

A new species of bristletails of the genus *Trigoniophthalmus* Verh. (Archaeognatha, Machilidae) from the North Ossetia–Alania

Новый вид щетинохвосток рода *Trigoniophthalmus* Verh. (Archaeognatha, Machilidae) из Северной Осетии–Алании

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A new bristletail species, *Trigoniophthalmus fiagdoni* sp. nov., is described from the North Ossetia–Alania. Its distinctive characters are discussed.

Описан новый вид щетинохвосток *Trigoniophthalmus fiagdoni* sp. nov. из Северной Осетии–Алании. Обсуждаются его отличительные признаки.

Key words: bristletails, taxonomy, Caucasus, Archaeognatha, Machilidae, *Trigoniophthalmus*, new species

Ключевые слова: щетинохвостки, систематика, Кавказ, Archaeognatha, Machilidae, *Trigoniophthalmus*, новый вид

INTRODUCTION

The Western Palaearctic genus *Trigoniophthalmus* Verhoeff, 1910 includes 30 species belonging to two subgenera: *Trigoniophthalmus* s. str. (4 species) and *Trigoniocellus* Kaplin, 2010 (26 species). These subgenera have two pairs of eversible vesicles on the abdominal coxites II–V and II–IV, respectively (Kaplin, 2010). One species of the subgenus *Trigoniophthalmus* s. str. and 18 species of the subgenus *Trigoniocellus* are known from the Caucasus.

MATERIALS AND METHODS

Examination of the bristletails collected by the authors in 75% alcohol in environs of Fiagdon (the North Ossetia–Alania) has revealed a new species of the genus *Trigoniophthalmus*; its description is given below. Holotype (male) and one paratype (female)

were dissected and mounted on glass microscope slides in the Berlese Fluid. Figures were made using microscope and drawing tool. The types of the new species are deposited in the collection of the All-Russian Institute of Plant Protection (VIZR), St Petersburg–Pushkin.

TAXONOMY

Order **ARCHAEOGNATHA**

Family **MACHILIDAE**

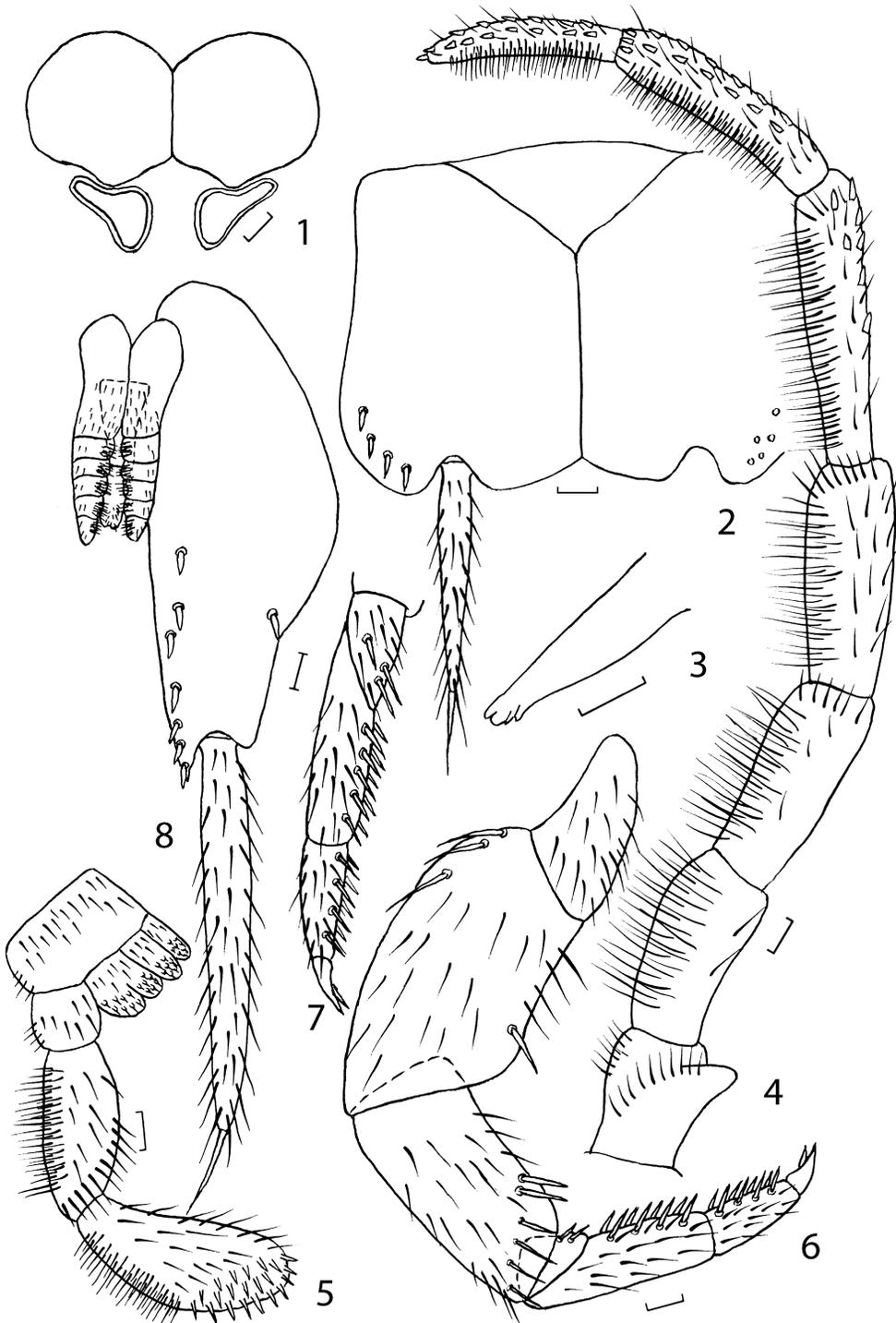
Genus *Trigoniophthalmus* Verhoeff, 1910

