

DESCRIPTION OF A NEW WATER MITE SPECIES OF THE GENUS *HYGROBATES* (ACARI, HYDRACHNIDIA, HYGROBATIDAE) FROM KAMCHATKA

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ABSTRACT: A description of a new water mite, *Hygrobates kamchatkaensis* from the Kamchatka Peninsula is provided.

KEY WORDS: Water mite, Hygrobatidae, *Hygrobates*, *H. kamchatkaensis*, morphology, larva, deutonymph, female, male.

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INTRODUCTION

The goal of this paper is to describe the larva, deutonymph, female and male of a new water mite species of the genus *Hygrobates* Koch, 1837 from the Kamchatka Peninsula.

Specimens were collected by the author in Azhabachie Lake (Kamchatka). Specimens were not fixed in Koenike liquid. Instead, the slides were made from fresh material. All the specimens were not dissected, thus preserving a natural shape of the body. For several larvae, deutonymphs and adults, the gnathosoma was mounted in the position that allowed investigating pedipalps in the lateral view. To obtain the larvae, the water mites were maintained in laboratory conditions (room temperature, natural day-night sequence). The eggs and larvae, obtained from the female, were kept individually in glass containers, 15 mm in diameter, and 15 mm in height.

Idiosomal setae are named according to 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, *Ai*—anales internae, *Ae*—anales externae.

Furthermore, the following abbreviations are used: P-1–5, pedipalp segments (trochanter, femur, genu, tibia and tarsus); I-Leg-1–5, first leg, segments 1–5 (trochanter, femur, genu, tibia and tarsus) i.e. III-Leg-3=genu of third leg; C1—coxal setae located posteromedially on coxa I, C2—coxal setae located posterolaterally on coxae I, C3—coxal setae located anterolaterally on coxae III, C4—coxal setae located anteriorly on coxae III, L—length; W—width; n=number of specimens measured; all measurements are given in μm .

