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Pipistrellus kuhlii (KUHLE, 1817) (Mammalia: Chiroptera): a species new to the fauna of Tajikistan

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Abstract: *Pipistrellus kuhlii* (KUHLE, 1817) (Mammalia: Chiroptera): a species new to the fauna of Tajikistan. In the paper, the first record of *Pipistrellus kuhlii* (KUHLE, 1817) in Tajikistan is described. The site is located approximately 500 km from the northern sites of this species in Afghanistan. The discussed issues are connected with the possible isolation of the Central-Eastern Asian populations of this species. The article includes a discussion on assigning the population of *P. kuhlii* from Eastern Europe to a subspecies and suggests the need for further research that would allow for a clear taxonomic assignment of the analysed population.

Key words: Chiroptera, distribution range, first record, biodiversity, *Pipistrellus kuhlii*, *Pipistrellus lepidus*, Tajikistan.

INTRODUCTION

During a zoological scientific expedition to Tajikistan in 2007, the first specimen of a bat representing the *Pipistrellus* SCHREBER, 1774 genus, which is distinctly different in terms of its morphology from the other species of this genus present in Tajikistan and that was mentioned by KHABILOV (2003), was caught in Hisor. The specimen was provisionally labelled *Pipistrellus lepidus* BLYTH, 1845 – a described species from Afghanistan (BLYTH 1845) whose locus typicus is Kandahar (Afghanistan) and whose phylum is, unfortunately, unknown (GAISLER 1970). The systematic membership of the *Pipistrellus kuhlii* species (KUHLE, 1817) remains unknown despite numerous studies, and *P. lepidus* BLYTH, 1845 is sometimes considered to be a separate species or a subspecies of Kuhl's pipistrelle (*P. kuhlii*) (SIMMONS 2005, DIETZ *et al.* 2009). Unfortunately, just as little is known about its Central Asian populations, as well as those from China, Pakistan and India (ELLERMAN & MORRISON-SCOTT 1951, MEYER-OEHME 1965, GAISLER *et al.* 1968, ROBERTS 1977, HABIBI 2003), and the specimens from Central and Eastern Europe are currently classified as the *P. k. lepidus* subspecies (ANDRIOLLO *et al.* 2015, SACHANOWICZ *et al.* 2017). However, due to the lack of typical specimens, assigning the Central and Eastern European specimens to *P. k. lepidus* may be debatable. SACHANOWICZ *et al.* (2017) analysed selected external traits and the body

measurements of *Pipistrellus k. kuhlii* and *P. k. lepidus* from the Balkans and Central Europe, and indicated the morphological traits that, according to them, are most likely to also have a diagnostic value for the Central Asian populations.

ANDRIOLLO *et al.* (2015) revealed that there are differences between each population of *Pipistrellus kuhlii*. SACHANOWICZ *et al.* (2017) concluded that the Central and Eastern European bats differ in terms of overall colouration and size of the body (the specimens of *P. k. lepidus* are bigger than the specimens of *P. k. kuhlii*), as well as the size and shape of the pale wing margin and colour of the penis, and that these traits hold a diagnostic value for the two mentioned taxa. The authors of the study (SACHANOWICZ *et al.* 2017) divided the researched specimens (excluding *P. k. maderensis*) according to their morphology and external traits into two distinct groups. The first group (*P. k. lepidus*) was characterized by a light, whitish or light brown colour of the back; while the second group (*P. k. kuhlii*) displayed colours of the back ranging from light through yellowish to brown, or even dark brown. The size and the shape of the pale wing margin, which in *P. k. kuhlii* is very narrow with a width amounting to no more than 1.0 mm, ranges in *P. k. lepidus* between 3.5 and 10.1 mm. Additionally, the width of the pale wing margin which Sachanowicz and co-authors consider to be the most reliable diagnostic trait, does not overlap in the two taxa. Furthermore, the face and ears in *P. k. lepidus* are of a light colour, with a yellow colouration around the eyes in the case of sexually active specimens; while the colours in *P. k. kuhlii* range from light through dark brown or blackish. In his monograph concerning bats from Tajikistan, KHABILOV (2003) lists only 19 species of bats, only two of which belong to the *Pipistrellus*: *Pipistrellus pipistrellus* and *Pipistrellus savii* genera. In one of the latest publications (KHABILOV 2018, KHABILOV & TADJIBAIEVA 2021) 20 species from Tajikistan are given.

MATERIAL AND METHODS

The specimen was obtained during a zoological scientific expedition to Tajikistan on 9 August 2007, in Hisor (38°29'01.8"N, 68°35'37.3"E); alternative names: Khisor, Гиссар, тадж. Ҳисор, 20km south-west of Dushanbe (Fig. 1). The bat was hidden in a space between the beams in the Hisor Fortress (Fig. 1). Seven more specimens of this species were found in deeper spaces. After the measurements and photos were taken, the specimen was released.

