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## NEW SPECIES OF THE GENUS *ANURIDA* (COLLEMBOLA, NEANURIDAE) FROM THE FAR EAST OF RUSSIA

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A review of the *Anurida* fauna of the Far East of Russia was performed, based on fresh material from forest ecosystems of Primorsky Krai. This taxon generally seems to be highly diverse and rather peculiar in the region under consideration. Seven new species of the genus are described and illustrated. Four of them, *A. pal-lens* sp. n., *A. armifera* sp. n., *A. multisensillata* sp. n. and *A. olae* sp. n., belong to the *weberi*-group widespread in Siberia and North America. They can be distinguished by colouration, the number of ocelli, fine differences in the structure of the mouthparts and in the set of sensilla on the antennae. *Anurida elegans* sp. n. is a typical representative of the Beringian *hammerae*-group most similar to *A. luciae* Fjellberg 1985. *Anurida longil-amellata* sp. n. resembles two Asiatic blind species, viz. *A. nadezhdae* Babenko 1998, described from central Siberia, and *A. kazukoae* Tamura 1997, known from China. The other described blind species, i.e. *A. aspera* sp. n., can be compared to a number of congeners, most of which are also known only from adjacent regions of the East Palaearctic. A key to the known non-cave Asiatic species of the genus is provided.

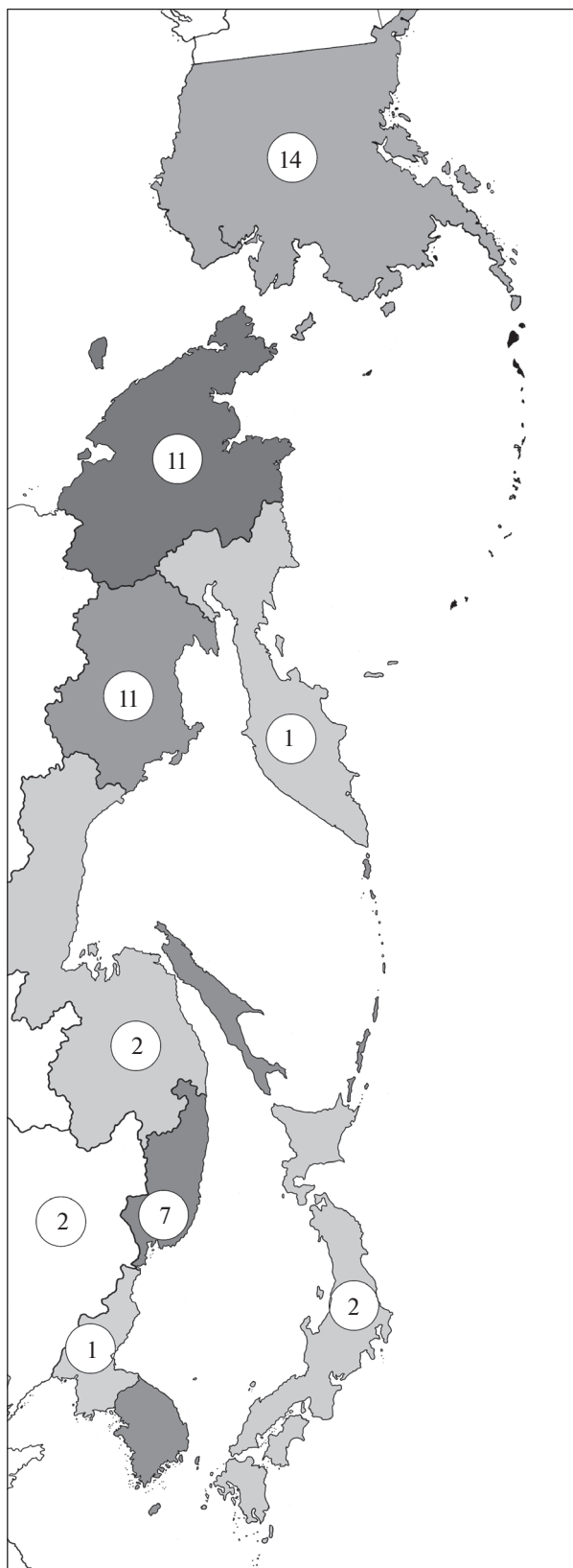
**Keywords:**  $\alpha$ -taxonomy, springtails, Pseudachorutinae, key, East Palaearctic

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Arne Fjellberg, a famous Norwegian collembologist, was the first to draw the attention to an increased diversity of the *Anurida*-complex on both coasts of the Northern Pacific. He revealed as many as 14 species of the genus in Alaska (Fjellberg, 1985), described several additional species from NE Siberia and the northern Cordillera (Fjellberg 1985a), and emphasized that *whether this richness in species has its centre in Beringia or not, is early to say* (Fjellberg 1985, p. 122). The *Anurida* fauna of northeastern Russia also appears to be rather rich. Thus, eight species of the genus (Babenko, 2017) have been found at one locality on the eastern coast of the Chukchi Peninsula, and no less than 16 species east of the Kolyma basin, i.e. in Chukchi Peninsula and Magadan Province taking together (Babenko, 1997, 1998; Babenko, Fjellberg, 2006;

Potapov et al., 2018). Against the background of a very poor non-cavernicolous fauna of the group in the more southern parts of eastern Asia, these estimates look quite impressive (Fig. 1). For example, only the widespread *A. tullbergi* Schött 1891 has been found on the Korean Peninsula (Weiner, Najt, 1985). Three terrestrial forms, *A. trioculata* Kinoshita 1916, *A. papillo-soides* (Hammer 1953) and *A. abashiriensis* Babenko et Nakamori 2018, have been recorded in Japan, although the genus includes many cave forms in both Japan and Korea (Yosii, 1956, 1972, 1977, Lee, Park, 2016). The genus is equally impoverished across the vast territories of China, with only two species involved: *A. kazukoae* Tamura 1997 and *A. tamurae* Yue et Yin 1999. In the adjoining regions of the Russian Far East, the genus has only recently become studied. In our ecological research devoted to the spatial distribution of springtails in the multi-species communities of the Far East, we have encountered not only a rather rich regional fauna of *Anurida* and allied genera, but also serious problems in species identification. The present paper solves some of existing taxonomic problems.

Abbreviations. *Abd.1–6*, abdominal segments; *A-, B-*whorls, distal and proximal whorls of setae on tibiotarsi; *a-, m-, p-*setae, setae of anterior, medial, and posterior rows on terga; *Ant.1–4*, antennal segments; *AO*, antennal organ on *Ant.3*; *C* – maxillary capitulum; *L.1, L.2, and L.3*, maxillary lamellae; *MSPU*, Zoology and Ecology Department of Moscow State Pedagogical University; *ms*, microsensillum(a); *or*, organite on antennal tip; *PAO*, postantennal organ; *S1–S4, S7–S8, S9*, antennal sensilla; *Th.1–3*, thoracic segments; *VT*, ventral tube; *U3*, unguis of leg 3.



**Fig. 1.** Map of Russian Far East and surrounding countries with the numbers of recorded terrestrial *Anurida* species in different regions (from top to bottom: Alaska, Chukchi Peninsula, Kamchatka, Khabarovsk Krai, Primorsky Krai, Northeast China, Japan, North Korea).

## SPECIES DESCRIPTIONS

*Anurida pallens* Babenko, Shveenkov  
et Kuznetsova sp. n.  
Figs 2, 1; 2, 4; 3, 1–5

**Diagnosis.** A whitish species of the *weberi*-group characterized by the presence of 2 + 2(3) indistinct ocelli, six usual blunt sensilla on *Ant.4*, oval *PAO* with 15–18 lobes, the mandibles with 4 + 2 teeth set in a line, and serrate maxillary *L.1*.

**Type material.** Holotype, preadult male, Far-East of Russia, Northern Primorye, Sikhote-Alin Nature Reserve, Kabaniyy station [N 45.1384°, E 135.8870°], coniferous wood with *Rhododendron fauriei*, litter, 932 m alt., 8.08.2017, leg. N. Kuznetsova, A. Geraskina and A. Kuprin. Paratypes, 4 males and 3 females, Sikhote-Alin Nature Reserve, Blagodatny station [N 44.9817°, E 136.5341°], 95 m alt., oak wood with hazel, litter, 7.08.2017, leg. N. Kuznetsova, A. Geraskina and A. Kuprin. The types are kept in MSPU.

**Additional material.** About 30 specimens from the same region.

**Description.** Length without antennae 1.0–1.2 mm. General colour on available slides whitish including ocelli and ocular area of head<sup>2</sup>. Body shape typical of *weberi*-group, rather stout and somewhat flattened, *Abd.6* rounded, not truncate, partly hidden under *Abd.5*. Integument granulation coarse and almost uniform.

