NEW FAUNISTICAL DATA ON ORIBATID MITES OF THE FAMILY DAMAEIDAE (ACARI, ORIBATIDA) FROM THE RUSSIAN FAR EAST

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ABSTRACT: The present study is based on a random set of previously unstudied oribatid mites of the family Damaeidae, which were collected from the Russian Far East in 1987–2019. Based on the above material, we have identified 22 species and 12 genera from 28 localities. Of these, the genus *Weigmannia* and the species *Epidamaeus craigheadi* and *Weigmannia parki* have been recorded from the Palaearctic region for the first time. In addition, the genera *Acanthobelba* and *Dyobelba*, as well as the species *Acanthobelba heterosetosa*, *Dyobelba biclavata*, *Damaeus maximus*, *D. striatus*, and *Epidamaeus variabilis*, have been recorded from Russia (Far East) for the first time. The species *Epidamaeus puritanicus* has the highest occurrence across different biotopes.

KEY WORDS: Damaeid mites, fauna, list of taxa, new record, Russia.

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INTRODUCTION

The oribatid mite family Damaeidae (Acari, Oribatida) comprises 288 species and six subspecies (Subías, online version 2020) spread over 27 genera/subgenera (opinions vary, e.g., Miko 2006; Ermilov and Norton 2014; Subías, online version 2020).

The family Damaeidae of the Russian Far East are moderately studied. Kulczynski (1926) was the first to mention damaeid mites on this territory; he described two new species (*Oribata camtschaticus* and *O. bacillum*) from Kamchatka. Later, Bulanova-Zachvatkina (1957a, b, 1962) described five more species (*Belba paracorynopus*, *B. rossica*, *B. sellnicki*, *Epidamaeus grandjeani* and *E. microspinus*). Subsequently, in her 1967 book, Bulanova-Zachvatkina listed 12 species and 6 genera of damaeids in the Russian Far East.

The 1960s marked the beginning of a systematic study of the Damaeidae in the Russian Far East. As a result, data on the fauna, taxonomy, distribution and other ecological aspects of damaeids from different regions of the Far East became available (e.g., Golosova 1969, 1971, 1981, 1987, 1989; Golosova and Krivolutsky 1976; Golosova and Pankov 1972, 1982; Kurcheva 1977; Lyashchev 1981, 1982, 1983, 1984; Makartseva 1970; Molodova 1970; Molodova and Golosova 1972; Bulanova-Zachvatkina 1975; Golosova *et al.* 1983; Krivolutsky *et al.* 1995). Pankov *et al.* (1997), Ryabinin and Pankov (2002), Ryabinin (2015) and Ryabinin *et al.* (2018) have published generalizing works (catalogues) on oribatid mites of the Russian Far East, including Damaeidae. As a result of these works, 31 damaeid

species belonging to 10 genera were known in the Russian Far East prior to our study.

In the course of our taxonomic identification of a random set of previously unstudied oribatid mites from the Russian Far East—namely, from the Khabarovsk Territory, the Primorsky Territory, the Jewish Autonomous Region and the Sakhalin Region—we have found several representatives of the Damaeidae. The main goals of our paper are as follows: to provide a list of the identified taxa; to briefly note on the new records and findings; and to present SEM micrographs of some of the species that will help in their identification in the future.

MATERIALS AND METHODS

Specimens. Substrate samples containing oribatid mites were collected from the Russian Far East in 1987–2019 (Fig. 1). Mites were extracted into 70% ethanol using Berlese's funnels (without electric lamps) in laboratory conditions in the course of seven-eight days. After the study was complete, all the identified specimens have been deposited (in ethanol with a drop of glycerol) at the Tyumen State University Museum of Zoology, Tyumen, Russia. Substrate samples were collected from 28 localities:

1. Khabarovsk Territory, Bureinsky Reserve, Dusse-Alin Ridge, rocky summit, 1,507 m a.s.l., soil litter from a biotope with reindeer moss and *Pinus pumila* vegetation, 52°10'54"N, 134°26'23"E, 27.06.2016 (K.N. Tkachenko).

