

WATER MITES OF THE GENUS *HYDRODROMA* KOCH, 1837 (ACARI: HYDRACHNIDIA, HYDRODROMIDAE) IN RUSSIA

P. V. Tuzovsky

Institute for Biology of Inland Waters Russian Academy of Sciences, 152742, Borok, Nekouz Distr., Yaroslavl Prov., Russia; e-mail: tuz@ibiw.yaroslavl.ru

ABSTRACT: A detailed taxonomic review of water mites of the genus *Hydrodroma* Koch, 1837 (Hydrodromidae) in Russia based on long-term survey in 1970–2013. The review includes illustrations and redescriptions of adults of 4 species: *Hydrodroma despiciens* (Müller, 1776), *H. pilosa* Besseling, 1940, *H. reinhardi* Pesic, 2002, *H. torrenticola* (Walter, 1908) and deutonymphs of three species (*H. despiciens*, *H. pilosa* and *H. torrenticola*). Identification keys to adults and deutonymphs are given.

KEY WORDS: Hydrachnidia, Hydrodromidae, *Hydrodroma*, water mites, morphology, male, female, deutonymph, identification key, Russia

INTRODUCTION

The world fauna of the genus *Hydrodroma* Koch, 1837 currently includes about 50 species (K.O. Viets 1987). The water mites of this genus are free-living in lakes, reservoirs, ponds and rivers and reported from all continents except for Antarctica (Cook 1974). Five species of the genus *Hydrodroma* are known in Europe: *H. despiciens* (Müller, 1776), *H. pilosa* Besseling, 1940, *H. reinhardi* Pesic, 2002, *H. rheophila* Cook, 1967, and *H. torrenticola* (Walter, 1908) (Pešić et al. 2003). From the territory of the former USSR, the single species (*H. despiciens*) was recorded by Sokolow (1940). My extensive survey of water mites from different regions of Russia over the past thirty yielded one more species, *H. torrenticola* from Karelia (Tuzovsky and Shatrov 2005). *H. despiciens* is a polymorphic species including several subspecies (K.O. Viets 1987). The European species *H. despiciens* was subdivided by Besseling (1940, 1965) who recognized two subspecies characterized by differences in the number of swimming setae (*H. despiciens despiciens* and *H. despiciens pilosa*). Gerecke (1991), Pešić et al. (2003) and Di Sabatino et al. (2010) consider of *H. despiciens pilosa* as a separate species (*H. pilosa*).

Here I conduct a detailed study of morphology of all species of *Hydrodroma* collected in Russia and to give identification keys for adults and deutonymphs.

MATERIAL AND METHODS

Most specimens were collected by the author in the European and Asian parts of Russia from 1970–2013. Specimens collected by P. Tuzovsky were not fixed in Koenike liquid, but slides were made from the fresh material. Most specimens

were not dissected, thus preserving the natural shape of the body. For several females and males the gnathosoma was mounted in a position that allowed investigating pedipalps in lateral view. All mite specimens were mounted in Hoyer's medium.

Nomenclature of idiosomal setae follows that of Tuzovsky (1987): *Fch* — frontales cheliceraerum, *Pi* — praeanales internae. 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; D — diameter; L — length; W — width; n = number of specimens measured. The length of appendage segments was measured along their dorsal side; all measurements are given in micrometers (µm).

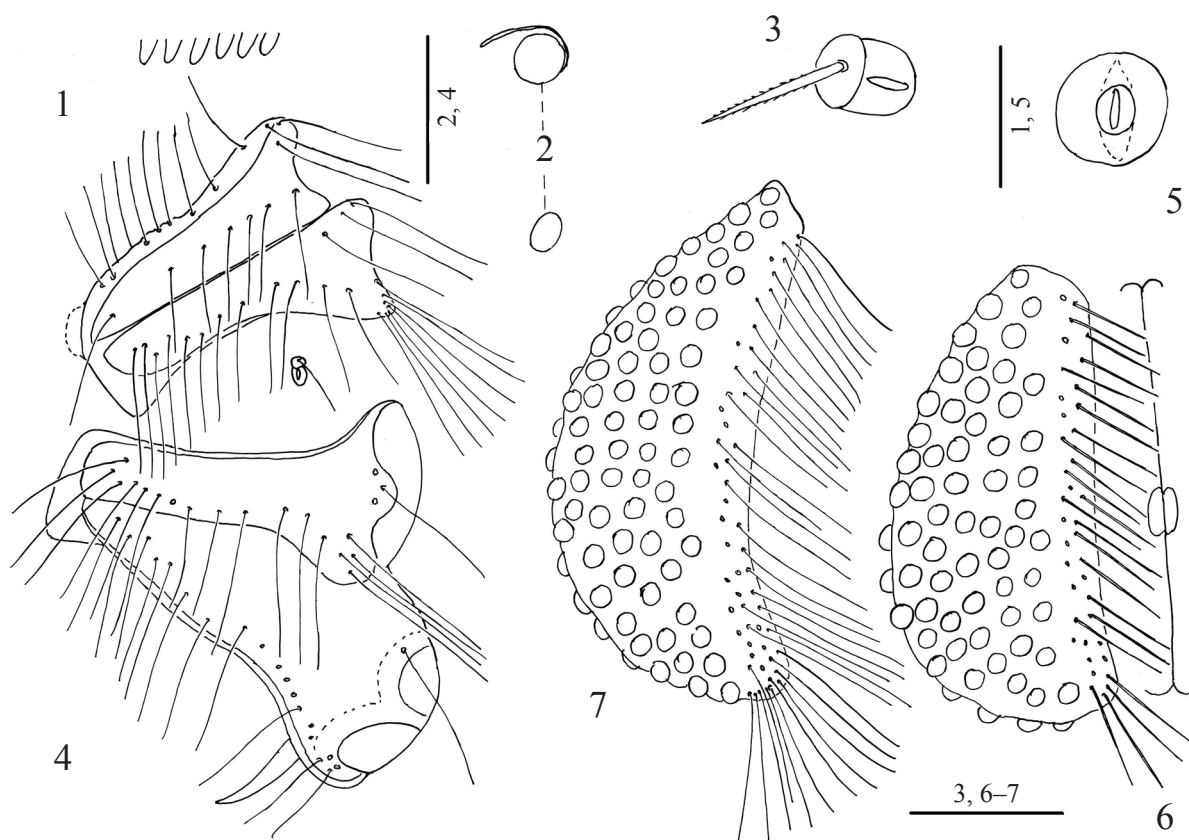
SYSTEMATIC PART

Family Hydrodromidae K. Viets, 1936

Genus *Hydrodroma* Koch, 1837

Type species: *Hydrodroma despiciens* (Müller, 1776)

Diagnosis. Adults: Color red, orange or yellow. Idiosoma soft, slightly compressed dorsoventrally, integument papillose, lateral eyes not encapsulated, on each side with two lenses well separated from each other. Trichobothria *Fp* and *Oi* not associated with glandularia, other idiosomal setae associated with glandularia. Coxal plates arranged in four groups. Coxal plates I+II medially touching, only separated by a fine membranous line. Rows of characteristic long, fine setae at medial margins of coxal plates I, and posterior margins of coxal plates II–IV. Genital flaps with more or less equally rounded lateral and straight or slightly concave medially, bearing numerous



Figs 1–7. *Hydrodroma despiciens* (Müller, 1776), adults: 1 — integument papillae; 2 — eye lenses; 3 — setae Fch; 4 — coxal plates I–IV; 5 — excretory pore; 6–7 — acetabular plate; 1–6 — female; 7 — male. Scale bars: 1, 5 = 100 µm; 2, 4 = 200 µm; 3, 6–7 = 50 µm.

small acetabula and fine smooth setae arranged in one or several rows along medial edge. Genital field with slight sexual dimorphism (males with more slender flaps, setae more numerous and longer). Excretory pore sclerotized. Legs II–IV with swimming setae. Leg claws without claw blade, with a dorsal clawlet. **Deutonymph:** Similar to adults, but lack a gonopore and genital flaps. Two pairs of genital acetabula and one pair of genital setae situated freely on integument. Trichobothria and setae *Pi* not associated with glandularia; pedipalps, coxal plates and legs have fewer setae than adults.

Hydrodroma despiciens (Müller, 1776)

