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RESEARCH ARTICLE

The first record of the greater noctule bat, *Nyctalus lasiopterus* (Schreber, 1780) (Chiroptera, Vespertilionidae), in the Republic of Mordovia (European Russia)

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Abstract

As part of a systematic five-year (2021–2025) mist-netting survey of bats in the Mordovia State Nature Reserve, we documented the first confirmed presence of the greater noctule bat, *Nyctalus lasiopterus*, in the Republic of Mordovia. This species is listed as Vulnerable on the IUCN Red List. From a total of 2560 captured bats representing 11 species, ten individuals of *N. lasiopterus* were recorded at two distinct locations in July 2025. The capture of both young-of-the-year and an adult post-lactating female suggests the potential presence of a maternity colony in the region. This finding significantly updates the regional chiropterofauna, confirms the northeastern expansion of this rare species' range, and underscores the critical importance of the reserve's broadleaf forests for its conservation. We recommend the inclusion of *N. lasiopterus* in the official faunal list of Mordovia.

Keywords

Chiroptera, *Nyctalus lasiopterus*, greater noctule bat, first record, vulnerable species, European Russia, bat fauna, range expansion, Mordovia

Introduction

Inventorying fauna by assessing its species richness is the first and most important task of any biodiversity monitoring program (Cutko 2009; Deharveng et al. 2015; Ogurtsov 2023; Ogurtsov and Zheltukhin 2024). However, despite the limited species richness, data on the theriofauna in some regions of Russia remain insufficient. This is especially true for difficult-to-study orders of mammals that lead a secretive lifestyle and/or are challenging to study using simple monitoring methods (Ermakov et al. 2020; Alekseeva et al. 2024; Malyavina and Smirnov 2024). Such mammals include bats (order Chiroptera).

Twenty-seven species of bats inhabit the territory of European Russia. Seventeen species of bats are known in the Middle Volga region, of which nine are sedentary and eight are migratory (Strelkov and Il'in 1990; Il'in et al. 2002; Kozhurina 2009; Lisovsky et al. 2019). According to preliminary estimates, the fauna of the Republic of Mordovia includes 12 species of bats (Artaev and Smirnov 2016). Previous studies of the chiropterofauna in the Mordovia State Nature Reserve conducted from 2005 to 2015 established the habitats of 10 bat species within the protected area (Ruchin et al. 2012; Artaev and Smirnov 2016; Kirillova and Kirillov 2023).

The greater noctule bat, *Nyctalus lasiopterus* (Schreber, 1780), is a rare species of carnivorous bat found in Europe, West Asia, and North Africa (Uhrin 2006; Kozhurina 2009; Smirnov and Vekhnik 2013). It is the largest and least studied bat in Europe and one of the few bat species that feed on passerine birds (Macdonald and Barrett 1993; Uhrin 2006; Alcalde et al. 2016). The greater noctule bat is listed as vulnerable (A4c) on the IUCN Red List of Threatened Species (Alcalde et al. 2016). The northeastern part of the range of *N. lasiopterus* is located in Russia. This species inhabits mixed and broadleaf forests in central and southern European regions (Kuzyakin 1980; Strelkov and Il'in 1990; Il'in et al. 2002; Kruskop 2012). Records of *N. lasiopterus* have been reported from the Moscow, Vladimir, and Nizhny Novgorod regions in the north to the southern part of Crimea and the southwestern part of Transcaucasia in the south. From west to east, *N. lasiopterus* is distributed from the Russian state borders to the Bashkortostan, Orenburg and Chelyabinsk regions (Il'in et al. 2002; Vasenkov et al. 2016; V. Snit'ko and L. Snit'ko 2021a, 2021b). The greater noctule bat is a migratory species that appears in European Russia in early May, and the offspring are typically born in the first half of June. Autumn migration begins in early August, and the last individuals fly away in early September (Smirnov and Vekhnik 2013). The biology and distribution of *N. lasiopterus* in Russia have not been fully studied.

Currently, there is no reliable evidence of the greater noctule bat in the Republic of Mordovia. The only record of *N. lasiopterus* in Mordovia pertains to a visual observation made by V.I. Astradamov of this species in flight in the Krasny Yar tract along the Sura River in the Dubensky District (Astradamov 2005). This observation

raises certain doubts, as it is not possible to visually distinguish *N. lasiopterus* from *Nyctalus noctula* Schreber, 1774 during flight (Artaev and Smirnov 2016).