RESULTS

The specimen collected from the space between the beams (a female) had the following measurements: forearm length of 35.8 mm, breadth of the white margin of the wing membrane of 7.2 mm (Fig. 2) and body mass of 8.2 g. The back was of a brown colour, while the bottom side was light grey (Figs. 3, 4) and the ears were brown.

The morphological analysis of the specimen from Tajikistan does not allow for a clear assignment to a subspecies (*P. k. lepidus* versus *P. k. kuhlii*). The comparison of the scatter plot (SACHANOWICZ *et al.* 2017) of the forearm length in relation to the body mass of the collected specimen shows that the result falls within the range determined for *P. k. lepidus* females. Furthermore, the analysis of the breadth of the pale discoloration of the wing, which is wider and located between the fifth finger and the shin (Fig. 2), indicates that the specimen belonging to *P. k. lepidus*.

Morphologically, however, the specimen differs from *P. k. lepidus* in terms of the colour of the fur and, as far as this trait is concerned, it resembles specimens of *P. k. kuhlii* (SACHANOWICZ *et al.* 2017) (Table 1).



Fig. 1. Hisor Fortress (Tajikistan in 2007).

Ryc. 1. Twierdza Hisor (Tadżykistan w 2007).



Fig. 2. Specimen *Pipistrellus kuhlii* caught in Tajikistan with a marked white discolouration of the wing (Tajikistan in 2007).

Ryc. 2. Okaz *Pipistrellus kuhlii* złowiony w Tadżykistanie z wyraźnym białym przebarwieniem skrzydła (Tadżykistan w 2007).



Fig. 3. Collected *Pipistrellus kuhlii* female specimen (Tajikistan in 2007).

Ryc. 3. Zebrany okaz samicy *Pipistrellus kuhlii* (Tadżykistan w 2007).

Table 1. Morphological differences between the subspecies of *Pipistrellus kuhlii* and the specimen collected in Tajikistan.

Tabela 1. Różnice morfologiczne między podgatunkiem *Pipistrellus kuhlii* a okazem zebrany w Tadżykistanie.

Taxon Takson	Forearm length Długość przedramienia	The color of hair Kolor włosów	Breadth of the white margin of the wing membrane Szerokość białego obrzeża błony skrzydłowej	References. Region Piśmiennictwo. Region
<i>Pipistrellus kuhlii kuhlii</i>	32.5 to 35.2 mm	fur colouration (ridge) - from light yellowish to brown and even dark brown	very narrow and reaches up to 1.0 mm	SACHANOWICZ <i>et al.</i> 2017. Southern and western Europe
<i>Pipistrellus kuhlii lepidus</i>	33.8 to 37.2 mm	fur coloration (ridge) - light whitish or light brown	3.5 to 10.1 mm	SACHANOWICZ <i>et al.</i> 2017. Central and Eastern Europe
<i>Pipistrellus kuhlii</i> – specimen collected in Tajikistan	35.8 mm	fur colouration (ridge) – Brown (belly) - light gray	7.2 mm	KLYS
<i>Pipistrellus lepidus</i>	46.2 mm	fur colouration (ridge) - light yellow clay, sand or pale-brown Isabella	wide discoloration of the size between the leg and the first finger of the hand	BLYTH 1845 Kandahar, Afghanistan

DISCUSSION

The attempt to assign the investigated specimen to a subspecies was based only on external traits (body mass, forearm length, colouration of the body, face and ears, and breadth of the wing discolouration). Bats from Central Asia and the Caspian Sea, which are considered to be representative of *P. k. lepidus*, display similar external traits and a comparable forearm length, with a mean length ranging from 35.0 to 36.2 mm, as with bats from the Central and Eastern European populations (SACHANOWICZ *et al.* 2017). However, in the specimen described by BLYTH (1845), the forearm was much longer and equalled 46.2 mm, while the Eastern European *P. k. lepidus* (STRELKOV *et al.* 1985) displayed a pale colouration of the body and a broad wing margin. The colouration of the specimen described in the study diverges from the one presented in the study by SACHANOWICZ (2017), because the specimen was considerably darker and had a fur colouration resembling that of *Pipistrellus kuhlii kuhlii*. Therefore, the studied specimen may be a representative of a separate Central and Eastern Asian population of this subspecies.

Perhaps this possibility will be determined in further studies (primarily, via a DNA analysis (MAYER *et al.* 2007) and studies of echolocation differences (PISKORSKI & SACHANOWICZ 2021).

