

XXXVIII-  
XXXIX

Muzeul Județean Mureș

# MARISIA



ȘTIINȚELE NATURII

STUDII ȘI MATERIALE

MARISIA

Studii și materiale

**XXXVIII-XXXIX**

Științele Naturii

ISSN 1016-9652



2019



# MARISIA

**Studii și materiale**

**XXXVIII-XXXIX**

**Științele Naturii**

## EDITORIAL BOARD:

**Executive editor:** Zoltán SOÓS

**Volume editor:** Mihaela SĂMĂRGHIȚAN

**Associate editor:** Daniela-Ramona BOTOȘ  
Alexandru SOLOMON

## ADVISORY BOARD:

Acad. Dumitru MURARIU (The Romanian Academy Bucharest)

Prof. univ. dr. Vlad CODREA (“Babeș-Bolyai” University of Cluj-Napoca, Faculty of Biology and Geology)

Prof. univ. dr. Silvia OROIAN (University of Medicine, Pharmacy, Science and Technology of Tîrgu Mureș, Faculty of Pharmacy)

Conf. univ. dr. Marius SKOLKA (“Ovidius” University of Constanța, The Faculty of Natural and Agricultural Sciences)

Prof. univ. dr. habil. Tatiana CALALB (“Nicolae Testemițanu” State University of Medicine and Pharmacy Chișinău, Faculty of Pharmacy)

Conf. univ. dr. Valeriu ALEXIU (University of Pitești, Faculty of Sciences, Natural Sciences Department)

Correspondence:

© MUZEUL JUDEȚEAN MUREȘ

CP 85, str. Mărăști nr. 8A, 540328

Tîrgu Mureș, România

[www.muzeulmures.ro](http://www.muzeulmures.ro)



MUZEUL JUDEȚEAN MUREȘ  
MAROS MEGYEI MŰZEUM

*The entire responsibility for the specialized information of the article's content is to be assumed by the author. All manuscripts are peer-reviewed by advisory board. The final acceptance of all papers for publication is subject to the editorial board decision.*

Front cover: *Narcissus poeticus* L. ssp. *radiiflorus* (Salisb.) Baker (photo and design: Mihaela Sămărghitan)

ISSN: 1016–9652



EDITURA MEGA | [www.edituramega.ro](http://www.edituramega.ro)

e-mail: [mega@edituramega.ro](mailto:mega@edituramega.ro)

MUZEUL JUDEȚEAN MUREȘ

# MARISIA

---

STUDII ȘI MATERIALE

---

XXXVIII-XXXIX

ȘTIINȚELE NATURII

Tîrgu Mureș  
2019

## PREVIOUS VOLUMES

- Studii și Materiale I, 1965 (Științele Naturii, Istorie, Etnografie, Muzeologie)
- Studii și Materiale II, 1967 (Științele Naturii, Istorie, Muzeologie)
- Studii și Materiale III-IV, 1972 (Științele Naturii, Istorie, Muzeologie)
- Marisia V, 1975 (Arheologie, Istorie, Etnografie)
- Marisia VI, 1976 (Arheologie, Istorie, Etnografie)
- Marisia VII, 1977 (Arheologie, Istorie, Etnografie)
- Marisia VIII, 1978 (Arheologie, Istorie, Etnografie)
- Marisia IX, 1979 (Arheologie, Istorie, Etnografie)
- Marisia X, 1980 (Arheologie, Istorie, Etnografie)
- Marisia XI-XII, 1981–1982 (Arheologie, Istorie, Etnografie)
- Marisia XI-XII, 1983, Fascicola 1 (Studia Scientiarum Naturae)
- Marisia XIII-XIV, 1984 (Arheologie, Istorie, Etnografie)
- Marisia XV-XXII, 1985–1992 (Arheologie, Istorie, Etnografie, Etnotoponimie)
- Marisia XXIII-XXIV, 1994 (Arheologie, Istorie, Etnografie)
- Marisia XXIII-XXIV, 1995, Fascicola 2 (Studia Scientiarum Naturae)
- Marisia XXV, 1996 (Arheologie, Istorie)
- Marisia XXV, 1996, Fascicola 1 (Etnografie, Artă, Artă populară)
- Marisia XXV, 1997 (Studia Scientiarum Naturae)
- Marisia XXVI, 2000 (Arheologie, Istorie)
- Marisia XXVI, 2000, Fascicola 2 (Etnografie, Artă, Artă populară)
- Marisia XXVI, 2000, Fascicola 4 (Studia Scientiarum Naturae)
- Marisia XXVII, 2003 (Arheologie, Istorie)
- Marisia XXVII, 2003, Fascicola 2 (Etnografie, Artă, Artă populară)
- Marisia XXVII, 2003, Fascicola 5 (Studia Scientiarum Naturae)
- Marisia XXVIII, 2005, Fascicola 2 (Etnografie, Artă, Artă populară)
- Marisia XXVIII, 2006 (Arheologie, Istorie)
- Marisia XXVIII, 2006, Fascicola 6 (Studia Scientiarum Naturae)
- Marisia XXIX, 2009 (Arheologie)
- Marisia XXIX, 2009 (Istorie)
- Marisia XXIX, 2009 (Etnografie)
- Marisia XXX, 2010 (Arheologie)
- Marisia XXIX-XXX, 2010 (Științele Naturii)
- Marisia XXX-XXXI, 2011 (Istorie)
- Marisia XXXI, 2011 (Arheologie)
- Marisia XXXI, 2011 (Științele Naturii)
- Marisia XXXII, 2012 (Arheologie)
- Marisia XXXII, 2012 (Științele Naturii)
- Marisia XXX, 2013 (Etnografie și Artă Populară)
- Marisia XXXII-XXXIII, 2013 (Istorie)
- Marisia XXXIII, 2013 (Arheologie)
- Marisia XXXIII-XXXIV, 2014 (Științele Naturii)
- Marisia XXXIV-XXXV, 2015 (Istorie)
- Marisia XXXV, 2015 (Științele Naturii)
- Marisia XXXIV-XXXV, 2014–2015 (Arheologie)
- Marisia XXXI-XXXII, 2015 (Etnografie și Artă Populară)
- Marisia XXXVI, 2016 (Științele Naturii)
- Marisia XXXVI, 2016 (Istorie)
- Marisia XXXVII, 2017 (Istorie)
- Marisia XXXVII, 2017 (Științele Naturii)

