

ON THE SYSTEMATICS OF THE WATER MITE *LEBERTIA USSURIENSIS* SOKOLOW, 1934 (ACARI, HYDRACHNIDIA, LEBERTIIDAE)

Petr V. Tuzovsky

Papanin Institute for Biology of Inland Waters of the Russian Academy of Sciences, Borok, Russia
e-mail: tuz@ibiw.yaroslavl.ru

ABSTRACT: The first description of the larva and deutonymph of *Lebertia ussuriensis* is provided.

KEY WORDS: Water mite, Lebertiidae, *Lebertia ussuriensis*, morphology, larva, deutonymph, female, male.

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INTRODUCTION

The water mite *Lebertia ussuriensis* Sokolow, 1934 was described based on male and female specimens from the Primorye Territory (Sokolow 1934, 1940). The larva and deutonymph of this species were previously unknown. The original description of this species is incomplete and insufficiently illustrated. Recent studies that utilized molecular methods (Martin *et al.* 2010, Pešić *et al.* 2017) showed that the present number of species is underestimated and that more cryptic species can be expected. The aim of the paper is to describe the larva and deutonymph and to characterize the female and male of *L. ussuriensis*.

Specimens were collected by the author and T. Vshivkova in the running waters of the Asian part of Russia. Most specimens were not dissected, thus preserving natural shape of the body. For several female and male larvae, the gnathosoma was mounted in a position that allowed investigating pedipalps and chelicerae in lateral view. To obtain larvae, water mites were maintained in laboratory conditions (room temperature, natural day-night). Eggs and larvae, obtained from females, were kept individually in glass or transparent plastic containers with diameters between 10–15 mm, and a height of 15 mm.

Idiosomal setae are named according to Tuzovsky (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, fe-

mur, 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 posterolaterally on coxae, C4—coxal setae located anteriorly on coxae III, L—length; W—width. N—number of specimens measured; all measurements are given in micrometers (µm). The females were identified using the original descriptions and revisions of Gerecke (2009) and Sabatino *et al.* (2010).

RESULTS

Family Lebertiidae Thor, 1900

Genus *Lebertia* Neuman, 1880

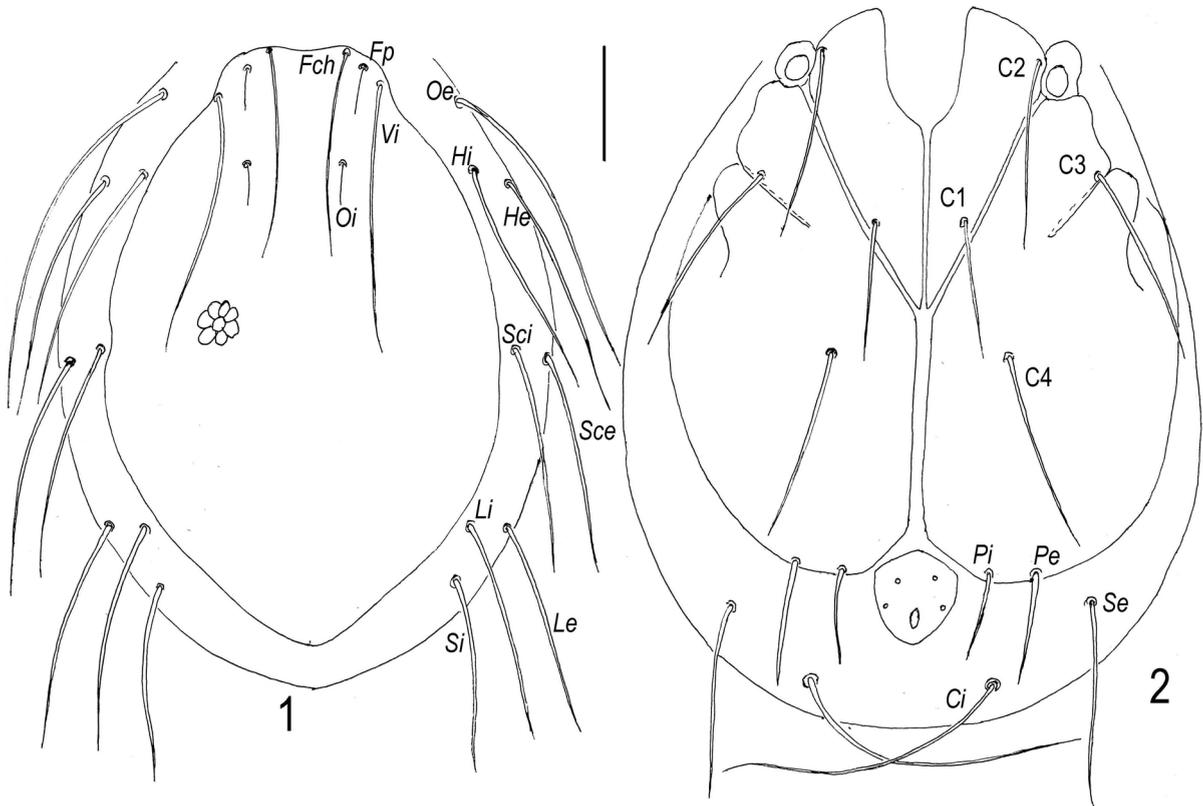
***Lebertia ussuriensis* Sokolow, 1931**

