Description of female and larva of the water mite *Tiphys yaroslavlensis* Tuzovskij, 2011 (Acari: Hydrachnidia, Pionidae)

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The water mite *Tiphys yaroslavlensis* Tuzovskij, 2011 was described and known only from the male. The aim of the paper is to describe of female and larva of this water mite.

The material was collected by the author in the Yaroslavl Province of Russia. To obtain larvae, water mite was maintained in laboratory (room temperature, natural day-night conditions). Idiosomal setae are named according to Tuzovskij (1987): Fch – frontales chelicerarum, Fp – frontales pedipalporum, Vi – verticales internae, Ve – verticales externae, Oi – occipitales internae, Oe – occipitales externae, Hi – humerales internae, He – humerales externae, Hv – humerales ventralia, Sc – scapulaires internae, Sc – scapulaires externae, Li – luminales internae, Le – luminales externae, Si – sacrales internae, Se – sacrales externae, Ci – caudales internae, Pi – praanales internae, Pe – praanales externae, Ai – anaales internae, Ae – anaales externae.

Furthermore, the following abbreviations are used: P–1–5, pedipalp segments (trochanter, femur, genu, tibia and tarsus); I–Leg–1–5 (for larvae), first leg, segments 1–5 (trochanter, femur, genu, tibia and tarsus); I–Leg–1–6 (for female), first leg, segments 1–6 (trochanter, basifemur, telofemur, genu, tibia and tarsus) i.e. III–Leg–1 = trochanter of third leg; C1 – coxal setae located posteromedially on coxa I, C2 – coxal seta located posteroanteriorly on coxa I, C3 – coxal seta located posterolaterally on coxa II, C4 – coxal seta located anteriorly on coxa III, s – solenidion, ac – acanthoid seta; mas – transverse muscle attachment scar; L – length; W – width, n = number of specimens measured; all measurements are given in micrometers (μm). IBIW – the Institute for Biology of Inland Waters of the Russian Academies of Sciences (Borok, Yaroslavl Province, Russia).

Family Pionidae Thor, 1900

Genus *Tiphys* Koch, 1836

*Tiphys yaroslavlensis* Tuzovskij, 2011
(Figs 1–23)

Material examined. 1 female, Russia, Yaroslavl Province, Nekouz District, forest sedge bog near settlement Borok, 26 May 2015, P.V. Tuzovskij; 6 larvae reared in laboratory (IBIW), duration of the embryonic period was 9 days.
**Figures 1–8.** *Tiphys yaroslavensis* Tuzovskij, 2011, female: 1 - dorsal plates; 2 - seta *Fch*; 3 - seta with glandularia; 4 - trichobothria *Oi*; 5 – ventral view; 6 – genital field; 7 – excretory pore; 8 – chelicera. Scale bars: 1–4, 6–8 = 100 μm; 5 = 200 μm.

**Diagnosis. Female:** Medial margin of coxal plate IV slightly longer than medial margin of coxal plate III; sclerites, bearing setae *Hv*, fused with postero medial margin of coxa II; genital plates more or less triangular with 3 acetabula and 9 short and fine setae each, all genital setae situated on each side of genital plate, gonopore and genital plates equal in length, anterior genital sclerite wider than posterior one; P-3 with 3 unequal setae, base of long lateral seta situated proximally to middle of segment; P-4 with relatively short distolateral spine (4.0–5.0 times shorter than tarsus), both ventral setae situated distally to middle of segment; larva: Dorsal shield elongate (ratio length/width 1.54–1.70), covering almost all dorsum in unengorged larva and bearing 3 pairs of setae, *Vi* situated on soft integument; setae *Oe* longest, *Hi* longer and thinner than *He*; coxal setae C1 and C4 subequal and longer than C2–C4, base of setae C4 on coxal plate III situated closely to medial end of suture line between coxal plates II and III; *tmas* scar present; setae *Se* much longer than setae *Si*; dorsal shield and coxal plates I–III punctuated; excretory pore plate anterior portion wider than posterior one, anal setae subequal and situated near anterior margin of excretory pore plate; formula of heavy setae on leg segments as follows: I–Leg 1–5: 0, 1, 1, 1, 0; II–Leg 1–5: 0, 1, 2, 4, 0; III–Leg 1–6: 0, 1, 2, 4, 0.