Fig. 1. Map of the Russian Far East.

2. Khabarovsk Territory, Bureinsky Reserve; 3 km from the mouth of the Umalta-Makit River, mountain spruce forest, western slope of a bluff, 650 m a.s.l., soil litter from a biotope with moss, *Picea ajanensis*, *Pinus pumila*, *Larix* sp. and *Vaccinium vitis-idaea* vegetation, 51°39'55"N, 134°14'52"E, 25.05.2013 (A.L. Antonov).
3. Khabarovsk Territory, Bureinsky Reserve, Dusse-Alin Ridge, near the headwaters of the Pravaya Bureya River, 1,611 m a.s.l., soil litter from a biotope with moss, lichen, *Cassiope* sp., *Rhodiola rosea* and *Pinus pumila* vegetation, 52°26'15"N, 134°26'23"E, 30.06.2011 (E.S. Koshkin).
4. Khabarovsk Territory, Bureinsky Reserve, ranger station "Strelka" (3.5 km below the confluence of the Levaya Bureya and the Pravaya Bureya rivers), damp moss in a *Picea ajanensis*, *Abies nephrolepis* and *Populus* sp. forest, 51°38'15"N, 134°15'17"E, 23.05.2016 (E.S. Koshkin).
5. Khabarovsk Territory, Bureinsky Reserve, ranger station "Strelka", Pravaya Bureya River, soil litter from an occasional floodplain, 51°38'22"N, 134°16'05"E, 22.06.2018 (A.L. Antonov).
6. Khabarovsk Territory, Bureinsky Reserve, boundary between the bottom of a rocky sum-