Figs. 1–25

Material examined. 4 females, 4 males, 21 deutonymphs, 9 larvae, Asia, Russia, Kamchatka Province, stream following from Azhabachie Lake, July–August 1983, leg. P.V. Tuzovsky; 1 male, 2 deutonymph, Primorye Territory, Komarovka River, 17.7.1983, leg. T.S. Vshivkova; 3 males, Chukotka, Anadyr District, Belaya stream (inflow of the Anadyr River), 13 September 1987, leg. P. Tuzovsky. Larvae were reared from three females, the duration of the embryonic period was 12–14 days.

Description. Larva. Dorsal plate broad, with convex lateral margins (L/W ratio 1.15–1.40), in unengorged larvae covering large part of dorsum, simple setae long and thick, but setae *Fch* longer than *Vi*, trichobothria *Fp*, *Oi* thin, short and equal in length (Fig. 1). Eight pairs of setae (*Oe*, *Hi*, *He*, *Sci*, *Sce*, *Li*, *Le*, *Si*) situated in soft membrane. All idiosomal setae not associated with glandularia.

Coxal setae C1 shorter than C2, C3 and C4 subequal in length. Idiosomal setae *Pi* shorter than



Figs. 1–2. *Lebertia ussuriensis*, larva: 1—dorsal view, 2—ventral view. Scale bar 50 μ m.

Pe and both setae located at posterior end of coxal plate III on each side. *Ci* longest whip-like and borne on small tubercles (Fig. 2). Urstigma relatively large oval. Excretory pore plate long as wide or slightly longer (L/W ratio 1.0–1.2), excretory pore located near posterior end of plate between bases of setae *Ae*, bases of setae *Ai* located close to anterior margin; distance between bases of setae *Ae–Ae* almost two times longer than distance between *Ai–Ai* (Figs. 3–6). Coxal shield and dorsal plate with cell-shaped reticulations.

Basal segments of chelicerae fused to each other medially (Fig. 7), with slightly convex lateral margins, their anterior edges concave. Chela small crescent-shaped with two minute subapical teeth.

