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Diversity of small rodents (Mammalia: Rodentia) in various sectors of the municipality of Chisinau

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Abstract. The small rodents in various sectors of the municipality of Chisinau are represented by 10 species. In the recreational sectors of the municipality of Chisinau, a rather rich fauna of small rodents was recorded due to the existence of various types of biotopes, including natural and wetland, which denotes the presence of stable communities of rodents, favoring in turn the existence of a series of predatory vertebrates.
Keywords: rodents, trappability index, abundance, municipality of Chisinau.

Diversitatea rozătoarelor mici (Mammalia: Rodentia) în unele sectoare ale municipiului Chișinău

Rezumat. Rozătoarele mici din diverse sectoare ale municipiului Chișinău sunt reprezentate de 10 specii. În sectoarele de agrement ale municipiului Chișinău a fost înregistrată o faună destul de bogată de rozătoare mici datorită existenței diverselor tipuri de biotopuri, inclusiv cele naturale și zonele umede, ceea ce denotă prezența unor comunități stabile de rozătoare, favorizind la rândul său existența unei serii de vertebrate prădătoare.
Cuvinte-cheie: rozătoare, indice de capturare, abundență, municipiul Chișinău.

1. Introduction

In recent decades the world has undergone rapid changes, including demographic explosions and massive urbanization, as result of human activities natural ecosystems have been affected, either positively or negatively. As an example of the negative effects of urbanization is the loss of many plant and animal species.

The degradation of natural habitats and their replacement by anthropogenic habitats have caused, over time, the decrease in the number of ecological niches and an intensification of interspecific competition, lax food requirements as well as the high degree of adaptability, representing an advantage of synanthropic species over other representatives of fauna from natural areas.

Synanthropic species are often generalist species, and in non-urban areas they commonly develop [5]. Mammals that are able to adapt to even the most developed portion of the urban environment are called urban explorers or synanthropes. They represent a

group of mammal species that are highly adapted to urban environments [6]. They are usually omnivores and their populations depend on man human resource.

The first rodents identified on the territory of the municipality of Chisinau from the Late Miocene fossil sites were discovered in the Otovasca site, which is part of the southeastern sector of Chisinau city. This archaic rodent belongs to the species *Chalicomys jaegeri* (Kaup, 1832) of the Castoridae family [4].

Small mammals are an indispensable component of urban ecosystem fauna and can serve as ecological indicators of urban ecosystem stability. In the last century, there are only a few studies on the urban fauna of small mammals, where 8 species of rodents are mentioned [9]. After the year 2000, the faunal studies of small mammals in the municipality of Chisinau were more intense. Thus, research was carried out in various types of more or less anthropized biotopes of the municipality of Chisinau [1-3, 8]. In these papers it is mentioned that urban ecosystems are populated by 11 species of rodents and three species of insectivores from three ecological groups: synanthropes, hemisynanthropes and exoanthropes, some ecological peculiarities of synanthropes species were elucidated.

As a result of these studies, the specific composition and diversity of the fauna of small mammals in the selected territories were elucidated.

The aim of the work was the ecological analysis indices of small rodent have been calculated: abundance, trappability and diversity in different types of biotopes of the small rodents in the sectors of the municipality of Chisinau, which are considered to be areas with intense recreational activity. As result of these studies, it was elucidated diversity of the small rodent fauna in the various sectors of the Chisinau city.

2. Materials and Methods

The research was carried out between the years 2008-2009 in the municipal parks of the municipality of Chisinau. Valea Trandafirilor Park is located in the Botanica sector. It covers an area of 145 hectares, of which 9 hectares are water surface. It was set up in 1968 on the site of a hill cultivated with roses, paths were built and the banks of the waters were dammed. Valea Morilor Park is part of the Buiucani sector of the municipality of Chisinau and is located on the shore of Lake Valea Morilor on a plot of land with a varied relief, having 4 entrances [13]. The park area was initially about 114 hectares, the lake having an area of 34 hectares. A 2.5-kilometer-long ring road was arranged around the lake. The Botanical Garden is located in the South-East part of Chisinau city, Botanica sector. The territory of the Botanical Garden is crossed by four constructed water reservoirs, which, being at different levels, form a cascade of lakes. Groundwater is at different depths between 1.5 - 7.0 m [12]. The Zoological Garden is located near the