In this paper, we present a description of the record of the greater noctule bat (*N. lasiopterus*), which we found in the territory of the Mordovia State Nature Reserve, thus identifying it as a new species for the fauna of the Republic of Mordovia.

Materials and methods

From the second decade of July to the first decade of August in 2021–2025, we conducted a study on the species composition and abundance of bats (Chiroptera) in the Mordovia State Nature Reserve. During this period, 2560 individuals of 11 bat species were captured at 17 sites in the protected area (Fig. 1).

The primary method used in this study involved capturing bats at night using mist nets (10 × 6 m with 17 mm mesh). We used the widely accepted technique of stretching the mist net between two poles (Jones et al. 1996). The poles used were 7 m long telescopic fishing rods tied to metal pegs driven into the ground. The bats were caught from 9:00 PM to 1:00 AM at each site for 1 to 3 nights. In total, we processed 840 net/hours, including: Inorki Lake – 120; cordon Novenkovskiy – 96; Picherki Lake – 96; cordon Taratinskiy – 88; cordons Drozhdenovskiy and Pavlovskiy – 80 each; cordon Plotomoyka – 64; cordon Srednyaya Melnitsa – 40; Pushta village, cordon Zhegalovskiy, and Lake Bolshaya Valza – 32 each; cordons Belousovskiy and Podrubnyiy – 24 each; Moksha River bank, cordons Dolgiy Most, Novenkiy, and Steklyannyiy – 8 net/hours each.

Adult (ad) and young (sad) bats were identified based on the degree of ossification of the wing bone epiphyses – metacarpus and phalanges (Strelkov 1963). After examination, measurement, and photography, the animals were returned to the capture sites and released. The geographic coordinates of the capture sites were determined using Google Maps (https://www.google.ru/maps/).

Occurrence and relative abundance indices were calculated using a previously proposed method (Pesenko 1982; Strelkov & Ilyin 1990). Relative abundance was defined as the ratio of the number of captured and recorded individuals of each species to the total number of captured individuals of all bat species at a given location, expressed as a percentage. The frequency of occurrence was estimated as the ratio of the number of locations where individuals of each bat species were found to the total number of locations where individuals of all bat species were recorded, expressed as a percentage. We calculated the detection rate as the ratio of the number of findings of each bat species to the total number of findings of all bat species, also expressed as a percentage.