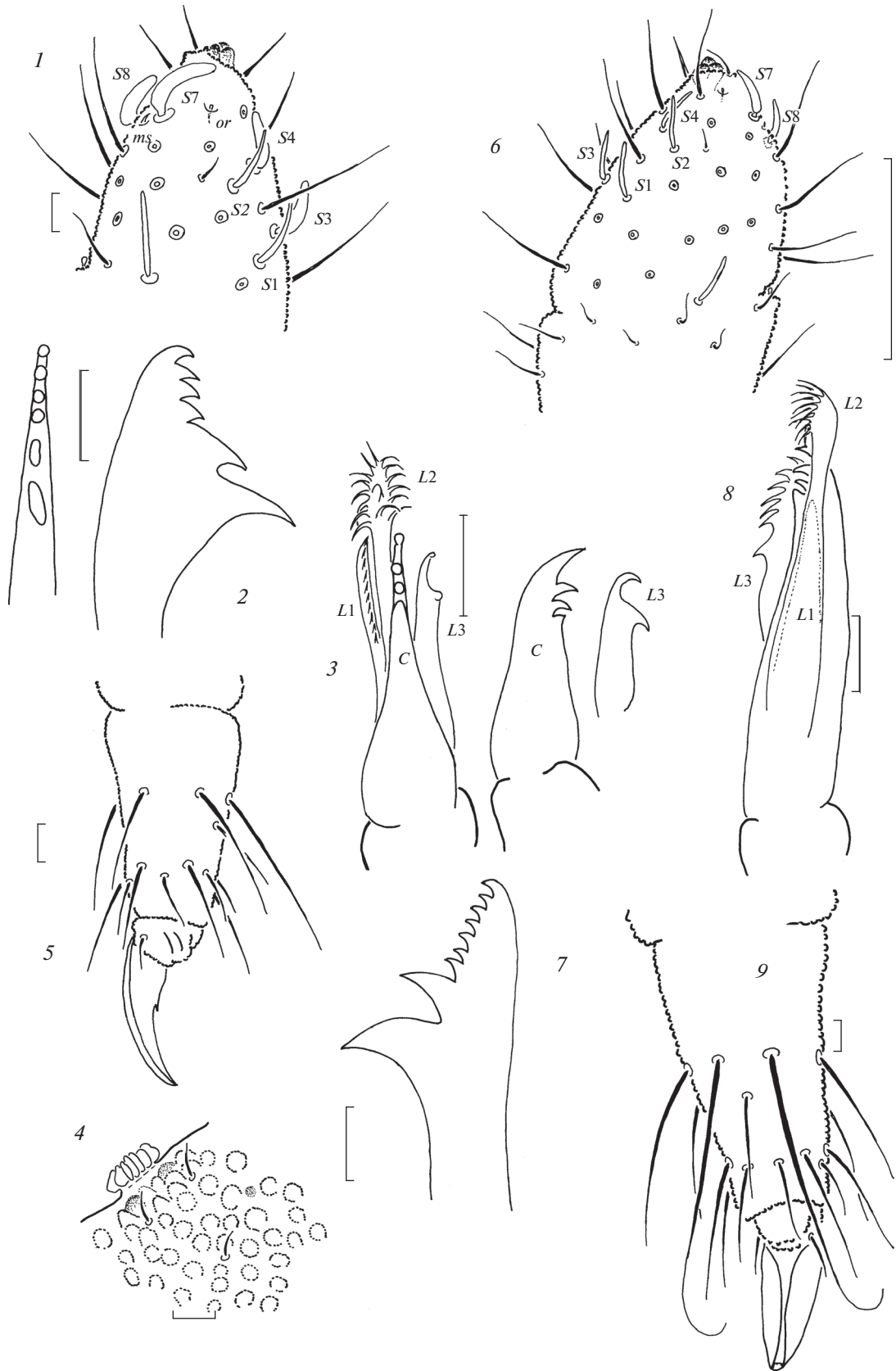
Ocelli present, 2 + 2(3), small, about as large as skin granules, usually uncolored and hard to detect. *PAO* roughly circular or slightly elongate, with 15–18 lobes (Fig. 3, 4). Antennae clearly shorter than head, of typical generic shape. *Ant.4* with 3-lobed apical bulb, usual curved sensilla, *S1* and *S2* thinner than *S3* and *S4*, in lateral group *S7* clearly longer and thicker than *S8*, subapical *ms* and organite present (Fig. 3, 1). *AO* on *Ant.3* typical, outer sensilla widely separated, small *ms* present ventrally. *Ant.1–2* with 7 and (12)13 setae, respectively. Labral formula as 4/2-3-5-2. Labium with 11 setae on each side including three setae on its apical part also armed with two small sensillar papillae. Mandibles (Fig. 3, 2) with 4 apical teeth set in line and 2 larger basal ones. Maxillary capitulum with 3 apical teeth on capitulum followed by straight cutting edge, clearly serrate *L.1*, rather long *L.2* reaching well beyond tip of capitulum, and *L.3* with 2 strong hooks (Fig. 3, 3).

Common dorsal setae fine and short, differentiated into macro and microsetae only on *Abd.6* (and also on abdominal sterna), sensilla thin and long, 5–6 times longer than ordinary setae, lateral microsensilla (*ms*) present on *Th.2*. Dorsal chaetotaxy typical of *weberi*-group (Fig. 2, 1). Main characteristics: tergum of *Th.1*

<sup>2</sup> Only a single specimen with some hypodermal pigment in ocular area has been seen.



**Fig. 2.** *Anurida pallens* sp. n. (1, 4) and *A. armifera* sp. n. (2–3, 5–7): 1 – dorsal chaetotaxy; 2 – dorsal chaetotaxy of *Th.* 2–3; 3 – dorsal chaetotaxy of abdomen; 4–5 – ventral side of *Abd.* 6; 6 – ventral chaetotaxy of abdomen; 7 – furcal remnant. Scales (mm): 1–4, 6–7 – 0.1; 5 – 0.01.



**Fig. 3.** *Anurida pallens* sp. n. (1–5) and *A. armifera* sp. n. (6–9): 1 – antennal tip; 2 – mandible; 3 – maxilla; 4 – PAO and ocelli; 5 – distal part of leg 3; 6 – antennal tip; 7 – mandible; 8 – maxilla; 9 – distal part of leg 3. Scales (mm): 6 – 0.1; 1–5, 7–9 – 0.01.

with 3 + 3 setae. *Th.*2–3 with seta *p*2 slightly posteriorly to *p*1, sensilla (*p*3) clearly moved forward and set practically at level with setae *m*4, only three setae (*a*1, *a*3, and *a*5) of *a*-row present. *Abd.*1–4 with 3 + 3 *p*-setae between sensilla (*p*4) and three widely separated setae in *a*-row (*a*1, *a*3, and *a*5). *Abd.*5 with only 2 + 2 setae (*a*1 and *p*1) between sensilla (*p*3). Differentiation of setae on *Abd.*6 as on Fig. 2, 4. Thoracic sterna without setae. Ventral tube usually with 4 + 4 setae. Furca remnant as two small warts, each with one seta and few setulae, in anterior part of *Abd.*4 sternum.

Legs 1–3 chaetotaxy as following: upper subcoxae – 1, 2, 2; lower subcoxae – 0, 2–3, 2–3; coxae – 2–3, 5, 5–7; trochanters – 6, 6, 5–6 (one posterior seta on trochanter of leg 3 clearly thinner and shorter than others); femora – 12–13, 11–12, 11; tibiotarsi – 19, 19, 18 setae, respectively. Tibiotarsal setae of moderate length, longest inner setae of *B*-whorl about as long as 1.3–1.4 of inner unguis edge (Fig. 3, 5). Unguis with clear inner tooth in basal half of inner edge.

**Etymology.** The name reflects the pale coloration of the new species, this being not very typical of the *weberi*-group: from the Latin *pallens*, meaning pale, dim, faded.

**Affinities.** *Anurida pallens* sp. n. is a representative of the *weberi*-group of the genus as defined by Babenko (2002) in sharing the same type of maxillae and mandibles, a typical arrangement of dorsal setae, and a broadened and somewhat flattened body with a small roundish *Abd.*6 partly hidden under *Abd.*5. Among the known species of the group, it seems to be most similar to *A. interior* Fjellberg 1985, described from the inner parts of Alaska. Both species are whitish and have a reduced number of ocelli (3 or less), this being not too common in the group. In addition, both are characterized by the almost identical differentiation of sensilla on *Ant.*4, with *S*1 and *S*2 being clearly thinner than others. Nevertheless, *A. pallens* sp. n. can be reliably distinguished from *A. interior* through the presence of an additional tooth in the apical group on the mandibles (4 + 2 vs 3 + 2 in *A. interior*), the serrate maxillary *L.*1 (vs smooth in *A. interior*), and the significantly longer sensilla on the terga as compared to ordinary setae.

There is also one Palaearctic species of the *weberi*-group, which is even more similar to *A. pallens* sp. n., i.e. *A. parapapillosa* Tshelnokov 1988. It is also white (with dark ocelli), characterized by the mandibles and maxillae identical to those in *A. pallens* sp. n., but shows 4 + 4 clear ocelli and no differentiated sensilla on *Ant.*4. The original description of *A. parapapillosa* was based on a single specimen from the inner Chukotka. A later revision of the holotype (Babenko, 1997) revealed that it was an early juvenile, this explaining the absence of antennal sensilla. Additional uncertainty arose due to the discovery from the same locality of another, similar juvenile with 8 (3 dorsal and 5 lateral) antennal sensilla. Thus, the status of

*A. parapapillosa* remains unclear and it can be distinguished from *A. pallens* sp. n. only by the number of ocelli (4 + 4 coloured ocelli in *A. parapapillosa* vs 2 or 3 barely visible ones in *A. pallens* sp. n.).

There is also one more pale [*Farbe reingelb bis braungelb im Leben und fast reinweiss im Alkohol* (Yosii, 1954, p. 137)] species with 3 + 3 ocelli in the neighbouring regions, namely, *A. trioculata* Kinoshita 1916, from Japan. It appears to be a member of the unrelated *hammerae*-group in having strongly differentiated setae, even though the sole available illustration of its chaetotaxy (Yosii, 1956, fig. 6) is too schematic for a definite conclusion. In any case, *A. trioculata* is larger (up to 3 mm) and has more lobes in *PAO* (25–32 vs 15–18 in *A. pallens* sp. n.), 5 teeth on the mandibles (6 in *A. pallens* sp. n.), and all maxillary lamellae are clearly serrate.

Yosii (1972), when recording *A. papillosoides* (Hammer 1953) from Hokkaido (North Cirque, Mt. Poroshiri), noted that *one example at hand coincides well with Hammer's description, but the body colour is totally white* (ibid., p. 80). Thus, this form cannot be excluded to be the same as or closely related to *A. pallens* sp. n. or some other whitish species of the *weberi*-group described in the present paper.

**Distribution.** Known from two different sites (coniferous and oak woods) within a territory of Sikhote-Alin State Nature Reserve.

***Anurida armifera* Babenko, Shveenkova  
et Kuznetsova sp. n.**

Figs 2, 2–3; 2, 5–7; 3, 6–9

**Diagnosis.** A dark coloured species of the genus *Anurida* with 4 + 4(3) ocelli, six usual blunt sensilla on *Ant.*4, roundish *PAO* with 12–16 lobes, the mandibles with 7(6) + 2 teeth set in a line, and maxillary *L.*3 bearing several strong hooks.

**Type material.** Holotype, female on slide, Far-East of Russia, South Primorye, Ussuriisky Nature Reserve, Komarovskoye Forest District, Turova Nipple, Khripunovsky Pass [N 43.6481°, E 132.3515°], 207 m alt., *Pinus sibirica* forest on slope, litter, 22.07.2016, leg. N. Kuznetsova and M. Potapov. Paratypes, 2 females and 3 juveniles, same site and date; one female, same State Reserve, Suvarovskoye Forest District, Anikinsky Station, valley of Anikin River [N 43.6684° E 132.4985°], 156 m alt., broadleaf wood with *Pinus sibirica*, litter, 13.08.2017, leg. N. Kuznetsova, A. Geraskina and A. Kuprin. The types are kept in the collection of MSPU.

**Additional material.** About 25 juvenile specimens from the same sites.

**Description.** Length without antennae 1.8–2.0 mm. Colour probably dark blue but only partly cleared specimens available. Body shape as in species of *weberi*-group, wide and flattened, *Abd.*6 rounded,

practically hidden under *Abd.5*. Integument granulation coarse and almost uniform.

