



BATS (CHIROPTERA) OF TRANSNISTRIAN UNDERGROUND SHELTERS BASED ON RESULTS OF THE 2020–2021 CENSUS

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bats, Chiroptera, underground sites, Prydnistrovnia, Moldova, Dnister valley

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Abstract

This report presents data on the species composition of bats inhabiting underground structures and complexes on the left bank of the Dnister River according to survey results for 2020–2021. Field studies of bats (order Chiroptera) inhabiting underground shelters of the left bank of the middle and lower reaches of the Dnister were conducted from August 2020 to October 2021. In total, we found 26 underground sites and complexes potentially suitable for bats in Transnistria and in 15 of them we counted their number and species composition. Most of the detected underground objects are of anthropogenic origin (former industrial tunnels for limestone mining and manual mining), and only 2 of natural origin — a shallow cave in the village of Rascov, Camenca District and a karst cave in the village of Mikhailovka, Rybnitsa District. The identified objects formed the basis of the first detailed cadastre of underground structures of the left bank of the Dnister and adjacent areas. Each underground facility was mapped with exact GPS coordinates and assigned a corresponding index and serial number. According to the survey results, 8 species of bats were recorded: *Rhinolophus hipposideros*, *Myotis blythii*, *Myotis bechsteinii*, *Myotis daubentonii*, *Myotis dasycneme*, *Plecotus auritus*, *Plecotus austriacus*, and *Eptesicus serotinus*. The most widespread and frequently encountered species in the studied area are the lesser horseshoe bat *Rhinolophus hipposideros* and Daubenton's bat *Myotis daubentonii*. The rare species include the brown long-eared bat *Plecotus auritus* and the grey long-eared bat *Plecotus austriacus*. The pond bat *Myotis dasycneme* and Bechstein's bat *Myotis bechsteinii* are considered extremely rare, and the latter has never been recorded in Transnistria before. Based on the obtained data and in order to preserve the species diversity of bats, we identified a number of underground complexes as key objects of primary importance in the life of bats during hibernation and their breeding season. In order to preserve and ensure the survival of a number of bat species inhabiting the Dnister valley, it is necessary to create a network of underground complexes with protected status.

Cite as

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Кажани (Chiroptera) підземних сховищ Придністров'я за результатами обліків 2020–2021 рр.

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Резюме. У статті представлено дані про видовий склад кажанів, що населяють підземні споруди та комплекси на лівому березі р. Дністер, за результатами обліків, проведених у 2020–2021 роках. Польові дослідження кажанів (ряду Chiroptera), які населяють підземні сховища лівого берега середньої та нижньої течії Дністра, проводилися з серпня 2020 р. по жовтень 2021 р. Загалом нами виявлено 26 підземних ділянок і комплексів, потенційно придатних для кажанів у Придністров'ї та у 15 з них ми підрахували їх кількість і видовий склад. Більшість виявлених підземних об'єктів мають антропогенне походження (колишні промислові тунелі для видобутку вапняку та ручного добування), і лише 2 — природне походження, зокрема неглибока печера в с. Рашкові Каменського району та карстова печера в с. Михайлівка Рибицького району. Виявлені об'єкти лягли в основу першого детального кадастру підземних сховищ лівого берега Дністра та прилеглих територій. Кожний підземний об'єкт було нанесено на карту за точними GPS-координатами і кожному присвоєно відповідний індекс і порядковий номер. За результатами дослідження виявлено 8 видів кажанів: *Rhinolophus hipposideros*, *Myotis blythii*, *M. bechsteinii*, *M. daubentonii*, *Myotis dasycneme*, *Plecotus auritus*, *P. austriacus*, *Eptesicus serotinus*. Найбільш розповсюдженими і такими, що часто трапляються, видами на дослідженій території є підковик малий *R. hipposideros* і нічниця водяна *M. daubentonii*. До рідкісних видів належать вухань бурий *P. auritus* і вухань сірий *P. austriacus*. Надзвичайно рідкісними вважаються нічниця ставкова *M. dasycneme* і нічниця довговуха *M. bechsteinii*, причому остання ніколи раніше в Придністров'ї не була зареєстрована. На основі отриманих даних та з метою збереження видового різноманіття кажанів нами визначено ряд підземних комплексів як ключових об'єктів, що мають велике значення для кажанів під час сплячки та у період їх розмноження. З метою збереження й забезпечення виживання низки видів рукокрилих, що населяють долину Дністра, необхідно створення мережі підземних комплексів з відповідним охоронним статусом.

