MARISIA

Studii şi materiale

XXXV

Ştiinţele Naturii

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BAT SPECIES (MAMMALIA, CHIROPTERA) HIBERNATING IN ABANDONED STONE QUARRIES FROM SAHARNA, REPUBLIC OF MOLDOVA

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Abstract: Abandoned quarries from Saharna (47^{0}41' N, 28^{0}57' E) situated at the 80–100 m above the sea level have several entrances. The ceiling consists of multiple cracking, remained after extraction activities and has a height of between 1.5 and 3 m. The first individuals were observed near the entrance at 2–4 m. A total of 7 km of underground passages were investigated and 325 individuals from 9 species. In 2013 we recorded only 112 individuals from 7 species, while in 2014 – 213 individuals from 9 species. During both years the dominant species was *Eptesicus serotinus* with about 65% in 2013 and only 40% in 2014, followed by *Myotis daubentonii* and *Rhynolophus hiiposideros* in the first year and by *R. hipposideros* then *M. daubentonii* in the second year of study. The rest of the species were registered in low number, between 0.5% and 7%. It must be mentioned the presence of *Barbastella barbastellus* species with approximately 2% in each study period. It is a very rare, endangered species of our fauna and the Saharna site represent the only known hibernation place of this species in R. Moldova. The abandoned stone quarries from Saharna represent an important bat hibernation shelter, where hundreds of individuals spent the winter and this site need special protection.

Keywords: bats, hibernation, underground roost, Saharna, community structure

Introduction

In the Republic of Moldova the order Chiroptera comprises 21 species belonging to families Rhynolophidae and Vespertilionidae. Almost half of them hibernate in underground shelters of various origins, including abandoned stone quarries that represent important roost sites. Such roosts provide favorable conditions for mating, hibernation, rearing the young, protection from adverse weather and predators. The studies of bats hibernating in underground shelters were carried out in 60's–70's of the past century all over the republic, but mostly in the northern and central zones [2, 3, 5, 6, 7]. Then, for almost 20 years bat studies were practically abandoned and at the end of 90's they continued by several researchers mostly in the central part of Moldova and in Nistru river valley [1, 4, 13, 14). Since 2013 intense studies on bat species hibernating in various underground shelters from the central part of Moldova have started, including preliminary results on bat communities hibernating in Saharna quarries [9, 10, 11, 12]. The abandoned stone quarries from Saharna represent an important bat hibernation site. Therefore, the bat study and monitoring in this area is of huge importance for bat conservation.

Material and methods

Abandoned stone quarries near Saharna village are located near the monastery (47^{0}41' N, 28^{0}57' E) at an altitude ranging between 88–100 m and there are several entries located along the slopes. The entries aren't protected in any way and the population has free access. A positive aspect for bats is that during the cold period the tourism and other recreational activities are less intense. The ceiling consists of multiple cracks left after extraction activities and has a height ranging from 1.5 to 5 m. The studies were performed in winter-beginning of the spring period of 2013–2014. The temperature outside was of -1^{0}C–0^{0}C in February and of 7^{0}C 10^{0}C in March. Inside the quarries the temperature was practically the same in both study periods: 7^{0}C–8^{0}C at 10 m from the entrance. The relative humidity ranged between 76% and 87%.

The bats were studied directly by visual observations, all individuals were identified. During winter the individuals weren't disturbed, while at the beginning of spring, when bats become more active, some of them were extracted from the ceiling cracks in order to determine their sex and age, weight and some morphological peculiarities.

Results and discussions

A total of 7 km of underground passages were investigated and 325 individuals from 9 species (*Rhynolophus hipposideros, Myotis blythi, M. daubentonii, M. dasycneme, M. mystacinus, Plecotus auritus, P. austriacus, Barbastella barbastellus, Eptesicus serotinus*) were registered. In 2013 we recorded only 112 individuals from 7 species, while in 2014 – 213 individuals from 9 species. This fact is probably due to the late period of study in 2013, which was at the end of March, when bats become active and begin to leave the underground shelters, while in 2014 the bat monitoring occurred at the beginning of February. In spring there were observed 12 individuals flying in the quarries.