Ocelli present, 4 + 4(3), anterior pair clearly larger than skin granules and easily detectable, posterior ocelli smaller and hard to detect, especially median one. *PAO* roughly circular or slightly elongate, with 10–16 lobes. Antennae clearly shorter than head, of typical generic shape. *Ant.4* with 3-lobed apical bulb, 6 usual curved sensilla, those in lateral group (*S7* and *S8*) usually thicker than dorsal sensilla (*S1–S4*), subapical *ms* and organite present (Fig. 3, 6). *AO* on *Ant.3* typical, outer sensilla widely separated, small *ms* present ventrally. *Ant.1–2* with 8 and 13 setae, respectively, dorsal setae on *Ant. 1–3* significantly shorter than ventral ones. Labral formula as usual (4/2-3-5-2). Labium with 11 setae on each side including three setae on its apical part also armed with two small sensillar papillae. Mandibles (Fig. 3, 7) with 6–8 small apical teeth set in line and 2 larger basal ones. Maxillary capitulum with 3 apical teeth on main part followed by straight cutting edge, fine, hardly detectable *L.1* (not clearly seen), rather long *L.2* reaching well beyond tip of capitulum, and *L.3* with several strong hooks (Fig. 3, 8).

Common dorsal setae fine and short, differentiated into macro and microsetae only on *Abd.6* (and also on abdominal sterna), sensilla thin and long, 6–7 times longer than ordinary setae, lateral microsensilla (*ms*) present on *Th.2*. Dorsal chaetotaxy as typical of *weberi*-group (Figs 2, 2–3), but abnormalities and asymmetry in seta position rather frequent. Main characteristics: tergum of *Th.1* with 3 + 3 setae. *Th.2–3* with seta *p2* slightly posteriorly to *p1*, sensilla (*p3*) clearly moved forward and set practically at level with setae *m4*, only three setae (*a1*, *a3*, and *a5*) of *a*-row present (Fig. 2, 2). *Abd.1–4* with 3 + 3 *p*-setae between sensilla (*p4*) and three widely separated setae in *a*-row (*a1*, *a3*, and *a5*), sensilla in anterior position well in front of *p3–p5* line. *Abd.5* with only 2 + 2 setae (*a1* and *p1*) between sensilla (*p3*). Differentiation of setae on *Abd.6* as on Fig. 2, 5. Thoracic sterna without setae. Ventral tube usually with 4 + 4 setae. Furca remnant as two small parts, each with one seta and few setulae, in anterior part of *Abd.4* sternum (Fig. 2, 6–7).

Legs 1–3 chaetotaxy as following: upper subcoxae – 1, 2, 2; lower subcoxae – 0, 2, 2; coxae – 3, 6(7), 6(7); trochanters – 6, 6, 6 (one posterior seta on trochanter of Leg 3 clearly thinner and shorter than others); femora – 13, 12, 11; tibiotarsi – 19, 19, 18 setae, respectively. Tibiotarsal setae rather long, especially inner ones of *B*-whorl (Fig. 3, 9). Unguis usually with small tooth in middle of inner edge, sometimes hardly visible.

**E t y m o l o g y.** Named after the numerous mandibular teeth, from the Latin *armifer*, meaning armed.

**A f f i n i t i e s.** Taking into account an arrangement of the dorsal setae and the general body shape of *A. armifera* sp. n. with small roundish *Abd.6* hidden under *Abd.5*, *A. armifera* could be placed in the *weberi*-

group, which is common in the region. Nonetheless, it differs from all other species of the group in having several strong hooks on maxillary *L.3* vs two typical of the group. It is this trait that has been considered as the main diagnostic character of the *weberi*-group by Babenko (2002) and therefore the diagnosis of the group needs revision. The number of hooks on *L.3* in *A. armifera* sp. n. appears to be size/age dependent (smaller/younger specimens have less serrations on *L.3*) and it can well be derived from typical two-hooked lamella of the *weberi*-group.

Another characteristic feature of *A. armifera* sp. n. is the shape of the mandibles with an increased number of teeth, set in a line. A similar type of the mandibles is known only in two Nearctic species: *A. amorita* Folsom 1902 and *A. dentata* Christiansen et Bellinger 1980. The former has also been recorded from the eastern Palearctic by Axelson (1903), but this record seems to be dubious. It differs from *A. armifera* sp. n. in having more ocelli (5 + 5 vs 4 + 4), more lobes in *PAO* (30–40 vs 10–16), all three maxillary lamellae clearly serrate, fine integument granulations and a larger size (up to 4 mm); its chaetotaxy is unknown. *Anurida dentata* also has 5 + 5 ocelli and it is characterized by a pronounced differentiation of dorsal setae on the abdominal tip (see Christiansen, Bellinger, 1980, fig. 245A); its maxillary head with long serrate lamellae also differs from that in *A. armifera* sp. n.

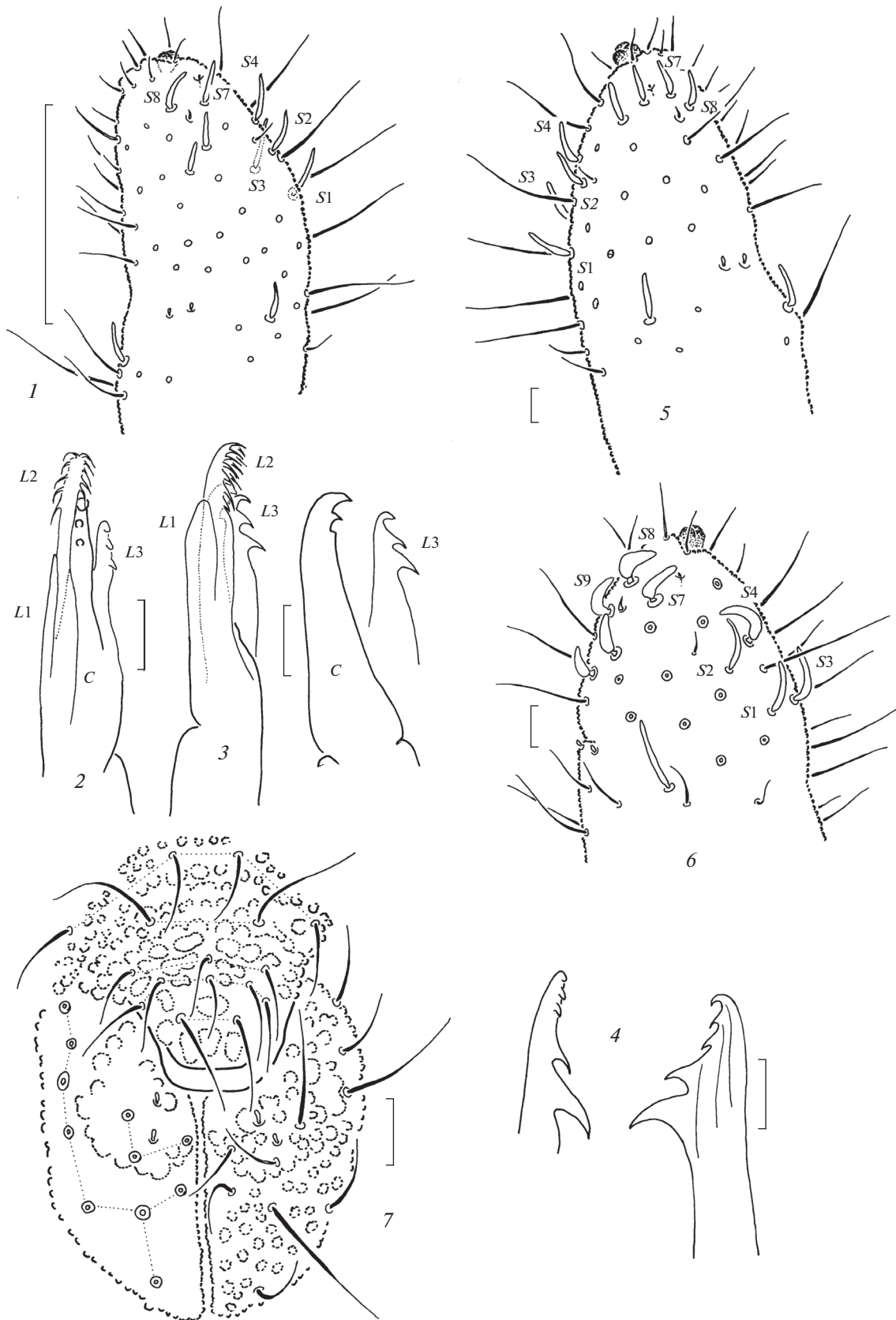
Apart from three species mentioned above, several congeners with multidentate mandibles are known from Japanese caves, for instance, *A. speobia* Yosii 1954, *A. assimilis* Yosii 1956 or *A. persimilis* Yosii 1956, but all of them are blind.

It is also noteworthy that, although such a type of mandibles is not common among the known Palearctic congeners of the *weberi*-group, it has been seen in two undescribed forms from the adjacent region (Kedrovaya Pad Nature Reserve). One of them differs from *A. armifera* sp. n. in having a rather thin maxillary capitulum with two small apical teeth and a blunt tip, *L.2* being barely drawn behind the tip of the capitulum, and *L.3* with several irregular hooks. The other one possesses two-hooked maxillary *L.3*, which is typical of the group, and 5 + 2 teeth on the mandible. Unfortunately, only small juveniles of both these forms are present in the available material, rendering their formal description impossible.

**D i s t r i b u t i o n.** Known only from the Ussurisky State Nature Reserve.

*Anurida multisensillata* Babenko,  
Shveenkov et Kuznetsova sp. n.  
Figs 4, 6–7; 5, 1–3

**D i a g n o s i s.** A white species of the *weberi*-group of *Anurida* characterized by the presence of 4 + 4 ocelli, three additional lateral sensilla on *Ant.4* (totally 9),



**Fig. 4.** *Anurida olae* sp. n. (1–4), *A. weberi* (5), and *A. multisensillata* sp. n. (6–7): 1 – antennal tip; 2–3 – maxilla; 4 – mandible; 5–6 – antennal tip; 7 – labrum and labium. Scales (mm): 1 – 0.1; 2–7 – 0.01.



roundish *PAO* with 15–20 lobes, and the mandibles and maxillae of the most typical type.

**Type material.** Holotype, female on slide, Far-East of Russia, South Primorye, Kedrovaya Pad Nature Reserve [N 43.1010° E 131.5613°], 149 m alt., oak wood, litter, 28.06.2016, leg. N. Kuznetsova and M. Potapov. Paratypes, preadult male, same site, rotten wood; one juvenile, same State Reserve [N 43.1159° E 131.5070°], mixed forest with *Abies holophylla* and *Pinus sibirica*, litter, 29.07.2016, leg. N. Kuznetsova and M. Potapov; preadult male and juvenile, Ussuriisky Nature Reserve, Komarovskoye Forest District, Grabovaya Nipple [N 43.6367°, E 132.3499°], 383 m alt., mixed forest on slope, litter, 24.07.2016, leg. N. Kuznetsova and M. Potapov; one male, same State Reserve, Komarovskoye Forest District, Turova Nipple, Khripunovsky Pass [N 43.6481°, E 132.3515°], 207 m alt., *Pinus sibirica* forest on slope, litter, 22.07.2016, leg. N. Kuznetsova and M. Potapov. The types are kept in the collection of MSPU.

