

***Dungeraphorura*, a new genus of Onychiuridae (Collembola) from East Palaearctic**

Ayuna Gulgenova¹ and Mikhail Potapov^{2,*}

¹ Buryat State University, Ulan-Ude 670000, Smolina St. 24 a, Russia

² Moscow Pedagogical State University, Moscow 129164, Kibalchicha St. 6 b. 5, Russia

* Corresponding author: Mikhail Potapov (e-mail: mpnk-abroad@yandex.ru)

Abstract

Dungeraphorura yaruna sp. n. is described from Transbaikalian region (Russia: Siberia). *Dungeraphorura* gen. n. combines characters of different tribes, but three key characters, simple vesicles in postantennal organ, presence of d0 seta on head, and 9 distal setae on tibiotarsi, indicate closer relation to the genera of the tribe Thalassaphorurini. The new genus readily differs from other genera of the tribe by the presence of a rudimental furca in form of a cuticular pocket with 2+2 setulae. The taxonomical remarks based on the material from East Siberia and Far East of Russia are given to *Dungeraphorura martynovae* (Dunger, 1978) comb. n., the second species of the genus.

Keywords: new species, Thalassaphorurini, Transbaikalia

1. Introduction

In the course of our study of collembolan fauna of the Transbaikalian region (Russia: East Siberia) we found a new species the generic position of which was uncertain. Among the species of family Onychiuridae, it mostly resembled *Protaphorura martynovae* Dunger, 1978 described from Mongolia and also recorded in our material. These two species shared characters which made possible to establish a new genus. The present work continues the taxonomical and faunistical study of Collembola of the Republic of Buryatia (Potapov & Chimitova 2009, Chimitova et al. 2010, Babenko et al. 2011).

Abbreviations: AO III = sensorial organ of Ant. III, Ant. = antennal segments, PAO = postantennal organ, Th. = thoracic segments, Abd. = abdominal segments, ms = microsensillum, pso = pseudocelli, psx = parapsseudocelli



Figs 1–2 Dorsal chaetotaxy of *Dungeraphorura yaruna* sp. n. Head and thorax (1), abdomen (2).

2. Results

Dungeraphorura gen. n.

Type species: *Dungeraphorura martynovae* (Dunger, 1978)

Diagnosis

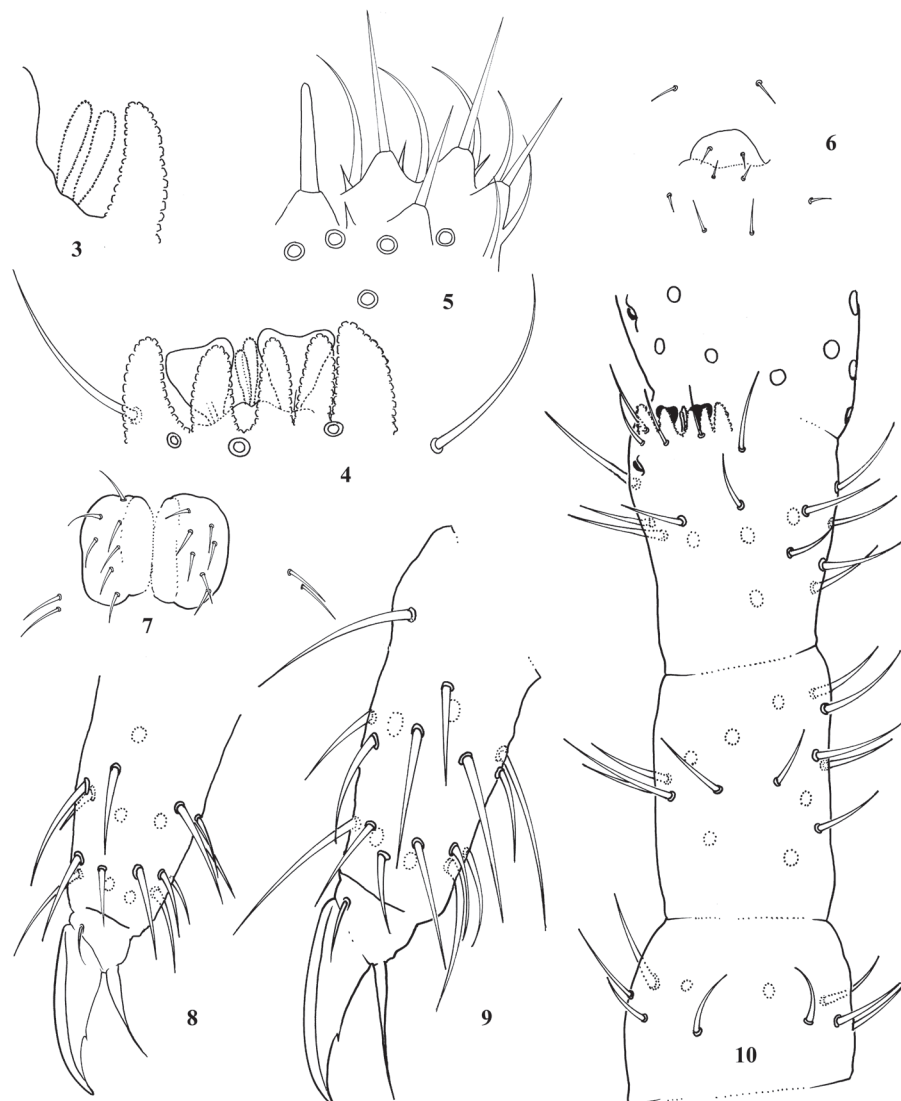
Body shape cylindrical. Anal spines present, on low papillae. Posterior cephalic pseudocelli present. Thoracic and abdominal tergites with lateral pseudocelli. Body granulation fine and uniform, somewhat stronger around pseudocelli, especially on head. Furca reduced to cuticular pocket with 2+2 setulae. Antennal organ III with 5 guard setae, 5 low papillae, 2 smooth sensory clubs and 2 sensory rods. Apex of antenna with two conical processes (Figs 16, 17). Postantennal organ with simple vesicles. Labium of A-type (following the terminology of Fjellberg 1999). Distal whorl of tibiotarsi with 9 setae. Sensilla on body indistinct. Seta d0 on the head present. Abdominal tergites IV and VI with one medial seta each (m0). Pseudocelli on thoracic tergite I absent. Two pseudocelli at posterior edge of the head and two at the base of antenna arranged in longitudinal rows (Fig. 1). Ventral parapseudocelli present. Male ventral organ absent.