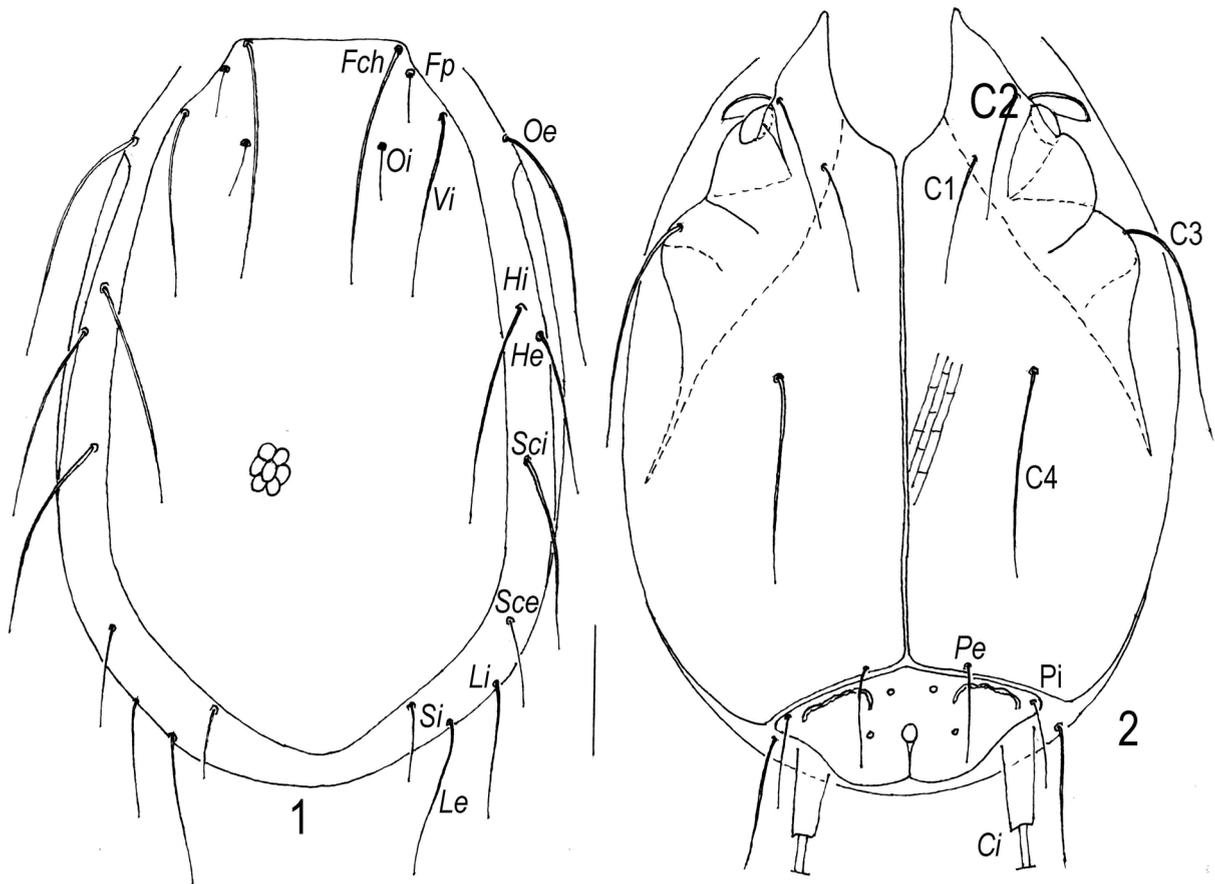
DESCRIPTION

Hygrobates (Hygrobates) kamchatkaensis sp. n.

Figs. 1–24

Type material. Holotype: female, slide 4647, Russia, Kamchatka Province, Azhabachie Lake, 1 July 1983, leg. P.V. Tuzovskij. **Paratypes:** 1 female, 1 male, 3 deutonymphs, from some locality and collection date as holotype. Larvae (n=7) were reared from single female (holotype), the duration of the embryonic period was 13 days.

Diagnosis. *Larva.* Dorsal plate elongate (L/W ratio 1.58–1.70), slightly narrowed in anterior half, setae *Fch* longer than *Vi*, *tmas* on coxae III absent, setae *Pe* slightly longer than *Pi*, number of thickened distal setae on legs segments: I-Leg: 1–1–1–0–0, II-Leg: 0–2–3–4–0, III-Leg: 0–2–4–5–0. *Deutonymph:* integument soft and finely striated; coxal plates I posteromedial margin convex in shape; setae *Fch* short, thick; coxal plate IV subrectangular; P-2 ventral margin straight distally forming a right angle, a few denticles covering distal half or 2/3 of ventral surface of segment; genital field with two elongate plates bearing two acetabula and three short, thin setae each, acetabula well separated on each side; excretory pore unsclerotized and situated slightly anteriorly to flanking setae (*Pi* and *Ci*), I-Leg-5 with two short subequal distoventral setae; II–IV-Leg-5 with single swimming seta each. *Adults:* coxal plate IV subrectangular; P-2 ventral margin straight, distally forming a right angle, denticles covering distal 2/3 of ventral surface of segment; P-4 ventral setae close to each other and situated near the middle of segment; I-Leg-5 with two short subequal distoventral setae; II–IV-Leg-5 with single swimming seta each. *Female:* genital plates elongate, slightly longer than gonopore, medial margin in-



Figs. 1–2. *Hygrobates kamchatkaensis* sp. n., larva: 1—dorsal view, 2—ventral view. Scale bar 50 μ m.

dented near the center, with 23–27 setae each, acetabula subequal in size and located in obtuse triangle. *Male*: genital plate wider than long, anterior margin with a knob-shaped projection, posterior margin indented, with a short rounded median projection, with 27–30 pairs of setae, acetabula 2/3 large on the same level.

Larva. Dorsal plate elongate (L/W ratio 1.58–1.90), in unengorged larvae covering large part of dorsum (Fig. 1), acute anteriorly, slightly narrowed in anterior half posterior end rounded, simple setae (*Fch*, *Vi*) long, thick, unequal, trichobothria (*Fp*, *Oi*) short, thin and subequal; *Fch* longer than *Vi*. Eight pairs of setae (*Oe*, *Hi*, *He*, *Sci*, *Sce*, *Li*, *Le*, *Si*) situated in soft membrane. Setae *Oe* longest, *Hi* and *Sci* almost subequal in length and longer than the other setae situated in the membrane.