**Additional material.** 12 juveniles from the Ussuriisky State Nature Reserve.

**Description.** Length without antennae 1.0–1.1 mm. Colour white excluding ocular area of head. Body shape typical of *weberi*-group, broadened and flattened, *Abd.6* almost completely hidden under *Abd.5*. Integument granulation coarse and uniform.

Ocelli present, 4 + 4(3), anterior pair distinct, about as large as skin granules, usually colored, posterior ocelli smaller, hardly visible. *PAO* roughly circular or slightly elongate, with 15–20 lobes (Fig. 5, 3). Antennae shorter than head, of typical generic shape. *Ant.4* with 3-lobed apical bulb, subapical *ms* and organite present; sensillar set enriched: 4 usual sensilla (*S1–S4*) present in dorsal group (*S1* and *S2* thinner than *S3* and *S4*) and 5 sensilla laterally (*S7–S9* and two additional sensilla below) (Fig. 4, 6). *AO* on *Ant.3* typical, outer sensilla widely separated, small *ms* present ventrally. *Ant.1–2* with 7 and (12)13 setae, respectively. Labral formula as usual 4/2-3-5-2 (Fig. 4, 7). Labium also typical with 11 setae on each side including three setae on its apical part also armed with two sensillar papillae (Fig. 4, 7). Mandibles with 3 small apical teeth set in line and 2 larger basal ones. Maxillary capitulum with 3 apical teeth on main part followed by straight cutting edge, fine (smooth?) *L.1* (not clearly seen), rather long *L.2* reaching well beyond tip of capitulum, and *L.3* with 2 strong hooks as on Fig. 3, 3.

Common dorsal setae fine and short, differentiated into macro and microsetae only on *Abd.6* (and also on abdominal sterna), sensilla thin and long, 4–5 times longer than ordinary setae, lateral microsensilla (*ms*) present on *Th.2*. Dorsal chaetotaxy typical of the *weberi*-group (Figs 5, 1–2). Thoracic sterna without setae. Ventral tube usually with 4+4 setae. Furca remnant as two small warts, each with one seta and few setulae, in anterior part of *Abd.4* sternum.

Chaetotaxy of legs 1–3 as following: upper subcoxae – 1, 2, 2; lower subcoxae – 0, 2, 2; coxae – 3, 6, 7; trochanters – 6, 6, 6 (one posterior seta on trochanter of Leg.3 clearly thinner and shorter than others); femora – 13, 12, 11; tibiotarsi – 19, 19, 18 setae, respectively. Tibiotarsal setae of rather short, longest inner setae of *B*-whorl about as long as inner unguis edge (1.0–1.1 : 1). Unguis without inner or lateral tooth.

**Etymology.** The name reflects the increased number of antennal sensilla, the main diagnostic trait of the new species.

**Affinities.** *Anurida multisensillata* sp. n. is quite typical of the *weberi*-group in having the most common type of maxillae and mandibles, a typical arrangement of the dorsal setae, and a broadened and somewhat flattened body with a small roundish *Abd.6* partly hidden under *Abd.5* as in the majority of congeners in the group. Nevertheless, *A. multisensillata* sp. n. occupies an isolated position in this complex due to the almost complete absence of colouration and therefore it can be compared to only two known Palearctic species: *A. parapapillosa* Tshelnokov 1988<sup>3</sup> and *A. pallens* sp. n. The presence of additional antennal sensilla further aligns *A. multisensillata* sp. n. with *A. parapapillosa* (more correctly, with *A. cf. parapapillosa* sensu Babenko, 1997). These two latter species differ from *A. multisensillata* sp. n. by showing 6 mandibular teeth (vs 5 teeth in *A. multisensillata* sp. n.) and serrate maxillary *L.1* (apparently smooth in *A. multisensillata* sp. n.).

**Distribution.** Coniferous-broadleaved forests of Ussuriisky Nature Reserve and Kedrovaya Pad Nature Reserve.

*Anurida olae* Babenko, Shveenkova  
et Kuznetsova sp. n.  
Figs 4, 1–4; 5, 4–6

**Diagnosis.** A dark coloured species of the *weberi*-group of *Anurida* characterized by the presence of 4 + 4 ocelli, (1)2 additional lateral sensilla on *Ant.4*, roundish *PAO* with 13–18 lobes, the mandibles with 3 + 2 teeth set in a line, and three hooks on dorsal maxillary lamella (*L.3*).

**Type material.** Holotype, female on slide, North-East of Russia, Magadan Province, about 120 km N of Magadan, upper reaches of Ola River [N 60.65° E 151.27°], larch forest, 830 m alt., 11.08.2011, leg. A. Babenko. Paratypes, two males and three females, same data as holotype. The types are kept in the collection of MSPU.

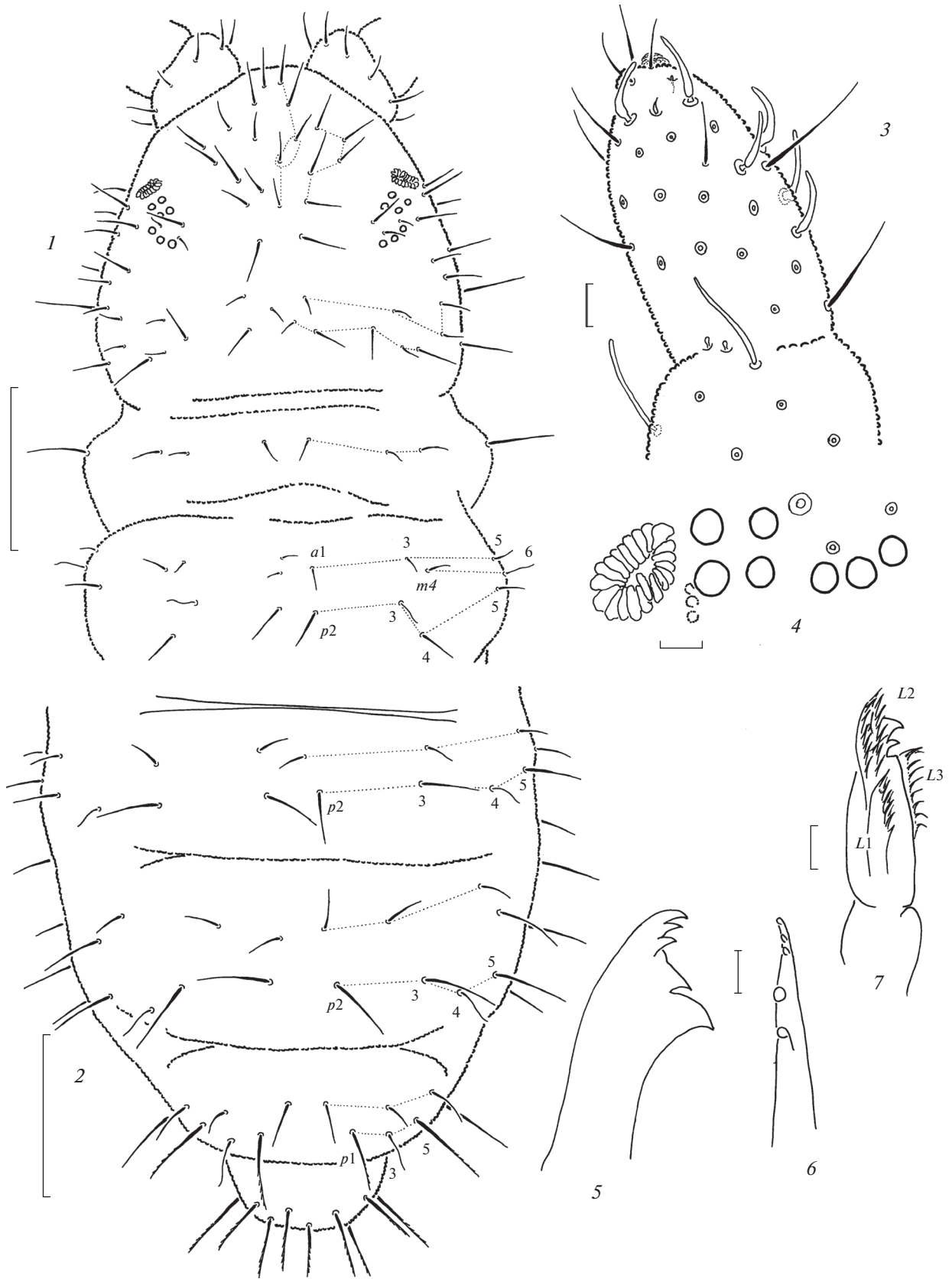
**Description.** Length without antennae 1.6–2.3 mm. Colour dark blue, paler ventrally. Body shape typical of *weberi*-group, widened and flattened,

<sup>3</sup> Described absence of black pigment in this species may well be explained by the juvenile stage (probably I instar) of the holotype (see Babenko, 1997).





**Fig. 5.** *A. multisensillata* sp. n. (1–3) and *Anurida olae* sp. n. (4–6): 1 – dorsal chaetotaxy of *Th.1–3* (lateral view); 2 – dorsal chaetotaxy of abdomen (lateral view); 3 – PAO and ocelli; maxilla; 4 – dorsal chaetotaxy of *Th.2* (lateral view); 5 – dorsal chaetotaxy of *Abd.4–6* (lateral view); 6 – PAO and ocelli. Scales (mm): 1–2, 4–6 – 0.1; 3 – 0.01.



**Fig. 6.** *Anurida elegans* sp. n.: 1 – dorsal chaetotaxy of head and *Th.*1–2; 2 – dorsal chaetotaxy of *Abd.*3–6; 3 – antennal tip; 4 – PAO and ocelli; 5–6 – tip of mandible; 7 – maxillary head. Scales (mm): 1–2 – 0.1; 3–7 – 0.01.

*Abd.6* partly hidden under *Abd.5*. Integument granulation coarse and uniform.

