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COMPLEMENTARY DESCRIPTIONS OF *KEMPNYIA GRACILENTA* (ENDERLEIN 1909) AND *KEMPNYIA RETICULATA* (KLAPÁLEK 1916) (PLECOPTERA: PERLIDAE)

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ABSTRACT
In this paper the larva of *Kempnyia gracilenta* (Enderlein) and the larva and female of *K. reticulata* (Klapálek) from the state of Espírito Santo, Brazil are described and compared to known members of the genus.

Keywords: Neotropical, larvae, female, Espírito Santo State, Brazil

INTRODUCTION

The taxonomic gap among Neotropical Plecoptera is a major hindrance in the study of this group. Regional systematic studies typically include descriptions of males and/or females, but only rarely are larval data included (e.g. Froehlich 1984b; 1988; Dorvillé & Froehlich 1997; Bispo & Froehlich 2004; 2008), and at this time the larvae of only two *Kempnyia* Klapálek species are known. This is due primarily to the difficulty in achieving accurate correlations between adult stages and the larvae.

Kempnyia, a South American endemic genus, currently includes 31 known species (Froehlich 2010) distributed throughout Central to South Brazil (Stark 2001; Bispo & Froehlich 2004). The genus was proposed by Klapálek (1914) and later expanded by Klapálek (1916). The modern interpretation for the genus resulted from the work of Zwick (1983) and Froehlich (1984a) in which species formerly included in *Eutactophlebia* Klapálek were transferred to *Kempnyia* and the former group was placed as a junior synonym of the latter. Recently considerable progress in the knowledge of this group has been made with several discoveries of new species and redescriptions of older ones (Bispo & Froehlich 2004; Froehlich 1984a; 1988; 1996). In addition, an emphasis on distinguishing larval stages has appeared in recent literature (Bispo & Froehlich 2008; Dorvillé & Froehlich 1999). In this study we continue this emphasis by providing the first descriptions for the larval stages of *K. gracilenta* (Enderlein) and *K. reticulata* (Klapálek). The previously unknown female for the latter species is also described.

