



A new species of *Caenis* Stephens, 1836 (Ephemeroptera: Caenidae) from Southern Brazil

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Abstract

A new species of the genus *Caenis* Stephens is described based on the male imago, female imago and egg stages from the state of Rio Grande do Sul, Brazil. The male imago of *Caenis gaucha* sp. nov. is diagnosed as follows: body length of male 2.0–2.5 mm; base of antennal flagellum not dilated; forceps apically rounded, not fused to lateral margins of styliger plate; styliger plate short with posterior margin slightly sub-triangular; ratio of foreleg 1.7–2.2 × the length of hind leg, forceps length 4.4–6.0 × the width ½ from base, and distance between the extreme lateral points of the forceps bases 1.7–1.8 × forceps length.

Key words: Caeninae, Neotropical Region, Taxonomy, Biodiversity

Introduction

Caenidae (Insecta: Ephemeroptera) is a globally widespread group, except New Zealand, Antarctica and various oceanic islands (Edmunds *et al.* 1976; Provonsha 1990; Domínguez *et al.* 2006; Barber-James 2008; Bauernfeind & Soldán 2012). In South America there are 30 species reported from four genera: *Alloretochus* Sun & McCafferty, 2008; *Brasilocaenis* Puthz, 1975; *Caenis* Stephens, 1836; and *Latineosus* Sun & McCafferty, 2008. (Domínguez *et al.* 2013).

The South American genera are inserted into two subfamilies: Caeninae (*Brasilocaenis* and *Caenis*) and Brachycercinae (*Alloretochus* and *Latineosus*). The genus *Caenis* is relatively common and cosmopolitan with about 160 species in the world, 20 of which have been recorded from South America (Barber-James *et al.* 2013; Molineri & Malzacher 2007; Malzacher 2011, 2012, 2013). Malzacher (1990, 2001) recognized two species groups of South American *Caenis*: one with strong and apically pointed forceps and another with forceps short, weaker, and apically rounded. Later, Malzacher (2001, 2011) subdivided the group of Caeninae with apically rounded forceps, also present elsewhere in the world, into six groups: two from Africa (*elouardi*-group and *vermifera*-group) and four from South and Central America (*argentina*-group, *pflugfelderi*-group, *reissi*-group and *grimi*-group).

In the present work *Caenis gaucha* sp. nov. is described based on adults of both sexes and eggs from the State of Rio Grande do Sul, Brazil.

Material and methods

Male genital structures were firstly mounted in glycerin-jelly and drawn with a camera-lucida under magnification; later these parts were permanently mounted in Canada Balsam. Wings were mounted dry on slides. Terminology follows Malzacher (1991) for male genital sclerites, Kluge (1994) for thoracic structures and Malzacher (1982) for eggs.

Depositories: IBN, Instituto de Biodiversidad Neotropical (Tucuman, Argentina); CZNC, Coleção Zoológica Norte Capixaba (São Mateus, Brazil); CEUFPE, Coleção Entomológica da Universidade Federal de Pernambuco (Recife, Brazil).

***Caenis gaucha* sp. nov.**

(Figure 1A–F)

Diagnosis. This species can be characterized by the following combination of characters. In the imagos: 1) body length of male 2.0–2.5 mm, of female 2.7–3.0 mm; 2) base of antennal flagellum not dilated; 3) male genital forceps apically rounded, not fused to lateral margins of styliger plate (**Fig. 1C**); 4) styliger plate short with posterior margin slightly subtriangular. Eggs: 1) two polar caps of cap-shaped type (**Fig. 1E**); 2) eggs bean shaped with the length $1.7\text{--}1.9 \times$ maximum width.

Description. **Male imago (Fig. 1A).** Length of body: 2.0–2.5 mm; forewing: 2.0 mm; foreleg: 1.4–1.6 mm; hind leg: 0.7–0.9 mm; cercus: 6.0 mm.

Ratios. *Leg:* body size $1.3\text{--}1.5 \times$ length of foreleg; foreleg $1.7\text{--}2.2 \times$ length of hind leg. Ratio of lengths of first segment of foretarsus (in microns): $2^{\text{nd}}:3^{\text{rd}}:4^{\text{th}}:5^{\text{th}} = 4.6\text{--}5:2.0\text{--}2.2:1.8\text{--}2.2:1.2$. *Genitalia:* forceps length $4.4\text{--}6.0 \times$ width $\frac{1}{2}$ from base; distance between extreme lateral points of forceps bases to forceps length = 1.7–1.8.

