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# THREE NEW WATER MITE SPECIES OF THE GENUS *TORRENTICOLA* PIERSIG, 1896 (ACARI: HYDRACHNIDIA: TORRENTICOLIDAE) FROM NORTH CAUCASUS

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[Тузовский П.В. Три новых вида водяных клещей рода *Torrenticola* Piersig, 1896 (Acariformes: Hydrachnidia: Torrenticolidae) с Северного Кавказа]
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***Key words**: Hydrachnidia, Torrenticolidae, Torrenticola, water mites, new species, North Caucasus*

***Ключевые слова**: Hydrachnidia, Torrenticolidae, Torrenticola, водяные клещи, новые виды, Северный Кавказ*

***Summary***: Illustrated descriptions of three new water mite species, *Torrenticola caucasica* **sp. n.**, *T. rara* **sp. n.** and *T. simulans* **sp. n.** from running waters of North Caucasus are presented.

***Резюме***: Иллюстрированное описание трех новых видов водяных клещей *Torrenticola amplexoides* **sp. n.**, *T. rara* **sp. n.** и *T. simulans* **sp. n.** из проточных водоемов Северного Кавказа.

## INTRODUCTION

The genus *Torrenticola* Piersig, 1896 is divided into two subgenera, *Torrenticola* s. str. and *Megapalpis* Halbert, 1944 [Gerecke & Sabatino, 1996, Wiles, 1997]. The subgenus *Torrenticola* is the most diversified and species-rich taxon among the Torrenticolidae with more than 200 species described from all continents except Antarctica and Australia [Di Sabatino et al., 2010], but only 13 species of water mites belonging to this subgenus are reported for the fauna of Russia [Sokolow, 1940, Tuzovskij, 2003a, 2003b, 2004, 2005]. In the materials from running waters of the Krasnodar Kray three new species of the genus *Torrenticola* were discovered. Their description is given in the present paper.

## MATERIALS AND METHODS

The material was sampled with a common hand net with 250 μm mesh size. Most specimens were not dissected, thus preserving the natural shape of the body. For several males females the gnathosoma was mounted in a position that allows investigating pedipalp, chelicera and capitulum in lateral view. All mite specimens were mounted in Hoyer's medium. The type material is deposited in the research collections of the Institute for Biology of Inland Waters, Borok, Russia (IBIW).

Idiosomal setae and lyriform organs 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, *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.

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) i.e. III–L–4 = genu of third leg; n = number of specimens measured. Length of segments was measured along their dorsal length; all measurements are given in μm.

## SYSTEMATIC PART

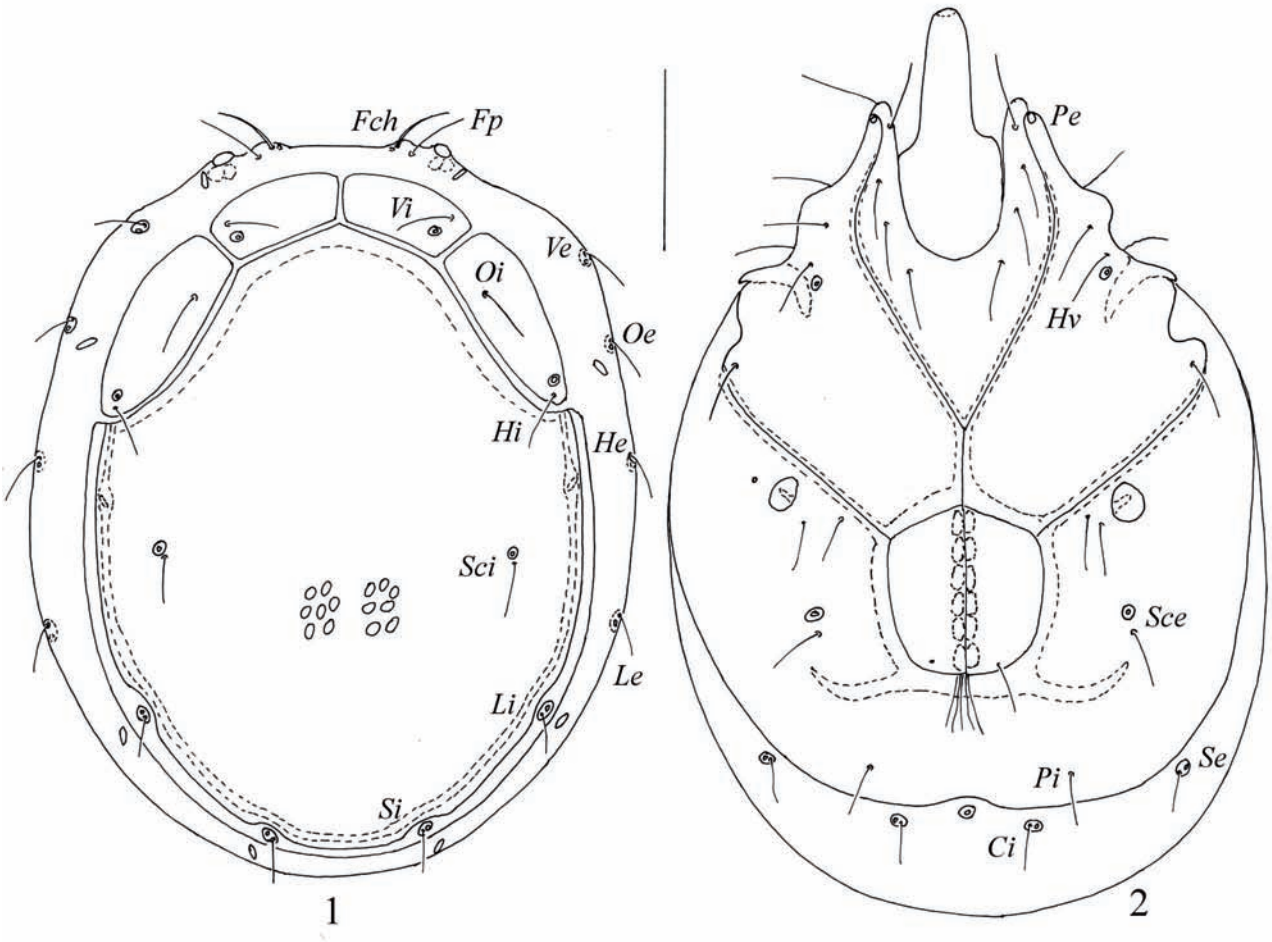
Family **Torrenticolidae** Piersig, 1902
Genus ***Torrenticola*** Piersig, 1896

