

FIRST DESCRIPTION OF THE MALE OF THE PREDACEOUS MIDGE GENUS *NOTIOHELEA* GROGAN AND WIRTH (DIPTERA: CERATOPOGONIDAE)¹

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ABSTRACT: The male of *Notiohelea pilosa* Spinelli and Grogan is described and illustrated from specimens collected in association with females in the Valdivian rain forests of Nahuel Huapi National Park, in Argentinean Patagonia and from specimens collected in nearby Chile. The male of *N. pilosa* is readily distinguished from those of *Macrurohelea* species by the presence of palisade setae on tarsomeres 1-3 of the hindleg.

KEY WORDS: Diptera, Ceratopogonidae, *Notiohelea pilosa*, male, *Macrurohelea*, Argentina, Chile, Patagonia, predaceous midge

RESUMEN. Se describe e ilustra el macho de *Notiohelea pilosa* Spinelli and Grogan sobre la base de ejemplares capturados asociados con hembras en la selva Valdiviana del Parque Nacional Nahuel Huapi, en la Patagonia argentina, y sobre machos capturados en sitios cercanos de Chile. El macho de *N. pilosa* se distingue de machos de *Macrurohelea* por las setas empalizadas presentes en los tarsómeros 1-3 de la pata posterior.

PALABRAS CLAVE: Diptera, Ceratopogonidae, *Notiohelea pilosa*, macho, *Macrurohelea*, Argentina, Chile, Patagonia, polvorin depredador.

The predaceous midge genus *Notiohelea* was described by Grogan and Wirth (1979), and it is presently known only from females of two extant species from the temperate *Nothofagus* forests of southern Argentina and Chile (Borkent and Spinelli, 2007). The two included species are *N. chilensis* Grogan and Wirth and *N. pilosa* Spinelli and Grogan.

As a result of an extensive collecting program undertaken during the spring-summer of 2006-2007 in Nahuel Huapi National Park, Argentina, males and females of *N. pilosa* were collected together in Puerto Blest, near the border with Chile. We subsequently became aware of some additional male and female specimens from Chile housed in the CNC. The purpose of this paper is to describe for the first time the male of a species of *Notiohelea* and compare *Notiohelea* with the similar genus *Macrurohelea* Ingram and Macfie.

METHODS

All specimens were slide mounted in Canada balsam and examined and measured with a binocular compound microscope and illustrations prepared with an attached camera lucida. The photomicrographs were taken with a Nikon Coolpix 3.100 digital camera through a binocular stereoscope or a Nikon CoolPix 995 through a Zeiss Jenaval compound microscope. Terms of structures follow those

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used in the Manual of Nearctic Diptera (McAlpine et al., 1981) with terms for wing veins as modified by Szadziewski (1996). The antennal (AR), palpal (PR) and proboscis/head (P/H) ratios are described by Blanton and Wirth (1979). Specimens examined are deposited, as noted, in the collections of the Museo de La Plata, Argentina (MLP), the Natural History Museum, London, England (NHM) or the Canadian National Collection, Ottawa, Canada (CNCI).

SYSTEMATIC ENTOMOLOGY

- *Notiohelea pilosa* Spinelli and Grogan
(Figs. 1-11)

Notiohelea pilosa Spinelli and Grogan, 1990: 133 (female; Argentina); Borkent and Wirth 1997: 103 (in World catalogue); Borkent and Spinelli, 2000: 50 (in New World catalogue south of USA); Borkent and Spinelli, 2007: 83 (in Neotropical synopsis).

Male. Head (Fig. 1) dark brown. Eyes separated by diameter of 3-4 ommatidia, with interommatidial spicules. Antennal flagellomeres (Figs. 1, 8) 1-10 medium brown, flagellomeres 11-13 dark brown, plume well-developed, all flagellomeres separate, 1-10 short, 11-13 elongate; AR 0.98-1.22 (1.09, n = 6); flagellomere 1 with 6 or more sensilla coeloconica. Palpus (Fig. 9) brown, with five segments; third segment slender, moderately elongate, with large apical sensory pit opening near apex; PR 2.09-2.89 (2.44, n = 7); P/H ratio 0.33-0.42 (0.37, n = 4).