Figs 1–18

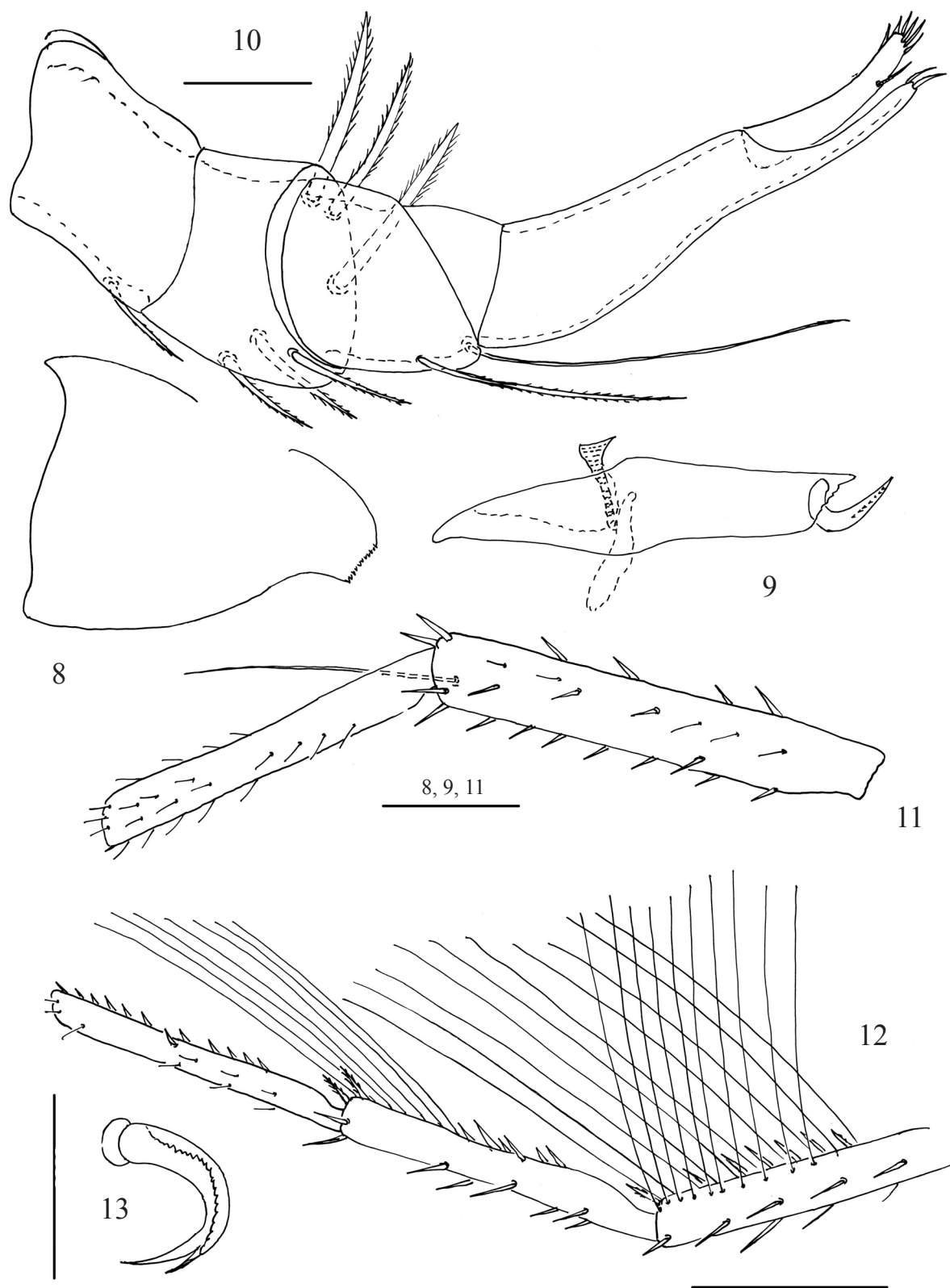
Material examined. 1 female, North Caucasus, Krasnodarsky Krai, Seversk District, settlement Ubinskaya, small pond, 20 May 1976, leg. P.V. Tuzovsky; 1 female, Samara Province, Stavropol District, National natural Park “Samara Luka”, Gusinoe Lake, 23 July 1997, leg. P.V. Tuzovsky; 2 males, Karelia, Krivoe Lake, 7 August 2002, leg. A.B. Shatrov; 1 female, North Caucasus,

Republic Adygea, Majkop-city, small pond, 18 July 2012, leg. V. Manzhurina and Yu. Saprykina.

Additional material: 1 deutonymph, Germany, Baden-Württemberg, artificial lake Kirchentellinsfurt (RT), NE border, 48°32'31,42"N, 09°09'03.38"E, summer 2010, leg. A. Renz; 1 deutonymph, Italy, Sicilia (EN) Monte Zimmara, pond at Monte Canale, 07.09.1985, leg. R. Gercke.

Diagnosis. Adults: Papillae of integument elongate, distally rounded; medial portion of coxal plates III+IV rectangular, P-3 with two long unequal dorsodistal setae; II–Leg-5 with single swimming seta; **male:** genital field with 70–120 acetabula and 75–140 long subequal setae, **female:** genital field with 65–75 acetabula and 45–65 short subequal setae; **deutonymph:** papillae of integument elongate, distally rounded, medial portion of coxal plates III+IV rectangular, II–Leg-5 with single swimming seta each.

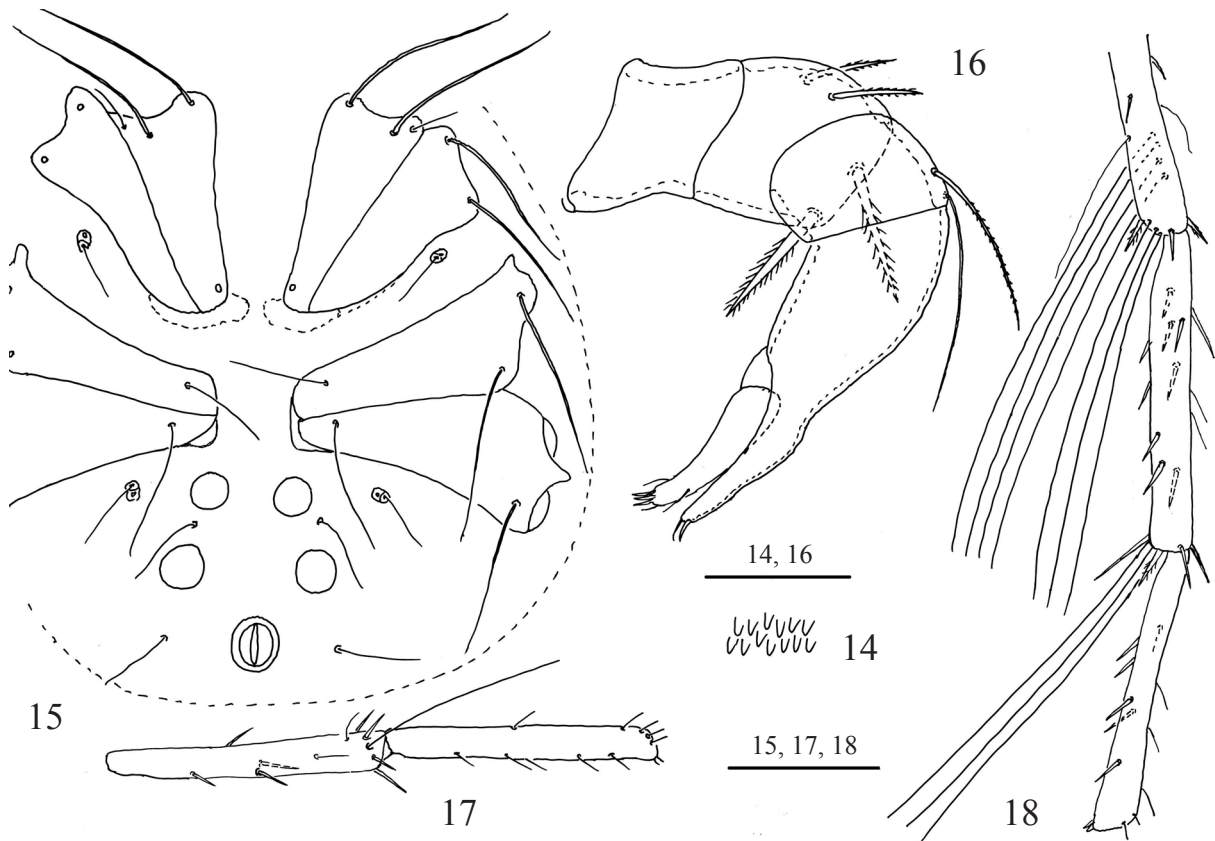
Adults. Colour usually red (occasionally yellow). Idiosoma oval, papillae of integument long, distally rounded (Fig. 1). Anterior lenses circular, posterior lenses oval (Fig. 2). Number and posi-



Figs 8–13. *Hydrodroma despiciens* (Müller, 1776), female: 8 — capitulum, lateral view; 9 — chelicera; 10 — pedipalp; 11 — II-Leg-5-6; 12 — IV-Leg-4-6; 13 — claw of leg II. Scale bars: 8–9,10 = 100 μ m; 10, 13 = 50 μ m; 12 = 200 μ m.

tion of idiosomal setae typical for genus *Hydrodroma*. Setae *Fch* (Fig. 3) thicker than other idiosomal setae. Shape and arrangement setae on

coxal plates I–IV shown on Fig. 4. Medial portion of coxal plates III+IV rectangular. Coxal setae numbers: coxal plates-I 20–24; coxal plates-II 20–



Figs 14–18. *Hydrodroma despiciens* (Müller, 1776), deutonymph: 14 — integument papillae; 15 — ventral view; 16 — pedipalp; 17 — II-Leg-5–6; 18 — IV-Leg-4–6. Scale bars: 14, 16 = 50 µm; 15, 17–18 = 100 µm.

26; coxal plates-III 19–25, coxal plates-IV 18–23. Excretory pore surrounded by sclerotized ring (Fig. 5).

Capitulum (Fig. 8) with short rostrum, capitular base slightly convex with short pointed dorso-proximal projection on each side. Chelicera (Fig. 9) with large basal segment and short stylet.

Pedipalp moderately slender (Fig. 10): P-1 with single dorsodistal seta; P-2 with six pectinate setae (three long mediobasal and three relatively short dorsal); P-3 with two long unequal dorsal setae, proximal seta thicker and shorter than distal one, base of proximal seta situated distally to middle of segment; P-4 tapering distally, with long pointed dorsodistal projection nearly reaching tip of elongated P-5.

Legs II–IV with swimming setae (Figs 11–12). Leg swimming setae numbers: II–Leg-5 posterior 1; III–Leg-4 posterior 10–13, III–Leg-5 posterior 7–10; IV–Leg-4 anterior 10–12, posterior 10–15; IV–Leg-5 anterior 0, posterior 7–9. Leg claws hook-like, with long ventral clawlet and short dorsal one (Fig. 13).

Female. Acetabular plate elongate (L/W ratio 1.85–2.55), with short subequal genital setae (Fig. 6). Acetabula number 49–70, setae number 29–39.

Measurements (n=3). Idiosoma L 1500–1850; coxal plates I+II L 255–290, coxae III+IV L 360–425; genital plate L 250–290, W 105–140; capitulum L 240–255; basal segment of chelicera L 260–290, cheliceral stylet L 60–65; pedipalpal segments (P-1–5) L: 55–70, 78–90, 60–65, 180–200, 80–85; leg segments L: I–Leg-1–6: 85–100, 100–110, 125–130, 200–225, 275–290, 235–250; II–Leg-1–6: 85–100, 125–140, 160–175, 310–325, 360–380, 285–315; III–Leg-1–6: 85–100, 125–150, 150–165, 285–315, 335–365, 285–300; IV–Leg-1–6: 135–140, 185–200, 240–265, 375–400, 385–415, 315–340.