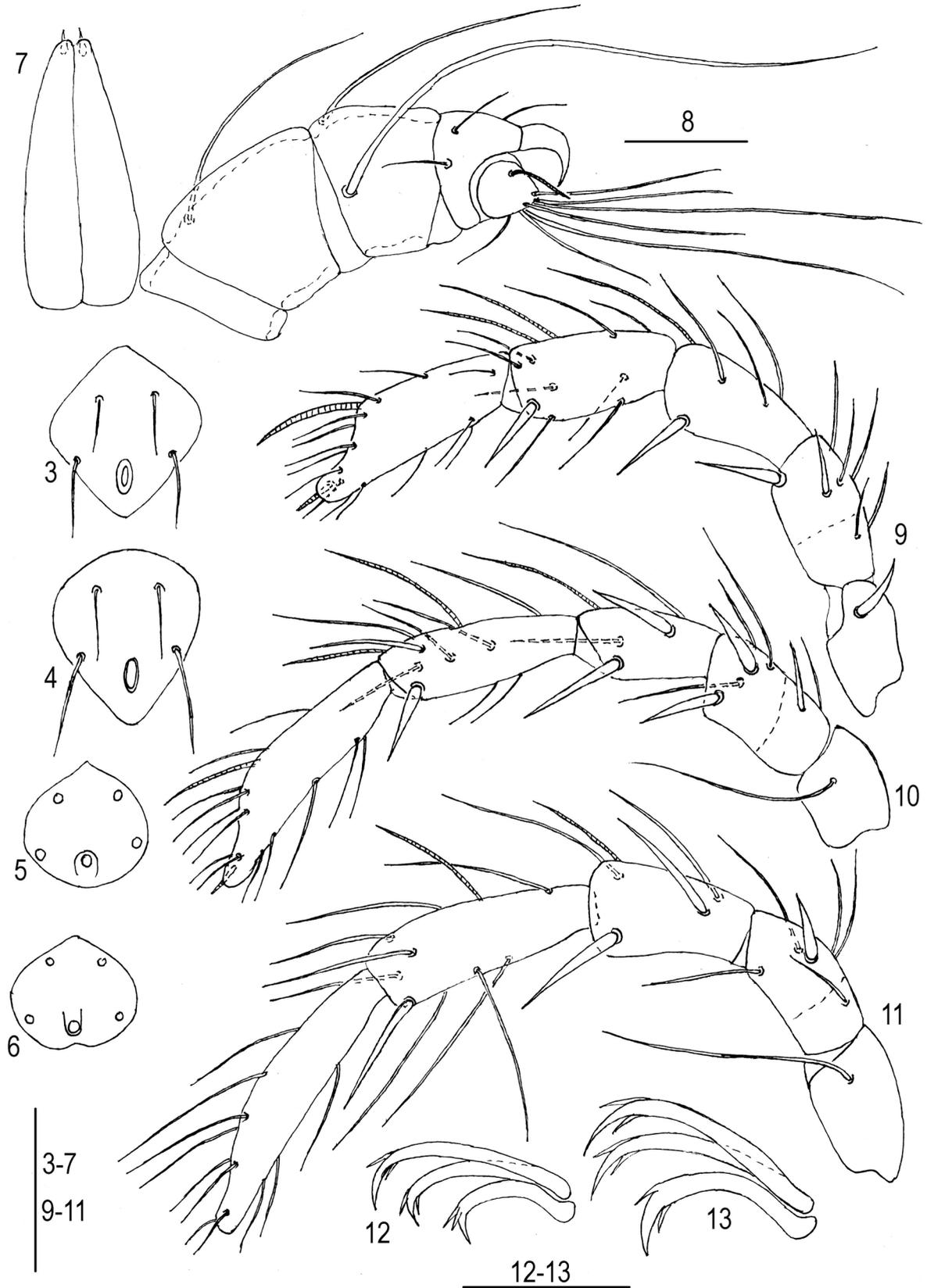
Pedipalps compact (Fig. 8): P-1 very short, without seta; P-2 relatively large, with long dorso-proximal seta; P-3 with a very long, thick latero-proximal seta and relatively short, thin dorso-proximal seta; P-4 short, its length less than height, with three short, thin setae, and massive hook-like dorsodistal claw; P-5 small, with one short solenidion, two long and five relatively short unequal simple setae, one of them very short.

Shape and arrangement of setae on legs segments as shown in Figs. 9–11. Total number of setae on legs