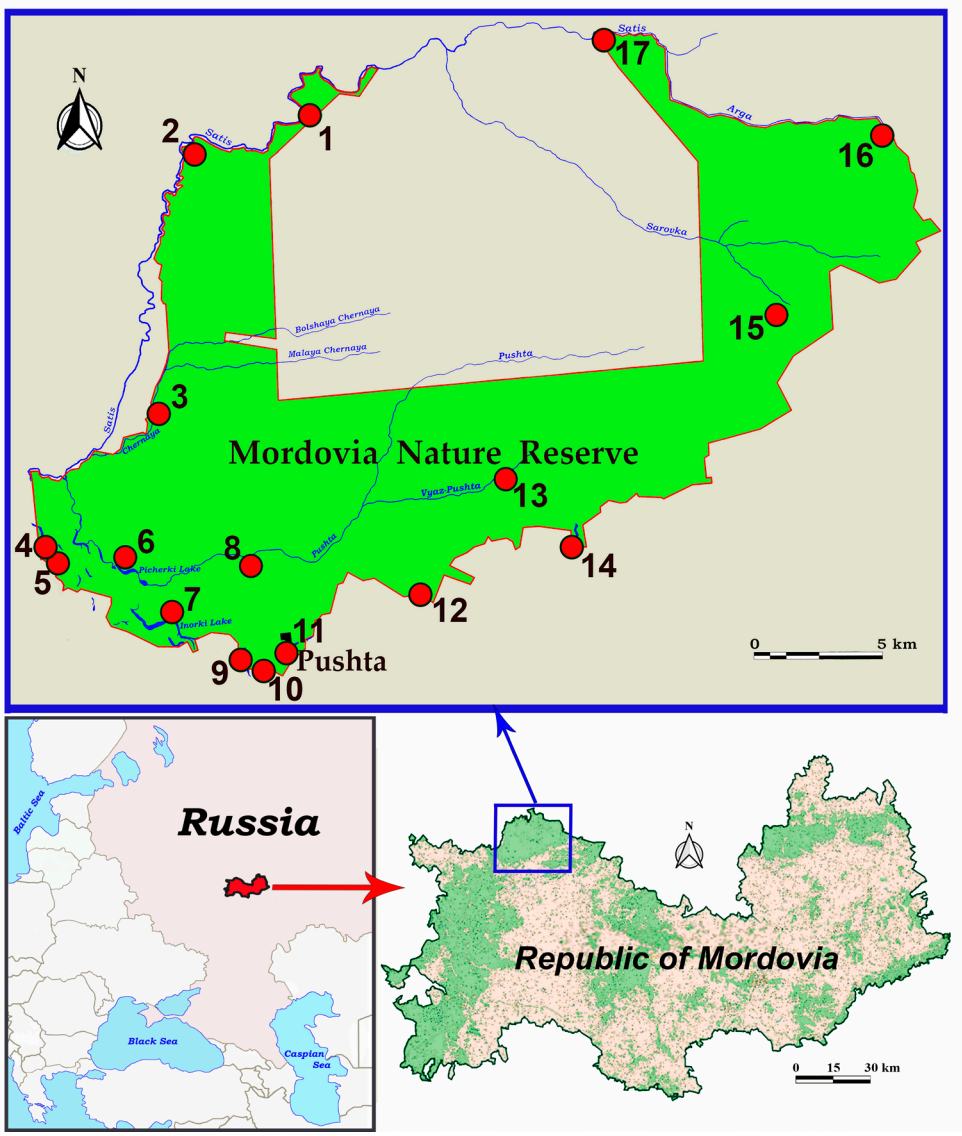

Figure 1. Map of the study area of the Mordovia State Nature Reserve in 2021–2025. Red circles on the map indicate bat capture sites. **1** – cordon Srednyaya Melnitsa, **2** – cordon Plotomoyka, **3** – cordon Podrubnyiy, **4** – Moksha River bank, **5** – cordon Taratinskiy, **6** – Picherki Lake, **7** – Inorki Lake, **8** – cordon Dolgiy Most, **9** – Lake Bolshaya Valza, **10** – cordon Novenkiy, **11** – Pushta village, **12** – cordon Drozhdenovskiy, **13** – cordon Zhegalovskiy, **14** – cordon Pavlovskiy, **15** – cordon Belousovskiy, **16** – cordon Steklyannyiy, **17** – cordon Novenkovskiy.

Results

Over the course of five years of research, a total of 2560 bats belonging to 11 species were captured (Table 1).

Table 1. Species composition, abundance and occurrence of bats in the Mordovia State Nature Reserve in 2021–2025

Species	*N*	Relative abundance, %	Detection rate, %	Frequency of occurrence, %
Myotis brandtii Eversmann, 1845	82	3.2	9.8	70.6
Myotis daubentonii (Kuhl, 1817)	118	4.6	14.1	70.6
Myotis dasycneme (Boie, 1825)	33	1.3	3.6	23.5
Myotis nattereri (Kuhl, 1817)	4	0.2	2.7	17.6
Nyctalus noctula (Schreber, 1774)	1559	60.9	15.2	100
Nyctalus leisleri (Kuhl, 1817)	68	2.6	13.4	88.2
Nyctalus lasiopterus (Schreber, 1780)	10	0.4	1.8	11.8
Pipistrellus nathusii (Keyserling & Blasius, 1839)	453	17.7	12.5	82.4
Pipistrellus pygmaeus Leach, 1825	90	3.5	10.7	70.6
Vespertiliio murinus Linnaeus, 1758	131	5.1	12.5	82.4
Plecotus auritus (Linnaeus, 1758)	12	0.5	6.2	41.2
Total	2560	100	100	–

Note: N – number of captured bats.

In July 2025, 10 individuals of the greater noctule bat were captured in two of the 17 surveyed areas of the Mordovia State Nature Reserve: the Novenkovskiy cordon (on the bank of the Satis River, 54.931721° N, 43.420510° E) and the Belousovskiy cordon (pond bank, 54.83385° N, 43.53377° E; forest road, 54.833270° N, 43.533930° E) (Figs 2–5).

The first finding was registered on July 18, 2025, on the bank of the Satis River (Novenkovsky cordon), when a solitary young male of *N. lasiopterus* was captured in a mist net (Figs 2, 3 and 8). The following day, July 19, 2025, three more bats were captured at the same location: one young female and two young males.