Etymology: The genus is dedicated to Wolfram Dunger, the eminent soil zoologist who contributed much to taxonomy of Palaearctic Collembola. He was the first to note the most remarkable features of the type species of the new genus.

Discussion

Dungeraphorura gen. n. combines characteristics of three tribes Thalassaphorurini, Protaphorurini and Onychiurini. At first sight, furcal cuticular pocket with 2+2 setulae and simple vesicles of postantennal organ indicate *Protaphorura* Absolon, 1901 (tribe Protaphorurini) which, however, has 11 setae in distal whorl of tibiotarsi. A more essential character, the presence of seta d0 on the head, places the new genus closer to tribe Onychiurini and several genera of Thalassaphorurini. Within the former tribe, it resembles *Bionychiurus* Pomorski, 1996 which has the similar shape of furcal rudiment, but differs with compound vesicles in postantennal organ and 11 distal setae in tibiotarsi. The compound vesicles are a characteristic for all genera of Onychiurini, most of which besides have a finely granulated furcal area, not the pocket type. Unlike in *Deuteraphorura* Absolon, 1901, *Onychiuroides* Bagnall, 1948, and *Orthonychiurus* Stach, 1954 the new genus has well developed anal spines. Seta d0 on the head and 9 setae in distal whorl of tibiotarsi place *Dungeraphorura* gen. n. in the tribe Thalassaphorurini (Pomorski, 1998). After Babenko et al. (2011) these characters are not necessary attributes and the potential dominant characters of the tribe are the structure of the furcal remnant (finely granulated area with 4 setulae arranged in two rows) and distinct antennal and tergal sensilla. A cuticular furcal pocket as present in *Dungeraphorura* gen. n. was never found in the tribe Thalassaphorurini before, a fact that makes the separate status of Thalassaphorurini even more problematic than it was shown by Babenko et al. (2011). The seta d0 present on the head is shared by the new genus and several genera of the tribe, as *Thalassaphorura* Bagnall, 1949, *Micronychiurus* Bagnall, 1949, *Agraphorura* Pomorski, 1998, and *Allonychiurus* Yoshii, 1995. In all these genera, apart from the first one, postantennal organ is compound. The longitudinal arrangement of pseudocelli on the head was shown only for a few genera of Thalassaphorurini and, therefore, is probably also important characteristic of the *Dungeraphorura* gen. n. (Fig. 1). The new genus can also be compared with *Uralaphorura* Martynova, 1978, the genus with uncertain tribe position. Both genera

share simple vesicles in PAO, the presence of seta d0, and a triangular arrangement of the anterior cephalic pseudocelli. Other characters (furcal area, distal whorl of tibiotarsal setae) rather support a convergent nature of these similarities. An additional peculiarity of the genus is the presence of two conical processes set at the apex of antennae (Figs 16–17). As a rule, the apex of antennae is mere, without any processes (Fig. 18).



