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## THE CURRENT STATUS OF KUHLMAN'S PIPISTRELLE *PIPISTRELLUS KUHLII* (CHIROPTERA, VESPERTILIONIDAE) IN THE CENTRAL FOREST-STEPPE OF UKRAINE

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**The Current Status of Kuhl's Pipistrelle, *Pipistrellus kuhlii* (Chiroptera, Vespertilionidae), in the Central Forest-Steppe of Ukraine.** Bilushenko A. A. — Based on our own fieldwork the faunistic status of the Kuhl's pipistrelle for the studied region was established. The expansion of *Pipistrellus kuhlii* (Kuhl, 1817) in the central part of the forest-steppe zone of Ukraine was confirmed. The paper represents data on the findings of this species and its prevalence, occurrence, describes biology and flight activity throughout the year in the studied territory.

**Key words:** *Pipistrellus kuhlii*, distribution, the central forest-steppe, Ukraine.

**О современном состоянии нетопыря средиземноморского, *Pipistrellus kuhlii* (Chiroptera, Vespertilionidae), в Центральной Лесостепи Украины.** Билушенко А. А. — На основе собственных полевых исследований установлено современное состояние нетопыря средиземноморского для исследуемого региона. Подтверждена экспансия *Pipistrellus kuhlii* (Kuhl, 1817) на территории центральной части лесостепной зоны Украины. В работе изложены данные о находках данного вида и его распространении, встречаемости. Описаны биология и летная активность в течение года в условиях исследуемого региона.

**Ключевые слова:** *Pipistrellus kuhlii*, распространение, Центральная Лесостепь, Украина.

### Introduction

Distribution area of *Pipistrellus kuhlii* (Kuhl, 1817) is limited to the arid regions of northern Africa, southern Europe and the Near East (Zagorodniuk, 2006). In Ukraine during the XIX — early XX centuries, this species was found relatively rare in a limited area. All well known by that time findings were limited to the South Crimea (Nikolsky, 1891; Brauner, 1912), where this species was considered indigenous.

In the second half of the twentieth and early twenty-first century *P. kuhlii* demonstrates active expansion on the territory of Ukraine. We are aware of the findings of the species in the Crimea (Beskaravayny, 1985), in the Black Sea Biosphere Reserve (Tkach, Fedorchenko, 1998), Sea of Azov (Volokh, 2001) in the Zaporozhye (Cheremisov, 1987), Chernigov (Kedrov, Sheshurak, 1999; Gavris, Kotserzhinskaya, 2002), Luhansk (Kondratenko, 1999), Kyiv (Kiev) (Godlevsky, Tyshenko, 2000), Kharkiv (Vlaschenko, 2007), Sumy (Merzlikin, Lebed, 2001), Dnipropetrovsk (Strigunov, Kotsyuruba, 2001), Odesa (Formanyuk, Panchenko, 2003), Ivano-Frankivsk regions (Sahanowich et al., 2006).

The purpose of this paper is to analyze the faunal and biological status of the Kuhl's pipistrelle in the studied region.

### Material and methods

Investigations were carried out on the territory of Cherkassy and Kirovograd regions — the central forest-steppe zone of Ukraine (fig. 1) (Marinich, Shyshchenko, 2005; Lanko et al. 1969). The counts were held in 15 locations where observations were carried out at least 1–40 times per the field season in the period of the second half of April to the second half of October each year during 2007–2010. Transect survey was established in points 2, 4, 6, 9, 13, 15, the average length of transect is 240 km. The total walking route of the studied territory is 650 km (2005–2012).

We used portable traps (Borisenko, 1999) and nylon mist nets (6 and 12 meters long) for catching. Mistnets were set between the buildings, the trees of green urban areas in the ways of daily migrations at about two hours before astronomical sunset. Mistnets were folded after sunrise.

The echolocation calls of bats were monitored (the percentage of registered ultrasonic signals of Kuhl's pipistrelle related to the total number of recorded signals of all species and superspecies during this period was calculated) by the ultrasonic detector Petterson D200 (the echolocation signals frequency for the *P. kuhlii* ranges from 37 to 41 kHz). Flight activity was estimated as the percentage of registered ultrasonic signals of Kuhl's pipistrelle related to the total number of recorded signals of all species. To identify the ultrasonic signals we compare field observations with the known descriptions and recordings (Barataud, 1996). The detector counts were reinforced by the visual observations; sometimes detector counts were compared with the mist net catches.