Ключові слова: рукокрилі, Chiroptera, підземні сховища, Придністров'я, Молдова, долина Дністра.

Introduction

Studies of bats in Transnistria began as early as the middle of the 20th century. Since the 1990s, detailed monitoring studies of bats have been conducted mainly in large underground complexes, such as those near the village of Bychok [Andreev & Vasiliev 1997; Vasiliev & Andreev 1997; Bondarenko & Guseva 2003], as well as in underground structures, mainly on the right bank of the Dnister River. The authors of this report have identified and surveyed all known underground structures and complexes on the left bank of the Dnister River to study the species composition of bats inhabiting these shelters. Data on the species and quantitative composition of bats in a number of locations are published for the first time. The species diversity of bats of some underground refuges on the left bank of the Dnister suggests their key importance in the biological cycle of bats.

Material and Methods

The material for the present report was collected during field studies carried out in 2020–2021.

In order to identify the presence of underground structures and complexes of both natural and anthropogenic origin in the study area, archival materials and reports of the Republican Geological Fund of the State Unitary Enterprise 'Geologorazvedka' (Dubossary), as well as topographic maps of the area as of 1982 at a scale of 1:50 000, placed in the public domain on the website of the National Geospatial Data Fund of the Land Relations and Cadastre Agency of the Republic of Moldova were used. The local population was also surveyed to search for a number of underground objects.

The revealed underground constructions were marked on the maps with the indication of exact GPS-coordinates and with the assignment of a corresponding index and serial number. A location map and a database of underground objects were created in MapInfo Pro 15.0.

The large underground constructions having a set of entrances, but connected by uniform network of tunnels, were considered by us as one object. For a number of small shallow underground objects, schematic plans were without reference to scale.

Underground structures accessible to research were inspected step-by-step during all seasons of the year. The method of visual inspection with counting of the number of individuals of each detected species of bats was mainly used. In the summer through autumn period of 2021, bats were captured manually or with net during repeated surveys of some dungeons to determine the sex-age structure and to measure morphometric parameters, after which they were released at the same site. No animals were captured in winter. We did not trap animals with spider nets at night. The inspection of large deep underground complexes with a branched network of tunnels was carried out to a depth of 200–250 m from the entrance, and their near-entrance part was carefully inspected as well.

Acronyms of species names: RHIP — *Rhinolophus hipposideros*; MBLY — *Myotis blythii*; MBEC — *M. bechsteinii*; MDAS — *M. dasycneme*; MDAU — *M. daubentonii*; PAUR — *Plecotus auritus*; PAUS — *P. austriacus*; ESER — *Eptesicus serotinus*. Conservation categories of species are given according to different sources, including the red lists of IUCN, Moldova, Transnistria (2nd ed.), and Ukraine (3rd ed.) [Akimov 2009; Cartea... 2015; Red... 2020; IUCN... 2021].

Research area and description of the underground shelters

The study area includes mainly the left bank of the Dnister and only a few underground shelters were surveyed on the right bank near the Dubossary Reservoir and near the city of Bendery.

In geological terms, this territory is confined to the south-western slope of the East European Platform and stretches in submeridional direction along the Dnister River, including the areas of its middle and lower reaches. Here, in the steep slopes of the river banks, as well as in the valleys of its tributaries, powerful layers of limestone of Neogene age emerge to the surface, which has been used as building material since ancient times. Since the mid-20th century, many areas with natural outcrops of limestone began to be developed on an industrial scale, in most cases by underground mining, resulting in the formation of large underground galleries (Fig. 1). Currently, most of the mines are closed and have been out of operation for more than 15 years.



