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First record and new species of *Tortopsis* Molineri, 2010 (Ephemeroptera, Polymitarcyidae) from Brazil

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Abstract

A new species of the recently erected genus *Tortopsis* is described from males and females imagos collected in Macaé river, Rio de Janeiro State. *Tortopsis canum* **sp. nov.** can be recognized by the color pattern of the head and pronotum, strongly shaded with black in both sexes, male genitalia with parastyli long and straight and female parastyli receptor "C" shaped, with receptors large, occupying nearly all extension of sternum VIII. This new species represents the first record of the genus *Tortopsis* in Brazil.

Key words: Atlantic Rainforest, Campsurinae, Mayfly, new species, Rio de Janeiro state

Introduction

On a recent revision of the genus *Tortopus*, Molineri (2010) described several new species and stages of *Tortopus l.s.*, as well as performed a phylogenetic analysis that led into the establishment of a new genus named *Tortopsis*. These two genera were recovered as sister-groups and separated as distinct clades on his analysis based on characteristics from males, females and eggs. Nymphs of *Tortopsis* and *Tortopus* were described by Scott *et al.* (1959), Molineri (2008) and Molineri *et al.* (2010) but nymphs of most species remain unknown and characteristics of this stage were not used by Molineri (2010) on his analysis. Despite that, morphological disparities allowing identification between *Tortopus* and *Tortopsis* were also found at nymphal stage.

According to Molineri (2010), imagos of *Tortopsis* are distinctive because females present: R sector of forewing lacking additional veins between R_2 and IR, parastyli receptors large and sublateral in position, parastyli receptors C or V-shaped with sockets opening towards median line. In males: gonopore associated with a claw-like structure, penes separated from base, parastyli more than 5 times the length of pedestals, curved in lateral view. In nymphs: single subapical tubercle on mandibular tusks. The well developed parastyli present on males of *Tortopsis* as well as the receptors of the females are part of an important coupling system with reproductive function properly described by McCafferty and Bloodgood (1989).

The genus is composed by nine species, none of them with records from Brazil. *Tortopsis* ranges from Canada on its northern limits to Argentina on its southern limits. On South America the genus is reported from Colombia, Ecuador, Bolivia, and Argentina. This is the first record of this newly erected genus from Brazil, Rio de Janeiro State. Such distributional pattern suggests lack of collects and that *Tortopsis* is probably widely distributed through South America.

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Material and methods

Specimens were caught on light traps and preserved in 80% ethanol. Collecting sites were marked with a GPS using the *datum* WGS84. Type material is deposited at Coleção Entomológica Prof. José Alfredo Pinheiro Dutra (DZRJ), Departamento de Zoologia, Universidade Federal do Rio de Janeiro—UFRJ. Drawings were made with the aid of camera lucida. Wings and eggs were temporally mounted on slides with 70% ethanol gel. Wings were drawn at stereomicroscope and eggs were described at light microscope. Photos were taken with a digital camera attached to a stereomicroscope, several pictures were taken and combined to form an unique picture.

Tortopsis canum sp. nov. Gonçalves, Da-Silva & Nessimian

Imago

Diagnosis. 1) Head strongly shaded with black between ocelli; head and pronotum color pattern as in Figs. 1–2; 2) forewing length: male—11.3–12.7mm; females—15.0–17.0mm; 3) wings hyaline with veins C, Sc and R_1 grayish on basal 3/4; 4) parastyli long and straight or only subtly curved (Fig. 10); 5) penes long, slender and cylindrical, apically hooked (Fig. 9–11); 6) female parastyli receptors "C" shaped, receptors large, occupying nearly all extension of sternum VIII (Figs. 12–13).

Description. ***Male imago:*** Length (mm): 11.0–13.0 body; 11.3–12.7 forewing; 5.0–5.2 hind wing. General coloration thorax yellowish and abdomen whitish suffused with gray and black.

