

TWO NEW WATER MITE SPECIES OF THE GENUS *ARRENURUS* DUGÈS, 1834 (ACARIFORMES: HYDRACHNIDIA: ARRENURIDAE) FROM RUSSIA

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[Тузовский П.В. Два новых вида водяных клещей рода *Arrenurus* Dugès, 1834 (Acariformes, Hydrachnidia, Arrenuridae) из России]

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Ключевые слова: *Hydrachnidia*, *Arrenuridae*, *Arrenurus*, водяные клещи, новые виды, Дальний Восток России, Северный Кавказ

Summary: Illustrated descriptions of two water mite species, *Arrenurus kolymaensis* sp. n. and *Arrenurus caucasicus* sp. n., from standing waters of Russia are presented.

Резюме: Иллюстрированное описание двух новых видов водяных клещей *Arrenurus kolymaensis* sp. n. and *Arrenurus caucasicus* sp. n. из стоячих вод России.

INTRODUCTION

The genus *Arrenurus* Dugès, 1834 comprises about 800 species [Smit, 2010]. At present, more than 70 species of this genus are known from Russia and 20 from the Far East of Russia [Sokolow, 1940; Tuzovskij, 1997; Semenchenko, 2008, 2010; Tuzovskij & Semenchenko, 2011]. Investigations of the water mite fauna of the Russian North-East and North Caucasus have yielded two new species from the genus *Arrenurus*, which are described below.

MATERIAL AND METHODS

The material was sampled with a common hand net with 250 µm mesh size. The material was not fixed in Koenike's fluid; permanent slides were made with fresh specimens. Most specimens were not dissected, thus preserving the natural shape of the body. For several males, females and deutonymph the gnathosoma was mounted in a position that allows investigating pedipalp in lateral view. All mite specimens were mounted in Hoyer's medium. The type material is deposited in the research collections of the Institute for Biology of Inland Waters, Borok, Russia (IBIW).

Idiosomal setae and lyriform organs terminology follows Tuzovskij [1987]: *Fch* – frontales chelicerae, *Fp* – frontales pedipalporum, *Vi* – verticales internae, *Ve* – verticales externae, *Oi* – occipitales internae, *Oe* – occipitales externae, *Hi* – humerales internae, *He* – humerales externae, *Hv* – humerales ventralia, *Sci* – scapulares internae, *Sce* – scapulares externae, *Li* – lumbales internae, *Le* – lumbales externae, *Si* – sacrales internae, *Se* – sacrales externae, *Ci* – caudales internae, *Pi* – praeanales

internae, *Pe* – praeanales externae (Figs. 1–2).

Furthermore, the following abbreviations are used: P-1–5, pedipalp segments (trochanter, femur, genu, tibia and tarsus); I-Leg-1–6, first leg, segments 1–6 (trochanter, basifemur, telofemur, genu, tibia and tarsus) i.e. III-Leg-4 = genu of third leg; s – solenidion; L – length, W – width; n = number of specimens measured. The length of the segments was measured along their dorsal margin; all measurements are given in µm.

SYSTEMATIC PART

Family Arrenuridae Thor, 1900

Genus *Arrenurus* Dugès, 1834

Arrenurus (Arrenurus) kolymaensis sp. n.

(Figs. 1–11)

Type series. Holotype: male (2359-IBIW); Russia, Magadan Province, Tenkinsky District, Kolyma River basin, lake on the right bank of the Kolyma River in 50 kms upstream from village Agrobaza; substrates: detritus, silt; depth 0.5–1.0 m; 17.08.1978, leg. P.V. Tuzovskij. Paratypes: 1 male and 3 deutonymphs; same data and locality as holotype, leg. P.V. Tuzovskij. One deutonymph of this species has developed in male, and two deutonymphs have developed in females in laboratory, 8.09.1978.

Male, description. Idiosoma (Fig. 1) wide (ratio L/W 1.13–1.14), with straight anterior margin and convex lateral margins, cauda short and distinctly set off from the remainder of the idiosoma; pygal lobes relatively short and wide and directed more or less posterolaterally. Dorsal shield large, convex anteriorly, bearing setae *Oi* and *Hi* in anterior half,

