

First record of *Gravatamberus pilosus* Mendes & Andersen, 2008 (Diptera: Chironomidae) in Argentina with the description of the adult female

Primer registro de *Gravatamberus pilosus* Mendes & Andersen, 2008 (Diptera: Chironomidae) en Argentina y descripción de la hembra adulta

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ABSTRACT. The species *Gravatamberus pilosus* Mendes & Andersen, 2008 is recorded for the first time in Argentina. The species is known from Chile and this new record should be taken as documentation of the occurrence of *G. pilosus* in the Eastern side of the Andes. As adult males showed differences from the original description, a description of the Argentine specimens is provided to describe their intraspecific variation. Female adults belonging to the genus *Gravatamberus* were collected in the same locality and are interpreted as the female of *G. pilosus*. Therefore, a detailed description of the female for the genus is provided for the first time.

Keywords: Argentina, Chironomidae, mallin, new record, Orthoclaadiinae, Subantarctic biogeographical province.

RESUMEN. La especie *Gravatamberus pilosus* Mendes & Andersen, 2008 se registra por primera vez en Argentina. La especie se conoce en Chile y este nuevo registro debe tomarse como documentación de la aparición de *G. pilosus* en el lado oriental de los Andes. Como los machos adultos mostraron diferencias con la descripción original, se proporciona una descripción de los ejemplares argentinos para describir su variación intraespecífica. En la misma localidad se recolectaron hembras adultas pertenecientes al género *Gravatamberus* y se interpreta como la hembra de *G. pilosus*. Por lo tanto, se proporciona por primera vez una descripción detallada de la hembra del género.

Palabras clave: Argentina, Chironomidae, mallín, nuevo registro, Orthoclaadiinae, Provincia biogeográfica Subantártica.

INTRODUCTION

The genus *Gravatamberus* was erected by Mendes & Andersen (2008). This genus is endemic to the Neotropical region and comprises five species from Chile, Brazil, Venezuela, Guatemala, Costa Rica, and Mexico. *Gravatamberus* is known from the male adult, pupae, and larvae. The type species of the genus *G. nidularium* Mendes & Andersen, 2008 inhabits the bromeliad *Nidularium innocentii* Lemaire in the Atlantic Rainforest biogeographic province. The rest of the species were collected in rainforest environments, except *G. pilosus* in boggy area and river estuary environments in Central Chile.

Specimens collected in different field trips in Argentinean Patagonia identified as *G. pilosus* showed some differences from the original description and therefore, a description of the Argentinean representatives is given. Female specimens collected in the same locality are identified as belonging to *Gravatamberus* and interpreted as the female of *G. pilosus*. Therefore, a detailed description of the female for the genus is provided for the first time.

MATERIAL AND METHODS

The specimens examined were preserved in ethanol. Microscope slides were prepared by clearing the specimens in 10% KOH; neutralize with glacial acetic acid; dehydrate in 80%, 96% and 100% ethanol and mounting in Canada balsam. Morphological terminology and measurement standards follow Sæther (1980); all measurements are in μm except when otherwise stated; measurements are given as ranges followed by the number of specimens (n) measured in parentheses. The specimens studied are deposited in the collection of the Instituto de Limnología "Dr. Raúl A. Ringuelet" (ILPLA).

RESULTS

Taxonomy

Gravatamberus pilosus Mendes et Andersen
Gravatamberus pilosus Mendes et Andersen 2008: 54.

Material examined. Argentina: 3 males; Río Negro; Parque Nacional Nahuel Huapi, Challhuaco, Mallín Los Patos, 41° 15' 48.6" S, 71° 17' 50.3" W; 20-XII-2006/03-I-2007; Malaise trap, M. F. Montes de Oca and A. Garré, col. 2 males; Parque Nacional Nahuel Huapi, Río Manso superior, 41° 14' 8.1" S, 71° 45' 58.5" W; 07-II-2007/02-III-2007; Malaise trap, M. F. Montes de Oca and A. Garré, col. 2 females; Río Negro; Parque Nacional Nahuel Huapi, Challhuaco, Mallín Los Patos, 41° 15' 48.6" S, 71° 17' 50.3" W; 20-XII-2006/23-I-2007; Malaise trap, M. F. Montes de Oca and A. Garré, col. 1 female, same data as previous except 20-XII-2006/03-I-2007.

Male (n = 5, except when otherwise stated between parentheses)

Total length 1.92–2.28 mm. Wing length 1.14–1.5 mm. Total length / wing length 1.39–1.95. Wing length / length of profemur 2.27–2.59.

