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NEW *VESPERTILIO MURINUS* (CHIROPTERA) WINTER RECORDS. AN INDICATION OF EXPANSION OF THE SPECIES' WINTER RANGE?

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New *Vespertilio murinus* (Chiroptera) Winter Records. An Indication of Expansion of the Species' Winter Range? Godlevska L. V. — Absence of winter records, known long distance movements of parti-coloured bats ringed in North-eastern (NE) Europe, and some observations of seasonal concentrations of migrating animals had enabled to consider *Vespertilio murinus*, until quite recently, as a migratory species wintering outside Ukraine and NE Europe as a whole. During the last years the species had been found in the winter season (November — middle March) in Ukraine in 14 provinces and in the AR Crimea: contact records in 7 provinces, observations of autumn display song in 9 provinces and in the AR Crimea. Analysis of the data allows to assert that at present the whole territory of Ukraine belongs to the winter range of *V. murinus*. New winter records of *V. murinus* from Ukraine and other countries of NE Europe should probably be considered as an evidence of the expansion of the species' winter range, that may be conditioned by the appearance of big massifs of rock-like structures (= multi-storey buildings) in plain regions.

Key words: *Vespertilio murinus*, Ukraine, NE Europe, winter range, expansion.

Новые зимние находки *Vespertilio murinus* (Chiroptera). Свидетельство расширения зоны зимовки вида? Годлевская Е. В. — Отсутствие зимних находок и известные дальние перелеты двухцветных кожанов, окольцованных в северо-восточной (СВ) Европе, а также некоторые наблюдения сезонных концентраций мигрирующих животных — всё это позволяло рассматривать до относительно недавнего времени *Vespertilio murinus* как вид-мигрант, который зимует за пределами Украины и СВ Европы в целом. В течение последних лет вид в Украине отмечен в зимний период (конец октября — середина марта) в 14 областях и АР Крым: контактные регистрации — в 7 областях, регистрация осенней брачной песни — в 9 областях и АР Крым. Имеющиеся данные позволяют утверждать, что территория Украины на сегодня полностью входит в зону зимовки вида. Новые зимние находки *V. murinus* из Украины и других стран СВ Европы, вероятно, следует рассматривать как доказательство расширения зимовочной зоны вида, которое может быть обусловлено появлением крупных массивов скалообразных структур (= многоэтажные дома) в равнинных регионах.

Ключевые слова: *Vespertilio murinus*, Украина, СВ Европа, зона зимовки, расширение.

The parti-coloured bat, *Vespertilio murinus* Linnaeus, 1758, is distributed from Central Europe through the Caucasus, Central Asia, Southern Siberia to the Far East (Rydell, Baagøe, 1994). The whole territory of Ukraine belongs to its range (Abelentsev, Popov, 1956; Godlevskaya, 2006). However, until quite recently, the species had not been observed here in winter. Absence of winter records, known long distance movements of parti-coloured bats ringed in NE Europe (Kurskov, 1965; Panyutin, 1968) and some observations of migrating animals, in particular in the southern part of Ukraine (Formozov, 1927; Popov, 1941) — all this let considering *V. murinus* as a migrating species, hibernating outside Ukraine and NE Europe as a whole (Abelentsev, Popov, 1956; Strelkov, 1969; Strelkov, Il'in, 1990). The data on winter records of the species in the territory of the former USSR and adjacent regions was reviewed by P. P. Strelkov in 2001 (Strelkov, 2001). Based on available data for that moment P. P. Strelkov lined the presumable northern border of the species' winter range through the Northern Caucasus and Transcarpathian Ukraine, Czech Republic to the north along the inter-fluve of Oder and Elbe Rivers to the Baltic Coast. P. P. Strelkov also noticed "attempts" of the parti-coloured bat to hibernate beyond that line. In the following years new data on *V. murinus* in Ukraine were gathered. These data supplement information about the species' winter range and allow to review its current borders, in particular in the territory of Ukraine.