### *Torrenticola (Torrenticola) caucasica* sp.n.

(Figs. 1–7)

**Type series**. Holotype: male (1579a –IBIW), Russia, North Caucasus, Krasnodar Kray, Seversk District, Ubin stream near settlement Ubinskaya; substrates: stones, gravel, sand; depth 0.3–0.5 m, 07.05.1976, leg. P.V. Tuzovskij. *Paratypes:* 5 males from Ubin stream, same locality as holotype, 3 males 07.05.1976 and 2 males 16.06.1976, leg. P.V. Tuzovskij.

**Male. Description.** Idiosoma wide, oval-shaped; frontal edge between setae *Fch* wide and straight (Fig. 1). Dorsum with main dorsal shield; in two pairs anterior platelets (medial and lateral) and long narrow sclerotized strip surrounded by the lateral and caudal portions of the main shield, this strip usually concealed by dorsal shield; both pairs of platelets are separated from main dorsal shield. Anteromedial platelets narrow, shorter than anterolateral platelets; the latter tapering posterolaterally. Dorsal shield




Figs 1-2. *Torrenticola caucasica* sp. n., male: 1 – dorsal view; 2 – ventral view. Scale bar: 200 μm.
Рис. 1-2. *Torrenticola caucasica* sp. n, самец: 1 – дорсальная сторона; 2 – вентральная сторона. Шкала: 200 μm.

wide, covering about 5/6 of dorsal surface (length/width ratio 1.16–1.30), bearing single pair of setae (*Sci*); secondary sclerotization very weakly developed. Glandularia *Sci* open distant from lateral margins of dorsal shield. Two muscle attachment sites with a rough sculpture between and slightly posteriorly to setae *Sci*. Setae *Vi* located on anteromedial platelets, setae *Oi* and *Hi* on anterolateral platelets; *Li* and *Si* on secondary sclerotization of dorsal shield; *Fch, Fp, Ve, Oe, He, Le* occupy peripheral position on idiosoma.

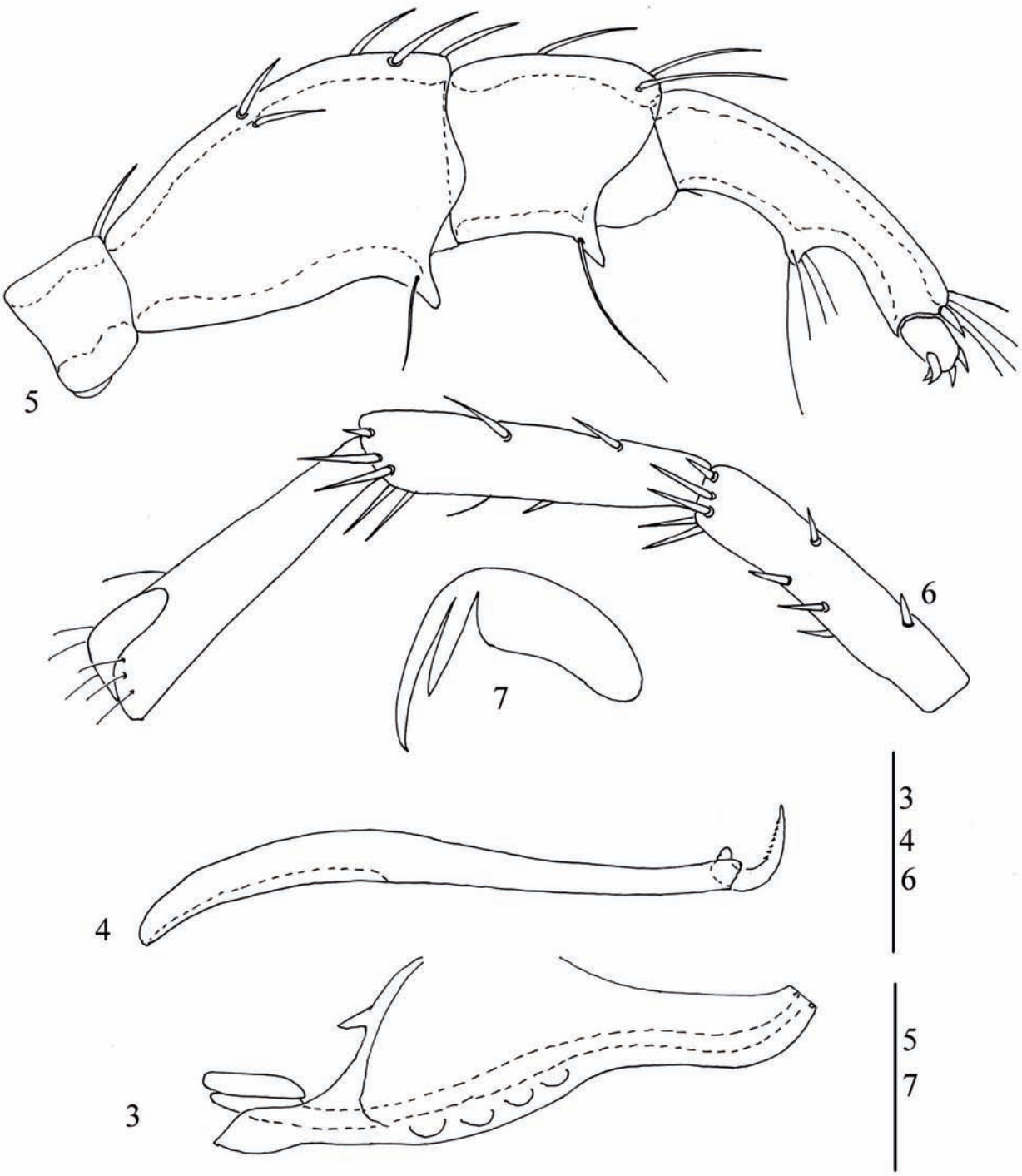
Coxal shield large (Fig. 2), covering about 4/5 ventral area, capitular bay U-shaped. Suture line between coxae II+III is 1.3–1.7 time shorter than medial portion of coxae I. Genital field almost subrectangular in shape. Suture lines of coxae IV well developed, starting at right angle from genital field, laterally slightly curved anteriorly. Glandularia and setae *Sce* slightly separated, glandularia *Pe* open at tips of anterolateral processes of coxae II. Postgenital area extended. Excretory pore not distanced from the line of primary sclerotization of ventral shield. Setae *Ci* and *Se* placed on zone secondary sclerotization, and *Pi* on zone of primary sclerotization of ventral shield.

