

## TWO NEW WATER MITE SPECIES OF THE GENUS *HYGROBATES* Koch, 1837 (ACARI, HYDRACHNIDIA, HYGROBATIDAE) FROM THE SAMARSKAYA OBLAST (RUSSIA)

Petr V. Tuzovsky

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

**ABSTRACT.** This paper provides an illustrated description of two new water mite species of the genus *Hygrobates*—*Hygrobates (Hygrobates) isakovoensis* sp.n. and *Hygrobates (Hygrobates) calligeroides* sp.n.—from the streams of European Russia.

**KEY WORDS:** Acari, water mites, Hygrobatidae, *Hygrobates*, morphology, male, female.

DOI: 10.21684/0132-8077-2023-31-1-123-129

### INTRODUCTION

In this paper, two new water mite species of the genus *Hygrobates* Koch, 1837 are described. Material was collected by the author in the streams of the Samarskaya Oblast. The material was sampled with a common hand net with a 250 µm mesh. The specimens were not fixed in Koenike liquid; instead, the slides were made from fresh material. Most specimens were not dissected, thus preserving the natural shape of the body. For several specimens, the gnathosoma was mounted in a position that allowed investigating the pedipalps and the chelicerae in the lateral view. Idiosomal setae are named according to Tuzovsky (1987). 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, e.g., III-Leg-3—genu of third leg); L—length; mL—medial length; W—width; n—number of specimens measured. All measurements are given in micrometers (µm). Type material is deposited in the collection of the Papanin Institute for Biology of Inland Waters (Borok, Russia).

### SYSTEMATICS

Family **Hygrobatidae Koch, 1837**

Genus ***Hygrobates* Koch, 1837**

***Hygrobates isakovoensis* sp.n.**  
(Figs. 1–10)

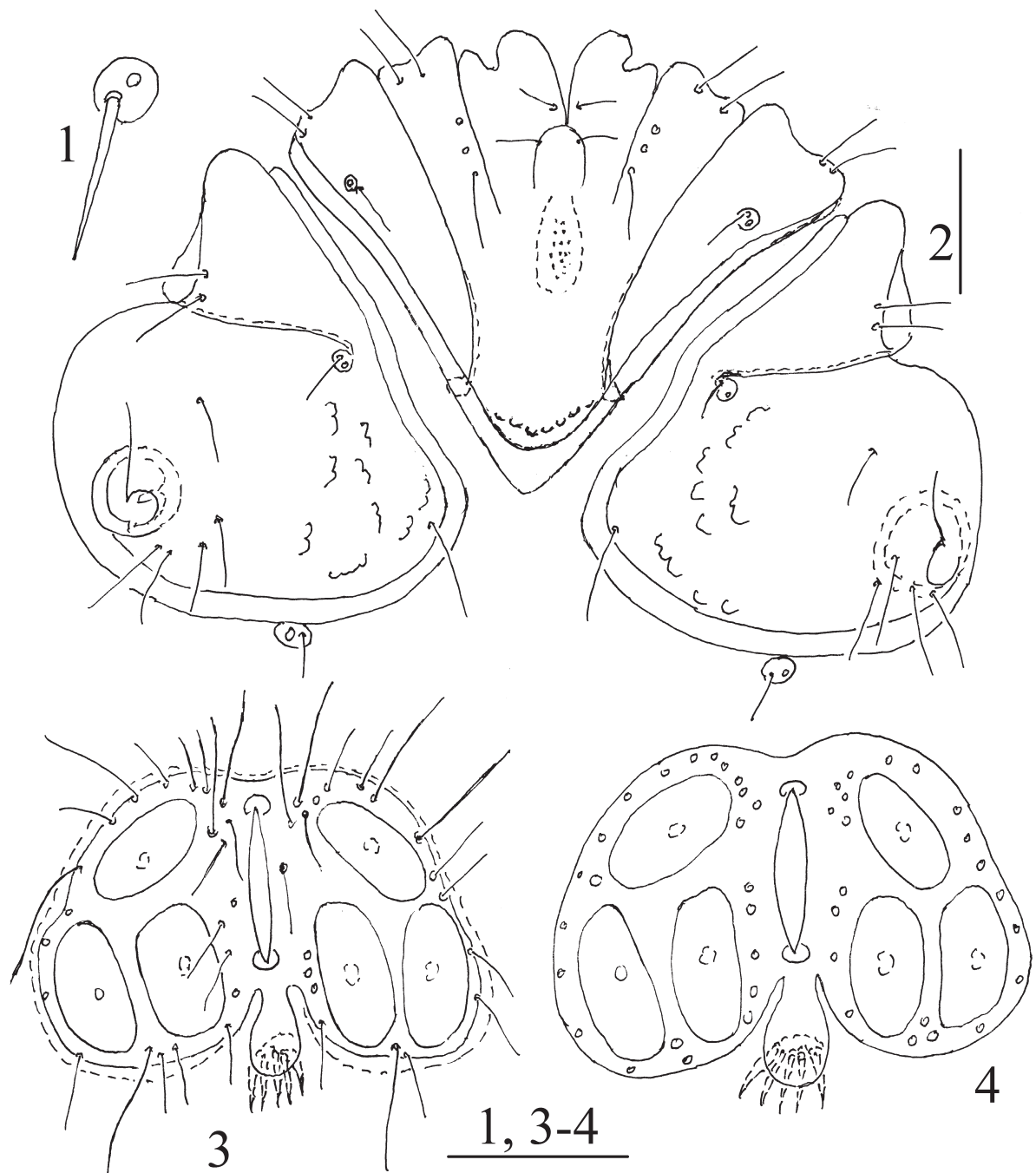
**Type material.** Holotype: male, slide no. 7006; Russia, Samarskaya Oblast, Pokhvistenevsky District; brook near the settlement of Isakovo; substrates: sand, gravel, small stones; depth 0.2–0.4 m,