Head (Fig. 2)*:* Yellowish; anterior margin whitish. Head heavily suffused with black; base of ocelli and area between the ocelli nearly completely black. Ocelli white. Eyes black. Scape and pedicel white shaded with gray; flagellum translucent.

Thorax: Pronotum yellowish white; anterior hump translucent white. Color pattern as in Fig. 2. Meso and metanotum yellowish suffused with black, particularly among suture lines of mesonotum. Prosternum translucent white. Meso and metasternum yellowish, both with blackish marking on median region; marking longer on mesosternum; mesofurcasternal plates approximating each other on anterior half, with mesofurcasternal impression narrow on that half and wide on posterior half.

Legs: Fore leg: coxa, trochanter, femur and tibia yellowish; femur and tibia heavily shaded with gray, with an apical marking on femur. Tarsomeres translucent white heavily suffused with gray, shade becoming more fainted toward apical segments. Tarsal claws white. Mid and hind legs: yellowish, femur and tibia shaded with gray.

Wings (Figs. 5 and 7)*:* Membrane hyaline; base of wings gray. Fore wing: veins C, Sc and R_1 gray, whitish on apical third, membrane of wing in this region also whitish. Remaining veins translucent-white. Hind wing: veins C and Sc gray on basal half; vein R_1 gray only at base.

Abdomen (Fig. 4)*:* Whitish with longitudinal medial line translucent white; terga I–VII shaded with gray, except for median line. Tergum VIII heavily shaded obstructing median line; terga IX–X heavily shaded with black or a darker gray, without median line. Sterna translucent white with lateral swellings yellowish; sterna suffused with gray medially; sterna VII–IX heavily suffused. Sterna VIII–IX more heavily suffused. Sternum IX entire with posterior margin and a pair of lateral lines black. Caudal filaments translucent white.

Genitalia (Figs. 9–11)*:* Translucent white; parastyli light brown. Parastyli straight or at most only subtly curved; forming an angle of about 45° in relation to penes.

Female imago: Length (mm): 11.5–12.5 body; 15.0–17.0 forewing; 6.0–7.2 hind wing. General coloration yellow suffused with black.

Head (Fig. 1)*:* Yellowish; anterior margin whitish. Head heavily suffused with black; base of ocelli and area between the ocelli nearly completely black. Ocelli white. Eyes black. Scape and pedicel white shaded with gray; flagellum translucent.

Thorax: Yellow; Pronotum with anterior ring heavily suffused with black, color pattern as in Fig. 1. Meso and metanotum heavily shaded with black; particularly among suture lines of mesonotum. Prosternum yellow lightly suffused with black. Meso and metasternum yellow heavily suffused with black on median region, forming blackish markings medially. Mesofurcasternal plates approximating each other on anterior half, with mesofurcasternal impression narrow on that half and wide on posterior half.

Legs: Yellow; with black shade on femur and tibia; foreleg heavily shaded.