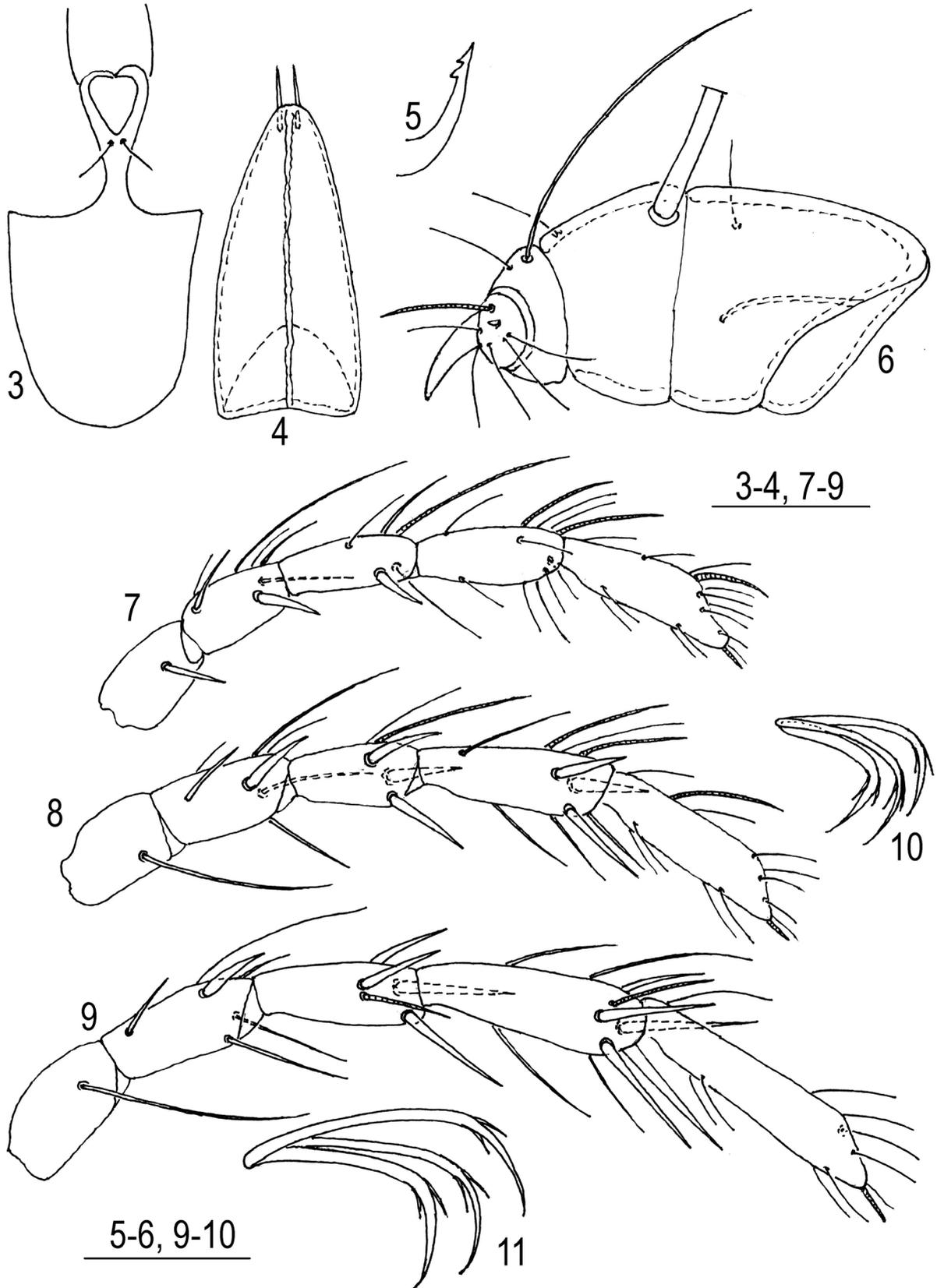
Both of coxal groups separated (Fig. 2). Coxal setae C1 and C2 relatively short and subequal, C3 slightly longer than C4. Transverse muscle attachment scar on coxae III absent. Setae *Pe* slightly longer than *Pi*. Urstigma relatively large, oval. All coxae with reticulated patterns consisting of elongated cells. Setae *Ci* very long, well thickened, situated on long projection. Excre-

tory pore plate wider than long (L/W ratio 0.47–0.50), slightly convex anteriorly, W-shaped posteriorly and with muscle attachment scars anteriorly; excretory pore and bases of setae *Ae* on the same level in the center of plate, bases of setae *Ai* located close to the anterior margin; distance between bases of setae *Ae–Ae* two times longer than between *Ai–Ai*.