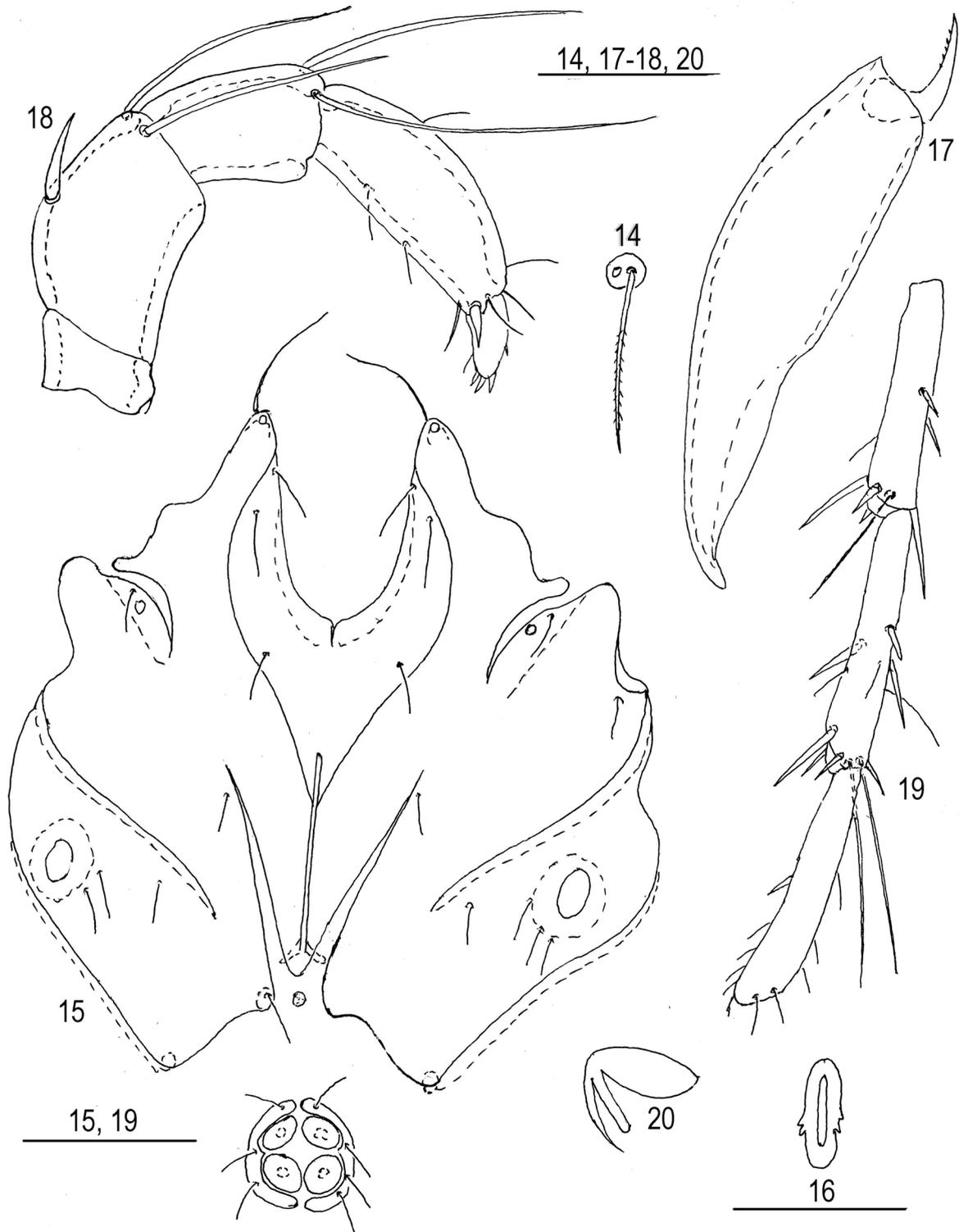
I–III except for eupathidia as follows (number of sensillae shown in parenthesis): I-Leg-1–5: 1, 7, 5(s), 11(2s), 15(s, ac); II-Leg-1–5: 1, 7, 5(s), 11(2s), 15(s, ac); III-Leg-1–5: 1, 6, 5(s), 10(s), 11(s). Basifemur and telofemur of all legs fused to each other, with indistinct suture line. Number of heavy setae from trochanter to tarsus: I-Leg: 1, 1, 1, 1, 0; II-Leg: 0, 2, 2, 1, 0; III-Leg: 0, 1, 2, 1, 0. II-Leg-1 and III-Leg-1 each with long seta. III-Leg-4 solenidion located near centre of segment, other solenidion(a) located dorso-distally. Claws of legs I and II (Fig. 12) smaller than claws of legs III (Fig. 13).

All investigated larvae of *Lebertia ussuriensis* are developed without parasitism to nymphal stages.