27 May 1993. Paratype: 1 male from the same locality; same data as holotype.

**Diagnosis.** *Male:* Integument soft and smooth, posteromedial margin of coxal plates I triangular with very short apodemes, coxal plate IV subrectangular; genital field wider than long with three pairs of large subequal acetabula, posterior margin deeply indented with large projection extending beyond posterior margin; P-4 ventral setae well separated, I-Leg-5 with two thick pointed subequal distoventral setae, I-Leg-6 with single thick ventral seta.

**Description.** *Male.* Color in life unknown. Idiosoma oval and somewhat flattened dorsoventrally. Integument smooth and soft. Trichobothria *Fp*, *Oi* and setae *Pi* not associated with glandularia, other idiosomal setae associated with glandularia. Setae *Fch* (Fig. 1) much thicker than others idiosomal setae. Anterior coxal plates with very short apodemes, posteromedial margin triangular in shape (Fig. 2). Suture line between coxal plates III–IV incomplete obliterated medially and reaching glandularium *Pe*. Coxal plates IV subrectangular, with nose-like protruding medial margin, posterior margins slightly convex. Setae *Sce* contiguous or fused with posterior margins of coxal plates IV.

Genital field (Figs. 3–4) wider than long (L/W ratio 0.65–0.67), anterior margin slightly concave, posterior margin deeply indented with a relatively large protrusion in the centre of indentation and a little extending beyond posterior margin. Genital acetabula large and occupying about one half genital plate surface on each side, distance between