Fig. 1. Underground complexes of the left bank of the Dnister: *a* — shallow manual tunnels near the village of Valya Adynka (K-04); *b* — one of the entrances to the manual tunnel complex north of the village of Bychok (G-01); *c* — karst cave with a complex of manual tunnels near the village of Mikhailovka (R-07); *d* — entrance to the mines near the village of Zozuliany (R-04).

Рис. 1. Підземні комплекси лівобережжя Дністра: *a* — ручні неглибокі штольні у с. Валя-Адинка (К-04); *b* — один із входів ручної виробки у північній частині комплексу штолень у с. Бичок (G-01); *c* — карстова печера з комплексом ручних штолень у с. Михайлівка (R-07); *d* — вхід у штольні у с. Зозуляни (R-04).

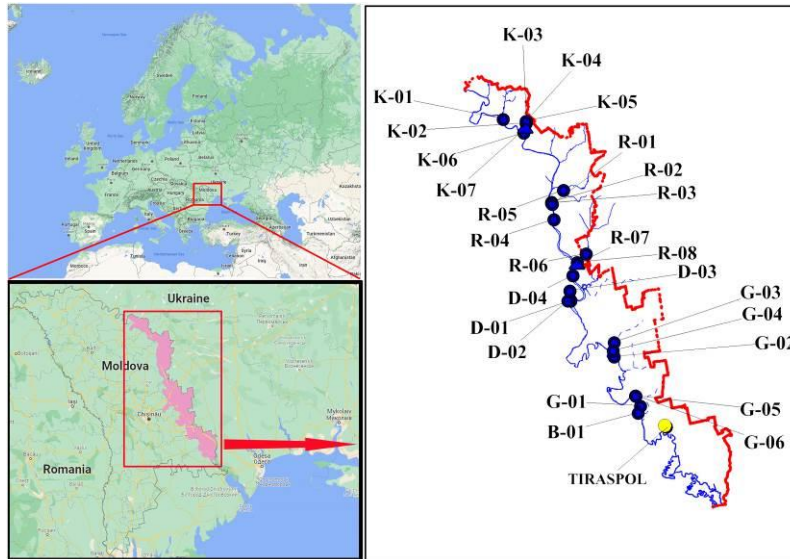


Fig. 2. Location map of underground shelters in the territory of Transnistria (overview map of Europe from the resource www.google.com/maps).

Рис. 2. Карта-схема розташування підземних сховищ на території Придністров'я (оглядова карта Європи з ресурсу www.google.com/maps).

The investigated territory, according to the administrative structure, is divided between 5 districts and 2 cities of republican subordination (Tiraspol and Bendery), in accordance to which each identified underground facility is assigned an index corresponding to the district and a serial number. The index designations are as follows: K — Kamenka District, R — Rybnitsa District, D — Dobossary District, G — Grigoriopol District, S — Slobozia District, and B — Bendery city with adjoining territories and settlements of the right bank of the Dniester.

In the studied territory, we have identified 26 underground objects and complexes potentially suitable for bats, in 15 of which we carried out surveys of their number and species composition (Fig. 2). Most of the identified underground objects are of anthropogenic origin (former industrial tunnels for limestone mining and manual mining), and only 2 of natural origin — a shallow cave in the village of Rașcov, Camenca District and a karst cave near the village of Mikhailovka, Ribnita District.

Camenca District (K): **K-01** — Camenca, shallow industrial adit up to 10 m long with a deep cleft in the right part of the face; **K-02** — Valea Adinca, an industrial test adit with five small rooms; **K-03** — Valea Adinca, a small test adit with deep cracks in the ceiling (bat droppings were found); **K-04** — Valea Adinca, shallow manual tunnels with two entrances; **K-05** — Valea Adinca, shallow industrial adit up to 50 m long with one room and a large collapse closer to the face; **K-06** — Rașcov, a complex of manual and industrial adits with three entrances, one of which collapsed; **K-07** — Rașcov, a karst shallow cave (grotto) in the upper part of the Zolota River's bank slope (left tributary of the Dniester River).

