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Article

Three new species of bat-parasitic gamasid mites of the genera *Spinturnix*, *Macronyssus* and *Steatonyssus* (Acari: Mesostigmata: Spinturnicidae, Macronyssidae) from Siberia and Mongolia, with keys to species of Russia and adjacent countries

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ABSTRACT
Female of *Spinturnix senkevitchi* **sp. nov.** (Spinturnicidae), female of *Macronyssus temujini* **sp. nov.** (Macronyssidae), and female and male of *Steatonyssus pseudoheteroventralis* **sp. nov.** (Macronyssidae) are described from vesper bats of Russia and Mongolia. Illustrations and keys to the genera *Spinturnix*, *Macronyssus* and *Steatonyssus* of Russia and adjacent countries (republics of former USSR, Mongolia, Korea, Japan) are also provided.

KEYWORDS: Bat ectoparasite, Buryatia, *Eptesicus gobiensis*, Gamasina, *Hypsugo alaschanicus*, *Murina hilgendorfi sibirica*, Tuva.

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INTRODUCTION

Parasitic mesostigmatid mites of the families Spinturnicidae Oudemans, 1902 and Macronyssidae Oudemans, 1936 (Mesostigmata: Gamasina) associated with bats may be important pathogen vectors of *Bartonella* sp. (Hornok *et al.* 2012; Reeves *et al.* 2016) but their systematics, host-associations, and geographic distributions are poorly known. Spinturnicid mites (11 genera, 110 species) are obligatory permanent ectoparasites of bats occurring on their wing membranes, the uropatagium or rarely around the anal orifice (Rudnick 1960; Beron 2020). The spinturnicid genus *Spinturnix* von Heyden, 1826 is worldwide in distribution and is the most species-rich, with nearly 50 nominal species (Uchikawa *et al.* 1994) associated primarily with vesper bats, family Vespertilionidae (Rudnick 1960). Ten species are known in Russia and adjacent countries (Stanyukovich 1997; Orlova and Zhigalin 2015). Macronyssid mites parasitize a large variety of vertebrate hosts, such as birds, reptiles and mammals, including humans (Radovsky 2010). Among them, the genus *Macronyssus* Kolenati, 1858 includes ectoparasites of several bat families, mainly Vespertilionidae, Rhinolophidae, Hipposideridae (Radovsky 1966, 1967, 2010). There are 15 species in Russia (Orlova *et al.* 2021). Another macronyssid genus *Steatonyssus* Kolenati, 1858 is distributed worldwide (Radovsky

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1967, 2010). This is the largest genus in the family, with two subgenera, *Steatonyssus* (*Steatonyssus*) (52 species) and *Steatonyssus* (*Steatonysella*) (one species) (Radovsky 2010). Mites of this genus parasitize bats (families Vespertilionidae, Molossidae, Rhinolophidae, Hipposideridae, Nycteridae, Emballonuridae, and Pteropodidae), rodents (Rodentia: Myoxidae), and elephant shrews (Macroscelidea: Macroscelididae). Nine species have been recorded in Russia and adjacent countries (Stanyukovich 1997), but some of them are known from the original descriptions only or from records that are not readily accessible in the literature.

Here, we describe three new mite species belonging to the genera *Spinturnix*, *Macronyssus* and *Steatonyssus*, found on bats in Mongolia and Southern Siberia and provide keys to species for these three genera for Russia and neighboring countries (republics of former USSR, Mongolia, Korea, Japan). A species checklist is also given, where principal hosts are indicated in bold.

MATERIALS AND METHODS

Mites were collected from bats in the field in the summers of 2013–2016 using mist nets and mobile traps. Each bat specimen was placed in an individual cloth bag and its field number, identification, sex, date, and collection locality were recorded. Mites were removed using forceps and needle and preserved in 70% ethanol; then the bat hosts were released into the wild. The host classification follows Ditz *et al.* (2009). The nomenclature for the mite idiosomal chaetotaxy follows Lindquist and Evans (1965) and Stanyukovich (1997). According to Stanyukovich (1997) and Radovsky (2010) paired organs in anterolateral corners of sternal shields were designated as “sternal glands”. All measurements are given in micrometers. Mites were mounted on permanent slides with Faure-Berlese's mounting medium (Whitaker 1988).

Photographs were taken with the AxioCam ICc5 digital camera (Zeiss, Germany) attached to a compound microscope, AxioImager A2 (Zeiss, Germany), equipped with a phase-contrast and DIC optics. Drawings were made using a Leica microscope equipped with a camera lucida. Holotypes of the new species were deposited in the collection of the Tyumen State University Museum of Zoology (Tyumen, Russia). Paratypes were deposited in Tyumen State Medical University (Tyumen, Russia). Here, we provide basic mite measurements (length and width) of the idiosoma and the main shields. We also provide keys to species of the genera *Spinturnix*, *Macronyssus* and *Steatonyssus* of Russia and adjacent countries based on our data and previous works (Dusbábek and Radovsky 1972; Uchikawa 1979; Stanyukovich 1997; Orlova and Zhigalin 2015).

We describe *Spinturnix senkevitchi* **sp. nov.** and *Macronyssus temujini* **sp. nov.** based on a single specimen each. However, these two new species have many very conspicuous character states distinguishing them from other species. The distinct morphologies, unique host associations and geographic distributions collectively suggest that these mites represent new species rather than being abnormal individuals. We could not collect more mite specimens because their bat hosts are not common in museums (these bats have restricted ranges and are rare).

Family Spinturnicidae Oudemans, 1902
Genus *Spinturnix* von Heyden, 1826

Spinturnix senkevitchi sp. nov.

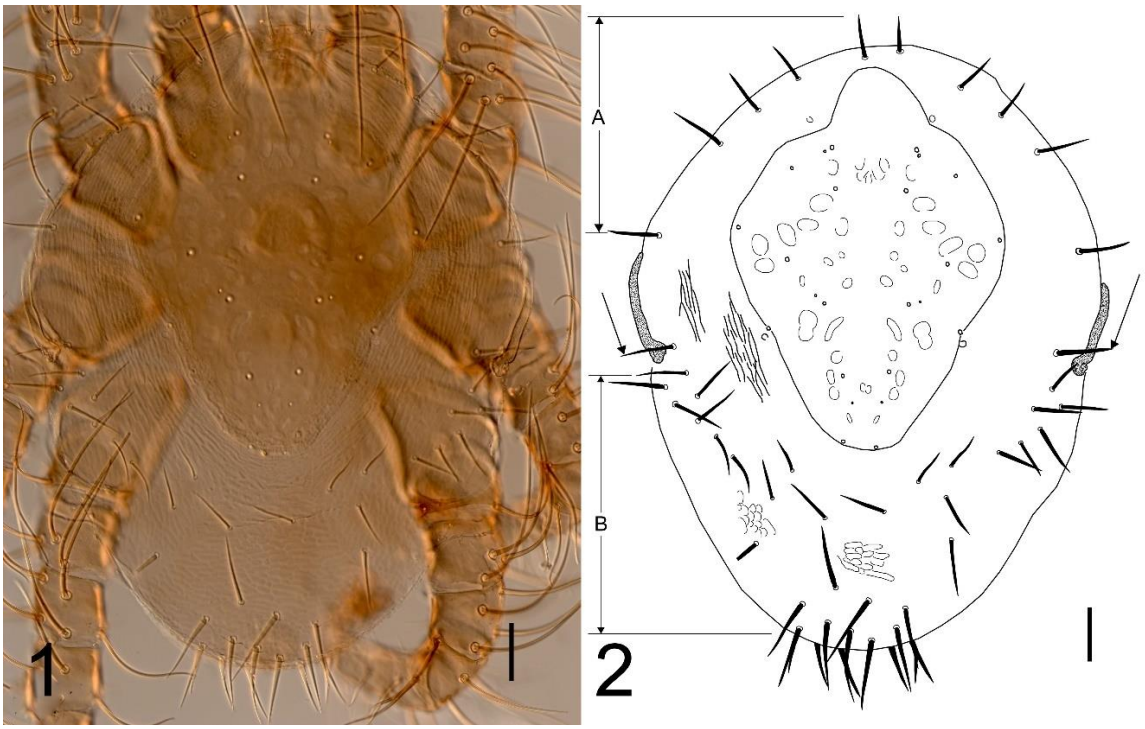
http://zoobank.org/urn:lsid:zoobank.org:act:0A003D3A-1AC5-444E-862C-2898A22229AE

Diagnosis (female)

Idiosoma 1100 long and 900 wide, broadly rounded anteriorly, widest at level of coxa II to III, with rounded opisthosoma. Dorsal shield with two large rounded projections. Opisthosoma with 18 pairs of dorsal and 11 pairs of opisthogastric setae. Sternal shield rounded, with one pair of setae (*St2*); epigynial shield club-shaped in outline, with one pair of setae.

Description

Dorsal idiosoma (Figs. 1–2) – Dorsal shield, 684 long, 494 wide, punctated, with a large rounded projection at anterior and posterior margins (Fig. 2), widest at level of coxae II–III; with 12 pairs of gland pores (three of them small, other larger) and pitted pattern. Peritremes (152) with stigma completely dorsal, with anterior ends between coxa II and III extending ventrally. Podonotal soft cuticle with wavy linear pattern, with five pairs of rough setae (73–102). Metapodosomal setae (Fig. 1) (97–101) proximal to stigma. Opisthonotal integument with scale-like pattern, with 18 pairs of setae (61–142).



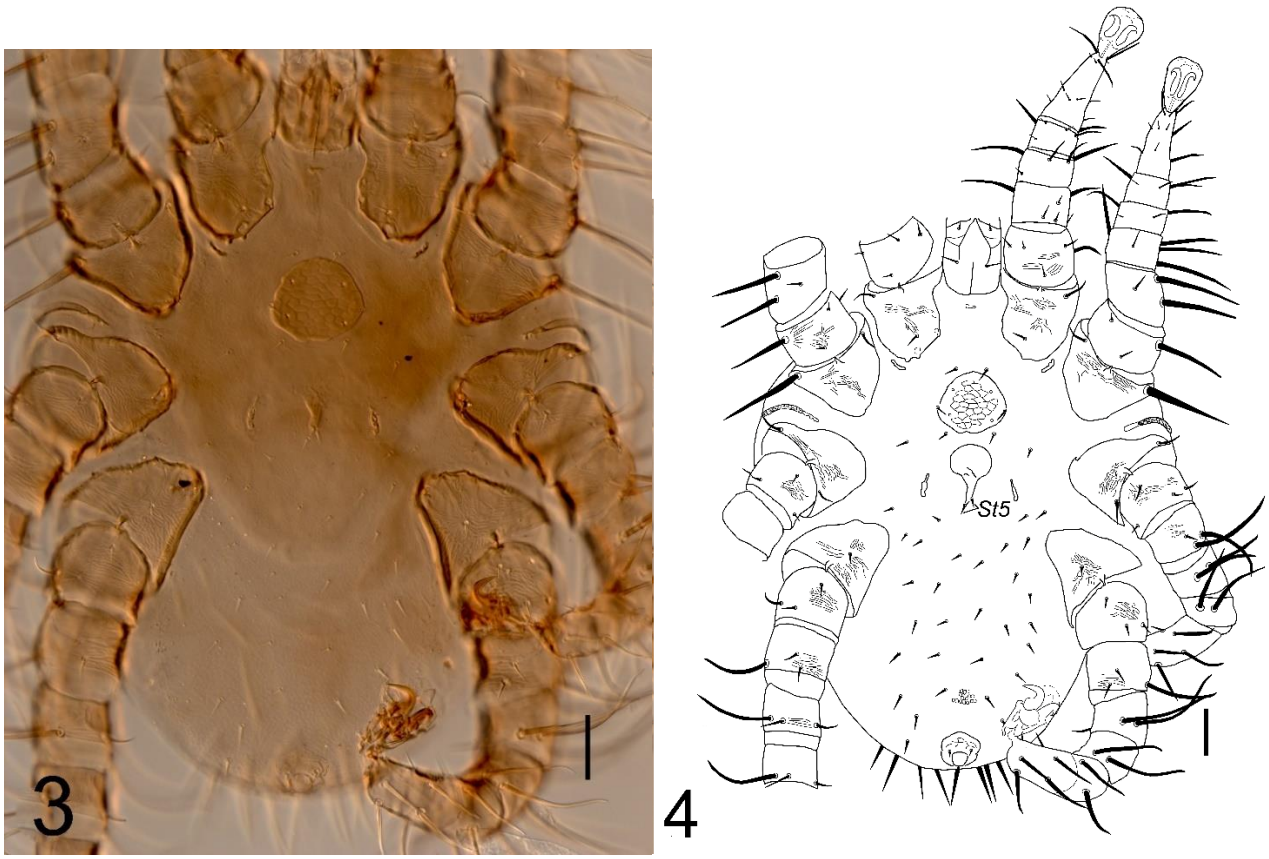
Figures 1–2. *Spinturnix senkevitchi* **sp. nov.** (female, dorsal idiosoma) – 1. Photograph; 2. Drawing. Scale bar 100 µm. A. Podonotum with podonotal setae; B. Opisthonotum with opisthonotal setae. Arrows mark metapodosomal setae.

Ventral idiosoma (Figs. 3–4) – Tritosternum small, flattened, 19 in width. Sternal shield rounded (127 long, 166 wide), with reticulate pattern, and 1 pair of setae *St2* (25–28), and two pairs of small gland pores. Epigynial shield (133 long, 99 wide) club-shaped in outline, with one pair of setae *St5* (18). Two pairs of endopodal sclerites on ventral surface: between coxae I and II and near epigynial shield. Four pairs of setae between coxae IV; with 21–27 ventral setae. Anal shield rounded, with 1 setal pairs.

Legs (Figs. 3–4) – Legs stout, approximately equal in width; coxae I-IV robust, with wavy linear pattern. Posterior setae of coxae II long (about 150) and rough. Dorsal and lateral leg setae long (96–201), thick and smooth; lanceolate setae absent. Ventral setae of legs mostly short (31–54) and smooth. Tarsal claws long, pulvilli well developed. Setation of legs as in Table 1.

Gnathosoma (Fig. 5) – Tectum small and short. Hypostomal setae: *hyp1* 24 in length, *hyp2* and *hyp3* minute. Hypostomal processes pointed. Chelicera with toothed chela.

Male, protonymph, deutonymph: Unknown.



Figures 3–4. *Spinturnix senkevitchi* **sp. nov.** (female, ventral idiosoma) – 3. Photograph; 4. Drawing. Scale bar 100 μm.