Methods

All available data on contact records of parti-coloured bats in winter and observations of the autumn mating display song of the species in Ukraine are summarized. The winter season is considered to be a period from late October to the middle of March. A mating song at the end of October — in December is considered to be an evidence of the species hibernation in the area where the song was recorded. *V. murinus* is a species with a noticeable mating behaviour: in autumn males advertise themselves with very characteristic calls which are well audible even without a bat-detector. Such mating calls are a reliable evidence of the presence of the species (Ahlén, Baagøe, 1999; Baagøe, 2001 a; Rydell, Baagøe, 1994).

A systematical search and mapping of singing *V. murinus* had been done by the author in different regions of Ukraine in 2005–2012. The search was carried out by walking transects, mainly through localities with multi-storey buildings or vertical rocks. A transect length amounted from 5 to 20 km or more. When planning a transect route, height of vertical structures had been taken into account, based on revealed peculiarities of disposition of singing males' loci — near high vertical surfaces (Godlevska, Khokhlova, 2008; Godlevska, in prep.). E. g., in cities transects were laid mostly through districts with continued massifs of new multi-storey buildings (9 storeys and higher); in rocky terrains, through localities with outcropped cliffs of considerable height. An effective revealing of singing males (in localities where they are really present) depends on different factors. However, the applied approach allows revealing singing parti-coloured bats even in conditions of limited time (a few hours).

Results and discussion

The location of winter records of *V. murinus* in the territory of Ukraine are plotted in fig. 1. The detailed list of records is given below.

Contact winter records of *V. murinus* are known from 7 provinces of Ukraine; observations of males' mating song, from 9 provinces and in the AR Crimea. In total, the species was revealed in winter in Ukraine in 14 provinces and in the AR Crimea.

All winter records of the species in Ukraine are only from cities and towns (most of which are situated in plain regions). Loci of display song ($n > 85$) had been revealed to be almost exclusively near high, 9–30 storey, buildings, or near rocks ($n = 2$). There

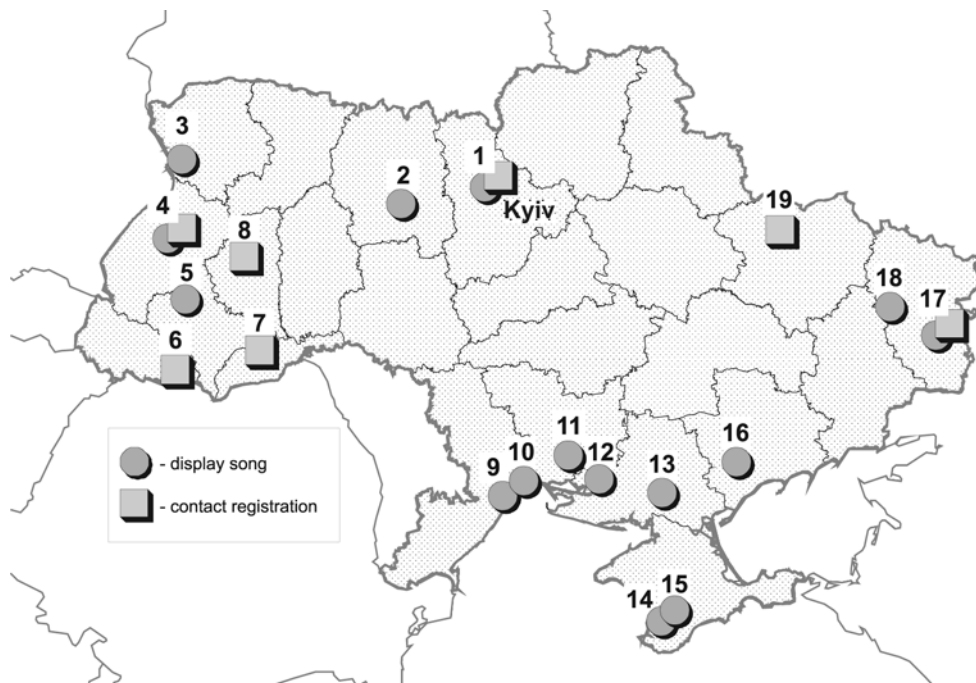


Fig. 1. Winter records of *V. murinus* in Ukraine. The numbers in the map correspond with numbers in the records' list.