Male. Acetabular plate elongate (L/W ratio 2.48–2.66), with numerous acetabula (49–66) and long subequal setae (45–54) (Fig. 7).

Measurements (n=2). Idiosoma L 1400–1625; coxal plates I+II L 240–250, coxal plates III+IV L 360–380; genital plate L 280–290, W 108–120; capitulum L 225–235; basal segment of chelicera L 250–275, cheliceral stylet L 55–60; pedipalpal segments (P-1–5) L: 60–65, 70–75, 55–65, 175–185, 72–78; leg segments L: I–Leg-1–6: 85–100, 90–100, 110–125, 200–215, 260–270, 235–250; II–Leg-1–6: 80–90, 110–125, 150–165, 295–315, 335–350, 280–290; III–Leg-1–6: 80–90, 120–125,

145–155, 275–290, 325–340, 280–290; IV–Leg-1–6: 135–150, 175–190, 225–240, 350–365, 370–380, 310–340.

Deutonymph. Papillae of integument elongate, distally rounded (Fig. 14). Medial portion of coxal plates III+IV rectangular, setae *Pi* not associated with glandularia (Fig. 15). Coxal setae numbers: coxal plates I 4, coxal plates II 2, coxal plates III 3, coxal plates IV 2. Gonopore absent, two pairs of genital acetabula and one pair of genital setae situated on soft integument; posterior pair of acetabula slightly larger than anterior pair.

Pedipalp stout (Fig. 16): P-1 without seta, P-2 with four setae, P-3 with unequal in length seta, base of proximal setae located distally of middle of segment. Legs II–IV with swimming setae (Figs 17–18). Number of leg swimming setae: II–Leg-5 posterior 1; III–Leg-4 posterior 3–4; III–Leg-5 posterior 2–3; IV–Leg-4 anterior 3–4, IV–Leg-4 posterior 3–5; IV–Leg-5 anterior 0; IV–Leg-5 posterior 2–4.

Measurements (n=2). Idiosoma L 500–850; coxal plates I+II L 105–120, coxae III+IV L 160–170; capitulum L 135–155; basal segment of chelicera L 130–155, cheliceral stylet L 38–42; anterior acetabulum D 24–30; posterior acetabulum D 30–35; pedipalpal segments (P-1–5) L: 38–42, 45–48, 30–36, 114–120, 50–55; leg segments L: I–Leg-1–6: 440–45, 50–55, 50–60, 84–90, 125–135; II–Leg-1–6: 42–48, 55–60, 60–75, 120–130, 160–170, 150–160; III–Leg-1–6: 40–45, 52–56, 65–72, 110–120, 165–175, 150–180; IV–Leg-1–6: 670–78, 85–100, 90–110, 155–170, 185–200, 170–185.

Remarks. The number of genital acetabula and genital setae in adults varies in various European localities: acetabula, males 58 ±9, females 64±15; setae, males 49±6, females 32±3 (Wiles, 1986). Di Sabatino et al. (2010) believe that deutonymph of *H. despiciens* distinguished from *H. pilosa* in shape of integument papillae and complete absence of swimming setae from II–Leg-5, but single swimming seta is present on this segment (Fig. 17).

Larva. See Prasad and Cook (1972), Wiles (1985).

Habitat. Standings waters, often with lower alkalinity (Wiles, 1985; Gerecke, 1991; Di Sabatino et al., 2010).

Distribution. Cosmopolitan (Lundblad 1968; Cook 1974; K.O. Viets 1978), however Pesic and Smit (2007a, 2007b) demonstrated that Australian populations formerly attributed to *H. despiciens*

represent several separate species. Therefore, new taxonomic evidence is needed concerning all other extra-European records (Di Sabatino et al. 2010).

***Hydrodroma pilosa* Besseling, 1940**

Figs 19–36

Material examined. 2 males, Samara Province, Stavropol District, National natural Park “Samara Luka”, small lake near village Koltsovo, 10 July 1992, leg. P.V. Tuzovsky; 1 male, 2 females, North Caucasus, Republic Adygea, Mажkop-city, small pond, 18 July 2012, leg. V. Manzhurina and Yu. Saprykina; 1 male and 7 females, Yaroslavl Province, Nekouz District, Rybinsk reservoir near settlement Borok, July–August 2003, 2013, leg. P.V. Tuzovsky.

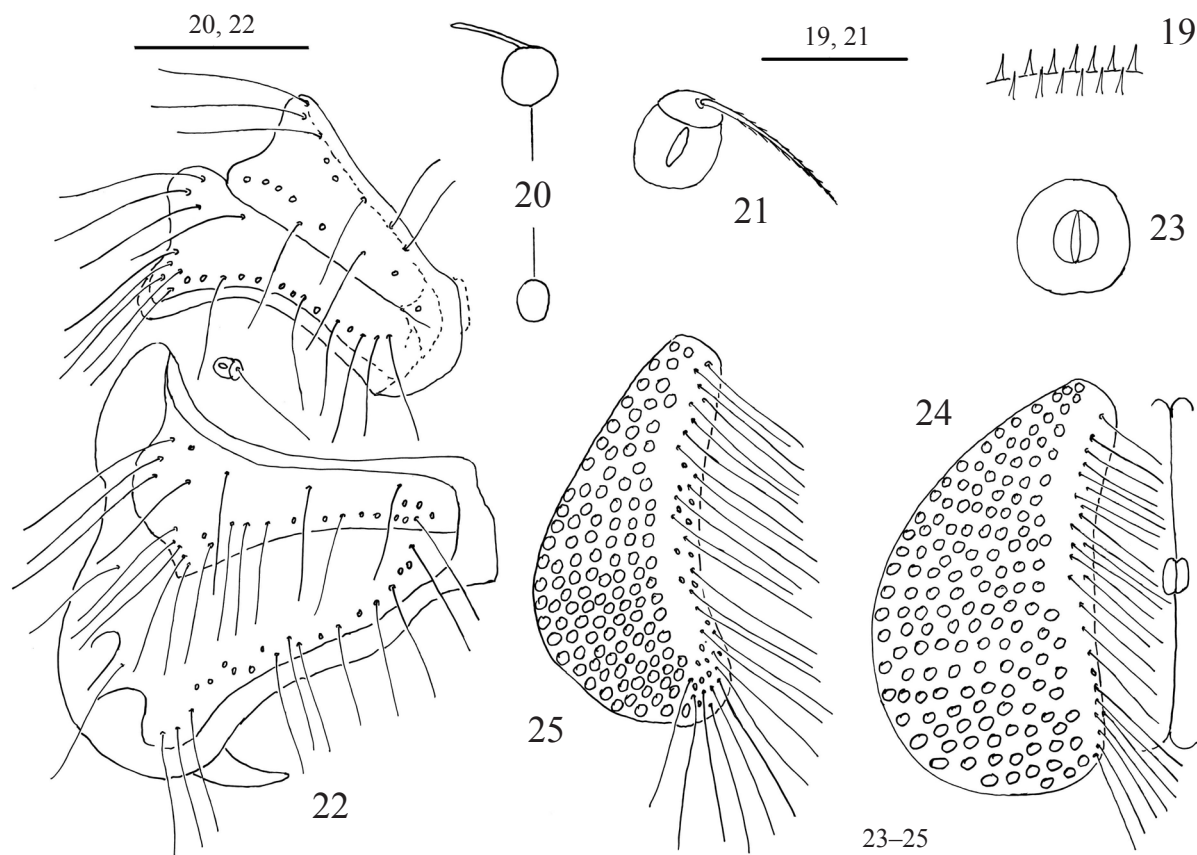
Diagnosis. Adults. Integument papillae sharply pointed; medial portion of coxal plates III+IV rectangular, P-3 with two long unequal dorsodistal setae; II–Leg-5 with 5–10 swimming setae; **male:** genital field with 55–120 acetabula and 75–140 long subequal setae, **female:** genital field with 65–75 acetabula and 45–65 short subequal setae; **deutonymph:** integument papillae sharply pointed, medial portion of coxal plates III+IV rectangular, II–Leg-5 with one or two swimming setae.

Adults. Colour usually red. Idiosoma oval, integument papillae sharply pointed (Fig. 19). Anterior lenses circular, posterior lenses oval (Fig. 20). Setae *Fch* (Fig. 21) thicker than other idiosomal setae. Shape and arrangement setae on coxal plates I–IV as shown in Fig. 22. Coxal setae numbers: coxal plates I 17–22; coxal plates II 19–25; coxal plates III 21–25, coxal plates IV 10–16. Medial portion of coxal plates III+IV rectangular. Excretory pore surrounded by sclerotized ring (Fig. 23).

Capitulum (Fig. 26) with short rostrum, capitular base moderately convex with short pointed dorsoproximal projection on each side. Chelicera (Fig. 27) with large basal segment and short stylet.

Pedipalp moderately slender (Fig. 28): P-1 with single dorsodistal seta; P-2 with six pectinate setae (three long mediobasal and three relatively short dorsal); P-3 with two long unequal dorsal setae, proximal seta thicker and shorter than distal one, base of proximal seta situated distally to middle of segment; P-4 tapering distally, with long pointed dorsodistal projection nearly reaching tip of elongated P-5.

Legs II–IV with swimming setae (Figs 29–30). Leg swimming setae numbers: II–Leg-5 pos-



Figs 19–25. *Hydrodroma pilosa* Besseling, 1940, adults: 19 — integument papillae; 20 — eye lenses; 21 — setae Fch; 22 — coxal plates I–IV; 23 — excretory pore; 24–25 — acetabular plate; 19–24 — female; 25 — male. Scale bars: 20, 22 = 200 μ m; 19, 21 = 50 μ m; 23–25 = 100 μ m.

terior 5–10; III–Leg-4 posterior 15–19, III–Leg-5 posterior 10–16; IV–Leg-4 anterior 14–18, IV–Leg-4 posterior 15–20; IV–Leg-5 anterior 5–9, IV–Leg-5 posterior 11–16. Leg claws hook-like, with long ventral clawlet and short dorsal one (Fig. 31).