## CONTENTS

### BOTANY

**Alina ROVINĂ, Monica NEBLEA, Liviu ROVINĂ**

Species of orchids identified in Grădiștea Muncelului Cioclovina Natural Park • Specii de orhidee identificate în Parcul Natural Grădiștea Muncelului Cioclovina ..... 9

**Luminița ROMAN, Horațiu ROMAN, Carmen Mariana CHIFIRIUC**

Potentiation of antibacterial effect of antibiotics in therapy of bacterial infections • Potențarea efectului antibacterian al antibioticelor în terapia infecțiilor bacteriene ..... 19

### ZOOLOGY

**Victoria NISTREANU**

Multiannual dynamics and actual state of shrew communities in the Republic of Moldova • Dinamica multianuală și starea actuală a comunităților de chițcani în Republica Moldova ..... 27

**Galina BUȘMACHIU**

New records of some rare and protected insects species from the Republic of Moldova • Date noi privind unele specii de insecte rare și protejate din Republica Moldova..... 35

**Adrian MESTECĂNEANU, Radu GAVA**

The census of the water birds from some dam basins of the Argeș River (2018) • Recensământul păsărilor de apă de pe unele lacuri de acumulare ale râului Argeș (2018) ..... 43

**Irina MIHAILOV, Svetlana BACAL**

Faunistical annotations Staphylinidae: Euaesthetinae, Scaphidiinae, Steninae and Paederinae from the Republic of Moldova • Adnotări faunistice (Coleoptera, Staphylinidae, Euaesthetinae, Scaphidiinae, Steninae, Paederinae) din Republica Moldova ..... 51

**Liviu ROVINĂ, Alina ROVINĂ**

Investigation on the wild fauna of community interest from the Grădiștea Muncelului Cioclovina Natural Park (Study case – Grădiștea de Munte – Valea Albă – Godeanu – Muncelul) • Investigații asupra faunei sălbatice de interes comunitar din Parcul Natural Grădiștea Muncelului Cioclovina (Studiu de caz – Grădiștea de Munte – Valea Albă – Godeanu – Muncelul)..... 65

**Irina MIHAILOV, Svetlana BACAL**

*Astrapaes ulmi* (Rossi, 1790) (Coleoptera, Staphylinidae) in the central area of the Republic of Moldova • *Astrapaes ulmi* (Rossi, 1790) (Coleoptera, Staphylinidae) în zona centrală a Republicii Moldova ..... 75

## PALEONTOLOGY

**Vlad A. CODREA, Alexandru A. SOLOMON**

Maastrichtian crocodilian and dinosaurs in the collection of Mureş County Museum •  
Crocodilienii și dinozaurii maastrichtieni din colecția Muzeului Județean Mureș.....81

## MUSEOLOGY

**Iorgu PETRESCU, Angela PETRESCU**

Donation of Dr. Hilarius Mitrea from the collections of Museum of Natural History from  
Bucharest • Donația Dr. Hilarius Mitrea din colecțiile Muzeului de Istorie Naturală din  
București .....101

**Mihaela SĂMĂRGHIȚAN**

Revision of the Caryophyllaceae collection from The Herbarium of Mureş County Museum,  
Natural Sciences Department • Revizuirea colecției de Caryophyllaceae din ierbarul Muzeului  
Județean Mureș, Secția de Științele Naturii .....131



# MULTIANNUAL DYNAMICS AND ACTUAL STATE OF SHREW COMMUNITIES IN THE REPUBLIC OF MOLDOVA

Victoria NISTREANU<sup>1</sup>

<sup>1</sup>Institute of Zoology

1 Academiei str., 2028-MD Chişinău, Republic of Moldova, vicnistreanu@gmail.com

---

**Abstract:** The paper is based on the existing bibliographical data, on the collection of vertebrate animals of the Institute of Zoology and on personal studies performed between 2003–2017 in various types of ecosystems on the whole territory of the Republic of Moldova. During the last 60 years, there were registered considerable modifications of shrew communities' structure on the whole territory of the republic. The species *Sorex araneus* is the most common and widespread among shrews; its abundance was the highest in the majority of studied periods (25%–70%), as well as in the past century (40%–72%). The pygmy shrew is rather spread all over the republic's territory, its abundance varied between 5% and 26% in the past century and between 7% and 46% in the last years of study. The bicolor white-toothed shrew was one of the rarest species in the past century with the abundance of below 7% and in the last years of study, it became one of the most common among shrews (up to 43%). The lesser white-toothed shrews is wide spread in various types of ecosystems, including the localities, with an abundance between 6% and 36% in the study years and below 22% in the past century. The Mediterranean water shrew that was one of the most abundant in the past century (up to 30%), at present is critically endangered with very low abundance (2.3% to 7.1%), being the most sensitive to the destruction and transformation of its natural habitats. In the third edition of the Red Book of the Republic of Moldova, the water shrew was included as critically endangered species, the Mediterranean water shrew – as endangered species and bicolor shrew as vulnerable species.