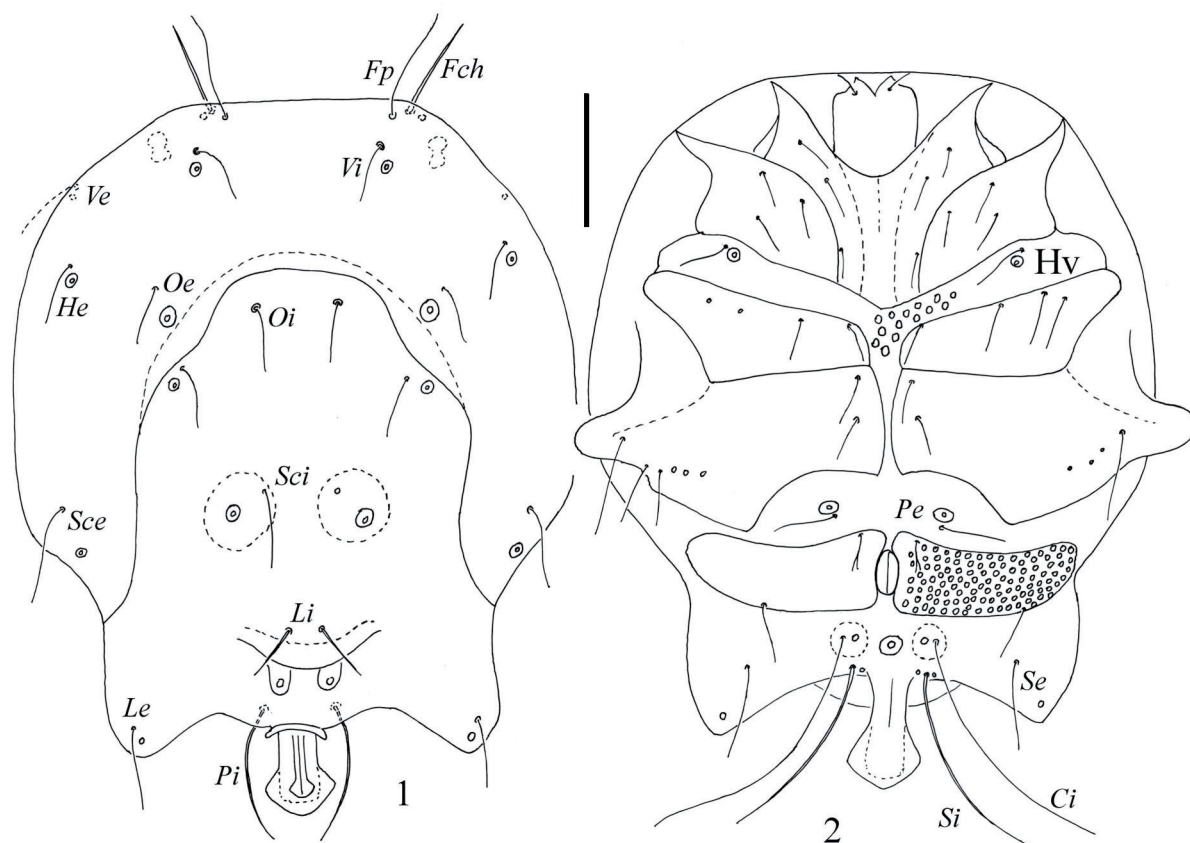


Fig. 1–2. *Arrenurus kolymaensis* sp. n., male: 1 – dorsal view; 2 – ventral view. Scale bar: 200 μ m.

Рис. 1–2. *Arrenurus kolymaensis* sp. n., самец: 1 – дорсальная сторона, 2 – вентральная сторона. Шкала: 200 μ m.

setae and glandularia *Sci* located on somewhat rounded humps near middle of the shield, bases of setae *Li* close together medially near posterior end of the idiosoma, *Le* near distal end of pygal lobes. Dorsal furrow passing onto sides of idiosoma at base of pygal lobes. Setae *Fp*, *Oi* and *Pi* without glandularia, other idiosomal setae associated with glandularia. Distance between setae *Oi*–*Oi* nearly three times shorter than distance between setae *Hi*–*Hi*. Petiole large and elongate, narrowed anteriorly, widest posteriorly, posterior margin of petiole convex, ligulate process elongate, narrow and slightly expanded distally; hyaline membrane weakly developed.

Anterolateral corners of coxal plates I and II pointed, reaching to anterior margins of the idiosoma (Fig. 2). Coxal plates I fused to each other medially, suture line weakly developed and present only in their anterior half. Medial margin of coxal plate III nearly three times shorter than medial margin of coxal plate IV, anterolateral corner of coxal plates III and lateral projection of coxal plates IV with rounded tips, the latter extending beyond the lateral idiosoma margin. Gonopore small; acetabular plates wide and reaching to lateral margins of the idiosoma, with rather numerous acetabula and two fine setae (short bifurcate anteromedial and long posterolateral). Setae *Pi* longer

than petiole, *Si* considerably longer than *Pi*; *Ci* located on somewhat rounded humps, *Si* thicker and shorter than *Ci*. Excretory pore open on small tubercle in the integument between setae *Ci*. Setae *Hv* situated near posterolateral margin of coxal plates II, *Pe* located beyond acetabular plates, setae and glandularia *Se* well separated and located on pygal lobes.

Pedipalp stocky (Fig. 3): P-1 short with a single dorsodistal seta; P-2 thick with short, straight ventral margin, with 7–8 distal setae, all these setae approximately equal in length; P-3 relatively short, with 2 (internal and external) subequal setae; P-4 relatively long, with stout and rather long antagonistic bristle, 2 thin dorsodistal setae and 2 short curved distal setae; P-5 with a single solenidion, 4 thin setae and unequal spines.

Tibia of legs II, genu and tibia of legs III and IV with swimming setae. Genu of leg IV (Fig. 4) large with long and straight distal projection, bearing six relatively short setae; IV–Leg–4 considerably longer than IV–Leg–5; claws of leg I–III (Fig. 5) with 2 thin clawlets, claws of leg IV (Fig. 6) with 2 subequal relatively thick clawlets; claw lamella with straight or slightly convex ventral margin in all claws.