Botanical Garden and is located in the southern part of the city, stretching over an area of 24,306 hectares [12]. The Arboretum Park is located in the Buiucani sector of Chisinau city. The park is located in the central-western part of the municipality, in the valley of Durlești river, the surface of the park has been extended to 77.8 hectares. "La Izvor" park is part of the Buiucani sector of Chisinau. Being the second largest in the municipality, it covers an area of 150 hectares and includes 3 lakes with several islets.

Data on the structure and density of the populations of small rodents were obtained according to the standard method of collecting the material in the field during 4-5 days with the help of traps arranged in lines of 25 pieces with the interval between them of 5 m and between the lines of 20 m. Black bread soaked in unrefined sunflower oil was used as bait. All captured animals were identified.

The ecological indices of small rodent have been calculated: abundance, trappability and diversity in different types of biotopes.

3. Results and Discussions

Research in different sectors of the city proved to be the most difficult to carry out due to the increased crowding of residents and the presence of stray animals. Thus, the species diversity of small rodents varies from one species in the Botanica sector to 10 (*C. glareolus, Arvicola terestris, Microtus arvalis, M. rossiaemeridionalis, Apodemus uralensis, A. sylvaticus, A. flavicollis, A. agrarius, Mus musculus* and *Rattus norvegicus*) in the Sculeni sector.

The diversity of small rodent species collected in various types of biotopes in the Sculeni sector of the municipality of Chisinau was the richest, compared to other types of the biotopes located on the territory of Chisinau city, possibly due to the fact that the works were mostly carried out in biotopes further away from inhabited houses, on the banks of the Bîc river and its surroundings.

The most numerous species was *A. sylvaticus* with trappability index of 4.7%, followed by *M. rossiaemeridionalis* with 4.0%, *A. agrarius* was reported with a trappability index of 2.8%. The species *Arvicola terrestris*, *Mus musculus* and *Rattus norvegicus* had the lowest trappability index with 0.1% each (Fig. 1).

The relative abundance in the Sculeni sector biotopes is the highest in the species *A. sylvaticus*, which constitutes 32.8%, followed by *M. rossiaemeridionalis* with 17.2%, *A. agrarius* – 14.9%. The lowest relative abundance was reported in the species *Arvicola terrestris* with 0.6%. Regarding the synanthropic species, we mention that *M. musculus* had a relative abundance of 4.6%, being captured in the warehouse, and *Rattus norvegicus* - 2.9% was captured not far from the warehouse, which is located on the banks of the

Bîc river. On the territory of the deposit, the most abundant species was *A. sylvaticus* with 83.3%, due to the fact that the deposit was bordered by a forest strip, while the synanthropic species *M. musculus* was reported with a much lower relative abundance only by 16.7%.

