



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

LUCAS R. C. LIMA^{1,4}, CARLOS MOLINERI² & ULISSES PINHEIRO³

¹Laboratório de Diversidade Animal e Vegetal, Campus Heróis do Jenipapo Universidade Estadual do Piauí, CEP 64280-000, Campo Maior-PI, Brazil. E-mail: lucaslima_86@hotmail.com

²Instituto de Biodiversidad Neotropical, CONICET (National Council of Scientific Research)-Universidad Nacional de Tucumán, Tucumán, Argentina, UNASUR. E-mail: carlosmolineri@gmail.com

³Laboratório de Porífera, Centro de Ciências Biológicas, Departamento de Zoologia, Universidade Federal de Pernambuco, CEP 50670-420 Recife-PE, Brazil. E-mail: uspinheiro@hotmail.com

⁴Corresponding author. E-mail: lucaslima_86@hotmail.com

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.

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.

Acknowledgements

We would like to express our gratitude to Rafael Boldrini for loaning of the material. We are also thankful to CONICET for permanent support. This study received partial financial support from CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior).

References

- Barber-James, H., Gattolliat, J.-L., Sartori, M. & Hubbard, M.D. (2008) Global diversity of mayflies (Ephemeroptera, Insecta) in freshwater. *Hydrobiologia*, 595, 339–350.
<http://dx.doi.org/10.1007/s10750-007-9028-y>
- Barber-James, H., Sartori, M., Gattolliat, J.-L. & Webb, J. (2013) World checklist of freshwater Ephemeroptera species. Available from: <http://fada.biodiversity.be/group/show/35> (accessed 10 September 2014)
- Bauernfeind, E. & Soldán, T. (2012) *The Mayflies of Europe (Ephemeroptera)*. Apollo Books, Ollerup, 781 pp.
- Domínguez, E., Molineri, C., Pescador, M.L., Hubbard, M.D. & Nieto, C. (2006) Ephemeroptera of South America. In: Adis, J., Arias, J.R., Rueda-Delgado, G. & Wantzen, K.M. (Eds.), *Aquatic Biodiversity in Latin America. Vol. 2*. Pensoft, Sofia-Moscow, 646 pp.
- Domínguez, E., Molineri, C., Nieto, C., Hubbard, M.D., Pescador, M. & Zúñiga, M.C. (2013) Checklist of South American species of Ephemeroptera. Available from: <http://fada.biodiversity.be/group/show/35> (accessed 10 September 2014)
- Edmunds, G.F. Jr., Jensen, S.L. & Berner, L. (1976) *Mayflies of North and Central America*. University of Minnesota Press, Minneapolis, 330 pp.
- Kluge, N. (1994) Pterothorax structure of mayflies (Ephemeroptera) and its use in systematics. *Bulletin de la Société Entomologique de France*, 99 (1), 41–61.
- Malzacher, P. (1982) Eistrukturen europäischer Caenidae (Insecta, Ephemeroptera). *Stuttgarter Beiträge zur Naturkunde*, 356, 1–15.
- Malzacher, P. (1990) Neue Arten der Eintagsfliegen-Familie Caenidae (Insecta, Ephemeroptera) aus Südamerika. *Studies on Neotropical Fauna and Environment*, 25, 31–39.
<http://dx.doi.org/10.1080/01650529009360799>
- Malzacher, P. (1991) Genital-morphological features in the Caenidae. In: Alba-Tercedor, J. & Sánchez-Ortega, A. (Eds.), *Overview and strategies of Ephemeroptera and Plecoptera*. Sandhill Crane Press, Gainesville, Florida, pp. 73–85.
- Malzacher, P. (2001) South and Central American *Caenis* species with rounded forceps tips (Insecta: Ephemeroptera: Caenidae). *Stuttgarter Beiträge zur Naturkunde*, 626, 1–20.
- Malzacher, P. (2011) The West African species of *Caenis* Stephens (Insecta: Ephemeroptera). *Stuttgarter Beiträge zur Naturkunde*, 4, 43–74.
- Malzacher, P. (2012) New species of *Caenis* (Ephemeroptera: Caenidae) from southern South Africa. *Aquatic Insects*, 34 (2), 151–172.
<http://dx.doi.org/10.1080/01650424.2012.713112>
- Malzacher, P. (2013) Caenidae from East Kalimantan, Borneo (Insecta: Ephemeroptera). With a discussion on phylogeny of the new tribe Clypeocaenini, subfamily Caeninae. *Stuttgarter Beiträge zur Naturkunde*, 6, 21–55.
- Molineri, C. & Malzacher, P. (2007) South American *Caenis* Stephens (Ephemeroptera, Caenidae), new species and stage descriptions. *Zootaxa*, 1660, 1–31.
- Provonsha, A.V. (1990) A revision of the genus *Caenis* in North America (Ephemeroptera: Caenidae). *Transactions of the American Entomological Society*, 116, 801–884.
- Puthz, V. (1975) Eine neue Caenidengattung aus dem Amazonasgebiet (Insecta: Ephemeroptera: Caenidae). *Amazoniana*, 5, 411–415.
- Stephens, J.F. (1836) Family III. - Ephemeridae, Leach. *Illustrations of British Entomology, Mandibulata*, 6, 54–70
- Sun, L. & McCafferty, W.P. (2008) Cladistics, classification and identification of the brachycercine mayflies (Insecta: Ephemeroptera: Caenidae). *Zootaxa*, 1881, 1–239.