Head. All the specimens with 13 flagellomeres; AR 0.63–0.84; ultimate flagellomere 252–284 long; subapical seta 30–44 (4) long. Temporal setae 7–10; including 1–2 inner verticals; 1–2 outer verticals; and 5–7 postorbitals. Clypeus with 8–14 setae. Tentorium 114–148 (4) long; 18–30 (4) wide. Stipes 92–114 long; 28–38 wide. Palp segment (1–5) lengths: 20–24 (4); 30–38 (4); 86–100 (4); 82–100 (3); 120–170 (3). Third palpomere with 2 subapical sensilla clavata in all the specimens.

Thorax. Antepnotum with 2–6 setae. Dorsocentrals 16–23; acrostichals 7–11 (4); prealars 5–8; supraalar 0–1. Scutellum with 6–9 setae.

Wing. VR 1.38–1.47. C extension 170–237 long. Brachiolum with 1–2 setae; Sc with 22–27 setae; R with 21–29 setae; R₁ with 12–17 setae; R₄₊₅ with

23–32 setae; RM with 0–2 seta; M with 1–5 seta; M₁₊₂ with 53–68 setae; M₃₊₄ with 16–34 setae; Cu with 20–31 setae; Cu1 with 12–33 setae; PCu with 32–53 setae; An with 25–34 setae. Cell m with 23–45 setae proximal to RM.

Legs. Spur of foretibia 22–36 long; spurs of midtibia 14–20 and 20–28 long; spurs of hind tibia 14–20 and 44–48 long. Width at apex of foretibia 24–30; of midtibia 26–32; of hind tibia 32–40. Comb with 8–9 setae. Lengths and proportions of legs as in Table 1.

Hypopygium. Tergite IX with 4–8 setae; laterosternite IX with 3–5 setae. Phallapodeme 54–68 long; transverse sternapodeme 62–76 long. Gonocoxite 124–150 long, inferior volsella ending at 0.19–0.26. Gonostylus 70–72 long; megaseta 6–10 long. HR 1.77–2.14; HV 2.74–3.26.

Female imago (n = 3, except when otherwise stated between parentheses)

Total length 1.56–2.02 mm, Wing length 1.46–

1.64 (2) mm; width 0.58–0.75 mm. Total length/wing length 1.18–1.38 (2). Wing length/length of profemur 2.52–2.78 (2).

Head. AR 0.22–0.24 (2). Antennae shown in Figure 1a. Length of flagellomeres (I–V): 80–94 (2); 64–74 (2); 66 (2); 54–60 (2); 64 (2). Temporal setae 7–8 (2); including 1–2 (2) inner verticals; 2 (2) outer verticals; and 4 (2) postorbitals. Clypeus with 14–15 setae. Tentorium 110–112 (2) long; 24–30 (2) wide; stipes 126 (1) long, 30 (1) wide. Palp segments (1–5) lengths: 22–26; 34; 86–106; 82–92 (2); 136 (1).

Thorax. Anteprenotum with 3 (1) lateral setae. Dorsocentrals 21–28 (2); acrostichals 8–9 (2); prealars 6. Scutellum with 7–10.

Wing (Figure 1b). VR 1.4–1.46 (2). Brachiolum with 2 (2) setae. C extension 252 (2). Sc with 21–24 (2) setae; R with 21–30 (2) setae; R₁ with 17–20 (2) setae; R₄₊₅ with 31–47 (2) setae; RM with 0–3 (2) seta; M with 2–3 (2) seta; M₁₊₂ with 62 (1) setae; M₃₊₄ with 27–37 (2) setae; Cu with

Table 1. Lengths (in µm) and proportions of legs of *Gravatamberus pilosus* Mendes & Andersen, 2008 (male, n = 5, except when otherwise stated between parentheses). 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.

Tabla 1. Longitudes (en µm) y proporciones de las patas de *Gravatamberus pilosus* Mendes & Andersen, 2008 (macho, n = 5, excepto cuando se aclara entre paréntesis). Abreviaturas: Fémur (fe); Tibia (ti); Tarsómeros 1–5 (ta1–5); Leg Ratio (LR), proporción entre metatarso y tibia; «*Beinverhältnisse*» (BV), longitud combinada de fémur, tibia y basitarsus dividida por la longitud combinada de los tarsómeros 2 a 5; «*Schenkel-Scheine-verhältnis*» (SV), relación entre fémur más tibia y metatarso.

	fe	Ti	ta ₁	ta ₂	ta ₃
P ₁	473–584	544–679	371–402 (2)	245 (2)	174–181 (2)
P ₂	466–568 (4)	466–568 (4)	245–260 (3)	134–142 (3)	103 (3)
P ₃	497–623 (4)	529–671	316–371 (4)	181–213 (4)	158–174 (4)
	ta ₄	ta ₅	LR	BV	SV
P ₁	110–118 (2)	71 (2)	0.59 (2)	2.58–2.71 (2)	3.14–3.17 (2)
P ₂	71–79 (3)	55–63 (3)	0.44–0.52 (3)	3.33–3.59 (3)	3.76–4.50 (3)
P ₃	79–103 (4)	63–79 (4)	0.55–0.61 (4)	2.79–2.93 (4)	3.16–3.49 (4)

16–19 (2) setae; Cu1 with 14–20 (2) setae; PCu with 38–44 (2) setae; An with 25–30 (2) setae. Cell m with 34–49 (2) setae proximal to RM.