The counts were held mostly during good weather conditions. In addition, the registration of the animals was performed during an evening departure from their shelters.

The occurrence frequency index, which is the percentage ratio of places where *P. kuhlii* was found to total number of the studied places, was used for quantitative analysis (Strelkov, Ilyin, 1990).

## Results and discussion

The total number of trapped animals is 1067 of 11 species (2005–2012), 145 of which are *P. kuhlii*. During the surveillance period on the studied territory (2007–2010), 530 ultrasonic signals of 13 species were detected, 360 calls were identified as Kohl's pipistrelle sounds.

Of the 21 studied sites *P. kuhlii* was registered in 15 points (mistnetting and detector registrations are combined with visual observations) (fig. 1). In seven of those points (1, 2, 3, 4, 8, 13, 15) the animals were mist netted. In 10 points the animals were registered by the detector in conjunction with visual observations (4, 5, 6, 7, 9, 10, 11, 12, 13). In three of those points (4, 13, 15) the presence of the species was confirmed by mistnetting.

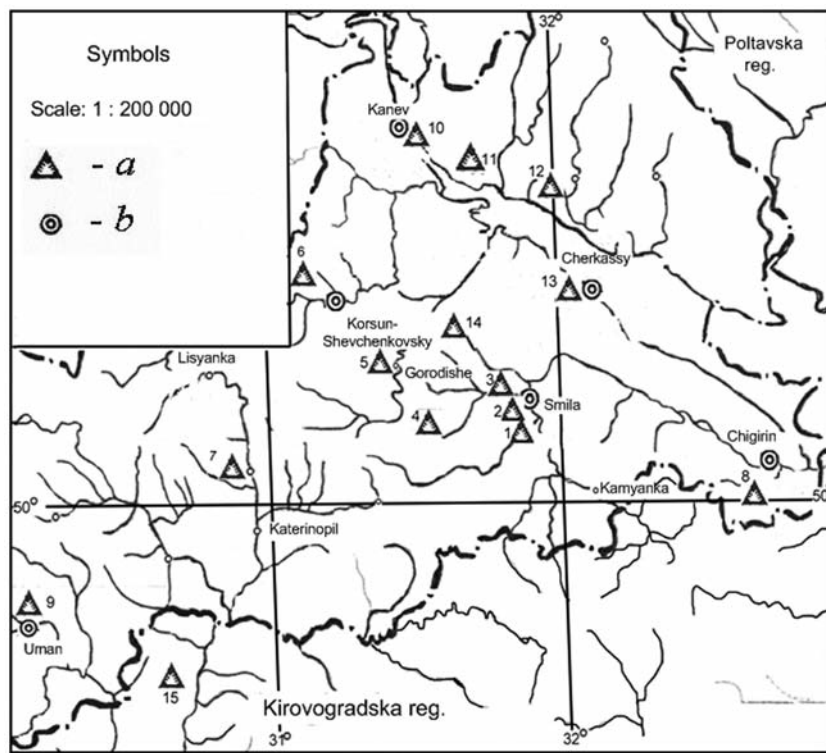


Fig. 1. Sites of catching and registrations of *P. kuhlii*: a — place of the observations; b — big cities — district centers.

Рис. 1. Места отлова и регистрации *P. kuhlii*: a — места наблюдений; b — районные центры.

The distribution of the Kuhl's pipistrelle in the region is linked to the human settlements of different status — from small towns to big cities (table 1). The occurrence of this species in the region is high.

The bats use only human built facilities as shelters. At the area of studies, nine shelters of the species were registered in panel buildings and 10 — in the brick built structures of different types (table 2). Four breeding colonies were registered.

Despite the fact that single animals could be found under the peeled bark of trees (Lindeman, Subbotin, 1983; Unkurova, 1988), *P. kuhlii* were never found in natural shelters during our study. Usually, colonies of *P. kuhlii* occupy narrow gaps and cavities which are inaccessible for carnivores and humans.

Most often, the animals were watched in flight near the forest and forest-park zones of settlements, and green areas near the buildings. According to the literature (Strelkov, Ilyin, 1990) and the original data, we can make a conclusion, that the presence of the water reservoir is not a prerequisite for species habitat though it undoubtedly improves the living conditions of *P. kuhlii*.

