed [9], we have synthesized the following main aspects:

1. *Rhinolophus ferrumequinum* Schreber 1774 is threatened with extinction in Northern Europe and underwent a considerable decime in Central Europe. It is still often found in the caves of Romania usually in groups mixed with other species. We found this species in ten caves. Considering the existent data regarding the distribution of the Rhinolophidae family this paper supplements their distribution area with new UTM coordinates and adds to the three new caves that were known locations.

2. *Rhinolophus hipposideros* Bechstein 1800 is threatened with extinction in Northern England and in Germany and is at high risk in Austria. This species is in serious decline in Central Europe and, already extinct in Northern Europe. This species is similar to *Rhinolophus ferrumequinum* in that it is also a species with a seasonal ecological adaptability. They may choose different shelters in the summer

Table 1

Crt. nr.	Species	Caves	UTM codes	Date	Observations
1	*Rhinolophus ferrumequinum* (Schreber 1774)	Peştera Coliboaia Peştera Ferice Peştera Moanei* Peştera Micula* Peştera Fagului*	FS 15 FS16 FT 10* FS 16 FS 16	20.05.99 26.08.99 27.11.99 29.10.99 12.12.99	1 individual +1 skull 1 skul 1 individual 3 individuals 1 individual
2	*Rhinolophus hipposideros* (Bechstein 1800)	Peştera Condorului* Peştera Mică din Valea Chifu* Peştera Ungurului* Peştera Moanei* Peştera Fagului*	FS14* FS16 FT 10 FT 10 FS 16	19.05.99 20.05.99 26.11.99 27.11.99 12.12 99	1 individual 1 individual 5 ndividuals 4 individuals 1 individual
3	*Myotis myotis* (Borkhausen 1797)	Peştera cu Apă din Valea Leşului* Huda lui Papară* Peştera Liliecilor de la Mânăstirea Bistriţa *** *** Peştera Ferice Peştera Hodobana* Peştera Coiba Mare* Peştera Coiba Mare* Peştera Moanei*	FS28* FS84* KL60 FS 15* FS 15* FS16 FS34 FS34 FS34 FT 10*	27.05.99 03.07.99 15.08.99 17.06.99 26.07.99 26.08.99 28.10.99 28.10.99 16.11.99 27 11 99	groups +1 skull groups +1 skull groups +1 skull nurseries colony nurseries colony 1 skull 6 individuals + 3 skulls 5 individuals +1 skull 1 individual
4	*Myotis blythii* (Tomes 1857)	*** *** Peştera Liliecilor de la Mânăstirea Bistriţa Peştera Coiba Mare* Peştera Hodobana*	FS 15* FS15* KL60 FS34 FS 34	17.06.99 26.07.99 15.08.99 28.10.99 16.11.99.	1 skull + nursery colony nursery colony 1 skull 3 mandibles 1 individual
5	*Myotis nattereri* (Kuhl 1817)	Peştera Fagului*	FS 16*	29.10.99	1 skull
6	*Myotis brandtii* (Eversmann 1840)	Peştera Dârninii*	FS 65*	06.11:99	1 skull
7	*Myotis dasycneme* (Boie 1825)	Peştera Coiba Mare*	FS34*	28.10.99.	2 skull
8	*Miniopterus schreibersii (Kuhl* 1817)	Peştera Fânaţe*	FSH*	20.09.99	Group + 3 skull
9	*Pipistrellus pipistrellus* (Schreber 1774)	Huda lui Papară*	FS84*	03.07.99	1 skull
10	*Nyctalus noctula* (Schreber 1774)	Peştera Condorului* Huda lui Papară*	FS 15* FS84*	20.05.99 03.07.99	1 individual 1 skull

Crt. nr.	Species	Caves	UTM codes	Date	Observations
11	*Plecotus auritus* (Linnaeus 1758)	Peştera Hodobana*	FS34*	29.10.99	1 mandible
12	*Plecotus austriacus* (Fischer 1829)	. Peştera Coiba Mare* Peştera Hodobana* Peştera Hodobana*	FS34* FS34* FS34*	28.10.99 29.10.99 18.11.99	1 skull 1 individual + 3 skulls 1 individual
13	*Eptesicus serotinus* (Schreber 1774)	Peştera Hodobana*	FS34*	29.10.99	1 skull

Note: * represent caves and UTM codes that were identified for the first time as locations for those species.

and in winter and have a great variability of abiotic factors [3]. We have identified it in five caves, all being mentioned for the first time for the lesser horseshoe bat.