The first individuals, belonging to *E. serotinus, P. austriacus* and *P. auritus* were observed near the entrance, at 3–4 from it. The *Plecotus* species usually hibernate near the entrances of underground shelters, up to 8–10 m, while the serotine bat can be found near the entrances, as well as deeper in the underground.

Most of the individuals were found in cracks solitarily, only *E. serotinus* individuals were found in small groups, ranging from 2 to 10 individuals (fig. 1). Other species were found exclusively solitarily.

Fig. 1: *Eptesicus serotinus* found in cracks in groups of 2 and 9 individuals

During both years the dominant species was *E. serotinus* with about 65% in 2013 and only 40% in 2014, followed by *M. daubentonii* and *R. hipposideros* in the first year and by *R.hipposideros* then *M. daubentonii* in the second year of study (fig.1). In general, the ratio of species distribution is more even in February than in March, the quantitative difference between the dominant species being less pronounced in winter. The whiskered bat (*M. mystacinus*) was the fourth species after its abundance and registered 6.73% in February and 4.7% in March. The rest of the species were registered in low number, between 0.5% and 4%. The *Plecotus* genus individuals weren't registered in the first year of study, while in the February of the second year *P. austriacus* had 2,35% and *P. auritus* only 0,5%, being the least abundant bat species.

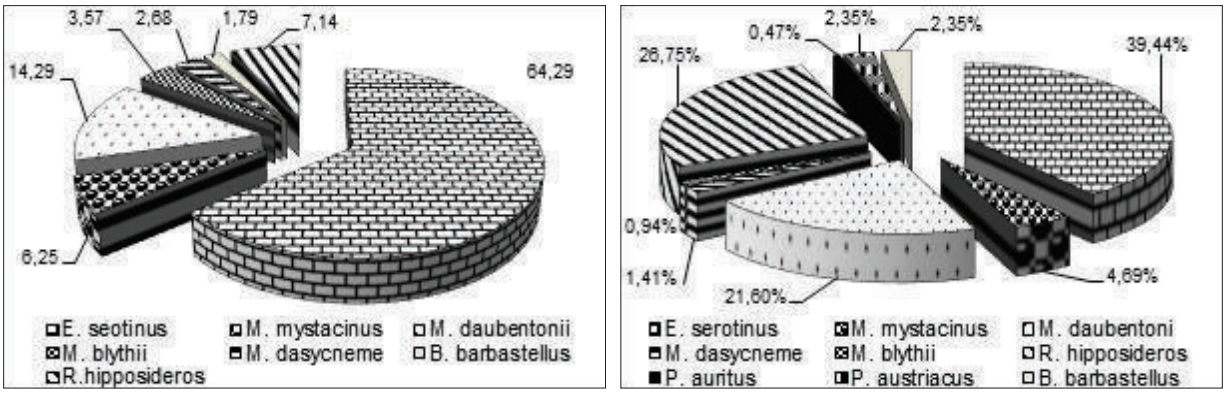

Fig. 2: Structure of hibernating bat community in abandoned stone quarries from Saharna in 2013 (left) and in 2014 (right)

It must be mentioned the presence of *B. barbastellus* species (fig. 3) with approximately 2% in each study period. It is a very rare, endangered species of our fauna and the Saharna site represent the only known hibernation place of this species in R. Moldova. Previously, the species was recorded in Cricova and Milestii Mici underground shelters [3], but at present it disappeared from these roosts [9, 10].

Fig. 3: *Barbastella barbastellus* – one of the rarest species in the fauna of Moldova

A very interesting fact was that during the studies a ringed individual of *E. serotinus* was found (ring no XC011567), adult male ringed in 1995 by one of the authors (Andreev, pers. comm.). Therefore, it was confirmed the extraordinary longevity of these small animals. The

individual was already an adult of at least 2–3 years old when it was ringed, thus in 2014 it was at least 21 years old. The maximum life span of this species is considered 21 years, but its tooth wear was not very pronounced, so we expect to find this individual in the future studies. This record also confirms that serotine bat does not migrate at long distances and is loyal to its wintering roost.

