

New record of *Parochlus carolinae* (Chironomidae: Podonominae) from the Ventania hill system with the description of the female

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Nuevo registro de *Parochlus carolinae* (Chironomidae: Podonominae) del sistema de Ventania y descripción de la hembra

RESUMEN. Se presenta el primer reporte de *Parochlus* Enderlein del sistema serrano de Ventania, el cual constituye el primer registro de este género de la provincia de Buenos Aires. Se describe e ilustra la hembra de *Parochlus carolinae* Rodríguez *et al.* y se enmiendan las descripciones originales del macho y de la larva. Se remarcan caracteres del cuerno torácico de la pupa para distinguir *P. carolinae* de otras especies del género *Parochlus*.

PALABRAS CLAVE. Argentina. *Parochlus*. Parque provincial E. Tornquist. Región Neotropical. Sierra de la Ventana.

ABSTRACT. The first report of *Parochlus* Enderlein from Ventania hill system is presented, being the first record of the genus from Buenos Aires province. The description and illustration of the female adult of *Parochlus carolinae* Rodríguez *et al.* is presented and the original male and larval descriptions are emended. Characters from the pupal thoracic horn are emphasized to distinguish *P. carolinae* from other *Parochlus* species.

KEY WORDS. Argentina. Neotropical region. *Parochlus*. E. Tornquist Provincial park. Sierra de la Ventana.

INTRODUCTION

The Podonominae is a subfamily of Chironomidae whose immature stages inhabit cold streams and brooks. This subfamily was established for a few northern hemisphere species (Thienemann, 1937) while its presence and high diversity in the southern continents was posteriorly discovered and reported by Brundin (1966).

The Podonominae genus *Parochlus* Enderlein comprises 50 described species (Ashe & O'Connor, 2009, 2012) of which 29 were reported for the Neotropical region. In this region, *Parochlus* was widely reported in the Andean South America (from Peru to Tierra del Fuego and Navarino Islands), the Archipelago of South Chile, Juan Fernandez Islands, and an undescribed species from the higher elevations of

Costa Rica. *Parochlus carolinae* was previously collected from the Carolina mountain stream and Grande River in San Luis Province, Argentina (Rodríguez *et al.*, 2009), representing the single record of a named *Parochlus* species for the Neotropics outside the Andean Patagonia.

Brundin (1966) distinguished seven groups of species in the genus *Parochlus*, each of them differentiated in subgroups. In a recent molecular study (Cranston *et al.*, 2010), four Brundin's species groups were represented but not all of them were resolved as such. In this study, the *squamipalpis* group and the genus *Zelandochlus* were considered into the *araucanus* group. Brundin (1966) reported considerable complications in the *araucanus* group, which was later confirmed by means of the molecular studies of Cranston *et al.* (2010).

Recently, we collected *P. carolinae* from the Ventania hill system. The Ventania system is part of the peripampasic orogenic arc defined by Frenquelli (1950) together with the Tandilia system, Mahuidas system, Pampean ranges and the Pre-cordillera of northwestern Argentina. Ventania belongs to the biogeographic area of Distrito Pampeano Austral (Cabrera & Willink, 1980) extending along 170 km between 37°–39° S and 61°–63° W, in a NW-SE direction with the highest altitude of 1243 m a.s.l. (Kristensen & Frangi, 1995). Because of its orogenic condition, Ventania was considered “an island of biodiversity”, in which the confluence of wildlife from the Brazilian region from the north and the Patagonia from the south occur (Ringuelet, 1961).

To date, six chironomid species were reported from Ventania. Of these, *Thienemaniella liae* Paggi, *Onconeura analiae* Donato *et al.*, *Allocladius globosus* Andersen *et al.* and *Pseudosmittia sætheri* Mauad *et al.* belong to the subfamily Orthoclaudiinae while *Podonomus tehuelche* Siri et Donato and *P. quinquesetosus* Siri et Donato belong to Podonominae.

In the present study we extend the distribution records of *P. carolinae* to the Ventania hill system, being the first report for Buenos Aires Province and the easternmost report of the genus *Parochlus* for the Neotropics. In addition, we describe and illustrate the female of *P. carolinae*, and emend the male adult and the larva.

MATERIALS AND METHODS

Immatures were transported live in separate vials and reared in the laboratory following methods by Epler (2001). Specimens cleared were slide-mounted in Canada balsam. General terminology follows Sæther (1980). Measurements are in μm (excepting body and wing length, in mm).