**Keywords:** shrew species, multiannual dynamics, state, ecosystems

## Introduction

The shrews (Soricidae, Soricomorpha) are the smallest mammals of the world, but they are of great importance for environment and for human economy, being important links within the animal trophic chains. This group was rather poor studied in the Republic of Moldova in comparison with other mammal groups. There are 6 shrew species inhabiting the republic territory: common shrew (*Sorex araneus*), pygmy shrew (*S. minutus*), bicolor white-toothed shrew (*Crocidura leucodon*), lesser shrew (*C. suaveolens*), water shrew (*Neomys fodiens*) and Mediterranean water shrew (*N. anomalus*). The water shrew was mentioned only by Brauner [5], but the detailed studies accomplished in the past century [2, 3, 7, 8, 9, 25] did not reveal the presence of this species. Its occurrence was mentioned in pellets of some predatory birds from Codri forest reserve in the central zone [27].

The studies of shrews started in the 60's – 70's of the past century when they were rather well studied and practically only one valuable paper was published [9]. Some data concerning

shrew species can be found in other papers, where shrew species are mentioned and some information concerning their abundance can be found [1, 2, 4, 10, 11, 13]. Since 2003 the detailed study of shrew species from the territory of the republic has begun [14, 16, 18], including some papers on shrew dynamics [15, 17]. The mentioned papers present data before 2009, but in the last 8 years considerable modification of shrew species state occurred. In the last years, the shrew studies focused on their spreading, occurrence in certain areas and the ecological analysis that included the abundance, dominance, frequency, ecological significance [20, 21, 22, 24].

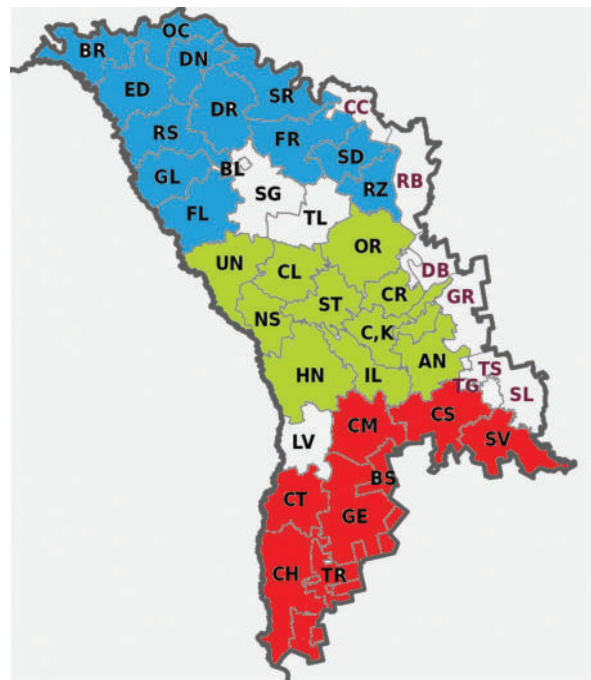
The paper presents information on multiannual dynamics of shrew communities from the 60's of the past century till present days and the actual status of shrew species on the territory of Republic of Moldova is analysed.

## Material and methods

The paper is based on the existing bibliographical data, on the collection of vertebrate animals of the Institute of Zoology and on personal studies performed between 2003–2017 in various types of ecosystems on the whole territory of the Republic of Moldova (fig. 1).

In the northern zone the studies were performed in Briceni, Ocnița, Edineț, Drochia, Soroca, Râșcani, Glodeni, Rezina, Florești, Șoldănești and Fălești districts; in the central zone – Chișinău municipality, Orhei, Călărași, Ungheni, Strășeni, Nisporeni, Criuleni, Hâncești, Ialoveni and Anenii-Noi districts; in the southern zone – Cimișlia, Căușani, Ștefan-Vodă, Basarabeasca, Cantemir, Cahul and Taraclia districts. The territories of the reserves Pădurea Domnească, Dobrușa, Codri, Plaiul Fagului, Trebujeni, Prutul de Jos were investigated, as well as anthropogenic ecosystems. The following types of ecosystems were studied: natural forest, paludous, riparian, agrocoenosis, wet forest, as well as different types of ecotone: forest belt, forest-paludous, forest-agrocoenosis, paludous-agrocoenosis, paludous-grassland.

The material was collected with snap traps, fall traps, live traps and by gathering dead individuals. The individuals were identified, measured, weighed, sex, age, physiological and reproductive state were registered, and the skulls were preserved for further morphological studies. In order to reveal the actual state of shrew species the indexes of abundance (A), frequency (F) and ecological significance (W) were calculated:  $A = 100n/N$ , where  $n$  – number of individuals of certain species in the sample,  $N$  – total individual number;  $F = 100p/P$ , where  $P$  – total number of samples,  $p$  – no of samples where the species is present;  $W = F \times A / 100$ , where  $F$  is frequency of certain species and  $A$  – abundance index. The species with the significance lower than 1% in the studied biotope are considered accidental; 1.1 – 5 % – accessorial; 5.1–10% – characteristic and  $W > 10\%$  – constant.