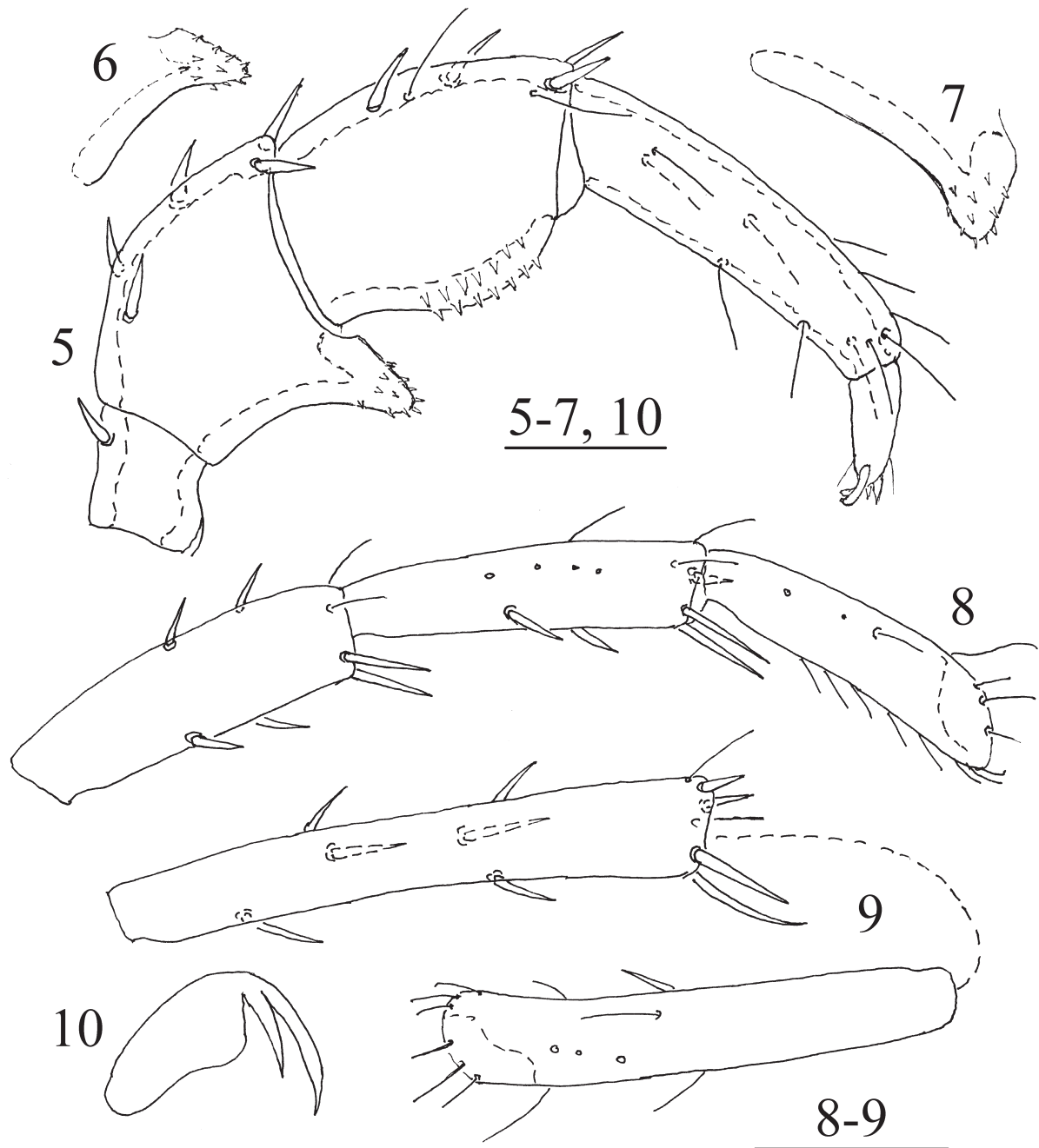


Figs. 1-4. *Hygrobat es isakovoensis* sp.n., male: 1—seta *Fch*; 2—coxal plates I-IV+capitulum; 3-4—genital field. Scale bars: 1-4—100  $\mu$ m.

all acetabula much lesser than length of any acetabulum, ac-2 and ac-3 on the same level. Genital field with 19-23 pairs of setae, five pairs of genital setae longer than others.

Pedipalp (Fig. 5): P-1 short, with single dorso-distal seta; P-2 large, ventral margin proximally straight, distoventral protruding in a conic, bluntly pointed projection covered by several small scat-

tered denticles (Figs. 6-7); P-3 large (P-2/P-2 ratio 1.06-1.11), ventral margin convex, distally with relatively large denticles covering more than half of ventral surface, dorsal margin with two proximal and two short, thick distal setae and one to three thin, long setae; P-4 slender, with straight ventral margin, ventral setae well separated (separation 30-36  $\mu$ m).