Type species *Machilis alternatus* Silvestri, 1904.

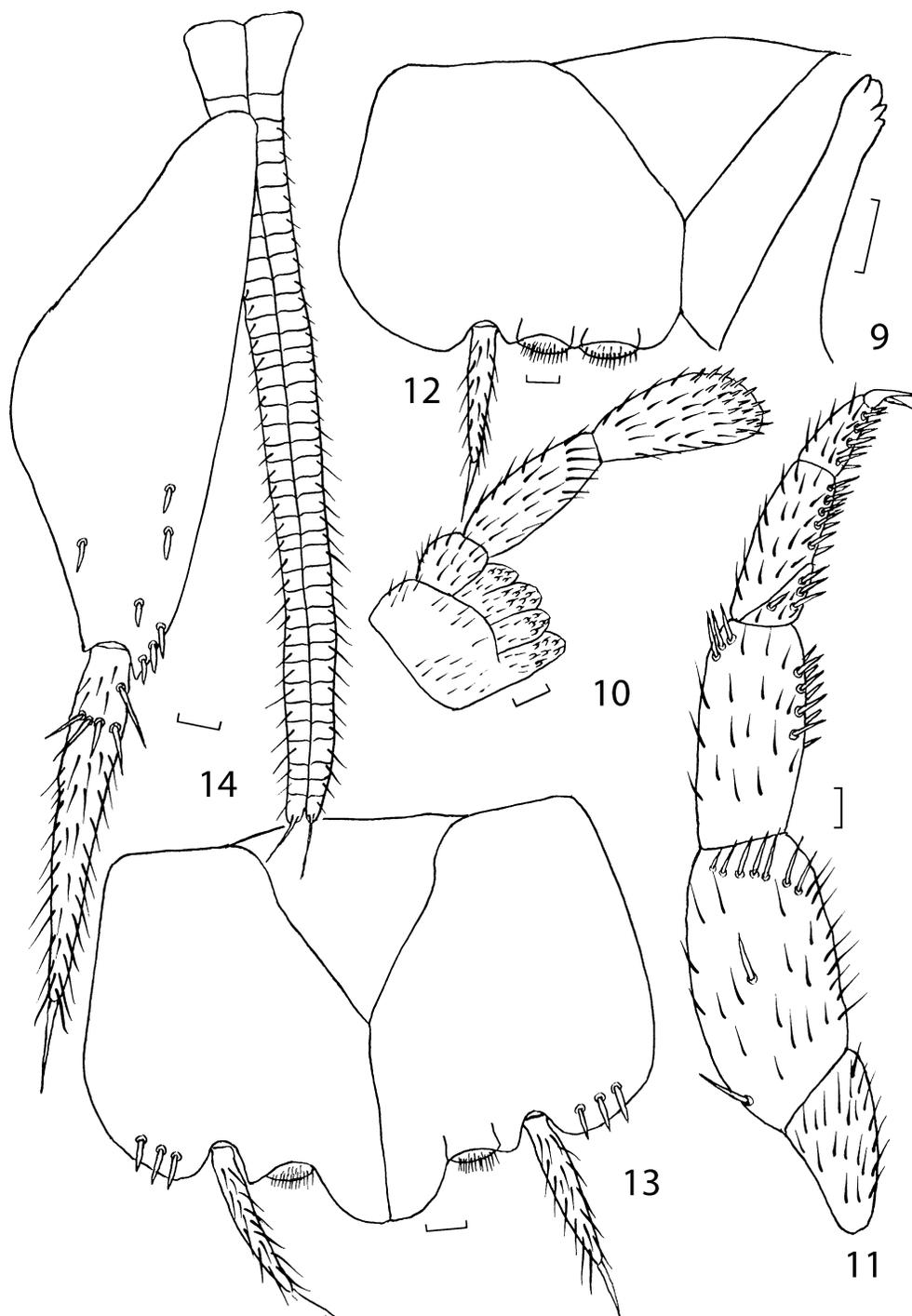
Trigoniophthalmus (Trigoniocellus) fiagdoni Kaplin, sp. nov.
(Figs 1–14)

