

## Migratory status of *Pipistrellus nathusii* and *Pipistrellus pipistrellus* in Ukraine

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**NEGODA V., ZAGORODNIUK I. Migratory status of *Pipistrellus nathusii* and *Pipistrellus pipistrellus* in Ukraine.** — The analysis of all known collection specimens, with reference to the localities and dates of the findings, as well as the reidentifications of the material is presented. Both species have migratory status in Ukraine. Their abundance in Ukraine is limited only to a few months, from May to September (5 months) for *Pipistrellus nathusii*, and from April to October (7 months) for *Pipistrellus pipistrellus*. The breeding areas of the common and Nathusius' pipistrelle in Ukraine overlap only in the Carpathian region. *Pipistrellus nathusii* is common in breeding season only in the northern forest part of Ukraine, and it occurs in the south only during migration time. The males of *P. nathusii* migrate from Zakarpattia later than females. The common pipistrelle is present in Ukraine only in the Carpathian region and Crimea, and its reproduction is known exactly only for its Carpathian population.

### Introduction

Among East-European bats, there are three taxonomic groups characterised by clearly expressed seasonal migratory activity: *Nyctalus*, *Vespertilio*, and *Pipistrellus* (Strelkov 1969; Zagorodniuk *et al.* 1998). Genus *Pipistrellus* is represented by 4 species in Ukraine, two of them, namely *P. pipistrellus* and *P. nathusii*, are considered widely distributed species in summer, but with seasonal migrations beyond the borders of Ukraine (Abelentsev & Popov 1956; Krochko 1994; Zagorodniuk 1998). They have high morphological similarity (Strelkov 1963), and it often complicates species identification (Zagorodniuk 2001). The latter is the reason that both traditional and modern views on distribution and migratory status of these two species in Ukraine are very preliminary and need revision.

Therefore, there are numerous inaccuracies in the regional identification keys to species, a large number of erroneously identified specimens by many well-known researchers, lack of clear information on the migration and seasonal dynamics of species ranges in Ukraine. One of the values of zoological collections is the ability to study materials of rare species through the accumulation of such materials. Collections also allow to revise those views that could rely on such material, as well as to evaluate the situation with some species in the distant time, based on the data about localities, dates and details of collected specimens marked on labels.

## Material

The collection series of bats stored in two museums were studied: both State and National Natural History Museums NAS of Ukraine. In total, 67 specimens were identified and analysed, including 47 specimens of *Nathusius' pipistrelle* and 20 of the common pipistrelle.

As it was shown during the research, collections provide unique data on species ratio and their changes over time (Dulitsky 1974; Zagorodniuk & Tkach 1996). It is also possible to analyse such records by seasons, which is important for species with range dynamics, including seasonal migrations. The standard label records (dates and localities) and the label's inscriptions were analysed. In all cases, the identifications were checked and, if necessary, corrections were made on the labels and records.

### *Nathusius's pipistrelle* — *Pipistrellus nathusii*

Based on the re-identification of the collected materials, we can assume that *P. nathusii* breeds only in the northern forest part of Ukraine. There are no specimens collected during the breeding season south of Poltava and Cherkasy Oblasts (Zakarpattia: see below).

At the same time, this species breeds throughout the forest part of Ukraine: there are a number of collections of pregnant and nursing females and young specimens (newborns) from Zakarpattia and other northern regions: Rivne, Ternopil, Kyiv, and Kharkiv Oblasts (Table 1).

It is clear that the geographical limits of the summer range of *Pipistrellus nathusii* in Ukraine completely coincide with the limits of the forest zone. Taking into account all the known records of the species in Ukraine, southern limit of its summer range runs (from the West to the East) through the following Oblasts: southern parts of Vinnytsia, Cherkasy, and Poltava Oblasts, and through the central part of Kharkiv Oblast (Fig. 1).