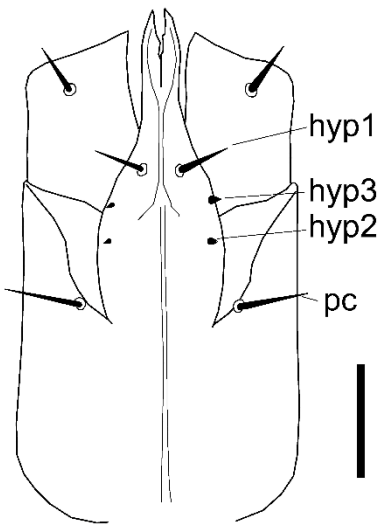


Figure 5. *Spinturnix senkevitchi* **sp. nov.** (female) – Ventral view of gnathosoma. Scale bar 50 μm.

Table 1. Leg chaetotaxy of female of *Spinturnix senkevitchi* **sp. nov.**

Leg	Coxa	Trochanter	Femur	Genu	Tibia	Tarsus
I	2	0-0/4-1(5)	2-4/3-2(11)	1-4/2-1(8)	1-4/3-1(9)	5-18/5-5(33)
II	2	1-0/2-1(4)	0-4/1-2(7)	1-4/2-1(8)	1-3/2-1(7)	3-5/5-3(16)
III	2	1-1/3-0(5)	1-2/1-0(4)	1-4/2-1(8)	1-3/2-1(7)	3-5/5-3(16)
IV	1	1-1/3-0(5)	1-3/2-0(6)	1-2/2-1(6)	1-3/2-0(6)	3-5/5-3(16)

Differential diagnosis

The female of *Spinturnix senkevitchi* is similar to that of *Spinturnix delacruzi* Estrada-Peña, Ballesta and Ibañez, 1992 by having a single pair of setae on the rounded sternal shield; however, *S. senkevitchi* differs by the presence of two pairs of gland pores on sternal shield (*vs* one in *S. delacruzi*), epigynial shield club-shaped in outline (*vs* triangular in *S. delacruzi*).

Type material

Holotype female, Mongolia: Kharmagtayn, Dornogov' aymag 42° 39′ N, 108° 56′ E, ex *Hypsugo alaschanicus* (Chiroptera: Vespertilionidae), 12 August 2014, leg. V.S. Lebedev.

Etymology

The species is named in honor of Dr. Yuriy A. Senkevitch (1937–2003), the distinguished Russian traveler born in Mongolia.

Key to species of the genus *Spinturnix* of Russia and adjacent countries (females)

1. Sternal shield rounded, with one pair of setae .....*Spinturnix senkevitchi* **sp. nov.**
– Sternal shield drop-shaped or pentagonal, without setae or with three pairs of setae 2
2. With 3–7 pairs of dorsal setae posterior to stigmata 3
– With more than 20 dorsal setae posterior to stigmata 5
3. With 6–7 pairs of dorsal setae posterior to stigmata; lanceolate seta on dorsal tip of tarsi II–IV present .....*S. plecotina* (Koch, 1839)
– With 3–4 pairs of dorsal setae; lanceolate seta on tarsi II–IV absent.....4
4. Two pairs of long setae and two pairs of short setae at the end of dorsal opisthosoma; tritosternum discoidal .....*S. kolenatii* Oudemans, 1910
– Three pairs of short setae on at the end of dorsal opisthosoma; tritosternum jar-shaped .... *S. bakeri* Rudnick, 1960
5. With less than 50 dorsal setae posterior to stigmata 6
– With more than 50 dorsal setae posterior to stigmata 11
6. Tritosternum is large, mushroom-shaped; some dorsal setae of legs I–II serrated ....*S. psi* (Kolenati, 1856)
– Tritosternum not mushroom-shaped or small and difficult to observe; setae of legs I-II are smooth 7
7. With 40 or more dorsal setae 8
– With less than 40 dorsal setae 9
8. Sternal shield with a pattern of large-sized cells, with three pairs of setae; tritosternum difficult to observe .....*S. bregetovae* Stanyukovich, 1995
– Sternal shield with small reticulate pattern, lacking setae; tritosternum distinct, small and rounded .....*S. acuminata helvetiae* Deunff, Keller & Aellen, 1986
9. Dorsal shield diamond-shaped, rounded; posterior margin of sternal shield rounded ....*S. nobleti* Deunff, Volleth, Keller & Aellen, 1990
– Dorsal shield ovate; posterior margin of sternal shield almost straight 10
10. Anterior and posterior ends of dorsal shield with a large rounded projection each; podosomal setae about two times shorter than opisthosomal setae..... *S. acuminata acuminata* (Koch, 1836)
– Dorsal shield with a single large anterior rounded projection, smoothly narrowed posteriorly; podosomal setae and opisthosomal seta subequal ..... *S. punctata* (Sundevall, 1833)
11. Sternal shield pentagonal .....*S. maedai* Uchikawa & Wada, 1979
– Sternal shield drop-shaped 12
12. Genital setae off genital shield; dorsal setae 90–130 13
– Genital setae on genital shield; dorsal setae 70–90 14

13. Dorsal opisthosomal setae 100–130, dorsal shield large (more than 800 μm) .... *S. myoti* (Kolenati, 1856)
– Dorsal opisthosomal setae 80–100, dorsal shield small (less than 800 μm) .... *S. uchikawai* Orlova, Zhigalin & Zhigalina, 2015
14. Marginal dorsal opisthosomal setae longer than other opisthosomal setae; tritosternum distinct .....*S. emarginata* (Kolenati, 1856)
– Marginal dorsal opisthosomal setae subequal to other opisthosomal setae .... *S. mystacin* (Kolenati, 1857)

List of hosts and distributions

Spinturnix acuminata acuminata (Koch, 1836)

Distribution – Russia (Stanyukovich 1997), Europe (Stanyukovich 1997), Caucasus (Azerbaijan) (Stanyukovich 1997), Asia (Kazakhstan, Tajikistan, Kyrgyzstan, China, India) (Stanyukovich 1997; Beron 2020), Africa (Morocco) (Beron 2020).

Hosts – *Nyctalus lasiopterus* (Beron 2020), ***N. leisleri*** (Stanyukovich 1997), ***N. noctula*** (Stanyukovich 1997), *Barbastella leucomelas* (Beron 2020), *Eptesicus serotinus* (Stanyukovich 1997), *Hypsugo savii* (as *Pipistrellus savii* – Stanyukovich 1997), *Murina leucogaster* (Stanyukovich 1997), *Myotis blythii* (Stanyukovich 1997), *My. dasycneme* (Stanyukovich 1997), *My. daubentoni* (Stanyukovich 1997), *My. myotis* (Beron 2020), *Pipistrellus kuhli* (Beron 2020), *Pi. pipistrellus* (Stanyukovich 1997), *Scotophilus heathii* (as *Scotophilus temminicki wrougthtoni* – Stanyukovich 1997).

Spinturnix acuminata helvetiae Deunff, Keller & Aellen, 1986

Distribution – Russia (Stanyukovich 1997), Europe (Stanyukovich 1997; Beron 2020).

Hosts – *Nyctalus leisleri* (Stanyukovich 1997), *Myotis daubentoni* (Beron 2020).

Spinturnix bregetovae Stanyukovich, 1995

Distribution – Russia (Orlova and Kazakov 2016)

Hosts – *Myotis ikonnikovi* (Orlova and Kazakov 2016; Beron 2020), *My. sibiricus* Kastshenko (Orlova *et al.* 2017a), *My. petax* (Orlova and Putintsev 2016).

Spinturnix emarginata (Kolenati, 1856)

Distribution – Russia (Crimea – Orlova and Orlov 2018a, b), Europe (Stanyukovich 1997; Beron 2020), Asia (Tadjikistan) (Stanyukovich 1997).

Hosts – *Myotis emarginatus* (Orlova and Orlov 2018a, b), *My. blythii* (Burazerović *et al.* 2018), *Rhinolophus euryale* (Beron 2020).

Spinturnix kolenatii Oudemans, 1910

Distribution – Russia (Stanyukovich 1997), Europe (Stanyukovich 1997; Beron 2020), Asia (Afghanistan, Japan, Mongolia) (Beron 2020), Africa (Namibia) (Orlova *et al.* 2020a).

Hosts – *Eptesicus nilssonii* (as *Ep. parvus* – Uchikawa and Wada 1979; Stanyukovich 1997), ***Ep. serotinus*** (Stanyukovich 1997; Beron 2020 as *Ep. turcomanus*), ***Ep. gobiensis*** (Scheffler *et al.* 2016), ***Ep. hottentotus*** (A. Smith) (Orlova *et al.* 2020a), *Plecotus auritus* (Stanyukovich 1997), *Myotis blythii* (Stanyukovich 1997), *My. daubentonii* (Stanyukovich 1997), *My. brandtii*

(Eversmann) (Stanyukovich 1997), *My. sibiricus* (Medvedev *et al.* 1991 as *My. brandtii*), *My. mystacinus* (Stanyukovich 1997), *Nyctalus noctula* (Stanyukovich 1997), *Pipistrellus nathusii* (Stanyukovich 1997), *Pi. pipistrellus* (Beron 2020), *Vespertilio murinus* (Stanyukovich 1997), *Murina hilgendorfi* (Stanyukovich 1997, as *Mu. leucogaster*).

Spinturnix maedai Uchikawa & Wada, 1979

Distribution – Russia (Stanyukovich 1997), Japan (Uchikawa and Wada 1979).

Hosts – *Murina hilgendorfi* (Orlova *et al.* 2015a), ***Mu. ussuriensis*** (Stanyukovich 1997), *Mu. frater* (Orlova *et al.* 2015a).

Spinturnix myoti (Kolenati, 1856)

Distribution – Russia (Stanyukovich 1997), Caucasus (Georgia) (Stanyukovich 1997), Asia (Kyrgyzstan, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, India, Japan) (Stanyukovich 1997; Beron 2020), Africa (Algeria) (Beron 2020).

Hosts – *Myotis myotis* (Stanyukovich 1997), ***My. blythii*** (Stanyukovich 1997; Orlova *et al.* 2015a), ***My. punicus*** (Benda *et al.* 2014), ***My. brandtii*** (Stanyukovich 1990; Stanyukovich 1997; Orlova 2011), ***My. capaccini*** (Benda *et al.* 2012), ***My. dasycneme*** (Stanyukovich 1997; Orlova 2011; Orlova *et al.* 2014a), ***My. daubentonii*** (Stanyukovich 1997; Orlova 2011), ***My. petax*** (Medvedev *et al*. 1991 as *My. daubentonii*; Orlova *et al*. 2014b; Orlova *et al*. 2015a), ***My. nattereri*** (Kuhl) (Stanyukovich 1990, 1997), ***My. mystacinus*** (Stanyukovich 1997), ***My. ikonnikovi*** (Medvedev *et al*. 1991; Stanyukovich 1997; Orlova *et al.* 2015a), ***My. macrodactylus*** (Temminck, 1840) as *My. capaccini*; Medvedev *et al.* 1991), ***My. sibiricus*** (Medvedev *et al*. 1991 as *My. brandtii*; Orlova *et al*. 2017a), ***My. emarginatus*** (Stanyukovich 1997), *Nyctalus noctula* (Stanyukovich 1997), *Barbastella barbastellus* (Stanyukovich 1997), *Pipistrellus nathusii* (Stanyukovich 1997), *Pi. pipistrellus* (Stanyukovich 1997), *Plecotus auritus* (Stanyukovich 1997), *Murina hilgendorfi* (Stanyukovich 1997, as *Mu. leucogaster*; Orlova *et al*. 2015a), *Vespertilio murinus* (Stanyukovich 1997), *Ve. sinensis* (Peters, 1880) (Stanyukovich 1997, as *Ve. superans*), *Otonycteris leucophaea* Severcov, 1873 (Stanyukovich 1997, as *Otonycteris hemprichii*), *Miniopterus schreibersi* (Stanyukovich 1997), *Rhinolophus euryale* (Stanyukovich 1997), *R. hipposideros* (Stanyukovich 1997), *Rh. ferrumequinum* (Stanyukovich 1997), *Tadarida teniotis* (Benda *et al*. 2014).

Spinturnix mystacina (Kolenati, 1857)

Distribution – Russia and Europe (Stanyukovich 1997), Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Japan) (Beron 2020).

Hosts – *Myotis mystacinus* (Stanyukovich 1990; Stanyukovich 1997), ***My. brandtii*** (Stanyukovich 1990, 1997), ***My. sibiricus*** (Orlova *et al*. 2017a, as *My. gracilis* and *My. hosonoi*; Beron 2020), ***My. davidii*** (as *My. aurascens*; Beron 2020), *My. ikonnikovi* (Beron 2020), *My. myotis* (Stanyukovich 1997), *My. nattereri* (Beron 2020), *My. alcathoe* (Beron 2020), *My. petax*, *My. dasycneme* (Stanyukovich 1997), *Eptesicus gobiensis* (Beron 2020), *Ep. serotinus* (Stanyukovich 1997), *Hypsugo alaschanicus* (Beron 2020), *Nyctalus noctula* (Stanyukovich 1997), *Plecotus auritus* (Stanyukovich 1997), *Vespertilio murinus* (Stanyukovich 1997).

Spinturnix nobleti Deunff, Volleth, Keller & Aellen, 1990

Distribution – Russia (Stanyukovich 1997), France (Stanyukovich 1997), Italy (Beron 2020), Switzerland (Stanyukovich 1997), Mongolia (Scheffler *et al*. 2012).

Hosts – ***Hypsugo alaschanicus*** (Orlova *et al.* 2021), ***Hy. savii*** (Beron 2020).

Spinturnix plecotina (C.L. Koch, 1839)

Distribution – Russia (Stanyukovich 1997), Europe (Stanyukovich 1997; Beron 2020), Asia (Turkey, Afghanistan, China, Mongolia, Japan, Taiwan) (Beron 2020), Africa (Morocco) (Beron 2020).

Hosts – ***Plecotus auritus*** (Stanyukovich 1990), ***Pl. ognevi*** (as *Pl. auritus*; Medvedev *et al.* 1991), ***Pl. sacrimontis*** (Beron 2020), ***Pl. austriacus*** (Stanyukovich 1997), ?*Pl. kozlovi* Bobrinskoj, 1826 (Beron 2020), ***Pl. tenerifae*** (Beron 2020), *Barbastella barbastellus* (Beron 2020), *Ba. leucomelas* (Stanyukovich 1997), *Eptesicus nilssonii* (Stanyukovich 1997), *Ep. serotinus* (Beron 2020), *Myotis brandtii* (Stanyukovich 1990), *My. dasycneme* (Orlova *et al.* 2014a), *My. sibiricus* (as *My. brandtii*; Medvedev *et al.* 1991), *My. daubentonii* (Stanyukovich 1997), *My. nattereri* (Stanyukovich 1997), *Nyctalus noctula* (Rudnick 1960), *Rhinolophus euryale* (Beron 2020), *Rh. ferrumequinum* (Stanyukovich 1997), *Rh. lepidus* (Beron 2020).