Рис. 1. Зимние регистрации *V. murinus* в Украине. Номера на карте соответствуют номерам в кадастре находок.

is only one known song locus near few-storied buildings (5 storeys), point 13 on fig. 1. Conducted search had not revealed singing parti-coloured bats in areas with family houses, parks and forests. All contact winter records (with known details of finding) in Ukraine concern individuals flown into rooms of high buildings or those found on the ground or in a yard near multi-storey buildings as well.

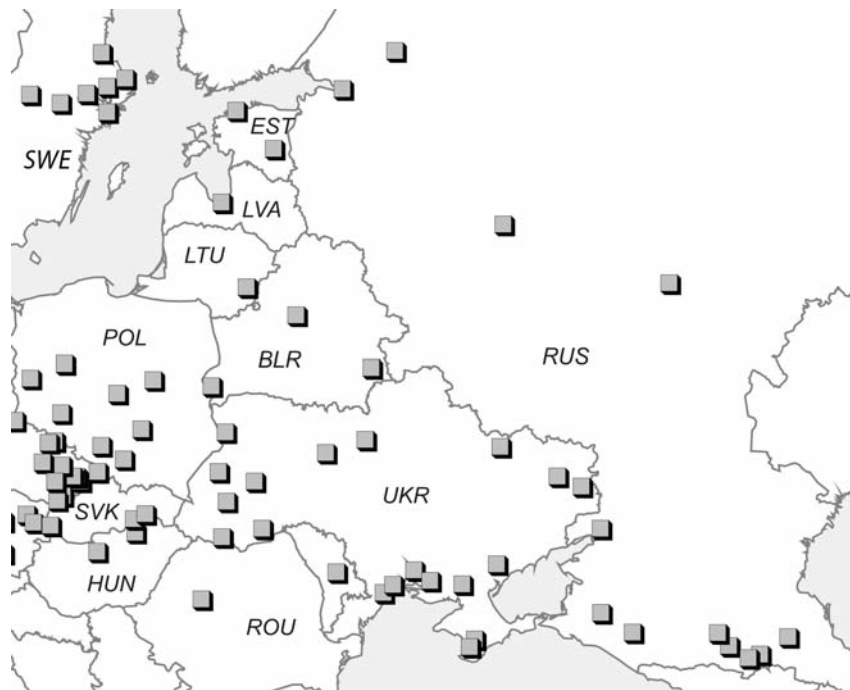
1. Kyiv City: *contact records:* 1F, 16.01.1998, inside a multi-stor. building; 1F, 27.01.2001, inside a multi-stor. building; 1F, 13.01.2003 (Tyshchenko, Godlevska, 2008); 1M, 02.01.2011, inside a 16-stor. building; 1M, 23.11.2011, inside a 24-stor. building; 1M, 25.11.2011, inside a 10-stor. building; 1M, 30.12.2011, inside a 9-stor. building; 1F, 23.02.2012, inside a 24-stor. building; 1M, 25.11.2012, inside a 18-stor. building; 1F, 27.11.2012, inside a 9-stor. building; 1F, 07.12.2012, inside a 24-stor. building; 1M, 17.12.2012, in a yard of multi-stor. buildings; 1F, 08.01.2013, inside a 24-stor. building; 1F, 21.02.2013, inside a 17-stor. building (own data); 1M, 18.10.2010; 1F, 31.10.2010 (E. Uljura, pers. com.); *display song:* > 50 loci in many city districts, since Autumn 2001, near multi-storied buildings (Godlevska, Khokhlova, 2008; Godlevska, in prep.). **2. Zhytomyr City:** *display song:* 1 locus, 08.11.2011, near multi-stor. buildings (own data). **3. Volodymyr-Volynsky:** *display song:* 4 loci, 21.10.2007, near multi-stor. buildings (A. Khokhlova, pers. com.). **4. Lviv City:** *contact? records:* two colonies, ca. 30 and 15 ind., December 2008 (Bashta, 2010); *display song?:* “October — first half of November”, “mass appearance of migrating individuals” (Bashta, 2010). **5. Kalush City:** *display song:* > 5 loci, 26.10.2007, near multi-stor. buildings (A. Khokhlova, pers. com.). **6. Rakhiv District:** *contact? records:* winter