Type material examined. **ARGENTINA, San Luis:** Carolina stream, 32°50'S/66°2'W, 17-xi-2006, 1 male adult (HOLOTYPE), sweep net, Donato M. col. (MLP 5278/1); 1 larval cephalic capsule and pupal exuviae associated, 1 pupal exuviae, drift net, Donato M. col. (MLP 5278/3).

Additional material studied. **ARGENTINA, Buenos Aires:** Parque Provincial “E. Torn-

quist”, Cueva del Toro stream, 38°01'19.0''S/62°01'33.3''W, 672 m a.s.l., 4-xi-2011, malaise trap, Donato M., Siri A. & Spaccesi F. cols, 1 female; 21-v-2012, sweep net, 1 male and 1 female adults; unnamed stream at the piedmont of Bahía Blanca hill, 38°03'31.5''S/62°01'11.7''W 554 m a.s.l., 3-x-2013, hand net, exuviae; Donato M., Siri A. & Spaccesi F. cols, 1 male and female adults associated with their respective pupal exuviae, 1 male pupal exuviae.

RESULTS

Description

Female adult (n = 3, except when otherwise stated between parentheses) (Figs 1–5)

Total length 1.77–2.16; total length/wing length 1.31–1.42; wing length/profemur length 3.25–3.44.

Head. Eyes bare. Antenna with 11 flagellomeres (Fig. 1), AR 0.22–0.24. Ultimate flagellomere 55–70 long. Temporal setae 13–16 on each side, postorbital setae 6–8 on each side; 10–15 frontal setae. Clypeus with 6–10 setae. Lengths of palpomeres (1–5) 30–45; 55–75; 78–95; 72–100 (2); 108–130 (2). Palpomere 2 globose.

Thorax (Fig. 2). Antepronotum with 4–5 lateral setae; acrostichals 44–62; dorsocentrals 82–87 (2); prealars 40 (2); supraalars 2–4; scutellars 13–24; prescutellars 6–8; posnotals 0–2; preepisternals 6–7.

Wing (Fig. 3). Length 1.30–1.64 mm; width 0.51–0.66 mm; L/W 2.48–2.69. Costa extended 130–150 beyond R_{4+5} . Cell r_1 at distal end of vein R_1 25–30; cell r_{4+5} 160–200; r_1 width/ r_{4+5} width 0.15–0.16. All veins setose. Wing cells setose, except r_{4+5} . Bra-chiolium with 5 setae, squama with 5–7 setae.

Legs. Tibial spur on p_1 38–42 long; on p_2 35–40 and 28–35 long; on p_3 50–55 and 30–38 long. Comb on p_3 with 10 spines. Lengths and proportions of legs in Table I.

Genitalia (Figs. 4–5). Cercus ovoid, 58–60 long. Seminal capsule 36–40 long; notum 160–170 long; sternite X with at least 10 short lateral setae.

Emendation of male adult and larvae

MALE ADULT

The original description of the male of *P. carolinae* (Rodríguez *et al.*, 2009) should be emended as follow:

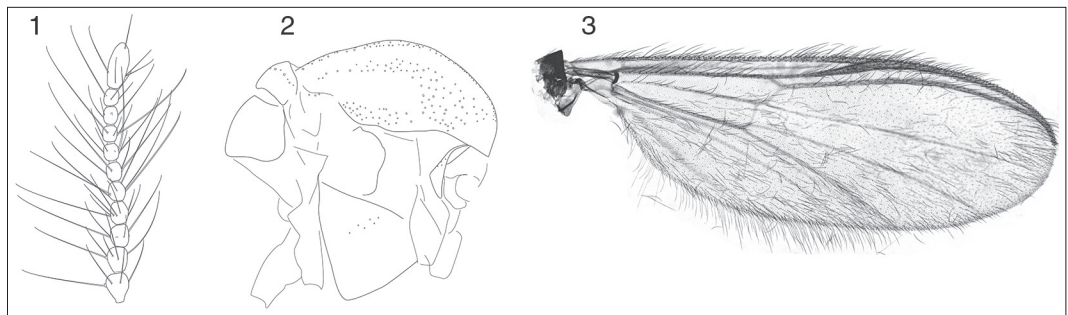
Eyes bare; mandible absents, preepisternum with setae.