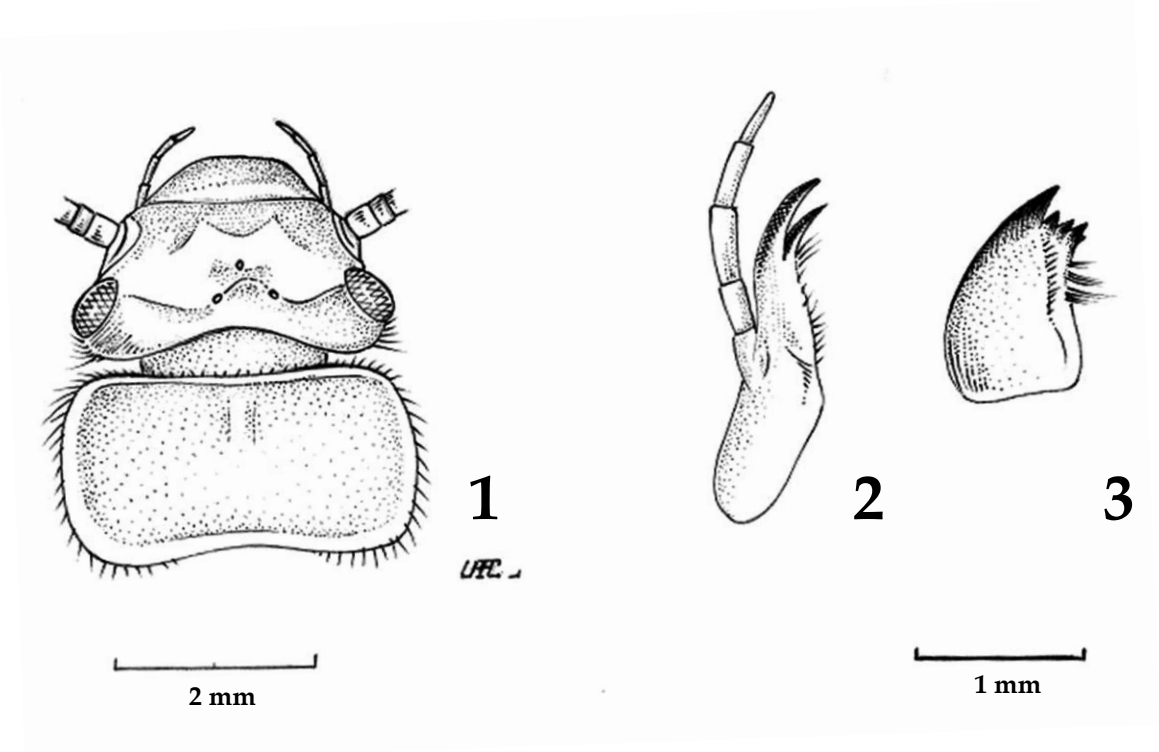
MATERIAL AND METHODS

Larvae were collected in Estação Biológica de Santa Lúcia (EBSL), 19° 57′ 55.9″ S, 40° 32′ 24.4″ W, Santa Teresa City, Espírito Santo State, Brazil. Larval

specimens were identified to genus using the key of Froehlich (1984b) and reared individually until emergence.

Larval rearings were made in small cages (11 X 9.5 X 7 cm) using river water and substratum in order to provide natural environmental conditions. After emergence, adults were sexed and allocated together to observe matings and infer correlations of males with females. Species identifications were made using the descriptions of male genitalia provided by Jewett (1960), Froehlich (1984a) and Zwick (1983).

Specimens were preserved in 70% alcohol. Their abdomens were removed, cleared in 10% potassium hydroxide (KOH) and rinsed in distilled water. Specimens were examined and illustrations prepared using a Leica MZ16 stereomicroscope equipped with camera lucida. Measurements of the head, pronotum, abdomen and total body length are given for larval specimens. These represent values taken from a spectrum of specimens representing various stages of development including pre-emergent larvae.



Figs. 1-3. *Kempnyia gracilenta* larva. 1. Head and pronotum, dorsal. 2. Maxilla, dorsal. 3. Mandible, dorsal.

RESULTS AND DISCUSSION

Kempnyia gracilenta (Enderlein)

(Figs. 1-3)

Acroneuria gracilenta Enderlein 1909:397.
Acroneuria gracilenta: Klapálek, 1916:47.
Acroneuria gracilenta: Claassen, 1940:182.
Eutactophlebia gracilenta: Jewett, 1960:175. (Figs. 6, 6b)
Eutactophlebia gracilenta: Zwick, 1973:490. (Figs. 35-39)
Kempnyia gracilenta: Froehlich, 1979:70-71.
Kempnyia gracilenta: Zwick, 1983:179.
Kempnyia gracilenta: Froehlich, 1984a:1137-1138. (Figs. 1-3)

Material Examined. Brazil, Espírito Santo, Santa Teresa, Córrego Sagüi, 19°58'00.5"S 40°32'09"W, 05.vii.2008, 1♂, 3♀, 21 larvae; 03.iv.2009, 9 larvae; 25.vi.2009, 21 larvae; Córrego Tapinuã, 19°58'16.5"S 40°31'80.1"W, 04.vii.2008, 7 larvae; 04.iv.2009, 2 larvae; 26.vi.2009, 1♀, 5 larvae; Córrego do Banhado,19°57'55.1"S 40°32'15.4"W, 04.ii.2009, 2 larvae; 04.iv.2009, 13 larvae; 26.vi.2009, 4 larvae; Córrego da Divisa, 19°58'06.3"S 40°31'28.9W,

02.vii.2008, 1♂ 2♀, 21 larvae; 14.ix.2008, 2 larvae; 10.xi.2008, 23 larvae; 03.ii.2009, 10 larvae; 04.iv.2009, 30 larvae; 26.vi.2009, 51 larvae; 21.vii.2009, 1♂; 21.viii.2009, 1♀. Córrego Bonito, 19°58'28,4"S 40°31'54.4"W, 03.vii.2008, 14 larvae; 14.ix.2008, 20 larvae; 05.ii.2009, 29 larvae; 05.iv.2009, 40 larvae; 25.vi.2009, 48 larvae; 20.viii.2009, 1♂; 12.ix.2009, 1♂.

Larva. General color light reddish brown. Head dark posteriorly, becoming paler in a broad transverse band forward of median ocellus; clypeus dark brown, M-line distinct in transverse pale band. Ocelli black; eyes black with a white band in the base. Antennae with a uniform yellowish-brown pattern. Pronotum brown with clear spots forming a characteristic pattern and with a pale median band; rugosities indistinct. Maxillary lacinia yellowish-brown, with the teeth sharp-pointed and red-brown. Mandible yellowish, with five sharp-pointed dark brown teeth. Glossae, paraglossae and labial palps pale yellow. Legs with a fringe of fine setae along the outer margin from trocanter to tarsi. Abdomen dark brown in the mature nymphs; apex of the abdominal segments with a fringe of bristles. Cerci dark brown at the base and paler to the apex.