colonies in buildings from 5–10 to ca. 100 ind., 1996–1999 (Pokynchereda, 1999). **7. Chernivtsi City:** *contact records:* 1M, 20.12.2009, caught by a cat at a balcony of multi-stor. building (Smirnov, Skilsky, 2010). **8. Ternopil City:** *contact records:* 1M, 10.01.2010, found grounded in the city centre (own data). **9. Odesa City:** *display song:* 3 loci, since Autumn 2005, near multi-stor. buildings (P. Panchenko, pers. com.; own data). **10. Juzhne City:** *display song:* > 1 locus, Oct.–Nov. 2011, near multi-stor. buildings (O. Formanjuk, pers. com.). **11. Mykolajiv City:** *display song:* 4 loci, 1–2.12.2008, near multi-stor. buildings (own data). **12. Kherson City:** *display song:* 2 loci, 31.10.2011, near multi-stor. buildings (P. Panchenko, pers. com.); 2 loci, 15.11.2011, near multi-stor. buildings (own data). **13. Askania-Nova Town:** *display song:* 1 locus, Autumn 2001, 22.11.2010, near 5-stor. buildings (I. Polischuk, pers. com.). **14. Simferopol City:** *display song:* 1 locus, 02.11.2007; in this city flying parti-coloured bats were observed on 14.03.2002, in Vorontsovsky Park (own data). **15. Bakhchysarai City:** *display song:* 2 loci, 03.11.2007, near rocks at northern outskirts; 2 loci; 19.11.2012, near multi-stor. buildings; flying parti-coloured bats were observed on 15.03.2002 in Old City of Bakhchysarai (own data). **16. Melitopol City:** *display song:* 2 loci, 16.11.2011, near multi-stor. buildings (own data). **17. Luhansk City:** *contact records:* 1U, 22.11.2012, on the ground near multi-stor. building (own data); *display song:* 1 locus, 26.11.2005, near multi-stor. buildings (own data); 3 loci, since Autumn 2005, near multi-stor. buildings (Zagorodniuk, Korobchenko, 2008). **18. Lysychansk City:** *display song:* 1? locus, 10.11.2006–02.12.2006 (Zagorodniuk, Korobchenko, 2008). **19. Kharkiv City:** *contact records:* 1M, 21.11.1977, in the multi-stor. building of Kharkiv University (Vlaschenko, 2011); 1M, 17.02.2012 (A. Vlaschenko, A. Gukasova, pers. com.).