**Fig. 1: Studied districts of the Republic of Moldova**

## Results and discussions

During the last 60 years, there were registered considerable modifications of shrew communities' structure on the whole territory of the republic. In the period 1950–1969 the natural ecosystems occupied larger surfaces and the many wet habitats were still intact. In this period the dominant species among shrews in the republic was *S. araneus*, with almost 50%, followed by *N. anomalus* (25%) that was very abundant in wet habitats. In the southern zone in the lower course of Prut River the Mediterranean water shrew was reaching up to 60% from all the shrews and 10% from all the small mammals [9]. In 50's–60's of the past century the lower Prut area of flood plain occupied large surfaces, with many floating islets, formed of rush, reed, covered with dense herbaceous vegetation and abundant litter, where the hygrophilous shrew species could find favourable trophic and shelter conditions. The pigmy (*S. minutus*) and lesser (*C. suaveolens*) shrews were rather spread on the republic's territory, but their abundance was lower – around 10% (fig. 1). The bicolour shrew was rather rare (up to 6%) and together with *C. suaveolens* was recorded in humid, as well as in more arid biotopes, such as fields, pastures, slopes with herbaceous or bush vegetation. The *Sorex* and *Neomys* species had characteristic ecological significance in various types of forest ecosystems, in paludous and riparian biotopes.

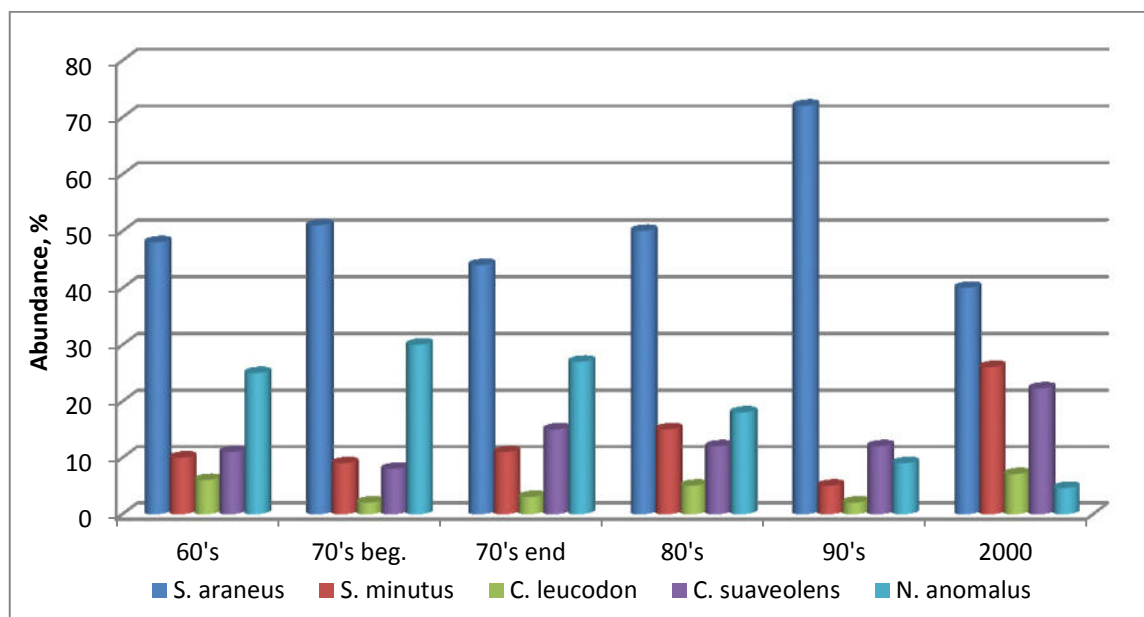


Fig. 2: Dynamics of shrew community structure before 2000

In the 1970's the dominant species among shrews also was *S. araneus*, followed by *N. anomalus*. The percent of common shrew was the highest at the beginning of 70's (51%) and slightly decreased toward the end of the decade (44%). It was registered in most of the ecosystems: forest (insular forests, central forest, forest shelter belts), in meadows of Nistru and Prut valleys, and in various types of wet biotopes. In insular forests from the northern part the common shrew constituted about 9–15% from all the small mammals, in wet oak forests with abundant shrub and herbaceous vegetation its abundance reached 20%, while in lower Prut marshes this species constituted up to 55% from all the small mammals [3, 9]. The Mediterranean shrew abundance increased in comparison to the previous decade (up to 30%) and together with the common shrew constituted more than 80% of shrew population. Although, the pigmy and lesser shrews were rather spread on the republic territory, they had low abundance; only 8–9% at the

beginning of 70's and increased to 11–15% toward the end of the decade. *Crocidura leucodon* was a very rare species registered only in “Codri” forest reserve [9] with very low abundance of 2–3% (fig. 2). In that period some studies on urban fauna have started and the shrew species were recorded as faunal components of cities and towns of Republic of Moldova [1]. The pigmy and lesser white-toothed shrews had approximately the same frequency and constituted about 20% from the whole shrew population.