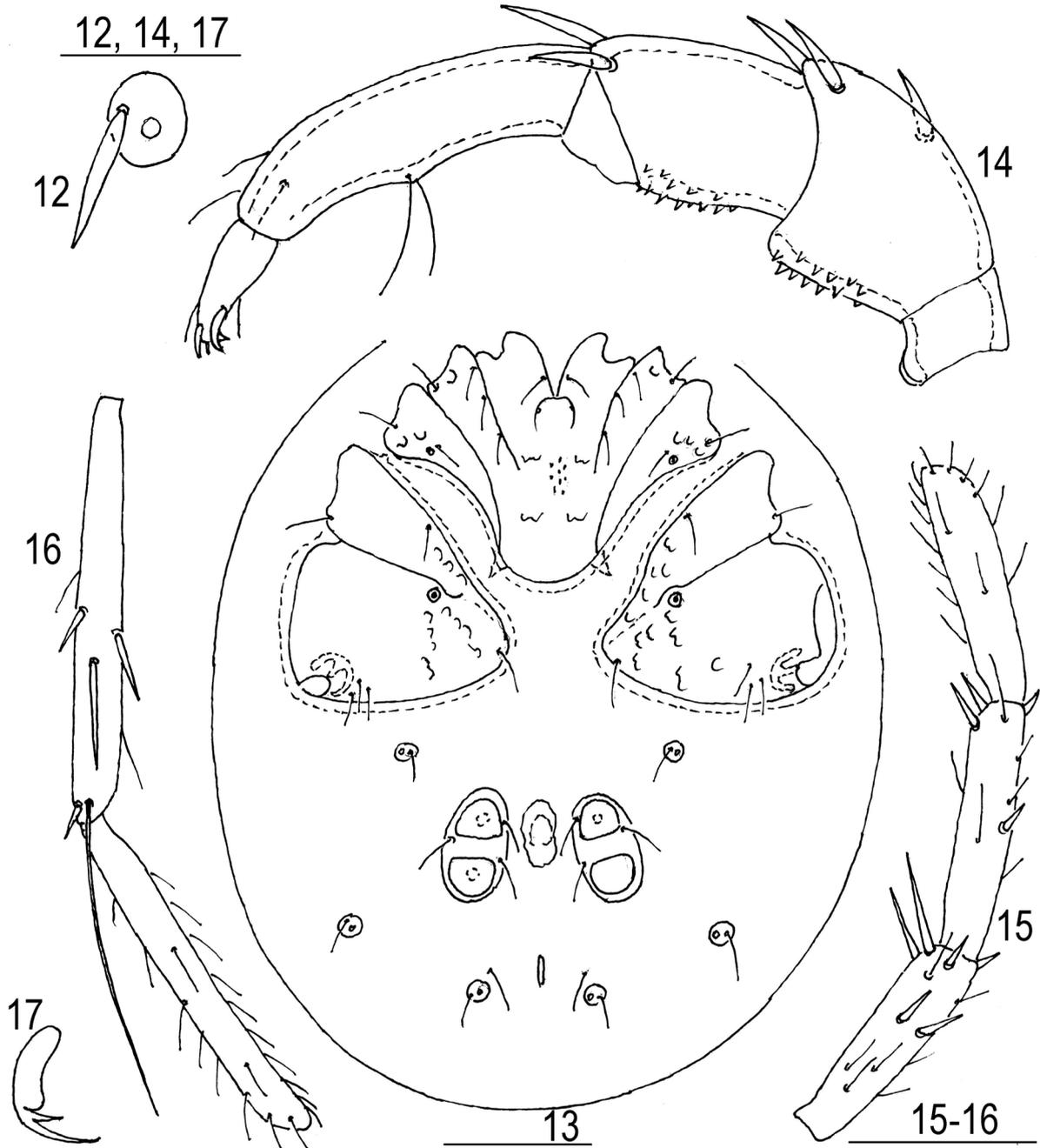
Capitulum (Fig. 3) elongate with relatively wide base and narrow rostrum. Basal part of capitulum longer than rostrum. Dorsal hypostomal setae longer than ventral ones.

Basal segments of chelicerae fused to each other medially (Fig. 4), with slightly convex lateral margins and straight or slightly concave anterior edges. Chela relatively small, crescent-shaped, with two minute subapical teeth (Fig. 5).

Pedipalps stout (Fig. 6): P-1 very short, without setae; P-2 relatively large, with single dorsal seta near middle of segment; P-3 with a very long, thick lateroproximal seta and short, fine dorsoproximal seta; P-4 with two unequal setae and a massive dorsodistal claw; P-5 small, with one rather long solenidion and unequal simple setae, one of them very short.



Figs. 3–11. *Hygrobates kamchatkaensis* sp. n., larva: 3—capitulum, ventral view, 4—chelicera, dorsal view, 5—distal portion of chela, lateral view, 6—pedipalp, lateral view, 7—Leg I; 8—Leg II; 9—Leg III, 10—claws of leg I, 11—claws of leg III. Scale bars 50 μm (3–4, 7–9), 20 μm (5–6, 9–10).