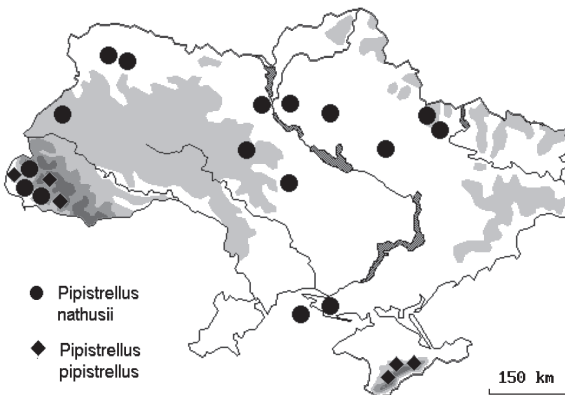


Fig. 1. Geographic distribution of *Pipistrellus pipistrellus* and *Pipistrellus nathusii* after results of revision of the main zoological collections.

Table 1. The number of known collected specimens of *Pipistrellus nathusii* and their distribution by months

Oblast	Specimens	Month	Females (month)	Males (month)	Remarks on reproductive activity
Zakarpattia	8	V, VIII, IX	2 (V)	5 (V, VIII, IX)	1 pregnant female with embryos
Lviv	1	VIII	no	1 (VIII)	no
Volyn	2	V, VII	no	2 (V, VII)	no
Rivne	1	V	1 (V)	no	1 pregnant female with embryos
Ternopil	2	VI	no	1 (VI)	subadult male
Kyiv	14	VI, VIII	6 (VI, VIII)	5 (VI, VIII)	2 pregnant females with embryos (VI)*
Cherkasy	2	VI	no	2 (VI)	no
Poltava	8	V, VII	6 (V, VII)	1 (V)	no
Kharkiv	6	V, VII	2 (V, VII)	4 (VII)	3 subadults: 1 female and 2 male
Kherson	8	VIII, IX	4 (VIII, IX)	4 (VIII, IX)	no
Total	52	V—IX	21 (V—IX)	25 (V—IX)	pregnant females with 2 embryos

\* Beside the mentioned specimen from Kyiv Oblast, there are 8 embryos and 1 young specimen from locality "Goryste" (June) in the collection of NNHM.

In cold season this species is absent in northern and central parts of Ukraine after the 15 of September. Exactly there were the last summer records of two "fat and ready to passage" females in the Kyiv Oblast on this date (col. NNHM). Migration ways pass, apparently, through the southern (steppe) part of Ukraine. In this time (between 28 August and 10 of September), there are recurrent cases of trapping of Nathusius's bats (both males and females) in the Lower Dnipro region (Kherson Oblast). Abelentsev & Popov (1956) and Selyunina (1998) described earlier the direct observations of migrating *Pipistrellus nathusii* in this territory. Our results confirmed completely all those previous conclusions. However, we must emphasise, that these authors described the autumn migrations of *P. nathusii* together with *P. pipistrellus*. Actually, known collections from this region (Gola Prystan and neighbouring areas), included these two species. Nevertheless, all those specimens were re-identified only as *Pipistrellus nathusii*.

Situation with this species in Zakarpattia Oblast of Ukraine is different. Museum collections did not support the fact of breeding of *Pipistrellus nathusii* in the region: all of the specimens were collected in the potentially migratory period. There are 4 specimens from early May (2 males and 2 females) from Vynogradiv Raion (plains of the Zakarpattia Oblast), and 4 other specimens (all males) collected in August and September (Beregovo and Mukachevo Raions).

Two versions for the explanation of the presence of only male individuals in autumn in the region has been proposed: 1) this territory is the part of the breeding range of *nathusii*, but females leave this territory in the autumn before males; 2) taking into account the absence of specimens from Zakarpattia in the breeding period, all mentioned records can be explained as the records of migrant specimens from the other regions (for example, more northern regions). Therefore, we can assume that

the spring migration of the specimens of both sexes takes place simultaneously, but they differ in migratory strategies in autumn.

### Common pipistrelle — *Pipistrellus pipistrellus* (sensu lato)

This species, after a series of re-identifications, turned out to be southern. Due to a careful examination of all available collections, we came to an unexpected conclusion. According to the collections, in Ukraine this species is known only from Zakarpattia and Crimea. There are also one specimen each from Lviv and Askania-Nova. It is possible that this species may be partially settled and hibernate within Ukraine, in Zakarpattia and Crimea.