In the 1980's, although the existent in literature data are very scarce [4, 13, 27], it was found that the abundance of common shrew was maintaining at high levels and the species constituted half of shrew population (fig. 1). It was the only species among shrews that was recorded in forest shelter belts [13]. The Mediterranean water shrew was registered only in natural reserves in biotopes near water basins and its abundance decreased below 20%. The abundance of pigmy shrew increased to 15%, it was recorded mostly in wet biotopes of “Codri” forest reserve [4]. The lesser shrew was maintaining at 12–15%, while the abundance of both species of white toothed shrews remained very low and did not overpass 5%.

The 1990's was the period of deep social and economic changes that lead to the modification of ecosystem structure and of the whole landscape of the republic. The processes of natural habitat destruction, such as forest cutting, water habitat modification and pollution, increasing of recreational activity etc. were rather intense. Therefore, the shrew species density decreased drastically in comparison to other groups of mammals. In this period the common shrew showed high degree of adaptability and had the highest abundance among shrews, constituting more than 70% from the shrew population on the whole territory of the republic and having a constant ecological significance in various types of natural ecosystems [10, 11]. *Sorex minutus* and *N. anomalus* were registered mostly in wet habitats and near water basins from natural reserves with the abundance of 5% and 9%, respectively. In other ecosystems the Mediterranean shrew was not recorded at all, while the pigmy shrew was accidental in forest ecosystems. It was noted the strong decreasing of Mediterranean water shrew by more than three times since the 70's till the end of 90's. This fact can be explained by the disappearance of floating islets after an intense flooding at the end of 70's, drying of lower Prut and Nistru swamp ecosystems in the 80's and by intense pollution of surface waters in 90's. The abundance of lesser shrew was maintaining at 12%, while that of bicolour shrew was only 1–2% and toward the end of the past century it became one of the rarest mammal species (fig. 1). As consequence, *C. leucodon* was included in the Red Book of Moldova, 2<sup>nd</sup> edition, as critically endangered [6].

At the end of 90's – beginning of new century first decade many abandoned lands started to revert to their natural state as natural biotopes: pastures, meadows, lands with abundant bush vegetation etc. These modifications lead to the new changes of the shrew communities' structure. The differences between the abundance of different species were not so obvious. Thus, the common shrew remains the dominant species, but its abundance decreased to 42%. The abundance of pigmy shrew and of lesser shrew increased almost twice (26% and 22%, accordingly). It was noted an increase of bicolour white-toothed shrew abundance up to 7%, while the abundance of *N. anomalus* decreased drastically to less than 5%, which is 2 times lower than in the 90's and 6 times lower than in 70's (fig. 2).

Since 2003 systematic monitoring and detailed studies of shrew communities modifications were performed. The common shrew is the dominant species in most of the years, except 2004 and 2008, being registered in the majority of studied ecosystems with a frequency of 84%. The pigmy shrew's abundance increased in all the periods (20–47%), except 2009, when it was less than 10%. The species frequency was rather high – 68%, it being recorded in wet habitats, in forest, paludous, riparian biotopes and their ecotones. In general, in the first two years of study

the *Sorex* species had a very high dominance, they constituted 70%–90% of the whole shrew community.

The abundance of bicolour white-toothed shrew remained very low in the first years of study, then varied between 6% and 30% and increased to more than 37% in 2009. The total species frequency was of 9.7% while in its preferred habitats (forest and paludous ecosystems) its frequency reached 40% [17, 18]. The lesser shrew had low abundance in 2003 and 2009 (below 10%), then increased in 2004–2006 above 11%, while in the other study periods it's abundance reached above 20% and in 2008 it even was the dominant species among shrews (fig. 3). It was noted that the lesser shrew was the dominant species in various types of localities, including Chişinău city [19, 26], where it had characteristic significance (8.3%). The general frequency of the species was 37.8% and reached 80% in urban ecosystems.