- mit and tundra, 1,481 m a.s.l., soil litter from a biotope with moss and lichen vegetation, 52°10'44"N, 134°26'25"E, 09.07.2019 (E.S. Koshkin).
7. Khabarovsk Territory, Bureinsky Reserve, Kuryaigagna Mountain Pass, Vodopadny Stream, mountain tundra, soil litter from a biotope with lichen, *Sorbaria* sp., *Cassiope* sp. and *Artemisia* sp. vegetation, 52°26'5"N, 135°01'55"E, 03.07.2017 (A. Yu. Oleinikov).
8. Khabarovsk Territory, Duplikansky Reserve, near the Duplikan River, soil from a sparse *Alnus* sp. and *Betula* sp. forest stand, 50°51'01"N, 132°51'08"E, 23.08.2006 (D.K. Kurenschchikov).
9. Khabarovsk Territory, Verkhnebureinsky District, Lake Big Suluk, mountain tundra, 1,300 m a.s.l., soil litter from a *Pinus pumila* woodland, 51°18'38"N, 134°20'49"E, 09.09.2014 (A. Yu. Oleinikov).
10. Khabarovsk Territory, Ayano-Maisky District, village of Nelkan, soil litter from a dry pine forest with *Rhododendron dauricum*, *Juniperus* sp. and *Sorbus* sp., 57°39'05"N, 136°09'01"E, 29.08.2017 (A. Yu. Oleinikov).
11. Khabarovsk Territory, Ayano-Maisky District, near the village of Nelkan, soil litter from a *Pinus pumila* forest with *Rhododendron dauricum* and *Vaccinium-vitis-idaea*, 57°40'14"N, 136°10'14"E, 03.07.2019 (A. Yu. Oleinikov).
12. Khabarovsk Territory, Ayano-Maisky District, village of Tsypana, Malyi Uskup Spring, soil litter from a *Pinus pumila* forest with *Rhododendron dauricum*, 58°13'06"N, 135°15'20"E, 03.07.2019 (A. Yu. Oleinikov).
13. Khabarovsk Territory, Dzhugdzhur Mountain Ridge, Serdok mountain pass, 1,200 m a.s.l., soil litter from a biotope with *Pinus pumila* and *Alnus* sp. vegetation, 55°40'09"N, 134°25'49"E, 18.08.2010 (A. Yu. Oleinikov).
14. Khabarovsk Territory, Dzhugdzhur Mountain Ridge, Serdok mountain pass, 1,100 m a.s.l., soil-litter from a biotope with *Pinus pumila*, *Vaccinium uliginosum* and *Alnus* sp. vegetation, 55°39'48"N, 134°25'20"E, 18.08.2010 (A. Yu. Oleinikov).
15. Khabarovsk Territory, Urmi River drainage basin, the right bank of the Annushkin Stream, soil litter from a biotope with *Pinus* sp. and *Larix* sp. vegetation, 50°23'22"N, 134°07'58"E, 21.06.2019 (A.L. Antonov).
16. Khabarovsk Territory, Ulchsky District, Amur River, moss on riverbank rocks, on the opposite side of Lake Khavanda, 61°20'41"N, 138°52'44"E, 20.06.2006 (N.A. Ryabinin).
17. Khabarovsk Territory, Central Sikhote-Alin Mountains, source of the Gobilli River, lichenous mountain tundra, soil litter, 49°31'05"N, 138°44'26"E, 25.06.2014 (E.M. Klimina).
18. Khabarovsk Territory, Vaninsky District, Sikhote-Alin Mountains, Chope Stream (tributary of the Tumnin River), 570 m a.s.l., moss from a forest biotope with *Larix* sp., *Pinus pumila*, *Calamagrostis* sp. and *Bergenia pacifica* vegetation, 49°72'76"N, 139°98'33"E, 31.08.2005 (E.M. Klimina).
19. Khabarovsk Territory, Vaninsky District, 153th-154th km of the Lidoga-Vanino Road, near the Gobilli River, soil in a riparian forest biotope with *Salix* sp., *Populus* sp. and *Chosenia* sp. vegetation, 49°17'N, 138°26'E, 16.09.2006 (D.K. Kurenschchikov).
20. Khabarovsk Territory, Bikinsky District, vicinities of the village of Lesopilnoe, soil litter from a biotope with *Quercus mongolica* and *Acer* ssp. vegetation, 40°44'00"N, 134°19'20"E, 16.08.2008 (N.A. Ryabinin).
21. Jewish Autonomous Region, Bastak Reserve, Ivakin land type association, soil litter from a biotope with *Quercus mongolica*, *Acer* ssp. and broadleaved species, 48°59'24"N, 133°02'58"E, 12.07.2009 (N.A. Ryabinin).
22. Primorsky Territory, Sovetsko-Gavansky District, middle course of the Botchi River, soil litter from a biotope with *Picea* sp. and *Pinus koraiensis* vegetation, 48°06'30"N, 139°20'57"E, 21.07.2006 (A. Yu. Oleinikov).
23. Primorsky Territory, Ussuriysky District, the village of Gorno-Tayozhnoye (25 km southeast of the city of Ussuriysk), soil in the oak forest near the Gornotayozhnaya research station (Russian Academy of Sciences) named after V.L. Komarov, 43°42'00"N, 132°09'05"E, 08.06.2006 (A.A. Baburin).
24. Primorsky Territory, Khasansky District, village of Barabash, "Land of Leopard" Reserve, litter from forest with *Quercus mongolica*, *Acer* spp. and *Juglans mandshurica* vegetation, 43°00'15"N, 131°25'01"E, 22.07.2008 (G.N. Ganin).
25. Sakhalin Region, Komandor Islands, Medny Island, Urilie-Glinki Mountain Pass, mountain tundra, soil litter from a biotope with *Rhododendron dauricum* and *Empetrum* sp. vegetation, 54°21'11"N, 167°33'51"E, 14.08.2011 (A. Yu. Oleinikov).