Measurements, n=3. L of idiosoma (except petiole) 885–900, W 775–790; L of petiole 135–140,

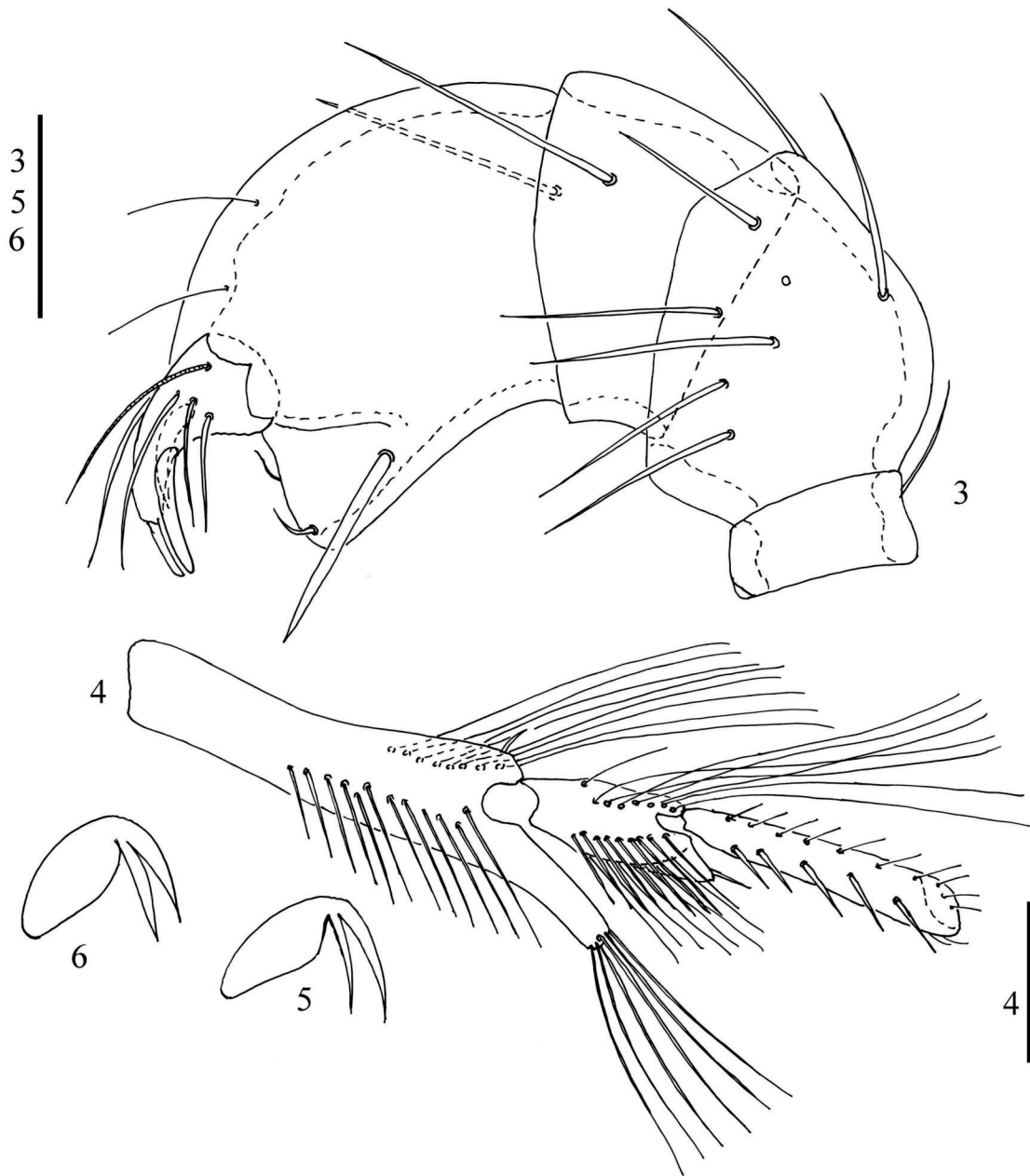


Fig. 3–6. *Arrenurus kolymaensis* sp. n., male: 3 – pedipalp; 4 – genu, tibia and tarsus of leg IV; 5 – claw of leg I, 6 – claw of leg IV. Scale bars: 3 = 50 μ m; 4–6 = 100 μ m.

Рис. 3–6. *Arrenurus kolymaensis* sp. n., самец: 3 – педипальпа, 4 – колено, голень и лапка ноги IV, 5 – коготок ноги I, 6 – коготок ноги IV. Шкалы: 3 = 50 μ m; 4–6 = 100 μ m.

W 100–115; L of dorsal shield 585–650, W 410–465; distance between setae *Oi–Oi* 100–115, distance between setae *Hi–Hi* 330–340, distance between setae *Sci–Sci* 175–190, distance between setae *Li–Li* 37–50; distance between medial margins of coxal plates IV 15–25; L of basal segment of chelicera 135–140, L of cheliceral stylet 90–100; L of pedipalpal segments (P-1–5): 30–35, 70–85, 60–66, 83–105, 36–42; L of leg segments: I–Leg-1–6: 85–100, 110–125, 125–140, 160–190, 150–165, 205–225; II–Leg-1–6: 85–100, 105–125, 140–150, 185–200, 185–190, 210–240; III–Leg-1–6: 110–105, 125–150, 150–165,

215–225, 185–215, 220–265; IV–Leg-1–6: 150–160, 185–225, 215–250, 250–300, 125–150, 150–165, L of distal projection of IV–Leg-4 80–115.