Thorax (Fig. 2) dark brown, humeral areas slightly paler. Scutum with numerous elongate setae; scutellum with 6-9 setae. Pleura without setae. Legs uniformly dark brown; hindtibial spur moderately elongate; hindtibial comb with 4 spines, 2 nearest spur longest; tarsomeres 1-2 of foreleg (Fig. 3), 1-3 of hindleg (Fig. 4) with dense palisade setae; prothoracic TR 1.91-2.16 (2.06, n = 7), mesothoracic TR 1.94-2.00 (1.96, n = 4), metathoracic TR 1.75-1.96 (1.88, n = 6); claws equal, small, slender, nearly straight, bifid at tip. Wing (Fig. 5) length 1.03-1.16 mm (1.09, n = 4); width 0.38-0.40 mm (0.39, n = 7) mm; CR 0.69-0.71 (0.70, n = 7); membrane slightly infuscated; second radial cell 2.12-3.37 (2.76, n = 7) times longer than first; base of M_2 absent or barely discernible; base of cubital fork slightly distad to base of r-m crossvein; macrotrichia on costa, R_1 , R_3 . Halter dark brown.

Abdomen. Tergites uniformly brown. Genitalia (Figs. 6-7, 10): tergite 9 broad, extending to or just anterior to level of apex of gonocoxite; posterior margin broad, nearly straight with very shallow posteromedian notch; apicolateral process short, with 1-2 slender setae; sternite 9 with anterior margin convex, 0.25 length of breadth, with narrow, shallow posteromedian excavation. Gonocoxite stout, slightly longer than greatest (basal) width, with conspicuous anteromesal process; gonostylus slender, slightly broader at base, 1.2 times longer than gonocoxite, nearly straight, apex slightly bulbous. Parameres (Fig. 11) separate, heavily sclerotized, each with slender, recurved base, proximal 0.7 of main portion

broad, then abruptly narrowed to pointed tip directed posteromesally (tip of one paramere broken in the illustrated specimen). Aedeagus triangular; basal arch extending 0.5 of total length; lateral arms heavily sclerotized proximally; distal portion broad, very apex either slightly bifid with each tip curved ventrally or undivided and single tip curved ventrally; cercus elongate, setose.

Distribution and Bionomics. *Notiohelea pilosa* is known from the Valdivian forests of Chile (Valdivia, Llanquihue, Chiloé provinces) and Argentina (Neuquen, Río Negro and Chubut provinces) (Fig. 12).