LARVAE

The original description of the larvae of *P.*

Table I. Lengths (μm) and proportions of female legs of *Parochlus carolinae* Rodriguez *et al.* ($n = 3$). Abbreviations: femur (fe); tibia (ti); tarsomeres 1-5 (ta1-5); leg ratio (LR), ratio of metatarsus to tibia; "Beinverhältnisse" (BV), combined length of femur, tibia, and basitarsus divided by combined length of tarsomeres 2-5; "Schenkel-Scheine-Verhältnis" (SV), ratio of femur plus tibia to metatarsus.

	fe	ti	ta ₁	ta ₂	ta ₃
p ₁	400–505	400–520	225–270	120–160	90–100
p ₂	430–570	430–560	170–230	110–130	70–90
p ₃	480–645	565–745	215–330	170–210	100–120
	ta ₄	ta ₅	LR	BV	SV
p ₁	50–60	60–70	0.52–0.58	3.13–3.28	3.44–3.80
p ₂	50–60	55–60	0.40–0.42	3.55–4.00	4.85–5.06
p ₃	50–65	55–70	0.38–0.45	3.36–3.70	4.07–4.86



Figs. 1-3. *Parochlus carolinae*, female adult. 1, antenna; 2, thorax; 3, wing.

carolinae (Rodriguez *et al.*, 2009) should be emended as follow:

Labrum: SI 20 long, SII 24 long, with pedestal 16 long; SIII 16 long; SIVa 4 long, with pedestal 15 long; SIVb blunt rod 12 long. The shape of the pecten epipharyngis could not be observed.

Bionomy and comments

Immatures of *P. carolinae* were collected at Cueva del Toro streams and at an unnamed stream at the piedemont of Bahía Blanca hill, both located at the Parque Provincial Ernesto Tornquist, Buenos Aires, Argentina. Immatures were collected in temporal running streams. Water analysis of the Cueva del Toro stream showed the following values: PO₄-P 0.011–0.670 (mg P/l); NO₂-N 0.001–0.034 (mg N/l); NO₃-N 0.088–0.296 (mg N/l); DBO <1–5 (mg O/l); DQO 5–22 (mg O/l); conductivity 81–114 ($\mu\text{S}/\text{cm}$); dissolved oxygen 9.00–13.98 (mg O/l) or 61–89 (%); temperature 9–11 °C.

Following Brundin’s *Parochlus* species group,

P. carolinae belongs to the *araucanus* group by the adult, pupal and larval characters. Due to the unresolved status of the subgroups of the *araucanus* group (see Cranston *et al.*, 2010), we do not consider appropriate to force the inclusion of *P. carolinae* into one of these subgroups.