Female. Description is given on two immature females. Anterolateral corners of coxal plates I and II more or less pointed (Fig. 7). Medial margin of coxal plates III 2.4–2.8 times shorter than medial margin of coxal plates IV, posterior coxal groups separated by narrow interspace; anterolateral corner of coxal plates III and lateral projection of coxal plates IV with rounded tips, the latter extending beyond the lateral idiosoma margin.

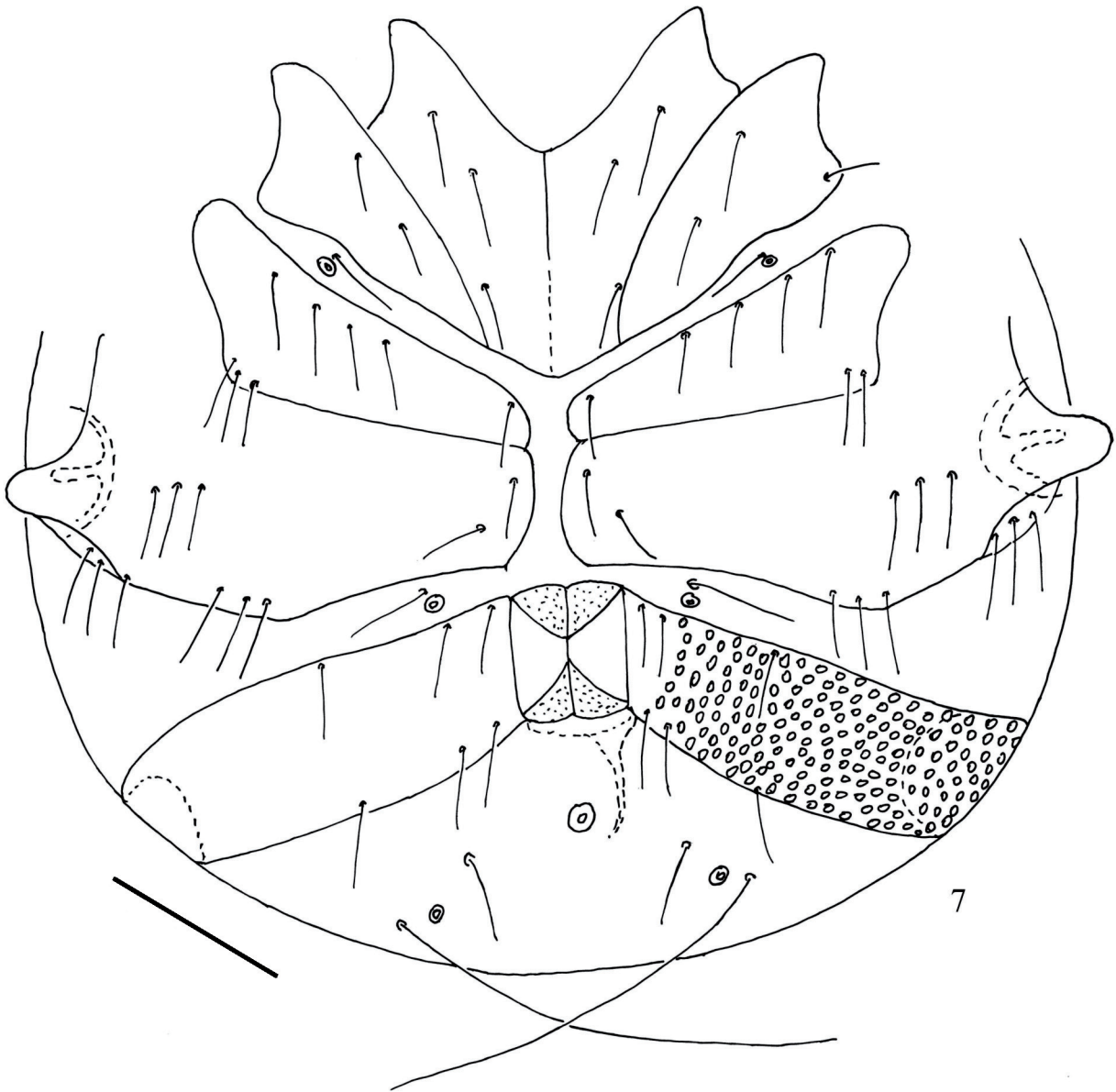


Fig. 7. *Arrenurus kolymaensis* sp. n., female: 1 – dorsal view. Scale bar: 200 μ m.

Рис. 7. *Arrenurus kolymaensis* sp. n., самка: 1 – дорсальная сторона. Шкала: 200 μ m.