Figs. 5–10. *Hygrobates isakovoensis* sp.n., male: 5—pedipalp; 6–7—P-2 ventral margin; 8—Leg-4–6; 9—IV-Leg-5–6; 10—leg claw. Scale bars: 5–7—100  $\mu$ m, 8, 9—100  $\mu$ m, 10—50  $\mu$ m.

Legs slender, without swimming setae. I/II-Leg-4–5 with two subequal thick pointed distoventral setae (Fig. 8); IV-Leg-5 with two short dorso-distal and two comparatively long unequal thick ventrodistal setae, IV-Leg-6 with single thick ventral seta (Fig. 9). Claws of all legs with long external clawlet and short internal one, lamella with concave ventral margin (Fig. 10).

Measurements (n=2). Idiosoma L 750–815; seta *Fch* L 72–80; coxal plates I+capitulum mL 270–280; coxal plates III+IV L/W 270–295/290–330; genital plate L 150–155, W 210–220, gonopore L 19–20; genital acetabula (ac-1–3) L/W 54–60/30–36, 60–66/30–32, 65–68/25–36; cheliceral segments L: total L 270–280, base 215–220, chela 78–85; pedipalp segments (P-1–5) L/W, L/W

ratio: 30–36/36–42, 0.85–1.0; 102–115/102–108, 1.0–1.1; 102–108/72–80, 1.33–1.41; 138–150/42–43, 3.52–3.57; 35–42/16–18, 2.0–2.33; P-2 projection L/W ratio 1.12–1.25; P-4 ventral setae distance 30–36; L P-2/P-4 ratio 0.74–0.76; leg segments L: I–Leg-1–6: 60–65, 89–95, 105–115, 160–165, 165–175, 150–165; II–Leg-1–6: 60–65, 85–90, 105–115, 170–185, 180–200, 170–180; III–Leg-1–6: 65–70, 80–85, 125–140, 195–210, 220–240, 195–205; IV–Leg-1–6: 135–145, 120–140, 180–195, 240–250, 260–275, 220–230.

**Differential diagnosis.** The new species is similar to the representatives of the *Hygrobatas calliger* complex in the structure of the pedipalp. The *Hygrobatas calliger* complex includes six (sub) species: *Hygrobatas calliger calliger* Piersig, 1896; *H. calliger obtusipalpis* K. Viets, 1930; *H. calliger latilaminatus* K. Viets, 1930; *H. italicus* Thor, 1927; *H. ponticus* Pešić, Esen and Mumladze, 2022; and *H. tyrrhenicus* Pešić and Smit, 2022 (Pešić *et al.* 2022). In all of the above, the integument is with prominent ridges, and the male genital field posterior margin with more or less developed projection or protrusion in the centre of the indentation, not extending beyond the posterior margin. In contrast, in the male of *H. isakovoensis* sp.n., the integument is smooth and the genital plate posterior margin with large posteromedian projection, extending beyond posterior margin (Figs. 3–4).

**Etymology.** The species epithet *isakovoensis* signifies the village, in the vicinity of which the species was collected (Isakovo).

**Distribution.** European part of Russia: Samarskaya Oblast.

**Habitat.** Running waters.

*Hygrobatas calligeroides* sp.n.

(Figs. 11–26)

**Type series.** Holotype: male, slide no. 6242, Russia, Samarskaya Oblast, Kamyslenskiy District; brook near the settlement of Chuvashkiy Baitugan; substrates: sand, gravel, silt; depth 0.2–0.4 m; 27 May 1993. Paratypes: 4 males and 5 females from the same locality; same data as holotype.