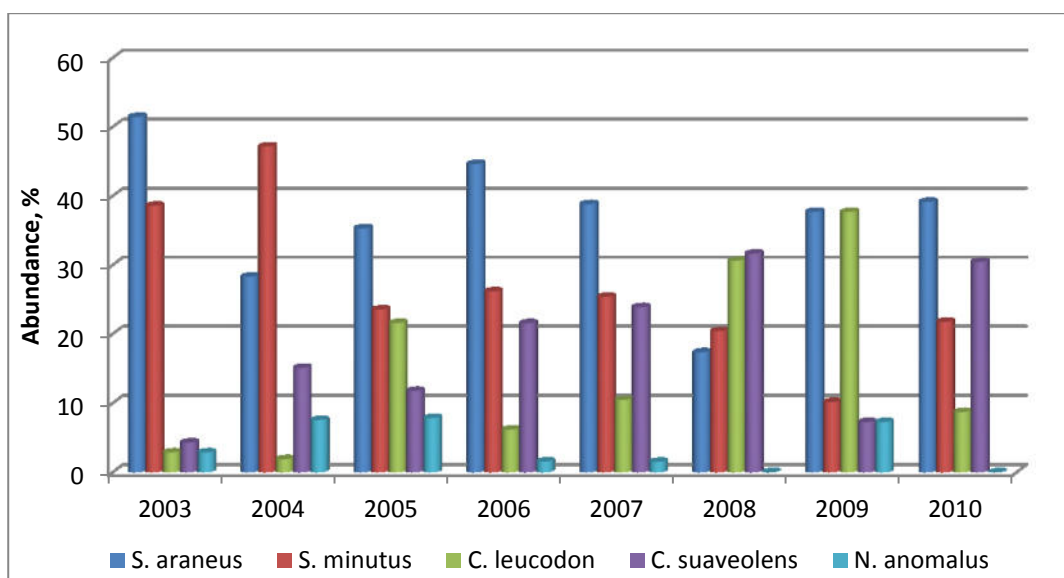


Fig. 3: Dynamics of shrew community structure in the study period 2003–2010

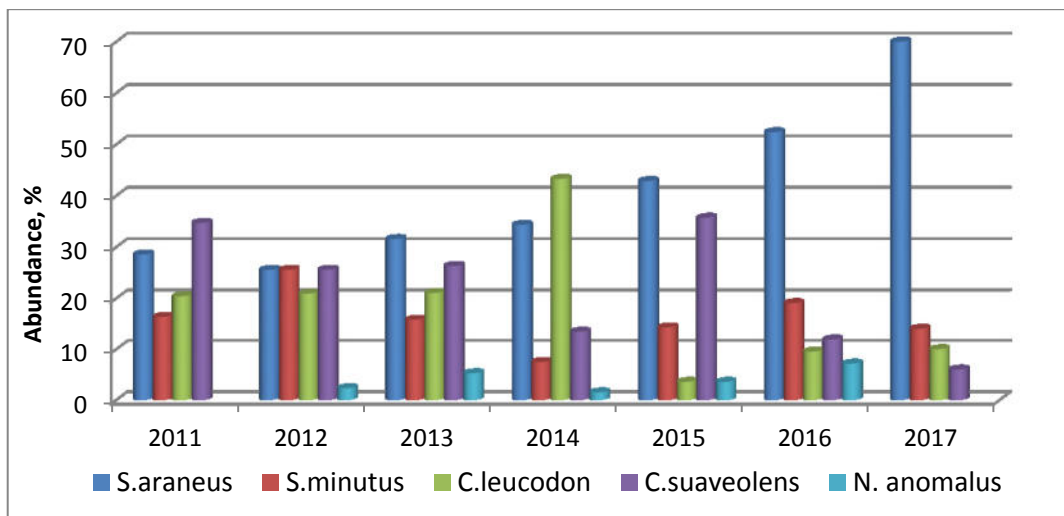
Starting with 2003 the Mediterranean water shrew was the rarest shrew species. Its abundance decreased drastically, the maximum value being registered in 2005 (7.8%), while in 2008 and 2010 the species was not recorded (fig. 3). The frequency of *N. anomalus* was very low (below 5%) and it was registered only near aquatic basins of natural reserves with accessorial or accidental ecological significance (0.2%–2.7%).

In the last years of study the situation within shrew communities showed some difference between years. The common shrew is dominant only in 2013 and in the last 3 years of study, of which in the last two years it has a very high abundance (52%–70%) and a frequency of 85.7%. The species had a characteristic ecological significance (9.1%) in wet forests, paludous biotopes and their ecotones, accessorial significance (3.9%) in natural forests, in forest belts and accidental significance (0.8%) at the ecotone of agricultural ecosystems. The abundance of pygmy shrew varied between 7.5% in 2014 to 25.6% in 2012, when it was one of the dominant species (fig. 4). It has a characteristic ecological significance (6.8%) in paludous biotopes and their ecotones and is accessorial or accidental in other ecosystems (0.7%–3.8%).

The proportion of *Crocidura* species varied in large limits. From 2011 to 2014 the abundance of *C. leucodon* increased from 20% to 43%, in 2014 being the dominant species with a frequency of 47%, while in the last 3 years it had a low abundance (up to 10%) and a frequency

of 14%. *Crocidura suaveolens* had rather high abundance in 2011–2013 and in 2015 (25%–35%) and was one of the dominant species, but in the last two years its abundance decreased to 6% (fig. 4). The frequency of the species remains high in localities (68%) with characteristic ecological significance (9.1%) and lower in other types of ecosystems: 22% in agrocoenoses and their ecotones and 17% in natural ecosystems, where the species was accessorial or accidental (0.8%–4.8%).

The status of Mediterranean shrew remains critical: it was registered in 2012–2016 with very low abundance of 2.3% to 7.1% (fig. 4). It was recorded only in wet biotopes from the reserves and protected areas [12, 22, 24], with the frequency between 7% and 23% with accidental or accessorial ecological significance (0.1%–2.4%).



**Fig. 4: Dynamics of shrew community structure in the study period 2011–2017**

After assessing the present state of the shrew species in the Republic of Moldova, it was concluded that the species *S. araneus* is the most common and widespread among shrews, the pygmy shrew is rather spread all over the republic's territory, but is less abundant and rarer, and the lesser shrew is widespread mostly in localities and other anthropized ecosystems. The species *N. fodiens* was not registered on the republic's territory, it was mentioned only for Pădurea Domneasca forest reserve in the north of the republic [12]; *Neomys anomalus* became a very rare species, while the state of *C. leucodon* improved all over the territory of the republic. As consequence, in the third edition of the Red Book of the Republic of Moldova [23] the water shrew was included as critically endangered species, the Mediterranean water shrew – as endangered species, while in bicolor shrew the status changed from critically endangered [6] to vulnerable species.