Gonopore large (L 140–175), placed posterior to middle of idiosoma; each genital flap with two separate patches, genital flap wider than distance between posterior coxal groups; acetabular plates very wide with 3 anteromedial and 3 posteromedial thin setae; glandularia *Pe* located between posteromedial margin of fourth coxae and genital plates; setae *Pi* nearly five times shorter than *Ci*. Pedipalps as in male but femur with 3 dorsodistal, 1 mediobasal and 1-2 ventrodorsal setae or with 4 dorsodistal and 2 ventrodorsal setae; genu with single mediobasal seta.

Measurements, n=2. L of idiosoma 1060–1190, distance between medial margins of coxal plates IV 53–70; L of genital plates 175–235, W 525–600; L of genital flaps 140–175, W 62–75; L of basal segment

of chelicera 122–135, L of cheliceral stylet 75–97; L of pedipalpal segments (P-1–5): 50–55, 110–115, 65–85, 135–165, 60–65; L of leg segments: I–Leg-1–6: 100–110, 150–185, 185–200, 225–255, 235–265, 260–290; II–Leg-1–6: 110–125, 160–190, 190–220, 265–300, 275–305, 275–305; III–Leg-1–6: 150–165, 160–190, 210–220, 260–315, 260–315, 235–275; IV–Leg-1–6: 175–215, 225–250, 225–275, 310–400, 285–350, 250–340.

Deutonymph. Similar to female, differing mainly by smaller size and external structures of genital field. Anterolateral corners of coxal plates I and II rounded (Fig. 8). Medial margin of coxal plates III twice shorter than medial margin of coxal plates IV, posterior coxal groups with large lateral extensions

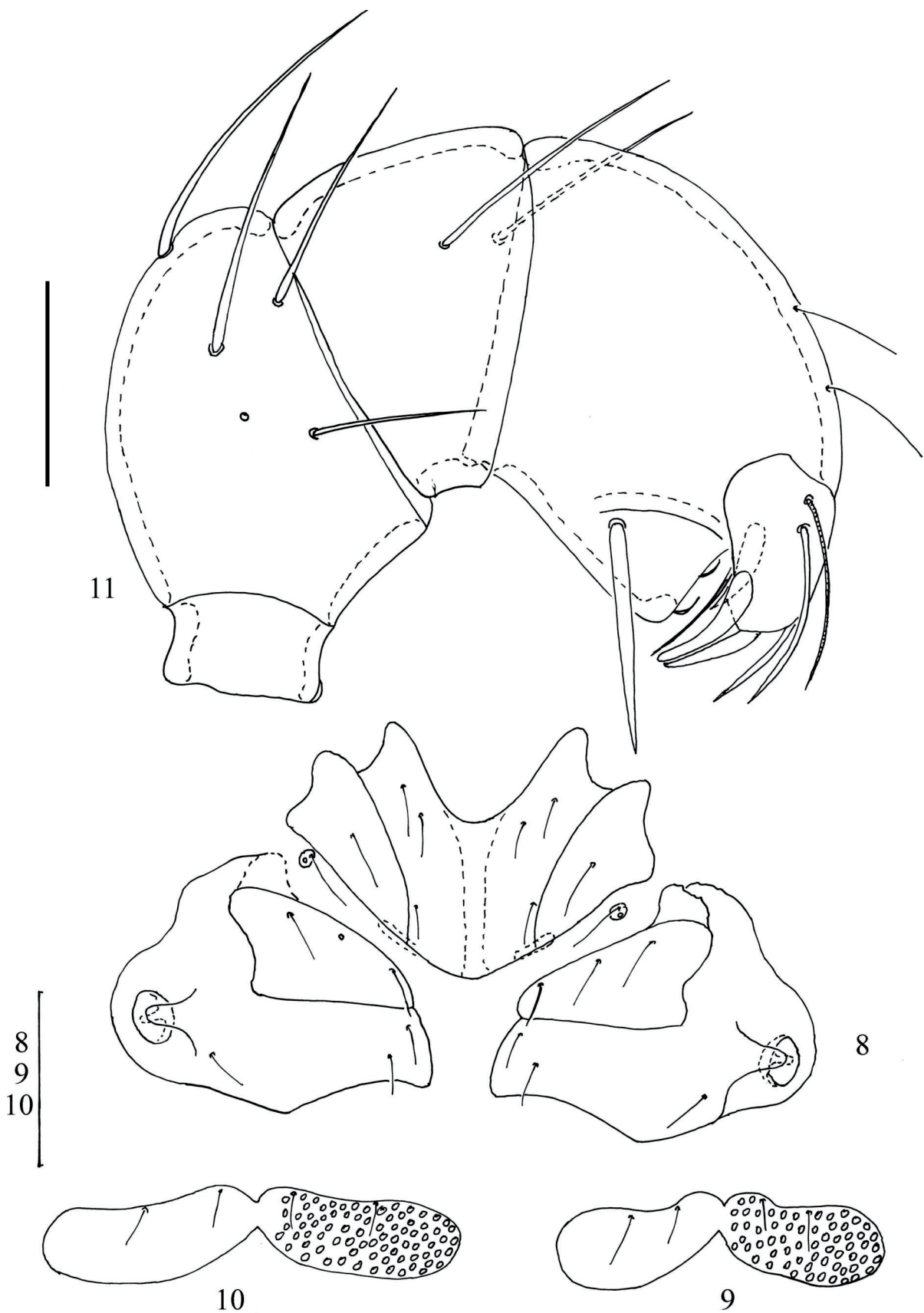


Fig. 8–11. *Arrenurus kolymaensis* sp. n., deutonymph: 8 – coxal plates, 9–10 – genital plates, 11 – pedipalp. Scale bars: 8–10 = 200 μ m; 11 = 50 μ m.