Figs 3–10 *D. yaruna* sp. n. (3–8, 10) and *D. martynovae* (9). Antennal organ III (3, 4). Papilla and sensory rods (3), general view (4), labial palp (5), furcal rudiment area (6), ventral tube (7), tibiotarsi of leg III (8, 9), antenna (10).

***Dungeraphorura yaruna* sp. n.** (Figs 1–8, 10–14, 16)

Type material: Holotype: Reproductive female, Russia (East Siberia), NE Buryatia, Vitim plateau, Eravna Basin, vicinities of Komsomol'skoye, kobresia-fescue-wormwood steppe, 20.VIII.2009. Paratypes: ibidem 2 reproductive males, 7 females, 1 juveniles; Eravna Basin, vicinities of Sosnovo-Ozerskoye, edelweiss-kobresia-fescue steppe 21.VIII.2009 - 1 reproductive male, 5 females, 2 juv., leg. A. Gulgenova.

Other material: Vitim plateau, Eravna Basin, vicinities of Komsomol'skoye, kobresia-fescue-wormwood steppe, 26.VIII.2008: 16 specimens, 20.VIII.2009: 109 specimens; at the same location, birch-larch forest, 26.VIII.2008: 12 specimens; Eravna Basin, vicinities of Sosnovo-Ozerskoye, edelweiss-kobresia-fescue steppe, 10.VII.2009: 11 specimens, 21.VIII.2009: 47 specimens, 27.IX.2009: 12 specimens; at the same location, birch-larch forest with shrubs 26.VIII.2008: 31 specimens, leg. A. Gulgenova.

The material is kept in Buryat State University (Ulan-Ude) and Moscow Pedagogical State University.