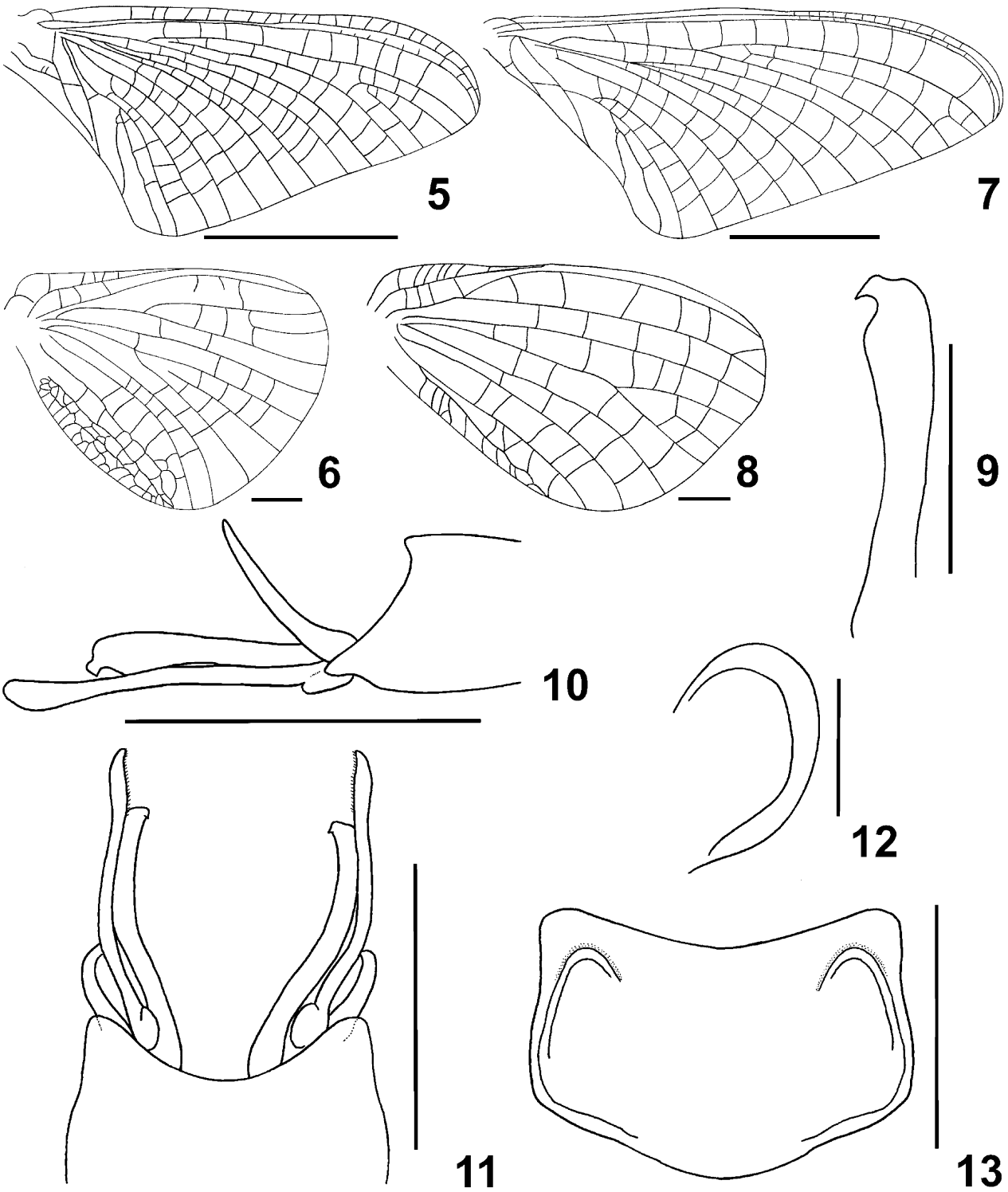
Wings (Figs. 6 and 8)*:* Membrane hyaline. Forewing: veins S, Sc and R_1 gray on basal 3/4; whitish on apical fourth; membrane on this region also whitish. Hind wing: vein C and Sc gray on basal half; vein R_1 gray only at base.

Abdomen (Fig. 3)*:* Yellow; when without egg, abdomen translucent white. Terga heavily suffused with black. Sterna suffused with black particularly on lateral swellings. Sternum VIII with lateral C-shaped parastyli receptors; outer margin of parastyli receptors shaded black posteriorly. Parastyli receptors large, occupying nearly all the extension of the sternum VIII. Eggs light yellow, bowl-shaped; without polar caps or any attachment structures. Caudal filaments translucent white.

Nymph: Unknown.

Biology. Specimens of *Tortopsis canum* **sp. nov.** were found near a deep, large river (6^{th} order), with sandy bottom. Adults were found flying near the Macaé river, on a strongly modified segment, where the Macaé river is rectified and riparian vegetation is lacking. In the same localities adults of *Campsurus melanocephalus* Pereira & Da-Silva, 1991 were also collected. *Campsurus melanocephalus* appeared in large numbers (about 70% of all Polymitarcyidae) in light traps whereas *T. canum* **sp. nov.** occurred in smaller numbers (30%).