Рис. 8–11. *Arrenurus kolymaensis* sp. n., дейтонимфа: 8 – коксальные пластинки, 9–10 – генитальные пластинки, 11 – педипальпа. Шкалы: 8–10 = 200 μ m; 11 = 50 μ m.

and separated by rather wide interspace.

Gonopore is absent, acetabular plates fused to each other medially, placed posterior to middle of the idiosoma; acetabular plates wide with two anterior setae only (Figs 9–10).

Pedipalp stocky (Fig. 11): P-1 short without dorsodistal seta; P-2 thick with short, straight ventral margin, with 5 distal setae, all these setae approximately equal in length; P-3 relatively short, with two (internal and external) subequal setae; P-4 relatively long, with stout and rather long antagonistic bristle, 2 thin dorsodistal setae and 2 short curved distal setae; P-5 with a single solenidion, 3 thin setae and 3 unequal spines.

Measurements, n=2. L of genital plates 90–95, W 460–470; L of basal segment of chelicerae 120, L of cheliceral stylet 72; L of pedipalpal segments (P-1–5): 23–25, 72–84, 48–60, 95–108, 35–48; L of leg segments: I–Leg–1–6: 50–65, 65–108, 60–100, 90–, 95–, 120–; II–Leg–1–6: 50–65, 65–108, 65–120, 100–, 115–, 125–; III–Leg–1–6: 55–70, 80–110, 70–120, 95–, 115–, 125–; IV–Leg–1–6: 80–102, 85–120, 100–140, 130–185, 140–180, 150–200.

DISCUSSION

The new species is similar to the European species *Arrenurus neumani* Koenike, 1895. The latter species is characterized by the following features: (male) anterior margin of the idiosoma is concave, setae Sci located distally to middle of the dorsal shield, the pygal lobes longer than their bases; (female): the acetabular plates not reaching of the lateral margins of idiosoma, genital flaps with unequal anterior and posterior pairs of patches [Viets, 1936; Cassaghe-Mèjean, 1966]. In contrast, anterior margin of idiosoma in male *A. kolymaensis* sp. n. is straight, setae Sci located near the middle of dorsal shield, the pygal lobes shorter than their bases width; the acetabular plates in female *A. kolymaensis* sp. n. reaching to the lateral margins of idiosoma, the genital flaps with subequal anterior and posterior pairs of patches.

Etymology. The species epithet *kolymaensis* is given after the region where it was collected (Kolyma River basin).

Habitat. Standing waters.

Distribution. Asia: Russia, Far East, Magadan Province.