Rybnitsa District (R): **R-01** — Vihvatintsi, a large complex of hand-dug tunnels with low ceilings and numerous rooms; **R-02** — Gidirim, a large complex of industrial adits, heavily littered, the quantitative and species diversity of bats is low; **R-03** — Gidirim, the entrance is caved in, the adits could not be examined; **R-04** — Zozuliany, a large complex of industrial adits, heavily littered, quantitative and species diversity of bats is low; **R-05** — Busky (Rybnitsa), a complex of handmade tunnels with ceilings up to 1 m high; most of them collapsed and could not be surveyed; **R-06** — Uch. Pridnestrovskoe, industrial test taps with three separate entrances; **R-07** — Mikhailovka, a karst cave in the upper part of the Dniester River's bank with an extensive gallery of tunnels used for manual mining of building stone; **R-08** — Mikhailovka, an industrial tunnel, backfilled, not investigated.

Dubossary District (D): **D-01** — Cocieri, a large complex of industrial adits with several levels; **D-02** — Golerkani, a complex of industrial adits, heavily littered, quantitative and species diversity of bats is low; **D-03** — Molovata, shallow tunnels of manual mining; **D-04** — Garmatskoe, shallow tunnels of manual mining.

Grigoriopolsky District (G): **G-01** — Bychok, the largest complex of industrial tunnels with several levels and multiple entrances, in the northern part — adits, predominantly manual mining; **G-02** — Grigoriopol, industrial working tunnels; **G-03** — Grigoriopol, industrial working adits; **G-04** — Grigorio-

pol, industrial adits, not active, not surveyed; **G-05** — Krasnogorka, shallow manual workings, heavily collapsed; **G-06** — Krasnogorka, shallow manual workings, heavily collapsed.

City of Bender (B): B-01 — Bender (microdistrict ‘Severny’), a complex of industrial tunnels.

Results and Discussion

Of the 26 underground sites and complexes we identified 21 sites that are potentially suitable for bats and which were surveyed in detail. The currently working tunnels and adits, access to which is difficult, have remained unexamined. The number and species composition of bats were counted in 15 of the 21 surveyed sites and the results are shown in Table 1. Data on 6 adits out of the 21 surveyed ones are not given in Table 1 because some of them were destroyed or bats and traces of their presence in them were completely absent.

Table 1. Results of bat surveys in underground shelters of Transnistria in 2020–2021

Таблиця 1. Результати досліджень кажанів у підземних сховищах Придністров'я у 2020–2021 рр.