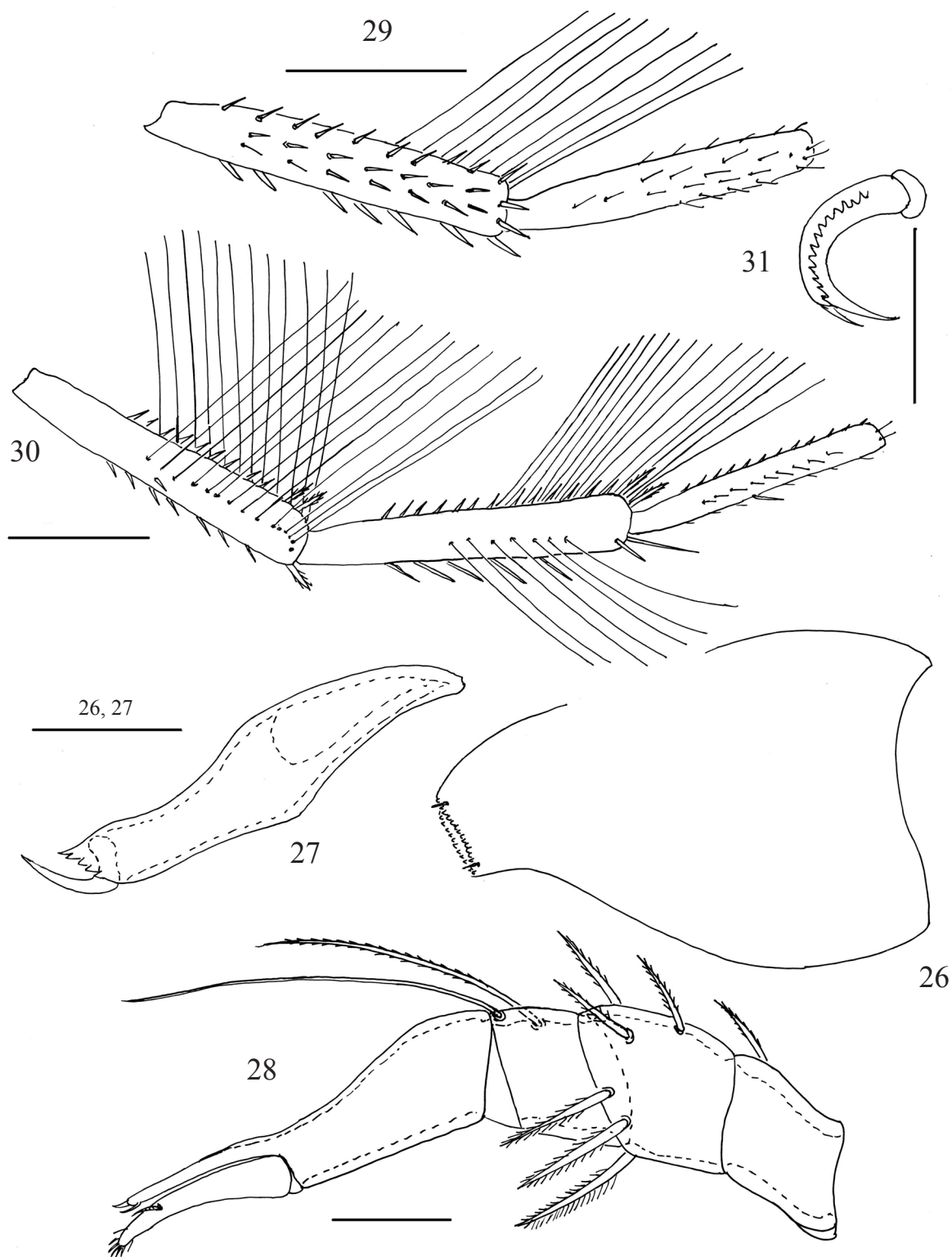
Female. Acetabular plate elongate (L/W ratio 1.85–2.55), with short subequal genital setae (Fig. 24). Acetabula number 59–133, setae number 27–45.

Measurements (n=3). Idiosoma L 1200–1900; coxal plates I+II L 235–240, coxae III+IV L 360–425; genital plate L 310–340, W 160–175; capitulum L 260–270; basal segment of chelicera L 285–315, cheliceral stylet L 60–70; pedipalpal segments (P-1–5) L: 60–70, 65–87, 54–75, 180–215, 60–95; leg segments L: I–Leg-1–6: 60–100, 105–140, 105–135, 165–225, 240–295, 195–250; II–Leg-1–6: 65–90, 130–170, 135–180, 280–340, 270–380, 245–315; III–Leg-1–6: 70–90, 145–180, 140–180, 285–330, 315–380, 250–305; IV–Leg-1–6: 110–160, 180–225, 220–275, 345–435, 350–435, 285–340.

Male. Acetabular plate elongate (L/W ratio 2.48–2.66), with numerous acetabula (55–94) and long, subequal setae (38–56) (Fig. 25).

Measurements (n=3). Idiosoma L 1200–1780; coxal plates I+II L 275–290, coxae III+IV L 375–400; genital plate L 310–340, W 135–165; capitulum L 235–255; basal segment of chelicera L 260–270, cheliceral stylet L 75–90; pedipalpal segments (P-1–5) L: 65–70, 60–85, 54–65, 145–195, 60–80; leg segments L: I–Leg-1–6: 70–100, 90–115, 90–125, 150–200, 210–275, 190–225; II–Leg-1–6: 65–100, 120–140, 125–165, 240–315, 280–350, 235–275; III–Leg-1–6: 70–100, 130–145, 120–165, 270–300, 275–335, 240–290; IV–Leg-1–6: 100–140, 150–190, 185–240, 310–375, 320–390, 300–325.

Deutonymph. Papillae on integument sharply pointed (Fig. 32). Medial portion of coxal plates III+IV rectangular, setae *Pi* not associated with glandularia (Fig. 33). Number of coxal setae: coxal plates-I 4; coxal plates-II 2; coxal plates-III 3, coxal plates-IV 2. Gonopore absent, two pairs of genital acetabula and one pair of genital setae situ-

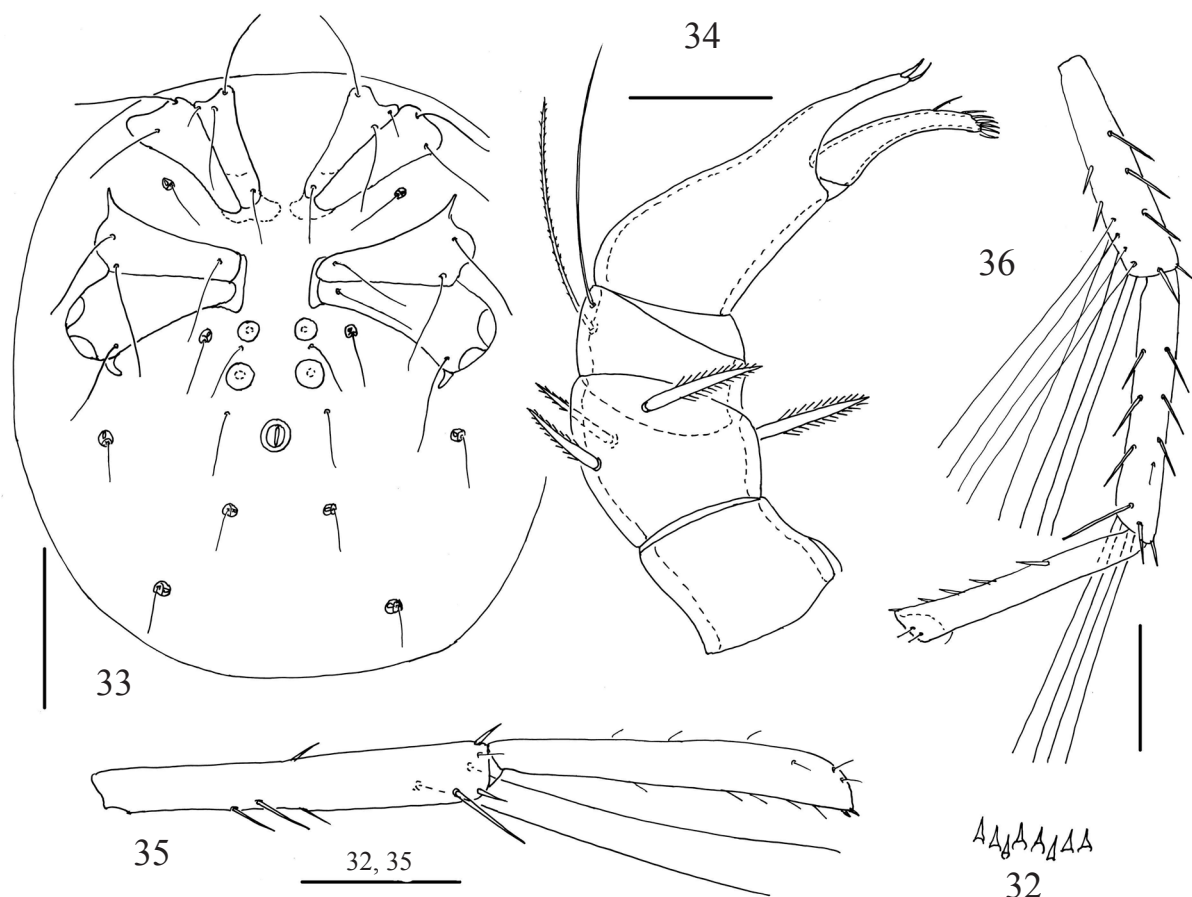


Figs 26–31. *Hydrodroma pilosa* Besseling, 1940, female: 26 — capitulum, lateral view; 27 — chelicera; 28 — pedipalp; 29–II–Leg-5–6; 30 — IV–Leg-4–6; 31 — claw of leg II. Scale bars: 26–27 = 100 μ m; 28, 31 = 50 μ m; 29–30 = 200 μ m.

ated on soft integument; posterior pair of acetabula large than anterior pair.