On July 21, 2025, three individuals of the greater noctule bat were caught in mist nets installed near a pond and on a forest road near the Belousovskiy cordon of the Mordovia State Nature Reserve: an adult post-lactating female, a young female, and a young male (Figs 6–9). The following day, on July 22, 2025, two more young males and one young female of *N. lasiopterus* were caught at the same place.

We have identified new habitats for other rare bat species (*Myotis nattereri* and *Nyctalus leisleri*) in the Republic of Mordovia. In July 2024, we captured Natterer's

bat (a young male) at site 4 (Fig. 1). Later that year, on July 29, we captured an adult post-lactating female of *M. nattereri* for the first time at site 12. On July 27, 2025, a young male of *M. nattereri* was captured in a mist net on a forest road at site 15 for the first time.

In July 2023, the lesser noctule, *N. leisleri*, was captured at cordons 8 and 12. In 2024, it was found at cordons 1 and 17, and in 2025, it was captured at site 6 as well as at cordons 2 and 15 (Fig. 1).

Figures 2–5. Capture sites of *Nyctalus lasiopterus* (photo by Nadezhda Kirillova): **2** – Novenkovskiy cordon, bank of the Satis River; **3** – Novenkovskiy cordon, mist nets installed on the bank of the Satis River; **4** – pond near the Belousovskiy cordon; **5** – Belousovskiy cordon, mist nets installed on the forest road.

Discussion

For the first time, the habitat of one of the rarest bat species in the Western Palearctic – the greater noctule bat (*N. lasiopterus*) – was established on the territory of Mordovia and the Mordovia State Nature Reserve. Based on the number of recorded occurrences in the Mordovia State Nature Reserve, the proportion of the greater noctule bat within the bat community is 1.8%, while its relative abundance is only 0.4% (Table 1). Capture of young individuals and an adult post-lactating female of *N. lasiopterus* may indicate the possible presence of a maternity colony of this rare

bat species in the area. At the same time, the capture of only young *N. lasiopterus* individuals at the Novenkovskiy cordon may suggest that this location is used as a feeding site, although it does not exclude the possibility of a maternity colony being present.

Although *N. lasiopterus* has been reliably recorded in Mordovia for the first time, the capture of this species is not unexpected, as the greater noctule bat has been observed in the Penza, Nizhny Novgorod and Ryazan regions adjacent to the region under study (Ivanchev and Kazakova 2011; Anufriev et al. 2014; Il'in 2019).

Figures 6–9. The bats examined (photo by Nadezhda Kirillova): **6** – adult post-lactating female of *Nyctalus lasiopterus*, captured in the Belousovskiy cordon; **7** – adult females of *Nyctalus lasiopterus* (left) and *Nyctalus noctula* (right); **8** – subadult male of *Nyctalus lasiopterus*, captured for the first time in Mordovia (Novenkovskiy cordon); **9** – subadult males of *Nyctalus lasiopterus* (left) and *Nyctalus noctula* (right).

Since *N. lasiopterus* was classified as vulnerable on the IUCN Red List 2016, the greater noctule bat is likely the most threatened species among European forest bats. Consequently, every record of *N. lasiopterus* is crucial to understanding the ecology of this rare species, which is essential for developing effective conservation strategies (Kovalov et al. 2019).

The Leisler's bat, *N. leisleri*, was first captured in the Mordovia State Nature Reserve in 2021 (Kirillova and Kirillov 2023). Since then, a total for eight habitats for *N. leisleri* have been documented within this protected area. The Natterer's bat,

M. nattereri, has been found in only two areas of the Mordovia State Nature Reserve: the Taratinskiy cordon and the corner of forest areas 425 and 439 (Artaev and Smirnov 2016; Kirillova and Kirillov 2023). Subsequent studies have expanded the list of habitats for both *N. leisleri* and *M. nattereri*. In summary, there are currently 15 known habitats for the lesser noctule bat and four habitats for the Natterer's bat within the territory of the Mordovia Nature Reserve.

Previously, 10 bat species were recorded in the territory of the Mordovia State Nature Reserve (Artaev and Smirnov 2016; Kirillova and Kirillov 2023). In 2025, we confirmed the presence of all 10 bat species and established the habitat of a new species for the fauna of both this protected area and Mordovia as a whole – the greater noctule bat. Therefore, at the current stage of chiropteran research, the fauna of the Mordovia State Nature Reserve now includes a total of 11 bat species.