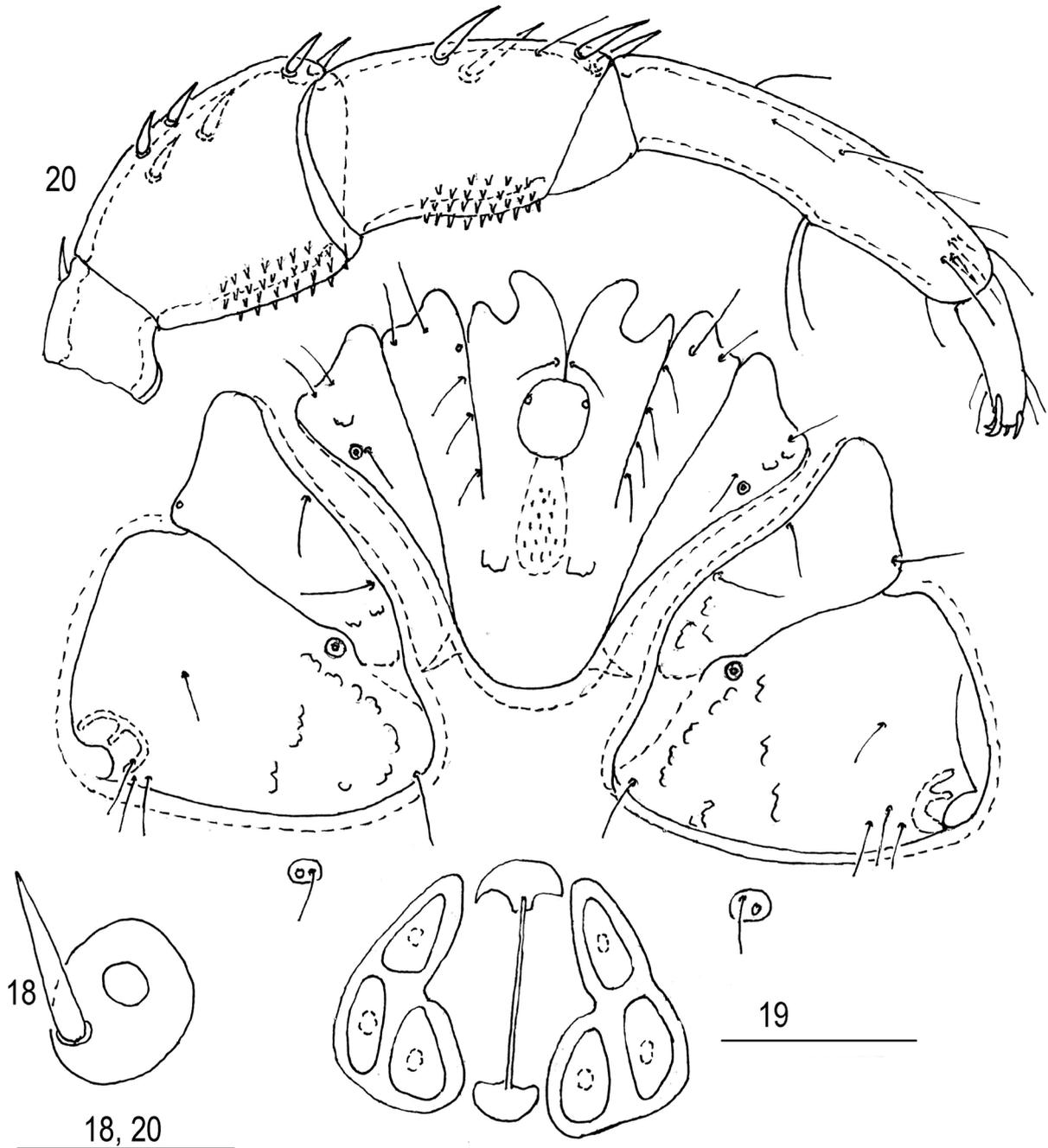


Figs. 12–17. *Hygrobatas kamchatkaensis* sp. n., deutonymph: 12—seta *Fch*, 13—idiosoma, ventral view 14—pedipalp; 15—I-Leg-4–6; 16, IV-Leg-5–6, 17, claw. Scale bars 50 µm (12, 14, 17), 100 µm (13, 15–16).

Shape and arrangement of setae, excluding eupathidia, on legs segments as shown in Figs. 7–9. Number of thickened distal setae from trochanter to tarsus: I-Leg: 1–1–1–0–0, II-Leg: 0–2–3–4–0, III-Leg: 0–2–4–5–0. Claws of legs III (Fig. 11) larger than claws of legs I and II (Fig. 10).