Pedipalp stout (Fig. 34): P-1 without seta, P-2 with four setae, P-3 with nearly equal in length se-

tae, base of proximal seta located distally middle of segment. Legs II–IV with swimming setae (Figs 35–36). Number of leg swimming setae: II–Leg-5 posterior 1–2; III–Leg-4 posterior 3–4; III–Leg-5



Figs 32–36. *Hydrodroma pilosa* Besseling, 1940, deutonymph: 32 — integument papillae; 33 — ventral view; 34 — pedipalp; 35 — II-Leg-5–6; 36 — IV-Leg-4–6. Scale bars: 32, 35–36 = 100 μ m; 33 = 200 μ m; 34 = 50 μ m.

posterior 3–6; IV-Leg-4 anterior 2–5, IV-Leg-4 posterior 3–5; IV-Leg-5 anterior 0; IV-Leg-5 posterior 3–5.

Measurements (n=5). Idiosoma L 490–900; coxal plates I+II L 60–65, coxae III+IV L 75–90; capitulum L 125–140; basal segment of chelicera L 160–170, cheliceral stylet L 40–50; anterior acetabulum D 28–32; posterior acetabulum D 35–42; pedipalpal segments (P-1–5) L: 30–45, 50–55, 30–40, 115–140, 50–65; leg segments L: I-Leg-1–6: 48–55, 40–55, 45–60, 85–100, 130–160, 135–160; II-Leg-1–6: 40–55, 60–65, 70–85, 125–155, 175–215, 170–195; III-Leg-1–6: 40–55, 60–65, 70–85, 125–155, 180–220, 170–195; IV-Leg-1–6: 60–75, 100–125, 120–140, 130–170, 205–240, 195–225.

Remarks. The number of genital acetabula and genital setae varies in mites from different European localities: acetabula, males 73 ± 10 , females 78 ± 11 ; genital setae, males 44 ± 7 , females 37 ± 4 ; swimming setae, adults: II-Leg-5 6–9, II-Leg-5 posterior 5–10; III-Leg-4 posterior 15–19, III-Leg-5 posterior 10–16; IV-Leg-4 anterior 14–18,

IV-Leg-4 posterior 15–20; IV-Leg-5 anterior 5–9, IV-Leg-5 posterior 11–16 (Wiles 1986). Larval morphologies in *H. pilosa* and *H. despiciens* are very similar and may be separated by size in leg length (Wiles 1985).

Larva. See Wiles (1985), Wainstein (1980) under the name *H. despiciens*.

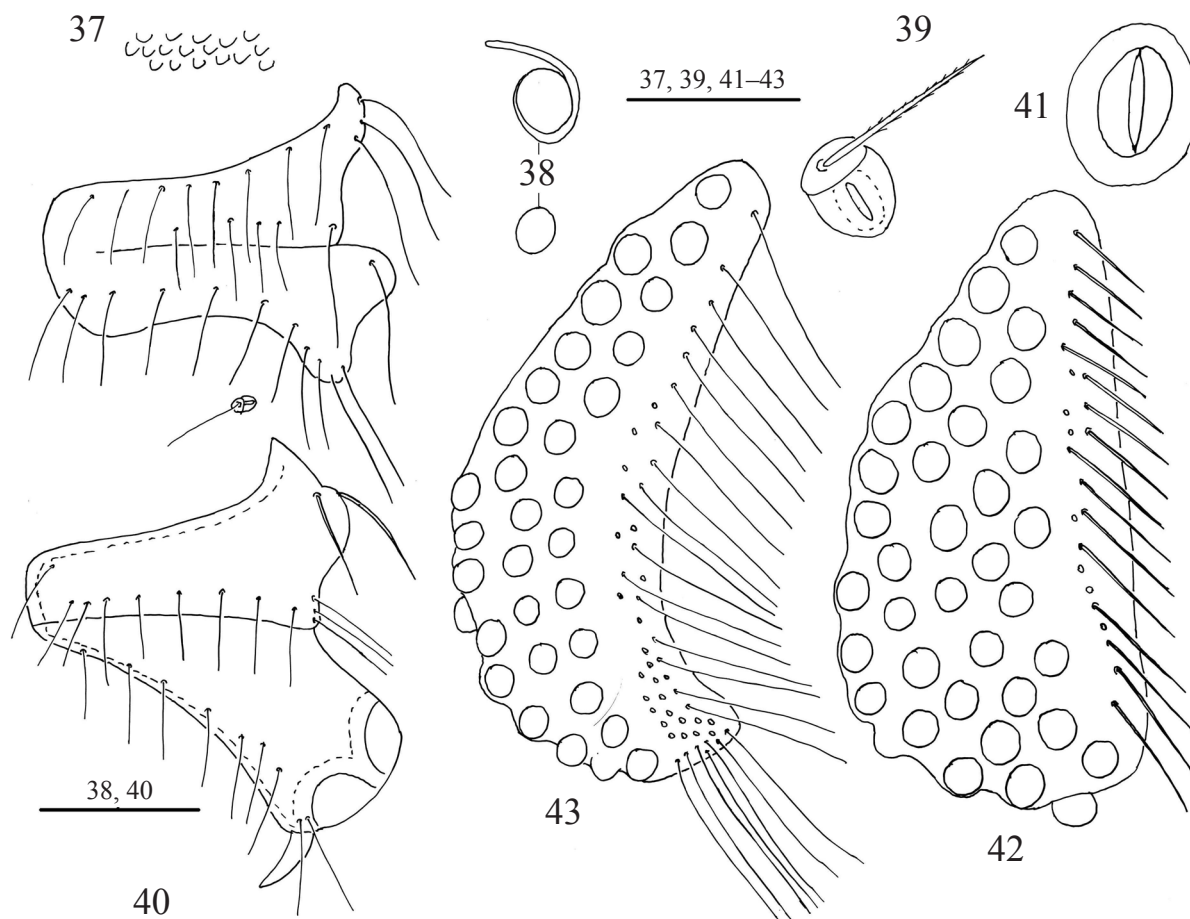
Habitat. Lakes, reservoirs, ponds, pools, and streams.

Distribution. Western Palaearctic. Widely distributed in temperate and warm climates, possibly by far more 50% of the records under name of *H. despiciens* in reality refer to *H. pilosa* (Di Sabatino et al. 2010).

Hydrodroma reinhardi Pesic, 2003

Figs 37–49

Material examined. 1 male, Yaroslavl Province, Nekouz District, small lake near village Pogorelka, 5 September 1994, leg. P.V. Tuzovsky; 2 males and 2 females, North Caucasus, Republic Adygea, Majkop-city, small pond, 18 July 2012, leg. V. Manzhurina and Yu. Saprykina.



Figs 37–43. *Hydrodroma reinhardi* Pesic, 2002, adults: 37 — integument papillae; 38 — eye lenses; 39 — setae *Fch*; 40 — coxal plates I–IV; 41 — excretory pore, ventral view; 42–43 — acetabular plate; 37–41, 42 — female; 43 — male. Scale bars: 38, 40 = 100 µm; 37, 39, 41–43 = 50 µm.

Diagnosis. Adults. Papillae of integument short, distally rounded; coxal plate IV triangular, with acute medial corner, medial margin of coxal plate III well developed straight or slightly convex; P-3 short seta situated proximally middle of segment; II–Leg-5 with 0–1 short swimming seta; **male:** genital field with 29–49 acetabula and 31–54 long setae; **female:** genital field with 29–62 acetabula and 13–25 short subequal setae.

Adults. Colour orange to brownish. Idiosoma oval, integument papillae short rounded distally (Fig. 37). Anterior eye lenses larger than posterior ones (Fig. 38). Setae *Fch* (Fig. 39) thicker than other idiosomal setae. Shape and arrangement setae on coxal plates I–IV as shown in Fig. 40. Suture line between coxal plates I+II incomplete, disappearing medially. Coxal plate II with strong concave posterior margin. Coxal plate IV triangular, with acute medial corner. Medial margin of coxal plate III well developed, straight or slightly convex. Coxal setae numbers: coxal plates I 13–19; coxal plates II 10–20; coxal plates III 10–14,