Conclusions

Further studies on the species composition and abundance of bats in Mordovia are necessary to clarify the number and distribution of the greater noctule bat in this region. The protection of broadleaf forests is essential for the conservation of *N. lasiopterus*, as well as for investigating the ecology of this rare bat species and identifying its habitats.

Based on the results of our study, we recommend the inclusion of the greater noctule bat, *Nyctalus lasiopterus*, in the faunal lists of Mordovia and the Mordovia State Nature Reserve.

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References

Alcalde J, Juste J, Paunovic M (2016) *Nyctalus lasiopterus*. IUCN Red List of Threatened Species 2016: e.T14918A22015318. https://doi.org/10.2305/IUCN.UK.2016-2.RLTS.T14918A22015318.en (accessed 22 July 2025)

Alekseeva GS, Erofeeva MN, Hernandez-Blanco JA, Litvinov MN, Chistopolova MD, Kim MD, Rozhnov VV, Naidenko SV (2024) Hematological analysis as a method of monitoring physiological status of medium carnivorous mammals in the Russian Far East. Nature Conservation Research 9(4): 93–104. https://doi.org/10.24189/ncr.2024.034

Anufriev GA, Bakka SV, Kiseleva NYu (2014) Red Book of the Nizhny Novgorod region. Vol. 1: Animals. Second edition. Dekom, Nizhny Novgorod, 448 pp. [In Russian]

Artaev ON, Smirnov DG (2016) Bats (Chiroptera; Mammalia) of Mordovia: species composition and distribution features. Nature Conservation Research 1(1): 38–51. http://doi.org/10.24189/ncr.2016.004 [In Russian]

Astradamov VI (Ed.) (2005) Red Book of the Republic of Mordovia. Vol. 2: Animals. Mordovian Book Publishing House, Saransk, 335 pp. [In Russian]

Cutko A (2009) Biodiversity Inventory of Natural Lands: A How-To Manual for Foresters and Biologists. NatureServe, Arlington, Virginia, 40 pp.

Deharveng L, Bedos A, Daugeron C, Villemant C, Judson MI (2015) Organization, usefulness and limitations of an ATBI (All Taxa Biodiversity Inventory): the inventory of terrestrial invertebrates in the Mercantour National Park. Zoosystema 37(1): 9–30. https://doi.org/10.5252/z2015n1a1

Ermakov OA, Mishta AV, Sheftel BI, Obolenskaya EV, Lada GA, Bystrakova NV, Ruchin AB, Lissovsky AA (2020) Does the Mediterranean water shrew *Neomys anomalus* (Soricidae, Eulipotyphla) expand the eastern part of the distribution range? Russian Journal Theriology 19(2): 112–130.

Google Maps (2025) https://www.google.ru/maps/ (accessed on 14 July 2025).

Il'in VYu (ed) (2019) Red book of the Penza region. Vol. 2: Animals. Second edition. Voronezh Regional Printing House – Publishing House named after EA Bolkhovitinov, Penza, Voronezh, 264 pp. [In Russian]

Il'in VYu, Smirnov DG, Krasil'nikov DB, Yanyaeva NM (2002) Materials for the cadastre of bats (Chiroptera) of European Russia and adjacent regions. Penza State Pedagogical University, Penza, 64 pp. [In Russian]

Ivanchev VP, Kazakova MV (Eds) (2011) Red Book of the Ryazan region. Second edition. Golos gubernii, Ryazan, 626 pp. [In Russian]

Jones C, McShea WJ, Conroy MJ, Kunz JH (1996) Capturing mammals. In: Wilson DE, Cole FR, Nichils JD, Rudran R, Foster MS (Eds) Measuring and monitoring biological diversity: standard methods for mammals. Washington DC, Smithsonian Institution Press, 115–155.

Kirillova NYu, Kirillov AA (2023) The first record of *Nyctalus leisleri* (Kuhl, 1817) (Chiroptera, Vespertilionidae) in the Mordovia Nature Reserve (European Russia). Proceedings of the Samara Scientific Center of RAS 25(5): 31–37. http://doi.org/10.37313/1990-5378-2023-25-5-31-37 [In Russian]

Kozhurina EI (2009) Synopsis of the fauna of bats in Russia: taxonomy and distribution. Plecotus et al. 23: 71–105. [In Russian]

Kovalov V, Hukov V, Rodenko O (2019) New record of *Nyctalus lasiopterus* (Schreber, 1780) in Ukraine with a new confirmation of carnivory. North-Western Journal of Zoology 15 (1): 91–95.