Ocelli present, 4 + 4, anterior pair distinctly larger than skin granules, posterior ocelli slightly smaller, but usually detectable. *PAO* roughly circular with 15–20 lobes (Fig. 5, 6). Antennae shorter than head, of typical generic shape. *Ant.4* with 3-lobed apical bulb, subapical *ms* and organite present; sensillar set enriched: 4 usual sensilla (*S1–S4*) present in dorsal group, two lateral (*S7–S8*) and 1–2(3) additional sensilla below (Fig. 4, 1). *AO* on *Ant.3* typical, outer sensilla widely separated, small *ms* present ventrally. *Ant.1–2* with 7 and 13–14 setae, respectively. Labral formula as usual 4/2-3-5-2, two basal labral setae clearly longer. Labium with 11 setae on each side, three setae of which set on its apical part, two sensillar papillae present. Mandibles with 3 small apical teeth set in line and 2 larger basal ones (Fig. 4, 4). Maxillary capitulum with 2 apical teeth on main part followed by straight cutting edge, smooth *L.1*, rather long *L.2* reaching well beyond tip of capitulum, and *L.3* with 3 clear hooks as on Figs 4, 2–3.

Common dorsal setae fine and short, clearly differentiated into macro and microsetae laterally and ventrally, lateral microsensilla (*ms*) present on *Th.2*. Dorsal chaetotaxy typical of *weberi*-group (Figs 5, 4–5). *Th.2–3* with three setae (*a3*, *a4* and *m4*) in dorso-lateral group above sensilla *p3*. Thoracic sterna without setae. Ventral tube with 5–6(8) setae on each side. Furca remnant as two small warts, each with one seta and few setulae, in anterior part of *Abd.4* sternum.

Chaetotaxy of legs 1–3 as following: upper subcoxae – 2, 3, 3–5; lower subcoxae – 0, 2, 2; coxae – 3, 6, 7; trochanters – 6, 6, 6; femora – 13, 13, 11; tibiotarsi – 19, 19, 18 setae, respectively. Tibiotarsal setae rather long, longest inner setae of *B*-whorl clearly longer than inner edge of unguis (1.5–1.9 : 1). Unguis usually with clear inner tooth.

**E t y m o l o g y.** Named after the type-locality – upper reaches of Ola River.

**A f f i n i t i e s.** *Anurida olae* sp. n. is very similar to *A. weberi* Christiansen et Bellinger 1980 as defined by Fjellberg (1985). Both species have 1–2 additional antennal sensilla, 4 + 4 ocelli, a circular *PAO* with about 15 lobes, the identical dorsal chaetotaxy, the slightly increased number of setae on the subcoxae and *VT*, the long tibiotarsal setae, and the inner tooth on the unguis. The only notable difference between these species is the shape of dorsal maxillary lamella (*L.3*): with two usual hooks in *A. weberi*, vs three such hooks in *A. olae* sp. n. Apart from this, the position of additional antennal sensilla in these two species appears to be slightly different: below *S7* and *S8* in *A. olae* sp. n., vs between the lateral and dorsal groups in *A. weberi* (cf. Fig. 4, 1 and Fig. 4, 5). The stability of the latter difference needs confirmation.

*Anurida olae* sp. n. can also be compared to *A. kolyomensis* Tshelnokov 1988, a similar species of the same

group, characterized by the presence of numerous (up to six) additional antennal sensilla and of the maxillae with serrate *L.1* and two-hooked *L.3*.

Three species of the *weberi*-group described above, *A. pallens* sp. n., *A. armifera* sp. n., and *A. multisensillata* sp. n., can easily be distinguished from *A. olae* sp. n. by the presence of only two setae (*a3* and *m4*) in front of sensilla *p3* on *Th.2–3*, whereas in *A. olae* sp. n. (as well as in *A. weberi* and *A. kolyomensis*) this setal group additionally includes seta *a4* (Fig. 5, 4).

**D i s t r i b u t i o n.** Known only from the type locality.

***Anurida elegans* Babenko, Shveenkova  
et Kuznetsova sp. n.  
Figs 6, 1–7**

**D i a g n o s i s.** A species of the *hammerae*-group characterized by the presence of 7 + 7 ocelli, six usual blunt sensilla on *Ant.4*, an oval *PAO* with about 20 lobes, the mandibles with 3 + 2 teeth, the maxillae with three serrate lamellae, and by the absence of axial setae *p1* on all terga of *Th.2–Abd.4*, as well as of setae *p2* on *Abd.5*.

**T y p e m a t e r i a l.** Holotype, male on slide, Far-East of Russia, Terneyski District, nearby Sikhote-Alin Reserve, Brusnichnaya River (tributary of Kema) [N 45.6482°, E 137.0097°], 228 m alt., valley mixed forest, litter, 6.08.2017, leg. N. Kuznetsova, A. Geraskina and A. Kuprin. Paratypes, immature female, Far-East of Russia, Sikhote-Alin Reserve, Kavalerovski District [N 44.3844°, E 135.3639°], 378 m alt., larch-wood, litter, 9.08.2017; 2 immature males, Far-East of Russia, Sikhote-Alin Reserve, Kabaniy station [N 45.1384°, E 135.8870°], 932 m alt., coniferous wood with *Rhododendrom fauriei*, litter, 8.08.2017, all leg. N. Kuznetsova, A. Geraskina and A. Kuprin. The types are kept in the collection of MSPU.

**D e s c r i p t i o n.** Length of holotype without antennae 1.6 mm. Largest specimen (holotype) with traces of blue pigment all over body, ocelli dark; other available material whitish, usually without dark pigment even on ocular area. Body shape typical of *hammerae*-group, rather slender and elongate, but *Abd.6* rounded and not constricted at base. Integument granulation fine and uniform.

Ocelli present, 7 + 7, anterior group with 4 ocelli (Fig. 6, 4). *PAO* elongate, with 18–24 lobes (Fig. 6, 4). Antennae clearly shorter than head, of typical generic shape. *Ant.4* with large 3-lobed apical bulb, 6 usual curved sensilla, subapical *ms* and organite present (Fig. 6, 3). *AO* on *Ant.3* typical, outer sensilla long and widely separated, small *ms* present ventrally. *Ant.1–2* with 7 and 13 setae, long erect setae on basal segments of antennae only slightly longer (1.2–1.4 : 1) than those on apical ones. Labrum with usual seta set, distributed as 4/2-3-5-2. Apical part of labium with three setae and two small sensillar papillae; its basal part

with 8 usual setae. Mandibles (Fig. 6, 5–6) with 3 small apical teeth set in oblique line and 2 larger basal ones. Maxillary capitulum with 2 apical teeth on main part followed by straight cutting edge and three serrate lamellae, *L.2* reaching beyond tip of capitulum (Fig. 6, 7).

Common dorsal setae straight, rather strong and slightly serrate; their differentiation into macro and microsetae clear only on abdominal tip, sensilla subequal (on thorax) or shorter (on abdomen) than other setae of *p*-rows, lateral microsensilla (*ms*) present on *Th.2*. Dorsal chaetotaxy as on Figs 6, 1–2. Main characteristics: tergum of *Th.1* with 3 + 3 setae. *Th.2–3* without setae *p1*, sensilla (*p3*) in anterior position in front of *p4*, only three setae (*a1*, *a3*, and *a5*) of *a*-row and seta *m4* present (Fig. 6, 1). *Abd.1–4* with 2 + 2 *p*-setae between sensilla (*p4*), i.e. setae *p1* absent on all abdominal terga (Fig 6, 2). *Abd.5* with only 2 + 2 setae (*a1* and *p2*) between sensilla (*p3*). Thoracic sterna without setae. Ventral tube with 4 + 4 setae. Furcal field with few tiny setulae in anterior part of *Abd.4* sternum.

Chaetotaxy of legs 1–3 as following: upper subcoxae – 1, 2, 2; lower subcoxae – 0, 2, 2; coxae – 3, 8, 8; trochanters – 6, 6, 5; femora – 13, 12, 11; tibiotarsi – 19, 19, 18 setae, respectively. Tibiotarsal setae of moderate length and slightly thickened, longest inner setae of *B*-whorl shorter than inner unguis edge (0.8 : 1). Unguis without inner or lateral teeth.

**E t y m o l o g y.** The name derives from the Latin *elegans*, meaning elegant, graceful.

**A f f i n i t i e s.** Fjellberg (1985a) described four definite stages in the reduction of axial chaetotaxy in species of the *hammerae*-group. *Anurida elegans* sp. n. belongs to the most advanced stage 4 with the loss of *p1*-seta on all terga of *Th.2–Abd.4*. The same type of reduction is known only for *A. reducta* Fjellberg 1985 and *A. narli* Fjellberg 1985, the species with 0 + 0 and 3 + 3 ocelli, respectively. Another species, *A. luciae* Fjellberg 1985, described from the upper Kolyma River, Chukotka, has been characterized as having a “weak” stage 4 with *p1* sometimes present on *Th.2–3*. *Anurida elegans* sp. n. shares with the latter species an almost complete set of ocelli (7 + 7) and an identical maxillary structure. Nevertheless, *A. luciae* is clearly larger (up to 2.0 mm) and has more strongly differentiated dorsal setae. Thus, the ratio of macroseta/microsetae in the posteromedial group on the head varies from 4.0 to 4.2 : 1 in *A. luciae* being less than 2.0 : 1 in *A. elegans* sp. n. Apart from this, *A. elegans* sp. n. shows only 3 microsetae on each side of *Th.1* (vs 2 macrosetae and 3–4 microsetae in *A. luciae*), 1 + 1 macrosetae between sensilla *p3* on *Abd.5* (additional *p2* macrosetae are present in *A. luciae*), *PAO* with less than 25 lobes (vs 30–40 in *A. luciae*), the mandible with 2 + 3 teeth (vs 3 + 3 in *A. luciae*), the ventral tube with 4 + 4 distal setae (vs 5 + 5 in *A. luciae*), the longest tibiotarsal setae of *B*-whorl shorter than the inner edge

of the unguis (vs 1.5–1.6 *U*<sub>3</sub> in *A. luciae*), and no inner tooth on the unguis.

A weak reduction of the number of ocelli as in *A. elegans* sp. n. is not typical of the genus. Among 76 congeners listed on [www.collembola.org](http://www.collembola.org) (Bellinger et al., 1996–2018), only *A. luciae* and *A. vontoernei* Nosek 1962 have more than 5 + 5 ocelli. Unfortunately, the available description of the latter European species which has a full number of ocelli is deficient and not fully trustworthy. Nonetheless, *A. vontoernei* seems to be hardly too close to *A. elegans* sp. n. in being smaller (0.6–0.7 mm), intensely coloured and having different maxillae with 4 teeth in the main part, the *PAO* with about ten lobes and only one seta on *VT*.