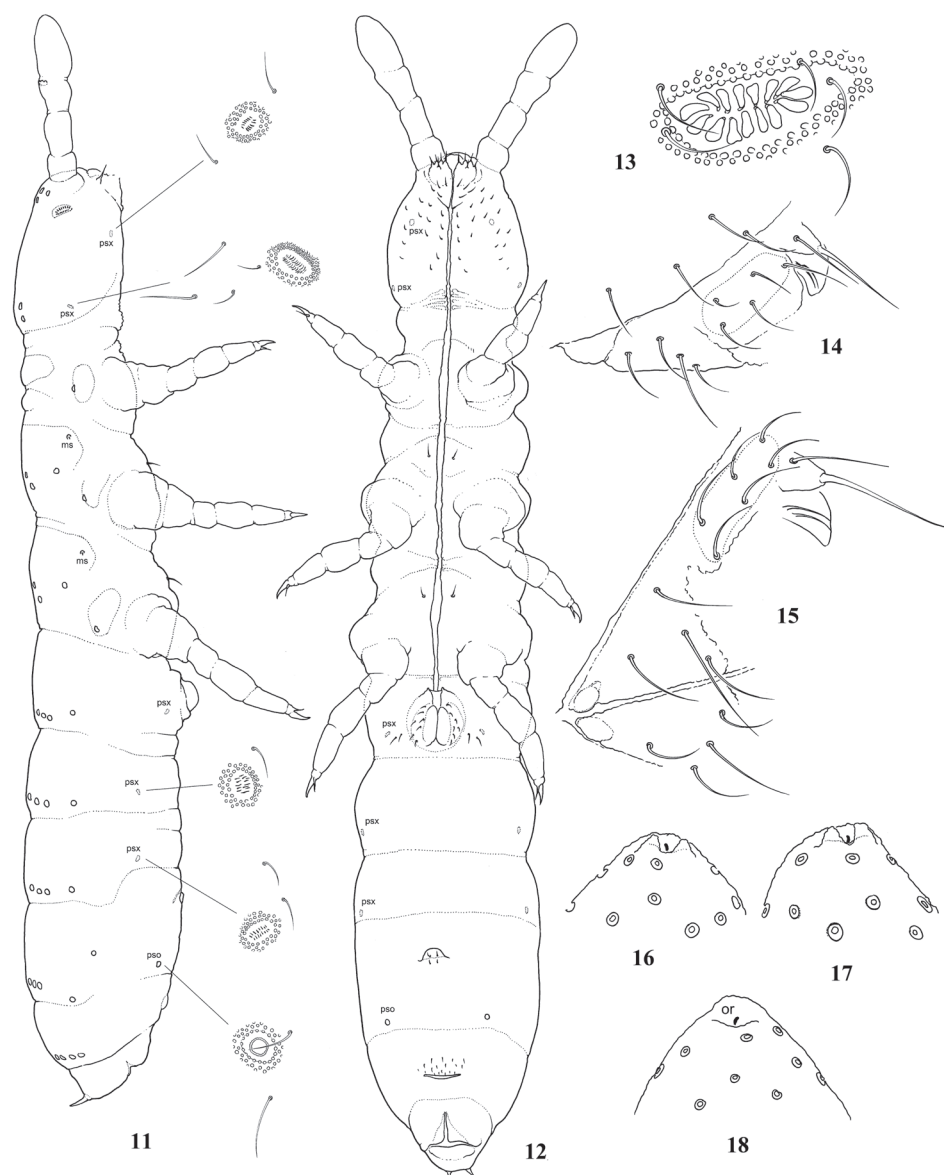
Description

Color white. Length 1.0–1.3 mm. Body shape cylindrical, slender (Figs 11–12). Anal spine on low papillae, a little shorter than inner side of claw (0.8–0.9 : 1). Furca reduced to cuticular pocket with 2+2 (Fig. 6). Body granulation fine and uniform, somewhat stronger around pseudocelli, especially on the head. Antennae nearly as long as head or slightly longer. Apex of Ant. IV with subapical organite and two conical processes nearby (Fig. 16). Microsensillum on Ant. IV in latero-external position, above proximal row of setae (Fig. 10). AO III with 5 guard setae with one set apart, 5 low papillae, 2 small sensory rods, 2 smooth sensory clubs, and microsensillum located slightly below AO III (Figs 3–4). Ant. I and II with 10 and 16 setae, respectively (Fig. 10). PAO consists of 15–16 simple vesicles (Fig. 13). Labial palp of A-type (after Fjellberg 1999), with 5 papillae, 10 guard setae (e_2 absent?). Labium with 5–6 proximal, 4 basomedial and 5 basolateral setae (Figs 5, 14). Maxillary palp simple, with two sublobal hairs. Two prelabral setae. Labral setae 5, 3, 2.

Pseudocellar formula: dorsal 32/033/44454, ventral 00/000/0001, subcoxae 1 of legs I, II, III with 1, 1, 1 pseudocelli, respectively (Figs 1–2, 11–12). The following asymmetric formulae of pso distribution among the normal specimens were found: ../.../44453, ../.../33354, ../.../44554, 33/.../..... (on one side of one specimen, with normal another side). Parapseudocelli present, with psx formula 11/000/1110. Medial parapseudocelli on the head more roundish, others elongate (Figs 11–12). Th. II and III with 1 microsensillum each. Dorsal chaetotaxy nearly symmetrical, poorly differentiated into meso- and microsetae. Seta d0 on the head present. Th. I with 7-8+7-8 setae. Th. II and III with 4-5+4-5 axial setae. Abd I, II, and III with 3-4+3-4, 3-4+3-4, and 4-5+4-5 axial setae, respectively. Sensillum 's' on Abd.V well differentiated, index M/s = 1.8–1.9, other body sensilla indistinct. Abd. IV and VI with medial setae m0 (Fig. 2). Subcoxae 1 and 2 of legs I–III with 5, 5, 6, and 1, 4, 4 setae, respectively. Th. II and III with 1+1 ventral setae. Ventral tube with 7+7 (rarely 6+6) distal setae and 2+2 setae at base (Fig. 7). Male ventral organ absent.

Tibiotarsi of all legs I–III with 9 setae in distal whorl (two T-setae absent) and with M-seta in B-row. Tibiotarsi of leg I with 19 setae (9, 8, 2), two Y-setae present. Tibiotarsi II and III with 18 setae (9, 8, 1), one Y-seta present. Claw with inner tooth, empodial appendage 0.8–0.7 as long as inner length of claw (Fig. 8).

Etymology: The type locality (Eravna Basin) sounds as 'yaruna' in Buryat language.



Figs 11–18 *D. yaruna* sp. n. (11–14, 16), *D. martynovae* (15, 17) and *Protaphorura armata* (Tullberg) (18). Arrangement of pseudocelli and parapseudocelli (11–12). Lateral (11) and ventral (12) views, postantennal organ (13), labium (partly) and sublobal plate, basolateral setae marked (14–15), apical part of antenna, dorsal view (16–18).