**Diagnosis.** Integument striated, posteromedial margin of coxal plates I rounded with short apodemes, coxal plate IV subrectangular. Acetabula moderately developed in obtuse triangular arrangement. P-2 with triangular, bluntly pointed, relatively shortened (L/H ratio about 1.0) ventrodiscal projection. Male anterior margin of genital plate straight or slightly convex, without any median

projection, posterior margin moderately deeply indented without a protrusion or projection in the center of indentation, genital acetabula occupying lesser than half of surface plate on each side. Female gonopore and genital plates subequal in length.

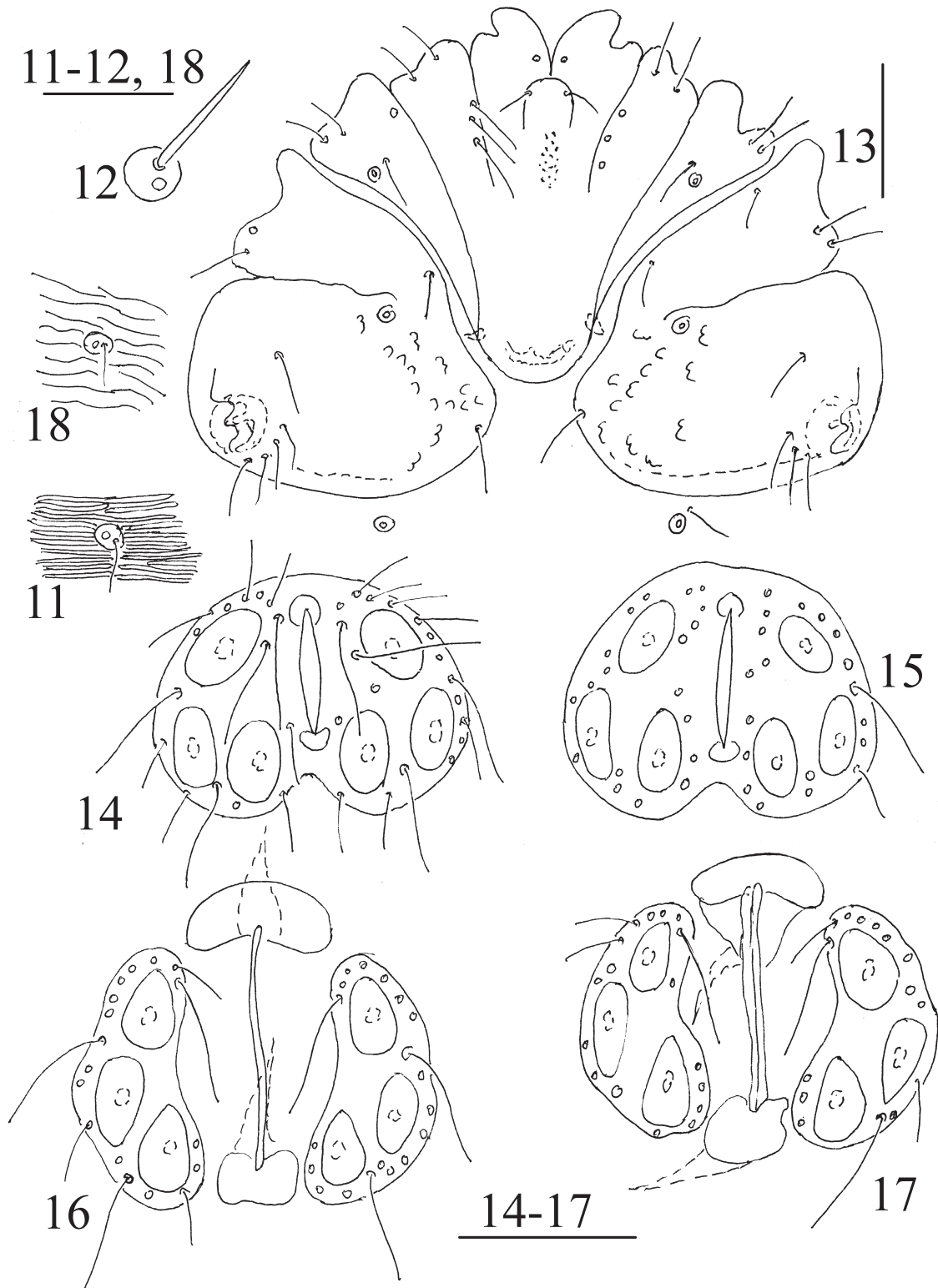
**Description. Both sexes.** Color in life unknown. Integument striated (Fig. 11), posteromedial margin of coxal plates I rounded with short apodemes. Setae *Fch* (Fig. 12) much thicker than other idiosomal setae. Suture line between coxal plates III–IV incomplete obliterated medially; coxal plates IV subrectangular, with a distinct nose-like protruding medial margins, posterior margins slightly convex; setae *Sce* and posterior margins of coxal plates IV separated (Fig. 13). Acetabula moderately developed in obtuse triangular arrangement.