Measurements, n=9. Dorsal plate L 220–270, W 190–200; setae *Fch* L 85–95, *Fp* and *Oi* L 13–18, *Vi* L 125–135, *Oe* L 130–140; *Hi* and *He* L 115–130, *Sci* and *Sce* L 95–115; *Li*, *Le*, *Si* and *Se* L 80–95, *Ci* L 115–130, *Pi* L 44–55, *Pe* L 64–80, setae C1 L 60–70, C2 and C4 80–90, C3 L 60–75; medial margins of coxae I L 75–90, medial margins of coxae II+III L 105–130; excretory pore plate L 40–50, W 38–45; capitulum L 65–70; cheliceral segments L: base 57–75, chela L 12–15; pedipalpal segments (P-1–5) L: 9–10, 25–35, 22–29, 12–17, 9–11; legs segments L: I-Leg-1–5: 32–35, 32–45,



Figs. 3-13. *Lebertia ussuriensis*, larva: 3-6—excretory pore plate; 7—chelicera, dorsal view; 8 pedipalp; 9—leg I; 10—leg II; 11—leg III; 12—claws of leg I; 13—claws of leg III. Scale bars: 3-7, 9-11—50 μm; 8, 12, 13—20 μm.

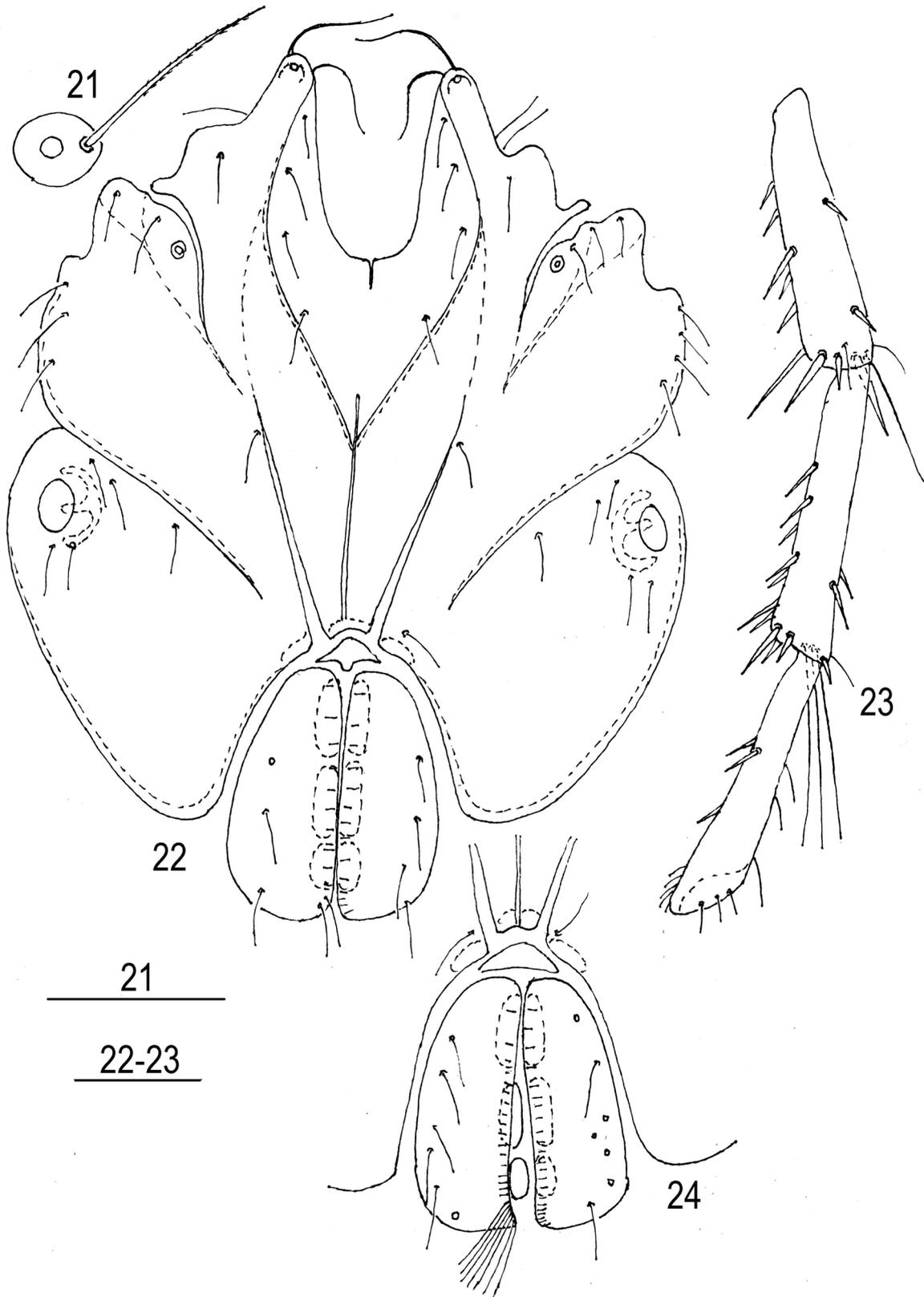


Figs. 14–20. *Lebertia ussuriensis*, deutonymph: 14—seta *Fch*, 15—coxal shield and genital field; 16—excretory pore; 17—chelicera; 18—pedipalp; 19—IV-Leg-4–6, 20—claw. Scale bars: 14, 17, 18, 20—50 µm; 16—20 µm; 15, 19—100 µm.