FIGURES 1–4. *Tortopsis canum* **sp. nov.** Imago. 1—Head and pronotum of female; 2—Head and pronotum of male; 3—Abdominal color pattern of female; and 4—Abdominal color pattern of male (scale: figs. 1–2: 1.0mm and figs. 3–4: 5.0mm).



FIGURES 5–11. *Tortopsis canum* **sp. nov.** Imago. 5—Male forewing; 6—Male hind wing; 7—Female forewing; 8—Female hindwing; 9—Detail of penes; 10—Male genitalia (lateral view); 11—Male genitalia (ventral view); 12—Detail of female parastyli receptors; and 13 – Female VIII sternum (scale: figs. 5 and 7: 5.0mm; figs. 6 and 8, 10–11 and 13: 0.1mm; figs. 9 and 12: 0.5mm).

Specimens were captured in light traps. Swarms began around 6:00 –7:00 PM, with few males flying, then reached its highest abundance and ended before 8:00PM.

Etymology. "*canum*", from the Greek, meaning "straight rod", in reference to the straight parastyli of males.

Type material. *Holotype:* Brazil, RJ, Macaé, Cachoeiros de Macaé, Rio Macaé, 05-IV-2009, 22º25'49.5"S /

42°18'06"W, 68m, Gonçalves, I.C. *leg.* 1 male imago (DZRJ1626); *Paratypes:* Brazil, RJ, Macaé: Cachoeiros de Macaé, Rio Macaé, 05-IV-2009, 22°25'49.5"S / 42°18'06"W, 68m, Gonçalves, I.C. *leg.* 1 male imago and 5 female imagos (DZRJ1627); Macaé, Rio Macaé, 16-IV-2009, 22°17'42.9"S / 41°52'48"W, Gonçalves, I.C. *leg.* 17 male imagos and 5 females imagos (DZRJ1628); Macaé, Rio Macaé, 16-IV-2009, 22°17'42.9"S / 41°52'48"W, Gonçalves, I.C. *leg.* 1 male imago (DZRJ1629).

Discussion

Tortopsis and *Tortopus* species have few morphological characteristics allowing species diagnosis. Therefore, morphological features used by Molineri (2010) to identify species within these genera were used as a base for providing *T. canum* **sp. nov.** diagnosis. The new species is similar to *Tortopsis limoncocha* Molineri, 2010 from sharing penes cylindrical, long and slender and parastyli not curved at base. *Tortopsis canum* **sp. nov.**, however, is the only species of the genus having parastyli straight. Regarding females, parastyli receptors of *T. canum* are much larger, reaching nearly all the extension of the sternum VIII, whereas in *T. limoncocha* they are much smaller, not reaching half of the extension of the sternum.

In order to comprise the new species, the key provided by Molineri (2010) could be altered as follows:

Males

4(3)	Parastyli curved from its base	5
-	Parastyli relatively straight in lateral view	7
7(4)	Parastyli only curved on apical 1/4 (Fig. 58 of Molineri, 2010)	*Tortopsis limoncocha*
-	Parastyli straight (Fig. 10)	*Tortopsis canum* **sp. nov.**

Females

6(4)	Parastyli receptors with C-shaped sockets (Figs. 55–56, 75 of Molineri, 2010)	7
-	Parastyli receptors V-shaped sockets (Figs. 61–61, 78 of Molineri, 2010).	*Tortopsis spatula*
7(6)	Color pattern on head and pronotum as in Fig. 88 (of Molineri, 2010); parastyli receptors small, not reaching more than half of VIII sternum	*Tortopsis limoncocha*
-	Color patter on head and pronotum as in Figs. 1; parastyli receptors wide, reaching nearly all extension of sternum VIII	*Tortopsis canum* **sp. nov.**

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