Capitulum (Fig. 3) with moderately long rostrum, its tip curved dorsally. Rostrum 1.5 time shorter than the capitular base, and ventrally non-distinctly set off from capitular base.

Chelicera (Fig. 4) elongated and slightly thickened proximally; stylet short, crescent, with two rows of fine teeth on the concave side.

Pedipalp (Fig. 5) robust; P–1 short, with a single dorsodistal setae; P–2 large, with slightly convex ventral margin, with five dorsal subequal setae, and one further seta laterally at the base of the ventrodistal conic projection; P–3 considerably shorter than P–2, with concave ventral margin, with three dorsal setae (one proximal and two distal unequal setae), ventral side of P–3 with a projection and single seta similar to that of P–2; P–4 with more-or-less equally convex dorsal side, one heavy seta and several thin setae on dorsodistal portion, ventral side concave, with a single small tubercles near middle of segment, bearing four setae of different length.

Morphology and chaetotaxy of leg IV as illustrated in figure 6. All legs without swimming setae.




Figs 3-7. *Torrenticola caucasica* sp. n., male: 3 – capitulum, lateral view; 4 – chelicera, lateral view; 5 – pedipalp, lateral view; 6 – genu, tibia, and tarsus of leg IV; 7 – claw of leg IV. Scale bars: 3–4, 6 = 100 μm; 5, 7 = 50 μm.
Рис. 3-7. *Torrenticola caucasica* sp. n., самец: 3 – капитулум, вид сбоку; 4 – хелицера, вид сбоку; 5 – педипальпа, вид сбоку; 6 – колено, голень и лапка ноги IV; 7 – коготок ноги IV. Шкалы: 3–4, 6 = 100 μm; 5, 7 = 50 μm.

Tarsi of legs II–IV gradually thickened to distal end, their ventral margin straight. Ambulacrae with long external and short internal clawlets, ventral margin of blade slightly concave (Fig. 7).

Measurements (n=6). Length of dorsum idiosoma 560–680, width 475–575; length of anteromedial platelets 120–125, width 48–63; length of anterolateral platelets 165–180, width 50–70; length of dorsal shield 500–575, width 385–475, distance from glandularia *Sci* to lateral margin of dorsal shield 65–72, length of median portion of coxae I 125–140, length of suture line of coxae II+III 75–95; length of genital field 140–160, width 120–140; distance from posterior margin of genital field to excretory pore 100–120, distance from posterior margin of genital field to caudal edge of idiosoma 155–215; length of capitulum

275–290; length of basal segment of chelicera 285–300, length of stylet of chelicera 42–54; lengths of pedipalpal segments (P–1–5): 30–32, 95–102, 60–63, 90–108, 12–15; lengths of leg segments: I–Leg–1–6 — 35–42, 75–95, 70–80, 90–95, 60–110, 75–90; II–Leg–1–6 — 40–48, 80–100, 70–80, 90–110, 100–115, 105–125; III–Leg–1–6 — 40–48, 80–90, 70–85, 105–120, 130–150, 135–155; IV–Leg–1–6 — 100–120, 90–115, 120–135, 150–170, 160–195, 155–185.