32–42, 42–55, 50–58; II-Leg-1–5: 32–36, 35–45, 38–42, 44–64, 51–70; III-Leg-1–5: 35–45, 38–48, 41–52, 54–70, 67–90.

Deutonymph. Integument soft and finely striated. Number of idiosomal setae typical for the

genus *Lebertia* (Tuzovsky 1987). Setae *Fch* (Fig. 14) longer and thicker than other idiosomal setae. Trichothria *Fp*, *Oi* and setae *Pi* not associated with glandularia, other idiosomal setae associated with glandularia. Coxal shield (Fig. 15) longer than wide



Figs. 21-24. *Lebertia ussuriensis* : 21—seta *Fch*; 22—coxal shield and genital field; 23—IV-Leg-4-6; 24—genital field; 21-23—female; 24—male. Scale bars: 21—50 μ m, 22-24—100 μ m.

and occupying more than half ventral surface of idiosoma. Coxal plates I fused to each other nearly

complete, fragment of suture line present only in their posterior portion. Suture line between coxal

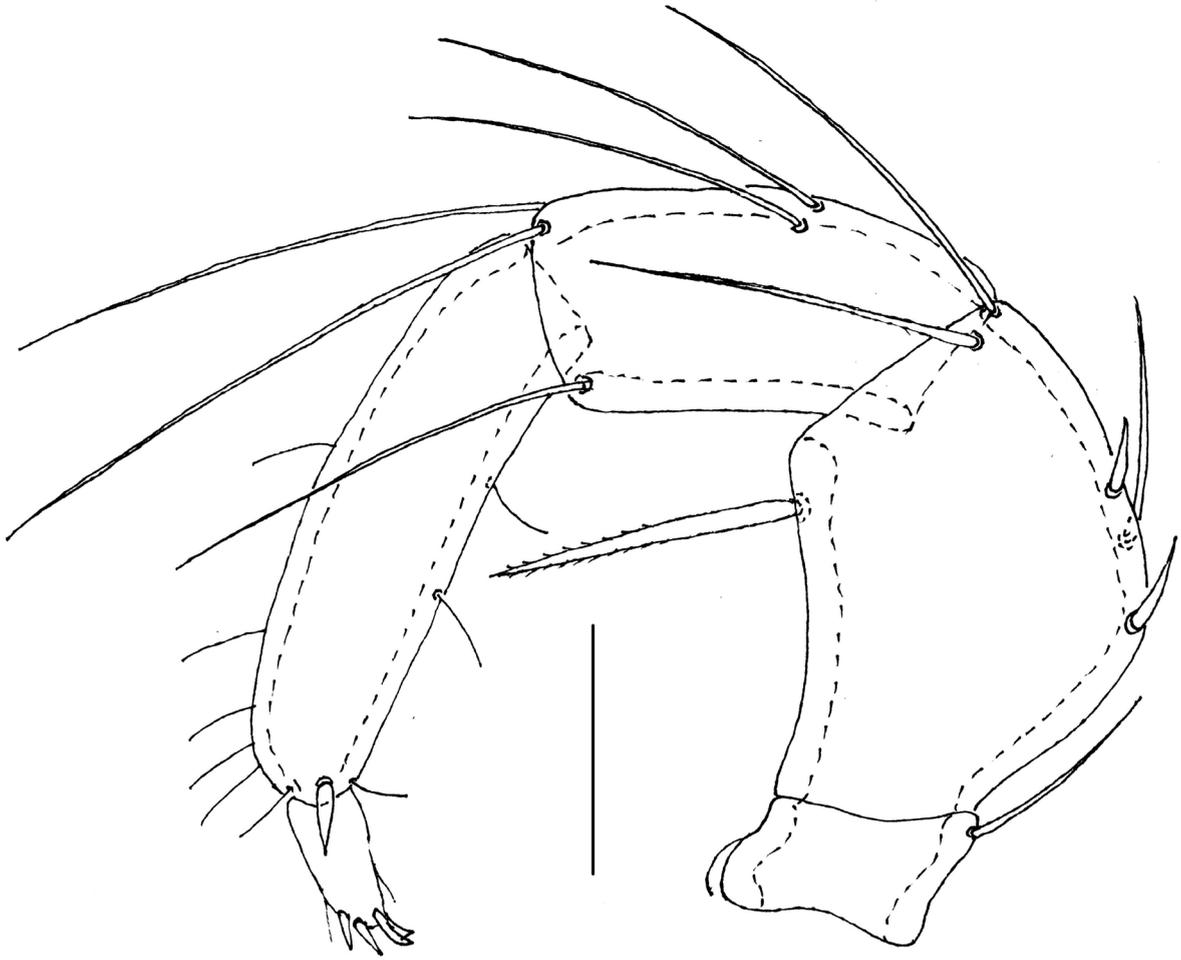


Fig. 25. *Lebertia ussuriensis*, female: pedipalp, lateral view. Scale bar 50 μ m.

plates II a little larger than median length of coxal plates I or they occasionally equal in length (Cx-I/Cx-II ratio 0.68–1.0). Coxal shield bearing two pairs of glandularia (*Hv* and *Pe*), *Pe* located near tips of coxal plates I. Genital field consisting of two pairs acetabula, two very narrow lateral plates, usually with three pairs of setae (occasionally four setae on any side) and small pregenital sclerite. All acetabula subequal or posterior pair a little larger than anterior pair. Excretory pore slightly sclerotized (Fig. 16).

Basal segment of chelicera with convex dorsal and nearly straight ventral margins (Fig. 17). Terminal part of chela pointed and with two rows of fine teeth.

Pedipalp compact (Fig. 18): P-1 short and without setae; P-2 with slightly concave ventral margin, bearing short, thick dorsal setae near middle of segment and two long dorsodistal setae; P-3 with two long dorsodistal setae; P-4 with straight ventral margin, bases of two ventral setae divided segment into three sectors: 1:1:1, 1:1:2 or