Spinturnix psi (Kolenati, 1856)

Distribution – Russia (Stanyukovich 1997; Orlova and Klimov 2020), Eurasia (Stanyukovich 1997; Beron 2020), Africa (Algeria, Morocco, South Africa) (Beron 2020), Australia (Beron 2020).

Hosts – ***Miniopterus schreibersii*** (Rudnick 1960), ***Mi. fuliginosus*** (as *Mi. schreibersii*; Rudnick 1960), ***Mi. pallidus*** (Benda *et al.* 2010, 2012), *Mi. orianae* (as *Mi. schreibersii* – Domrow 1972), *Mi. australis* (Domrow 1972), *Mi. tristis* (Corpuz-Raros and Lit 2015), *Miniopterus* sp. (Prasad 1969; as *Mi. schreibersii*; Baker and Delfinado 1964; Arutyunyan and Ogajanyan 1974), *Myotis blythii* (Arutyunyan and Ogajanyan 1974), *My. myotis* (Beron 1965), *My. capaccinii* (Benda *et al.* 2012, 2016), *My. macrotarsus* (Corpuz-Raros and Lit 2015), *Myotis* sp. (Baker and Delfinado 1964), *Pipistrellus papuanus* (Domrow 1972), *Pipistrellus* sp. (Prasad 1969), *Hypsugo savii* (Benda *et al.* 2016), *Hipposideros* sp. (Prasad 1969), *Rhynolophus mehelyi* (Arutyunyan and Ogajanyan 1974), *Rhinolophus megaphyllus* (Domrow 1972).

Spinturnix punctata (Sundevall 1833)

Distribution – Russia (Stanyukovich 1997), Europe (Stanyukovich 1997), Caucasus (Georgia) (Orlova *et al.* 2021), Asia (Tajikistan, Kyrgyzstan, Turkey) (Stanyukovich 1997; Orlova and Kazakov 2016; Beron 2020).

Hosts – *Barbastella barbastellus* (Beron 2020), *B. leucomelas darjelingensis* (Beron 2020), *Hypsugo savii* (Beron 2020).

Spinturnix senkevitchi sp. nov.

Distribution – Mongolia (this article).

Host – *Hypsugo alaschanicus* (this article).

Spinturnix uchikawai Orlova, Zhigalin & Zhigalina, 2015

Distribution – Russia (Kuril Islands) (Orlova *et al.* 2015b).

Host – *Myotis macrodactylus* (Orlova *et al.* 2015b).

Family Macronyssidae Oudemans, 1936

Genus *Macronyssus* Kolenati, 1858

Macronyssus temujini sp. nov.

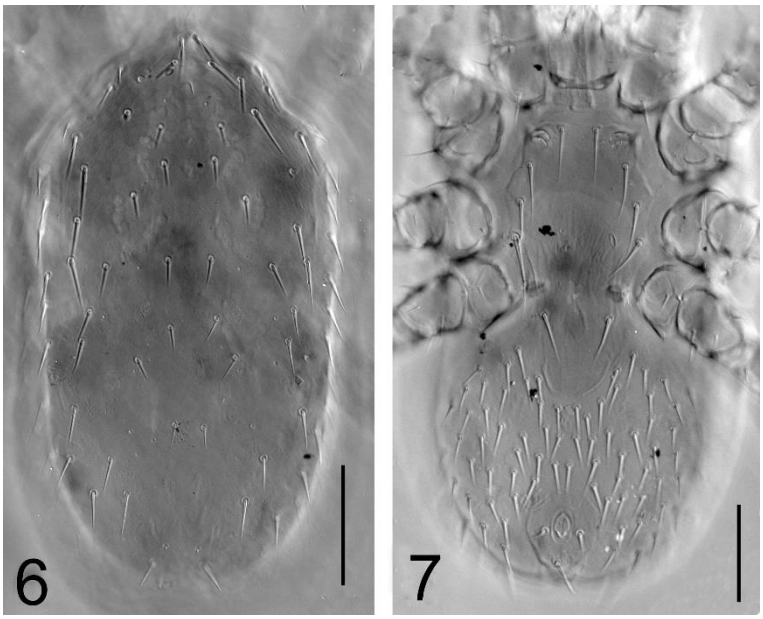
http://zoobank.org/urn:lsid:zoobank.org:act:85ECC57C-CD02-4348-8560-9D4F845EE850

Diagnosis (female)

Idiosoma oval, relatively small (480 × 270), weakly sclerotized. Dorsal shield with 26 pairs of setae; *j1* off dorsal plate; *s3*, *z4* absent; *z3–z5* ratio about 2.5:1. Sternal glands with two semicircular zones surrounding few short striae; *St1* reaching posterior margin of sternal plate. Epigynial plate without accessory setae. Peritremes terminate at about middle of coxae I. Deutosternal groove with nine denticles in single row. Fixed cheliceral digit with two well developed ventral spines.

Description (female)

Dorsal idiosoma (Figs. 6, 8) – Single dorsal plate, elongated, with nine corners, relatively large, 447 long and 207 wide; with reticulate and rounded sculpturing over entire dorsal plate; with 26 pairs of smooth setae; *j1* off shield; *j2–6*, *J1*, *J2*, *J3*, *J5*, *z2–3*, *z5–6*, *Z2–5*, *s1–2*, *s4–6*, *S1–3*, *r3–4* on plate; *s3*, *z4* absent; *z3–z5* ratio about 2.5 : 1; anterolateral setae (*z2–3*, *z5–6*, *Z4–5*, *s1–2*, *s4–6*, *S1–3*, *r3–4*) slender and long (25–54; submedian setae (*j2–6*, *J1*, *J2*, *J3*, *J5*) of medium length (17–25); *J5* microsetae. Unarmed dorsal integument with 29 lateral setae 32–35 long. Peritremes with stigma on dorsal side of idiosoma, terminating at about middle of coxa I (Figs. 8, 10).



Figures 6–7. *Macronyssus temujini* **sp. nov.** (female, photograph) – 6. Dorsal idiosoma; 7. Ventral idiosoma. Scale bar 100 µm.

Ventral idiosoma (Figs. 7, 9) – Sternal shield 46 long and 129 wide; setae *St1* 49, *St2* 53, *St3* 55. Posterior margin of sternal plate indistinct, concave, reaching level between *St2* and *St3*. Setae *St1* reaching posterior margin of sternal plate. Sternal glands (paired organ in anterolateral corners of sternal shields) with two semicircular zones surrounding few short striae; with two pairs of sternal pores (Figs. 15–16). Epigynial plate 185 long and 98 wide, tongue-shaped, broad, with well developed sculpturing; posterior edge smoothly rounded, without extension; epigynial setae 46, situated at posterior 1/3 of epigynial plate. Anal plate 83 long and 65 wide, inversely pyriform, with one pair of adanal setae (19) and unpaired postanal seta (30). Opisthosoma with about 33 pairs of ventral setae (23–33), caudal setae 35 long.

Legs – Legs stout and long (352–457); tibia I length/width ratio about 1:1 (Fig. 14). Coxa II with well-developed spur; coxae II and III have well-developed ventral ridges. Chaetotaxy of legs is presented in Table 2.

Gnathosoma (Fig. 11) – Gnathosoma 147 long (including palps). Tritosternum bipartite, with expanded base (22 wide). Gnathosomal base subrectangular in outline, with well-developed sclerotization. There are three pairs of hypostomal setae and one pair of gnathosomal setae. Deutosternal groove with 9 denticles in single row. Palpal trochanter has a ridge-like ventral process (Fig. 11, arrows). Chelicera 82 long (Fig. 12), fixed chela 29 long with sculpturing near tip and with two ventral spines, movable chela 26 long conical with massive base sharply narrowed tip and expressed sculpturing.

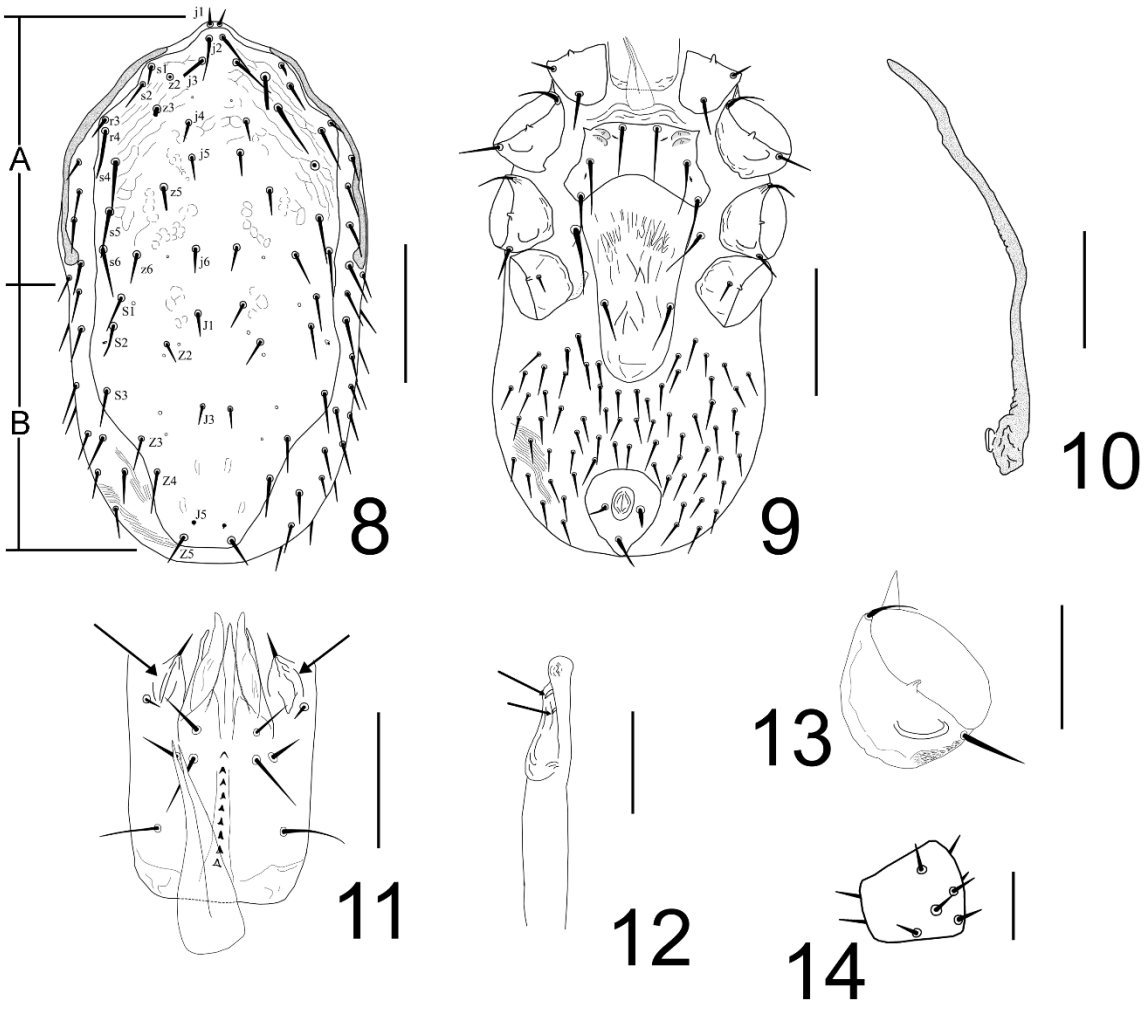
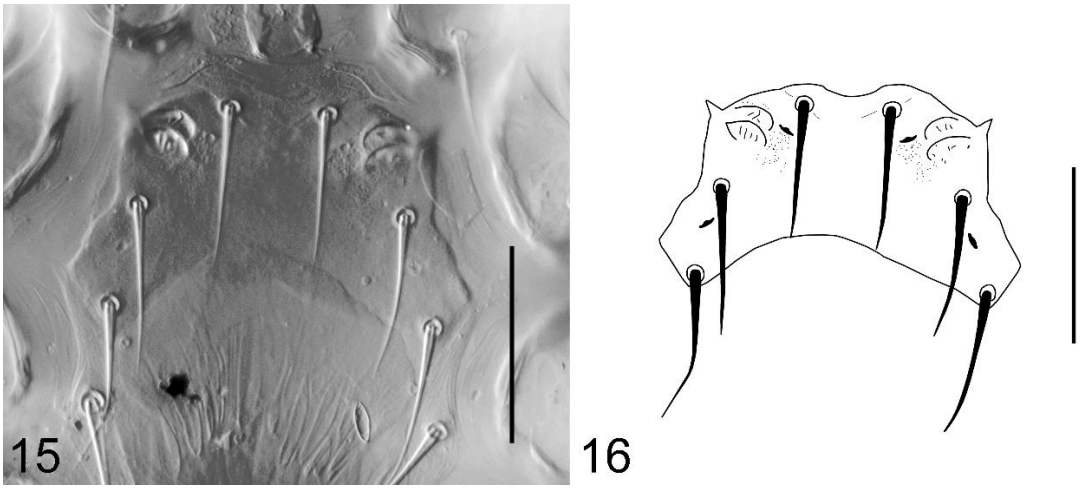


Figure 8–14. *Macronyssus temujini* **sp. nov.** (female) – 8. Dorsally idiosoma, A. Podonotum with podonotal setae, B. Opisthonotum and opisthonotal setae; 9. Ventral idiosoma; 10. Peritreme; 11. Ventral gnathosoma, arrows mark palp trochanter ridges; 12. Chelicera, arrows mark two ventral spines on fixed digit; 13. Coxa II; 14. Tibia I. Scale bar: 8, 9: 100 μm; 10, 11, 13: 50 μm; 12, 14: 25 μm.

Differential diagnosis

Macronyssus temujini belongs to the *crosbyi* species group. The new species is similar to *Macronyssus tigirecus* in having 26 pairs of setae on the dorsal plates; the two species differ by a specific pattern of the sternal glands on the sternal shield (Figs. 9, 15, 16).

Male, protonymph and deutonymph: Unknown.



Figures 15–16. Sternal shield of *Macronyssus temujini* **sp. nov.** (female) – 15. Photograph, 16. Drawing. Scale bar 50 µm.