*P. kuhlii* hunts along the roads of settlements. Feeding animals were repeatedly registered near the Kanev Reservoir (06.10.2008 at 20:30; 10.08.2009 at 20:00) and over Holodnyanske pond in Smela (about five registrations were made during 2008–2010). Animals were flying 1–1.5 m above the water surface. On the 13th of August 2010 an adult female of *P. kuhlii* was caught with the help of mist net installed in a shallow water. Besides, we caught more than 15 specimens of *Myotis daubentonii* at the same date and place. This fact suggests that Kuhl's pipistrelle can use near-water sites as foraging habitats.

Kuhl's pipistrelle is a common species of bats in the surveyed human communities. In the colony these animals are quiet. P. P. Strelkov and V. J. Ilyin also report the silence of colonies (Strelkov, Ilyin, 1990). The number of individuals in the breeding colonies on the studied area ranges from 3 to 105. Reproductive colony consists of adult females and offspring, while adult males are kept away. However, we managed to catch adult males twice (04.08.2009 and 14.08.2010) during their departure from the shelter where the breeding colony was. In both cases, the males were ready to mate, as the increased testes, which reached 8 mm in length, indicated it. Mixed colonies were not found. Though, rare cases of *P. kuhlii* living in a shelter with other bat species, and the presence of both sexes in a breeding colony are mentioned in the literature (Strelkov, Ilyin, 1990).

Mass mating is marked in the middle of July. Female pregnancy develops in May. It is found that of 16 females caught in the last day of May 2008, 15 were pregnant. The only female with no signs of pregnancy had genital lymph hardening. Independent physically matured young animals were observed at the beginning of August (04.08.2009).

According to the detector-visual surveys, *P. kuhlii* shows long flight activity during the year, compared to other species of bats (fig. 2.). It lasts from the second half of April to the second half of October. The animals in Smela and Cherkassy cities were also observed during warm periods in late autumn (November) and winter when the air temperature was above zero. They were flying 0.5–1 m above the ground: near man-holes, in the deep pits of unfinished buildings, in areas with low relief (valleys, ravines, near the water reservoirs). Obviously, at that time animals avoid places with wind blows.

*P. kuhlii* is a member of the Near Eastern faunal assemblage. It is common in the southern part of the Western Palearctic in warm Mediterranean climate (Gazaryan, 2002). Mediterranean region is characterized by January temperature from +5 to +10 °C, and thus hibernation of bats from this faunal assemblage in their native climate is short and intermittent (Kowalski et al., 1986). Perhaps this fact can explain the long

Table 1. The list of findings and registrations of *P. kuhlii* in central forest steppe of UkraineТаблица 1. Список находок и регистрации *P. kuhlii* в центральной части лесостепной зоны Украины

Place of catching / records	Date of catching / records	Animals data	Place of research	Methods of catching / record	Order on the map	
Smeliansky district, Kovaliha village, Cherkassy region	2007–2010	41–105 animals	Shed above the main entrance to the school building	Recorded during the flight out of shelters Caught by a net during the flight	1	
	31.05.2008	14 ♀ ad, 2 ♂ ad				
	07.06.2008	4 ♀ ad				
	04.08.2009	38 ♀ ad, ♀ juv, 8 ♂ ad		Caught by arachnoid net during the flight		
Smela town	2008–2010	14.08.2009	Workshop building near the school number 10	Caught by arachnoid net during the flight	2	
				34 ♀ ad, 3 ♀ juv, ♂ juv		Caught by arachnoid net during the flight
						Recorded with the help of the ultrasound detector + visually
						Portative trap (Borisenko, 1999)
Boghdan Khmelniysky str., Smela, Cherkassy region, Smela town	17.04.2009	♀ ad	The area of apartment buildings (microdistrict)			
Smela town	15.08.2009	16 ♀ ad	Workshop building near the school number 10	Mist net		
	18.08.2009	6 ♀ ad	Outside the school number 10 building	Mist net		
	13.08.2010	♀ ad	Shallow water “Holodnyanskiy pond”	Mist net		
Malaya Yablunovka village, Smela region	01.07.2008	5 ♀ ad ?	Near the boiler house building (in the school yard)	Portative trap (Borisenko, 1999)	3	
Gorodischenskiy district, Tsvetkovo village, Cherkassy region	19.07.2008	2 ♀ ad	On the school yard	Mist net (evening time)	4	
	19–20.07.2008	2 ♂ ad	Shelter belts (over 300 m from the school)	Mist net (second part of night)		
Gorodische town	30.08.2008	One animal registered	Near the administrative buildings of the local park	Recorded with the help of the ultrasound detector + visually	5	
Korsun-Shevchenko district, Vigrev town, Cherkassy region	11.08.2010	Registered 8 animals simultaneously	The neighborhood of the village	Recorded with the help of the ultrasound detector + visually	6	
Zvenigorodka, Cherkassy region	27.08.2008	2 animals	Roadside	Visually	7	
Chigirinskij district, Melniki vilmlage, Cherkassy region	19.08.2009	3 ♂ ad	Near the forest buildings	Mist net	8	
Uman — “Sofievka”	15.06.2010	Close to 30 registries	Near the administrative and commercial buildings	Recorded with the help of the ultrasound detector + visually	9	
Kanev city (Kanev Reserve)	16.10.2008	7 animals (hunting was registered)	Under a street lamp near the curb	Recorded with the help of the ultrasound detector + visually	10	
Kanev district, Prokhorovka village, Cherkassy region	27.06.2010	59 registries	At the 7.5 km route through the village	Recorded with the help of the ultrasound detector + visually	11	
Zolotonisky district, Dmytrivka village, Cherkassy region	26.06.2010	32 registries	On the route ~ 5 km around the village	Recorded with the help of the ultrasound detector + visually	12	