Legs. Spur of front tibia 26–30 long; spurs of middle tibia: 18–22 and 28–30; of hind tibia: 22 and 44–48. Width at apex of front tibia 24–32; of middle tibia 30–36; of hind tibia 38–44. Comb with 8–10 setae. Lengths (in μm) and proportions of legs in Table 2.

Genitalia (Figures 1c–f). Gonocoxapodeme slightly curved, ending on the base of gonapophysis VIII. Gonapophysis VIII divided with large and rounded ventrolateral lobe (Figure 1d); dorsomesal lobe large with microtrichia (Figure 1e). Apodeme lobe large and distinct, partly sclerotized (Figure 1f). Gonocoxite IX rounded at end with 9–12 strong setae and 3–4 small setae. Coxosternapodeme curved. Tergite IX divided into two setigerous protrusions with 5–8 and 5–9 setae each one. Sternite VIII with 23–24 setae. Cercus 48–64 long. Seminal capsule 72–82. Notum 70–80 long. Segment X normal. Postgenital plate weak, indistinct, bluntly triangular. Labia bare, not sclerotized. Spermathecal ducts not observable.

Remarks. According to the preliminary key to the females of Orthoclaadiinae in Sæther (1977) the species will key to couplet 30, if the characters long acrostichals starting near antepnotum

and squama with setae are ignored, then will key to couplet 32 with *Parametriocnemus* Goetghebuer, 1932 by sharing the R_{4+5} ending above M_{3+4} . The female of *Gravatamberus* shares with *Parametriocnemus* the large ventrolateral lobe of Gp VIII; TIX divided into 2 setigerous protrusions; segment X well developed; and seminal capsules ovoid, without distinct neck.

Mendes & Andersen (2008) conducted a phylogenetic analysis using parsimony with successive weighting to assess the phylogenetic relationships of *Antillocladius*, *Gravatamberus*, and *Litocladius*. In the strict consensus of the shortest tree obtained by the authors, *Gravatamberus* was the sister group of *Phytotelmatocladus* (in Mendes & Andersen analysis as “Genus H *sensu* Epler”), and both the sister group of *Gynocladus*. In the strict consensus tree after reweighting, *Gravatamberus* was the sister group of the clade *Gynocladus* - *Phytotelmatocladus*. The clade *Gravatamberus* - *Gynocladus* - *Phytotelmatocladus* was supported by the characters dorsocentrals uniserial posterior, setae in cells in male present in cells r_{4+5} and m_{1+2} (this character reverted to the plesiomorphic condition since *Phytotelmatocladus* possess the wing membrane bare) anal veins An_1 extending well beyond cubital fork and An_2 conspicuous. The characters supporting this clade are not strict synapomorphies

Table 2. Lengths (in μm) and proportions of legs of *Gravatamberus pilosus* Mendes & Andersen, 2008 (female, n = 3, except when otherwise stated between parentheses). Abbreviations as in Table 1.

Tabla 2. Longitudes (en μm) y proporciones de las patas de *Gravatamberus pilosus* Mendes & Andersen, 2008 (hembra, n = 3, excepto cuando se aclara entre paréntesis). Abreviaturas como en la Tabla 1.

	fe	ti	ta ₁	ta ₂	ta ₃
P ₁	473–592	521–671	323–395	166–237	142–166
P ₂	466–537 (2)	473–600	221–276	118–150	79–103
P ₃	497–631	544–686	363–371 (2)	174–213 (2)	150–174 (2)
	ta ₄	ta ₅	LR	BV	SV
P ₁	79–103	63	0.56–0.62	2.92–3.28	3.07–3.44
P ₂	63	55	46–0.47	3.68–3.82 (2)	4.25–4.25 (2)
P ₃	87–95 (2)	63 (2)	0.54–0.58 (2)	3.10–3.33 (2)	3.35–3.55 (2)