Table 2. Leg chaetotaxy of female of *Macronyssus temujini* **sp. nov.**

Leg	Coxa	Trochanter	Femur	Genu	Tibia	Tarsus
I	2	1-1/3-1(6)	2-5/4-1(12)	2-6/2-2(12)	2-6/2-2(12)	4-23/8-4(39)
II	2	1-0/3-1(5)	2-4/3-1(10)	2-5/2-2(11)	2-4/2-2(10)	3-4/7-2(16)
III	2	1-1/3-0(5)	1-3/2-0(6)	2-4/2-1(9)	2-3/2-1(8)	3-4/7-2(16)
IV	1	1-1/3-0(5)	0-3/2-1(6)	2-5/2-1(10)	2-4/2-2(10)	3-4/7-2(16)

Type material

Holotype female, Russia: Buryatia Republic, Hongor-Uula (Natural park "Tunkinskiy"), 51° 40′ N, 102° 15′ E, ex *Murina hilgendorfi sibirica* (Chiroptera: Vespertilionidae), 8 August 2016, D.V. Kazakov).

Etymology

The species is named after Genghis Khan (Temujin), the founder of Mongol empire, which incorporated modern-day Buryatia.

Key to species of the genus *Macronyssus* of Russia and adjacent countries (females)

NOTE: Some key features on each species do not necessarily correspond to the indicated figure; the figures show comparative details of the sternal shield of those *Macronyssus* species of Russia and adjacent countries.

1. Dorsal plate with 30 pairs of setae ..... *Macronyssus hosonoi* Uchikawa, 1979 (Fig. 26)
– Dorsal plate with less than 28 pairs of setae 2
2. Setae *St*1 not reaching posterior margin of sternal plate 3
– Setae *St*1 reaching posterior margin of sternal plate 10
3. Dorsal plate with 26–28 pairs of setae 4
– Dorsal plate with 20–25 pairs of setae 8
4. Dorsal plate with 28 pairs of setae 5
– Dorsal plate with 26 pairs of setae. Sternal glands with short lines forming 3 unequal cells, covered by dot-and-dash lines ..... *M. sibiricus* Orlova & Zhigalin, 2015 (Fig. 27)

5. Sternal setae and most of other ventral idiosomal setae distinctly widened basally. Sternal glands with striae and no cells ..... *M. kolenatii* (Oudemans, 1902) (Fig. 30)
– Sternal setae and most of the other ventral idiosomal setae simple, not widened basally. Sternal glands with 3–6 cells and (sometimes) striae 8
6. Sternal glands with 5–6 cells without small strokes 7
– Sternal glands with 3–4 cells covered with small strokes .... *M. crosbyi* (Ewing & Stover, 1915) (Fig. 29)
7. Dorsal shield longer than 550 μm, width greater than 270 μm, sternal glands with large reticulate pattern ..... *M. flavus* (Kolenati, 1856) (Fig. 24)
– Dorsal shield shorter than 550 μm, width less than 270 μm, sternal glands with small reticulate pattern ..... *M. leislerianus* Fain, Walter & Heddergott, 2003
8. Dorsal plate with 25 pairs of setae. Sternal glands with short lines and points, forming rounded zones ..... *M. stanyukovichi* Orlova & Zhigalin, 2015 (Fig. 31)
– Dorsal plate with 20–24 pairs of setae, sternal glands without rounded zones 9
9. Dorsal plate with 20 pairs of setae. Setae *Z*5 long. Sternal glands with striae forming a pattern that resembles a fingerprint ..... *M. ellipticus* (Kolenati, 1856) (Fig. 20)
– Dorsal plate with 22–24 pairs of setae. Setae *Z*5 short. Sternal glands with many undulated striae ..... *M. cyclaspis* (Oudemans, 1906) (Fig. 19)
10. Dorsal plate with 28 pairs of setae 11
– Dorsal plate with 25–27 pairs of setae 14
11. Posterior margin of sternal plate concave, reaching level of setae *St2* 12
– Posterior margin of sternal plate slightly concave, not reaching level of setae *St2* 13
12. Sternal glands with one cell, covered with cruciate striae within an oval zone .... *M. charusnurensis* Dusbábek 1966 (Fig. 21)
– Sternal glands without oval zone with two cells, covered by distinct, irregular, striae .... *M. corethroproctus* (Oudemans, 1902) (Fig. 18)
13. Sternal glands with V-shaped striae; six deutosternal teeth with one denticle in a row .... *M. barbastellinus* Dusbábek & Pinchuk, 1971 (Fig. 17)
– Sternal glands resemble cells, some of which exhibiting dot-and-dash lines; ten deutosternal teeth with one denticle in a row (may be two denticles in lower row) .... *M. heteromorphus* Dusbábek & Radovsky, 1972 (Fig. 22)
14. Dorsal plate with 25 pairs of setae; setae *J*3 absent .... *M. uncinatus* (Canestrini, 1885) (Fig. 32)
– Dorsal plate with 26–27 pairs of setae; setae *J*3 present 15
15. Dorsal plate with 26 pairs of setae 16
– Dorsal plate with 27 pairs of setae 17
16. Sternal glands with two semicircular zones surrounding few short striae .... *M. temujini* Orlova & Anisimov **sp. nov.** (Fig. 16)
– Sternal glands without semicircular zones and short striae, consist of curved wavy lines that form closed shapes ..... *M. tigirecus* Orlova & Zhigalin, 2015 (Fig. 28)
17. Sternal glands not small and not oval, composed of four curved granular lines in a regular pattern; setae in *j*–*J*–series are microsetae, subequal ..... *M. granulosus* (Kolenati, 1856) (Fig. 25)
– Sternal glands small and oval; setae in *j*–*J*–series increase in length from *j*3 to J3 .... *M. diversipilis* (Vitzthum, 1920) (Fig. 23)

List of hosts and distributions

Macronyssus barbastellinus Dusbábek & Pinchuk, 1971

Distribution – Europe (Dusbábek and Pinchuk 1971; Haitlinger 1978), Asia (Kyrgyzstan) (Rybin 1983).

Host – *Barbastella barbastellus* (Dusbábek and Pinchuk 1971; Haitlinger 1978; Rybin 1983).

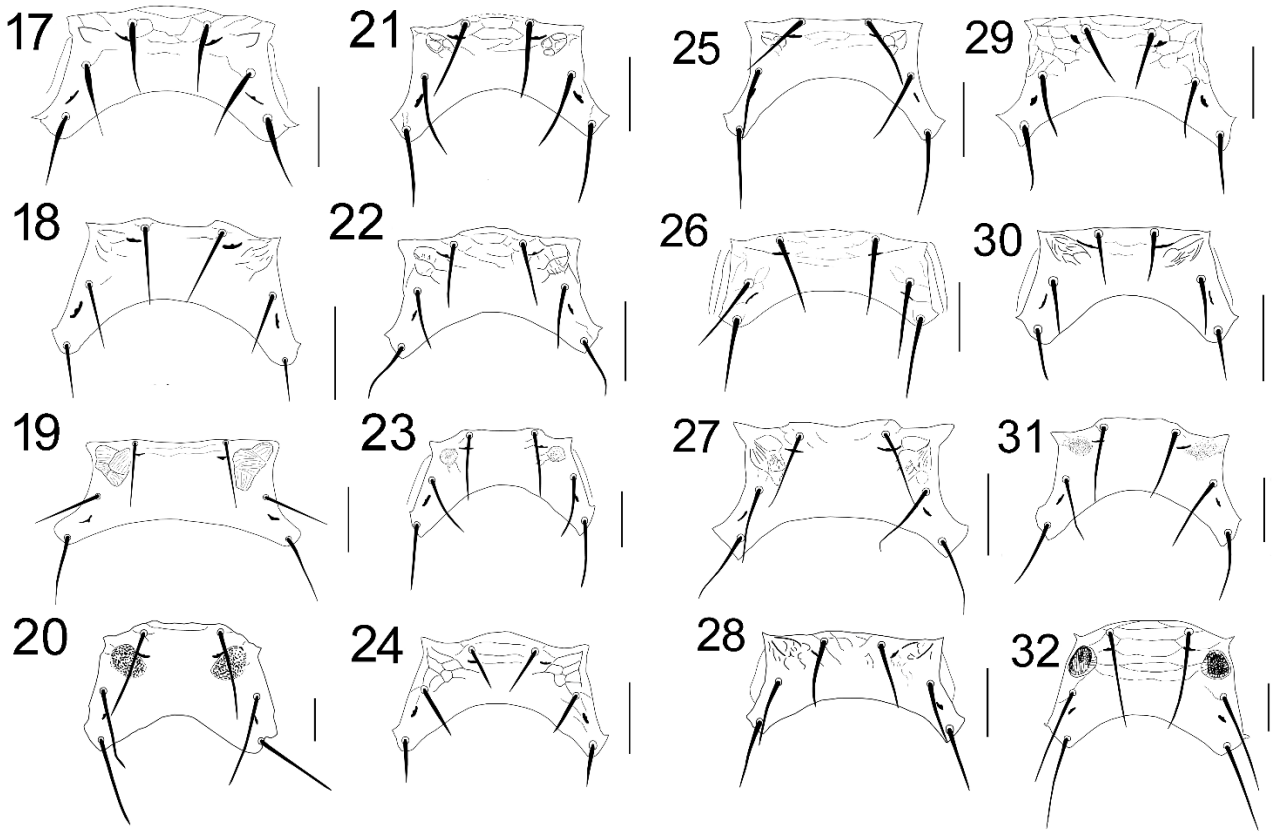


Figure 17–32. Sternal shield of *Macronyssus* species – 17. *M. barbastellinus* (from Dusbabek, Pinchuk 1971); 18. *M. corethroproctus* (Reserve "Malaya Sos'va", Khanty-Mansy autonomic region), 19. *M. cyclaspis* (from Stanyukovish 1997); 20. *M. ellipricus* (galleries of Samara Bend, Samara province); 22. *M. charusnurensis* (Uyuk river, Tuva republic); 22. *M. heteromorphus* (from Dusbabek, Radovsky 1972); 23. *M. diversipilis* (galleries of Samara Bend, Samara province); 24. *M. flavus* (settlement Solnechnaya polyana, Samara province); 25. *M. granulosus* (Tigirekskiy reserve, Altai region); 26. *M. hosonoi* (Uyuk river, Tuva republic); 27. *M. sibiricus* (Barsukovskaya cave, Novosibirsk region); 28. *M. tigirecus* (Tigirekskiy reserve, Altai region); 29. *M. crosbyi* (Aramashevskaya cave, Sverdlovsk region); 30. *M. kolenatii* (settlement Leninsky Leskhoz, Rostov province); 31. *Macronyssus stanyukovichi* (Barsukovskaya cave, Novosibirsk region); 32. *Macronyssus uncinatus* (from Radovsky 2010). Scale bar 50 μm.

Macronyssus charusnurensis Dusbábek, 1966

Distribution – Russia (Stanyukovich 1997), Kazakhstan (as *Ichoronyssus mirabilis* – Senotrusova and Tagil'tsev 1968), Mongolia (Dusbábek 1966), Japan (Uchikawa 1979).

Hosts – *Myotis petax* (as *My. daubentonii* – Medvedev *et al.* 1991; Orlova *et al.* 2014b), *My. sibiricus* (as *My. mystacinus* – Uchikawa 1979), *My. blythii* (Orlova *et al.* 2017b), *Eptesicus nilssonii* (as *Eptesicus parvus* – Uchikawa 1979), *Plecotus ognevi* (as *Plecotus auritus* – Stanyukovich 1997), *Murina hilgendorfi* (Orlova *et al.* 2015a).

Macronyssus corethroproctus (Oudemans, 1902)

Distribution – Russia (Stanyukovich 1997), Europe (Dusbábek 1972; Haitlinger 1978; Orlova & Zapart 2012).

Hosts – *Myotis dasycneme* (Radovsky 1967; Stanyukovich 1997; Orlova 2011; Orlova & Zapart 2012), *My. mystacinus*, *My. blythii*, *Pipistrellus nathusii* and *Vespertilio murinus* (Stanyukovich 1997).

Macronyssus crosbyi (Ewing & Stover, 1915)

Distribution – Holarctic (Radovsky 1967; Stanyukovich 1997).

Hosts (in the Old World) – *Myotis dasycneme*, *My. brandtii*, and *My. daubentonii* (Stanyukovich 1990), *M. sibiricus* (Orlova *et al.* 2017a), *Plecotus auritus* (Stanyukovich 1990), *P. ognevi* (as *Plecotus auritus* – Medvedev *et al.* 1991), *Pipistrellus nathusii*, *Vespertilio murinus* and *Eptesicus nylssonii* (Stanyukovich 1990).

Macronyssus cyclaspis (Oudemans, 1906)

Distribution – Russia, Caucasus (Azerbaijan) (Stanyukovich 1997), Europe (Radovsky 1967), Asia (Uzbekistan, Kyrgyzstan) (Stanyukovich 1997, Rybin 1983).

Hosts – *Barbastella barbastellus* (Radovsky 1967; Dusbábek, 1972), *Pipistrellus pipistrellus* (Rybin 1983), *Pi. kuhlii* (Stanyukovich 1997), *Plecotus auritus* (Radovsky 1967), *Myotis nattereri* (Stanyukovich 1997), *My. daubentoni* (Stanyukovich 1997), *My. brandtii* (Stanyukovich 1997), *My. frater* (Stanyukovich 1997), *My. myotis* (Radovsky 1967), *Eptesicus serotinus* (Radovsky 1967).

Macronyssus diversipilis (Vitzthum, 1920)

Distribution – Russia (Stanyukovich 1997), Europe (Radovsky 1967; Haitlinger 1978), Caucasus (Dagestan republic) (Orlova *et al.* 2020b).

Hosts – *Myotis daubentonii* (Radovsky 1967; Haitlinger 1978), *My. nattereri* (Radovsky 1967; Haitlinger 1978), *My. tschuliensis* (Orlova *et al.* 2020b), *My. myotis* (Haitlinger 1978; Stanyukovich 1997), *My. dasycneme* (Stanyukovich 1990), *My. brandtii* (Haitlinger 1978; Stanyukovich 1990), *Pipistrellus pipistrellus* (Radovsky 1967), *Vespertilio murinus* (Radovsky 1967), *Plecotus auritus* (Radovsky 1967), *Eptesicus nillsonii* (Stanyukovich 1997), *E. serotinus* (Stanyukovich 1997), *Barbastella barbastellus* (Haitlinger 1978).

Macronyssus ellipticus (Kolenati, 1856)

Distribution – Europe (Radovsky 1967), Russia (Stanyukovich 1997).

Hosts – *Myotis nattereri* and *My. myotis* (Radovsky 1967; Haitlinger 1978), *My. blythi* (Orlova *et al.* 2015a), *My. mystacinus*, *My. brandtii*, *My. dasycneme* and *My. daubentonii* (Haitlinger 1978), *My. sibiricus* (Orlova *et al.* 2017a), *Rhinolophus ferrumequinum* and *R. hipposideros* (Stanyukovich 1997), *Plecotus auritus* (Radovsky 1967; Haitlinger 1978), *Murina hilgendorfi* (Orlova *et al.* 2015a).