**Female**. Unknown.

**Habitat.** Running waters.

**Distribution.** Europe (Russia: Krasnodar Kray).

## DISCUSSION

The nw species is similar to *Torrenticola elliptica* Maglio, 1909, *T. meridionalis* Di Sabatino & Cicolani, 1990 and *T. brevirostris* (Halbert, 1911). The dorsal shield in *T. elliptica* and *T. meridionalis* bears two pairs of setae (*Sci, Li*) [Cicolani & Sabatino, 1990]; in contrast, the dorsal shield in *T. caucasica* sp. n. bears only one pair of setae (*Sci*). The excretory pore in *T. brevirostris* stays away from the line of primary sclerotization of the ventral shield, the capitular rostrum shortened, P–2 shorter than P–4 [Di Sababatino et al., 2010]; in contrast, the excretory pore in *T. caucasica* sp. n. is not distanced from the line of primary sclerotization of the ventral shield, the capitular rostrum long, P–2 and P–4 are equal in length.

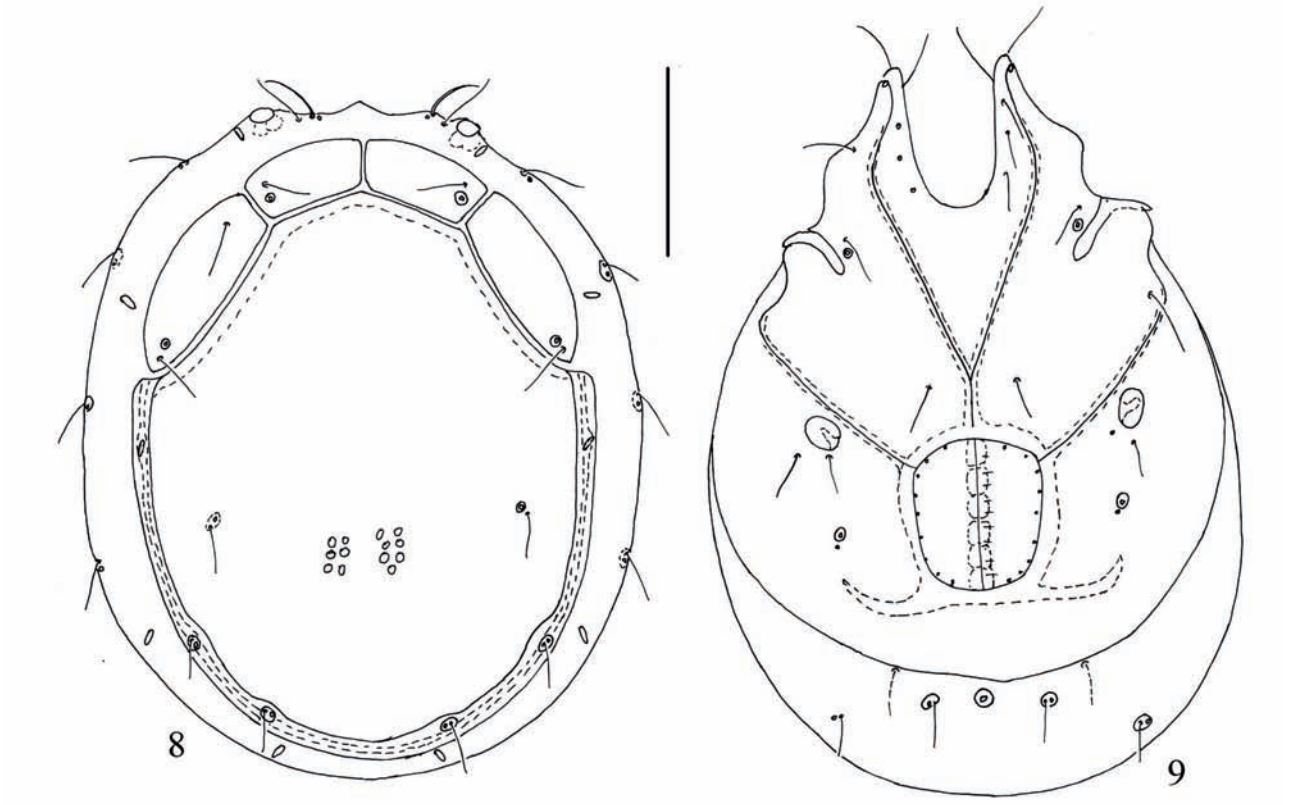
### *Torrenticola (Torrenticola) rara* sp. n.

(Figs. 8–14)