In the previous studies performed in 60–70's of the past century in Saharna quarries the quantitative and qualitative structure of hibernating bat community was different. Up to 70's of the past century the dominant species was *M. blythi*, which formed large colonies ranging from 200 to 800 individuals [5, 7]. This species represented more than 95% of hibernating bat community. Unfortunately, its number decreased constantly and toward middle of 70's the number of individuals constituted only few dozen. The whole community consisted of 4–6 species depending on the year of study. The lesser horseshoe bat was constantly recorded in the quarries, being the second species after *M. blythi* [5]. The barbastelle bat was registered only one time in Saharna quarries [5], the species being more widely distributed than nowadays [2].

In the 90's the studies on bat fauna from Saharna site continued and the community of bats in autumn period comprised 6 species [14] including *Rhinolophus ferrumequinum*, a very rare species that wasn't found in the last years. Few years later, during a 5-year monitoring, 10 bat species hibernating in Saharna underground shelters were registered, of which *Myotis nattereri* wasn't recorded in our study. The lesser horseshoe bat was dominant in during the whole year and it is still rather abundant at present, while the barbastelle bat was one of the dominant species in winter period. For the first time the species *P. austriacus* and *E. serotinus* were recorded and the highest bat diversity among all hibernation roost was mentioned for this site [13].

The abandoned stone quarries from Saharna represent an important bat hibernation roost, where hundreds of individuals from about 9 species, including rare and endangered species, spent the winter and we recommend to assign a special protection status for this site.

Conclusions

In abandoned stone quarries from Saharna during 2 years 325 individuals from 9 species were registered. In 2013 we recorded only 112 individuals from 7 species, while in 2014 – 213 individuals from 9 species.

During both years the dominant species was *E. serotinus* with about 65% in 2013 and only 40% in 2014, followed by *M. daubentonii* and *R. hipposideros* in the first year and by *R.hipposideros* then *M. daubentonii* in the second year of study. The rest of the species were registered in low number, between 0.5% and 7%.

It must be mentioned the presence of *B.barbastellus* species with approximately 2% in each study period. It is a very rare, endangered species of our fauna and the Saharna site represent the only known hibernation place of this species in R. Moldova.

The abandoned stone quarries from Saharna represent an important bat hibernation shelter, with the highest bat diversity among all hibernation roost and this site need special protection.

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SPECIILE DE LILIECI (MAMMALIA, CHIROPTERA) CARE HIBERNEAZĂ ÎN CARIERELE ABANDONATE DE LA SAHARNA, REPUBLICA MOLDOVA
(Rezumat)

Carierele abandonate de la Saharna ($47^0$41' N, $28^0$57' E), situate la altitudinea de 80–100 m, au câteva intrări. Tavanul constă din multiple crăpături rămase în urma excavaţiilor şi are înălţimi cuprinse între 1,5 şi 5 m. Primii indivizi au fost observaţi în apropierea intrărilor, la 2–4 m. În total au fost parcurşi 7 km şi înregistraţi 325 indivizi din 9 specii. În 2013 au fost semnalaţi 112 indivizi din 7 specii, iar în 2014 – 213 indivizi din 9 specii. Pe parcursul ambilor ani de studiu, specia dominantă a fost *E. serotinus* cu cca. 65% în 2013 şi 40% în 2014, urmată de *M. daubentonii* şi *R. hipposideros*, în primul an de studiu şi de *R. hipposideros* apoi *M. daubentonii*, în al doilea an. Celelalte specii au fost semnalate într-un număr mai redus, rata acestora fiind cuprinsă între 0,5% şi 7%. Trebuie menţionată prezenţa speciei *B.barbastellus* cu circa 2% în fiecare perioadă de studiu. Este o specie periclitată şi foarte rară în fauna noastră, iar situl Saharna este unicul loc cunoscut de hibernare a speciei în R. Moldova. Carierele abandonate de la Saharna reprezintă un loc important al hibernării liliecilor, unde iernează sute de indivizi, şi acest sit necesită statut de protecţie.