1:1:3, dorsal margin with single short proximal seta and four distal short, thin setae, distolateral spine pointed, its length about $\frac{1}{2}$ of P-5.

Legs 6-segmented. Legs III-IV with swimming setae, their number as following: 1–2 on III-Leg-5, 0–1 on IV-Leg-4 and 2 on IV-Leg-5 (Fig. 19). Claws of all legs with long pointed external and comparatively thick internal clawlets, lamella with convex ventral margin (Fig. 20).

Measurements (n=10). Idiosoma L 295–625; coxal plate L 240–315, W 225–270; coxal plates I mL 60–80; coxal plates II mL 80–95; acetabular plates L: 38–48; acetabula (ac-1–2) L: 12–18, 16–24; capitulum L: 100–105; cheliceral segments L: base 95–105, chela 22–26; pedipalp segments (P-1–5) L: 12–16, 40–48, 32–42, 44–56, 16–18; leg segments L: I-Leg-1–6: 32–36, 32–39, 41–48, 54–68, 60–68, 70–84; II-Leg-1–6: 33–39, 35–42, 40–48, 64–74, 67–93, 85–96; III-Leg-1–6: 38–45, 38–48, 48–55, 73–90, 95–115, 105–120; IV-Leg-1–6: 67–80, 45–55, 73–80, 100–145, 118–145, 110–130.

Both sexes. Integument soft and finely striated. Setae *Fch* (Fig. 21) longer and thicker than other idiosomal setae. Trichothria *Fp*, *Oi* and setae *Pi* not associated with glandularia, other idiosomal setae associated with glandularia.

Coxal shield longer than wide (Fig. 22). Coxal plates I fused to each other nearly complete, fragment of suture line present only in their posterior portion. Suture line between coxal plates II a little larger than median length of coxal plates I, occasionally nearly equal in length (Cx-I/Cx-II ratio 0.83–0.95). Coxal shield bearing two pairs of glandularia (*Hv* and *Pe*), *Pe* located near tips of coxal plates I. Posterior margin of coxal plates comparatively narrow. Coxal plates IV embracing the genital field $\frac{3}{4}$ to $\frac{2}{3}$, with obtuse-angled or rounded posteromedial edges. Genital field with three pairs of acetabula, posterior pair smaller than anterior pairs of acetabula. Excretory pore as in deutonymph. Legs III–IV with swimming setae, their number as following: 1–2 on III-Leg-5 and IV-Leg-4, usually 3, occasionally 2 or 4, on IV-Leg-5 (Fig. 23).