Table 1.  
Окончание табл. 1.

Place of catching / records	Date of catching / records	Animals data	Place of research	Methods of catching / record	Order on the map
Cherkassy	2008–2011			Recorded with the help of the ultrasound detector + visually	13
	11.09.2008	3 ♂ ad	Near the building of the local boiler house (south district)	Mist net	
	13.01.2011	♀ juv	The building of “Ukrtelecom” (fourth floor)	The animal was given by the coworker	
Irdyn village, Cherkassy district	31.08.2010	32 registries	At the 3.5 km route through the village	Recorded with the help of the ultrasound detector + visually	14
Nerubayka village, Arkhangelsk district, Kirovograd region	29.08.2008	2 ♂ ad	Near the building of the kindergarten	Recorded with the help of the ultrasound detector + Mist net	15

Table 2. Distribution of *P. kuhlii* colonies by shelters  
Таблица 2. Распространение *P. kuhlii* в местах обитания

Colony location	Number of colonies		Height of roost, m
	Breeding	Other	
Households	0	2	3–10
Educational institutions	3	7	2.5–6
Farm buildings	0	5	2.5–4
Abandoned buildings	1	1	2

flight activity of *P. kuhlii* throughout the year, as well as its periodic registrations during warm periods in the winter.

In a conclusion on the current faunistic status of *P. kuhlii* we can underline that it is the most common bat species near the human settlements, and could be referred to the real synanthropes. This conclusion is also confirmed by the literature (Strelkov et al., 1990; Smirnov et al., 2011).

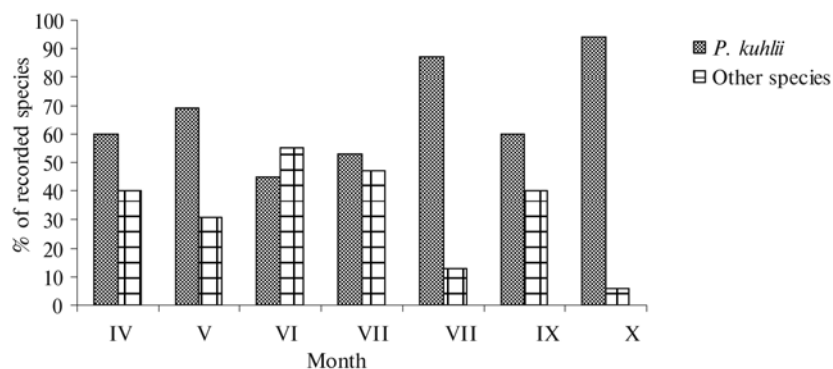


Fig. 2. Flight activity of *P. kuhlii* from April to October: IV — April (n = 25); V — May (n = 75); VI — June (n = 50); VII — July (n = 125); VIII — August (n = 138); IX — September (n = 90); X — October (n = 27).

Рис. 2. Лётная активность *P. kuhlii* с апреля по октябрь: IV — апрель (n = 25); V — май (n = 75); VI — июнь (n = 50); VII — июль (n = 125); VIII — август (n = 138); IX — сентябрь (n = 90); X — октябрь (n = 27).

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