The shrew species are sensitive to environmental changes and can serve as indicators of ecosystem functional stability. The semiaquatic species are indicators of surface water pollution and their continuously decreasing trend indicate the alarming situation of wet habitats on the entire republic's territory. The rare species and their habitats need urgent protection measures.

The work was performed under the fundamental project 11.817.08.14F.

## Conclusions

During the last 60 years there were registered considerable modifications of shrew communities structure on the whole territory of the republic. The species *S. araneus* is the most common and widespread among shrews, its abundance was the highest in the majority of studied periods (25%–70%), as well as in the past century (40%–72%). It is the most well adapted species among shrews. The pygmy shrew is rather spread all over the republic's territory, its abundance varied between 5% and 26% in the past century and between 7% and 46% in the last years of study. The bicolor white-toothed shrew was one of the rarest species in the past century with the abundance of below 7% and in the last years of study it became one of the most common among shrews (up to 43%). The lesser white-toothed shrews is wide spread in various types of ecosystems, including the localities, with an abundance between 6% and 36% in the study years and below 22% in the past century. The Mediterranean water shrew that was one of the most abundant in the past century (up to 30%), at present is critically endangered with very low abundance (2.3% to 7.1%), being the most sensitive to the destruction and transformation of its natural habitats. In general all shrew species are sensitive to anthropic disturbances and can serve as good ecological indicators of ecosystem stability. Further measures on the protection of shrew species and their habitats must be taken.

## REFERENCES

1. Anisimov, E., Cojuhari, A., 1978, *Fauna gorodov i ee obrana*. „Cartea Moldovenească”, Chişinău: 56 pp.
2. Averin, Iu. V., 1969, *Osnovnye komplekсы covremennykh biotopov ptits i mlekopitaiyushchikh Moldavii*. In *Voprosy ekologii i practicheskogo znachenia ptits i mlekopitaiyushchikh*. Vol. 4: 3–14.
3. Averin, Iu. V., Lozan, M. N., Munteanu, A. I., Uspenskii, G. A., 1979, *Jivotnyi Vir Moldavii. Mlekopitaiushchie*. Chişinău „Ştiinţa”: 188 pp.
4. Averin, Iu. V., Munteanu, A. I., Chegorca, P. T., Gavrilenco, V. S., Luncashu, M. I., Savin, A. I., 1984, *Mlekopitaiushchie. Priroda zapovednica “Codri”*. Chişinău „Ştiinţa”: 57–64.
5. Brauner, A. A., 1923, *Selskohoziasstvennaia zoologia*. Gosizdat Ucrainy, Odessa: 7–15.
6. Corcimari, N., 2001, *Crocidura leucodon*. In *Red Book of the Republic of Moldova*. II<sup>nd</sup> edition. „Ştiinţa”, Chişinău: 149
7. Gassovskii, G. I., 1952, *Mlekopitaiushchie severnykh raionov Moldavii. Uchenye zapiski Kisinevskigi Universiteta*, IV: 35–50.
8. Kuznetsov, B. A., 1952, *Fauna mlekopitaiushchih Moldovy. Izv. Mold. Fil. AN SSSR*, 4–5(7–8): 111–150.
9. Lozan, M. N., 1975, *Nasekomoyadnye mlekopitayushchie Moldavii (Insectivora, Mammalia)*. In *Ecologia ptits i mlekopitaiyushchikh Moldavii*. Chişinău „Ştiinţa”: 96–118.
10. Mihailenco, A., 1996, *Gryzuny i nasekomoiadnye zapovednicov Moldovy*, Simpozion jubiliar “Rezervația naturală “Codrii” – 25 ani. Realizări, probleme, perspective”, Lozova: 40–41.
11. Mihailenco, A., 1997, *Obzor fauny gryzunov i nasekomoyadnyh Moldovy. Sbornik nauchnyh trudov. Pamiati prof. A. A. Braunera*. Astroprint, Odessa: 88–92.
12. Munteanu, A., Nistoreanu, V., Savin, A., Turcanu, V., Corcimaru, N., Cebanu, A., Moşu, A., Romanescu, V., Bondarenco, A., Andreev, S., Larion, A., Sîtnic, V., 2013, *Atlasul speciilor de vertebrate (mamifere, reptile, amfibieni, peşti) incluse în cadastrul regnului animal al Republicii Moldova*. S.n., „Elan Poligraf”, Chişinău: 100 pp.
13. Munteanu, A.I., Savin, A.I., 1984, *Mlekopitayushchie*. In *Fauna biotsenoticheskikh oazisov i ee practichescoc znachenie*. Chişinău „Ştiinţa”: 179–202.
14. Nistoreanu, V., 2008, *Spreading of insectivore species (Erinaceidae, Talpidae, Soricidae, Insectivora) in Nistru river basin*. Transboundary Dniester river basin management and the EU Water Framework Directive. Proceedings of International Conference, Eco-Tiras, Chişinău: 213–217.
15. Nistoreanu, V., Savin, A., Larion, A., Corcimaru, N., Bulracu, V., Caraman, N., 2010, *Evolution of shrew (Mammalia, Soricomorpha, Soricidae) communities in Republic of Moldova in the last decades*. International conference “Dniestr river basin: ecological problems and management of transboundary natural resources”, Tiraspol: 148–150.