Abbr.: ms = microsensillum, pso = pseudocellus, psx = parapseudocellus, or = organite

Remarks: *Dungeraphorura yaruna* sp. n. differs from *D. martynovae* by pseudocellar formula (32/033/44454 vs. 32/033/33343), number of basolateral setae in labium (5 vs. 6), and number of tibiotarsal setae (19, 18, 18 vs. 20, 18–20, 18–19). The value of the last difference needs to be verified on larger material.

Distribution: The species is known only from two nearby localities of Eravna Basin.

***Dungeraphorura martynovae* (Dunger, 1978) comb. n. (Figs 9, 15, 17)**

Material. Russia (East Siberia), SW Buryatia, Tunkinskiye Gol'tsy Range, Hulugaysha Mount, 1563 m alt.; forb-grass birch forest, VII.2009; SE Buryatia, SE slope of Zagansky Range, vicinities of Shebertuy, 985 m alt., N 50.81451, E 107.78026, larch-birch forest, 20.VIII.2011, leg. A. Gulgenova and L. Vanyavina; Russia (Far East), Magadanskaya Region, upper flow of Ola River, ca 120 km N Magadan, 830 m alt., N 60 39', E 151 16', larch forest, 11.VIII.2011, leg. A. Babenko.

Taxonomical remarks: Labial palp of A-type, with all 5 papillae, 10 guard setae (e_2 absent?). Labium with 5–6 proximal setae, 4 basomedial and 6 basolateral setae (Fig. 15). Maxillary palp simple, with two sublobal hairs. Two prelabral setae. Th. II and III with 1+1 ventral setae. Abd. IV and VI with m_0 seta. Tibiotarsi of all legs I–III with 9 setae in distal whorl (two T-setae absent) and with M-seta in B-row. Tibiotarsi of leg I with 20 setae (9; 8; 3), three Y-setae present. Tibiotarsi II with 18–20 setae (9; 8; 1–3). Tibiotarsi III with 19 setae (9; 8; 2) (Fig. 9). The number of ventral pso 00/000/0001, psx 11/000/11100.

Remarks: So far the generic position of the species remained uncertain (Sun et al. 2010). Our material well agrees with the description of Dunger (1978), in the redescription above we give some morphological additions. Dunger (1978) noted the presence of ventral pseudocelli on the head, which are more likely parapseudocelli as in *D. yaruna* sp. n. For difference from *D. yaruna* sp. n. see its description.

Distribution: Probably widely distributed in Eastern Palaearctic. The species is known from several distant localities in Mongolia and Asiatic part of Russia.

3. Acknowledgements

We are much indebted to A. Babenko for the loan of the material and his friendly and fruitful comments. The work was partly supported with the RFBR projects (11-04-01655-a and 12-04-90827-mol_rf_nr). We are also much indebted to anonymous reviewers from Senckenberg Museum of Natural History (Germany) and Y. Shvejonkova (Russia) for the critical remarks.

4. References

- Babenko, A. B., A. B. Chimitova & S. K. Stebaeva (2011): New Palaearctic species of the tribe Thalassaphorurini Pomorski, 1998 (Collembola, Onychiuridae) – *ZooKeys* **126**: 1–38.
- Chimitova, A. B., N. M. Chernova & M. B. Potapov (2010): Springtail (Collembola) populations in cryogenic soils of the Vitim Plateau. – *Entomological Review* **90** (8): 957–967.
- Dunger, W. (1978): Poduromorphe Collembolen (Insecta, Collembola) aus der Mongolischen Volksrepublik. I. Onychiuridae. – *Abhandlungen und Berichte des Naturkundemuseums Görlitz* **52**: 1–20.
- Fjellberg, A. (1999) The labial palp in Collembola – *Zoologischer Anzeiger* **237**: 309–330.
- Pomorski, R. J. (1998): Onychiurinae of Poland (Collembola: Onychiuridae). – *Genus (Supplement)*, Polish Taxonomical Society, Wrocław: 201 pp.
- Potapov, M. & A. Chimitova (2009): Isotomidae (Collembola) of Buryat Republic. *Folsomia culter* sp. nov. and taxonomic value of terminalian chaetotaxy in the genus – *Zootaxa* **2225**: 49–56.

Sun, X., J.-X. Chen & L. Deharveng (2010): Six new species of *Thalassaphorura* (Collembola, Onychiuridae) from southern China, with a key to world species of the genus. – *Zootaxa* **2627**: 20–38.

Accepted 21 November 2012