Pedipalp (Fig. 19): P-1 short, with single dorso-distal seta; P-2 ventral margin proximally straight, distally forming a triangular, bluntly pointed relatively short projection covered by several small scattered denticles (Figs. 20–22); P-3 comparatively long, ventral margin convex, distally with relatively large denticles covering distal two thirds of ventral margin, dorsal margin with two proximal and two distal short, thick setae and one to three thin, long setae; P-4 slender, with straight ventral margin, ventral setae separated (separation 30–36  $\mu$ m). Chelicera (Fig. 23) with large and relatively small sickle-shaped chela.

Legs slender, I/II–Leg-4–5 with two subequal thick pointed distoventral setae (Fig. 24); IV–Leg-5 with one short dorsodistal seta and two comparatively long unequal thick ventrodiscal setae, IV–Leg-6 usually with single (occasionally two or three) short, thick ventral seta (Fig. 25). Claws of all legs with long external clawlet and short internal one, lamella with concave ventral margin (Fig. 26).

**Male.** Genital field (Figs. 14–15) wider than long (L/W ratio 0.65–0.67), anterior margin slightly convex or straight, posterior margin moderately indented without any projection or protrusion in the centre of indentation. Acetabula moderately developed in obtuse triangular arrangement and occupying less than one half genital plate surface on each side, distance between ac-1–ac-2 and ac-2–ac-3 much lesser than length of any acetabulum. Genital field with 19–23 pairs of setae, four pairs of genital setae longer than others.

Measurements (n=5). Idiosoma L 570–735; seta *Fch* L 60–65; coxal plates I+capitulum mL 250–270; coxal plates III+IV L/W 230–260; genital plate L 130–132, W 160–180, gonopore L 60–72; genital acetabula (ac-1–3) L/W 42–45/21–24, 36–48/18–24, 48–54/30–32 54; cheliceral segments L: total 280–