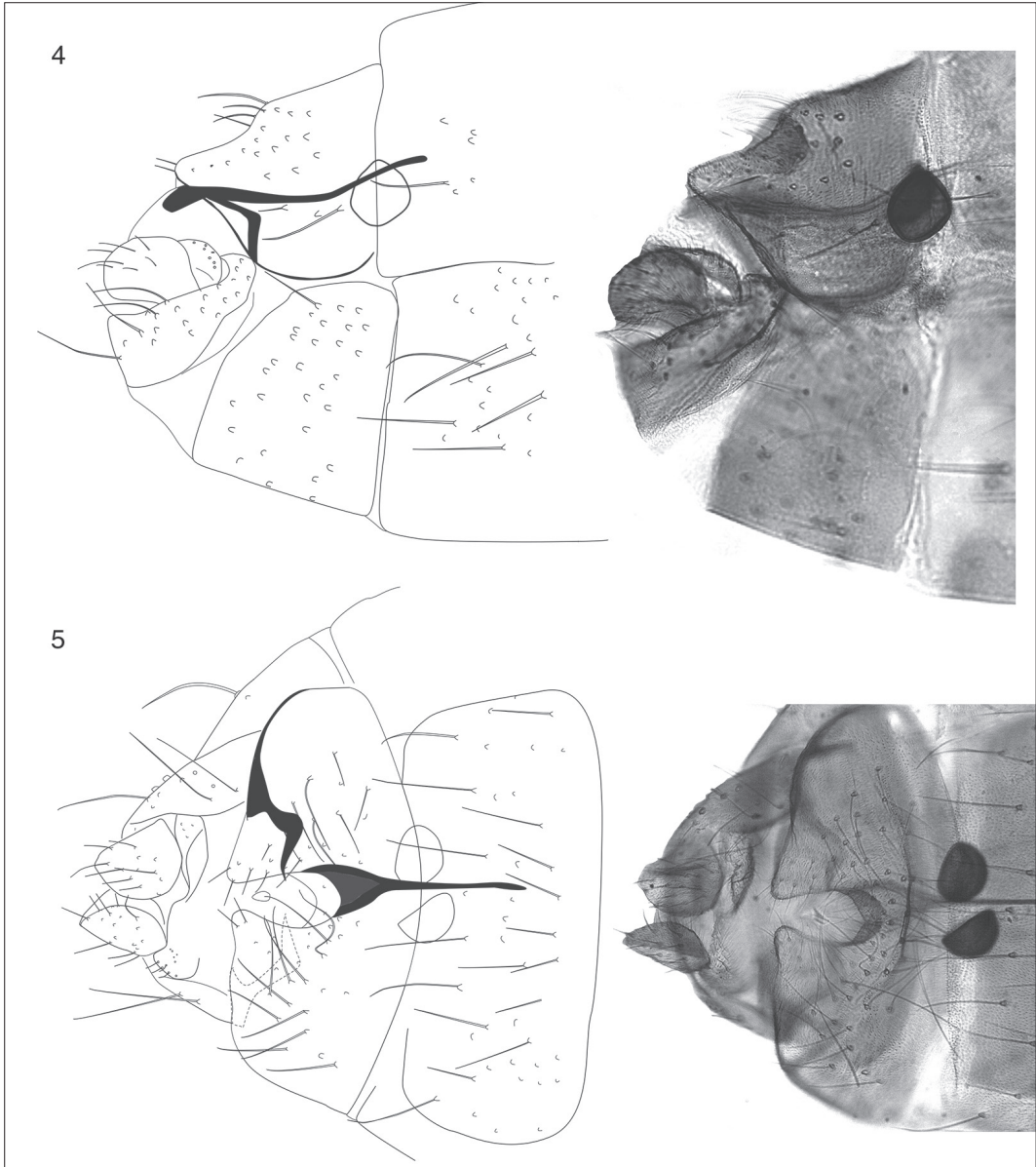
The eyes of the male adults of *P. carolinae* were originally described as hairy by Rodriguez *et al.* (2009), so these authors compared this species with *P. duseni*, since this is the other *Parochlus* species with hairy eyes. However, according to the analysis performed on the type material, *P. carolinae* eyes are bare. Other characters emended from the original description are the absence of mandible, and the presence of preepisternal setae of the male adults.

The best characters to distinguish the species of the *araucanus* group are present in the pupa (Brundin, 1966). *Parochlus carolinae* pupa has a strongly indicated horn sac of the thoracic horn, reaching 0.27–0.36 the length of the plastron plate. The horn sac in this species is practically

indistinguishable from the felt chamber (see Fig. 11 in Rodríguez *et al.*, 2009), which results in a diagnostic feature to distinguish the pupa of *P. carolinae* from the remaining pupae of *Parochlus*. The distal end of the felt chamber is represented by the aeropyles, which as in most of the *Parochlus* species connect at the proximal margin of the plastron plate. A more or less strongly indicated horn sac was also reported for *P. patagonicus* Brundin, *P. ohakunensis* (Freeman) and *P. carinatus* Brundin.

However, the shape of the thoracic horn of these species clearly differs from that of *P. carolinae*.

The finding of *P. carolinae* in the orogenic system has an important biogeographical significance, and it may be also distributed along the entire peripampasic orogenic arc. Further studies along the peripampasic orogenic arc are essential to understand the actual distribution and phylogeny of the subfamily Podonominae. Besides, the record of the genus *Parochlus* together with the occurrence of the genus *Podono-*



Figs. 4-5 . *Parochlus carolinae*, female adult. 4, genitalia, lateral view: drawing and photo; 5, genitalia, ventral view: drawing and photo.

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mus and *Allocladius globosus* reinforce the idea of Ringuelet (1961) in considering Ventania system as a complex area where Neotropical and Patagonian fauna occur.

A detailed revision of the different species of *Parochlus* is needed to elucidate the validation of the group species, as well as the biogeographical inferences and species relationships.

AKNOWLEDGEMENTS

Analía Paggi for providing type material of *P. carolinae*; Jorge Donadelli (ILPLA) for the water physico-chemical analysis, Anibal Areco and all of the park rangers of Parque Provincial E. Tornquist for helping us in the field work, OPDS for logistic support and for granting authorization to collect, Mónica Caviglia for English proof reading, and Fernando Spaccesi for his invaluable help in the field collection. The paper is the Scientific Contribution N°948 of the Institute of Limnology "Dr. R.A. Ringuelet" (ILPLA, CCT-La Plata, CONICET, UNLP). This study is supported by CONICET and Agencia Nacional de Promoción Científica (PICT-2008-1910).

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