3. *Myotis myotis* Borkhausen 1797 was highly endangered in Northwest Europe, especially Netherlands, Germany and Austria, but during the last few years remnant populations have stabilized in many regions. In almost all regions of Central Europe, the populations have declined by 80% or more in the last 20-30 years. It is widespread in Romania, especially in caves. We identified several hundreds of bats in eight caves, six of them mentioned here for the first time.

4. *Myotis blythii* Tomes 1857. There are indications that their numbers have also declined in the Southwest of Europe. Presently it is faced with extinction in Austria. It is often found together with *Myotis myotis*. The distribution areas of these two species overlap almost completely in Europe. In our study this species has been identified in four caves, three of them being cited for the first time in this paper. A large nursery, probably mixed with *M. myotis,* has been found in F15 area.

5. *Myotis nattereri* Kuhl 1818 is widespread almost throughout the Europe: Ireland, United Kingdom, Denmark, southern Sweden, Estonia and the Mediterranean countries. Isolated individuals from this species are seldom seen in Romania's caves, but never in mixed colonies [3]. Recent skeletal remains were found in Pestera Fagului, a newly mentioned cave as a station for bats.

6. *Myotis brandtii* Eversmann 1845. Widespread in England and Wales, it has also been found in Southern Scotland. It is extremely endangered in Germany and Austria and rare in Poland and Baltic countries. As of now, there are no scientific records concerning this species of bat fauna in Romania. However, biologists and amateur speleologists have reported bats belonging to this species. We recently found an actual skeleton in the Dârninii Cave.

7. *Myotis dasycneme* Boie 1825. Worldwide, it is considered an endangered species, undergoing a large decline in Western Europe. It can seldom be found in our country. D u m i t r e s c u [3] mentioned it only twice in Banat (South-Western

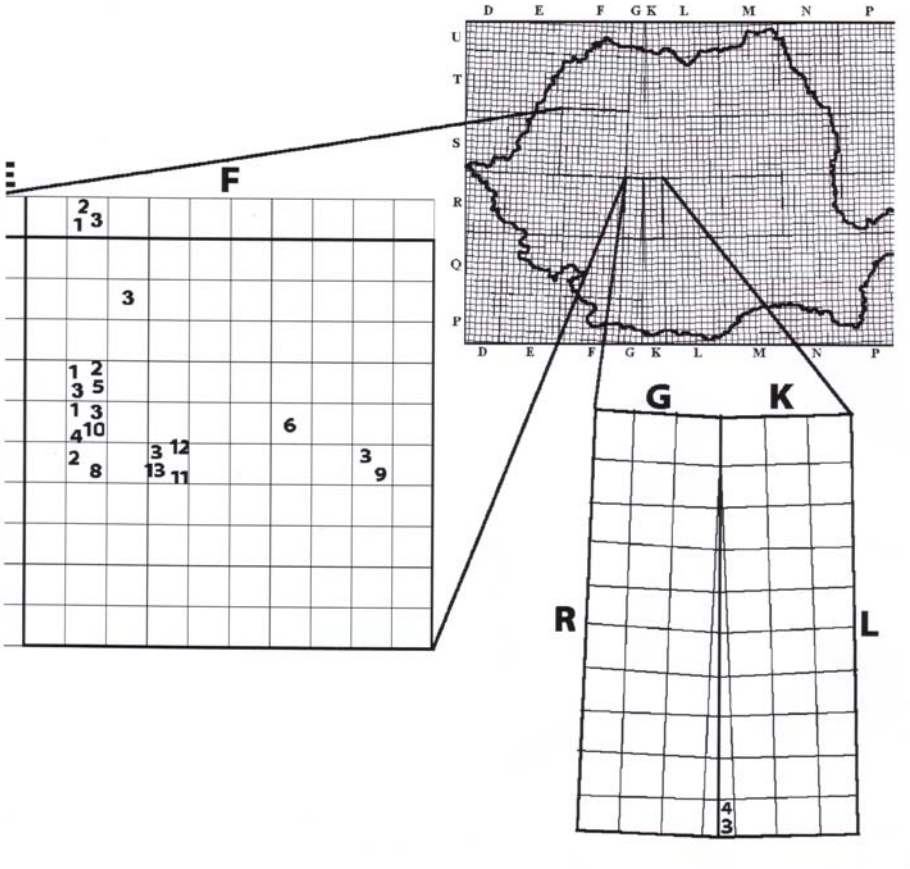

Fig. 1 – The distribution of bats in UTM codes in the investigated areas. The numbers on the map correspond with the current numbers from table 1.

Romania), in some older data from Pazslawsky [6] and C ă l i n e s c u [2]. Based on two skulls found together with other skeletal remains of *Myotis myotis, Myotis blythii* and *Plecotus austriacus* we have identified this species in Coiba Mare Cave.