Holotype. Male (in slides); **Russia**, North Ossetia–Alania, Alagir Distr., Kurtatinsky Gorge,

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Figs 1–8. *Trigoniophthalmus fiagdoni* sp. nov., holotype (male): 1, eyes and paired ocelli; 2, urosterite and coxites of abdominal segment VIII; 3, anterior part of mandible; 4, maxillary palp; 5, labial palp; 6, fore leg; 7, hind tarsus; 8, male genitalia with abdominal coxite IX. Scale bars 0.1 mm.



Figs 9–14. *Trigoniphthalmus fiagdoni* sp. nov., paratype (female): 9, anterior part of mandible; 10, labial palp; 11, fore leg; 12, urosternite and coxites of abdominal segment III; 13, urosternite and coxites of abdominal segment VII; 14, ovipositor with abdominal coxite IX. Scale bars 0.1 mm.

Upper Fiagdon, 42°50'N, 44°18'E, 1350 m, 28 June 2017, coll. V. Kaplin, P. Alborova (VIZR).

Paratypes. One male and 8 females (1 female in slides); same data as for holotype (VIZR).

Description. Body length: male 9.2 mm, female 8.8–10.1 mm. Body width: male and female 2.4–2.5 mm. General body color whitish, practically without hypodermal pigment. Antennal base, frons, clypeus, maxillae, mandibles, submentum, mentum and coxae of all legs with purple-brown hypodermal pigment of weak or medium intensity. Color of scales on surface of body brownish. Antennae of male longer, of female shorter than body. Distal chains of flagellum divided into 13–15 articles in male and into nine or ten articles in female. Clypeus of male with long thin bristles. Cercus approximately 0.52 (male) or 0.44–0.48 (female) body length, including about 20 articles. Apex of cercus rounded with one short lateral spike. All articles of cerci, except for apical three, with 1–3 colorless supporting macrosetae on inner side. About ten basal articles of caudal filament also with supporting macrosetae on lateral side.

Compound eyes brownish-grey (in alcohol). Ratio of length to width of compound

eye about 1.0; ratio of length of contact line to length of eye 0.52–0.55 in both sexes. Paired ocelli submedian, pear shape, brown with narrow white border, 1.5 (male) or 1.6 (female) times as wide as long. Distance between inner margins of ocelli 0.20–0.22 and between their outer margins 0.70–0.72 total width of compound eye in both sexes (Fig. 1).

Apical article of maxillary palp 0.76 (male) or 0.79–0.80 (female) times as long as preceding one. Dorsal surface of 7th, 6th and 5th articles of maxillary palp with 13, 11 and 5 (male) or 15–17, 14–15 and 6–7 (female) hyaline spines, respectively. Ventral surface of 2–7th articles of male maxillary palp as well as dorsal surface of 2nd and 3rd articles of male labial palp with relatively numerous and long thin setae (Figs 4, 5). Apical article of labial palp triangularly oval, 2.3 (male) or 2.6 (female) times as long as wide (Figs 5, 10). Mandibles with three (male) or four (female) distal teeth (Figs 3, 9).