Index of adit	Record date	Species (acronyms)								Credited to		
		RHIP	MBLY	MBEC	MDAS	MDAU	PAUR	PAUS	ESER	ind.	species	Sum of sp.
K-01	26.09.2020	–	–	1	–	–	–	–	–	1	1	2
	04.01.2021	–	–	–	–	–	–	1	–	1	1	
K-02	26.09.2020	2	–	–	–	2	–	–	–	4	2	3
	04.01.2021	37	–	–	–	3	–	1	–	41	3	
K-04	26.06.2021	–	–	–	–	–	–	–	–	–	0	2
	04.01.2021	1	–	–	–	–	–	–	–	1	1	
	26.06.2021	1	–	–	–	–	–	4	–	5	2	
K-05	03.10.2021	1	–	–	–	–	–	–	–	1	1	3
	04.01.2020	–	–	–	–	1	–	–	–	1	1	
	26.06.2021	–	1	–	–	–	–	1	–	2	2	
K-06	03.10.2021	–	–	–	–	–	–	–	–	–	–	6
	11.04.2021	11	22	2	1	5	–	–	1	42	6	
	26.06.2021	3	–	–	–	–	–	–	–	3	1	
R-01	03.10.2021	43	9	–	1	1	–	–	–	54	4	5
	26.09.2020	5	–	–	–	–	–	–	–	5	1	
	12.09.2020	1	18	–	–	4	–	–	12	35	4	
	26.09.2020	2	15	–	3	2	–	–	8	30	5	
	07.11.2020	12	7	–	1	1	–	–	–	21	4	
R-02	24.12.2020	44	4	–	–	3	–	–	–	51	3	1
	03.07.2021	–	2	–	–	–	–	–	–	2	1	
	03.10.2021	–	17	–	–	–	–	–	–	17	1	
R-04	07.11.2020	3	–	–	–	–	–	–	–	3	1	1
	24.12.2020	27	2	–	–	6	–	–	–	35	3	
R-07	03.07.2021	–	1	–	–	–	–	–	–	1	1	3
	03.10.2021	–	3	–	–	–	–	–	–	3	1	
	19.09.2020	19	–	–	–	15	–	–	2	36	3	
D-01	05.01.2021	26	1	–	–	1	–	–	–	28	3	4
	03.07.2021	1	–	–	–	–	–	–	–	1	1	
	22.02.2021	27	–	7	–	75	3	2	10	124	6	
D-02	06.03.2021	–	51	1	3	–	1	–	–	56	4	8
	09.05.2021	3	–	–	–	–	–	–	–	3	1	
G-01	09.05.2021	–	–	–	–	25	–	–	–	25	1	1
	29.08.2020	3	–	–	2	23	2	–	9	39	5	
	10.10.2020	5	–	–	–	34	–	2	42	83	4	
B-01	23.01.2021	–	–	–	–	2	–	5	14	21	3	6
	10.10.2021	–	–	–	–	13	–	1	19	33	3	
Total individuals:		287	153	11	11	230	6	16	118			

According to the survey results, the following species composition of bats was revealed: *Rhinolophus hipposideros*, *Myotis blythii*, *Myotis bechsteinii*, *Myotis daubentonii*, *Myotis dasycneme*, *Plecotus auritus*, *Plecotus austriacus*, and *Eptesicus serotinus*.

Family Rhinolophidae

This group is represented in underground locations by one species.

Rhinolophus hipposideros (Borkhausen, 1797) is recorded practically in all underground shelters of Transnistria (in 13 of 15 examined) (Fig. 3). It is the most abundant and frequent species in the studied area. They are concentrated at wintering grounds and also throughout the year in adits near the settlements of Bychok, Cocieri, Mikhailovka, Zozuliany, Vykhvatyntsi, Rașcov, and others.

The largest aggregations were found in winter in caves near Valya Adynca (37 specimens), Rașcov (43 specimens), and Vykhvatyntsi (44 specimens). The species is listed in the Red Data Book of Transnistria (2nd edition) as Endangered (EN), as well in the list of IUCN (Version 2021.3: Europe — NT), Bern Convention, Bonn Convention, European Habitat Directive; Red Data Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; Red... 2020; IUCN... 2021].

Family Vespertilionidae, subfamily Myotinae

This group is represented in underground locations by four species.

Myotis blythii (Tomes, 1857) is recorded in underground shelters in the central and northern regions of Transnistria: Dubossary, Rybnitsa, and Camenca (Fig. 4). To the south of Dubossary, we have not found it. Large aggregations (over 50 individuals) were recorded only in winter and in early autumn during the breeding season. In summer, single individuals, usually males, were recorded. The largest concentrations of wintering lesser mouse-eared bats were found in the adits nearby to the villages of Cocieri (over 51 individuals), Rașcov (22 individuals), and Vykhvatyntsi (18 individuals). The species is listed in the Red Book of Transnistria (2nd edition) with the status (VU) Vulnerable; also listed in the IUCN (Version 2021.3: Europe — NT), Bern and Bonn Conventions, European Habitat Directive; in the Red Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; Red... 2020; IUCN... 2021].