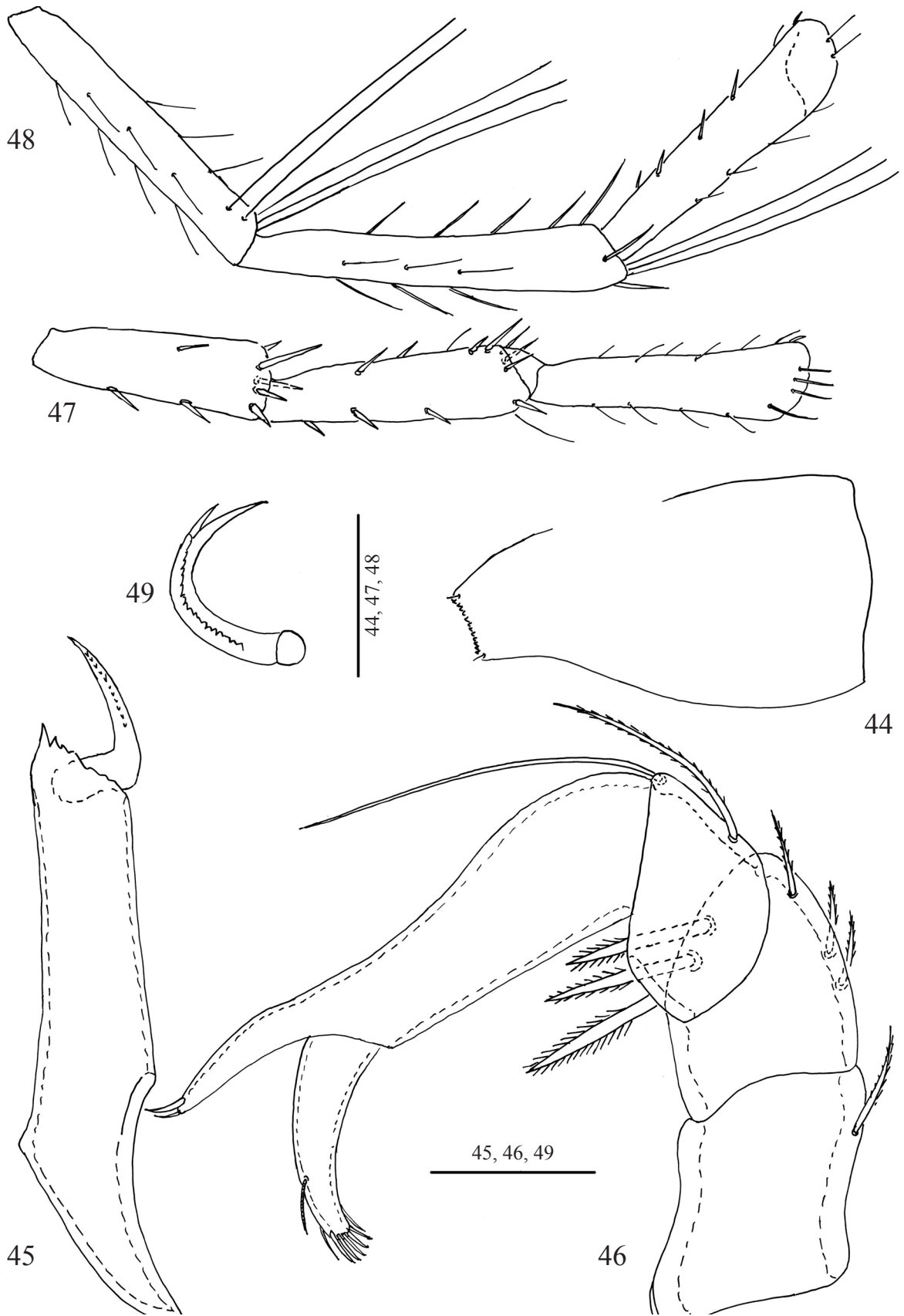
coxal plates IV 7–13. Excretory pore surrounded by sclerotized ring (Fig. 41).

Capitulum (Fig. 44) with moderately long rostrum, capitular base slightly convex. Chelicera (Fig. 45) with large basal segment and short stylet.

Pedipalp moderately slender (Fig. 46): P-1 with single dorsodistal seta; P-2 with six pectinate setae (three long mediolateral and three relatively short dorsal); P-3 with long, thin dorsodistal seta and short, thick anteriodorsal seta, base of anteriodorsal seta situated proximally middle of segment; P-4 with long pointed dorsodistal projection.

Legs III–IV with swimming setae. II–Leg-5 (Fig. 47) without true swimming seta. Number of leg swimming setae: III–Leg-4 posterior 2–4, III–Leg-5 posterior 2–4; IV–Leg-4 anterior 2, IV–Leg-4 posterior 2–4; IV–Leg-5 anterior 0, IV–Leg-5 posterior 2–3 (Fig. 48). Leg claws hook-like, with long ventral clawlet and short dorsal one (Fig. 49).

Female. Acetabular plate elongate (L/W ratio 2.07–2.64), with short subequal genital setae (Fig. 42), 29–44 acetabula and 18–24 setae.



Figs 44–49. *Hydrodroma reinhardi* Pesic, 2002, female: 44 — capitulum, lateral view; 45 — chelicera; 46 — pedipalp; 47 — II-Leg-5-6; 48 — IV-Leg-4-6; 49 — claw of leg II. Scale bars: 44, 47–48 = 100 μm ; 45–46, 49 = 50 μm .

Measurements (n=2). Idiosoma L 800–1125; coxal plates I+II L 180–190; coxal plates III+IV L 220–230; genital plate L 160–175, W 65–78; capitulum L 195–205; basal segment of chelicera L 230–240, cheliceral stylet L 55–60; pedipalpal segments (P-1–5) L: 48–54, 65–69, 35–48, 155–190, 53–55; leg segments L: I–Leg-1–6: 48–60, 78–85, 90–96, 135–145, 170–180, 165–175; II–Leg-1–6: 54–60, 95–98, 115–120, 175–185, 205–215, 180–190; III–Leg-1–6: 48–55, 90–100, 115–120, 180–185, 220–230, 190–200; IV–Leg-1–6: 78–90, 125–132, 160–170, 245–255, 260–270, 220–235.

Male. Acetabular plate elongate (L/W ratio 2.8–3.0), with numerous acetabula (29–32) and long, subequal setae (50–54) (Fig. 43).

Measurements (n=3). Idiosoma L 875–1000; coxal plates I+II L 140–160, coxal plates III+IV L 170–195; genital plate L 130–170, W 54–60; capitulum L 168–175; basal segment of chelicera L 220–230, cheliceral stylet L 55–60; pedipalpal segments (P-1–5) L: 48–54, 54–60, 30–42, 135–145, 48–55; leg segments L: I–Leg-1–6: 48–60, 65–72, 70–78, 115–125, 150–155, 155–160; II–Leg-1–6: 48–55, 78–85, 85–90, 140–150, 170–180, 165–170; III–Leg-1–6: 42–48, 78–85, 90–96, 150–155, 185–190, 180–185; IV–Leg-1–6: 78–90, 108–115, 130–140, 200–210, 220–230, 210–220.

Remarks. Specimens of *H. reinhardi* from North Caucasus and Yaroslavl Province are in a general agreement with the original description (Pesic 2002) but II–Leg-5 without true swimming seta. The number of genital acetabula and genital setae varies in different Mediterranean localities: acetabula, males 35–49, females 45–62; genital setae, males 31–54, females 13–25 (Pesic 2002).

Larva. Unknown.

Deutonymph. Unknown.

Habitat. Springs, running waters, lakes, ponds.

Distribution. Mediterranean: France (Corsica), Italy, Serbia and Montenegro (Pesic 2002), Iran (Pešić et al. 2003); Russia: North Caucasus (Adygea) and Yaroslavl Province.

***Hydrodroma torrenticola* (Walter, 1908)**

Figs 50–66

Material examined. 7 males, 12 females, 7 deutonymphs, Yaroslavl Province, Nekouz District, Il'd stream near village Mar'ino, June–August 2002, 2003, 2005, leg. P.V. Tuzovsky; 2 female Yaroslavl Province, Breitovo District,

Kamenka stream near village Sit'-Pokrovskoe, 2 July 2003, leg. P.V. Tuzovsky; 1 female and 3 males, Karelia, Krivoe Lake, 7 August 2002, leg. A.B. Shatrov.

Diagnosis. Adults. Papillae of integument elongate, distally rounded; medial portion of coxal plates III+IV rounded; P-3 with two long unequal dorsodistal setae; II–Leg-5 with single swimming seta; **male:** 39–66 acetabula and 43–64 long subequal setae, **female:** genital field with 40–70 acetabula and 25–45 short subequal setae; **deutonymph:** integument papillae distally rounded, medial portion of coxal plates III+IV rounded, II–Leg-5 with single swimming seta.

Adults. Colour usually orange to brown (occasionally yellow). Idiosoma oval, papillae rounded of integument elongated distally rounded (Fig. 50). Anterior eye lens larger than posterior ones (Fig. 51). Setae *Fch* (Fig. 52) thicker than other idiosomal setae. Shape and arrangement of setae on coxal plates I–IV shown on Fig. 53. Coxal setae numbers: coxal plates I 23–33; coxal plates II 26–36; coxal plates III 21–25, coxal plates IV 20–23. Medial portion of coxal plates III+IV relatively rounded. Excretory pore well sclerotized (Fig. 54).

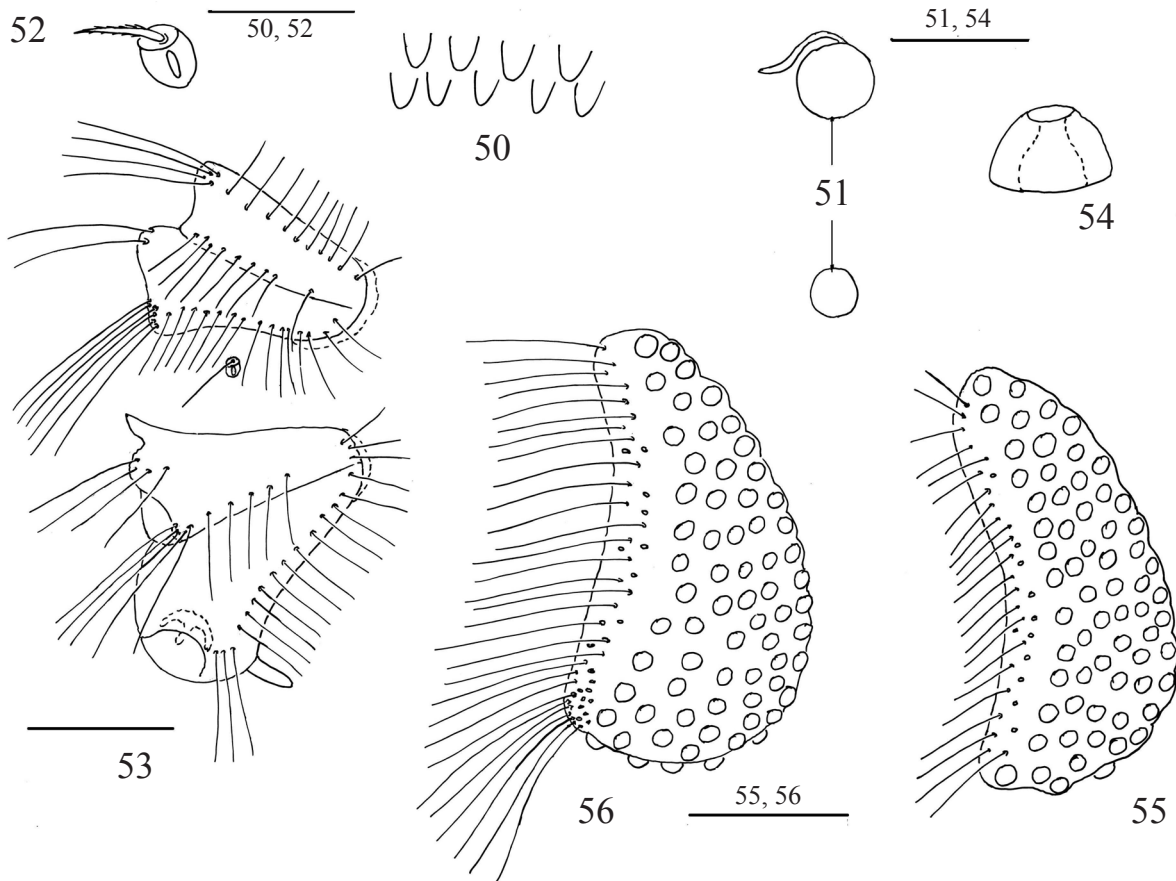
Capitulum (Fig. 57) with moderately long rostrum, capitular base slightly convex. Chelicera (Fig. 58) with large basal segment and short stylet.