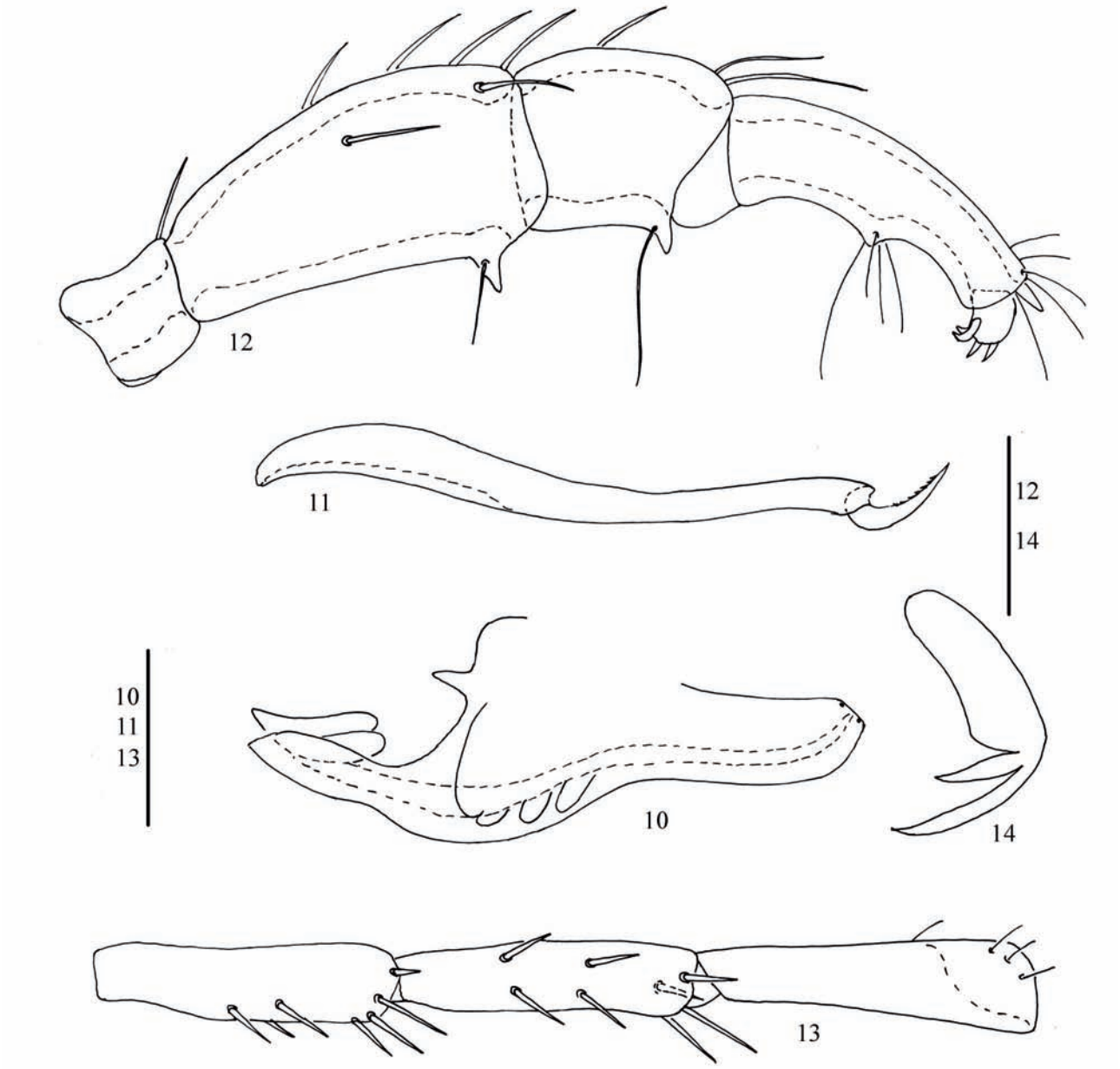
**Type**. Holotype: male (9665–IBIW), Russia, North Caucasus, Krasnodar Kray, Seversk District, Ubin stream near settlement Ubinskaya, 07.05.1976. The river bottom pebble and sand, depth 0.3–0.5 m, leg. P.V. Tuzovskij.

**Male. Description.** Idiosoma wide and oval-shaped, its frontal edge between setae *Fch* wide, with small median protrusion (Fig. 8). Dorsum with main dorsal shield, in two pairs anterior platelets (medial and lateral) and long, narrow sclerotized U-shaped strip surrounded by the lateral and caudal portions of the main shield; this strip concealed by dorsal shield; both pairs of platelets separated from main dorsal shield. Anteromedial platelets narrow, shorter than anterolateral platelets; the latter tapering posterolaterally. Dorsal shield wide (length/width ratio 1.2), covering about 5/6 dorsal surface, bearing single pair of setae (*Sci*), secondary sclerotization very slightly developed. Glandularia *Sci* open distant from lateral margins of dorsal shield. Two muscle attachment sites with rough sculpture between and slightly posteriorly to setae *Sci*. Setae *Vi* located on anteromedial platelets, *Oi* and *Hi* on anterolateral platelets; *Li* and *Si* on secondary sclerotization of dorsal shield; *Fch, Fp, Ve, Oe, He, Le* occupy peripheral position on idiosoma.

Coxal shield large (Fig. 9), covering about 4/5 ventral area, capitular bay U-shaped. Suture line between coxae II+III is 2.7 time shorter than the medial portion of coxae I. Genital field almost subrectangular




Figs 8-9. *Torrenticola rara* sp. n., male: 8– dorsal view; 9 – ventral view. Scale bar: 200 μm.
Рис. 8-9. *Torrenticola rara* sp. n, самец: 8 – дорсальная сторона; 9 – вентральная сторона. Шкала: 200 μm.




Figs 10-14. *Torrenticola rara* sp. n., male: 10 – capitulum, lateral view; 11 – chelicera, lateral view; 12 – pedipalp, lateral view; 13 – genu, tibia, and tarsus of leg IV; 14 – claw of leg IV. Scale bars: 10–11, 13 =100 μm, 12, 14 = 50 μm.

Рис. 10-14. *Torrenticola rara* sp. n., самец: 10 – капитулум, вид сбоку; 11 – хелицера, вид сбоку; 12 – педипальпа, вид сбоку; 13 – колено, голень и лапка ноги IV; 14 – коготок ноги IV. Шкалы: 10–11, 13 =100 μm, 12, 14 = 50 μm.

in shape. Glandularia *Sce* open at the level of middle of genital flaps, glandularia *Pe* open at tips of antero-lateral processes of coxae II. Suture lines of coxae IV well developed, starting at right angle from genital field, laterally slightly curved anteriorly. Postgenital area extended. Excretory pore slightly distanced from the line of primary sclerotization of ventral shield. Setae *Ci* and *Se* placed on zone of secondary sclerotization, and *Pi* close to zone of primary sclerotization of ventral shield.