Macronyssus flavus (Kolenati, 1856)

Distribution – Russia (Bregetova 1956; Stanyukovich 1990), Europe (Dusbábek 1964; Radovsky 1967), Caucasus (Dagestan republic) (Orlova *et al.* 2020b), Asia (Kazakhstan, Kyrgyzstan, China) (Senotrusova 1968, Rybin 1983, Gu and Wang 1985).

Hosts – *Nyctalus noctule* (Dusbábek 1964; Radovsky 1967; Haitlinger and Ruprecht, 1992), ***N. leisleri*** and ***N. lasiopterus*** (Stanyukovich 1997), *Myotis myotis* (Dusbábek 1964; Radovsky 1967), *My. mystacinus* (Bregetova 1956), *My. daubentonii* (Bregetova 1956; Dusbábek 1964), *My. blythi* (Stanyukovich 1997), *My. nattereri* (Stanyukovich 1997), *Barbastella barbastellus* (Dusbábek 1964), *Pipistrellus pipistellus* (Dusbábek 1964; Radovsky 1967), *Pi. nathusii* (Bregetova 1956), *Verspertilio*

murinus (Bregetova 1956), *Eptesicus nillsoni* (Bregetova 1956).

Macronyssus granulosus (Kolenati, 1856)

Distribution – Russia (Stanyukovich 1997), Eurasia (Radovsky 1967; Estrada-Peña *et al.* 1989), Africa (Radovsky 1967), USA? (Radovsky 1967).

Hosts (in Europe and Russia) – ***Myotis myotis*** (Radovsky 1967), ***My. blythi*** (Radovsky 1967; Estrada-Peña *et al*. 1989), ***My. macrodactylus*** (Orlova *et al.* 2015b), *My. nattereri*, *My. dasycneme*, *My. daubentoni*, *My. brandtii*, *My. cappaccini* and *My. mystacinus* (Stanyukovich 1997), *My. emarginatus* (Orlova and Orlov 2018a), *Rhinolophus euryale*, and *R. clivosus brachygnathus* (Radovsky 1967), *Miniopterus schreibersii* (Estrada-Peña *et al.* 1989), *Barbastella barbastellus* (Stanyukovich 1997), *Plecotus auritus* (Stanyukovich 1997), *Murina hilgendorfi*, and *Nyctalus leisleri* (Stanyukovich 1997).

Macronyssus heteromorphus Dusbábek & Radovsky, 1972

Distribution – Russia (Stanyukovich 1997), Japan (Uchikawa 1979).

Hosts – [*Rattus norvegicus*] (Dusbábek and Radovsky 1972), *Myotis petax* (as *M. daubentonii* – Stanyukovich 1997), *My. sibiricus* (as *My. mystacinus* – Uchikawa 1979; Orlova *et al.* 2017a), *My. ikonnikovi* (Uchikawa 1979), *Plecotus ognevi* (as *Pl. auritus* – Stanyukovich 1997), *E. nillsonii* (Stanyukovich 1997), *Murina hilgendorfi* (as *Mu. leucogaster* – Stanyukovich 1997).

Macronyssus hosonoi Uchikawa, 1979

Distribution – Russia (Orlova *et al.* 2015a, 2017a), Japan (Uchikawa 1979).

Hosts – ***Myotis sibiricus*** (as *My. mystacinus* – Uchikawa 1979; Orlova *et al.* 2017a), *My. petax* (Orlova *et al.* 2015b), *My. macrodactylus* (Orlova *et al.* 2015b), *My. ikonnikovi* (Uchikawa 1979), *Barbastella darjeligensis* (Uchikawa 1979), *Plecotus ognevi* (Stanyukovich 1997 – as *Pl. auritus*), *Murina hilgendorfi* (Orlova *et al.* 2021).

Macronyssus kolenatii (Oudemans, 1902)

Distribution – Russia (Stanyukovich 1997), Europe (Radovsky 1967; Stanyukovich 1990), Caucasus (Armenia) (Ogadjanian and Arutyunian 1974), Asia (Kazakhstan, Uzbekistan) (Stanyukovich 1997), Africa (Egypt) (Radovsky 1967).

Hosts – ***Pipistrellus pipistrellus*** (Radovsky 1967; Stanyukovich 1990), ***Pi. pygmaeus***, ***Pi. nathusii*** (Stanyukovich 1990), ***Pi. kuhlii*** (Radovsky 1967), *My. dasycneme*, and *My. brandtii* (Stanyukovich 1990), *My. mystacinus* (Stanyukovich 1997), *Vespertilio murinus*, and *Eptesicus nillsoni* (Stanyukovich 1997).

Macronyssus leislerianus Fain, Walter & Heddergott, 2003

Distribution – Russia (Orlova *et al.* 2020b), Europe (Fain *et al.* 2003).

Hosts – *Nyctalus leisleri* (Fain *et al.* 2003; Orlova *et al.* 2020b).

Macronyssus sibiricus Orlova & Zhigalin, 2015

Distribution – Russia (Orlova and Zhigalin 2015; Orlova *et al.* 2017a).

Hosts – ***Myotis sibiricus*** (Orlova *et al.* 2017a), *My. petax* (Orlova *et al.* 2015a), *My. dasycneme* (Orlova and Zhigalin 2015).

Macronyssus stanyukovichi Orlova & Zhigalin, 2015

Distribution – Russia (Orlova *et al.* 2021).

Hosts – *Murina hilgendorfi* (Orlova and Zhigalin, 2015), *Myotis sibiricus and My. bombinus* (Orlova *et al.* 2021).

Macronyssus temujini Orlova & Anisimov sp. nov.

Distribution – Russia: Eastern Siberia (this article).

Host – *Murina hilgendorfi* (this article).

Macronyssus tigirecus Orlova & Zhigalin, 2015

Distribution – Russia (Orlova *et al.* 2021).

Host – *Murina hilgendorfi* (Orlova & Zhigalin, 2015).

Macronyssus uncinatus (Canestrini, 1885)

Distribution – Europe (as *Macronyssus rhinolophi* ; Radovsky 1967; as *Macronyssus rhinolophi*; Estrada-Peña *et al.* 1989), Caucasus (Armenia) (as *Macronyssus rhinolophi*; Ogadjanian and Arutyunian 1974), Azerbaijan (as *Macronyssus rhinolophi*; Gadzhiev and Dubovchenko 1967), Uzbekistan (as *Macronyssus rhinolophi*; Stanyukovich 1997), Tajikistan (as *Macronyssus rhinolophi*; Stanyukovich & Malinovskiy 1992), Kyrgyzstan (as *Macronyssus rhinolophi*; Rybin 1983). Africa (as *Macronyssus rhinolophi*; Radovsky 1967).

Hosts – *Rhinolophus ferrumequinum* (Dusbábek 1964; Radovsky 1967), ***R. clivosus*** (Radovsky 1967), ***R. hipposideros*** (Turk and Turk 1952), ***R. euryale*** (Dusbábek 1964; Estrada-Peña *et al.* 1989), ***R. mehelyi*** (Stanyukovich 1997), *Myotis myotis* (Radovsky 1967), *My. blythi* (Stanyukovich 1997), *M. emarginatus* (Dusbábek 1964; Estrada-Peña *et al.* 1989), *Miniopterus schreibersii* (Estrada-Peña *et al.* 1989), *Pipistrellus pipistrellus* (Dusbábek 1964).

Genus *Steatonyssus* Kolenati, 1858

Steatonyssus pseudoheteroventralis sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:85ECC57C-CD02-4348-8560-9D4F845EE850

Diagnosis

Female – Idiosoma oval, podosomal shield with 11 pairs of setae, *j2* approximately ¾ of *j3*. Opisthosomal plate with reticulate pattern, with 7 pairs of setae (including a pair of microsetae). Sternal plate with posterior marginal band better sclerotized than remainder of plate. Genital shield tongue-shaped, with striped sculpture. Peritremes terminate near posterior margin of coxae II; peritremal plate interrupted anterior to peritreme. **Male –** Entire dorsal shield with a narrow opisthosomal portion, bearing 19 pairs of setae. Ventrum with separate sternogenitoventral and anal plates. Anterior seta of coxa III simple, without bladelike extension.

Description

Female – Measurements summarized in Table 3.

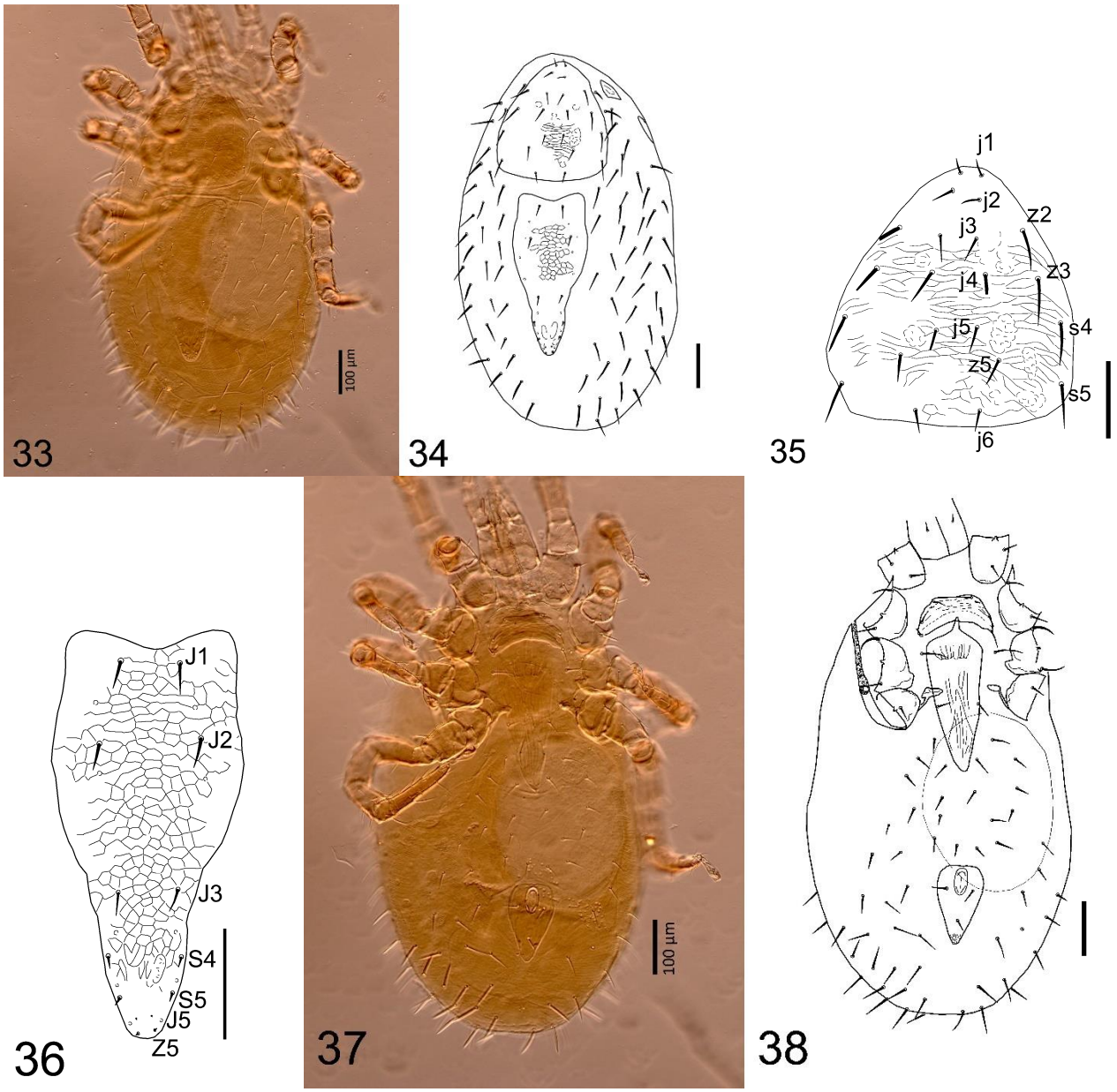
Dorsal idiosoma (Figs. 33–34) – Idiosoma approximately 850 long, 500 wide. Podonotal shield rounded triangular (Fig. 35), 213–280 long and 241–249 wide, with squamous pattern, bearing 11 pairs of setae: middle line j1, j2, j3, j4, j5, z5, j6; lateral line z2, z3, s4, s5. Opisthonotal shield sphenoid (Fig. 36), 319–356 long and 165–169 wide, with reticulate pattern, anterior margin concave, seven pairs of setae (including two pairs of microsetae): J1, J2, J3, J5, S4, S5, Z5, and five pairs of pores on opisthonotal plate. Dorsal unarmed surface with 41–47 pairs of spiny setae.

