

DATA ON BAT FAUNA OF CHIȘINĂU CITY, REPUBLIC OF MOLDOVA

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ABSTRACT

The studies were accomplished during 2012-2015 in various types of ecosystems from Chișinău city and its surroundings. In urban ecosystems of the city 10 species of bats were recorded. The most abundant and widespread is the serotine bat, followed by the common pipistrelle and common noctule. The hygrophilous species *Myotis daubentonii* and *M. dasycneme* were registered in wet biotopes and near water basins. Among long-eared bats the grey one is most common and spread, while the brown long-eared bat was recorded only in forest biotopes. The most suitable ecosystems for bats are the forests around the city and the parks within the city. Various types of human constructions provide favorable shelter conditions for bats during summer and roosts in winter. Two species of bats were identified in *A. otus* pellets *E. serotinus* and *V. murinus*. The bat fauna of Chișinău city is rather well represented and indicate the adaptation of animals toward strong anthropic disturbances.

Key words: urban ecosystems, bats, biotopic distribution, pellets

Introduction

In the last decades an intense development of urban localities is registered in the republic, especially of Chișinău city. From evolutionary point of view the urban habitats are young ones with a specific complex of ecological conditions that are permanently changing. The surfaces of cities and adjacent territories subjected to disturbances are continually expanding. In such conditions an important problem of the evolutions and of modern ecology is the monitoring of multiannual dynamics and evaluation of adaptation strategies of the animals toward the anthropogenic disturbances of the environment.

Urban fauna is an important element in maintaining the ecological balance of city ecosystems. The bats are indispensable components of mammal fauna in urban ecosystems and can serve as ecological indicators of ecosystem state and stability degree of urban biocoenoses. There are only few mentions in some studies concerning bat urban fauna in the past century (1), where several species are cited as component of urban fauna. Since than data on bat urban fauna are practically missing. In the last years some studies were performed on the occurrence of bat species in Chișinău area (14). Also, within the complex studies of terrestrial vertebrate urban fauna, several bat species were

identified (5, 16). Still, there are no studies concerning bat fauna from urban ecosystems of Chișinău city.

Therefore, the aim of this paper was to evaluate the occurrence, diversity and biotopic distribution of bat species in Chișinău city ecosystems and to reveal the bat species most adapted toward urban environment.

Materials and methods

The studies were accomplished during spring-winter period of 2012-2015 in various types of ecosystems of Chișinău city and its surroundings. The study area included the parks La Izvor, Valea Trandafirilor, Dendrarium, Ștefan cel Mare and Botanical Garden. The forest ecosystems are represented by forest plantations, shelter belts and remains of natural woods around the city. The open land ecosystems are represented by various types of cultivated lands, fallow grounds, grasslands, pastures. The wet biotopes are represented by the banks of rivers, lakes and ponds. Various types of buildings were also considered such as houses with adjacent gardens and blocks with adjacent territories, usually grown with tree and shrub vegetation.

The used methods were the direct observations of morphology and flight peculiarities. Also the ultrasound detector was used in order to identify bat species according to the emitted ultrasounds. The counting on routes with the length

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of 1 to 5 km was made during several days each month (March-October). Pellets of *Asio otus* were collected in the yard of a primary school in Ciocana sector, where remains of bats were identified.

In studies the following equipment was used: binoculars, laser rangefinder, night vision monocular, GPS E-Trex-10, digital camera, ultrasonic detector D-230.

Results and discussions

During the studies in Chişinău city and its surroundings 10 species of bats were recorded out of 21 species existing on the territory of the Republic of Moldova (tab. 1).

The most widespread and common species was the serotine bat (*Eptesicus serotinus*), registered in all the studied biotopes. It was recorded in spring-autumn period in various types of forest biotopes, in parks, near wet habitats, flying above open lands (pastures, cultivated sectors, fallow ground, gardens,

small squares) and in buildings, where they spent the day. In winter period it was found in various building attics, even in corners of large halls of administrative buildings, usually at the upper floors.

The lesser horseshoe bat (*Rhinolophus hipposideros*) was registered only one time with the ultrasound detector in a summer evening in forest biotope near Vadul-lui-Voda suburb. It is a rare species inhabiting in Nistru river valley. The species has a specific of ultrasound frequency, between 105 and 115 kHz and can't be mistaken for other species.