Pedipalp moderately long (Fig. 25): P-1 with single dorsodistal setae; P-2 with three unequal proximal and two long dorsodistal setae, ventral margin of segment concave, ventrodiscal seta thick and shifted a little away from ventrodiscal segment end; P-3 dorsal setae close to each other, inserted slightly proximally from center of segment, medio- and dorsodistal setae close to each other, ventrodiscal seta inserted near ventrodiscal segment edge; P-4 with straight ventral margin, generally divided by seta insertions into three unequal sectors 2:1:2, 2:1:3 or 3:2:2, mediobasal peg-like seta pointed, its length about $\frac{1}{2}$ P-5.

Female. Genital field with 10–15 pairs medial and 3–5 pairs lateral thin setae (Fig. 22). Measurements (n=5). Idiosoma L 625–1250; coxal shield 560–600, W 475–560; coxal plate I mL 125–145, coxal plate II mL 150–170; genital flap L 185–200, W 75–85, genital acetabula (ac-1–3) L 62–70, 55–65, 37–45; cheliceral segments L: base 190–200, chela 36–42; pedipalp segments (P-1–5) L: 27–30, 77–80, 72–78, 90–96, 27–30; leg segments L: Leg-1–6: 50–65, 65–80, 80–88, 115–125, 120–125, 125–140; II-Leg-1–6: 62–75, 73–78, 85–100, 135–150, 160–175, 150–160; III-Leg-1–6: 62–75, 78–90, 105–115, 150–175, 205–215, 160–200; IV-Leg-1–6: 110–140, 100, 100–105, 125–165, 200–225, 210–250, 200–215.

Male. Genital field with 20–25 pairs medial and 5–7 pairs lateral thin setae (Fig. 24). Measure-

ments (n=8). Idiosoma L 600–875; coxal shield 550–565, W 475–525; coxal plate I mL 125–140, coxal plate II mL 140–155; genital flap L 135–145, W 60–65, genital acetabula (ac-1–3) L 40–50, 37–45, 25–35; cheliceral segments L: base 168–175, chela 24–30; pedipalp segments (P-1–5) L: 24–30, 65–72, 65–68, 82–86, 23–25; leg segments L: Leg-1–6: 50–65, 62–75, 75–80, 110–125, 110–130, 125–135; II-Leg-1–6: 62–75, 62–75, 75–80, 135–140, 145–155, 145–155; III-Leg-1–6: 65–87, 75–90, 100–115, 145–155, 185–200, 175–180; IV-Leg-1–6: 110–125, 85–100, 140–150, 185–200, 210–230, 200–215.

DISCUSSION

The water mite *Lebertia ussuriensis* is similar to *L. fimbriata* Thor, 1899. However, the following distinct differences can be found in the morphology of larva and adults of *Lebertia ussuriensis* (character states of larva and adult of *L. fimbriata* are given in parenthesis after Martin 2000 and Müller 2015 for larvae, Gerecke 2009 and Di Sabatino *et al.* 2010 for adults): **larva:** larvae do not parasitize (parasitic on chironomid Diptera: Chironominae, Orthocladiinae and Tanitarsini); dorsal plate broad, 190–200 μm , Fig. 1 (comparatively narrow, 125–145 μm); excretory pore located near distal end of excretory pore plate, Figs. 2–6 (centrally located on excretory pore plate); III-Leg-2 with single heavy seta, Fig. 11 (two heavy setae); **adults:** IV-Leg-5 with three to four swimming setae, Fig. 19 (one to two swimming setae); IV-Leg-6 with three to four ventral spines (two ventral spines).

Habitat. Running waters.

Distribution. Asia, Russia, Far East, Primorye Territory (Sokolow 1934, 1940, Semenchenko 2008), Amur Province, Jewish Autonomous Region and Khabarovsk Territory (Semenchenko 2008), Kamchatka and Chukotka (my data).

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