

AN UNUSUAL FINDING OF A PARASITIC GAMASID MITE *MACRONYSSUS HETEROMORPHUS* DUSBÁBEK, RADOVSKY, 1972 (MESOSTIGMATA: GAMASINA: MACRONYSSIDAE) IN THE TRANS-URALS

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ABSTRACT: We present the first record of *Macronyssus heteromorphus* Dusbábek et Radovsky, 1972 (Mesostigmata: Gamasina: Macronyssidae) in the Trans-Urals. Our record is located 1,500 km northwest from the nearest site of this species' previous record. The collected specimen (male) was found parasitizing a female of *Myotis brandtii* (Eversmann, 1845) (Chiroptera: Vespertilionidae). The records of both *Macronyssus heteromorphus* and its host species are the first ones in the Khanty-Mansi Autonomous Area. In this article, we present the measurements of this species for the first time, including the measurements that were omitted from the first description of this mite. Our finding also points to the existence of an area where *Myotis brandtii* and *Myotis sibiricus* Kastschenko, 1905 are sympatric.

KEY WORDS: Bats, gamasid mites, *Macronyssus heteromorphus*, Macronyssidae, *Myotis brandtii*.

DOI: 10.21684/0132-8077-2019-27-1-107-111

INTRODUCTION

The family Macronyssidae comprises obligatory and temporary parasites of mammals, birds and reptiles. The majority of this family's species are associated with bats (Chiroptera). Macronyssidae includes more than 30 genera that are known from the New and Old Worlds (Radovsky 2010).

The species belonging to the genus *Macronyssus* inhabit predominantly the Palearctic, where about 20 *Macronyssus* species have been recorded. Their hosts are usually bats of the family Vespertilionidae, most often of the genus *Myotis* (Orlova *et al.* 2017). With a rare exception, the species of the genus *Macronyssus* are either highly host-specific (monoxenous) or they parasitize closely related bat species (oligoxenous).

The genus *Myotis*, after splitting off from a common ancestor in Southeast Asia approximately 25 million years ago, separated into two phylogeographic branches, which spread across the Palearctic in two opposite directions: Western Europe and the Far East. By now, these two branches have formed two independent faunal complexes in the boreal zone (Ruedi *et al.* 2013). The two groups have become isolated from each other due to physical landscape specifics of the western part of the West Siberian Plain. In particular, this area provided very few winter shelters for bats, which resulted in low densities of these animals.

The above factors resulted in the emergence of two independent faunal complexes of bat ectoparasites. Boreal *Myotis*-specific *Macronyssus*

species usually have either a western Palearctic or an eastern Palearctic distribution. For example, *M. diversipilis* Vitzthum, 1920 falls into the former grouping, while the latter group is comprised of *M. charusnurensis* Dusbábek, 1962; *M. hosonoi* Uchikawa, 1979; *M. sibiricus* Orlova, Zhigalin, 2015; and, as it was considered previously, *M. heteromorphus* Dusbábek, Radovsky, 1972 (Orlova *et al.* 2017).

The possibility of *Myotis* species belonging to the eastern and western Palearctic faunal complexes being sympatric is strongly debated. Therefore, the study of ectoparasites in the Khanty-Mansi Autonomous Area (KMAA) is important because it may clear up the aforementioned issue. Here, we report the first record of the *Macronyssus heteromorphus* mite, collected from a non-specific host in the western part of KMAA. Our finding, which extends *M. heteromorphus*'s geographic distribution, is unusual because this species is known to be ectoparasitic on eastern Palearctic bats. We discuss possible explanations of such an unusual finding.

MATERIAL AND METHODS

On July 15, 2018, we conducted a survey of birch hollows in the State Nature Reserve “Malaya Sosva”, located in the Berezovskiy District, KMAA (62°23' N, 64°04' E, 40 m a.s.l., datum WGS84; coll. A.A. Tomishina) (Fig. 1). During our survey, the bats were captured using a but-

terfly net. One specimen of *M. heteromorphus* (♂) parasitizing a presumably pregnant female of Brandt's bat *Myotis brandtii* (Eversmann, 1845) (Chiroptera: Vespertilionidae) was collected using a needle. The mite was mounted on permanent slides with Faure–Berlese's mounting medium (Whitaker 1988). Photographs were taken with a digital camera AxioCam ICc5 (Zeiss, Germany) via a compound microscope AxioImager A2 (Zeiss, Germany) with phase-contrast and DIC objectives. The specimen was deposited in the Entomological Collection of the Zoological Museum of Tyumen State University.