**D i s t r i b u t i o n.** Sikhote-Alin Reserve and its surroundings.

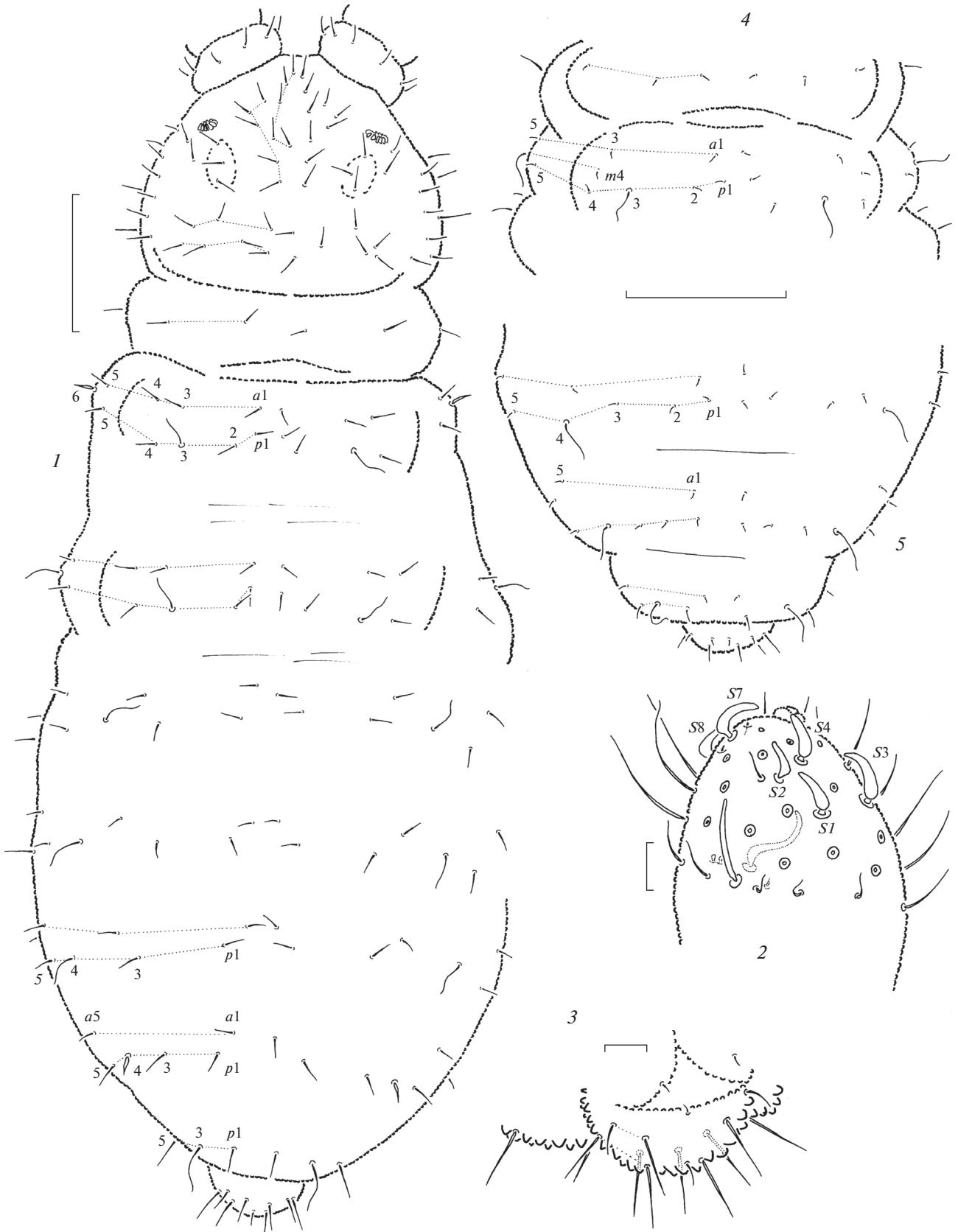
***Anurida longilamellata*** Babenko, Shveenkov  
et Kuznetsova sp. n.  
Figs 7, 1–3; 8, 1–2

**D i a g n o s i s.** A white, blind species of the genus *Anurida* with the common type of mandibles with 3 + 2 teeth and prolonged maxillary *L.2*. It is also characterized by a peculiar chaetotaxy with flame-like sensilla *m6* on *Th.2* and *p4* on *Abd.4*, while setae *p2* on *Abd.1–4* and all setae of *a*-row on *Abd.5* are absent.

**T y p e m a t e r i a l.** Holotype, female on slide, Far-East of Russia, Kedrovaya Pad Nature Reserve, Central shelter [N 43.1147°, E 131.4872°], 119 m alt., northern slope, mixed forest with *Pinus sibirica* and *Abies holophylla*, litter, 27.07.2016, leg. N. Kuznetsova and M. Potapov. Paratypes, one juvenile, same data as holotype; two specimen (sex unknown), same State Reserve, river valley [N 43.1159°, E 131.5070°], 101 m alt., mixed forest with *A. holophylla* and *P. sibirica*, litter, 29.07.2016, leg. N. Kuznetsova and M. Potapov. The types are kept in the collection of MSPU.

**D e s c r i p t i o n.** Length of holotype without antennae 0.9 mm. Colour white. Integument granulation rather coarse and uniform.

Ocelli absent. *PAO* roughly circular, with 9–11 lobes. Antennae shorter than head, of typical generic shape. *Ant.4* with 3-lobed apical bulb (in holotype, in juveniles simple), subapical *ms* and organite present; six usual subequal sensilla (*S1–S4*, *S7* and *S8*) present (Fig. 7, 2). *AO* on *Ant.3* with typical sensorial set, ventral outer sensillum *S*-shaped. *Ant.1–2* with 7 and 12 setae, respectively. Number of prelabral and labral setae: 4/12. Chaetotaxy of labium also typical: three setae and two sensillar papillae (organite) on apical part of labium and eight setae on its basal part. Mandibles rather fine with three small apical teeth set in line and two larger basal ones (Fig. 8, 2). Maxillary capitulum with two apical teeth on main part, probably smooth *L.1* (not clearly seen), thin and long *L.2*, more than twice as long as capitulum, covered by sev-



**Fig. 7.** *Anurida longilamellata* sp. n. (1–3) and *A. aspera* sp. n. (4–5): 1 – dorsal chaetotaxy; 2 – antennal tip; 3 – Abd.6 (ventral side); 4 – dorsal chaetotaxy of Th.1–2; 5 – dorsal chaetotaxy of Abd.3–6. Scales (mm): 1, 4–5 – 0.1; 2–3 – 0.01.



**Fig. 8.** *Anurida longilamellata* sp. n. (1–2) and *A. aspera* sp. n. (3–7): 1 – maxillary head; 2 – tip of mandible; 3 – maxillary head; 4 – tip of mandible; 5 – PAO; 6 – antennal tip; 7 – distal part of leg. Scales 0.01 mm.

eral long filaments, and delicate *L.3* with 2 hooks (Fig. 8, 1).

Common dorsal setae straight, smooth and rather strong, without visible differentiation, sensilla usually thinner and only slightly longer than ordinary setae, those on *Th.2* (*m6*) and on *Abd. 4* (*p4*) clearly shortened and widened, flame-shaped, lateral microsensilla (*ms*) present on *Th.2*. Dorsal chaetotaxy rather spe-

cial (Fig. 7, 1). Main characteristic: *Th.1* with 2 + 2 setae. *Th.2–3* with 3 + 3 axial setae (*a1*, *p1* and *p2*), both *p2* and sensilla *p3* in backward position, at level with *p2–p4* line, four setae present in *a*-row (*a1*, *a3*, *a4*, *a5*), *m4* absent. *Abd.1–4* with 2 + 2 setae between sensilla *p4* (setae *p2* absent). *Abd.5* without *p2* as well as all setae of *a*-row. Differentiation of setae on *Abd.6* as on Fig. 7, 3. Thoracic sterna without setae. Ventral tube

with 4 + 4 setae. Furca remnant as two small warts in anterior part of *Abd.4* sternum, each with one seta.

Legs 1–3 chaetotaxy as following: upper subcoxae – 1, 2, 2; lower subcoxae – 0, 2, 2; coxae – 3, 6, 7; trochanters – 6, 6, 6 (one posterior seta on trochanter of Leg.3 clearly thinner and shorter than others); femora – 12(13), 12, 11; tibiotarsi – 19, 19, 18 setae, respectively. Tibiotarsal setae rather short, longest ones of *B*-whorl as long as or slightly shorter than those of *A*-whorl and about as long as inner edge of unguis. Unguis without inner or lateral tooth.

**E t y m o l o g y.** The species is named after the long and unusual ventral maxillary lamella (*L.2*).

**A f f i n i t i e s.** Among the known species of the genus, *A. longilamellata* sp. n. is obviously most similar to *A. nadezhdae* Babenko 1998, described from the Putorana Plateau, Yenisei River basin, Siberia. Both these species share such unusual features as an *S*-shaped ventral sensillum of *AO* (more common for *Micranurida*) and the maxillae with long and thin *L.2*, as well as two hooks on *L.3* (rare in blind congeners). The main characteristics of the dorsal chaetotaxy of these species are also almost identical. Thus, both species have *Th.1* with 2 + 2 setae, a backward position of *p2* and *p3* on *Th.2–3*, broadened, flame-shaped sensilla *m6* on *Th.2* and *p4* on *Abd.4*, and no *p2* setae on *Abd.1–4*. The new species differs from *A. nadezhdae* in having longer antennal sensilla (*vs* short, hammer-like in *A. nadezhdae*), labial sensorial papillae (not seen in *A. nadezhdae*), a complete set of tibiotarsal setae (seta *M* is absent from *A. nadezhdae*, 18-18-17 tibiotarsal setae totally), and no seta of *a*-row on *Abd.5* (*vs a1* and *a5* present in *A. nadezhdae*).

The Chinese species *A. kazukoae* Tamura 1997 with 2 + 2 setae on *Th.1* and broadened sensilla *m6* on *Th.2* and *m4* on *Abd.4* most probably belongs to the same group. Nevertheless, its maxilla is quite different and there are 3 + 3 *p*-setae between sensilla *p4* on *Abd.1–4*.

An *S*-shaped ventral sensillum in *AO*, 2 + 2 setae on *Th.1*, 2 + 2 *p*-setae between sensilla *p4* on *Abd. 1–4*, and the absence of *a1*-setae on *Abd.5* are also characteristic of the European *A. balatovae* Rusek 1970. Both maxilla and mandible of the latter species appear to differ from those in *A. longilamellata* sp. n.

The maxillary head, surprisingly similar to that of *A. longilamellata* sp. n. and *A. nadezhdae*, is also known for two species from the West-European genus *Rusekella* Deharveng 1982, namely for *R. flagellata* (Arbea et Jordana 1985) and *R. gamae* Arbea et Jordana 1991. Nevertheless, this similarity hardly reflects the close relationship of these species, since *Rusekella*, having a papillate seta *L* on the labium, is believed to belong to another phylogenetic line of Neanuridae (Deharveng, 1982).