Table 3. Metric data of female and male specimens from *Steatonyssus pseudoheteroventralis* **sp. nov.**

Characters		Females				Males			
		Holotype	n	Range	Mean	Holotype	n	Range	Mean
Podonotal shield	length	248	4	213-280	246	-	-	-	-
	width	247	4	241-249	246	-	-	-	-
Opisthonotal shield	length	319	4	319-356	343	-	-	-	-
	width	165	4	165-169	168	-	-	-	-
Sternal shield	length	44	4	44-48	46	-	-	-	-
	width	139	4	133-139	136	-	-	-	-
Epyginial shield	length	261	3	261-269	265	-	-	-	-
	width	103	3	92-107	101	-	-	-	-
Dorsal shield	length	-	-	-	-	481	2	481, 485	483
	width	-	-	-	-	217	2	217, 232	225
Sternogenitoventral shield	length	-	-	-	-	226	2	218, 226	222
	width	-	-	-	-	128	2	128, 138	133
Anal shield	length	144	4	143-168	155	117	2	117, 121	119
	width	88	4	80-88	85	63	2	63, 68	66
Seta j1	length	10	3	10-12	11	18	2	18, 19	18.5
j2	length	13	4	13-15	13	10	2	10, 12	11
j3	length	14	4	13-16	14	23	2	22, 23	22.5
j4	length	18	4	17-20	19	17	2	15, 17	16
j5	length	14	4	13-15	14	22	2	22, 23	22.5
j6	length	14	4	13-16	15	20	2	18, 20	19
z2	length	20	4	19-20	20	22	2	21.5, 22	22
z3	length	23	4	21-25	24	28	2	28, 29	28.5
z5	length	14	4	13-16	15	20	2	20, 21	20.5
s4	length	26	4	23-26	25	30	2	30, 33	31.5
s5	length	23	4	22-23	22	30	2	30, 31	30.5
J1	length	30	4	27-31	29	20	2	20, 22	21
J2	length	28	4	26-28	27	22	2	22, 24	23
J3	length	22	4	20-25	22	14	2	13, 14	13.5
S4	length	10	4	10-11	11	8	2	7, 8	7.5
S5	length	7	4	5-7	6	5	2	5, 6	5.5
Dorsal unsclerotized integument setae	length	40-43	20	34-52	45	28-30	10	27-32	28.5
Seta St1	length	26	4	24-26	25	24	2	24, 27	25.5
St2	length	25	4	24-26	25	28	2	27, 28	27.5
St3	length	27	4	26-27	27	23	2	23, 25	24
St4	length	47.5	4	45-49	47	17	2	17, 20	18.5
Ventral unsclerotized integument setae	length	30-45	20	21-52	36	16-31	10	13-34	24.5
Preanal setae	length	30	4	29-31	30	19	2	19, 20	19.5
Postanal setae	length	29	4	28-32	30	16	2	16, 16	16
Gnathosoma	length	204	4	204-296	241	128	2	128, 136	132
	width	89	4	89-128	109	72	2	72, 77	74.5
hyp1	length	12	3	11-12	11	8	1	-	-
hyp2	length	10	3	9-10	10	6	1	-	-
hyp3	length	24	3	23-25	24	17	1	-	-
pc	length	14	3	13-14	14	9	1	-	-

Ventral idiosoma (Figs. 37–38) – Sternal shield concave posteriorly, 44–48 long and 133–139 wide, with compressed reticulate pattern and posterior sclerotized margin. Epigynial plate 261–269

long and 92–107 wide, with blunt, membranous anteromedial projection. Anal shield pear-shaped, 143–168 long and 80–88 wide. Integument of idiosoma with approximately 20–25 pairs of spiny setae ventrally. Anus very close to anterior margin of anal plate; adanal and postanal setae subequal. Peritremes reach posterior half of coxa II; peritremal plate interrupted anterior to peritreme, with a separate, short leaflike portion over coxae I and II.



Figures 33–38. *Steatonyssus pseudoheteroventralis* **sp. nov.** (female) – 33. Dorsal idiosoma, photograph, 34. Dorsal idiosoma, drawing; 35. Podonotal shield with podonotal setae, drawing; 36. Opisthonotal shield, drawing; 37. Ventrally idiosoma, photograph, 38. Ventrally idiosoma, drawing. Scale bar 100 µm.

Legs – Coxae II with anterodorsal spur. Chaetotaxy of legs is presented in Table 4.

Gnathosoma (Figs. 39, 44) – Deutosternal groove with nine denticles arranged 1–1–1–1–1–1–1–1–1. Gnathosoma with three pairs of hypostomal setae and one pair of gnathosomal setae. *Hyp1*, *hyp2* and *pc* subequal, *hyp3* long.

Male – Measurements are given in Table 3.

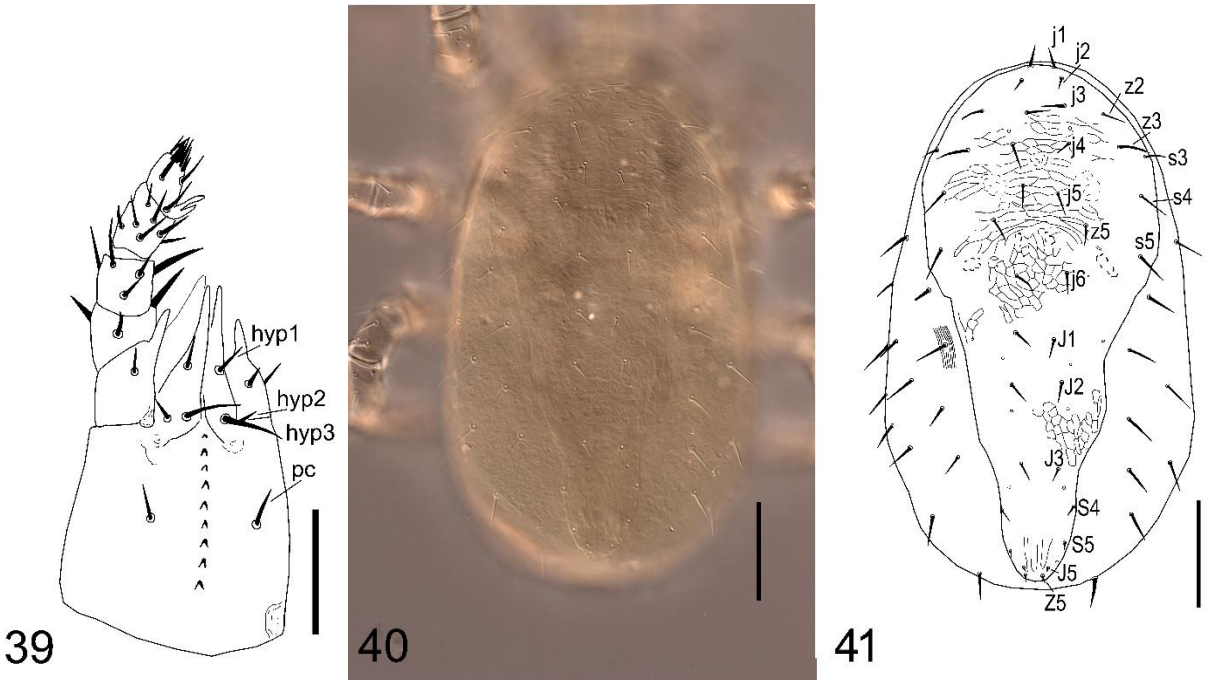
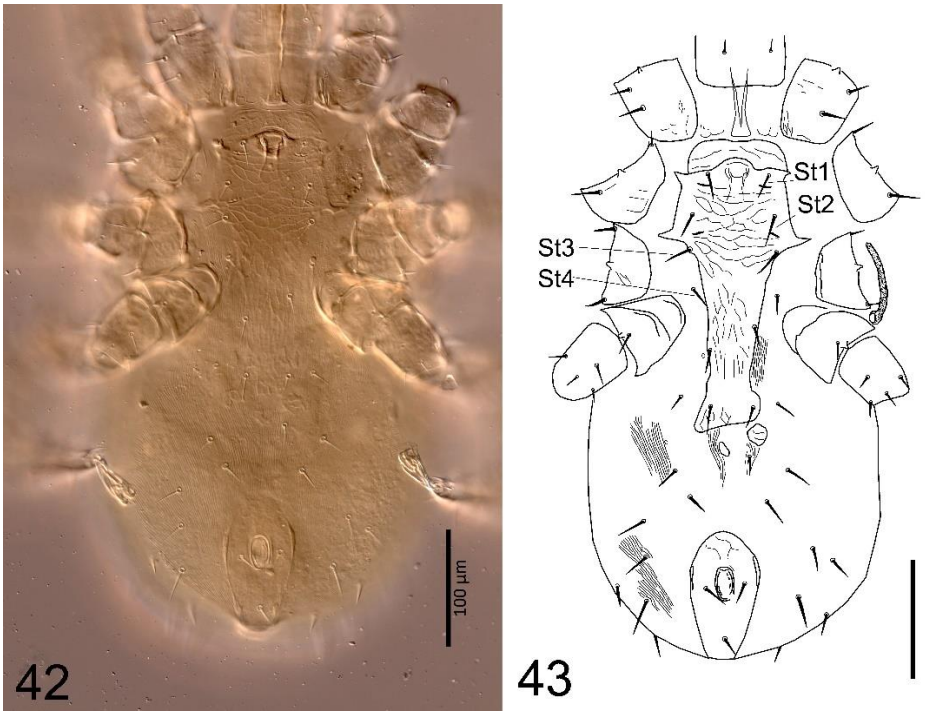


Figure 39–41. *Steatonyssus pseudoheteroventralis* **sp. nov.** – 39. Female gnathosoma; 40. Male dorsal idiosoma, photograph; 41. Male dorsal idiosoma, drawing. Scale bar: 39: 50 µm; 40, 41: 100 µm.

Table 4. Leg chaetotaxy of female of *Steatonyssus pseudoheteroventralis* **sp. nov.**

Leg	Coxa	Trochanter	Femur	Genu	Tibia	Tarsus
I	2	1-1/3-1(6)	2-5/4-2(13)	2-6/3-2(13)	2-6/3-2(13)	4-23/8-4(39)
II	2	1-0/3-1(5)	2-5/3-1(11)	2-6/2-2(12)	2-4/2-2(10)	3-4/7-2(16)
III	2	1-1/3-0(5)	1-3/1-1(6)	2-4/2-2(10)	2-3/2-2(9)	3-4/7-2(16)
IV	1	1-1/3-0(5)	1-3/1-1(6)	2-5/2-1(10)	2-4/2-2(10)	3-4/7-2(16)



Figures 42–43. *Steatonyssus pseudoheteroventralis* **sp. nov.** (male) – 42. Ventral idiosoma, photograph, 43. Ventral idiosoma, drawing. Scale bar 100 µm.

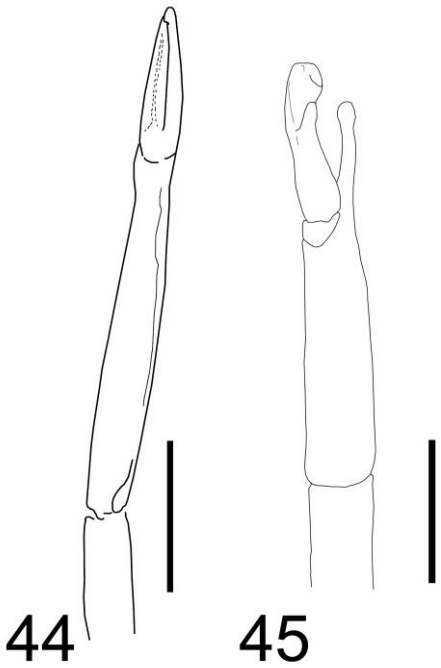
Dorsal idiosoma (Figs. 40–41) – Idiosoma approximately 500 long, 300 wide. Dorsal shield entire, 481, 485 long and 217, 232 wide, with a narrow opisthosomal portion; reticulate over most of its part, but with longitudinal striations near posterior tip; with 19 pairs of setae, 12 in podosomal region (with one additional anterolateral pair as compared to female) and seven in opisthosomal region (as in female). Dorsal unsclerotized cuticle with 10–15 pairs of spiny setae.

Ventral idiosoma (Figs. 42–43) – With sternogenitoventral and anal shield; shields separated by striate unsclerotized cuticle with two sclerites; sternogenital portion of ventral shield 218; 226 long and 128, 138 wide, with sternal (*St1*, *St2*, *St3*), one pair of genital setae and one pair of ventral setae; metasternal setae (*St4*) situated on unsclerotized cuticle. Anal plate 117, 121 long and 63, 68 wide, with anterior margin convex and rounded, lateral margins somewhat thickened. Peritremes short, terminating at level of coxa III. Ventral unsclerotized cuticle with 9–10 pairs of spiny setae.

Legs – Anterior seta of coxa III simple, without blade-like anterior projection.

Gnathosoma – As in female. Chelicerae (including chela, without basic segment) 147 long; chela 56 long; fixed digit clavate, 39 long; movable digit massive, spermatodactyl nearly straight, 11 long (Fig. 45).

Protonymph, deutonymph and larva: Unknown.



Figures 44–45. *Steatonyssus pseudoheteroventralis* **sp. nov.** – 44. Female chelicera, 45. Male chelicera. Scale bar 50 µm.

Differential diagnosis

The male of *Steatonyssus pseudoheteroventralis* is similar to that of *S. heteroventralis* Ah & Radovsky 1967 in having divided ventral sclerotization but differ in setae *St4* situated on unsclerotized cuticle (*vs St4* on the sternogenitoventral shield in *S. heteroventralis*) and fewer idiosomal setae: 8 pairs of ventral setae in *S. pseudoheteroventralis vs.* 13 in *S. heteroventralis* and 10–15 pairs of dorsal setae in *S. pseudoheteroventralis vs.* 25 in *S. heteroventralis*. Females of the two species also differ by the number of dorsal setae situated on unsclerotized cuticle: 30 pairs in *S. pseudoheteroventralis vs* more than 50 pairs in *S. heteroventralis*.

Type material

Holotype female, 3 paratype females and 1 paratype male, Mongolia: oasis Dzulganay, 43° 35′

N, 100° 04′ E, ex *Eptesicus gobiensis* Bobrinskii, 1926 (Chiroptera: Vespertilionidae), 28 July 2013, leg. V.S. Lebedev. *Other specimens:* Russia: Irbitey River (Tuva Republic, Russia), 50° 44′ N, 93° 08′ E, male ex *Ep. gobiensis*, 22 July 2016, leg. A.V. Zhigalin.

Etymology

The new species epithet is derived from the prefix pseudo (false) and *heteroventralis* (*Steatonyssus heteroventralis*, a morphologically similar species).