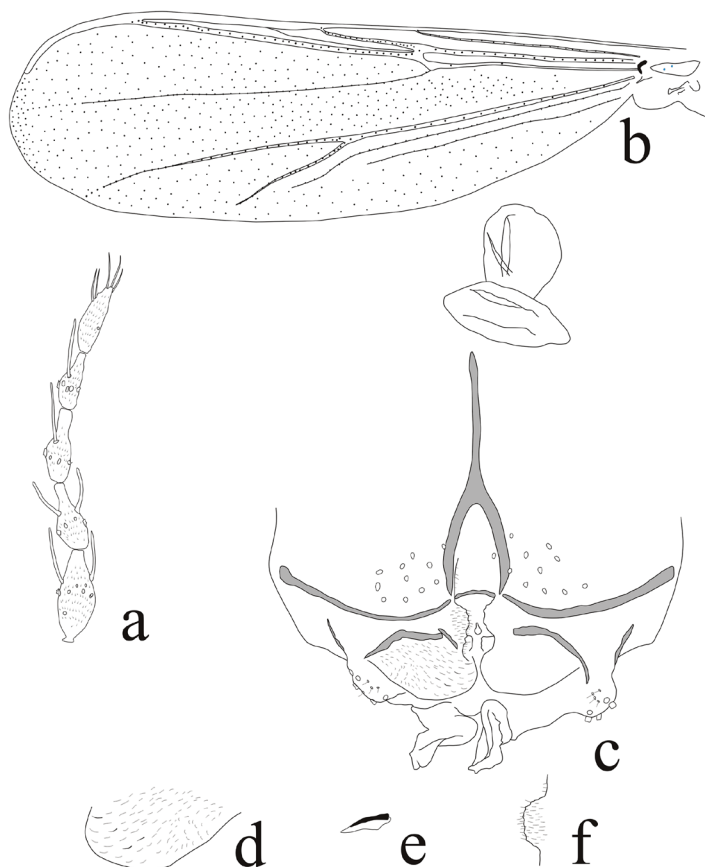


Figure 1. *Gravatamberus pilosus* Mendes & Andersen, 2008. Male. a, Antennae. b, Wing. c, Female genitalia. d, Ventrolateral lobe. e, Apodeme lobe. f, Dorsomesal lobe.

Figura 1. *Gravatamberus pilosus* Mendes & Andersen, 2008. Macho. a, Antena. b, Ala. c, Genitalia femenina. d, Lóbulo ventrolateral. e, Lóbulo apodemal. f, Lóbulo dorsomedial.

and are very extended and highly variable in the chironomid morphology. Therefore, these phylogenetic relationships should be interpreted with caution, and considering that *Gynocladius* and *Phytotelmatocladius* are known as females and parthenogenetic. However, the description of the female *Gravatamberus pilosus* allows to improve the data matrix of Mendes & Andersen (2008) by completing the female characters for the genus. A new analysis was carried out in TNT, version 1.1 (Goloboff *et al.*, 2008) using the same search parameters of Mendes & Andersen (2008). As a result, the genus *Phytotelmatocladius* was excluded

from the clade and *Gynocladius* was the sister group of *Gravatamberus* sharing the characters gonocoxapodeme short and straight or evenly curved and ending at base of gonapophysis, gonocoxite IX moderately developed to reduced, gonocoxite IX with some long and some short setae, apodeme lobe well developed, but not meeting at midline and with microtrichia, and seminal capsules spherical to ovoid, small or of normal size. Both genera differ by the presence in *Gynocladius* of the tergite IX undivided, gonapophysis divided with ventrolateral lobe much smaller and more or less brush-like, and seminal capsules at least partly colored, instead

of *Gravatamberus* with tergite IX divided into two setigerous protrusions, gonapophysis with lobes of about same size, and seminal capsules completely pale.

As was mentioned above, the species *G. pilosus* was collected in boggy area and river estuary environments in Central Chile. The new records occur in the Subantarctic biogeographical province (Cabrera & Willink, 1973; Morrone, 2001). This area consists of valleys and mountains with a temperate and humid climate. The dominant vegetation is the *Nothofagus* forest. Some of the specimens were collected in mallin environment, a particular kind of wetland found inside the forest, distinctly differentiated from the surrounding areas by their highly organic-rich soil, in basins with high water content, with high net primary production and with a characteristic flora. The record of *G. pilosus* added a new species to the chironomid checklist from Nahuel Huapi National Park (NHNP) (Donato *et al.*, 2008) and is another species found in both sides of the Andes that represent approximately 36.72 % of the species of Chironomidae found in NHNP (Donato *et al.*, 2009).

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CRedit Contribution Statement

M.D.: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing

– original draft, Writing – review & editing.
A.S.: Conceptualization, Investigation, Writing – original draft, Writing – review & editing.

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