Capitulum (Fig. 10) with long rostrum, its tip curved dorsally; capitular base relatively short, with convex ventral margin and rather long posterior apodemes.

Chelicera (Fig. 11) elongated and slightly thickened proximally; stylet short, crescent, with two rows of fine teeth on the concave side.

Pedipalp (Fig. 12) moderately slender; P–1 short, with a single dorsodistal setae; P–2 large, with straight ventral margin, with six dorsal subequal setae, and a further one laterally at the base of ventrodistal conic projection; P–3 considerably shorter than P–2, with concave ventral margin, with three dorsal setae (one proximal and two distal unequal setae), ventral side of P–3 with a projection and single long seta similar

to that of P–2; P–4 shorter than P–2, with more-or-less equally convex dorsal side, one heavy seta and several thin setae on dorsodistal portion; ventral side concave, with a single small tubercles near middle of segment, bearing four setae of different length.

Morphology and chaetotaxy of leg IV as illustrated in figure 13. All legs without swimming setae. Tarsi of legs II–IV gradually thickened to distal end, their ventral margin straight. Ambulacra (Fig. 14) with long external and short internal clawlets, ventral margin of blade concave.

Measurements, (n=1). Length of dorsum idiosoma 605, width 510; length of anteromedial platelets 120, width 55; length of anterolateral platelets 150, width 65; length of dorsal shield 470, width 390, distance from glandularia *Sci* to lateral margin of dorsal shield 60; length of median portion of coxae I 160, length of suture line of coxae II+III 60; length of genital field 140, width 130; distance from posterior margin of genital field to excretory pore 100, distance from posterior margin of genital field to caudal edge of idiosoma 190; length of capitulum 275; length of basal segment of chelicera 270, length of stylet of chelicera 48; lengths of pedipalpal segments (P–1–5): 35, 90, 54, 85, 18; lengths of leg segments: I–Leg–1–6 — 35, 78, 78, 90, 100, 95; II–Leg–1–6 — 40, 65, 72, 95, 108, 125; III–Leg–1–6 — 48, 65, 78, 115, 138, 150; IV–Leg–1–6 — 105, 100, 115, 150, 168, 160.