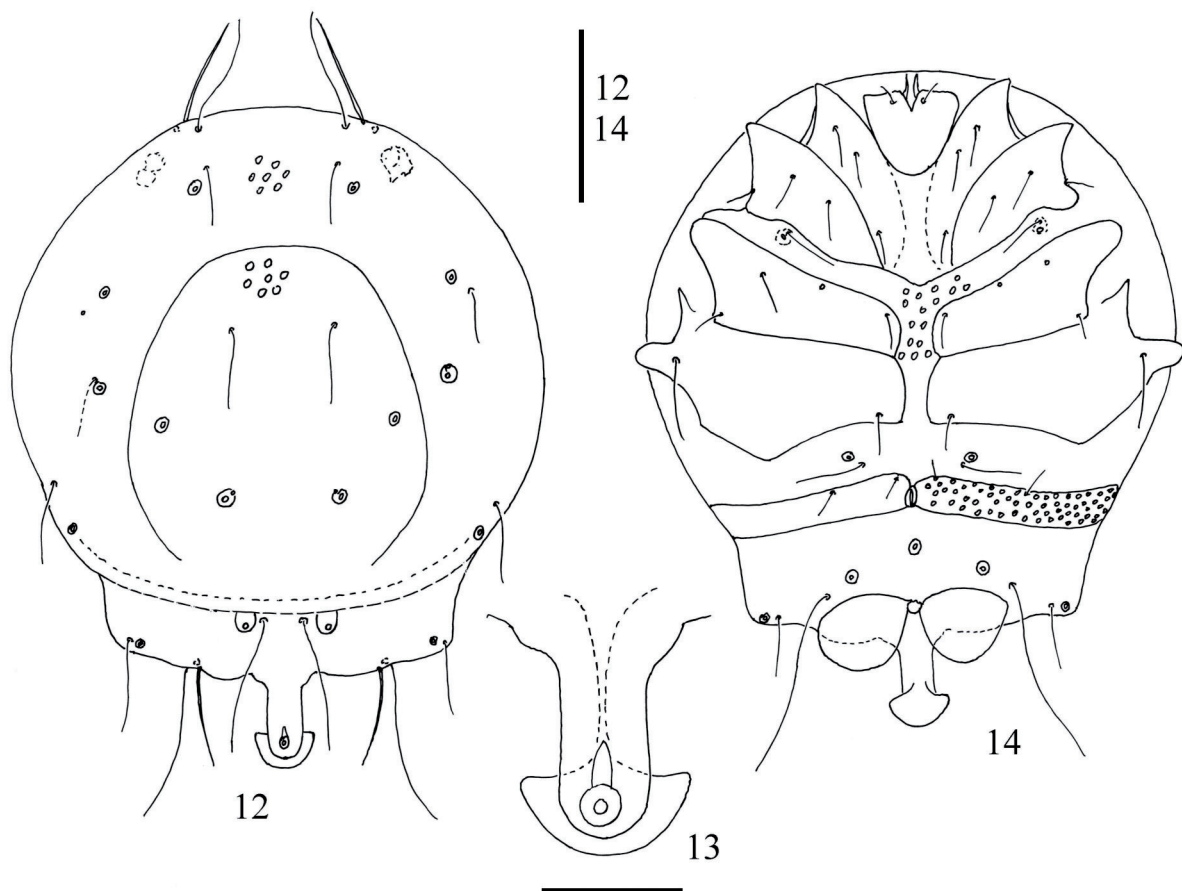


Fig. 12–14. *Arrenurus caucasicus* sp. n., male: 12 – dorsal view; 13 – petiole, dorsal view, 14 – ventral view. Scale bars: 12, 14 = 200 μ m, 13 = 50 μ m.

Рис. 12–14. *Arrenurus caucasicus* sp. n., самец: 12 – дорсальная сторона, 13 – петиолус, дорсальная сторона, 14 – вентральная сторона. Шкалы: 12, 14 = 200 μ m, 13 = 50 μ m.

Arrenurus (Arrenurus) caucasicus sp. n.

(Figs. 12–19)

Type series – Holotype: male (1853–IBIW); Russia, Krasnodar Kray, Seversky District, Ubin River, in 10 kms upstream from settlement Ubinskaya; substrates: stones, gravel, sand; depth 0.5 m; 8 June 1976, leg. P.V. Tuzovskij.

Description. Male. Idiosoma nearly circular (ratio length/width 1.07), cauda short, distinctly set off from the remainder of the idiosoma, pygal lobes not developed (Fig. 12). Setae *Fp*, *Oi* and *Pi* without glandularia, other idiosomal setae associated with glandularia. Setae *Fch* thicker than setae *Fp*. Dorsal

shield bearing setae *Oi*, *Hi* and *Sci*. Dorsal furrow incomplete and ending dorsally beyond base of cauda. Setae and *Li* long, thin, located in anterior portion of cauda. Setae *Si* relatively thick and considerably shorter than *Pi*; *Le* located in posterolateral corners of cauda. Petiole (Fig 13) moderately developed with parallel lateral margins and rounded distally, bearing semicircular appendix ventrally; ligulate process very small, circular distally, and slightly extending beyond posterior margin of petiole; hyaline membrane absent.

Anterolateral corners of coxal plates I and II pointed, reaching to anterior margins of the idiosoma or slightly extending beyond the anterior idiosoma