**Description**

**Female.** Colour red. Idiosoma oval, integument soft and finely striated. Dorsum with two pairs unequal anterior platelets, anteromedial platelets comparatively large and elongate (L/W ratio 2.9–3.0), anterolateral platelets small transverse (Fig. 1). The number and position of idiosomal setae typical for the genus *Tiphys*. All dorsal setae thin and approximately equal in length, but setae *Fch* (Fig. 2) longer and thicker than others idiosomal setae associated with glandularia (Fig. 3) and trichobothria (Fig. 4). Anterior coxal plates with short apodemes (Fig. 5). Sclerites bearing setae *Hv* fused with posterior margins coxal plates II. Suture line
between coxal plates III and IV complete. Medial margin of coxal plate IV slightly longer than medial margin of coxal plate III. Posterior margins of coxal plate IV forming right or obtuse angle, apodemes slightly developed. Acetabular plates and gonopore equal in length, with three subequal genital acetabula and 9 genital setae on each plate (Fig. 6). Excretory pore surrounded by slightly sclerotized ring and with small anterior sclerite (Fig. 7). Chelicera (Fig. 8) with large basal segment and short crescent claw. Surface of basal segments punctuated.

Figures 9–12. Tiphys yaroslavlensis Tuzovskij, 2011, female: 9 – pedipalp; 10 - IV-Leg-4-6; 11 - claw of leg II; 12 - claw of leg IV. Scale bars: 9, 11-12 = 50 μm; 10 = 200 μm.
Figures 13–14. Tiphys yaroslavensis Tuzovskij, 2011, larva: 13 - dorsal view; 14 - ventral view. Scale bar: 50 μm.

Pedipalp stout (Fig. 9): P–1 short, with single short dorsodistal seta; P–2 large, with straight ventral margin and bearing six dorsal setae; P–3 with three unequal setae, base of long lateral seta located proximally middle of segment; P–4 rather slender, both ventral setae located on small conical unequal tubercles distally middle of segment, dorsodistal spine short (4-5 times shorter than P–5) and pointed; P–5 with proximal solenidion, five thin setae and four short, thick distal spines.

Legs 6–segmented slender. Anterior pair of legs without swimming setae. Legs II–IV with swimming setae, their number as following: two to three on II–Leg-4, three on II–Leg-5, three to four on III–Leg-4, five to six on III–Leg-5, four on IV–Leg-4, six to seven on IV–Leg-5; IV–Leg-6 with three to four thick setae (Fig. 10). Claws of leg I-III (Fig. 11) larger than claws of leg IV (Fig. 12). Claws of all legs equal in length but internal claw thicker than external one, lamella with convex ventral margin

Measurements (n=1). Idiosoma L 985; anterior dorsal plates L 65–75, W 20–25; acetabular plates L 162–175, W 85–95; cheliceral segments: base L 175, claw L 62; pedipalp segments (P–1–5) L: 50, 125, 75, 137, 62; leg segments L: I–Leg-1–6: 75, 85, 135, 170, 180, 220; II–Leg-1–6: 80, 100, 150, 185, 185, 235; III–Leg-1–6: 85, 110, 145, 180, 220, 225; IV–Leg-1–6: 150, 125, 185, 250, 275, 245.

Larva. Idiosoma flat, dorsal plate in unengorged larvae covering almost the whole dorsum (Fig. 13), bearing 3 pairs of setae (Fch, Fp, Oi), with slightly convex lateral margins, its anterior margin straight or slightly convex, posterior margin rounded. Setae Vi, Oe, Hi, He, Sci, Sce and Li situated on soft membrane, Oe longest, Hi slightly longer and thinner than He, Sci and Sce subequal in length. Surface of dorsal plate punctuated.

Coxal plates (Fig. 14) moderately large and elongate, first pair of plates with short apodemes directed laterally, plates II-III with a rudimentary apodeme on each side. Setae Ci and C4 subequal and slightly longer than C2 and C3. Setae Ci very long thickened, located on small tubercles. Setae Se much longer than Si, Pe slightly longer than Pi. Excretory pore plate (Figs 15–16) more or less triangular (L/W
ratio 0.83 - 0.90), its anterior portion wider than posterior one, anterior margin convex; setae \( Ai \) and \( Ae \) subequal and forming nearly true transverse row; bases of \( Ai \) close to each other, located anteriorly to excretory pore; distance between setae \( Ae-Ae \) almost three times longer than distance between \( Ai-Ai \). Surface of all coxal plates punctuated.