Measurements, n=10. Dorsal plate L 250–260, W 170–160; setae *Fch* L 73–85, *Vi*, *Hi*, *He* L 60–70, setae *Fp* and *Oi* L 16–20, setae *Oe* L 80–87; setae *Vi* L 57–65; setae *Hi* L 70–75, setae *He* L 52–58; setae *Sci* L 58–74; setae *Sc*, *Li*, *Le*, *Se* L 35–48; setae *Si* L 25–32, setae *Ci* L 180–

200, setae *Pi* L 25–29, setae *Pe* L 35–39, setae *C1* and *C2* L 35–42, setae *C3* L 80–90, setae *C4* L 73–85; medial margins of coxae I–III L 175–185; hypostomal bay L 41–48; urstigma L 16–19; excretory pore plate L 44–55, W 102–112; capitulum L 89–93; basal segments of chelicerae L 76–83, chela L 16–17; pedipalpal segments (P-1–5) L: 5–6, 28–32, 22–26, 6–7, 5–6; legs segments L: I-Leg-1–5: 28–32, 35–42, 36–39, 44–48, 48–52; II-Leg-1–5: 32–36, 35–39, 38–42, 51–56, 51–58; III-Leg-1–5: 41–45, 41–45, 44–48, 60–65, 67–71.

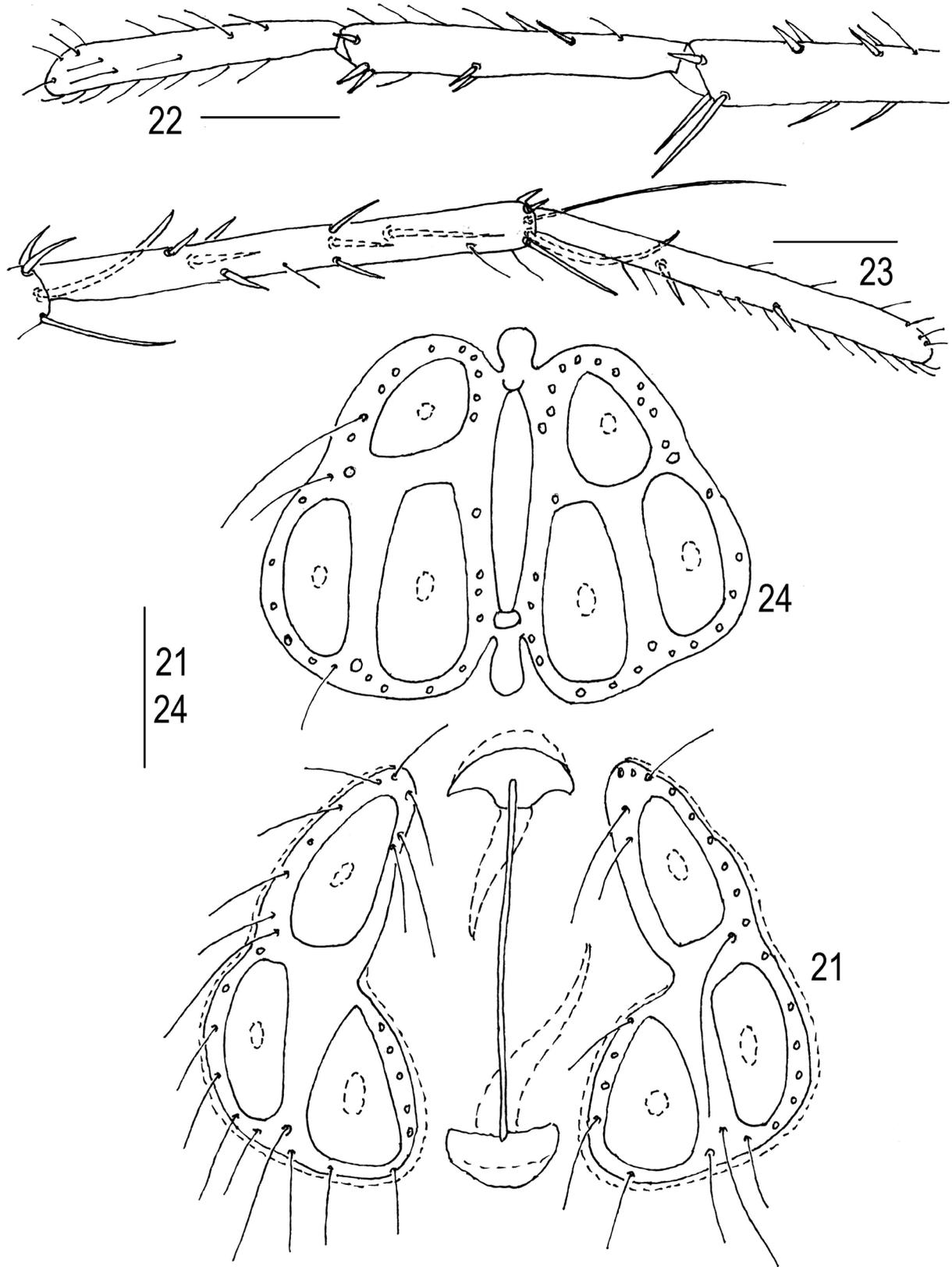


Figs. 18–20. *Hygrobates kamchatkaensis* sp. n., female: 18—seta *Fch*, 19—idiosoma, ventral view; 20—pedipalp. Scale bars 50 μ m (18, 20), 200 μ m (19).