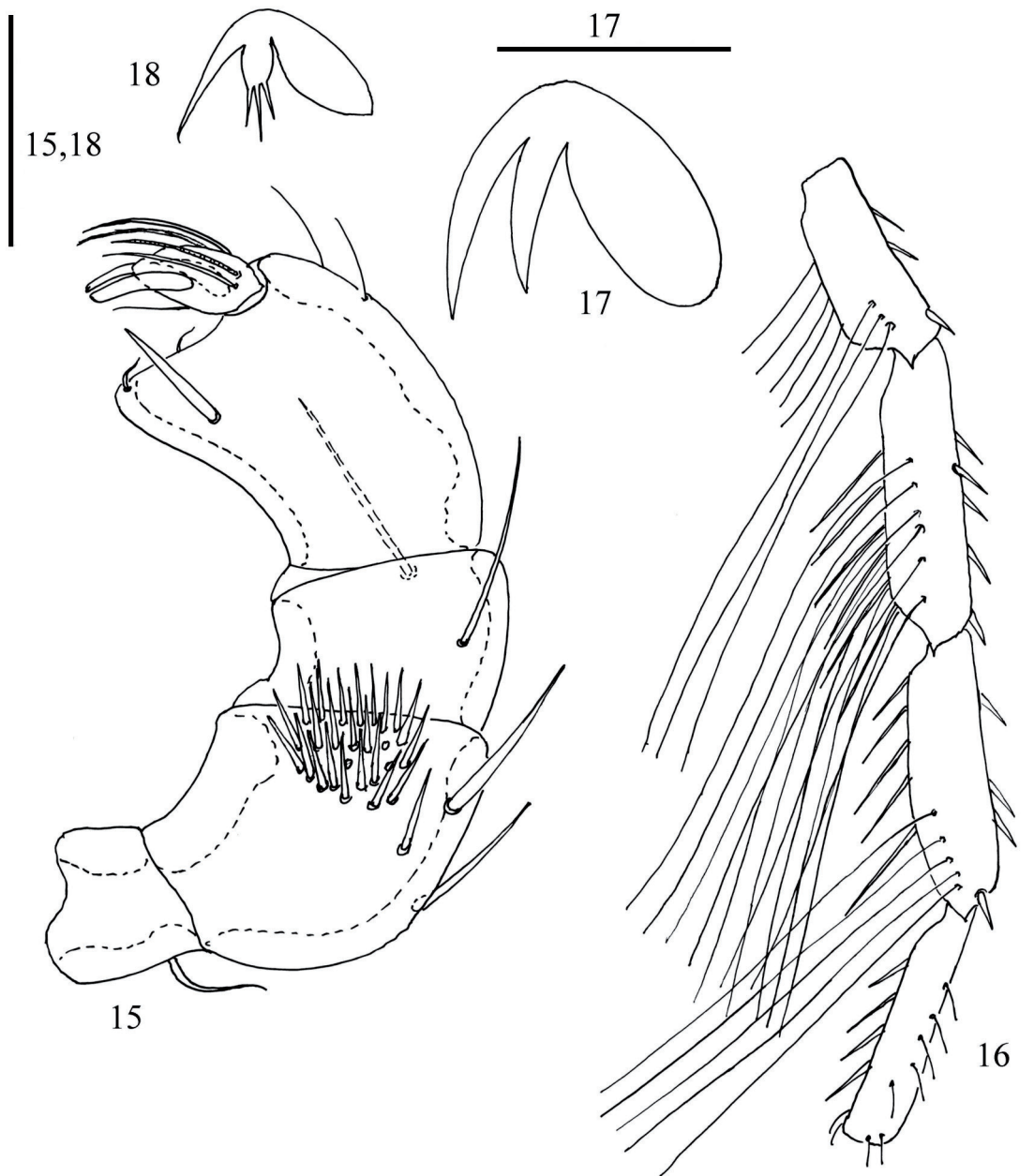


Fig. 15–18. *Arrenurus caucasicus* sp. n., male: 15 – pedipalp; 16 – telofemur, genu, tibia and tarsus of leg IV; 17 – claw of leg IV, 18 – claw of leg I. Scale bars: 15, 18 = 50 μ m, 16 = 100 μ m, 17 = 20 μ m.

Рис. 15–18. *Arrenurus caucasicus* sp. n., самец: 15 – педипальпа, 16 – телофемур, колено, голень и лапка ноги IV, 17 – коготок ноги IV, 18 – коготок ноги I. Шкалы: 15, 18 = 50 μ m, 16 = 100 μ m, 17 = 20 μ m.

margin (Fig. 14). Coxal plates I completely fused to each other medially. Medial margin of coxal plate III shorter than medial margin of coxal plate IV, anterolateral corner of coxal plate III and lateral projection of coxal plate IV with rounded tips, the last extending beyond the idiosoma proper.

Gonopore small and elongate, acetabular plates narrow, and slightly extending onto lateral sides of idiosoma, with numerous acetabula and 2 anterior setae each. Setae *Hv* situated near posterolateral margin of coxal plates II, *Pe* located between coxal plates IV and acetabular plates, seta *Se* and *Ci* located on posterior part of cauda.

Pedipalp normal in size (Fig. 15): P-1 short with a single dorsodistal seta; P-2 thick with concave ventral margin, with 2 relatively long dorsal setae and a patch of numerous short, spine-like mediobasal setae; P-3 relatively short with 2 subequal setae (internal and external); P-4 relatively long with stout and rather long ventrolateral seta, 2 thin dorsodistal setae and 2 very short curved distal setae; P-5 with a single solenidion, 4 thin setae and 3 spines: proximal spine pointed, two distal spines with rounded tips.

Telofemur, genu and tibia of legs II–IV with swimming setae; IV–Leg–4 (Fig. 16) without distal projection; IV–Leg–4, IV–Leg–5 and IV–Leg–6 approximately equal in length; claws of fourth legs with two unequal pointed denticles (Fig. 17), claw of legs I–III (Fig. 18) with long external pointed clawlet and short internal clawlet, which bearing 3 thin unequal projections.

Measurements, n=1. L of idiosoma 575, W 535; L of petiole 84, W 42; L of dorsal shield 375, W 300; distance between setae *Oi–Oi* 95, distance between setae *Hi–Hi* 230, distance between setae *Sci–Sci* 85, distance between setae *Li–Li* 30; distance between medial margins of coxal plates IV 60; L of pedipalpal segments (P-1–5): 27, 63, 36, 66, 27; L of leg segments: I–Leg–1–6: 55, 65, 70, 90, 90, 114; II–Leg–1–6: 55, 75, 70, 95, 108, 120; III–Leg–1–6: 55, 85, 70, 110, 120, 120; IV–Leg–1–6: 80, 100, 90, 110, 120, 115.

Female. Unknown.

Etymology. The species epithet *caucasicus* is given after the region where it was collected (Caucasus).

Habitat. Standing waters.

Distribution. Europe (Russia: Krasnodar Krai).

DISCUSSION

The new species is similar to the European species *Arrenurus albator* Müller, 1776. Male of the latter species is characterized by the following features: anterior margin of idiosoma is concave, the pygal lobes well developed [Viets, 1936; Cassagne-Méjean, 1966]. In contrast, anterior margin of idiosoma in male *A. caucasicus* sp. n. is straight; the pygal lobes are not developed.

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