Coloration. *Head:* whitish shaded with gray on posterior margin and median region in dorsal view; venter of head whitish (**Fig. 1A**). Antenna: scape and pedicel whitish, flagellum hyaline.

Thorax. Prothorax yellowish translucent shaded with gray on lateral and posterior margins (**Fig. 1A**). Meso- and metanotum yellowish shaded with gray on carinae; in lateral view, mesonotum yellowish brown; pleurae and sterna paler. Wing membrane hyaline, veins translucent except C, Sc and Rs grayish. *Legs.* Foreleg with coxa and femur shaded with gray and dorsal edge with blackish line; foretibia with subapical gray mark. Middle and hind legs whitish with coxae and femora yellowish.

Abdomen. Abdominal segments I–VIII translucent white, IX–X yellowish; abdominal terga I–II with narrow, sometimes interrupted transverse blackish bands, and laterally on tergum VIII (**Fig. 1A**). Sterna translucent white with segments IX–X yellowish. Pleura with dark tracheal marks.

Genitalia. Sternum IX with chitinous lateral structures uncolored. Forceps translucent yellow. Penis whitish. Caudal filaments translucent white (**Fig. 1A**).

Morphology. *Antenna:* Base of antennal flagellum not dilated.

Thorax. Lateral margins straight, not protruding; prosternal longitudinal ridges forming triangle shaped structure, closed anteriorly and with straight lateral margins (**Fig. 1B**).

Abdomen. Lateral filaments and finger-like process on tergum II lacking.

Genitalia. Styliger plate short rectangular with subtriangular apex; central sclerite dome-shaped, apophyses, basolateral and lateral sclerites weakly discernible (**Fig. 1C**). Forceps apically rounded, axis densely covered with trichomae, and not fused to lateral margins of styliger plate (**Fig. 1D**). Ventral surface of penis without tubercles and groove, lobes of penis pointed laterally.

Female imago. Length- body: 2.7–3.0 mm; forewing: 2.6 mm; foreleg: 1.0–1.1 mm; cercus: 0.9 mm.

Thorax: same as males except dark lines on sutures of mesonotum; katapisternum not paler than rest of mesopleural sclerites. *Abdomen:* same as males except abdomen with segments 3–6 shaded with gray; abdominal sternum 9 with posterior margin straight, not projected. Lateral filaments present on terga VII–IX, very short.

Egg. Length: 120–125 μm ; width: 65–72 μm . Coloration light yellow. Bean shaped with length $1.7\text{--}1.9 \times$ width. Chorion finely punctured, surface with granules. Micropyle funnel-shape, narrow and long, without sperm guide. Two cap-shaped polar caps (**Figs. 1E, 1F**).

Nymph. Unknown.

Etymology. *Gáúcho* (Spanish spelling) or *gaucho* (Portuguese spelling) is a resident of the South American pampas and also is the main demonym of the people from the state of Rio Grande do Sul, type locality of the new species. Name in apposition.

Type material. Holotype: male imago from Brazil, Rio Grande do Sul State, Bossoroca, Barra de Angico, Rio Piratinim, 23–24.xii.2008, Pes, AM coll. Paratypes: 108 male imagos and nine female imagos (light trap), same data as holotype (slides CEUFPE350146 #001, CEUFPE350146 #002, CEUFPE350146 #003, IBN662, IBN663, IBN664, IBN665, IBN666, IBN667), (46 imagos at IBN, 18 at CEUFPE, and 50 at CZNC).