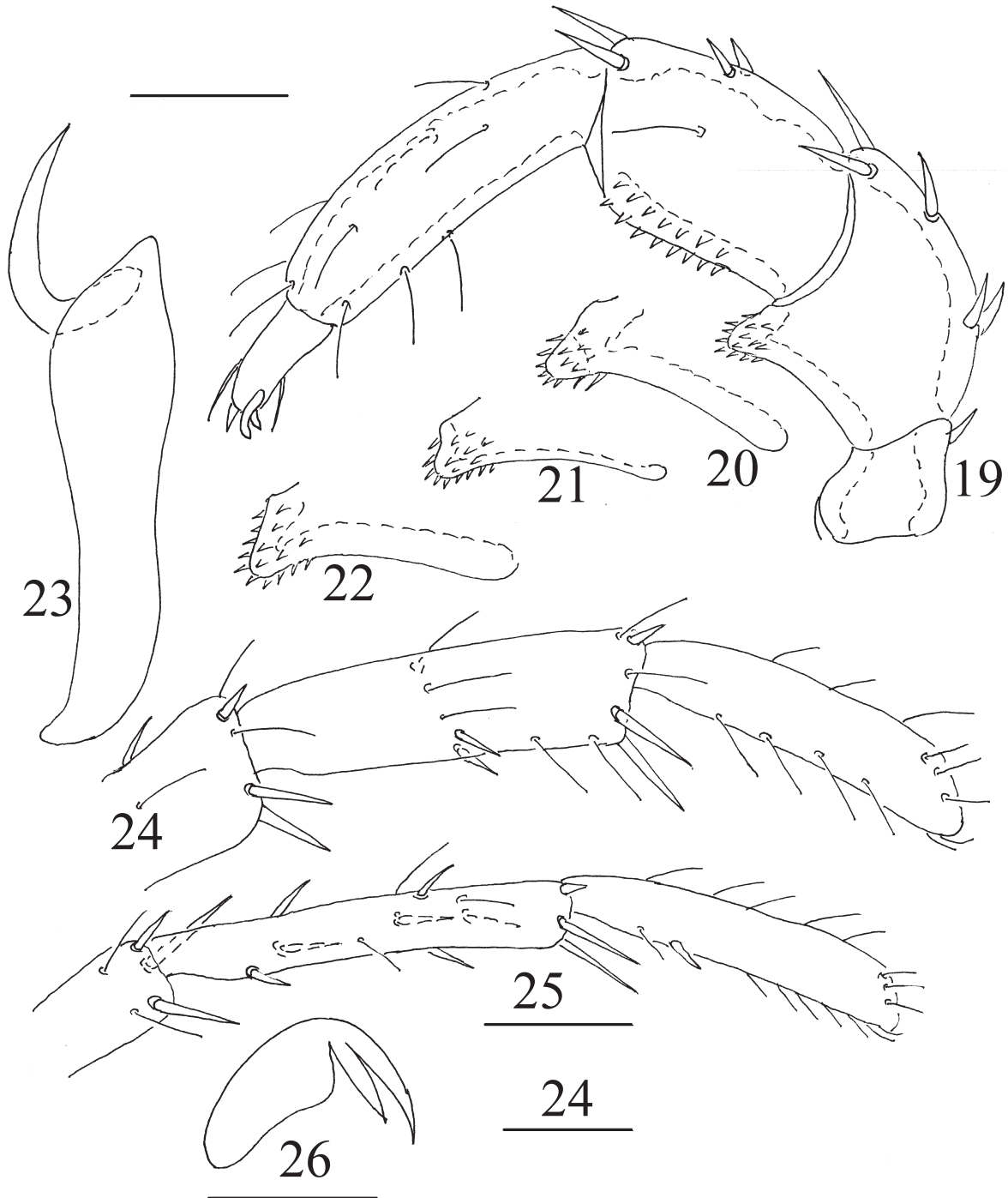
Figs. 11–18. *Hygrobates* spp. 11–17—*H. calligeroides* sp.n., male: 11—fragment of integument; 12—seta *Fch*; 13—coxal plates+capitulum; 14–15—genital field of male; 16–17—genital field of female; 18—*H. calliger*, male: fragment of integument. Scale bars: 11, 12, 18—50  $\mu$ m; 13, 14–18—100  $\mu$ m.



290, base 185–190, chela 90–105; pedipalp, total 324–372, (P-1–5) L/H, L/H ratio: 30–36/32–40, 0.7–1.0; 95–108/83–85, 0.85–0.92; 78–90/65–69, 1.18–1.30; 120–130/35–40, 2.50–2.66; 40–41/16–18, 2.30–2.33; P-2 projection L/W ratio 0.83–0.95; P-4 ventral setae distance 20–30; L P-2/P-4 ratio 0.77–0.81; leg segments L: I-Leg-1–6: 57–65, 97–

106, 90–98, 135–140, 145–150, 138–147; II-Leg-1–6: 57–60, 89–98, 97–100, 145–155, 163–172, 162–165; III-Leg-1–6: 65–75, 97–106, 113–115, 178–180, 203–215, 185–195; IV-Leg-1–6: 138–147, 137–140, 153–155, 220–240, 250–255, 219–221.

