A new species of bristletails of the genus *Charimachilis* (Microcoryphia: Machilidae) from Crimea

**Новый вид щетинохвосток рода Charimachilis (Microcoryphia: Machilidae) из Крыма**

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**Introduction**

The genus *Charimachilis* Wygodzinsky, 1939 comprises 14 described species that are distributed in the mountainous landscapes within the subtropical and temperate belts of the Southwestern Palaearctic: between 31° to 50°N (from Israel in the south to the Belgorod region of Russia in the north) and between 11° and 41°E (from Austria in the west to Abkhazia in the east) [Kaplin, 2019]. The position of this genus in the superfamily Machilidae is not clear, primarily because of the specific features of its ovipositor morphology [Sturm, Bach de Roca, 1993]. Due to the arrangement of scales on the antennae of adults, Mendes [1990] placed it in the subfamily Machilinae. Bach de Roca et al. [2013] considered this genus as *incertae sedis* group within the Machilidae. Based on the morphological characters of the second and third instar larvae of *C. caucasica* Kaplin, 1999, as well as on the genital areas of male and female of the genus, Kaplin [2019] suggested that *Charimachilis* and *Turquimachilis* Bach de Roca et al., 2013 form a group of genera within the Machilinae. Males were found only in populations of *C. caucasica* Kaplin, 1999 and *C. abchasica* Kaplin, 2017 with the largest body sizes (10.6–14 mm) from the Great Caucasus. All other species with a body size of 7–10 mm are parthenogenetic [Kaplin, 1999, 2017, 2019]. Recent collections of bristletails in Crimea (vicinity of the city Staryi Krym) has revealed a new species of this genus; its description is given below.

**Materials and methods**

The bristletails were collected by the author into 75% alcohol. Holotype was dissected and mounted on...
Figs 1–7. *Charimachilis taurica* sp.n., holotype (female): 1 — scapus and pedicellus of antenna; 2 — anterior part of eyes and paired ocelli; 3 — maxillary palpus; 4 — labial palpus and labium (part); 5 — distal part of mandible; 6 — middle leg; 7 — uroterite and urocoxites VII. Scale bars: 0.1 mm.

Рис. 1–7. *Charimachilis taurica* sp.n., голотип (самка): 1 — основной членик и стволик усика; 2 — глаза и парные глазки; 3 — нижнечелюстной щупик; 4 — нижнегубной щупик и нижняя губа (часть); 5 — дистальная часть верхней челюсти; 6 — средняя нога; 7 — стернит и кокситы VII сегмента брюшка. Масштабные линейки: 0,1 мм.
Glass microscope slides in the Berlese fluid. Figures were made using microscope and a drawing projector. The type of the new species is deposited in the collection of the All-Russian Institute of Plant Protection (VIZR), Russian Academy of Sciences, St. Petersburg.

Results and discussion

Order Microcoryphia Verhoeff, 1904
Family Machilidae Grassi, 1888
Subfamily Machilinae

Genus Charimachilis Wygodzinsky, 1939
Type species: Prasmachilis orientalis Silvestri, 1908

Charimachilis taurica Kaplin, sp.n.
Figs 1–11.
MATERIAL. Holotype, ♂ Republic of Crimea, vicinity of the city Staryi Krim leg. V. Kaplin 13. IX. 2020, mixed forest (45°01´N, 35°05´E (VIZR).

DESCRIPTION (holotype). Body length 10.0 mm, width 2.6 mm; total eyes width 0.86 mm, eye length: 0.43 mm; paired ocelli width and length 0.41 and 0.18 mm, respectively; coxal styli length 0.5–0.6 mm; ovipositor length 1.6 mm. Antennae and cerci are broken. General body color (in alcohol) whitish, with brown and violet hypodermal pigments of weak intensity on head (frons, gena, occiput, lateral parts of clypeus, maxillae). Antenae, maxillary and labial palp, mandibles, legs, cerci, caudal filament without pigments. Scale color on upper and lower surface of body brownish. The chains in the distal part of flagellum divided into 7–9 annuli. Ratio of length to width of scapus of antenna about 1.7 (Fig. 1).