RESULTS AND DISCUSSION

We followed the original description of the species made by Dusbábek and Radovsky (1972). Males of *M. heteromorphus* can be easily distinguished from other *Macronyssus* spp. mainly by three pairs of long spine-like setae on posterior margin of the dorsal plate (Figs. 2). The measurements of the collected specimen are demonstrated in the table below.

M. heteromorphus was recorded before on the Kuril Islands on an atypical host—a gray rat *Rattus norvegicus* (Berkenhout, 1769). Previously, researchers thought that this mite was spread over the central and the eastern Palearctic regions. It was recorded in the Novosibirsk Region, the Altai Territory, the Republic of Khakassia, the Republic of Tuva, the Krasnoyarsk Territory, the Republic of Buryatia, the Russian Far East and Japan (Dusbábek and Radovsky 1972; Uchikawa 1979; Medvedev *et al.* 1991; Stanyukovich 1997; Orlova *et al.* 2015; Orlova *et al.* 2017a, b) (Fig. 1). Researchers have recorded *M. heteromorphus* on the following hosts: Siberian bat *Myotis sibiricus* Kastschenko, 1905; eastern water bat *Myotis petax* Hollister, 1912; David's bat *Myotis davidii* (Peters, 1869); Ikonnikov's bat *Myotis ikonnikovi* Ognev, 1912; northern bat *Eptesicus nilssonii* (Keyserling, Blasius, 1839); Siberian tube-nose bat *Murina hilgendorfi* Peters, 1880. Among the aforementioned hosts, the Siberian bat is associated with the most records. Apparently, small *Myotis* bats of the eastern Palearctic faunal complex are the main hosts of *M.*

Table 1
Comparison of body part measurements of males of *Macronyssus heteromorphus* from the Trans-Urals and Kunashir Island.

Body part	Length, µm	Width, µm	References
Idiosoma	450.5	308.5	Trans-Urals, this paper
	450, 455	—	Kunashir Island, Dusbábek Radovsky 1972
Dorsal shield	405.8	275	Trans-Urals, this paper
	388, 392	231, 243	Kunashir Island, Dusbábek Radovsky 1972
Longest caudal setae	66.7–73.5	—	Trans-Urals, this paper
	92	—	Kunashir Island, Dusbábek Radovsky 1972
Holovenral shield*	369.7	259	Trans-Urals, this paper
Tarsus I	70	—	Trans-Urals, this paper
	68, 69	—	Kunashir Island, Dusbábek Radovsky 1972
Gnathosoma (without palps)*	154.3	73.9	Trans-Urals, this paper
Palps*	108.3	—	
Chelicera (including basal segment)*	110.8	—	
Fixed digit*	15.4	—	
Movable digit*	33.5	—	

*asterisk marks measurements lacking from the first description of *M. heteromorphus*.

heteromorphus. However, these bats do not live in the “Malaya Sosva” Reserve. The closest locations, where eastern water bats were recorded, are the Korliki village (Orlova *et al.* 2013) and the Natural Reserve “Tigirekskiy” (Orlova *et al.* 2014) (both locations are along the 82° longitude). Brandt’s bat, which harbored the parasite specimen, belongs to the western Palearctic species complex and does not live east of the Trans-Urals (Skalon 1935; Raevskiy 1982; Bernikov and Starikov 2009; Starikov *et al.* 2009).

This study presents both the first record of *M. heteromorphus* in the Trans-Urals as well as the first record of this parasite species recovered from Brandt’s bat. Our record is 1,500 km northwest from the previous nearest record (Fig. 1). Previously, this species was associated only with the eastern Palearctic *Myotis* species complex. This finding alters our understanding of the spread of the eastern Palearctic species of bat ectoparasites.