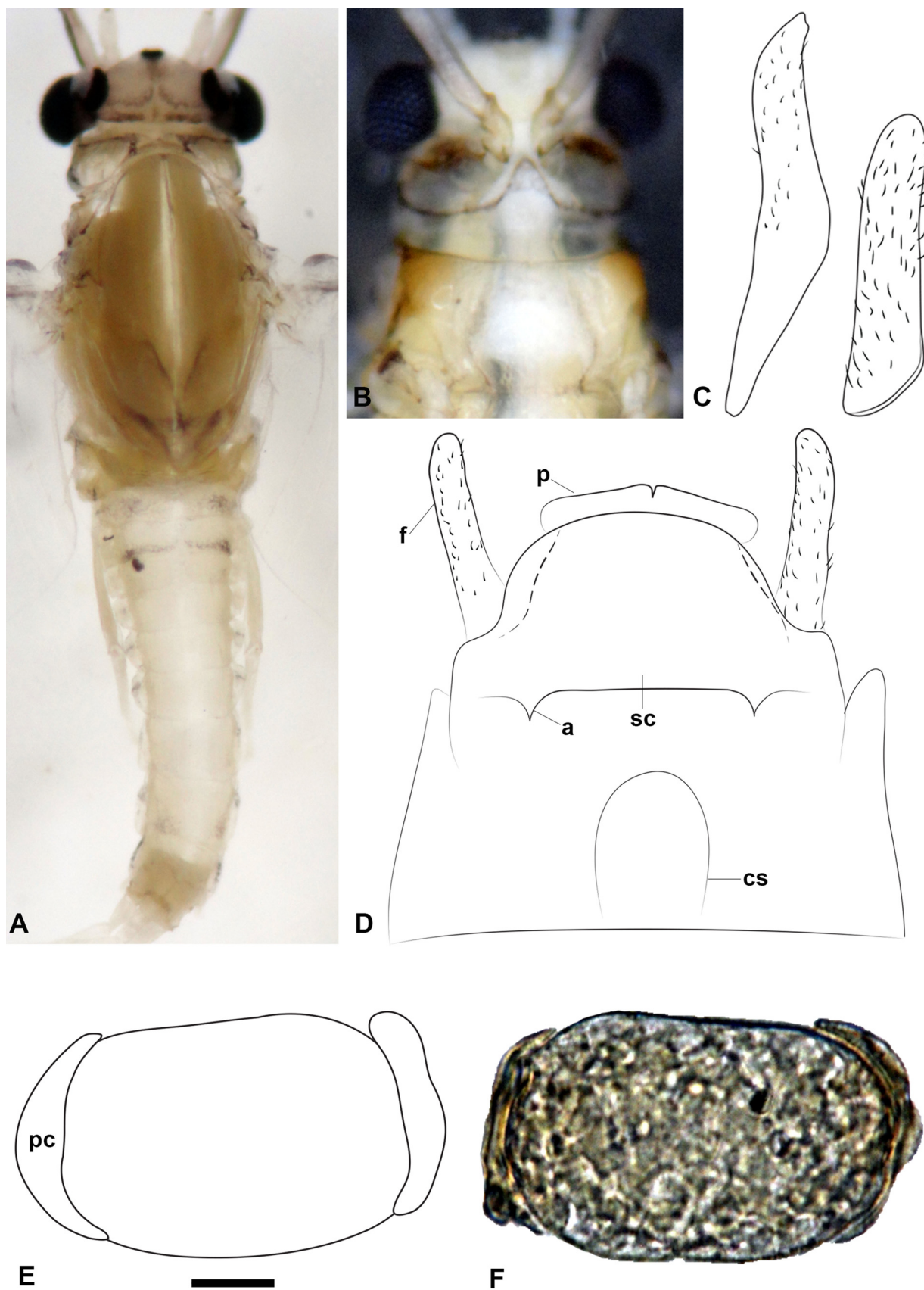


FIGURE 1. *Caenis gaucha* sp. nov. Male imago: A) abdominal color pattern, dorsal view; B) prosternum and prosteron longitudinal ridges, ventral view; C) variations in forceps; D) male genitalia, ventral view; E) egg; F) photograph of egg (a=apophysis, cs=central sclerite, f=forceps, p=penes, pc=polar cap, sc=styliiger sclerite). Scale bar = 25 μ m.

Discussion. The new species fits well with the *grimi*-group proposed by Malzacher (2001) because of the following characters: abdominal tergum II without a finger-like process, penis with lobes laterally pointed, styliger-plate broad with straight hind margin, and weakly discernible sclerites. However, it can be distinguished from the other species by main axis of forceps densely covered with trichomae, ratio of foreleg $1.7\text{--}2.2 \times$ the length of hind leg ($1.4\text{--}1.6 \times$ in *C. tenella*), forceps length $4.4\text{--}6.0 \times$ the width $\frac{1}{2}$ from base ($3.0\text{--}4.0 \times$ in *C. tenella*), and distance between the extreme lateral points of the forceps bases $1.7\text{--}1.8 \times$ forceps length.

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