**D i s t r i b u t i o n.** Coniferous-broadleaved forests of Kedrovaya Pad State Nature Reserve.

***Anurida aspera*** Babenko, Shveenkova  
et Kuznetsova sp. n.  
Figs 7, 4–5; 8, 3–7

**D i a g n o s i s.** A small, white and blind species of the genus *Anurida* characterized by the usual set of six subequal antennal sensilla, the mandibles with five teeth, of which three apical ones are positioned in an oblique line, the maxillae with a multidentate capitulum and two-hooked *L.3*, and by the presence of 3 + 3 *p*-setae between sensilla *p4* on all terga of *Abd.1–4*.

**T y p e m a t e r i a l.** Holotype, male on slide, Far-East of Russia, Ussuriyskiy Nature Reserve, Komarovskoye Forest District, Grabovaya Nipple [N 43.6367°, E 132.3499°], 383 m alt., mixed forest on slope, litter, 23.07.2016, leg. N. Kuznetsova and M. Potapov. Paratypes, one male, same data as holotype; two males, same State Reserve, Komarovskoye Forest District, Turova Nipple, Khripunovsky Pass [N 43.6481°, E 132.3515°], 207 m alt., *Pinus sibirica* forest on slope, litter, 22.07.2016, leg. N. Kuznetsova and M. Potapov. The types are kept in the collection of MSPU.

**D e s c r i p t i o n.** Length without antennae 0.6–0.8 mm. Colour white. Integument granulation coarse and uniform.

Ocelli absent. *PAO* roughly circular, with 9–11 lobes (Fig. 8, 5). Antennae shorter than head, of typical generic shape. *Ant.4* with 3-lobed apical bulb, subapical *ms*, organite, and six usual subequal sensilla (*S1–S4*, *S7* and *S8*) present (Fig. 8, 6). *AO* on *Ant.3* with typical sensorial set. *Ant.1–2* with 7 and 12 setae, respectively. Number of prelabral and labral setae as usual: 4/12, in single specimen reduced to 4/10. Chaetotaxy of labium also typical: three setae and two sensillar papillae (organite) on apical part of labium and eight setae on its basal part. Mandibles rather fine with three small apical teeth set in oblique line and two larger basal ones (Fig. 8, 4). Maxillary capitulum with two strong apical teeth on main part, followed by disrupt cutting edge forming several irregular teeth, *L.1* not clearly seen (smooth ?), *L.2* with 2–3 irregular rows of long filaments, projecting beyond tip of capitulum, and delicate *L.3* with 2 hooks (Fig. 8, 3).

Common dorsal setae fine and short, without visible differentiation, only sensilla clearly longer, lateral microsensilla (*ms*) present on *Th.2*. Main characteristics of dorsal chaetotaxy (Figs 7, 4–5): *Th.1* with usual 3 + 3 setae. *Th.2–3* with both *p2* and sensilla *p3* in backward position, at level with *p4*, three setae present in *a*-row (*a1*, *a3*, *a5*), and one in *m*-row (*m4*). *Abd.1–3* with complete set of seta: *a1*, *a3*, *a5* and *p1–p5*. *Abd.4* similar but without *a3* setae. Ventral tube with 4 + 4 setae. Furca remnant as two small warts in anterior part of *Abd.4* sternum, each with one seta and 2–3 tiny setulae.

Legs 1–3 with basic set of setae: upper subcoxae – 1, 2, 2; lower subcoxae – 0, 2, 2; coxae – 3, 6, 7; trochanters – 6, 6, 6; femora – 13, 12, 11; tibiotarsi – 19,



19, 18 setae, respectively. Tibiotarsal setae rather short, longest ones about as long as inner edge of unguis. Inner tooth on unguis usually present (Fig. 8, 7), sometimes invisible.

**E t y m o l o g y.** From the Latin word “asper” which means grainy.

**A f f i n i t i e s.** One of the most peculiar characters of *A. aspera* sp. n. is the shape of dorsal maxillary *L.3* with two strong hooks. Such a character is very typical of the *weberi*-group, but among blind congeners *A. aspera* sp. n. shares it with only three described species: *A. sakhensis* Babenko 1997, *A. nadezhdae* Babenko 1998, and *A. longilamellata* sp. n. However, the chaetotaxy of the two latter species (2+2 setae between sensilla *p4* on *Abd.1–4* and flame-like sensilla *m6* on *Th.2* and *p4* on *Abd.4*) is so very special that they can hardly be too close to *A. aspera* sp. n.

As regards *A. sakhensis*, it appears to be very similar to *A. aspera* sp. n. in having the identical mandibles with three apical teeth set in an oblique line (a not very common feature). These two species can be distinguished by a number of fine chaetotic peculiarities. Thus, contrary to *A. sakhensis*, in *A. aspera* sp. n. all dorsal setae are practically identical, not differentiated into macro- and microsetae, setae *a4* on *Th.2–3* are absent, and *Abd.4* with *p2* setae present, but setae *a3* absent. Apart from this, *A. sakhensis* is larger (1.4 mm vs <1.0 mm) and the maxillae appear to be slightly different; ventral *L.1* is probably smooth in *A. aspera* sp. n. vs serrate in *A. sakhensis*.

There are also a number of other blind species of the genus occurring in the eastern Palaearctic, which can be compared to *A. aspera* sp. n. For instance, *A. annatshagi* Tshelnokov 1988, described from the Magadan Area, also shows mandibular teeth arranged in two different planes, but a different maxillary shape and a more strongly reduced chaetotaxy without setae *p2* on *Abd.1–4*. *Anurida subarctica* Fjellberg 1985, another similar blind species widespread in the northern parts of the eastern Palaearctic, is identical to *A. aspera* sp. n. in thoracic chaetotaxy, but that of *Abd.4* is quite different (only 1 + 1 *p*-setae present between sensilla *p4*).

**D i s t r i b u t i o n.** Coniferous-broadleaved forests of Ussuriyskiy Nature Reserve.

#### A key to non-cave Asiatic species of the genus *Anurida*

1. *Th.2–3* with complete set of *p*-setae (*p1–p5* present). With or without dark pigment and ocelli....3

– Setae *p4* on *Th.2–3* absent. White species with uncoloured ocelli..... 2

2. Ocelli 3 + 3. *Th.2–3* with two setae above sensilla *p3*. *Abd.1–4* with 2 + 2 *p*-setae between sensilla *p4*. Maxillary *L.3* serrate..... *alpina* Agrell 1939

= *tundricola* Tshelnokov 1988  
Transpalaearctic

– Ocelli 2 + 2. *Th.2–3* with three setae above sensilla *p3*, i.e. *a3–a4* and *m4* present. *Abd.1–4* with 3 + 3 *p*-setae between sensilla. Maxillary *L.3* with three strong hooks..... *tatiana* Babenko 1997

East Palaearctic

3. Sensilla *p3* on *Th.2–3* moved forward and set in front of setae *p4*. Ocelli present..... 4

– Sensilla *p3* on *Th.2–3* set at a level with or behind setae *p4*. Ocelli usually absent, rarely present..... 26

4. Head with 7 + 7(8) ocelli..... 5

– At most 5 + 5 ocelli..... 6

5. *Th.1* with 2 + 2 macrosetae and few microsetae. *Abd.5* with *p2* present, i.e. 2 + 2 *p*-setae between sensilla *p3*. *PAO* with 30–40 lobes. Mandible with 3 + 3 teeth. Inner tooth on unguis present..... *luciae* Fjellberg 1985

= *macrochaetosa* Tshelnokov 1988

Magadan Province

– *Th.1* with common 3 + 3 microsetae. *Abd.5* without *p2*, i.e. only 1 + 1 *p*-setae present between sensilla *p3*. *PAO* with less than 25 lobes. Mandible with 3 small apical and 2 larger basal teeth. Inner tooth on unguis absent..... *elegans* sp.n.

North Primorye

6. *Th.2–3* with 2 + 2 *p*-setae in the axial group.... 7

– *Th.2–3* with 1 + 1 *p*-setae in the axial group. Ocelli 3 + 3..... *narli* Fjellberg 1985

= *tshuktshorum* Tshelnokov 1988

Nearctic – East Palaearctic

7. *Th.2–3* with *p2* in front of *p1*. Ocelli 5 + 5(4)... 8

– *Th.2–3* with *p2* at a level with or behind of *p1*. Ocelli 5 + 5 or lesser..... 9

8. More than one row of setae on *Th.1*. *Th.2–3* with seta *m5*. *Abd.1–3* with 3 + 3 *p*-setae between sensilla *p4* (microsetae *p1* present). *Abd.4–5* with both *p1* and *p2* present..... *hammerae* Christiansen 1951

= *mandibulata* Tshelnokov 1988;

= *polychaetosa* Tshelnokov 1988

Nearctic – East Palaearctic

– *Th.1* with a common set of setae (3 + 3). *Th.2–3* without seta *m5*. *Abd.1–4* with 2 + 2 *p*-setae between sensilla *p4*, i.e. microsetae *p1* absent. *Abd.5* without seta *p2*..... *beringi* Fjellberg 1985

= *neriensis* Tshelnokov 1988

Nearctic – East Palaearctic

9. Dark coloured species..... 10

– Paler species, diffuse dark pigment on body and ocular plate present or absent..... 22

10. Body with distinct dorsal cuticular tubercles. *Th.2–Abd.5* with both *a1* and *a2* setae (2 + 2 *a*-setae in the axial group)..... *neanuriformis* Babenko 2002

Khakassia

– Body without cuticular tubercles. *Th.2–Abd.5* with only 1 + 1 *a*-setae in the axial group..... 11

11. Common setae fine, short and undifferentiated, only sensilla distinct..... 12

– Dorsal setae strongly differentiated into macro- and microsetae. *Abd.1–4* with 2 + 2 *p*-setae between sensilla (*p3* absent). Mandible with 7 teeth. Maxillary *L.3* serrate..... *tullbergi* Schött 1891