Myotis bechsteinii (Kuhl, 1817) has not been previously recorded in the territory of Transnistria. It is the rarest bat species found by us in winter only in three dungeons of Transnistria: in Dubossary and Camenca districts. One bat was recorded at the end of September in a shallow adit in Camenca. The largest number of wintering individuals (7 specimens) was recorded once in adits near Cocieri in late February 2021, however during repeated inspection in the beginning of March only one specimen was recorded (Fig. 5). The species is listed in the IUCN (Version 2021.3: Europe — VU), Bern and Bonn Conventions, European Habitat Directive; Red Data Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; IUCN... 2021].



Fig. 3. *Rhinolophus hipposideros* (Borkhausen, 1797): a — part of a colony of lesser horseshoe bat at a wintering site in adits near the village of Vykhvatyntsi (R-01); b — a single individual during daytime (cave near the village of Mikhailovka, R-07).

Рис. 3. *Rhinolophus hipposideros* (Borkhausen, 1797): a — частина колонії підковоноса малого під час зимівлі у штольнях у с. Вихватинці (R-01); b — поодинокі особина удень (печера у с. Михайлівка, R-07).



Fig. 4. *Myotis blythii* (Tomes, 1857): *a* — lesser mouse-eared bat from the adits at Vhvatintsi (R-01); *b* — wintering individuals (adits at Cocieri, D-01).

Рис. 4. *Myotis blythii* (Tomes, 1857): *a* — нічниця гостровуха із штолень у с. Вихватинці (R-01); *b* — зимуючі особини (штольні у с. Кочієри, D-01).



Fig. 5. *Myotis bechsteinii* (Kuhl, 1817): *a* — a wintering individual in the adits near the village of Cocieri (D-01); *b* — an old male from the adit near the village of Cocieri (D-01).

Рис. 5. *Myotis bechsteinii* (Kuhl, 1817): *a* — зимуюча особина у штольнях у с. Кочієри (D-01); *b* — старий самець із штольні у с. Кочієри (D-01).



Fig. 6. *Myotis daubentonii* (Kuhl, 1817): *a* — a colony in a cave near the village of Mikhailovka (R-07); *b* — a solitary individual in the tunnel near the village of Rașcov (K-06).

Рис. 6. *Myotis daubentonii* (Kuhl, 1817): *a* — колонія у печері у с. Михайлівка (R-07); *b* — поодинокі особини у штольні у с. Рашків (K-06).

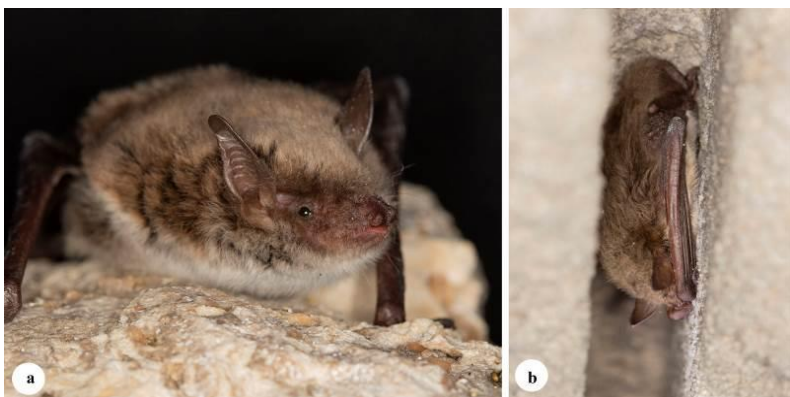


Fig. 7. *Myotis dasycneme* (Boie, 1825): *a* — pond bat from a complex of adits near the village of Vychok (G-01); *b* — a wintering individual (adits near the village of Rașcov, K-06).

Рис. 7. *Myotis dasycneme* (Boie, 1825): *a* — нічниця гостровуха із комплексу штолень у с. Бичок (G-01); *b* — зимуюча особина (штольні у с. Рашків, K-06).