Measurements. Larval Head: 2.9 x 2.2mm; Pronotum: 3.38 x 1.79mm; Abdomen: 4.3mm; total length: 10.59mm (n = 379).

Remarks. Larvae of *K. gracilenta* are distinguished from known members of the genus on the basis of the pale transverse band which extends between the compound eyes, covering part of the ocellar triangle and obscuring the M-line (Fig. 1). The marginal lacinial bristles include a few (ca. 3-4) longer ones at the base of the second tooth and a row of shorter ones extending to the lacinial base (Fig. 2). The latter character distinguishes larvae of this species from those of *K. tijucana* Dorvillé & Froehlich (Dorvillé & Froehlich 2001) and *K. reticulata* (see Fig. 8), whereas the smaller size and shape of the epicranial suture distinguishes *K. gracilenta* larvae from those of the much larger larvae of *K. neotropica* (Jacobson & Bianchi) (Bispo & Froehlich 2008).

Distribution. Brazil: São Paulo; Rio de Janeiro; Minas Gerais; Espírito Santo.

***Kempnyia reticulata* (Klapálek)**

(Figs. 4-9)

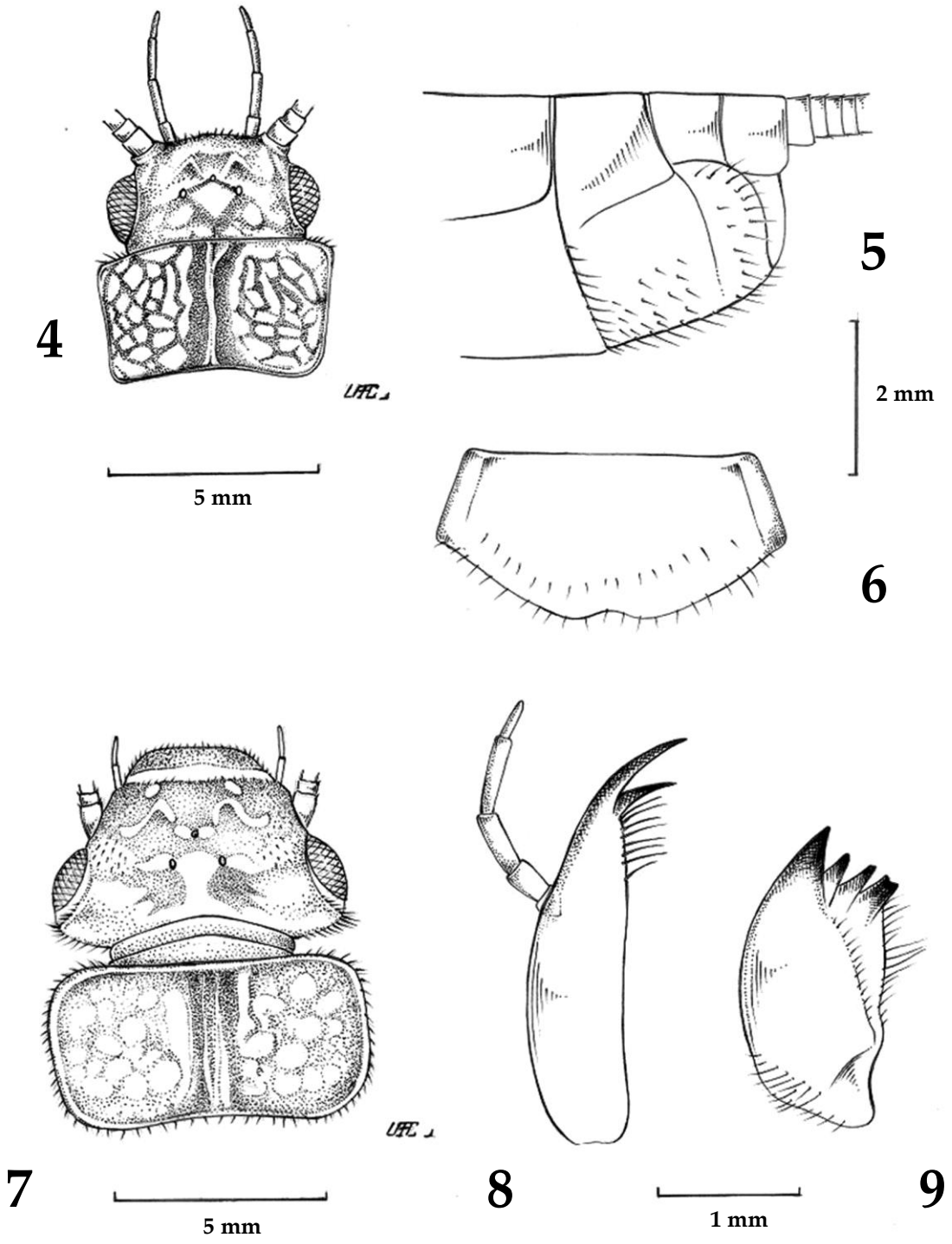
Eutactophlebia reticulata Klapálek 1916:46.
Eutactophlebia reticulata: Claassen, 1940:182.
Kempnyia calabriae: Joost, 1980:73. (Figs. 1-4)
Kempnyia reticulate: Zwick, 1983:177-180. (Figs. 1-4)