Pedipalp moderately slender (Fig. 59): P-1 with single dorsodistal seta; P-2 with six pectinate setae (three long mediodistal and three relatively short dorsal); P-3 with long, thin dorsodistal seta and short, thick proximal seta, base proximal seta situated near middle of segment; P-4 tapering distally, with long pointed dorsodistal projection.

Legs II–IV with swimming setae (Figs 60–61): II–Leg-5 posterior 1; III–Leg-4 posterior 4–8, III–Leg-5 posterior 4–8; IV–Leg-4 anterior 7–8, IV–Leg-4 posterior 5–9; IV–Leg-5 anterior 2–4, IV–Leg-5 posterior 4–8. Leg claws hook-like, with long ventral clawlet and short dorsal one (Fig. 62).

Female. Acetabular plate elongate (L/W ratio 2.20–2.24), with short subequal genital setae (Fig. 55), with 40–70 acetabula, and 25–45 setae.

Measurements (n=5). Idiosoma L 1600–1750; coxal plates I+II L 235–265; coxae III+IV L 335–375; genital plate L 265–275, W 115–125; capitulum L 225–240; basal segment of chelicera L 250–275, cheliceral stylet L 50–62; pedipalpal segments (P-1–5) L: 60–72, 60–75, 60–63, 165–175, 72–78; leg segments L: I–Leg-1–6: 75–100, 100–115, 120–140, 185–225, 235–275, 225–250; II–Leg-



Figs 50–56. *Hydrodroma torrenticola* (Walter, 1908), adults: 50 — integument papillae; 51 — eye lenses; 52 — setae Fch; 53 — coxal plates I–IV; 54 — excretory pore, lateral view; 55–56 — acetabular plate; 50–55 — female; 56 — male. Scale bars: 50, 52 = 50 μ m; 51, 54 and 55–56 = 100 μ m; 53 = 200 μ m.

1–6: 75–90, 125–140, 150–165, 225–300, 310–340, 260–290; III–Leg-1–6: 75–90, 120–150, 150–175, 250–275, 250–275, 300–340, 260–280; IV–Leg-1–6: 115–175, 130–205, 210–250, 350–375, 350–390, 300–340.

Male. Acetabular plate elongate (L/W ratio 2.46–2.56), with numerous acetabula (39–66) and long subequal setae (43–45) (Fig. 56).

Measurements (n=5). Idiosoma L 1150–1520; coxal plates I+II L 235–250, coxae III+IV L 285–315; genital plate L 285–290, W 110–115; capitulum L 225–240; basal segment of chelicera L 260–275, cheliceral stylet L 60–63; pedipalpal segments (P-1–5) L: 50–60, 65–72, 65–72, 165–180, 75–78; leg segments L: I–Leg-1–6: 75–90, 85–100, 110–115, 200–215, 235–265, 210–250; II–Leg-1–6: 85–100, 110–125, 135–165, 260–290, 300–350, 250–300; III–Leg-1–6: 80–100, 125–150, 135–150, 250–275, 285–325, 250–290; IV–Leg-1–6: 125–150, 160–175, 210–225, 350–365, 335–375, 290–330.

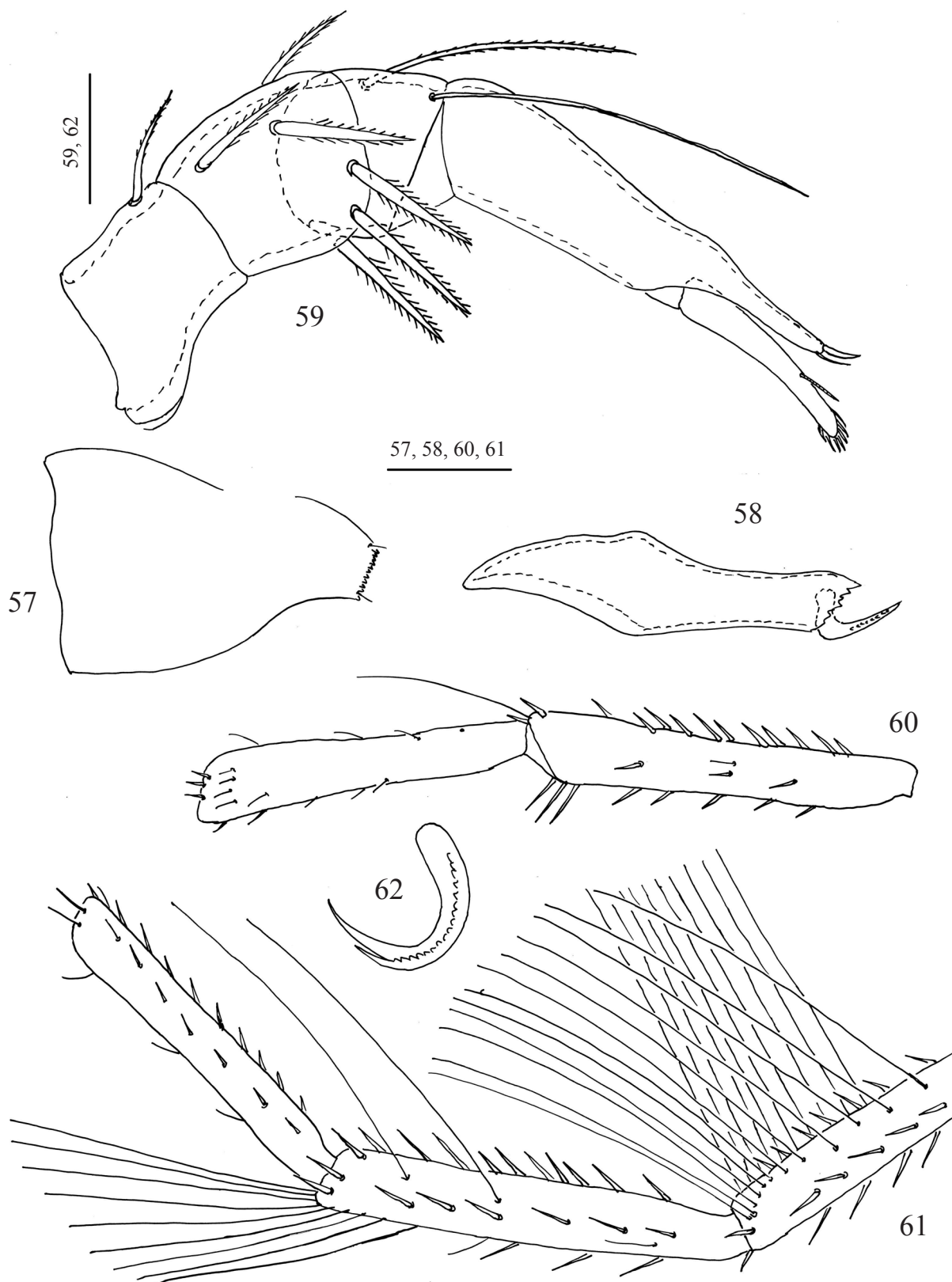
Deutonymph. Number of coxal setae: coxal plates I 4; coxal plates II 1; coxal plates III 2, cox-

al plates IV 2 (Fig. 63). Posterior pair of acetabula large than anterior pair of acetabula.

Pedipalp stout (Fig. 64): P-1 without seta, P-2 with four setae, P-3 with short, thick proximal seta and long dorsodistal one, base of proximal setae located near middle of segment.