REFERENCES

- ANDRIOLLO T., NACIRI Y., RUEDI M. 2015. Two Mitochondrial Barcodes for one Biological Species: The Case of European Kuhl's Pipistrelles (Chiroptera). *PLoS ONE* 10(8): e0134881.
- BLYTH E. 1845. Rough Notes on the Zoology of Candahar and the Neighbouring Districts. By Capt. Thos. Hutton, of the Invalids, Mussoorie. Eith notes by Ed. Blyth, Curator of the Asiatic Society's Museum. (Continued.). Journal of the Asiatic Society of Bengal. Calcutta: Bishop's College Press. Vol. XIV. Part I. No. 161. 333–340..
- DIETZ C., NILL D., VON HELVERSEN O. 2009. Handbook of the Bats of Britain, Europe and Northwest Africa: A & C Black, London, 400 pp.
- ELLERMAN J.R., MORRISON-SCOTT T.S.C. 1951. Checklist of Palearctic and Indian mammals 1758 to 1946. London. British Museum (Natural History), 810 pp.
- GAISLER J. 1970. The bats (Chiroptera) collected in Afghanistan by the Czechoslovak expeditions of 1965-1967. *Acta Scientiarum Naturalium Academiae Scientiarum Bohemicae Brno* 4: 1–56.
- GAISLER J., POVOLNY D., SEBEK Z., TENORA F. 1968. Faunal and ecological review of mammals occurring in the environs of Jalalabad. with notes on further discoveries of mammals in Afghanistan II. Chiroptera. *Zoologické Listy* 17: 41–48.
- HABIBI K. 2003. Mammals of Afghanistan. Coimbatore, India: Zoo Outreach Organisation with assistance from U.S. Fish and Wildlife Service, 168 pp.
- KHABILOV T.K. 2003. The Fauna of the Republic Tajikistan. Mammals. Bats. Volume XX, part 8 Nuri Marifat Publishing House. Khujand, 119 pp. [in Russian].
- KHABILOV T.K. 2018. The first finds of the Indian horseshoe bat (*Rhinolophus lepidus*, Chiroptera) in the territory of Talzhikistan. / T.K. Khabilov, D.E. Tadjibaeva // News of higher educational institutions. Volga region. *Natural Sciences* 1(21): 3–10. [in Russian].
- KHABILOV T.K., TADJIBAeva D. 2021. Bats Species Diversity of Northern Tajikistan: 45 Years Later. Mountain ecosystems and their components 2021. *BIO Web of Conferences* 35, 00013(2021): 1–5. <https://doi.org/10.1051/bioconf/20213500013>.
- MAYER F., DIETZ C., KIEFER A. 2007. Molecular species identification boosts bat diversity. *Frontiers in Zoology* 4(4): 1–5. <https://doi.org/10.1186/1742-9994-4-4>.
- MEYER-OEHME D. 1965. Die Säugetiere Afghanistans (Tiel III) Chiroptera. *Journal Faculty of Science, Kabul*: 42–56.
- PISKORSKI M., SACHANOWICZ K. 2021. Different songflight calls of *Pipistrellus kuhlii* and *Pipistrellus lepidus* (Vespertilionidae, Chiroptera) in Europe. *Journal of Vertebrate Biology* 71(21058): 1–9. <https://doi.org/10.25225/jvb.21058>.
- ROBERTS T.J. 1977. The Mammals of Pakistan. Ernest Benn, London, 361 pp.
- SACHANOWICZ K., PISKORSKI M., TEREBA A. 2017. Systematics and taxonomy of *Pipistrellus kuhlii* (KUHLE, 1817) in Central Europe and the Balkans. *Zootaxa* 4306(1): 53–66. <https://doi.org/10.11646/zootaxa.4306.1.2>.
- SIMMONS N.B. 2005. Order Chiroptera, pp. 312–529, In: Wilson D.E., Reeder D.M. (Eds.), Mammal species of the World A taxonomic and geographic reference. 1. 3rd ed. Washington, Johns Hopkins University Press.

Streszczenie

Autorzy opisują pierwszy okaz nietoperza reprezentujący rodzaj *Pipistrellus* SCHREBER, 1774, wyraźnie różniący się morfologią od innych gatunków tego rodzaju występujących w Tadżykistanie. Okaz został tymczasowo oznaczony jako *Pipistrellus lepidus* BLYTH, 1845 – opisany z Afganistanu. Artykuł zawiera dyskusję na temat przyporządkowania populacji *Pipistrellus kuhlii* (KUHLE, 1817) z Europy Wschodniej do podgatunku i sugeruje potrzebę dalszych badań, które pozwoliłyby na jednoznaczne przyporządkowanie taksonomiczne analizowanej populacji stwierdzonego gatunku.

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