Kruskop SV (2012) Order Chiroptera. In: Pavlinov IYa, Lisovsky AA (Eds) Mammals of Russia: Systematic and geographical reference book. KMK, Moscow, 73–126. [In Russian]

Kuzyakin AP (1980) The Greater noctule bat (*Nyctalus lasiopterus*) in the USSR. In: Kuzyakin AP, Panyutin KK (Eds) Bats (Chiroptera). Nauka, Moscow, 55–59. [In Russian]

Lisovsky AA, Sheftel BI, Savelyev AP, Ermakov OA, Kozlov YuA, Smirnov DG, Stakheev VV, Glazov DM (2019) Mammals of Russia: list of species and applications aspects. Collection of works Zoological Museum of Moscow State University 56, Moscow, 191 pp. [In Russian]

Malyavina MS, Smirnov DG (2024) Structure of ectoparasite communities of *Nyctalus species* (Chiroptera: Vespertilionidae) in the Zhiguli State Nature Reserve and Samarskaya Luka National Park (European Russia). Nature Conservation Research 9(2): 1–23. https://doi.org/10.24189/ncr.2024.009 [In Russian]

Ogurtsov SS (2023) Estimating brown bear population density and abundance using camera traps in the Central Forest State Nature Reserve (west of European Russia). Nature Conservation Research 8(2): 1–21. https://dx.doi.org/10.24189/ncr.2023.008 [In Russian]

Ogurtsov SS, Zheltukhin AS (2024) Mammal inventory using camera traps in the Central Forest State Nature Reserve (West of European Russia). Nature Conservation Research 9(3): 12–33. https://doi.org/10.24189/ncr.2024.017 [In Russian]

Pesenko YuA (1982) Principles and methods of quantitative analysis in faunal studies. Nauka, Moscow, 287 pp. [In Russian]

Ruchin AB, Artaev ON, Bugaev KE, Grishutkin GF, Potapov SK, Spiridonov SN (2012) Vertebrate animals of the Mordovia Nature Reserve. Committee of RAS for the Conservation of Biological Diversity, Moscow, 64 pp. [In Russian]

Smirnov D, Kirillova N, Kirillov A, Ruchin A, Vekhnik V (2022) New records of *Nyctalus leisleri* (Kuhl, 1817) and *Myotis nattereri* (Kuhl, 1817) (Mammalia: Chiroptera: Vespertilionidae) from National Park "Smolny" and its surroundings, Republic of Mordovia. Journal of Threatened Taxa 14(8): 21553–21560. https://doi.org/10.11609/jott.6919.14.8.21553-21560

Smirnov DG, Vekhnik VP (2013) Trophic ecology and predation of the Greater noctule bat (*Nyctalus lasiopterus*) in Russia. Izvestiia Akademii Nauk. Seriia Biologicheskaia 2: 227–234. [In Russian]

Snit'ko VP, Snit'ko LV (2021) A new find of *Nyctalus lasiopterus* (Schreber, 1780) in the Ural. Bulletin of Moscow Society of Naturalists. Biological Series 126(4): 3–9. [In Russian]

Snit'ko VP, Snit'ko LV (2021) The first record of the Greater noctule bat (*Nyctalus lasiopterus*) in the Southern Urals. Biology Bulletin 48: 1104–1106. https://doi.org/10.1134/S1062359021070293

Strelkov PP (1963) Order Chiroptera – bats. In: Sokolov II (Ed.) Mammals of the fauna of the USSR. Part 1. Keys to the fauna of the USSR. Issue 82. Zoological Institute of the USSR Academy of Sciences, Moscow, Leningrad, 122–218. [In Russian]

Strelkov PP, Il'in VYu (1990) Bats (Chiroptera, Vespertilionidae) of the south of the Middle and Lower Volga region. Fauna, systematics, and evolution of mammals. Proceedings of Zoological Institute of the Russian Academy of Sciences 225: 42–167. [In Russian]

Uhrin M (2006) On the Greater noctule (*Nyctalus lasiopterus*) in Central Slovakia. Vespertilio 9–10: 183–192.

Vasenkov DA, Golovina GA, Sidorchuk NV (2016) The first registration of greater noctule (*Nyctalus lasiopterus*) in Vladimir region. Plecotus et al. 19: 32–36. [In Russian]