Fore femur and tibia of male and female widened (Figs 6, 11). Fore femur of male without sensory field. Ratios of length to width of femur, tibia and tarsus as shown in Table 1. Ratio of length of 3rd tarsomere

Table 1. Ratios of length to width of main leg segments of *Trigoniophthalmus fiagdoni* sp. nov.

| Sex | Femur | | | Tibia | | | Tarsus | | |
|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------|-----------|
| | fore | middle | hind | fore | middle | hind | fore | middle | hind |
| Male | 1.89 | 2.28–2.30 | 2.48–2.50 | 1.90 | 2.20–2.23 | 3.12–3.18 | 3.50–3.58 | 4.00 | 6.25–6.37 |
| Female | 1.98–2.04 | 2.20–2.32 | 2.44–2.45 | 2.08–2.14 | 2.28–2.39 | 2.98–3.02 | 3.81–4.20 | 3.70 | 6.71–6.86 |

Table 2. Numbers of spine-like setae on leg parts in *Trigoniophthalmus fiagdoni* Kaplin sp. nov.

| Segments | | Sex, pair of legs | | | | | |
|----------------------|-----|-------------------|--------|-------|--------|--------|------|
| | | Male | | | Female | | |
| | | fore | middle | hind | fore | middle | hind |
| Tarsomeres of tarsus | 1st | 2 | 3–4 | 4 | 4 | 4 | 5 |
| | 2nd | 12 | 8–10 | 10–12 | 8–10 | 10 | 10 |
| | 3rd | 7 | 8 | 8–10 | 8 | 8 | 8–10 |
| Tibia | | 3 | 5–6 | 6 | 6–8 | 6 | 6 |
| Femur | | 1 | 1–2 | 1–2 | 0 | 0–1 | 2 |

Table 3. Ratios of lengths of some abdominal structures in *Trigoniophthalmus fiagdoni* sp. nov.

| Abdominal segments | Urosternite / coxite | | Stylus (not including apical spines) / coxite | | Apical spine / stylus | |
|--------------------|----------------------|-----------|---|-----------|-----------------------|-----------|
| | male | female | male | female | male | female |
| II | 0.55 | 0.60 | 0.55 | 0.54 | 0.41 | 0.45 |
| III–VI | 0.61–0.66 | 0.64–0.66 | 0.50–0.51 | 0.49–0.51 | 0.46–0.48 | 0.46–0.50 |
| VII | 0.56 | 0.62 | 0.55 | 0.51 | 0.47 | 0.50 |
| VIII | 0.35 | – | 0.70 | 0.66 | 0.38 | 0.42 |
| IX | – | – | 0.80 | 0.62 | 0.22 | 0.24 |

Table 4. Distribution of sublateral macro- and mesosetae on abdominal tergites and coxites of *Trigoniophthalmus fiagdoni* sp. nov.

| Abdominal segments | Tergite | | Coxite | |
|--------------------|-----------|-----------|-----------|-----------|
| | male | female | male | female |
| I–IV | 0 | 0 | 0 | 0 |
| V | 1–2 + 1–2 | 1–2 + 1–2 | 0 | 0 |
| VI | 3 + 3 | 2 + 2 | 0 | 0 |
| VII | 3 + 3 | 3 + 3 | 2–3 + 2–3 | 3 + 3 |
| VIII | 3 + 3 | 3 + 3 | 4–5 + 4–5 | 3–4 + 3–4 |
| IX | 3 + 3 | 3 + 3 | 1–9 + 9–1 | 1–7 + 6–0 |
| X | 3 + 3 | 3 + 3 | – | – |

of tarsus to total length of tarsus 0.32–0.33 in both sexes (Fig. 7). Legs of male without long, thin bristles. Ventral surface of femora, tibiae and tarsi with spine-like setae (Figs 6, 7, 11). Number of spine-like setae as shown in Table 2. Middle and hind legs with coxal styli. Length of styli 0.55, 0.65 and 0.80 mm in both sexes. Ratio of length of styli to width of middle and hind coxae about 1.65 in female or 1.4–1.5 in male.