Notes. The information about the record in Kharkiv City in 1977 was not published until recently (Vlaschenko, 2011). Thus, it was not reviewed earlier. Observations of parti-coloured bats in October–November are mentioned by A.–T. Bashta in his papers on the bat fauna of the western Ukrainian regions but without giving particular details (places, time etc.), thus these data were not included in the list. In the paper by I. Zagorodniuk and M. Korobchenko (2008) two more winter records of parti-coloured bats are mentioned. However, one of them (v. Lozno-Aleksandrovka, Jan. 2006) was not supported by factual proofs, the second (Krasnodon City, Nov. 2006) was given erroneously and concerned to *Eptesicus serotinus* (I. Zagorodniuk, pers. com.).

The geography of the winter records allows asserting that at present the whole territory of Ukraine is included in the winter range of *V. murinus*. Revealing the species in winter in provinces where the species had not been found wintering yet is, very probably, a matter of time.

The available data are not sufficient to say what animals form the winter population of *V. murinus* in Ukraine, whether they are local or come from remote regions, or which part of the summer population remains to hibernate. However, regular winter records for continuous time in some cities, like Kyiv, Luhansk, and Odessa, etc, prove that the wintering of *V. murinus* occurs there permanently.

It can't be excluded that the absence of winter records in past in Ukraine might be caused by insufficient interest and efforts to study bats in the field. However, from the sum of all available data, it is more likely that the species was really absent here in win-



The map was compiled using publications mentioned above as well as the next sources and publications: Moldova — Averin et al., 1979; Romania — Z. Nagy, L. Szánty, 2002; Hungary — Topál, 1976; Boldogh, 2006; Slovakia — Lehotská, 2006; Matis, Dittel, 1997; Czech Republic — Červený, Bürger, 1989; Mach, 2001; Rumler, 2001; Horáček, 2004; Řehák, 2006; Poland — Harmata, 1999; Lesinski et al., 2001; Mysłajek et al., 2007; Mysłajek, 2008; Gottfried et al., 2008; Cichocki et al., 2009; Russia — collection of the Zoological Institute RAS; collection of the Institute of Ecology of Mountain Territories RAS, pers. communication of S. Gazaryan; Sweden — Ahlén, 1986.

Fig. 2. Localities of winter records of *V. murinus* in Eastern Europe and adjacent regions.

Рис. 2. Пункты зимних регистраций *V. murinus* в Восточной Европе и сопредельных регионах.

ter, at least in the largest part of the country. Thus, new winter records may be considered as an evidence of expansion of the winter range of the species.

Almost all winter records of parti-coloured bats in Ukraine are associated with multi-storey buildings or vertical rocks. Such a prevalent biotopic relation of the parti-coloured bat's winter records to rock and rock-like (multi-storey buildings) localities was also described for other European regions (e. g. Spitzenberger, 1984; Baagøe, 2001 a, b) and was a reason of assignment *V. murinus* to the group of epilithic species (Klausnitzer, 1987).

This biotopic relation of the winter occurrence of the species allows connecting the supposed expansion of the winter range of *V. murinus* with a mass appearance of anthropogenic rock-like structures in plain regions. Intensive construction of multi-storey buildings was begun in the second half of the XXth century. For instance, mass creation of 9-storied houses in Ukraine started in Kyiv in 1964 (History of Kiev, 1986), and of 16-storied buildings, in 1970s. Onset of mass building high houses in other regions of Ukraine occurred even later. Correspondingly, the beginning of the supposed expansion of the species winter range along Ukrainian plains may be dated in the second half of the XXth century. On the other hand, available data allow to conclude that the main natural roosts of the species in the winter season are rock crevices in mountainous areas (Spitzenberger, 1984; Červený, Bürger, 1989). Detection of hibernating animals in rocks bears a considerable element of randomness. So, very probably, hibernation of *V. murinus* occurred in the territory of Ukraine before the “era of high buildings” but in corresponding mountain regions, e. g. in the Carpathians and Mountain Crimea.

The relation of the expansion of the winter range with the mass appearance of high buildings should be explained by the similarity of multi-storey buildings and natural steep

rocks by their structural and dimensional characteristics. Buildings provide hibernation cavities similar to crevices in rocks. As well artificial rock-like structures provide appropriate mating grounds (Baagøe, 2001 a, b; Godlevska, in prep.). However, besides, one more issue may be considered for the northward expansion of the winter range to regions with severe winters — a temperature inside rock-like hibernation roosts. In dwelling houses the temperature in wall cavities, obviously, is formed by external temperature and heating of inside, “human”, quarters. Thus, under other even circumstances temperature in crevices of dwelling buildings should be higher than in those of rocks. This may be crucial for bats hibernating in such type of shelters in regions with continuous periods of heavy frosts.

During the last years new winter records of the species came from regions where it was not found wintering before and / or from which long-distance movements were known. Winter records of parti-coloured bats are already known from cities in: Poland (Lesiński et al., 2001; others); Belarus — Minsk, Homel (Shpak, 2012), Brest (M. G. and V. T. Demyanchik, pers. com.); N and E of European parts of Russia — St.-Petersburgh (Bogdarina, 2006), Moscow (E. I. Kozhurina, pers. comm.: cit. after Strelkov, 2001), Penza (Zolina et al., 2007); Lithuania — Vilnius (Baranauskas et al., 2006); Latvia — Riga (Šuba et al., 2010); and Estonia — Tartu and Tallinn (Lutsar, Masing, 2011).

In fig. 2 the Ukrainian records are given, together with other known localities of winter records of the species in Eastern Europe and adjacent regions. The data from Ukraine complement a general picture and allow presuming that the winter range of *V. murinus* may already cover a significantly larger territory than it was thought before.

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