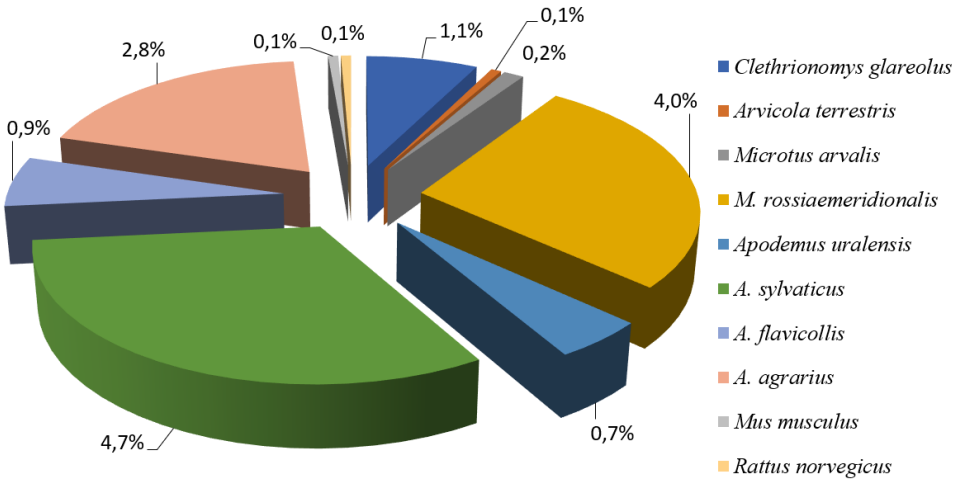

Figure 1. Trappability index of small rodent species in the Sculeni sector.

The deposit, which is located near to the Bîc river bank, the most abundant species was *A. sylvaticus* with 62.5%, followed by *M. rossiaemeridionalis* - 12.5%. The species *C. glareolus, A. terestris, A. agrarius* and *R. norvegicus*, the last species being strongly synanthropic species, they had a relative abundance of 6.25% each at the time of the research (Fig. 2.).

After the research carried out in the anthropized biotopes of Valea Morilor Park of Chisinau city, 3 species of small rodents were identified: *A. sylvaticus A. uralensis* and *Mus musculus*. The highest trappability index in these biotopes was reported for the strongly anthropized species *M. musculus* with 4.4% and an abundance of 58.3%, followed by *A. sylvaticus* with – 1.9% and a relative abundance of 25%. While the species *A. uralensis* had a trappability index of 1.3% and a relative abundance of 16.7%.

In the Botanica sector of Chisinau city, research was carried out in Valea Trandafirilor Park, where 2 species were identified, both belonging to the genus *Apodemus*: *A. sylvaticus* and *A. uralensis*. Both species had close values of trappability index *A. sylvaticus* 5% and *A. uralensis* 4%, the first species having an abundance of 55.6% and the second 44.4%.

The diversity of rodent species is very poor in the city parks, it was represented by only 3 species, of which the species *A. sylvaticus* had a major abundance of 46.7%, and

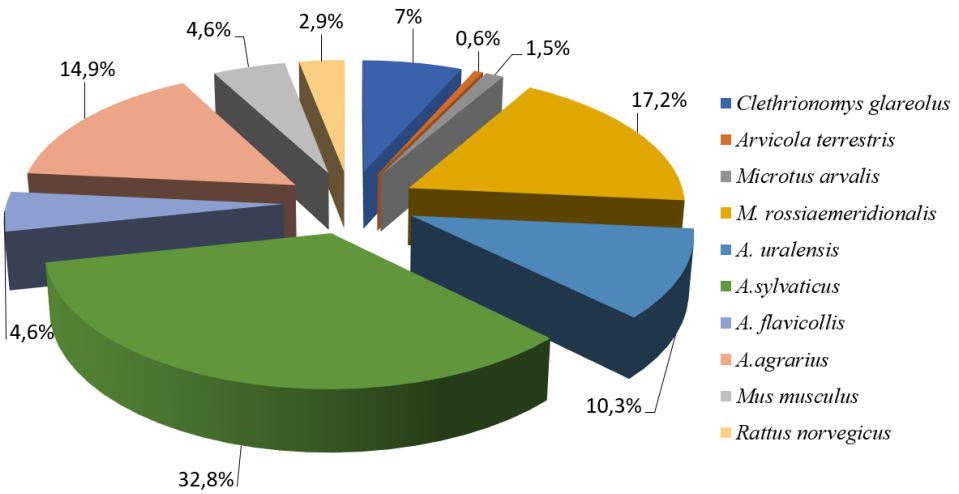

Figure 2. The abundance of small rodent species in the Sculeni sector.

the smallest one was reported in the synanthropic species *M. musculus* – 20%, because it inhabits the biotopes near houses.