Our discovery may also serve as a proof of the existence of an area where *M. brandtii* and *M. sibiricus* are sympatric. It is possible that this area is located along the part of the Ob River that flows between the cities of Nizhnevartovsk and Khanty-Mansiysk. In that area, the Ob River flows east to west, which allows bats to migrate in the sublatitudinal direction. This is due to the fact that well-drained river valleys, which are characterized by a reduced number of bogs, provide a sufficient number of shelters for bats (e.g., tree hollows, sand martin burrows and man-made structures).

Further research of bats and their ectoparasites on the territory of KMAA is necessary.

ACKNOWLEDGMENTS

We are very grateful to Oleg L. Orlov (Tyumen State University) and Sergey V. Kruskop (Zoological Museum of Lomonosov Moscow State University) for their helpful comments.

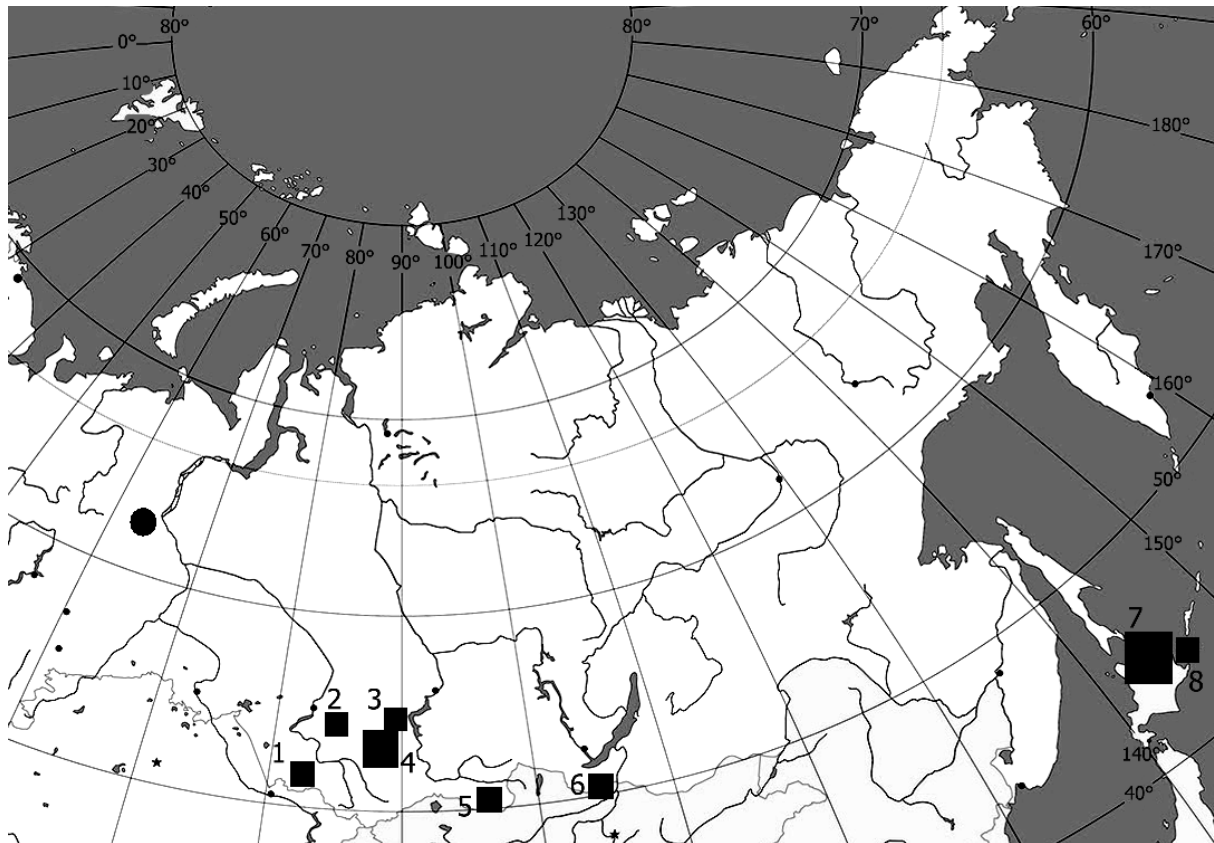