Compound eyes dark brown, slightly lighter towards the contact line (in alcohol). Ratio of length to width of compound eye about 1.0; ratio of contact line to length of eye 0.52 (Fig. 2). Paired ocelli shoe-shaped, dark brown, almost black with narrow white borders. Ratio of distance between inner and outer margins of ocelli to total width of compound eyes, 0.15 and 0.97, respectively.

Apical palpomere of maxillary palp about as long as previous one (0.98–1.05). Ratio of length of 5th and 4th palpomers about 1.44. Dorsal surface of 7th, 6th and 5th palpomers of maxillary palp with 15–16, 16 and 3–4 hyaline spines, respectively (Fig. 3). Apical palpomere of labial palp triangularly oval, 2.6–2.7 mm times longer than width, with about 18–23 sensorial chaetae. Apical palpomere of maxillary palp triangularly oval, with narrow white borders. Ratio of distance between inner and outer margins of ocelli to total width of compound eyes, 0.15 and 0.97, respectively.

Table 1. Length to width ratios of leg segments in female Charimachilis taurica sp.n.

| Segments | Leg |
|----------|-----|
|          | fore | middle | hind |
| Tarsus   | 4.45 | 3.83   | 4.32 |
| Tibia    | 2.20 | 1.98   | 3.01 |
| Femur    | 2.01 | 2.28   | 2.41 |
| Coxa     | 2.62 | 2.56   | 2.32 |

Urocoxites I–VII with 1 + 1 eversible vesicles. Posterior angle of urosternites II–VI approximately 68–70º, VII about 64º. Length ratios of urosternites and urocoxites II–VI 0.70–0.75, VII 0.55. Length ratios of urostyl (not including apical spines) and urocoxites II–VII 0.47–0.50, VIII 0.74 and IX 0.55. Length ratios of apical and urostyl II–VII 0.40–0.50, VIII 0.39, IX 0.30. Urocoxite VII with well-developed protruding lobes between eversible vesicles. Ratio of length to width of one lobe about 0.58. (Fig. 7). All thoracic tergites and urosternites; urotergites and urocoxites I–V without macrochaetae. Urotergites VI with 1 + 1, VII with 2 + 2, VIII with 3 + 3, IX with 2 + 2, X with 1 + 1; urocoxites VI with 1 + 1, VII with 2 + 2, VIII with 2 + 3 + 2–3 and urocoxite IX with 3 outer and 6–7 inner sublateral spines (Figs 8, 9). Under surface of distal part of urocoxites IX also with numerous medium-sized relatively long chaetae.

Ovipositor scolergitized, thickened, covered by the urocoxites IX, stout, typical of the genus Charimachilis. Gonapophysis VIII with 17 divisions (Fig. 10). Apical divisions with two small lobules and subterminal needle equal in length to two apical divisions taken together. The first apical division also with about 17 sensory short chaetae and 2 thing, longer chaetae. Following two divisions with about 5 small sensory chaetae and 5–7 longer ordinary chaetae. Distal divisions, excepting apical one, with 4–5 lateral digging teeth (Fig 10). Gonapophysis IX with 16 divisions ending with a somewhat curved apical horn at its end and with a subterminal chaeta as long as 3 apical divisions combined (Fig. 11). This division also presents a group of several sensory spines, which are also present in the following 5–6 divisions, but their number decreases towards the base. These divisions also have about 2 chaetae, those of the external part being longer. All divisions of anterior and posterior gonapophyses with chaetae.

Male unknown.

COMPARATIVE REMARKS. Charimachilis taurica sp.n. with digging ovipositor and with 1 + 1 eversible vesicles on urocoxites II–V, belongs to the genus Charimachilis.
Figs 8–11. Charimachilis taurica sp.n., holotype (female): 8 — urocoxite IX; 9 — urocoxite VIII; 10 — anterior gonapophysis; 11 — posterior gonapophysis. Scale bars: 0.1 mm.