The landscape parks (Botanical Garden and Zoological Garden) from the faunal point of view were much richer than the aforementioned parks, being identified 8 species of rodents. The maximum abundance was held by the species *A. sylvaticus* with 27.5% followed by *A. flavicollis* with 18.9%, *A. agrarius* with 15.3%, and the species with the lowest abundance value was *M. arvalis* with 3% (Fig. 3.).

As result of the processes of development and urbanization(the growth of cities and suburban areas), the forest cover of the region decreased significantly, the native forest coenoses were gradually replaced by parks, protective forest belts, agrocoenoses, etc. [11]. The emergence and subsequent development of settlements, especially those as large as cities, could only affect the state of the surrounding natural landscapes. Urban biota (including small rodents) is exposed to sound and electromagnetic pollution, which affects the functioning of cellular and molecular structures.

Undoubtedly, green spaces, which are of particular importance for improving the ecological condition of the urban environment, should be considered the most important components of urban landscapes. Plants retain dust and absorb 50-60% of toxic gases [10]. They essentially reduce noise pollution and wind intensity. Tree crowns, especially poplars, absorb up to 20–70% of sound energy [10].

As result of the research carried out, some practical recommendations can be proposed such as:

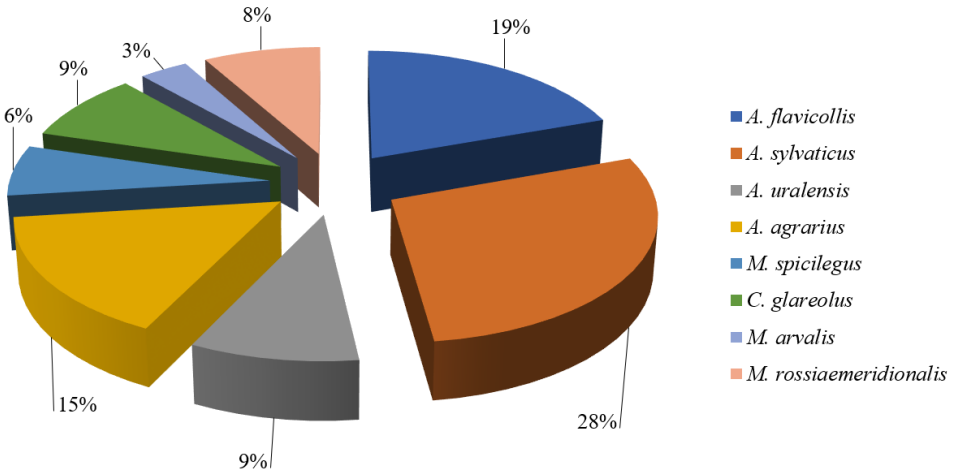

Figure 3. The abundance of small rodent species in the landscape parks of Chisinau city.

1. Prohibiting the storage of household waste in unauthorized places, in order to avoid the accumulation of a large number of synanthropic and hemi-synanthropic rodents – harmful to the health of the population.

2. Monitoring of drains, sewers and basements of blocks of flats, houses, abandoned buildings, as these are breeding sites for synanthropic species of small rodents (*R. norvegicus* and *M. musculus*).

3. Awareness of the general public through lectures, projects, articles in newspapers and popularizing magazines, participation in various events regarding the maintenance of faunal diversity in urban ecosystems, rodents being an indispensable component of them.

4. Conclusions

In the recreational sectors of the municipality of Chisinau a rather rich fauna of small rodents was recorded due to the existence of various types of biotopes, including natural, which denotes the presence of stable communities of rodents, which in turn favor the existence of a series of ownerless animals.

In Chisinau city, lawns and boulevards were the most unfavorable for the existence of small rodents, i.e. the biotopes most intensely subject to urbanization factors. The most attractive for rodents in the municipality of Chisinau are the landscaped parks. The dominant group was that of the hemisynanthropic species.

A considerable negative influence on rodent species is the high disturbance factor from the local population and recreational activity in populated areas.

Thus, the fauna of small rodents is well represented in the recreational and urban ecosystems of the municipality of Chisinau. The obtained results are close to the existing data for other European cities [11].

Acknowledgements

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