**Female**. Unknown.

**Habitat.** Running waters.

**Distribution.** Europe (Russia: Krasnodar Kray).

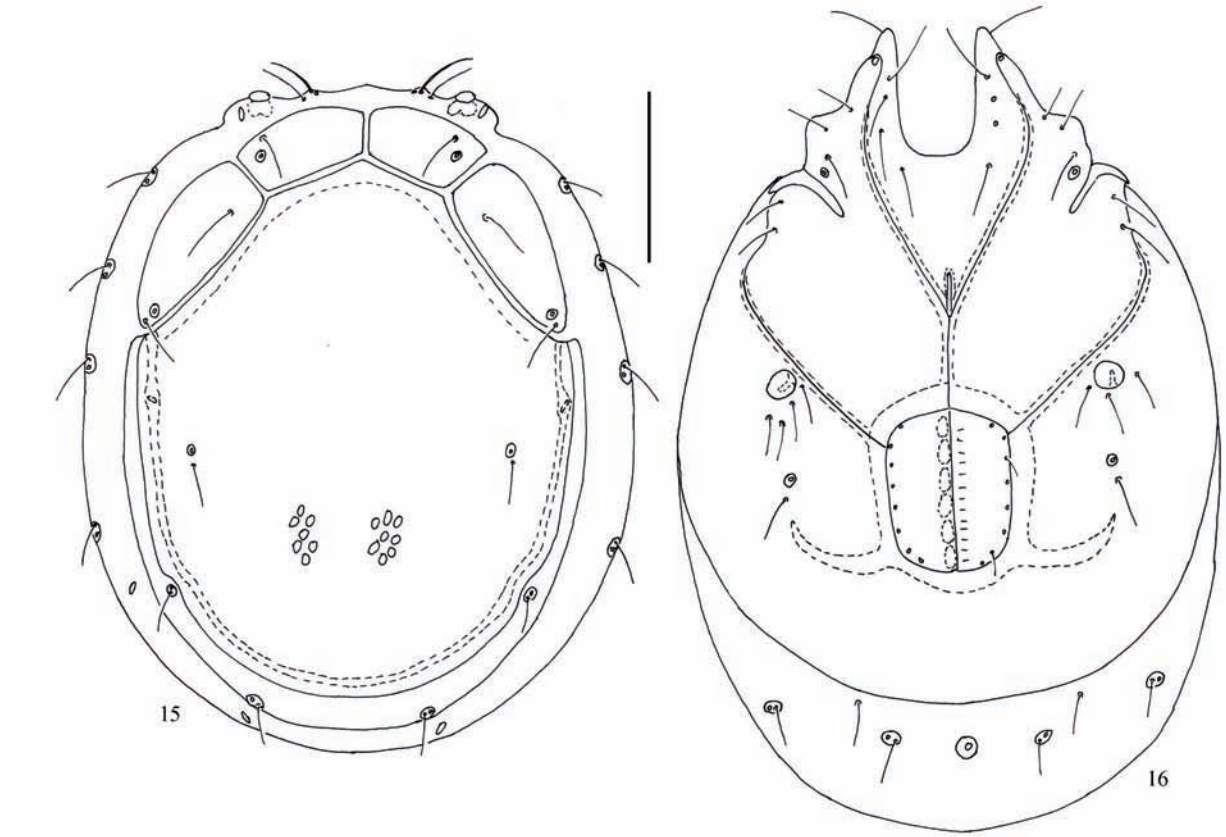
## DISCUSSION

The present species is similar to *Torrenticola anomala* (Koch, 1837). The genital field in male *T. anomala* almost round (length/width 114–133/90–117 μm); P–2 (length 84–112 μm) shorter than P–4 (length 92–116 μm), length ratio P–2/P–4 0.86–0.96); the medial suture between coxal plates II+III length 130–160 μm, the postgenital area short (length 80–130 μm), the excretory pore and setae *Ci* (=Vgl–2) located near posterior margin of the idiosoma [Di Sabatino et al., 2010]. In contrast, the genital field in male *T. rara* sp. n. subquadratic (length/width 138/130 μm); P–2 (length 90 μm) longer than P–4 (length 85 μm), length ratio P–2/P–4 1.05); the medial suture between coxal plates II+III length 60 μm, the postgenital area rather long (length 190 μm), the excretory pore and setae *Ci* (=Vgl-2) located away from the posterior margin of the idiosoma.

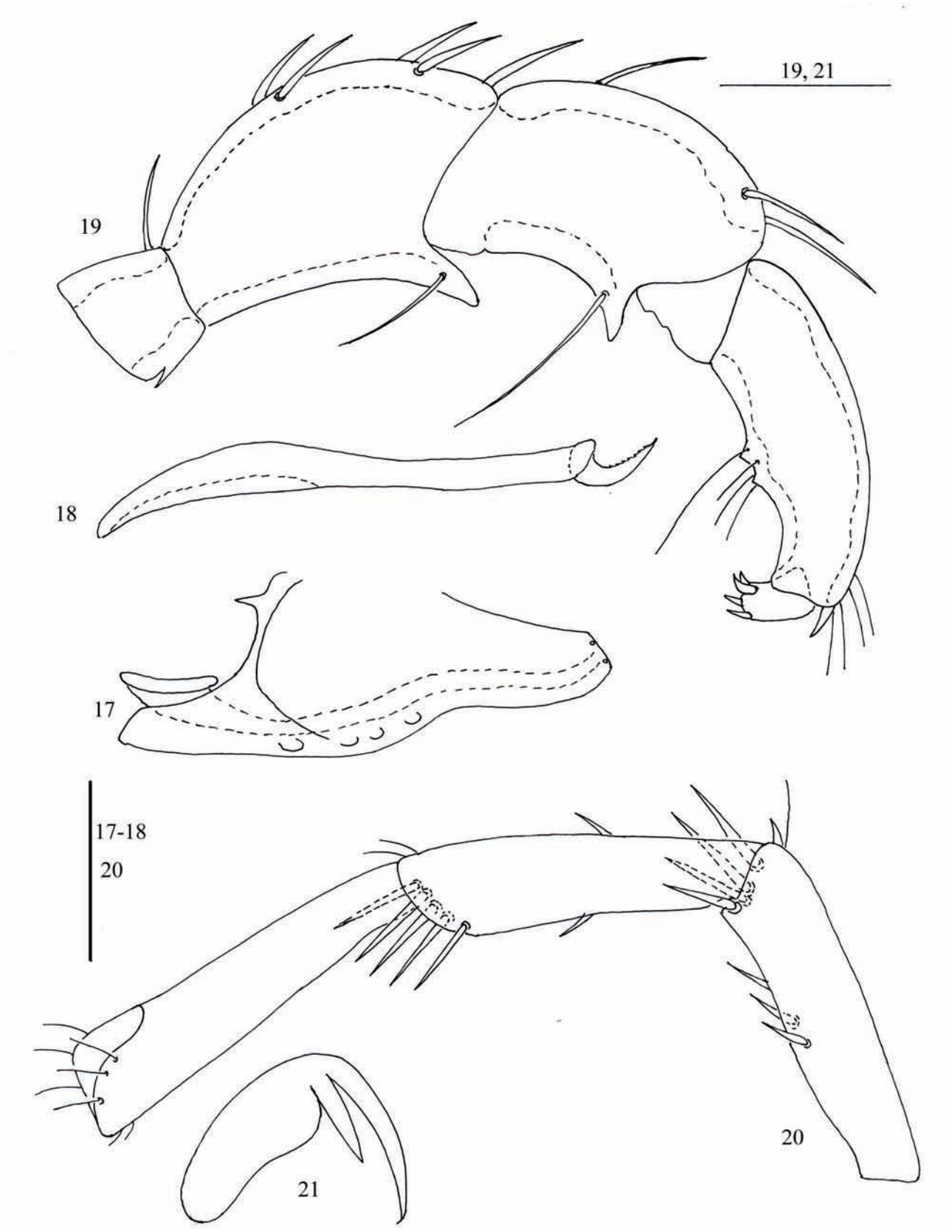
### *Torrenticola (Torrenticola) simulans* sp.n.

(Figs. 15–21)

**Type** – Holotype: male (9666–IBIW), Russia,




Figs 15-21. *Torrenticola simulans* sp. n., male: 15– dorsal view; 16 – ventral view. Scale bar: 200 μm.
Рис. 15-16. *Torrenticola simulans* sp. n, самец: 15 – дорсальная сторона; 16 – вентральная сторона. Шкала: 200 μm.