The common pipistrelle (*Pipistrellus pipistrellus*) was recorded in most of the ecosystems, except the shore of lakes, ponds and rivers. This species is widespread in rural and urban localities and have a tendency toward synanthropization, therefore it is well adapting toward urban conditions and can be met in urban ecosystems during the whole year.

Table 1 - Bat species registered in urban ecosystems of Chişinău city and surroundings.

No	Species	Ecosystems						Pellets of <i>Asio otus</i>
		Forest	Shelter belts	Parks	Wet biotopes	Open biotopes	Buildings	
1.	<i>Rhinolophus hipposideros</i>	+	-	-	-	-	-	-
2.	<i>Myotis daubentonii</i>	+	-	+	+	+	+	-
3.	<i>M. dasycneme</i>	-	-	+	+	-	-	-
4.	<i>M. mustacinus</i>	+	-	+	-	-	-	-
5.	<i>Nictalus noctula</i>	+	+	+	-	-	+	-
6.	<i>Plecotus austriacus</i>	-	+	+	-	+	+	-
7.	<i>P. auritus</i>	+	+	+	-	-	-	-
8.	<i>Pipistrellus pipistrellus</i>	+	+	+	-	+	+	-
9.	<i>Eptesicus serotinus</i>	+	+	+	+	+	+	+
10.	<i>Vespertilio murinus</i>	-	-	-	-	-	-	+

The hygrophilous species *Myotis daubentonii* and *M. dasycneme* were registered in wet biotopes and in parks near water basins. The Daubenton's bat, which is more spread, was also recorded flying above open lands (pastures, fallow ground), but always near water sources, such as rivulets and small ponds. It was found occasionally in attics of various buildings. The whiskered bat (*M. mystacinus*) is a rather rare forest species that was recorded in forest ecosystems and seldom in parks.

The common noctule (*Nictalus noctula*) is a widespread forest species, but it can be found in localities. Thus, it was recorded in various types of forest ecosystems, as well as in buildings. A large colony of about 200 individuals was found in a building, during the repair works at the beginning of December 2013. The colony was carefully removed in boxes near Cricova town, situated at about 15 km

from Chişinău city, at the entrance of abandoned stone quarries. After one month the place was inspected and no individuals were registered, they probably found shelter in the nearest locality.

Among long-eared bats (*Plecotus*) the grey one is most common and spread. It avoids compact and dense forest stands, but occurs in shelter belts and parks. It prefers open type biotopes and during winter it was found in buildings: in attics, at the corner in large halls, or even hanging on the walls (fig. 1). The brown long-eared bat is more rare and was registered in only various kind of forest biotopes.

The most suitable ecosystems for bats are the forests around the city and the parks within the city, where the most of bat species were registered. Only in forest biotopes, especially at ecotone areas, were recorded the lesser horseshoe bat and other 6

species. The recreational and touristic activities in forest ecosystems around the city formed specific types of habitats near the city with accumulation of food waste that are attractive for many insects, which, at their turn, represent the trophic source for the bats.

The parks provide favorable trophic conditions due to the existence of various types of habitats, such as tree plantations, with old and hollow trees, water habitats, where typically hygrophilous species were met (Daubenton's bat and pond bat), as well as large alleys, along which prefer to hunt the serotine bat, the long-eared bats and the whiskered bat. In shelter belts the most common species were recorded, while in wet biotopes the Daubenton's bat and pond bat were registered along with the most common and eurytopic serotine bat. In open biotopes, located mostly at city limits, only four most common species were registered. Various kind of buildings prove to be suitable for five bat species that find favorable shelter conditions and are well adapted to anthropic disturbances. The representatives of these species often spent the winter in buildings, of which the common noctule form winter colonies, while the rest of species hibernate solitarily or in small groups of 2-4 individuals (Daubenton's bat).



Fig. 1 – *Plecotus austriacus* hanging on the wall.