Material Examined. Brazil. Espírito Santo. Santa Teresa. Córrego Sagüi. 05.vii.2008, 5 larvae; 03.iv.2009, 2 larvae; 04.vii.2008, 2♀; 25.vi.2009, 3 larvae. Córrego Tapinuã, 04.vii.2008, 3 larvae; 10.ix.2008, 1 larva; 03.ii.2009, 3 larvae; 04.iv.2009, 3 larvae; 26.vi.2009, 3 larvae; 01.vii.2009, 1♂. Córrego da Divisa, 02.vii.2009, 2 larvae; 03.ii.2009, 4 larvae; 04.iv.2009, 16 larvae; 26.vi.2009, 7 larvae. Córrego Bonito, 03.vii.2008, 9 larvae; 14.ix.2008, 12 larvae; 12.xi.2008, 3 larvae; 05.ii.2009, 7 larvae; 05.iv.2009, 20 larvae; 26.vi.2009, 15 larvae.

Female. Brown eyes; ocelli partially black; triangular spot between the ocelli pale. Base of antennae light brown (pedicel). Pronotum with conspicuous reticulate rugosities and brown median band. Legs light brown but darker near the tips, particularly at the femoral apex. Venter and cerci with uniform pale color.Wings with many cross-veins; costa, subcosta and cross-veins hyaline; veins R, Cu and M brownish. Subgenital plate large and arched.

Larva. General color dark brown. M-line distinct, and paler than the frons. Eyes black with a pale line surrounding margins. Reticulate below the post-frontal suture, and bearing a pale band between the lateral ocelli which separates dark pigment on the occiput. Clypeus brownish and labrum dark brown. Three ocelli totally black. Antenna brown. Mandible with five teeth and numerous bristles on the outer margins at the base. Maxillary palp light brown; lacinia with two teeth and a row of prominent marginal bristles extend for ca. half the lacinial length. Pronotum brown with pale spots forming an ornamental pattern. Legs light brown with brownish spines.

Measurements. Female: total length: 16.79mm; head: 3.33mm; forewing length: 18-19mm; hindwing: 17.00mm. Larva: head: 3.7 x 2.91mm; Pronotum: 4.05 x 2.16mm; Abdomen: 5. 92mm; length total: 14.12mm (n = 118).



Figs. 4-9. *Kempnyia reticulata.* 4-6. female. 4. Head and pronotum, dorsal. 5. Sterna 7-10, lateral view. 6. Subgenital plate, ventral. 7-8-9. larva. 7. Head and pronotum. 8. Left maxilla. 9. Left mandible.

Remarks. Despite the large size and form of the female subgenital plate which are similar to those of *K. colossica* (Navas) and *K. gaussu* Froehlich (Froehlich 1988), these species do not otherwise appear to be closely related. The larvae are somewhat larger than those of *K. gracilenta* (see above) and are readily distinguished from these and the other known species (*K. neotropica*, *K. tijucana*) on the basis of color pattern of the head (Fig. 7) and in details of the lacinial bristle arrangement (Fig. 8). The head pattern is generally similar to that of *K. tijucana* (Dorvillé & Froehlich 2001) but with more extensive pale areas lateral to the ocelli and the lacinial teeth diverge more strongly and have more uniformly sized marginal bristles than is shown for *K. tijucana* by Froehlich (1984b).

Distribution. Brazil: São Paulo; Rio de Janeiro; Minas Gerais; Espírito Santo.

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