In both sexes, abdominal segments I and V–VII with 1 + 1 eversible vesicles, but abdominal segments II–IV with 2 + 2 eversible vesicles (Figs. 12, 13). In male, posterior angle of urosternites II, III–VI, VII and VIII approximately 78°, 73–75°, 78° and 99°; but in female, posterior angle of urosternites II, III–IV and V–VII about 78°, 68–70° and 56–60°. Ratios of lengths of stylus (without apical spine) and coxite on segments II–IX as shown in Table 3. Shape

of urosternite VIII in male as shown in Fig. 2. Inner posterior lobes of coxites VII of female protruding (Fig. 13); ratio of length to total width of these lobes about 0.48. Thoracic tergites, abdominal tergites I–IV, urosternites, abdominal coxites I–VI without macrochaetae; in both sexes, abdominal tergite V with 1–2 + 1–2 macrochaetae, but abdominal tergite VI–X with 3 + 3 macrochaetae. Distribution of sublateral macrochaetae on abdominal coxites VII–IX as shown in Table 4. Abdominal coxites IX with 1 + 1 and 9 + 9 (male) or 0–1 + 0–1 and 6–7 + 6–7 (female) outer and inner sublateral macrochaetae (Figs 8, 14).

Ovipositor slender, elongate (2.1–2.3 mm), significantly surpassing apex of styli IX by about 0.75 length of latter (Fig. 14). Anterior and posterior gonapophyses with approximately 38 articles. Two basal articles of anterior gonapophyses and about

Table 5. Main morphological differences between *Trigoniophthalmus fiagdoni* sp. nov. and closest congeners.

| Morphological characters | <i>T. fiagdoni</i> | <i>T. dombai</i> | <i>T. divnogorski</i> | <i>T. borgustani</i> | <i>T. vorontzovi</i> | <i>T. lineatus</i> |
|---|---|------------------|-----------------------|----------------------|--|--------------------|
| Eye color (in alcohol) | brownish-grey | dark | dark | dark | brown | dark |
| Ratio of distance between inner margins of ocelli to total width of eye | 0.20–0.22 | 0.22–0.24 | 0.17–0.18 | 0.13–0.15 | 0.15–0.16 | 0.13 |
| Spine-like setae on legs | present | absent | absent | absent | absent | absent |
| Number articles of parameres | 1 + 5 | 1 + 6 | 1 + 7 | 1 + 6 | 1 + 5 | 1 + 6 |
| Ratio of lengths of cercus and body | 0.52 (male) 0.44–0.48 (female) | 0.33–0.44 | 0.29–0.33 | 0.34–0.45 | 0.41–0.47 (male) 0.34–0.43 (female) | 0.29–0.35 |

25 basal articles of posterior gonapophyses glabrous. Apical spines of gonapophyses as long as three apical articles combined. Distal articles of anterior and posterior gonapophyses with seven or eight and with six setae, respectively (not counting sensory setae and apical spines).

Male genitalia with one pair of parameres on abdominal segment IX. Parameres with 1 + 5 articles, surpassing apex of penis. Penis and parameres significantly not attaining level of apex of coxites IX (Fig. 8).

Remarks. *Trigoniophthalmus fiagdoni* sp. nov. with 2 + 2 eversible vesicles on abdominal coxites II–IV belongs to the subgenus *Trigoniocellus* Kaplin 2010, namely to the group of species with long thin bristles on the clypeus, 2–7th articles of male maxillary palps and 1–3rd or 2nd and 3rd articles of male labial palps. This group includes five described species (*T. divnogorski* Kaplin, 2010; *T. dombai* Kaplin, 2012; *T. borgustani* Kaplin, 2015; *T. vorontzovi* Kaplin, 2012;

T. lineatus Kaplin, 2015). The new species differs from other species of this group by the color of the compound eyes, structure of the legs, paired ocelli, cerci and male genitalia. The main differences between these species are shown in Table 5.

Etymology. The new species takes its name from the type locality: Fiagdon, *North Ossetia-Alania*.

Habitats. All specimens of *Trigoniophthalmus fiagdoni* sp. nov. were collected in mountain forest (*Betula*, *Pinus*, shrubs) under stones, 1350 m above sea level.

REFERENCE

- Kaplin V.G.** 2010. On the fauna of bristletails of the genera *Petrobius* and *Trigoniophthalmus* (Thysanura, Machilidae) from the Caucasus. *Zoologicheskii Zhurnal*, **89**(4): 424–441. (In Russian; English translation: *Entomological Review*, **90**(3): 387–404).

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