In Zakarpattia, this species appears (or becomes active) in early spring — in April. Undoubtedly, here the species not only resides but also breeds (many females with embryos were collected here). Contrary to widespread opinion about migratory status of this species, there is one specimen collected on December 10 in Soimy village, Mizhhirria Raion. Moreover, collection of two specimens in the Grebin cave (mountainous part of the Carpathians\*) also confirms our assumption about wintering of this species in Zakarpattia. Earlier, Krochko (1964; also: Krochko & Semistrol 1973) mentioned hibernating specimens of the common pipistrelles for Zakarpattia as objects of his special research.

For Crimea, the first spring findings of this species were registered there from April 29. No females with embryos were found. In addition to the mentioned "spring" specimen, there was one young female collected in the summer, on July 22, which can confirm the breeding of the species in the Crimea. Therefore, the collection materials leave some doubts about the status of the species in the Crimea.

Table 2. The number of known collected specimens of *P. pipistrellus* and their distribution by months

Oblast	Specimens	Month	Females (month)	Males (month)	Remarks on reproductive activity
Zakarpattia	11	IV, V, VII, VIII, XII	9 (IV, V, VII)	2 (VIII, XII)	3 females (IV, V) with 2 embryos; 2 females (V) with 1 embryo*
Lviv	1	VII	no	1 (VII)	no
Kherson	1	VIII	1 (VIII)	no	no
Crimea	8	IV, VII, IX, X	5 (IV, VII, X)	2 (IX, X)	1 subadult female (VII)
Total	21	IV—X	15 (IV, V, VII, VIII, X)	5 (VII, VIII, IX, X, XII)	females with 1–2 embryos

\* Beside the mentioned specimen from Zakarpattia Oblast, there are about 20 young specimens (mummies) from Uzhhorod (old castle) in the collection of NNHM.

\* This species was not indicated earlier in the caves of the Carpathian Biosphere Reserve (see: Zagorodniuk *et al.* 1997; Pokynchereda 1997).

Table 3. The features of migratory status of *P. pipistrellus* and *P. nathusii* in Ukraine

Features	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus nathusii</i>
Time of presence in Ukraine	9 month: April to December	5 month: May to September
Width of summer range	4 most western and southern oblasts	8 oblasts in the forest zone
Hibernation in Ukraine	yes, not mass and not often	absent
Summary on migratory status	long in time and relatively narrow in space in Ukraine	brief in time and wide in space the colonisation of forest regions

Since in the more northern regions (Dnipro Oblast and Sloboda Ukraine) this species is not known from collections, the Crimean population can be considered as local. Collected males are known from the Crimea only in autumn, whereas females are known from the warm season (Table 2). In winter, this species probably disappears from the Crimea: it was collected from here no later than October 28. Later and until spring (April 29), actually for 6 months, this species is not registered here.

## Discussion

Results of analysis of the collections changed our views on the ranges and migratory activity of studied species in Ukraine. Review of the available collected specimens allows revising known literature data on these topics (first of all, monograph by Abelentsev & Popov 1956, and review by Strelkov 1969). Possibly, it is connected with the absence of collected specimens from some regions and with small samples. Nevertheless, it is important to remember that the studied species have much in common, and their morphological differences are nearly imperceptible (Strelkov 1963, *etc.*). Therefore, many errors in the identification can occur, and data on *Pipistrellus* presented in the “Fauna of Ukraine” (Abelentsev & Popov 1956) should be recognised as preliminary in general and erroneous in some parts\*.

It is supported by the fact that about 50 % of *P. pipistrellus* collected from Ukraine we re-identified as *P. nathusii* (Zagorodniuk 2001), and verified collected specimens of the latter are known just from the western and southern regions of Ukraine (Fig. 1). On the other hand, there are several recent (1998–2000) records of *P. pipistrellus* in northern regions: Volyn (I. Dykyy, pers. comm.), Podilia (V. Tyshchenko, pers. comm.), Kyiv (L. Godlewska, pers. comm.), and Sumy (G. Gavryts, pers. comm.). These opposite facts can be explained by two ways:

- 1) this species is present in most part of Ukraine, but its abundance is very low, and records are not confirmed by the collected materials;
- 2) this species expanded its modern range during the few last decades, after the period of the collecting of known morphological specimens.