Transpalaearctic

12. Dorsal chaetotaxy clearly plurichaetotic, especially pronounced on lateral parts of a body. Each upper subcoxae of legs 1–3 with more than 10 setae..... *asiatica* Babenko 2002  
East Palaearctic  
– Dorsal chaetom without additional setae. No more than 5 setae on each subcoxae..... 13
13. *Th.*2–3 with only one seta (*a*3) in front of *p*3 sensilla. *Abd.* 1–4 with 2+2 *p*-setae between sensilla *p*4 (*p*3 absent). Mandibles with 4–5 small apical and 2 larger basal teeth. Maxillary *L.*3 with few serrations..... *decemoculata* Hammer 1953  
Nearctic – East Palaearctic  
– *Th.*2–3 with two setae (*a*3 and *a*4 or *m*4) in front of *p*3 sensilla. *Abd.* 1–4 with complete set of *p*-setae (3 + 3) between sensilla *p*4..... 14
14. *Ant.*4 with lateral sensilla *S*7 and *S*8 fused forming arch. *Abd.*5 with 1(2) *p*2-setae.... *papillosa* (Axelson 1902)  
East Palaearctic – [?] Nearctic  
– Lateral sensilla *S*7 and *S*8 on *Ant.*4 free. *Abd.*5 without setae *p*2..... 15
15. *Ant.*4 with some additional sensilla in lateral group..... 16  
– *Ant.*4 with basic set of six sensilla (*S*1–*S*4, *S*7–*S*8)..... 18
16. *Ant.*4 with 4–6 additional sensilla. Maxillary *L.*1 clearly serrate. Ventral tube with 6–7 setae. Upper subcoxae of legs 1–3 with 2–3, 2–4, 4–5 setae..... *kolymensis* Tshelnokov 1988  
East Palaearctic  
– *Ant.*4 with 1–2 additional sensilla. Maxillary lam.1 smooth. Subcoxae with 1–2, 2–3, 2–5 setae..... 17
17. Maxillary *L.*3 with two strong hooks..... *weberi* Christiansen et Bellinger 1980  
Nearctic – East Palaearctic  
– Maxillary *L.*3 with three strong hooks..... *olae* sp. n. Magadan Province
18. Mandible with (6)7 apical teeth followed by two larger basal ones. Maxillary *L.*3 with several strong hooks..... *armifera* sp. n. South Primorye  
– Mandible with 3 + 2 teeth. Maxillary *L.*3 with two hooks..... 19
19. Setae of *m*-row on *Abd.*6 almost as long as macrosetae *p*1..... 20  
– Setae of *m*-row on *Abd.*6 as microsetae, clearly shorter than macrosetae *p*1..... 21
20. Dorsal maxillary *L.*2 passing well beyond tip of capitulum. Intensity of pigmentation on ventral and dorsal sides of a body almost equal..... *palustris* Babenko 1997  
East Palaearctic  
– Dorsal maxillary *L.*2 short, not passing beyond tip of capitulum. Ventral side of a body clearly lighter..... *zanokhae* Babenko 1998  
Mid Siberia
21. Maxilla prolonged, almost styliform, its capitulum with 2 tiny teeth, lamellae short and indistinct..... *confinis* Babenko 1998  
East Palaearctic  
– Maxilla typical of the genus, its capitulum with 4 teeth, lamellae distinct..... *dynkengda* Babenko 1998  
Mid Siberia
22. *Ant.*4 with additional lateral sensilla..... 23  
– *Ant.* 4 with basic set of six sensilla (*S*1–*S*4, *S*7–*S*8)..... 24
23. Mandible with 4 small apical teeth and two larger basal ones..... *parapapillosa* Tshelnokov 1988  
Chukotka  
– Mandible with 3 + 2 teeth.... *multisensillata* sp. n. South Primorye
24. *Th.*2–3 usually with three setae (*a*3, *a*4, *m*4) above sensilla *p*3. Setae *p*1 on *Abd.*5 clearly longer than *a*1..... 25  
– *Th.*2–3 with two setae (*a*3, *m*4) above sensilla *p*3. Setae *p*1 on *Abd.*5 subequal to *a*1..... *pallens* sp. n. North Primorye
25. All teeth on mandible set in a line. Common dorsal setae practically undifferentiated, setae *p*1 clearly longer than *a*1 only on *Abd.*5. Maxillary lam.3 with two hooks..... *azurea* Babenko 1997  
East Palaearctic  
– Apical teeth on mandible set in oblique row. Dorsal setae clearly differentiated, on all terga setae *p*1 longer than *a*1. All three maxillary lamella serrate..... *bondarenkoae* Tshelnokov 1988  
= *jakutica* Tshelnokov 1988  
East Palaearctic
26. Ocelli (4 + 4) and dark pigment on body present..... *papillosoides* (Hammer 1953)  
= *arctica* Tshelnokov 1988  
Nearctic and East Palaearctic  
– Ocelli and pigment absent..... 27
27. *Th.*2–3 with seta *p*2 anterior to *p*1 seta..... 28  
– *Th.*2–3 with seta *p*2 posterior to *p*1 seta..... 30
28. *Ant.*4 with usual lateral sensilla (*S*7 and *S*8)..... *martynovae* Fjellberg 1985  
Nearctic – East Palaearctic  
– *Ant.*4 with one additional lateral sensillum (*S*9)... 29
29. *Th.*2–3 without seta *m*5. Maxillary lam.3 with two strong hooks followed by 1–2 minute teeth..... *similis* Fjellberg 1985  
Nearctic – East Palaearctic  
– *Th.*2–3 with seta *m*5 present in lateral group. All maxillary lamellae clearly serrate.... *kyshyensis* Babenko et Nakamori 2018  
Chukotka
30. *Ant.*4 with additional sensillum (*S*9) in the lateral group..... *polaris* Hammer 1953  
= *frigida* Fjellberg 1973  
= *wrangelenensis* Tshelnokov 1988  
Circumpolar

- *Ant.4* with basic set of sensilla (*S1–S4, S7–S8*)... 31
31. *Th.1* with 2 + 2 setae. Lateral sensilla (*m6*) on *Th.2* and dorsal one (*p4*) on *Abd.4* flame-like..... 32
- *Th.1* with 3 + 3 setae. All lateral and dorsal sensilla long, seta-like..... 34
- *Th.1* with at least 4 + 4 setae. Mandibles very peculiar with strong apical and basal teeth and 3 intermediate oblique, transverse rows of long thin filaments. All three maxillary lamella with long filaments passing well above tip of capitulum..... *abashiriensis*  
Babenko et Nakamori 2018  
Japan
32. *Abd.1–4* with 3 + 3 *p*-setae between sensilla *p4*..... *kazukoae* Tamura 1997  
China
- *Abd.1–4* with 2 + 2 *p*-setae between sensilla *p4*... 33
33. *Abd.5* without *a*-row of setae... *longilamellata* sp. n.  
South Primorye
- Setae *a1* and *a5* on *Abd.5* present..... *nadezhdae*  
Babenko 1998  
Mid Siberia
34. *Th.2–3* with two setae above *p3–p4* line, i.e. *a4* or *m4* absent..... 35
- *Th.2–3* with three setae (*a3–a4* and *m4*) above *p3–p4* line..... 36
35. *Abd.4* with 1 + 1 or 2 + 2 *p*-setae between sensilla *p4*. Mandible with 3 + 2 teeth set in a line..... *subarctica* Fjellberg 1985  
= *tajmyrica* Tshelnokov 1988  
Nearctic – East Palaearctic
- *Abd.4* with 3 + 3 *p*-setae between sensilla *p4*. Mandible with 3 + 2 teeth, three apical ones set in oblique row..... *aspera* sp. n.  
South Primorye
36. All antennal sensilla subequal. *Abd.1–3* usually with *p2* setae. Maxillary *L.3* with two strong hooks..... *sakhensis* Babenko 1997  
East Palaearctic
- One of antennal sensilla (*S3*) clearly thinner. *Abd.1–3* without setae *p2*. Maxillary *L.3* serrate..... *annatshagi* Tshelnokov 1988  
= *balagannakhi* Tshelnokov 1988  
East Palaearctic

Two further insufficiently described Asiatic species are not included in the above key:

*Anurida trioculata* Kinoshita 1916 (Japan): yellow in life and almost white in alcohol, *Ant.4* with 6 long sensilla, 3 + 3 ocelli, *PAO* with 25–32 lobes, mandibles with 5 teeth not set in a line, maxillary head with three strong apical teeth and 2 [?] serrate lamellae, unguis with a clear inner tooth. Dorsal chaetotaxy, according to Yosii (1956): setae strongly differentiated in size, all terga from *Th.2* to *Abd. 5* with 3 + 3 axial setae, middle ones (*m1* in Yosii [= *p2* ?]) much longer. This appears to be a member of the *hammerae*-group despite a posterior position of sensilla on *Th.2* in the single available illustration (Yosii, 1956, fig. 6).

*Anurida tamurae* Yue et Yin 1999 (China): white and blind, *PAO* elliptical with 19–21 lobes, sensilla *p3* on thorax in anterior position, according to fig. 16 in Yue and Yin (1999), abdominal chaetotaxy complete (ibid., fig. 12).

## CONCLUSION

Altogether, 78 species of the genus *Anurida* are listed on www.collembola.org (Bellinger et al., 1996–2018). This number includes two *nomina nuda*: *A. orientalis* Martynova in Stebaeva, 1976 and *A. borealis* Martynova in Stebaeva, 1976, as well as three junior synonyms: *A. frigida* Fjellberg 1973, *A. wrangelensis* Tshelnokov 1988, and *A. mandibulata* Tshelnokov 1988. On the other hand, two Korean cave congeners, *A. decipiens* Yosii 1966 and *A. troglodyta* Lee et Park 2016, are omitted from the list. As a result, altogether with the seven species described in the present paper, the known global diversity of the genus amounts to 82 species, including 13 true troglobionts. A significant part of the remaining 69 non-cave congeners (38 included in the above key and 2 additional ones) are known to occur in Asia, mainly in its fairly boreal parts. This interesting observation obviously needs an explanation and clearly requires further efforts to study the fauna of the region.

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## НОВЫЕ ВИДЫ РОДА *ANURIDA* (COLLEMBOLA, NEANURIDAE) ДАЛЬНЕГО ВОСТОКА РОССИИ

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На основе новых материалов из нескольких районов Дальнего Востока проведена ревизия рода *Anurida*, весьма богатого и разнообразного в рассматриваемом регионе. Приведены описания семи новых видов рода. Четыре из них, а именно *A. pallens* sp. n., *A. armifera* sp. n., *A. multisensillata* sp. n. и *A. olae* sp. n., являются представителями группы *weberi*, распространенной в Сибири и Северной Америке. Они различаются окраской, числом глазков, тонкой структурой ротовых частей и набором сенсилл на усиках. *Anurida elegans* sp. n. — вид берингийской группы *hammerae*, наиболее сходный с *A. luciae* Fjellberg 1985. *Anurida longilamellata* sp. n. похожа на два безглазых азиатских вида, а именно на *A. nadezhdae* Babenko 1998 (Средняя Сибирь) и *A. kazukoae* Tamura 1997 (Китай). *Anurida aspera* sp. n., второй описанный слепой вид, можно сравнить с целым рядом форм, большинство из которых также встречается только в соседних районах восточной Палеарктики. Приведена таблица для определения всех известных не пещерных азиатских видов рода.

**Ключевые слова:** α-таксономия, ногохвостки, Pseudachorutinae, определительный ключ, Восточная Палеарктика