Key to species of the genus *Steatonyssus* of Russia and adjacent countries (females)

1. Setae *Z5* on opisthosomal plate long 2
– Setae *Z5* short 3
2. Setae *Z5* 1.5–2.0 times shorter than *J1–3* ..... *S. spinosus* Willmann, 1936
– Setae *Z5* and *J1–3* equal ..... *S. noctulus* Rybin, 1992
3. Peritremes long, reaching posterior margin or middle of coxa II 4
– Peritremes short, not reaching posterior margin of coxa II 5
4. Setae St1–3 subequal; posterior end of opisthonotal plate with three pairs of short, subequal setae *S4*, *S5*, *Z5*; *J5* microsetae 6
– Setae St 1 2 times shorter than St 3; posterior end of opisthonotal plate with setae S5 approximately 3 times longer than S4 and Z5; J5 short ..... *S. mongolicus* Dusbabek, 1966
5. Peritremes reaching middle of coxae III; sternal plate with a well sclerotized posterior margin .... *S. occidentalis evansi* (Ewing, 1933)
– Peritremes nearly reaching anterior margin of coxa III; sternal plate with a weakly sclerotized band ..... *S. desertorus* Rybin, 1992
6. Setae *St1* very short, nearly three times shorter than *St3* ..... *S. periblepharus* Kolenati, 1858
– Setae *St1* slightly shorter then *St3* 7
7. Posterior end of body with 10–12 pairs of thick, knife-shaped setae .... *S. superans* Zemskaya, 1951
– Thick, knife-shaped setae absent 8
8. Peritremes reaching middle of coxae II; anterodorsal spur on coxa II with five denticles (sometimes difficult to observe); setae *S 4–5* and *Z5* subequal ..... *S. aglaiae* Stanjukovich, 1991
– Peritremes reaching posterior margin of coxae II 9
9. Setae *j3* short, 1/2 of length of *j1* ..... *S. cavus* Rybin, 1992
– Setae *j3* longer 10
10. Dorsal unsclerotized cuticle with more than 50 pairs of setae .... *S. heteroventralis* Ah & Radovsky, 1967
– Dorsal unsclerotized cuticle with about 30 pairs of setae .... *S. pseudoheteroventralis* **sp. nov.**

Key to species of the genus *Steatonyssus* of Russia and adjacent countries (males)

1. Ventral sclerotization undivided 3
– Ventral sclerotization divided 2
2. Setae *St4* situated on unsclerotized cuticle, idiosoma with 10-15 dorsal and eight ventral pairs of setae ..... *S. pseudoheteroventralis* **sp. nov.**
– *St4* situated on sternogenitoventral shield, idiosoma with 25 dorsal and 13 ventral pairs of setae . ..... *S. heteroventralis*
3. Two dorsal plates ..... *S. superans*
– Single dorsal plate 4
4. Setae *Z5* long 5

– Setae *Z5* short 6
5. Dorsal plate with 23–24 pairs of setae; holoventral plate slightly widens posteriorly to coxae IV; anterior seta on coxae III resembles a fish tail ..... *S. spinosus*
– Dorsal plate with 25 pairs of setae; holoventral plate narrow, without widening posteriorly to coxae IV; anterior seta on coxae III usual ..... *S. noctulus*
6. Peritremes reaching middle of coxae III 7
– Peritremes reaching anterior margins of coxae III or posterior margins of coxae II 8
7. Dorsal plate with 18 pairs of setae; anterior seta on coxa III usual ..... *S. desertorus*
– Dorsal plate with 19 pairs of setae; anterior seta on coxae III variable 6
8. Anterior seta on coxa is III spur-like, with ridge-like thickening .....*S. occidentalis evansi*
– Anterior seta on coxa III usual 9
9. Dorsal plate clearly divided into podosomal and opisthosomal parts, these parts closely connected by a transverse furrow .....*S. mongolicus*
– Dorsal plate undivided 10
10. Dorsal plate with 16 pairs of setae; anterior seta on coxae III usual ……..…. *S. cavus*
– Dorsal plate with 19–20 pairs of setae; anterior seta on coxae III looks like a fish tail .... *S. periblepharus*

List of hosts and distributions

Steatonyssus aglaiae Stanjukovich, 1991

Distribution – Russia (Stanyukovich 1991).
Host – *Rhinolophus ferrumequinum* (Stanyukovich 1991).

Steatonyssus cavus Rybin, 1992

Distribution – Kyrgyzstan (Rybin 1992).
Host – *Rhinolophus ferrumequinum* (Rybin, 1992).

Steatonyssus desertorus Rybin, 1992

Distribution – Kyrgyzstan (Rybin 1992).
Host – *Eptesicus bottae* (Rybin 1992).

Steatonyssus heteroventralis Ah & Radovsky, 1967

Distribution – South Korea (Ah and Radovsky 1967).
Hosts – *Pipistrellus abramus* (Ah and Radovsky 1967).

Steatonyssus mongolicus Dusbabek, 1966

Distribution – Tajikistan (Stanyukovich 1997), Mongolia (Dusbabek 1966)
Hosts – *Myotis davidii* (as *My. mystacinus*) (Stanyukovich 1997).

Steatonyssus noctulus Rybin, 1992

Distribution – Russia (Stanyukovich 1997), Europe (Stanyukovich 1997; Rupp and Ludwig 2000), Asia (Kyrgyzstan) (Rybin 1992).

Hosts – ***Nyctalus noctula*** (Stanyukovich 1997), *Ny. lasiopterus* (Orlova *et al.* 2021), *Ny. leisleri* (Orlova *et al.* 2021), *Miniopterus schreibersi* (Stanyukovich 1997); *Eptesicus serotinus* (Orlova *et al.* 2021).

Steatonyssus occidentalis (Ewing, 1933)

Distribution – Russia (Stanyukovich 1997), Europe (Micherdzinski 1980), Asia (Kyrgyzstan) (Rybin 1983).

Hosts – ***Eptesicus serotinus*** (Stanyukovich 1997), *Myotis mystacinus*, and *My. blythii* (Stanyukovich 1997), *My. daubentonii* (Haitlinger and Walter 1997), *Pipistrellus pipistrellus* (as *Vespertilio pipistrellus* – Rybin 1983), *Plecotus auritus*, *Pl. austriacus*, and *Nyctalus noctula* (Haitlinger and Walter 1997).

Steatonyssus periblepharus Kolenati, 1858

Distribution – Russia (Stanyukovich 1997), Europe (Radovsky 1967; Micherdzinski 1980), Asia (Afganistan, Mongolia, China) (Stanyukovich 1997), Africa (Algeria, Egypt, Libya) (Benda *et al.* 2014).

Hosts – ***Pipistrellus nathusii*** (Medvedev *et al.* 2000; Orlova *et al.* 2021), ***Pi. pipistrellus*** and ***Pi. pygmaeus*** (Orlova *et al.* 2021), ***Pi. kuhlii*** (Orlova *et al.* 2020c), ***Pi. coromandra***, *Myotis blythii*, *My. myotis*, *My. dasycneme*, *My. daubentonii*, *My. mystacinus*, *My. brandtii*, *My. cappaccinii*, *My. emarginatus*, *My. nattereri*, *Plecotus auratus*, *Pl. austriacus*, *Vespertilio murinus*, *Eptesicus nilssonii*, *E. serotinus*, *Barbastella barbastellus*, and *Nyctalus noctula* (Stanyukovich 1997), *Hypsugo savii* (Orlova *et al.* 2021), *Rhinolophus ferrumequinum*, *Rh. euryale*, and *Miniopterus schreibersi* (Stanyukovich 1997).

Steatonyssus pseudoheteroventralis sp. nov.

Distribution – Russia (this article), Mongolia (this article).

Host – *Eptesicus gobiensis* (this article).

Steatonyssus spinosus Willmann, 1936

Distribution – Russia (Orlova *et al.* 2021), Europe, and Asia (Kyrgyzstan, Korea, China) (Radovsky, 1967).

Hosts – [*Solenodon paradoxus*], ***Vespertilio murinus*** (Stanyukovich 1997; Orlova *et al.* 2021), ***V. sinensis*** (as *V. superans* – Till and Evans 1964; Medvedev *et al.* 1991), *Myotis myotis*, *My. blythii*, *My. daubentonii*, and *My. mystacinus* (Stanyukovich 1997), *My. dasycneme*, *My. petax*, *M. davidii*, *M. sibiricus* (Orlova *et al.* 2021), *Hypsugo alaschanicus* (as *Pipistrellus savii* – Medvedev *et al.* 1991), *Pipistrellus pygmaeus*, and *Pi. nathusii* (Orlova *et al.* 2021), *Pi. pipistrellus* (Stanyukovich 1997), *Eptesicus nilssonii* (Orlova *et al.* 2021), *Ep. serotinus*, *Nyctalus noctula*, and *Ny. leisleri* (Stanyukovich 1997), *Ny. aviator* (Beron, 2014), *Barbastella barbastellus*, and *Plecotus auritus* (Stanyukovich 1997), *Pl. ognevi* (Orlova *et al.* 2021), *Rhinolophus ferrumequinum*, and *Rh. hipposideros* (Stanyukovich 1997).

Steatonyssus superans Zemskaja, 1951

Distribution – Russian (Stanyukovich 1997), Asia (Kazakhstan, Tajikistan, Korea) (Ah and Radovsky, 1967; Stanyukovich 1997).

Hosts – *Vespertilio sinensis* (Bregetova 1956; as *Vespertilio superans* – Medvedev *et al*. 1991), ***V. murinus*** (Zemskaja 1951; Zhovtiy *et al*. 1962), *Myotis petax* (Orlova *et al.* 2021), *Eptesicus nilssonii* (Medvedev *et al*. 1991), *Plecotus ognevi* (Orlova *et al.* 2021), *Eptesicus serotinus*, and *Nyctalus lasiopterus aviator* (Beron 2014).

CONCLUSIONS

Our findings of the three new species in Southern Siberia and Mongolia indicate that these regions are not sufficiently explored for bat parasitic mites. Further research is necessary to elucidate the mite diversity in these regions and establish their host associations and distributions.

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REFERENCES

Ah, H.S. & Radovsky, F.J. (1967) Notes on *Steatonyssus* Kolenati in Korea with description of a new species (Acarina: Macronyssidae). *The Journal of Parasitology*, 53(2): 419–431.

Arutyunyan, E.S. & Ogadganyan, A.M. (1974) Parasitic mites of fam. Spinturnicidae Oudemans, 1901 (Parasitiformes, Gamasoidea) from Armenian bats. *Biological Journal of Armenia*, 27(4): 72–81.

Baker, E.W. & Delfinado, M.D. (1964) Spinturnicidae of South East Asia and the Pacific region. *Pacific Insects*, 6: 571–591.

Benda, P., Lučan, R.K., Obuch, J., Reiter, A., Andreas, M., Bačkor, P., Bohnenstengel, T., Eid, E.K., Ševčík, M., Vallo, P. & Amr, Z.S. (2010) Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 8. Bats of Jordan: fauna, ecology, echolocation, ectoparasites. *Acta Societatis Zoologicae Bohemicae*, 74(3–4): 185–353.

Benda, P., Faizolâhi, K., Andreas, M., Obuch, J., Reiter, A., Ševčík, M., Uhrin, M., Vallo, P. & Ashrafi, S. (2012) Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 10. Bat fauna of Iran. *Acta Societatis Zoologicae Bohemicae*, 76: 163–582.

Benda, P., Spitzenberger, F., Hanák, V., Andreas, M., Reiter, A., Ševčík, M., Šmíd, J. & Uhrin, M. (2014) Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 11. On the bat fauna of Libya II. *Acta Societatis Zoologicae Bohemicae*, 78: 1–162.

Benda, P., Abi Said, M.R., Jaoude, I.B., Karanouh, R., Lučan, R.K., Sadek, R., Ševčík, M., Uhrin, M. & Horáček I. (2016) Bats (Mammalia: Chiroptera) of the Eastern Mediterrane-an and Middle East. Part 13. Review of distribution and ectoparasites of bats in Lebanon. *Acta Societatis Zoologicae Bohemicae*, 80: 207–316.

Beron, P. (1965) Contribucion a l'etude des acariens parasites des Chiropteres en Hongrie I. Fam.: Spinturnicidae, Trombiculidae, Myobiidae et Acaridae). *Vertebrata Hungarica*, 7: 141–152.

Beron, P. (2014) *Acarorum Catalogus III*: *Opilioacarida, Holothyrida, Mesostigmata*. Pensoft & National Museum of Natural History, Sofia, 286 pp.

Beron, P. (2020) *Acarorum Catalogus, VI. Order Mesostigmata. Gamasina: Dermanyssoidea (Rhinonyssidae, Spinturnicidae)*. Pensoft & National Museum of Natural History, Sofia, 264 pp.

Bregetova, N.G. (1956) [*Gamasid mites (Gamasoidea). A short identification key*]. Moscow, Izdatelstvo Akademii Nauk, 243 pp.

Burazerović, J., Orlova, M., Obradović, M., Ćirović, D. & Tomanović, S. (2018) Patterns of abundance and host specifity of bat ectoparasites in the central Balkans. *Journal of Medical Entomology*, 55: 1: 20–28.

Corpuz-Raros, L.A. & Lit, Jr I.L. (2015) List of mites (Acari) inhabiting Philippine caves and cave-dwelling vertebrates. *Museum Publications in Natural History*, 4: 30–54.

Ditz, C., Von Helversen, O. & Nill, D. (2009) *Bats of Britain, Europe & Northwest Africa*. Black Publisers Ltd., London, 400 pp.

Domrow, R. (1972) Acari Spinturnicidae from Australia and New Guinea. *Acarologia*, 13(4): 552–584.

Dusbábek, F. (1964) Parasitische Fledermausmilben der Tschechoslowakei II. Fam. Dermanyssidae Kol. 1859. *Československá parasitologie*, 11: 77–125.

Dusbábek, F. (1966) A contribution to the knowledge of parasitic mites from Mongolia (Acarina: Gamasides). *Mitteillungen aus dem Zoologischen Museum in Berlin*, 42: 43–58.

Dusbábek, F. (1972) The zone of bat acarinia in Central Europe. *Folia Parasitologica*, 19: 139–154.

Dusbabek, F. & Pinchuk, L.M. (1971) A new mite species *Macronyssus barbastellinus* sp. n. (Parasitiformes: Gamasoidea) from a bat. *Parasitologiya*, 5(5): 401–404.

Dusbábek, F. & Radovsky, F.J. (1972) *Macronyssus heteromorphus* (Acarina, Macronyssidae) a new species from the Kuril Islands. *Journal of Medical Entomology*, 9: 575–579. DOI: 10.1093/jmedent/9.6.575

Estrada-Peña, A., Peribanez-Lopez, M.A., Sanchez-Acedo, C., Balcells-Rocamora, E. & Serra-Cobo, J. (1989) Distribution and faunal composition in north and northeast of Spain of some mites and ticks parasitic on Chiroptera (Spinturnicidae, Macronyssidae, Ixodidae, and Argasidae). *Acarologia*, 30(4): 345–353.

Fain, A., Walter, G. & Heddergott, M. (2003) A new species of *Macronyssus* Kolenati, 1858 (Acari: Macronyssidae) from Leisler's bat, Nyctalus leisleri Kuhl, 1818 (Mammalia: Chiroptera) in Germany. *International Journal of Acarology*, 29(1): 55–61.

Gadzhiev, A.T. & Dubovchenko, T.A. (1967) Gamasid mites (Parasitiformes, Gamasoidea) of the bats of Azerbaijan. *Zoologicheskiy zhurnal*, 46(11): 1716–1719.

Gu, Y.-M. & Wang, C.-S. (1985) Notes on the genera *Macronyssus* and *Ichoronyssus* in China (Acarina: Macronyssidae). *Acta Zootaxonomica Sinica*, 10: 156–161.

Haitlinger, R. (1978) Pasozyty zewnetrzne nietoperzy Dolnego Slaska. IV. Macronyssidae, Dermanissidae, Veigaiaidae. *Wiadomosci parazitologiezne*, 24: 707–718.

Haitlinger, R. & Ruprecht, A. (1992) Parasitic arthropods (Siphonaptera, Diptera, Acari) of bats from western part of the Bialowieza Primeval Forest. *Nyctalus*, 4(3): 315–319.

Haitlinger, R. & Walter, G. (1997) Data relating to the distribution and host-specifity of bat-infesting mites (Acari, Mesostigmata, Prostigmata, Astigmata) in Germany. *Drosera*, 2: 95–112.