In any case, most of the previous (old) descriptions of the pipistrelle bat from the main part of Ukraine seem to be erroneous and need revision.

\* Publications on bat ringing in Ukraine (Abelentsev *et al.* 1968–1970) include very little information about *Pipistrellus* and some doubtful data.

Strelkov (1969) and some other authors describe a phenomena of the differentiation of male and female ranges of *Pipistrellus* species in summer, when males occur in more southern regions than females. Our data show such differentiation in *P. pipistrellus* solely: their records overlap only in autumn (see Table 2). In *P. nathusii*, males and females have the same geographical ranges.

According to the literature data (Abelentsev & Popov 1956; Krochko 1964), both species can survive the winter in Zakarpattia. However, we must take into account two facts. First, such reports concern small groups or single specimens, but not large hibernating colonies of *Pipistrellus*. Second, known collected specimens confirm the hibernation in Ukraine (Zakarpattia) of *P. pipistrellus* only. Verified records of *P. nathusii* in Ukraine are only in warm period (from the beginning of May to the beginning of September). Thus, we have no facts confirming the hibernation of *Nathusius's* bat in the territory of Ukraine.

## Conclusion

Revision of the collected samples allows concluding:

1. *Nathusius's* bat is widely distributed in Ukraine, but its geographical range during breeding season is limited to the central and northern oblasts within the forest zone. This species was registered in the South only in the time of seasonal migrations, in early spring and late autumn.
2. *Pipistrelle* bat occurs in Ukraine only in Zakarpattia and Lviv Oblasts in the West and in the Crimea and Kherson Oblast in the South. According to these data (after verifying the collected specimens), the known breeding (summer) range of this species overlaps with that of *P. nathusii* in the West.
3. Presence of *Pipistrellus nathusii* in Ukraine is limited to 5 months, from May to September. This species is a highly migratory bat, which hibernates beyond the territory of Ukraine. There are two verified places of its migration ways in the south of Ukraine: via the Carpathians and via the Dnipro Delta.
4. Presence of *Pipistrellus pipistrellus* in Ukraine is limited to 9 months, from April to December. This species seems to be not a highly migratory bat, and it survives the winter in Ukraine in the Crimea and in the Carpathians.
5. In both species, females fly away earlier than males. Most records of females are from May to July, while most of males were registered in June to August. In the Crimea, Kherson, and Zakarpattia, *P. nathusii* stays to September, and *P. pipistrellus* to October (once to December).

## Acknowledgements

We are thankful to Svitlana Zolotukhina (NNHM, Kyiv) and Andriy Bokotey (SNHM, Lviv) for help during the work with collections, Ihor Dykyy (Lviv National University), Volodymyr Tyschenko (National Agriculture Academy, Kyiv), Lena Godlewska and Gleb Gavrys (Institute of Zoology, Kyiv) for information about new records of the studied species.

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## Резюме

**НЕГОДА В., ЗАГОРОДНЮК І. Міграційний статус *Pipistrellus nathusii* та *Pipistrellus pipistrellus* в Україні.** — Аналіз всіх відомих колекційних зразків, з увагою до місць і дат знаходок, а також з перевизначенням матеріалу. Обидва види мають в Україні статус перелітних. Їхнє перебування в Україні обмежене лише кількома місяцями — з травня до вересня (5 місяців) для нетопира лісового, з квітня до жовтня (7 місяців) для нетопира малого. Ареали розмноження малого та лісового нетопирів в Україні перекриваються лише в Карпатському регіоні. Нетопир лісовий поширений на розмноженні лише у північній лісовій частині України і зустрічається на півдні тільки на прольоті. Із Закарпаття самці нетопира лісового відлітають пізніше самиць. Нетопир малий представлений в Україні у Карпатському регіоні та в Криму, а про його розмноження можна говорити лише щодо його карпатської популяції.