Рис. 8–11. Charimachilis taurica sp.n., голотип (самка): 8 — коксит IX сегмента брюшка; 9 — коксит VIII сегмента брюшка; 10 — передняя створка яйцеклада; 11 — задняя створка яйцеклада. Масштабные линейки: 0,1 мм.
Wygodzinsky including 14 species [Kaplin, 2019; Kaplin, Martynov, 2020]. Charimachilis tauraica sp.n. can be compared to three parthenogenetic congeners known from the Eastern Europe, namely C. ukrainensis Stach, 1958, C. morozovi Kaplin, 2019 and C. rostoviensis Kaplin, 2020. It differs from all these species by the ratio of distance between inner margins of paired ocelli to total width of compound eyes (0.15 in C. taurica sp.n., 0.08–0.10 in C. rostoviensis, 0.18–0.20 in C. morozovi and 0.11–0.13 in C. ukrainensis) and length to width ratio of apical palpomere of labial palp (2.6–2.7, 2.3–2.4, 2.4–2.5 and 1.9–2.1, respectively). It also differs from C. ukrainensis and C. rostoviensis by the ratio of length to width of compound eye (1.0 in C. taurica sp.n., 0.82 in C. ukrainensis and 0.86 in C. rostoviensis), ratio of length of contact line of eyes to their length (0.52, 0.40, 0.33–0.35); ratio of length of urostyli to urocoxites VIII (0.74, 0.2, 0.95) and urocoxites IX (0.55, 0.75, 0.46, respectively). Additionally C. taurica and C. rostoviensis are characterized by different posterior angle of urosternites II–V (68–70° in C. taurica and 80–86° in C. rostoviensis). As for C. morozovi, it clearly differs from the new species having more annuli in chains in the distal part of flagellum (7–9 in C. taurica and 10–12 in C. morozovi) and lateral digging teeth on anterior gonapophysis (4–5 in C. taurica and not present in C. morozovi). The main morphological differences between the new species and C. rostoviensis, C. morozovi and C. ukrainensis are summarized in Table 3.

**ETYMOLOGY.** The new species is named by a suffix that refers to the historical name of Crimea Peninsula (Tauria) where it was collected.

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**Table 3. Main morphological differences between females of C. taurica sp.n., C. rostoviensis, C. morozovi and C. ukrainensis [Stach, 1958; Kaplin, 2019; Kaplin, Martynov, 2020].**

| Morphological characters | C. taurica sp.n. | C. rostoviensis | C. morozovi | C. ukrainensis |
|--------------------------|-----------------|----------------|-------------|---------------|
| Body length, mm          | 10              | 10–11          | 7–9         | 11            |
| Ratio of length to width of compound eye | 1.0             | 0.86           | 0.96        | 0.82          |
| Ratio of length of contact line of eyes to their length | 0.52            | 0.33–0.35      | 0.52–0.55   | 0.40          |
| Ratio of distance between inner margins of paired ocelli to total width of compound eyes | 0.15            | 0.08–0.10      | 0.18–0.20   | 0.11–0.13     |
| Ratio of lengths of apical and preceding palpomeres of maxillary palp | 0.98–1.05       | 1.12–1.14      | 1.0         | 1.2           |
| Number of hyaline spines on dorsal surface of the 6th palpomere of maxillary palp | 3–4             | 8–9            | 2–3         | ?             |
| Ratio of length to width of apical palpomere of labial palp | 2.6–2.7         | 2.3–2.4        | 2.4–2.5     | 1.9–2.1       |
| Number of annuli in distal chains of flagellum | 7–9             | 8–12           | 10–12       | 8–9           |
| Number of hyaline spine-like chaetae on hind tibia | 7–8             | 12–13          | 7           | 6             |
| Posterior angle of urosternites II–V, degrees | 68–70           | 80–86          | 70–75       | 50–70         |
| Ratio of length of urostyli to urocoxites (not including apical spines) | II–V            | 0.47–0.50      | 0.48–0.53   | 0.45–0.50     | 0.62–0.68 |
|                          | VIII           | 0.74           | 0.95        | 0.82          | 0.9        |
|                          | IX             | 0.55           | 0.46        | 0.56–0.57    | 0.75       |
| Number of sublateral spines on urocoxite IX | outer 3        | 1              | 2–3         | 1             |
|                          | inner 6–7      | 6              | 5–7         | 6–7           |
| Number of divisions of gonapophysis | VIII 17        | 17             | 16–17       | 15            |
|                          | IX 16          | 15             | 19–20       | 17            |
| Number of lateral digging teeth on anterior gonapophysis | 4–5           | 4–5           | 0           | 3–4           |
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