Hornok, S., Kovats, D., Meli, M. L., Gönczi, E., Hofmann-Lehmann, R., Dan, Á. & Molnár, V. (2012) First detection of bartonellae in a broad range of bat ectoparasites. *Veterinary Microbiology*, 159(3–4): 541–543. DOI: 10.1186/1756-3305-7-202

Lindquist, E.E. & Evans, G.O. (1965) Taxonomic Concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata). *Memoirs of the Entomological Society of Canada*, 97: 5–66. DOI: 10.4039/entm9747fv

Medvedev, S.G., Chistyakov, D.V., Stanyukovich, M.K. & Paskhina, M.V. (2000) Bat ectoparasites

fauna of Sebezh National Park. *Nature of the Pskov Region*, 11: 22–25.

Medvedev, S.G., Stanyukovich, M.K., Tiunov, M.P. & Farafonova, G.V. (1991) Ectoparasites of bats of the Russian Far East. *Parazitologiya*, 25: 27–37.

Micherdzinski, W. (1980) *Eine Taxonomische Analyse der Familie Macronyssidae, Oudemans, 1936. I: Subfamilie Ornithonyssinae, Lange, 1958 (Acarina: Mesostigmata)*. Polska Akademia Nauk, Warszawa, Poland, 254 pp.

Ogadjanian, A.M. & Arutyunian, E.S. (1974) Mites of the family Macronyssidae Oudemans, 1936 (Parasitiformes, Gamasoidea) parasitising on bats of Armenia. *Biological Journal of Armenia*, 27(10): 75–82.

Orlova, M.V. (2011) Ectoparasite associations of bats from the Urals (Russia). *Hystrix Italian Journal of Mammalogy*, 1: 105–110.

Orlova, M.V., Chistyakov, D.V., Orlov, O.L., Kruger, F. & Kshnyasev, I.A. (2014a) Ectoparasite fauna of pond bat *Myotis dasycneme* (Boie, 1825) (Chiroptera, Vespertilionidae) in Northern Eurasia. *Bulletin of St. Petersburg University*, 3(1): 24–38.

Orlova, M.V. & Kazakov, D.V. (2016) New findings of rare species of the mite genus *Spinturnix* von Heyden, 1826 (Mesostigmata, Gamasina: Spinturnicidae) in Russia and Tajikistan. *Entomological Review*, 96: 922–925.

Orlova, M.V., Kazakov, D.V., Kravchenko, L.B. & Zhigalin, A.V. (2017a) Ectoparasite fauna of the Siberian bat *Myotis sibiricus* (Chiroptera: Vespertilionidae) with a revision of previous data on ectoparasites from Brandt's bat *Myotis brandtii* s. l. and the whiskered bat *M. mystacinus* s. l. of the Eastern Palaearctic. *Entomological Review*, 97(8): 1166–1173.

Orlova, M.V. & Klimov, P.B. (2020) Local host-parasite co-extinction: the bent-wing bat *Miniopterus schreibersii* (Chiroptera: Miniopteridae) and *Spinturnix psi* (Mesostigmata: Spinturnicidae) in Crimea. *Plecotus et al.*, 23: 80–87.

Orlova, M.V., Klimov, P.B., Orlov, O.L., Smirnov, D.G., Zhigalin, A.V., Budaeva, I.V., Emelyanova, A.A. & Anisimov, N.V. (2021) A checklist of bat-associated macronyssid mites (Acari: Gamasina: Macronyssidae) of Russia, with new host and geographical records. *Zootaxa*, 4974(3): 537–564. DOI: 10.11646/zootaxa.4974.3.4

Orlova, M.V., Laverty, T.M., Reeves, W.K., Gratton, E.M. & Davies, M.L. (2020a) The first record of the spinturnicid mite *Spinturnix kolenatii* Oudemans, 1910 (Mesostigmata: Gamasina: Spinturnicidae) from the long-tailed serotine bat *Eptesicus hottentotus* A. Smith, 1833 (Chiroptera: Vespertilionidae) in Africa. *International Journal of Acarology*, 46(3): 160–164. DOI: 10.1080/01647954.2020.1731596

Orlova, M.V. & Orlov, O.L. (2018a) Contribution to the ectoparasite fauna of bats (Chiroptera: Vespertilionidae, Rhinolophidae) of Crimea. *Entomological Review*, 98: 319–323.

Orlova, M.V. & Orlov, O.L. (2018b) First record of the parasitic gamasid mite *Spinturnix emarginatus* (Kolenati, 1856) in Crimea. *Acarina*, 26(2): 237–242.

Orlova, M.V., Orlov, O.L. & Zhigalin, A.V. (2014b) New records of ectoparasites of the eastern water bat *Myotis petax* Hollister, 1912 (Vespertilionidae, Chiroptera) and the revision of the previous material collected from *Myotis daubentonii* s. lato in Eastern Palaearctic. *Entomological Review*, 94(9): 1306–1312.

Orlova, M.V. & Putintsev, N.I. (2016) Bat ectoparasites (Chiroptera: Vespertilionidae) of Tuva. *Materials of the XIII Ubsunur International Symposium "Ecosystems of Central Asia: research, conservation, rational use*, pp. 313–316.

Orlova, M.V., Smirnov, D. G., Anisimov, N.V., Orlov, O.L., Klimov, P.B., Vekhnik, V.P., Murashko, E.S. & Lukyanenko, A.M. (2020b) Parasitic macronyssid mites (Mesostigmata: Macronyssidae)

from bats of Northern Caucasus with key for females of the genus *Macronyssus* Kolenati, 1858 of Russia and adjacent countries. *International Journal of Acarology*, 46: 364–372. DOI: 10.1080/01647954.2020.1801839

Orlova, M.V., Smirnov, D.G., Vekhnik, V.P., Lukyanenko, A.M. & Zabashta, A.V. (2020c) Ectoparasites and Pathogens of Kuhl's Pipistrelle *Pipistrellus kuhli* (Kuhl, 1817) (Chiroptera: Vespertilionidae): Our Own and Published Data Review. *Russian Journal of Biological Invasions*, 11: 348–362.

Orlova, M.V. & Zapart, A. (2012) Interaction of ectoparasites in cohabitating colonies of pond bats *Myotis dasycneme* (Boie, 1825) and species of genus *Pipistrellus* from northern Poland. *Annals of Parasitology*, 58(4): 211–215.

Orlova, M.V. & Zhigalin, A.V. (2015) Three new bat ectoparasite species of the genus *Macronyssus* from Western Siberia (with an identification key for females of the genus *Macronyssus* from the Palearctic boreal zone). *Journal of Parasitology*, 101: 314–319. DOI: 10.1645/14-609.1

Orlova, M.V., Zhigalin, A.V., Orlov, O.L. & Golovanova, A.P. (2017b) Ectoparasites of *Myotis blythii* (Chiroptera: Vespertilionidae) in natural researve "Tigirekskiy". *Proceedings of the Tigirek State Natural Reserve*, Vol. 9: pp. 95–99.

Orlova, M.V., Zhigalin, A.V., Orlov, O.L., Kruskop, S.V. & Bogdanov I.I. (2015a) Contribution to the ectoparasite fauna of rare and poor studied bat species of Southern Siberia. *Biology Bulletin*, 42(3): 254–259.

Orlova, M.V., Zhigalin, A.V. & Zhigalina, D.I. (2015b) Parasitic gamasid mites (Acari: Mesostigmata) associated with bats (Chiroptera: Vespertilionidae) on Kunashiri Island, with a description of a new species *Spinturnix uchikawai* sp. nov. *Acta Arachnologica*, 64: 27–31. DOI: 10.2476/asjaa.64.27

Prasad, V. (1969) Bat mites (Acarina: Spinturnicidae) mainly from south-east Asia and the Pacific region. *Acarologia*, 11: 657–677.

Radovsky, F. (1966) Revision of the macronyssid and laelapid mites of bats: outline of classification with description of new genera and new type species. *Journal of Medical Entomology*, 3: 93–99. DOI: 10.1093/jmedent/3.1.93

Radovsky, F. (1967) *The Macronyssidae and Laelapidae (Acarina: Mesostigmata) parasitic on bats.* Barkeley, University of California, 288 pp.

Radovsky, F. (2010) *Revision of genera of the parasitic mite family Macronyssidae (Mesostigmata: Dermanyssoidea) of the world*. Indira Publishing House, Michigan, USA, 170 pp.

Reeves, W.K., Beck, J., Orlova, M.V., Daly, J.L., Pippin, K., Revan, F. & Loftis, A.D. (2016) Ecology of bats, their ectoparasites, and associated pathogens on Saint Kitts island. *Journal of Medical Entomology*, 53(5): 1218–1225. DOI: 10.1093/jme/tjw078

Rudnick, A. (1960) A revision of the mites of the family Spinturnicidae (Acarina). *University of California Publications in Entomology*, 17(2): 157–284.

Rupp, D. & Ludwig, P. (2000) First records of *Steatonyssus noctulus* Rybin, 1992 in Central Europe. *Spixiana*, 23: 275–278.

Rybin, S.N. (1983) Gamasid mites of bats and their shelters in South Kyrgyzstan. *Parasitologiya*, 17(5): 355–360.

Rybin, S.N. (1992) New species of mites of the genus *Steatonyssus* (Mesostigmata: Macronyssidae). *Parasitologiya*, 2: 157–161.

Scheffler, I., Dolch, D., Ariunbold, J., Stubbe, A., Stubbe, M., Abraham, A. & Thiele, K. (2012) Ectoparasites of bats in Mongolia, Part 2 (Ischnopsyllidae, Nycteribiidae, Cimicidae and Acari). Available from: http://digitalcommons.unl.edu/biolmongol (Accessed on 27.03.2023)

Scheffler, I., Jargalsaikhan, A., Bolorchimeg, I., Stubbe, A. & Stubbe, M. (2016) Bat ectoparasites of Mongolia, Part 3. Available from: http://digitalcommons.unl.edu/biolmongol (Accessed on 27. 03.2023)

Senotrusova, V.N. (1968) Biology of the gamasid mite *Ichoronyssus flavus* (Kolenatii, 1856). *Parasitologiya*, 2(4): 339–341.

Senotrusova, V.N. & Tagil'tsev, A.A. (1968) New species of gamasid mite *Ichoronyssus mirabilis* Senotrusova et Tagiltsev (Acariformes, Gamasoidea) from whiskered bat from Zaysan Basin. *Zoologicheskiy zhurnal*, 47(1): 134–136.

Stanyukovich, M.K. (1990) Gamasid and Argasidae mites of bats of Baltic states and Leningradskaya oblast. *Parazitologiya*, 24: 193–199.

Stanyukovich, M.K. (1991) New species of the genus *Steatonyssus* (Parasitiformes: Gamasina) from bat. *Parasitologiya*, 25: 270–273.

Stanyukovich, M.K. (1997) Keys to the gamasid mites (Acari: Parasitiformes, Mesostigmata, Macronyssoidea et Laelaptoidea) parasiting bats (Mammalia, Chiroptera) from Russia and adjacent countries. *Rudolstädter naturhistorische Schriften*, 7: 13–46.

Stanyukovich, M.K. & Malinovskiy, K.Y. (1992) The gamasid mites and argasid ticks of bats from Tadjikistan. *Doklady Tadjikskoy Academii Nauk*, 35: 68–72.

Till, W.M. & Evans, G.O. (1964) The genus *Steatonyssus* Kolenati (Acari, Mesostigmata). *Bulletin of the British Museum (Natural History) Zoology*, 11(8): 511–582.

Turk, F.A. & Turk, S.M. (1952) Studies of Acari. 7th Series: records and descriptions of mites new to the British fauna, together with short notes on the biology of sundry species. *Annals and Magazine of Natural History*, Series 12, 5(53): 475–506. DOI: 10.1080/00222935208654319

Uchikawa, K. (1979) Bat mites of the Genus *Macronyssus* Kolenati (Acari, Macronyssidae). *Annotationes Zoologicae Japonenses*, 52: 246–256.

Uchikawa, K. & Wada, Y. (1979) Studies on mesostigmatid mites parasitic on mammals and birds in Japan. IX. Bat mites of the genus *Spinturnix* von Heyden, 1829 (Part I) (Spinturnicidae). *Japanese Journal of Sanitary Zoology*, 30(2): 121–125.

Uchikawa, K., Zhang, M.Y., O'Connor, B.M. & Klompen, H. (1994) Contribution to the taxonomy of the genus *Spinturnix* (Acari: Spinturnicidae), with the erection of a new genus, *Emballonuria*. *Folia Parasitologica*, 41: 287–304.

Whitaker, J.O. Jr. (1988) Collecting and preserving ectoparasites for ecological study. *In:* Kunz, J.H. (Ed.) *Ecological and behavioral methods for the study of bats*. Smithsonian Instution Press, Washington, USA, pp. 459–474.

Zemskaya, A.A. (1951) *Biology, development and taxonomy of parasitic mites of the family Dermanyssidae (Acarina, Parasitiformes*). Dissertation, abstract, Moscow State University, Moscow, 11 pp.

Zhovtiy, I.F., Zarubina, V.N., Prokopiev, V.N. & Shvedko, L.P. (1962) About bat ectoparasites of Southeast Transbaikalia and adjacent areas of the Mongolian People's Republic. *Proceedings of Irkutsk State Scientific Anti-Plague Institute of Siberia and the Far East*, 24(9): 338–343.

سه گونهٔ کنهٔ میان‌استیگمای جدید انگل خفاش از جنس‌های *Spinturnix*، *Macronyssus* و *Steatonyssus* (Acari: Mesostigmata: Spinturnicidae, Macronyssidae)، از سیبری و مغولستان، همراه با کلید گونه‌های روسیه و کشورهای همسایه

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چکیده

مادهٔ **sp. nov.** *Spinturnix senkevitchi* (Spinturnicidae)، مادهٔ **sp. nov.** *Macronyssus temujini* (Macronyssidae)، ماده‌ها و نرهای **sp. nov.** *Steatonyssus pseudoheteroventralis* (Macronyssidae) از خفاش‌های واسپر (ناهیدی) روسیه و مغولستان توصیف می‌شوند. تصاویر و کلیدهای جنس *Spinturnix*، *Macronyssus* و *Steatonyssus* روسیه و کشورهای همسایه (جمهوری‌های اتحاد جماهیر شوروی سابق، مغولستان، کره، ژاپن) نیز ارایه شده است.

واژگان کلیدی: انگل خفاش، بوریاتیا، *Eptesicus gobiensis*، *Hypsugo alaschanicus*، *Murina hilgendorfi sibirica*، تووا.

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