**Female.** The female is similar to the male but larger in dimensions and differs in the structure



Figs. 19–26. *Hygrobatas calligeroides* sp.n., male: 19—pedipalp; 20–22—P-2, ventral margin; 23—chelicerae; 24—I-Leg-4–6; 25—IV-Leg-4–6; 26—leg claw. Scale bars: 19–24, 26—50  $\mu$ m, 25—100  $\mu$ m.

of the genital field. Acetabular plates (Figs. 16–17) elongated (L/W ratio 1.37–1.75), as long as gonopore, with 16–19 pairs of thin setae, three pairs of them considerably longer than other genital setae. Acetabular plate medial margin slightly indented near the center; acetabula in obtuse triangular arrangement. Anterior genital sclerite distinctly larger than posterior one.

Measurements (n=5). Idiosoma L 610–855; seta Fch L 54–60; coxal plates I+capitulum mL 250–300; coxal plates III+IV L/W 245–265/240–270; genital plate L/W 120–132, 57–60, gonopore L 120–135; pregenital sclerite W 78–85; genital acetabula (ac-1–3) L/W 42–48/30–32, 48–50/24–27, 42–54/24–30; cheliceral segments L: total L 280–295, base 210–225, chela 95–105; pedipalp: total L 240–305, P-1–5 L/H, L/H ratio: 32–41/36–48, 0.87–1.0; 80–123/90–96, 1.1–1.26; 60–90/65–80, 0.92–1.12; 105–155/36–42, 2.1–2.42; 30–36/17–18, 1.76–2.0; P-2 projection L/W, L/W ratio 15–24/13–18, 1.15–1.33; P-4 ventral setae distance 24–30; L P-2/P-4 ratio 0.76–0.81; leg segments L: I-Leg-1–6: 57–65, 105–110, 95–100, 154–160, 154–165, 145–163; II-Leg-1–6: 48–50, 105–123, 105–115, 169–173, 170–188, 163–165; III-Leg-1–6: 73–82, 105–115, 120–125, 185–196, 220–225, 195–205; IV-Leg-1–6: 145–163, 145–165, 163–172, 228–245, 260–278, 228–237.

**Differential diagnosis.** The present species is similar to *Hygrobates ponticus* in the structure of the idiosoma and the pedipalps. The new species differs from *H. ponticus* in the following characters (character states of *H. ponticus* are indicated in parenthesis, data from Pešić *et al.* 2022). Integument striated, Fig. 11 (vs. strongly lineated, Fig. 18). **Male:** anterior margin of genital plate straight or slightly convex (vs. with a very shallow

indentation and a small knob-shaped medial projection in the centre of the indentation), posterior margin moderately indented without any projection or protrusion in the centre of the indentation (vs. deeply indented with a small protrusion in the centre of the indentation), acetabula occupying less than half of the surface plate on each side (vs. more than half of the surface plate). **Female:** gonopore and genital plates subequal in length (vs. gonopore longer than genital plate).

**Etymology.** The species is named *calligeroides* because it has many characters in common with the palaeartic species *H. calliger* complex.

**Distribution.** European part of Russia: Samarskaya Oblast.

**Habitat.** Running waters.

#### ACKNOWLEDGEMENTS

This research was performed in the framework of the state assignment No. 0122-2014-0007 (Federal Agency of Scientific Organizations [FASO], Russia). The author expresses sincere gratitude to anonymous referees for reviewing the manuscript.

#### REFERENCES

- Pešić, V., Esen, Yu., Gerecke, R., Goldschmidt, T., Mumladze, L., Smit, H., Zawal, A. 2022. Evidence of cryptic speciation in the *Hygrobates calliger* complex (Acariformes, Hydrachnidia, Hygrobatidae) with a description of two new species. *Ecologica Montenegrina*, 59: 101–122. <https://dx.doi.org/10.37828/em.2022.59.10>
- Tuzovsky, P.V. 1987. *Morfologiya i Postembrional'noe Razvitiye Vodyanykh Kleshchej* [Morphology and Postembryonic Development in Water Mites]. Nauka Publ., Moscow, 172 pp. [In Russian]