26. Sakhalin Region, Komandor Islands, Medny Island, the Big Waterfall, soil litter from blueberry thickets, 54°21'11"N, 167°33'55"E, 18.08.2011 (A. Yu. Oleinikov).
27. Khabarovsk Territory, Badzhalsky Mountain Ridge, Mogda River, tundra, 1,000 m a.s.l., decaying moss near a spruce tree in a deciduous forest containing larch, spruce, alder, cedar elfin, ledum, cowberry and moss (*Sphagnum* sp.), 04.07.1987 (N.A. Ryabinin).
28. Primorsky Territory, Botchinsky Reserve, Baza Mountain, 400 m a.s.l., vicinities of the Mulpa River, soil from a forest containing cedar and spruce, 48°14'45"N, 139°25'19"E, 21.06.2007 (A. Yu. Oleinikov).

Observation and documentation. Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. SEM micrographs were made with the aid of a JEOL-JSM-6510LV SEM microscope.

Abbreviations. *Aa*, *Ap*—prodorsal tubercles; *P*—propodolateral apophysis; *in*—interlamellar seta; *bs*—bothridial seta; *bo*—bothridium; *Ba*—prodorsobasal tubercle; *c*, *la*, *lm*, *lp*—notogastral setae; *s. a.*—spina adnata; *3b*, *3c*—epimeral setae; *Va*, *Vp*—ventrosejugal tubercles; *Sa*—parastigmatic tubercle.

LIST OF IDENTIFIED TAXA

- Genus *Acanthobelba* Enami and Aoki, 1993
Acanthobelba heterosetosa Choi, 1997 (Fig. 2).
 Localities: 3, 18. Distribution: Korea.
- Genus *Belba* Heyden, 1826
Belba rossica Bulanova-Zachvatkina, 1962.
 Localities: 5, 6, 19, 20, 21, 22, 23, 25. Distribution: Palaearctic region.
- Genus *Belbodamaeus* Bulanova-Zachvatkina, 1967
Belbodamaeus gobilliensis Ermilov and Ryabinin, 2020. Localities: 5, 9, 20, 24, 25. Distribution: Russian Far East.
- Genus *Damaeus* C.L. Koch, 1835
Damaeus maximus Mihelčič, 1957. Localities: 19, 24, 25. Distribution: central and southern Europe.
- Damaeus striatus* (Enami and Aoki, 1988) (Figs. 4–7). Localities: 19, 24, 25. Distribution: eastern Palaearctic region.
- Genus *Dyobelba* Norton, 1979
Dyobelba biclavata Wang and Norton, 1993. Localities: 1, 3, 11, 12. Distribution: southeastern Palaearctic region.

Genus *Epidamaeus* Bulanova-Zachvatkina, 1957

Epidamaeus aborigensis Behan-Pelletier and Norton, 1985. Localities: 10, 11, 14, 24. Distribution: eastern Asian Russia.

Epidamaeus arcticolus (Hammer, 1952) (Figs. 8–13). Localities: 1, 3, 16, 17, 19, 20. Distribution: Boreal.

Epidamaeus chopeensis Ermilov and Ryabinin, 2020. Localities: 12, 14, 19, 24. Distribution: eastern Asian Russia.

Epidamaeus craigheadi (Jacot, 1939) (Figs. 14–16). Localities: 1, 5, 6, 10, 11, 19, 27. Distribution: USA (New Hampshire).

Epidamaeus fortispinosus Hammer, 1967. Localities: 15, 23. Distribution: Boreal.

Epidamaeus gilyarovi (Behan-Pelletier and Norton, 1985). Localities: 90, 97. Distribution: eastern Asian Russia.

Epidamaeus puritanicus (Banks, 1906) (Figs. 17, 18). Localities: 2, 3, 4, 6, 7, 10, 14, 16, 19, 20, 28. Distribution: Holarctic region.

Epidamaeus tritylos (Behan-Pelletier and Norton, 1983). Localities: 15, 26. Distribution: Boreal.

Epidamaeus variabilis Fujikawa and Fujita, 1985 (Figs. 19–22). Localities: 10, 17, 119, 21, 23, 24, 25. Distribution: Japan, northern China.

Genus *Kunstdamaeus* Miko, 2006

Kunstdamaeus bacillum (Kulczynski, 1926). Localities: 5, 6, 17, 26. Distribution: Russian Far East.