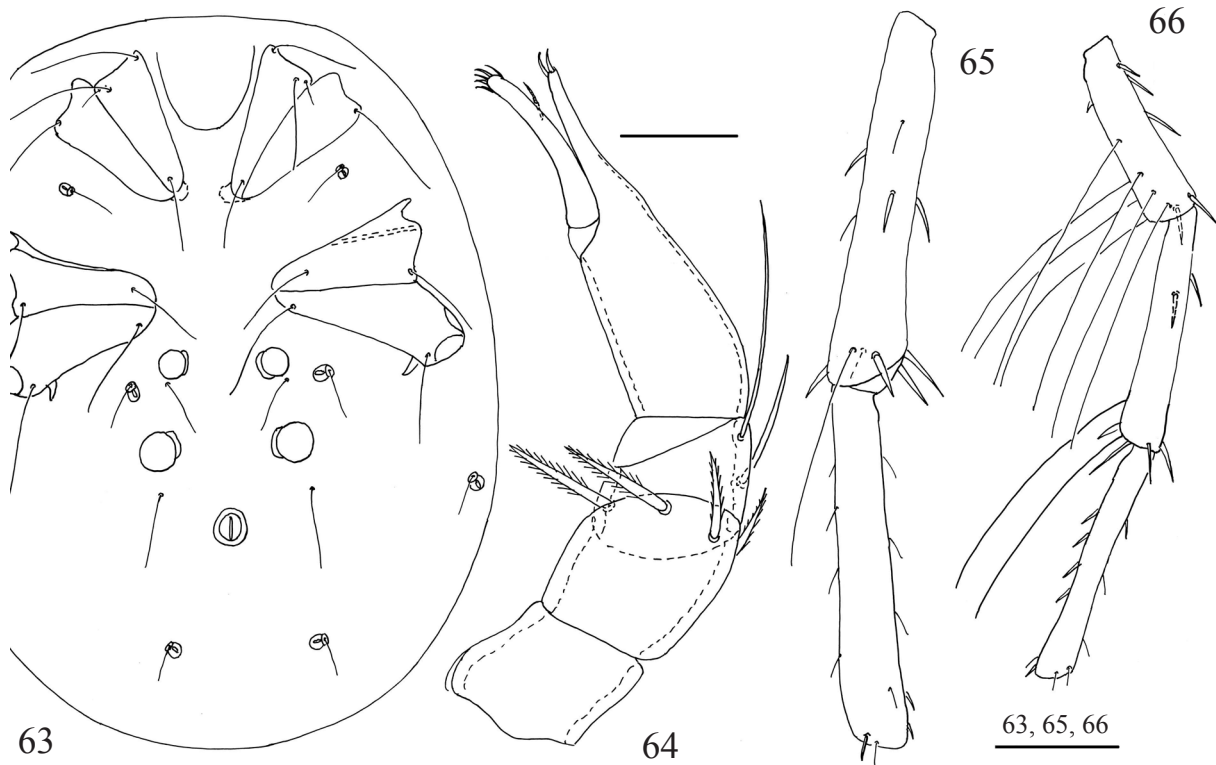
Legs II–IV with swimming setae (Figs 65–66). Number of leg swimming setae: II–Leg-5 posterior 1; III–Leg-4 posterior 2; III–Leg-5 posterior 2–3; IV–Leg-4 anterior 3–4, IV–Leg-4 posterior 3–5; IV–Leg-5 anterior 0; IV–Leg-5 posterior 2–3. II–Leg-5 swimming seta usually less than one half length of segment, but sometimes it longer than half of segment.

Measurements (n=7). Idiosoma L 490–600; coxal plates I+II L 95–110, coxae III+IV L 130–155; capitulum L 115–125; basal segment of chelicera L 115–125, cheliceral stylet L 35–37; anterior acetabulum D 25–28; posterior acetabulum D 30–35; pedipalpal segments (P-1–5) L: 30–32, 36–42, 36–42, 100–105, 42–48; leg segments L: I–Leg-1–6: 30–36, 60–63, 48–55, 70–80, 105–125, 115–120; II–Leg-1–6: 35–39, 55–63, 60–70,



Figs 57–62. *Hydrodroma torrenticola* (Walter, 1908), female: 57 — capitulum, lateral view; 58 — chelicera; 59 — pedipalp; 60 — II-Leg-5-6; 61 — IV-Leg-4-6; 62 — claw of leg II. Scale bars: 57–58, 60–61 = 100 μ m; 59, 62 = 50 μ m.

95–110, 130–150, 130–145; III-Leg-1-6: 35–38, Leg-1-6: 60–66, 70–85, 75–90, 135–155, 160–
60–65, 60–65, 100–110, 135–150, 120–145; IV- 180, 155–170.



Figs 63–66. *Hydrodroma torrenticola* (Walter, 1908), deutonymph: 63 — ventral view; 64 — pedipalp; 65 — II–Leg-5–6; 66 — IV–Leg-4–6. Scale bars: 63, 65–66 = 100 µm; 64 = 50 µm.

Remarks. The number of genital acetabula and genital setae varies among European localities: acetabula, males 47 ± 6 , females 57 ± 7 ; setae, males 50 ± 4 , females 36 ± 8 (Wiles 1986).

Larva. See Wiles (1985).

Habitat. Running waters, lakes.

Distribution. Central, Western and South Europe (Di Sabatino et al. 2010); Russia: Karelia (Tuzovsky and Shatrov 2005), Upper Volga.

Key to *Hydrodroma* species from Russia

Adults

- 1 (2) Number of swimming setae on II–Leg-5 > 4 (Fig. 29), integument with papillae sharply pointed (Fig. 19) *H. pilosa* (Besseling, 1940)
- 2 (1) Number of swimming setae on II–Leg-5 = 0–1, integument with papillae distally rounded
- 3 (4) IV–Leg-5 anterior side with two to five swimming setae (Fig. 61)
..... *H. torrenticola* (Walter, 1908)
- 4 (3) IV–Leg-5 anterior side without swimming setae
- 5 (6) Medial portion of coxal plates III+IV rectangular (Fig. 4), integument with elongated papillae (Fig. 1), P-3 short seta situated distally middle of segment (Fig. 10) *H. despiciens* (Müller, 1776)
- 6 (5) Medial portion of coxal plates III+IV rounded (Fig. 40), integument with short papillae (Fig.

37), P-3 short seta situated proximally middle of segment (Fig. 46) *H. reinhardi* Pesic, 2002

Deutonymphs

(unknown for *H. reinhardi*)

- 1 (2) Medial portion of coxal plates III+IV rounded (Fig. 63) *H. torrenticola* (Walter, 1908)
- 2 (1) Medial portion of coxal plates III+IV rectangular 3
- 3 (4) Integument papillae distally rounded (Fig. 14) *H. despiciens* (Müller, 1776)
- 4 (3) Integument papillae sharply pointed (Fig. 32) *H. pilosa* (Besseling, 1940)

ACKNOWLEDGEMENTS

The author is grateful to V. Manzhurina and Yu. Saprykina, Dr. A. Shatrov, Prof. R. Gerecke and A. Renz (Germany) for sending me material and to anonymous referees for reviewing the manuscript.

REFERENCES

Besseling, A. 1940. Lets over der variabiliteit bij *Hydrodroma*-soorten. *Entomologische Berichten*, Amsterdam, 10: 245–247.
 Besseling, A. 1965. De Vormen van *Hydrodroma despiciens* (O.F. Müller 1776). (Ned. Hydrachnellae XLIII). *Entomologische Berichten*, Amsterdam, 25: 34–40.

- Cook, D.R. 1974. Water mite genera and subgenera. *Memoirs of the American Entomological Institute*, 21: 1–860.
- Di Sabatino, A., Gerecke, R., Gledhill, T. and Smit, H. 2010. 8. Acari, Hydrachnidia II. In: Gerecke, R. (ed). Süßwasserfauna von Europa, 7, 2–2, Elsevier GmbH, Spectrum Akademischer Verlag Heidelberg: 1–240.
- Gerecke, R. 1991. Taxonomische, faunistische und ökologische Untersuchungen an wassermilben (Acari, Actinedida) aus Sizilien unter Berücksichtigung anderer aquatischer Invertebraten. *Lauterbornia*, 7: 1–304.
- Lundblad, O. 1968. Die Hydracarinen Schwedens. II. *Arkiv för Zoology*, 21 (1): 1–633.
- Pesic, V. 2002. *Hydrodroma reinhardi* sp. n., a new species of water mites (Acari, Actinedida, Hydrodromidae) from Mediterranean Area. *Aquatic Insects*, 24 (4): 317–323.
- Pešić, V., Asadi M. and Saboori A. 2003. Water mites of the family Hydrodromidae (Acari: Hydrachnidia) from Iran. *Arch. Biol. Sci.*, Belgrade, 55 (3–4): 31–32.
- Pesic, V. and Smit H., 2007a. Water mites of the genus *Hydrodroma* Koch (Acari: Hydrachnidia, Hydrodromidae) from Australia. Part I. *Zootaxa*, 1389: 31–44.
- Pesic, V. and Smit H., 2007b. Water mites of the genus *Hydrodroma* Koch (Acari: Hydrachnidia, Hydrodromidae) from Australia. Part II. *Zootaxa*, 1509: 41–50.
- Prasad, V. and Cook, D. 1972. The taxonomy of water mite larvae. *Memoirs of the American Entomological Institute*, 18: 1–326.
- Sokolow, I.I., 1940. Hydracarina — vodyanye kleshchi. Chast' I. Hydrachnellae. Fauna SSSR (novaya seriya No 20. Paukoobraznye, 5 (2) [Hydracarina — the aquatic mites. Part I. Hydrachnellae. Fauna of the USSR. (nouv. ser., no 20), Arachnides, 5 (2)]. Publisher: Nauka, Moscow-Leningrad, 24+511 pp. [In Russian].
- Tuzovsky, P.V., 1987. *Morfologiya i postembrional'noye razvitiye vodyanykh kleshchey* [Morphology and Postembryonic Development in Water Mites]. Nauka, Moscow. 172 pp. [In Russian].
- Tuzovsky, P.V. and Shatrov A.B. 2005. Fauna vodyanykh kleshchey (Acariformes: Parasitengona, Halacaroidea) ozer Krivoe i Krugloe Chupinskoy guby Kandalakshskogo zaliva [Water mites fauna (Acariformes: Parasitengona, Halacaroidea) of lakes Krivoe and Krugloe in the Chupa Bay basin]. *Entomologicheskoe Obozrenie*, 84 (2): 455–464 [In Russian].
- Viets, K.O., 1978. Hydracarina. *Limnofauna Europaea*. Illies J. (Ed.). Stuttgart: G. Fischer: 154–181.
- Viets, K.O., 1987. [Die Milben des Süßwassers (Hydrachnellae und Halacaridae) part], Acari. 2. Katalog. *Sonderbände des Naturwissenschaftlichen Vereins in Hamburg*, 8: 1–1012.
- Wainstein, B.A., 1980. *Key to water mite larvae*. Nauka, Leningrad, 238 pp. [In Russian]
- Wiles, P.R., 1985. The systematics of the British Hydrodromidae Viets, 1936. *Archiv für Hydrobiologie*. Suppl. 70 (3): 365–403.
- Wiles, P.R., 1986. *Hydrodroma monticola* (Piersig) (Hydrachnidia, Hydrodromidae Koch, 1837): a redefinition of the species. *Archiv für Hydrobiologie*, 108 (1): 135–140.