16. Nistreanu, V., 2011, Distribution of shrews from genus *Sorex* Linnaeus, 1758 (Mammalia: Insectivora) on the territory of Republic of Moldova. *Travaux du Muséum National d'Histoire Naturelle Gr. Antipa*. **LIV**(2): 555–561.
17. Nistreanu, V., 2011, Multiannual dynamics of shrew (Mammalia, Soricomorpha, Soricidae) communities in Republic of Moldova. *Oltenia Journal for Studies in Natural Sciences*, **27**(2): 140–144.
18. Nistreanu, V., 2011, Spreading, biotopic distribution and dynamics of *Crocidura* shrew species in the Republic of Moldova, *Studii și comunicări, Complexul Muzeal de Științele Naturii „Ion Borcea”*, Bacău, **24**: 80–85.
19. Nistreanu, V., Caraman, N., Larion, A., Postolachi V., 2012, *Diversity of shrews (Soricomorpha, Soricidae) in urban environment of Chisinau city*, Proceedings of International Conference „Geocological and bioecological problems of Northern Black Sea Basin” Edit. Univ. Tiraspol: 216 – 218.
20. Nistreanu, V., Bușmachi, G., Savin, A., Țurcan, V., Larion, A., Sîtnic, V., Postolachi, V., 2015. *Fauna of small mammals, reptiles, amphibians and Collembolans from Trebujeni landscape reserve, Republic of Moldova*. Materialele Conferinței științifico-practice internaționale consacrate memoriei profesorului Benedict Dîbovschi. Belarus, Grodno: 11–14.
21. Nistreanu, V., Larion, A., Postolachi, V., 2015, Small mammal diversity in steppe zone Sadaclia, Republic of Moldova. *DROBETA, Științele Naturii*, **XXV**: 135–141.
22. Nistreanu, V., Larion, A., Burlacu V., Caraman N., Postolachi, V., 2015, Faunistics and ecological peculiarities of small mammal communities of Plaiul Fagului reserve, Republic of Moldova. *Vestnik Tyumenskogo Gosudarstvennogo Universiteta, Ecologia i Prirodopolzovanie.*, T. 1, **3**(3): 138–149.
23. Nistreanu, V., 2015, *Crocidura leucodon. Neomys anomalus. Neomys fodiens*. In *Red Book of the Republic of Moldova*. IIIrd edition, „Știința”, Chișinău: 236–238
24. Nistreanu, V., 2016, *Actual state of shrew species (Insectivora: Soricidae) in the Republic of Moldova*. IXth International Conference of Zoologists “Sustainable use, protection of animal world and forest management in the context of climate change”, Chișinău: 21–23.
25. Saenko, Ia. M., 1959, Mlekopitaiushchie yujnyh i necotoryh tsentralnyh raionov Moldavii, *Uchenye zapiski Kisinevskigi Universiteta*, **XXXIX**: 105–126.
26. Tikhonov, I. A., Muntyanu, A. I., Uspenskaya, I. G., Konovalov, Yu. N., Burlaku, V. I., Karaman, N. K., Nistreanu, V. B., Tikhonova, G. N., Kotenkova, E. V., 2012, Biotopic distribution, population structure, and some features of small mammal reproduction in Chișinău city, *Biology Bulletin*, **39**(10): 839–845.
27. Zubcov, N., 1983, *Hishchnye ptitsy i sovy Moldavii*. Thesis of doctor of biology. Chișinău: 224 pp.

## DINAMICA MULTIANUALĂ ȘI STAREA ACTUALĂ A COMUNITĂȚILOR DE CHIȚCANI ÎN REPUBLICA MOLDOVA

(Rezumat)

Datele din lucrare se bazează pe informația bibliografică existentă, pe colecția de vertebrate terestre a Institutului de Zoologie, precum și pe cercetările personale efectuate în perioada 2003–2017, în diverse tipuri de ecosisteme de pe întreg teritoriul republicii. Pe parcursul ultimilor 60 de ani s-au înregistrat modificări esențiale ale structurii comunităților de soricide, în diverse tipuri de ecosisteme pe teritoriul republicii. Specia *Sorex araneus* este cea mai răspândită și comună dintre chițcani, cu cea mai mare abundență în majoritatea perioadelor de studiu (25%–70%), precum și în secolul trecut (40%–72%). Chițcanul pitic este destul de răspândit pe întreg teritoriul republicii, abundența acestuia a variat între 5% și 26%, în cercetările anterioare și între 7% și 46%, în ultimii ani de studiu. Chițcanul de câmp era una dintre cele mai rare specii în secolul trecut, cu o abundență sub 7%, iar în ultimii ani de studiu a devenit una din speciile comune (până la 43%). Chițcanul de grădină este larg răspândit în diverse tipuri de ecosisteme, inclusiv în localități cu abundența cuprinsă între 6% și 36%, în perioada de studiu și sub 22%, în cercetările anterioare. Chițcanul de mlaștină, care era una dintre cele mai abundente specii în secolul trecut (până la 30%), în prezent este o specie rară, periclitată cu abundență foarte scăzută (2.3% – 7.1%), fiind cea mai sensibilă la transformarea și distrugerea habitatelor naturale. În ediția a III-a a Cărții Roșii a Republicii Moldova, chițcanul de apă a fost inclus ca specie critic periclitată, chițcanul de mlaștină – ca specie periclitată și chițcanul de câmp – ca specie vulnerabilă.