Figs 17-21. *Torrenticola simulans* sp. n., male: 17 – capitulum, lateral view; 18 – chelicera, lateral view; 19 – pedipalp, lateral view; 20 – genu, tibia, and tarsus of leg IV; 21 – claw of leg IV. Scale bars: 17–18, 20 = 100 μm, 19, 21 = 50 μm.

Рис. 17-21. *Torrenticola simulans* sp. n., самец: 17 – капитулум, вид сбоку; 18 – хелицера, вид сбоку; 19 – педипальпа, вид сбоку; 20 – колено, голень и лапка ноги IV; 21 – коготок ноги IV. Шкалы: 17–18, 20 = 100 μm, 19, 21 = 50 μm.

North Caucasus, Krasnodar Kray, Seversky District, Ubin stream near settlement Ubinskaya, 07. 05. 1976. The river bottom pebble and sand, depth 0.3–0.5 m, leg. P.V. Tuzovskij.

**Male. Description.** Idiosoma wide, oval-shaped, its frontal edge between setae *Fch* wide, convex (Fig. 15). Dorsum with main dorsal shield, in two pairs anterior platelets (medial and lateral) and long narrow sclerotized strip surrounded by the lateral and caudal portions of the main shield; this strip concealed by dorsal shield, both pairs of platelets are separated from main dorsal shield. Anteromedial platelets narrow, shorter than anterolateral platelets; the latter tapering posterolaterally. Dorsal shield wide (length/width ratio 1.28), covering about 5/6 of dorsal surface, bearing single pair of setae (*Sci*); secondary sclerotization very weakly developed. Glandularia *Sci* open distant from lateral margins of dorsal shield. Two muscle attachment sites with rough sculpture between and posteriorly to setae *Sci*. Setae *Vi* located on anteromedial platelets, setae *Oi* and *Hi* on anterolateral platelets; *Li* and *Si* on secondary sclerotization of dorsal shield; *Fch, Fp, Ve, Oe, He, Le* occupy peripheral position on idiosoma. Eyes lenses very small, located on small protrusion of frontal margin near setae *Fp*.

Coxal shield large (Fig. 16), covering about 4/5 ventral area, capitular bay U-shaped. Suture line between coxae II+III 2.17 time shorter than medial portion of coxae I. Genital field subquadratic, located in anterior portion of posterior half of ventral surface. Suture lines of coxae IV well developed, starting at right angle from genital field, laterally slightly curved anteriorly. Postgenital area extended. Glandularia *Pe* open at tips of anterolateral processes of coxae II. Excretory pore, setae *Ci* and *Se* distanced from the line of primary sclerotization of ventral shield, *Pi* situated near posterior margin of zone of primary sclerotization.

Capitulum with moderately long rostrum, the latter twice shorter than the capitular base, and ventrally non-distinctly set off from capitular base (Fig. 17).

Chelicera (Fig. 18) elongated and slightly thickened proximally; stylet short, crescent with two rows of fine teeth on the concave side.

Pedipalp (Fig. 19) robust; P–1 short, with a single dorsodistal setae; P–2 large, with slightly convex ventral margin, with five dorsal subequal setae, and one further seta laterally at the base of the ventrodistal conic projection; P–3 considerably shorter than P–2, with concave ventral margin, with three dorsal setae (one proximal and two distal unequal setae), ventral side of P–3 with a projection and single long seta; P–4 and P–2 equal in length, with more-or-less equally convex dorsal side, one heavy seta and several thin setae on dorsodistal portion; ventral side concave, with two small tubercles near middle of segment, bearing four setae of different length.

Morphology and chaetotaxy of leg IV as illustrated in figure 20. All legs without swimming setae. Tarsi of legs II–IV gradually thickened to distal end, their ventral margin straight. Ambulacra (Fig. 21) with long external and short internal clawlets, ventral margin of blade slightly concave.

Measurements, (n=1). Length of dorsum idiosoma 710, width 585; length of anteromedial platelets 125, width 62; length of anterolateral platelets 200, width 85; length of dorsal shield 610, width 475; distance from glandularia *Sci* to lateral margin of dorsal shield 85, length of median portion of coxae I 185, length of suture line of coxae II+III 85; length of genital field 185, width 170; distance from posterior margin of genital field to excretory pore 50, distance from posterior margin of genital field to caudal edge of idiosoma 210; length of capitulum 265; length of basal segment of chelicera 245, length of stylet of chelicera 55; lengths of pedipalpal segments (P–1–5): 335, 90, 65, 90, 20; lengths of leg segments: I–Leg–1–6 — 50, 85,85, 115, 110, 110; II–Leg–1–6 — 50, 85, 85, 125, 135, 150; III–Leg–1–6 — 60, 85, 85, 135, 170, 180; IV–Leg–1–6 — 130, 115, 135, 200, 200, 210.

**Female**. Unknown.

**Habitat**. Running waters.

**Distribution**. Europe (Russia: Krasnodar Kray).

## DISCUSSION

The new species is similar to *Torrenticola brevirostris* (Halbert, 1911). The suture line between coxal plates I in *T. brevirostris* not developed, P–2 shorter than P–4, ratio P–2/P–4 is 0.85–0.92; the postgenital area length in mature males is up to 235 μm [Di Sabatino et al., 2010]. In contrast, the short suture line between coxal plates I in *T. simulans* sp. n. is present, P–2 and P–4 are equal in length, ratio P–2/P–4 is 1.0; the postgenital area length in mature males is 210 μm.

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