Figures 15–19. *Tiphys yaroslavlensis* Tuzovskij, 2011, larva: 15-16 - excretory pore plate; 17 - capitulum; 18 - chelicerae, dorsal view; 19 - pedipalp, lateral view. Scale bars: 100 µm.
Capitulum (Fig. 17) with wide base and relatively narrow rostrum, anterior hypostomal setae much longer than posterior ones. Basal segments of chelicerae (Fig. 18) fused to each other medially, longer than wide, expanded proximally and tapering distally; cheliceral claws small pointed.

Pedipalps short and stocky (Fig. 19): P–1 short and without seta; P–2 large, with slightly convex dorsal margin and single short, thin dorsal seta near middle of segment; P–3 with very long, thick lateroproximal seta and relatively short dorsodistal one; P–4 with three unequal setae and large dorsodistal claw; P–5 small, with short solenidion, two long and five short unequal simple setae.
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Figures 22–23. Tiphys yaroslavlensis Tuzovskij, 2011, larva: 22 - leg III; 23 - claws of leg I. Scale bars: 20 μm.

Legs 5–segmented, shape and arrangement of setae on legs segments as shown in Figs 20–22. Total number of leg setae, excluding eupathidia, as follows (specialized setae indicated in parentheses): I–Leg-1–5: 1, 7, 5 (s), 10 (2s), 13 (s, ac); II–Leg-1–5: 1, 7, 5 (s), 10 (2s), 13 (s, ac); III–Leg-1–5: 1, 6, 5 (s), 10 (s), 12 (ac). Number of heavy setae from trochanter to tarsus: I–Leg: 0, 1, 1, 2, 0; II–Leg: 0, 1, 2, 4, 0; III–Leg: 0, 1, 2, 4, 0. I–Leg-1 with relatively short seta, II–Leg-1 and III–Leg-1 with long seta each. Acanthoid seta comparatively long and setose, located distally on tarsus of all legs. Lateral claws and empodial claw nearly equal in length, but lateral claws comparatively thin, empodial claw thick and hook-like (Fig. 23).

Measurements, n=5. Dorsal plate L 205–220, W 120–140; setae C1 L 75–80, setae C2 and C3 L 55-65, setae C4 L 80-90; medial edge of coxa I L 60–67, medial edge of coxae II+III L 95–105; excretory pore plate L 16–19, W 19–23; cheliceral segments: base L 64–68, claw L 16–19; pedipalpal segments (P–1–5) L: 5-6, 28-30, 22-29, 8-10, 5-7; legs segments L: I–Leg-1–5: 25-29, 24-26, 19-23, 27-32,41-45; II–Leg-1–5: 25-29, 22-26, 25-27, 35-39, 54-58; III–Leg-1–5: 32-36, 27-32, 28-32, 41–45, 54–60.

Habitat. Sedge bogs and sedge-sphagnum bogs.

Distribution. Europe: Russia, Upper Volga.

Remarks. The water mite Tiphys yaroslavlensis is similar to T. torris (Müller, 1776). However, the following clear differences can be found in the morphology of female and larva of T. yaroslavlensis (character states of female and larva of T. torris are given in parenthesis after Tuzovskij 2011, respectively): female: all genital setae situated on acetabular plates, Fig. 6 (2-3 genital setae situated on soft cuticle between anterior genital sclerite and anterior ends of genital plates on each side); P-3 lateral seta situated proximally to middle of segment, Fig. 9 ( P-3 lateral seta situated distally to middle of segment); P-4 with short dorsodistal spine, 4-5 times shorter than P-5 (P-4 with rather long distolateral spine, 2.0–2.5 times shorter than tarsus); larva: dorsal shield bearing three pairs of setae, Fig. 13 (four pairs of setae); coxal setae C1 and C4 subequal, Fig. 14 (C4 much longer than C1), dorsal shield and coxal plates I–III punctuated (with cell-shaped reticulations); number of heavy setae on II/III–Leg- 4: four (number of heavy setae on II/III–Leg-4: three).

The female was collected near locus typicus, distance about 1 km. The female and the male are characterised by identical colouring (colour red) and the structure of the pedipalps.
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