In studies from the previous years in Chişinău city there were recorded 11 bat species: *Rh. hipposideros*, *M. blythii*, *M. daubentoni*, *M. dasycneme*, *M. nattereri*, *M. mystacinus*,

Plecotus sp., *N. noctula*, *P. pipistrellus*, *P. nathusii*, *E. serotinus* (1). The long-eared bat (*Plecotus*) mentioned in several studies from the past century is probably was *P. austriacus*, which is more common in city ecosystems. Another species recorded in the past century and wasn't recorded in the last years is *N. leisleri*, which was registered in the forest ecosystems around the city (2). In earlier studies the presence of *M. blythii* (13), *P. pipistrellus*, *E. serotinus* (2, 3) and *V. murinus* (8) is mentioned for Chişinău city.

During the analysis of about 1000 pellets of long eared owl collected in Chişinău, 11 individuals of two bat species were identified: *E. serotinus* with 2 individuals and *V. murinus* with 9 individuals, which constituted 0.29% from all identified animals.

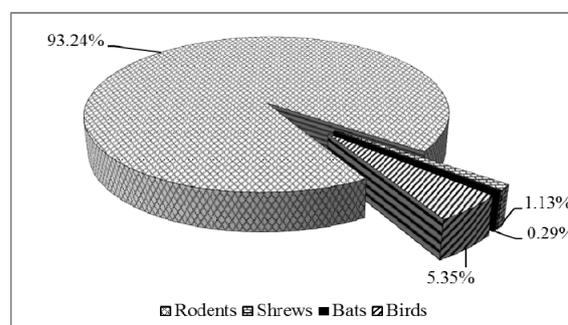


Fig. 2 – Trophic spectrum of long-eared owl in winter period in Chişinău city.

The majority of *A. otus* trophic spectrum consists of rodents, followed by birds and shrews. The bat species are only occasionally hunted during winter. In warm winter days, especially in localities, some bat individuals leave their shelters and fly around in the evening hours.

The presence in pellets of *V. murinus* individuals is of particular interest, because it is a very rare and endangered species that was recorded only in several places from the central part of the republic.

The occurrence of bats in long-eared owl's diet is mentioned for other regions, such as Czech Republic (4), Slovakia (6, 15), Spain (10, 12), Italy (11), Israel (7), Ukraine (9). In all the studies the proportion of bats was low and varied between 0,009% and 2.3%, which is consistent with our data.

The bat fauna from urban ecosystems of Chişinău city is rather well represented and indicate the adaptation of animals toward strong anthropic disturbance. The presence of some rare species, such as the lesser horseshoe bat, pond bat, particoloured bat indicate that the animals find favorable conditions (roost, food, reproduction sites) in urban ecosystems of the city.

Conclusions

In Chişinău city and its surroundings 10 species of bats were recorded. The most abundant and widespread is the serotine bat, followed by the common pipistrelle and common noctule. The hygrophilous species *Myotis daubentonii* and *M. dasycneme* were registered in wet biotopes and near water basins. Among long-eared bats the grey one is most common and spread, while the brown long-eared bat was recorded only in forest biotopes.

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Rezumat

Cercetările au fost efectuate în anii 2012-2015 în diverse tipuri de ecosisteme ale municipiului Chişinău. Speciile de chiroptere au fost identificate după morfologia externă și tipul zborului, precum și cu ajutorul detectorului de ultrasunete. În raza oraşului și în împrejurimi au fost semnalate 10 specii de lilieci. Cea mai comună și răspândită este liliacul târziu, urmat de liliacul pitic și cel de amurg. Specii higrofile liliacul de apă și cel de iaz au fost înregistrate în habitatele umede din apropierea bazinelor acvatice. Printre lilieci urecheați mai abundent și răspândit este liliacul urecheat cenușiu, iar cel brun a fost semnalat doar în ecosisteme forestiere (păduri, parcuri, perdele). A fost localizată o colonie de cca 200 indivizi de liliac de amurg în timpul reparațiilor unei clădiri din zona centrală a municipiului. În ingluviile ciufului de pădure au fost identificate 2 specii de lilieci: *E. serotinus* și *V. murinus*, care au constituit 0,29%. Fauna de lilieci a mun. Chişinău este destul de bine reprezentată, ceea ce denotă adaptarea animalelor la perturbările antropice din ecosistemele urbane.

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