Deutonymph. Integument soft and finely striated. Idiosoma oval and somewhat flattened dorsoventrally. Trichobothria *Fp*, *Oi* and setae *Pi* not associated with glandularia, other idiosomal setae associated with glandularia. Setae *Fch* (Fig. 12) much thicker than other idiosomal setae. Anterior coxal plates with short apodemes, posteromedial margin convexity rounded (Fig. 13). Coxal plate IV subtriangular in shape with rounded medial margin. Genital field with two elongate plates (L/W ratio 1.67–1.85) bearing two acetabula and three

short, thin setae each, acetabula well separated on each side, genital sclerite moderately developed and located between the plates. Excretory pore unsclerotized and situated slightly anteriorly to flanking setae (*Pi* and *Ci*).

Pedipalp moderately long (Fig. 14): P-1 without setae, P-2 with one dorsoproximal seta and two dorsodistal subequal setae, ventral margin straight distally forming a right angle, a few denticles covering distal half or 2/3 of ventral surface of segment; P-3 with two dorsodistal thick unequal setae, ventral



Figs. 21–24. *Hygrobates kamchatkaensis* sp. n., adult: 21, 24—genital field, 22—I-Leg-4–6, 23—IV-Leg-5–6; 21–23—female, 24—male. Scale bars 100 μ m.

margin slightly convex distally, with a few denticles covering distal half or 2/3 of segment; P-4 ventral setae on the same level near middle of segment.

Shape and arrangement of setae on terminal segments of legs I and IV as shown in Figs. 15–16. I-Leg-5 with two short subequal distoventral setae.

II–IV–Leg-5 with single swimming seta each. Claws in all legs with long external clawlet and short internal one, lamella with concave ventral margin (Fig. 17).

Measurements, n=3. Idiosoma L 450–510; seta *Fch* L 30–37; coxal plates I+capitulum mL 160–175; genital plates L 72–80, W 38–48, genital acetabula (ac-1–2) L/W 24–30/27–36, 30/30–42; pedipalp segments (P-1–5) L: 20–24, 60–66, 48–54, 84–90, 29–31; legs segments L: I-Leg-1–6: 42–48, 48–55, 65–72, 95–108, 105–112, 108–115; II-Leg-1–6: 42–48, 50–55, 72–78, 105–115, 128–133, 120–125; III-Leg-1–6: 45–50, 54–66, 78–90, 125–138, 150–162, 144–150; IV-Leg-1–6: 78–90, 72–78, 108–115, 155–168, 174–180, 150–162.

Adults. Integument soft and finely striated. Setae *Fch* (Fig. 18) thicker than others idiosomal setae. Posteromedial margin of coxal plates I rounded (Fig. 19). Coxal plate IV subtriangular in shape, with a slightly nose-rounded protruding medial margin.

Pedipalp (Fig. 20) moderately long: P-1 with single dorsodistal seta; P-2 usually with six thick dorsal setae, ventral margin straight, distally forming a right angle, denticles covering distal 2/3 of ventral surface of segment; P-3 with two dorso-proximal, two dorsodistal thick setae and with single seta ventral margin straight or slightly convex in distal half, denticles covering distal 2/3 of ventral surface segment; P-4 ventral setae close to each other and situated near the middle of segment.

Shape and arrangement of setae on terminal segments of legs I and IV as shown in Figs. 22–23, respectively. I-Leg-5 with two short subequal distoventral setae. II–IV–Leg-5 with swimming seta each.

Female. Genital plates elongate (L/W ratio 1.7–2.0), slightly longer than gonopore, medial margin indented near the center, with 23–27 setae each, acetabula subequal in size and located in obtuse triangle (Fig. 21).