Myotis daubentonii (Kuhl, 1817) is the second most frequently recorded species after the lesser mouse-eared bat. It is recorded in most of the underground shelters of Transnistria (it was found in 10 of 15 surveyed shelters) (Fig. 6). The most numerous and frequently occurring species in the studied area. It is concentrated in wintering grounds, as well as throughout the year in the adits near the villages of Cocieri, Bychok, and Bendery (Severny). Winters solitarily or in small aggregations of up to 4–5 individuals. In spring and autumn, it gathers in small groups (colonies) of up to 14 individuals (in mine galleries near Bendery). The species is listed in the Red Book of Transnistria (2nd edition) with the status (VU) Vulnerable; also listed in the IUCN (Version 2021.3: Global — LC), Bern and Bonn Conventions, European Habitat Directive; Red Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; Red... 2020; IUCN... 2021].

Myotis dasycneme (Boie, 1825) is a rare bat species found during winter and in spring to summer only in four dungeons of Transnistria in both southern and northern areas. It winters solitarily, often together with other bats (Fig. 7). It is listed in the Red Data Book of Transnistria (2nd edition) with Endangered (EN) status, also IUCN (Version 2021.3: Europe — NT), Bern and Bonn conventions, European Habitat Directive, Red Data Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; Red... 2020; IUCN. 2021].

Family Vespertilionidae, subfamily Vespertilioninae

This group is represented in underground localities by three species.

Plecotus auritus (Linnaeus, 1758) was found only in two adits: near Bychok, Grigoriopol District and near Cocieri, Dubossary District. One pair (1♂, 1♀) was found in the adits near Bychok; four individuals were recorded wintering alone near Cocieri. We recorded 6 individuals during the survey period. The species is listed in the Red Book of Transnistria (2nd edition) with the status (EN) Endangered; also listed in the IUCN (Version 2021.3: Global — LC), Bern and Bonn conventions, the European Habitat Directive; in the Red Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; Red... 2020; IUCN... 2021].

Plecotus austriacus (Fischer, 1829) is sporadically recorded in underground shelters throughout Transnistria (recorded in 5 of 15 surveyed adits). The greatest number of individuals (up to 5) was recorded in adits near the villages of Bychok (Grigoriopol District) and Valea-Adynca (Kamenka District) (Fig. 8). The species is listed in the Red Book of Transnistria (2nd edition) with the status (VU) Vulnerable; it is also listed in the IUCN (Version 2021.3: Global, Europe — NT), Bern and Bonn Conventions, the European Habitat Directive; in the Red Books of Moldova and Ukraine [Akimov 2009; Cartea... 2015; Red... 2020; IUCN... 2021].

Eptesicus serotinus (Schreber, 1774) is recorded in underground shelters throughout Transnistria. The greatest number of wintering individuals was observed in the adits near the villages of Bychok (Grigoriopol District), Vykhatintsi (Rybnitsa District), and Cocieri (Dubossary District) (Fig. 9). It was not registered by us in summer. The species is listed in the IUCN (Version 2021.3: Global — LC), Bern and Bonn Conventions, and in the Red Book of Ukraine [Akimov 2009; IUCN... 2021].



Fig. 8. *Plecotus austriacus* (Fischer, 1829): a — a colony in the adits at Valya Adynka (K-04); b — a grey long-eared bat from the adit complex at Bichok (G-01).

Рис. 8. *Plecotus austriacus* (Fischer, 1829): a — колонія у штольнях у с. Валя-Адинка (К-04); b — особина вуханя сірого із комплексу штолень у с. Бичок (G-01).



Fig. 9. *Eptesicus serotinus* (Schreber, 1774) from the adits complex near the village of Bychok (G-01).

Рис. 9. *Eptesicus serotinus* (Schreber, 1774) із комплексу штолень у с. Бичок (G-01).

The investigated territory, according to the administrative structure, is divided between 5 districts and 2 cities of republican subordination (Tiraspol and Bendery), in accordance to which each identified underground facility is assigned an index corresponding to the district and a serial number. The index designations are as follows:

Conclusions

Thus, according to the results of investigations of underground shelters it was possible to establish the presence of 8 bat species: *Rhinolophus hipposideros*, *Myotis blythii*, *Myotis bechsteinii*, *Myotis daubentonii*, *Myotis dasycneme*, *Plecotus auritus*, *Plecotus austriacus*, and *Eptesicus serotinus*. Summary data on the ratio of the number of individuals of the registered bat species in underground shelters are shown in Fig. 10.