Kunstdamaeus ladislavmiko Ermilov and Ryabinin, 2020 (Figs. 23–26). Localities: 1, 5, 6, 17, 21, 24, 25. Distribution: Russian Far East.

Genus *Parabelbella* Bulanova-Zachvatkina, 1967

Parabelbella rusfareastensis Ermilov and Ryabinin, 2020. Localities: 2, 28. Distribution: Russian Far East.

Genus *Porobelba* Grandjean, 1936

Porobelba spinosa (Sellnick, 1920) (Figs. 27, 28). Localities: 13, 19, 23. Distribution: Palaearctic region.

Genus *Spatiodamaeus* Bulanova-Zachvatkina, 1957

Spatiodamaeus ziemowiti Ermilov and Ryabinin, 2020. Localities: 23, 24. Distribution: Russian Far East.

Genus *Tokukobelba* Lamos, 2016

Tokukobelba compta (Kulczynski, 1902) (Figs. 29–32). Localities: 5, 16, 19, 20, 22, 23, 24. Distribution: Palaearctic region.

Figs. 2–7. SEM micrographs of *Acanthobelba heterosetosa* Choi, 1997 (2), *Weigmannia parki* (Jacot, 1937) (3) and *Damaeus striatus* (Enami and Aoki, 1988) (4–7). Scale bars=200 μ m (4–6), 100 μ m (2, 3), 50 μ m (7).

Figs. 8–13. SEM micrographs of *Epidamaeus arcticolus* (Hammer, 1952). Scale bars=200 µm (8–11), 20 µm (12, 13).

Genus ***Weigmannia*** Miko and Norton, 2010
Weigmannia parki (Jacot, 1937) (Fig. 3). Localities: 8, 19. Distribution: central and eastern Nearctic region, USA (Florida).

Remarks. The list of identified damaeid mites includes 22 species from 12 genera. Of these, five species (*Belbodamaeus gobilliensis*, *Epidamaeus chopeensis*, *Kunstidamaeus ladislavmiko*, *Parabellabella rusfareastensis* and *Spatiodamaeus ziemowiti*)

Figs. 14–18. SEM micrographs of *Epidamaeus craigheadi* (Jacot, 1939) (14–16) and *Epidamaeus puritanicus* (Banks, 1906) (17, 18). Scale bars=200 μ m (17, 18), 100 μ m (14, 15), 10 μ m (16).

are new to science (Ermilov and Ryabinin 2020a–d); one genus (*Weigmannia*) and two species (*Epidamaeus craigheadi* and *Weigmannia parki*) have been recorded for the first time in the Palearctic region; two genera (*Acanthobelba* and *Dyobelba*) and five species (*Acanthobelba heterosetosa*, *Dyobelba biclavata*, *Damaeus maximus*, *D. striatus* and *Epidamaeus variabilis*) have been recorded in Russia (Far East) for the first time. Species that are most frequently encountered in different biotopes are as follows: *Epidamaeus puritanicus* (encountered in 11 biotopes out of 28); *Belba rossica* (encountered

in 8 biotopes); *Epidamaeus craigheadi*, *E. variabilis*, *Kunstidamaeus ladislavmiko*i and *Tokukobelba compta* (encountered in 7 biotopes).

Our data, as well as the previously published works (e.g., Ryabinin 2015; Ryabinin *et al.* 2018), suggest that the oribatid fauna of the family Damaeidae recorded in the Russian Far East now includes 44 species from 13 genera.

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Figs. 19–22. SEM micrographs of *Epidamaeus variabilis* Fujikawa et Fujita, 1985. Scale bar=200 μ m.

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Figs. 23–26. SEM micrographs of *Kunstidamaeus bacillum* (Kulczynski, 1926). Scale bars=200 μ m (23–25), 50 μ m (26).

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Figs. 27–32. SEM micrographs of *Porobelba spinosa* (Sellnick, 1920) (27, 28) and *Tokukobelba compta* (Kulczynski, 1902) (29–32). Scale bars=100 µm (27–30), 20 µm (31, 32).

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