Measurements (n=2). Idiosoma L 1,300–1,600; seta *Fch* L 35–38; coxal plates I+capitulum mL 285–315; genital plates L 205–213, W 100–125, genital acetabula (ac-1–3) L/W 73–75/37–38, 75–80/30–38, 75–88/55–63; cheliceral segments L: base 285–315, chela 150–163; pedipalp segments (P-1–5) L: 37–45, 160–165, 105–115, 175–188, 55–63; legs segments L: I-Leg-1–6: 775–88, 125–130, 160–165, 230–240, 250–265, 225–230; II-Leg-1–6: 80–90, 135–145, 185–200, 260–275, 300–315, 260–275; III-Leg-1–6: 100–105, 155–175, 210–225, 300–340, 350–375, 300–325; IV-Leg-1–6: 195–205, 185–190, 275–290, 380–400, 385–400, 325–360.

Male. Genital plate (Fig. 24) wider than long, anterior margin with a knob-shaped projection, posterior margin indented, with a short rounded median projection, with 27–30 pairs of setae, acetabula in a triangular position, ac-2/3 much larger than ac-1 and on the same level.

Measurements (n=1). Idiosoma L 1,100; seta *Fch* L 45; coxal plates I+capitulum mL 350; genital plate L 185, W 250, genital acetabula (ac-1–3) L/W 55/42, 87/37, 100/50; cheliceral segments L: base 250, chela 125; pedipalp segments (P-1–5) L: 37, 120, 87, 150, 50; leg segments L: I-Leg-1–6: 75, 100, 140, 195, ?, ?; II-Leg-1–6: 87, 112, 162, 235, 260, 360; III-Leg-1–6: 87, 125, 180, 275, ?, ?; IV-Leg-1–6: 160, 160, ?, ?, ?, ?.

Differential diagnosis. The new species is similar to *Hygrobates nigromaculatus* group, which included the following species: *H. nigromaculatus* Lebert, 1879, *H. octoporus* Daday, 1905 and *H. setosus* Besseling, 1942. P-2 ventral margin in all named species straight and without any distoventral protrusion or projection. The larva and deutonymph in *H. octoporus* are unknown. Distinctions between these species in the identification keys are given.

Key to species of the *Hygrobates nigromaculatus* group

Larvae

- 1 (2) Transverse muscle attachment scar on coxa III present (Tuzovskij 2017).....
.....*H. setosus* Besseling, 1942
- 2 (1) Transverse muscle attachment scar on coxa III absent
- 3 (4) Dorsal plate broad with convex lateral margins, I-Leg-2/3 with two heavy distal setae each (Tuzovskij 2017).....
.....*H. nigromaculatus* Lebert, 1879
- 4 (3) Dorsal plate relatively narrow with parallel lateral margins (Fig. 1); I-Leg-2/3 with single heavy distal seta each (Fig. 7).....
.....*H. kamchatkaensis* sp. n.

Deutonymphs

- 1 (2) II–IV–Leg-5 with one swimming seta each (Fig. 16).....
.....*H. kamchatkaensis* sp. n.
- 2 (1) II–IV–Leg-5 without swimming setae
- 3 (4) I-Leg-5 with two unequal distoventral setae (Tuzovsky 2017).....
.....*H. nigromaculatus* Lebert, 1879
- 4 (3) I-Leg-5 with two subequal distoventral setae (Tuzovskij 2017).....
.....*H. setosus* Besseling, 1942

Adults

- 1 (2) Genital field with four pairs of acetabula.....*H. octoporus* Daday, 1905
- 2 (1) Genital field with three pairs of acetabula
- 3 (4) II–IV-Leg-5 with single swimming seta each (Fig. 23).....*H. kamchatkaensis* sp. n.
- 4 (3) II–IV-Leg-5 without swimming setae
- 5 (6) **Both sexes:** I-Leg-5 with two short unequal distoventral setae. **Females:** Median length of the coxal plates I+capitulum relatively short L 300–320 µm, genital plates short L 150–175 µm. **Males:** Ejaculatory complex proximal chamber subrectangular, with straight anterior margin, pair of the rudimentary proximal horns extending to the anterior margin of the proximal chamber; median length of coxal plates I+capitulum L 270–290 µm (Tuzovskij 2017).....
.....*H. nigromaculatus* Lebert, 1879
- 6 (5) **Both sexes:** I-Leg-5 with two short subequal distoventral setae. **Females:** Median length of the coxal plates I+capitulum comparatively long L 330–360 µm, genital plates relatively long L 205–230 µm. **Males:** Ejaculatory complex proxi-

mal chamber oval with convex anterior margin, a pair of rudimentary proximal horns not reaching to the anterior margin of proximal chamber, median length of coxal plates I+capitulum L 330–345 µm (Tuzovskij 2017).....*H. setosus* Besseling, 1942

Etymology. The species is named after the region where it was collected (Kamchatka).

Habitat. Standing waters.

Distribution. Asia (Russia: Kamchatka peninsula).

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