Fig. 1. Known (rectangles) and new (circle) record sites for the bat ectoparasitic mite *Macronyssus heteromorphus* Dusbábek et Radovsky, 1972 (Acari: Mesostigmata: Gamasina): 1. Natural Reserve “Tigirekskiy” (Altai Republic) (Orlova *et al.* 2017a); 2. Barsukovskaya cave (Novosibirsk Region) (Orlova *et al.* 2017a); 3. Arkheologicheskaya cave (Khakasia Republic) (Orlova *et al.* 2017a); 4. Ledianaya, Zhenevskaya, Yashchik Pandory, Mayachnaya caves (Krasnoyarsk Region) (Stanyukovich 1997; Orlova *et al.* 2017a); 5. Uyk River (Tuva Republic) (Orlova *et al.* 2015); 6. Dzhida River (Buryatia Republic) (new data); 7. Okedo, Memanbetsu, Sarobetsu, Tennin-kyo (Hokkaido, Japan) (Uchikawa 1979); 8. Kunashir Island (Sakhalin Region) (Dusbábek and Radovsky 1972).

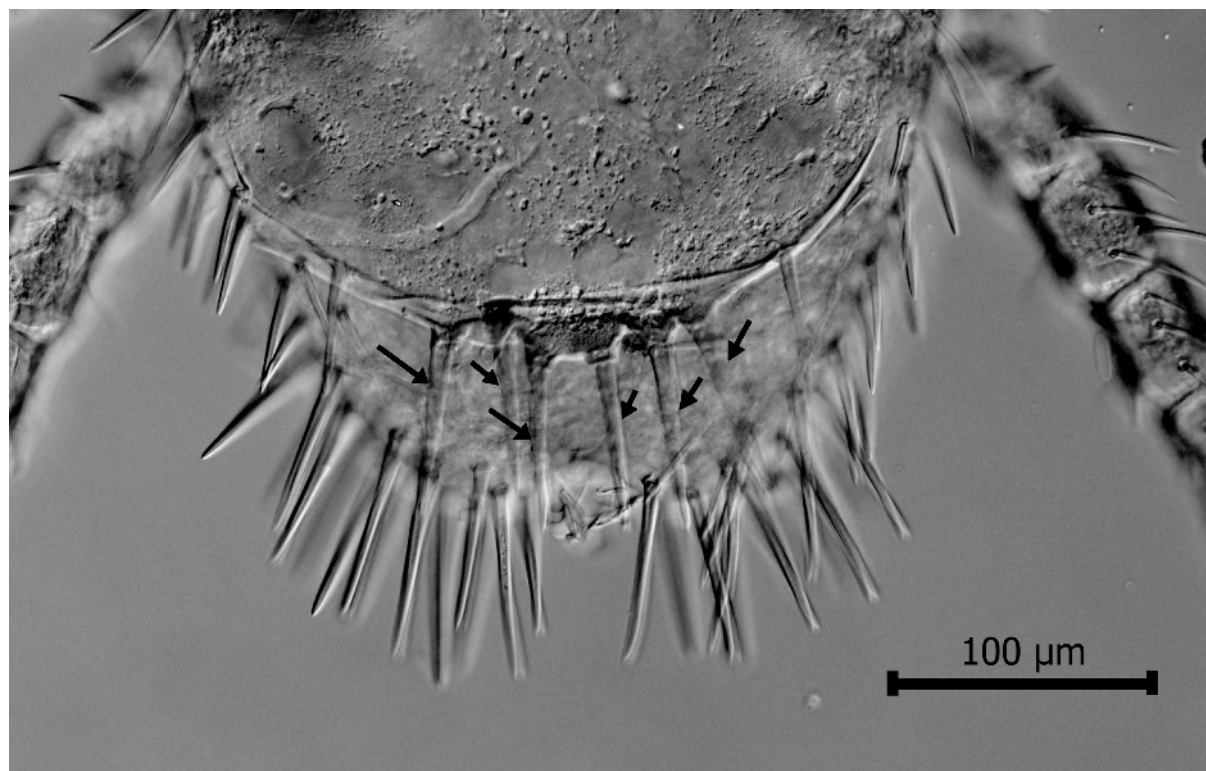


Fig. 2. *Macronyssus heteromorphus*, ♂, opisthosoma, arrows mark the long caudal setae.

The research was also supported by the Tomsk State University Competitiveness Improvement Program.

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