The most widespread and frequently encountered species in the studied area are the lesser horseshoe bat (*Rhinolophus hipposideros*) and Daubenton’s bat (*Myotis daubentonii*). The serotine bat (*Eptesicus serotinus*) is common and found in most dungeons. The lesser mouse-eared bat (*Myotis blythii*) is often found, and only in the central and northern areas of Transnistria; it has never been observed south of Dubossary. Rare species are the brown long-eared bat (*Plecotus auritus*) and grey long-eared bat (*Plecotus austriacus*), with the former occurring three times less frequently. The pond bat (*Myotis dasycneme*) is a very rare species, with only single individuals being registered, and Bechstein's bat (*Myotis bechsteinii*) is a species that has never been registered in Transnistria before.

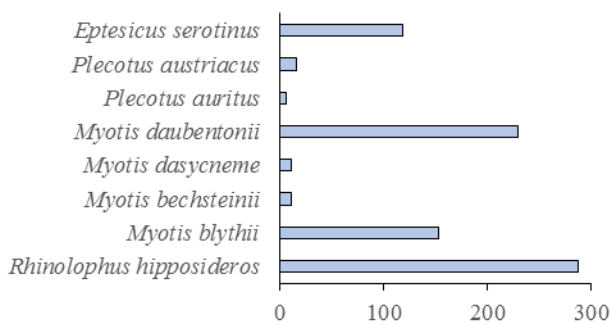


Fig. 10. Ratio of the number of individuals of bat species recorded in 2020–2021 in underground shelters.

Рис. 10. Співвідношення кількості особин виявлених у 2020–2021 рр. видів кажанів у підземних сховищах.

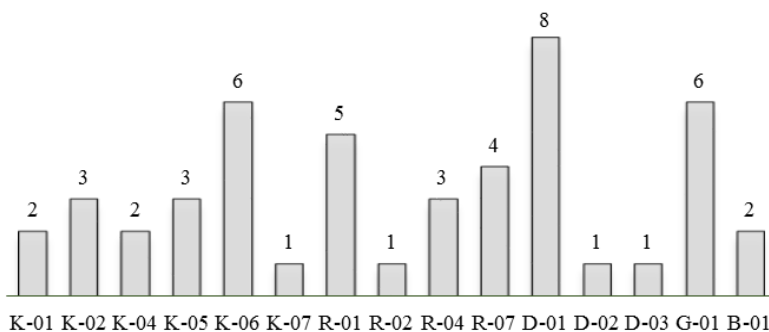


Fig. 11. Ratio of the total number of bat species in different underground shelters of Transnistria.

Рис. 11. Співвідношення загальної кількості видів кажанів у різних підземних сховищах Придністров'я.

It should be noted that during the surveys in 2020–2021, we did not find the whiskered bat (*Myotis mystacinus*), a species that was previously recorded in a number of adits in the southern and central regions [Andreev & Vasiliev 1997; Vasiliev & Andreev 1997; Vasiliev & Andreev 1998; Bondarenko & Guseva 2003].

The ratio of the total number of bat species found in different underground shelters in Transnistria is shown in Fig. 11.

Among the most important sites for the preservation of species diversity of bats should be noted the tunnel complexes near the villages of Cocieri D-01 (8 species), Bychok G-01 (6 species), Rașcov K-06 (6 species), and Vykhatyntsi R-01 (5 species). These underground complexes should be given the status of protected sites as they play a key role in the life of bats in the winter period, as well as during their breeding season.

The data presented in this work on the fauna of bats of underground shelters of the left bank of the Dnister are preliminary and further research is required on an ongoing basis in order to obtain more accurate and detailed information on the dynamics of the number and changes in the species composition.

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