8. *Miniopterus schreibersii* Kuhl 1818. Large colonies have become extinct in France, Switzerland and Germany. In Central Europe it is among the endangered species. Fifty years ago there were many Schreiber's bats in Romania [3]. In our research we only found them in one of the previously numerous caves where they had been reported to have been living. This may be the result of a serious decline in the *Miniopterus schreibersii* populations. Ferice Cave was probably used only as a mating place, because during our summer and winter visits we could not find any individuals. They were present in the above mentioned location in the autumn and the large actual deposits of guano testify to their periodic visits to this cave.

9. *Pipistrellus pipistrellus* Schreber 1774. It is still one of the most common bat species, in Northern and Central Europe. It is widespread; and common throughout Europe, but the effective numbers have declined by 60% during the past years. We identified it by the skeletal remains found in "Huda lui Papară" Cave, which represents a preferred hibernaculum for many species of bats.

10. *Nyctalus noctula* Schreber 1774. It is very rare in several regions of Great Britain and it is virtually absent in Spain, Portugal and Southern France. This is a species that prefers forest or anthropic habitats, and is only exceptionally found in caves. We noticed individuals of this species in two caves that represent new locations for them. In "Huda lui Papară" Cave we found living bats and also skeleton remains.

11. *Plecotus auritus* Linnaeus 1758. It is a common and widespread species almost all over Europe, but was not recorded in Southern Spain, Southern Italy and Greece. According to Schobber and Grimmberger [9] it is greatly endangered in Germany, due to the treatment of the forests with chemicals. In Romania they have been seen all over, but single bats and not colonies. We have identified it on the basis of the skulls from Hodobana Cave. We have visited this cave twice, without noticing living individuals.

12. *Plecotus austriacus* Fischer 1829. Rarer than *Plecotus auritus* in Central Europe, it is common in the Mediterranean and the Balkan regions. Valenciuc [10] was the first one to identify this species in Romania. We found an actual skeleton of this species in Coiba Mare Cave and during our repeated visits we observed living, solitary individuals in Hodobana Cave, which represents a constant location for *Plecotus* sp. We also found hoe three skeletons of the same species.

13. *Eptesicus serotinus* Schreber 1774. This species is widespread over Europe, up to 55°N, and in the South in the Mediterranean and the Balkan regions. It is declining in abundance but apparently it increases towards the north. In

Romania, according to previous data [3], several individuals have been seen in caves, but only in the Banat region. We also found it in Hodobana Cave in Bihor Mountains.

According to these observations, we can draw some conclusions regarding the frequency p / P • 100 (p = number of Caves in which we found the investigated species and P = number of all investigated Caves with bats from our study) and the abundance of the mentioned species. The distribution of the Chiroptera in the visited areas indicates a, great dispersion of *Myotis myotis* (53.33% of the investigated locations were populated by this species), often accompanied by

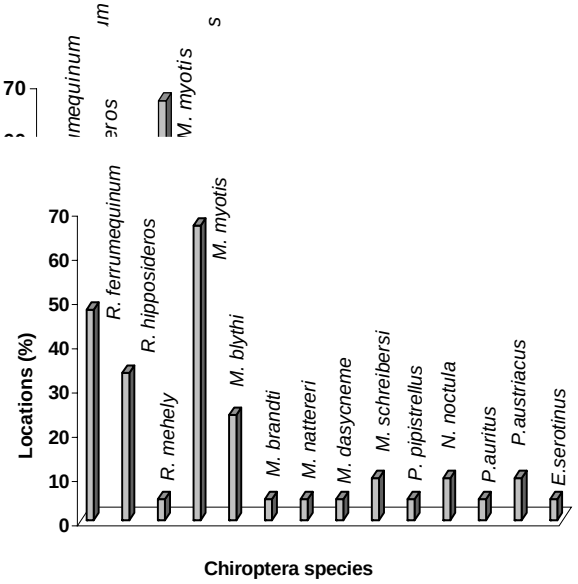

Fig. 2 – The frequency of bats.

Myotis blythii (26.66%). *Rhinolophus ferrumequinum* (33.33%) and *Rhinolophus hipposideros* (33.3%) are next to them in the distribution of bats species. The other species have only a small presence either in one (6.66%) or at most in two caves (13.33%) (Fig. 2). Generally, the bats we observed were lone males during the summer period or recent skeletons found when we visited for the first time the respective caves. Concerning the species abundance in the territory, the situation is almost the same, with the *Myotis myotis* and *Myotis blythii* the most numerous. For example, we identified one nursery colony and other three summer groups for these species.

Based on these recent investigations and on the previous data, we may assume that nowadays the number of bats in the caves of Romania has diminished.

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