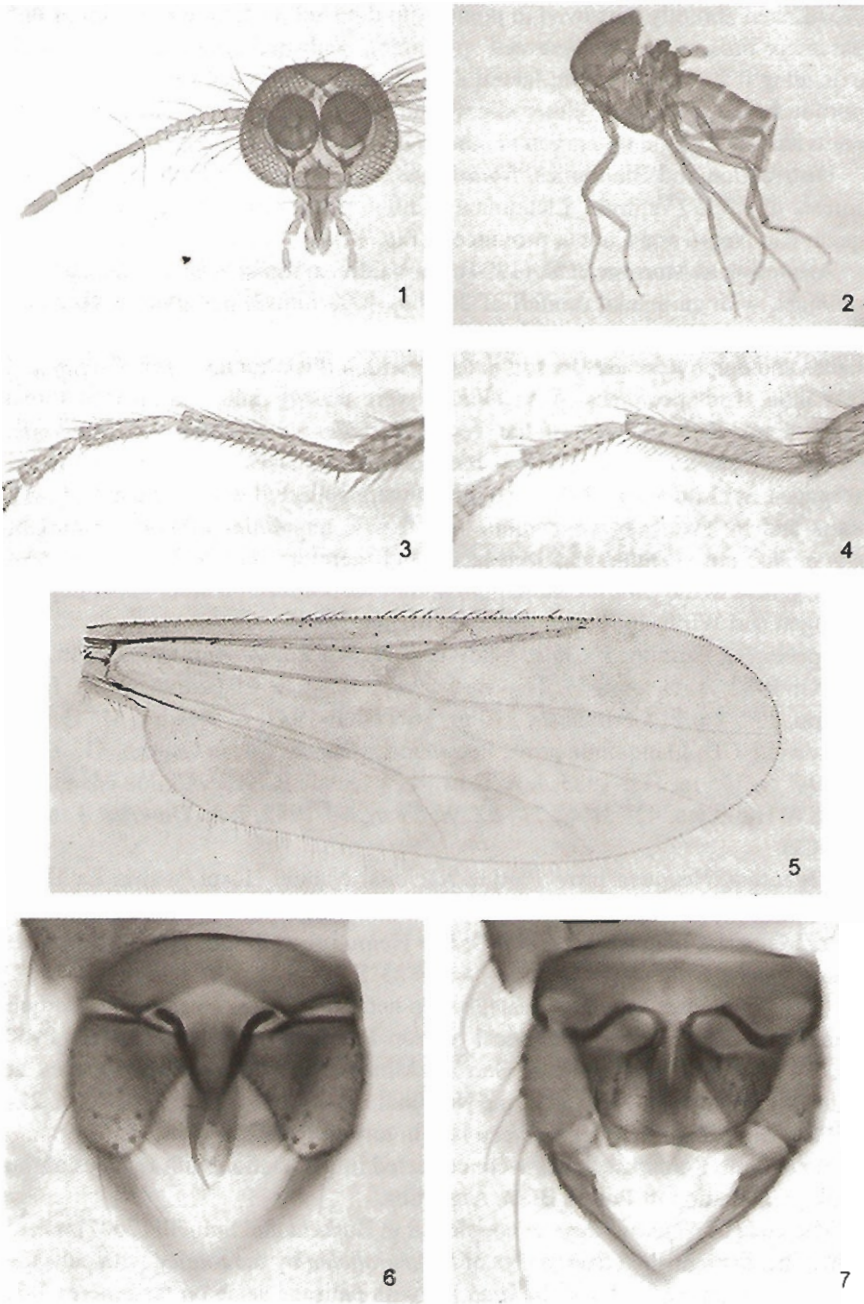
According to Morrone et al. (1994), the Valdivian forest is a very humid environment, with an annual rainfall of 2000 to 4000 mm. It possesses a very rich biota that inhabit a variety of habitats. Tree trunks are covered with creepers, lianas and epiphytes, and the soil is damp with a thick humus layer of abundant leaf litter. The specimens of *Notiohelea* were mainly collected in open forest areas dominated by trees of the genus *Nothofagus*: "coihue" (*N. dombeyi*), "lenga" (*N. pumilio*) and "ñire" (*N. antarctica*), near lakes or streams with many seepages, at altitudes of 59-887 m. Adults were collected with Malaise and light traps and by sweeping vegetation. The female mandibles of both species of *Notiohelea* are vestigial and lack teeth, and therefore, unlike females in most other genera in the tribe Ceratopogonini, they do not feed on other small Diptera (Grogan and Wirth, 1979; Spinelli and Grogan, 1990).

Specimens Examined. Chile, Valdivia prov., 4.1 km W. Anticura, 270 m, 19-25-XII-1982, A. Newton-M. Thayer, 1 female (CNCI); Llanquihue prov., Lago Chapo, 13.5 km E. Correntoso, 310 m, 16-27-XII-1982, A. Newton-M. Thayer, 1 male (CNCI); Llanquihue prov., Petrohué-Ensenada-Volcan Osorno, 41° 11' S, 72° 30' W, 195 m, 11-I-1985, J. A. Downes, 1 female (CNCI); Chiloé Island, 3.3 km SW Huillinco, 42° 39' S, 73° 52' W, 59 m, 4-I-1985, J. A. Downes, 3 males (CNCI).

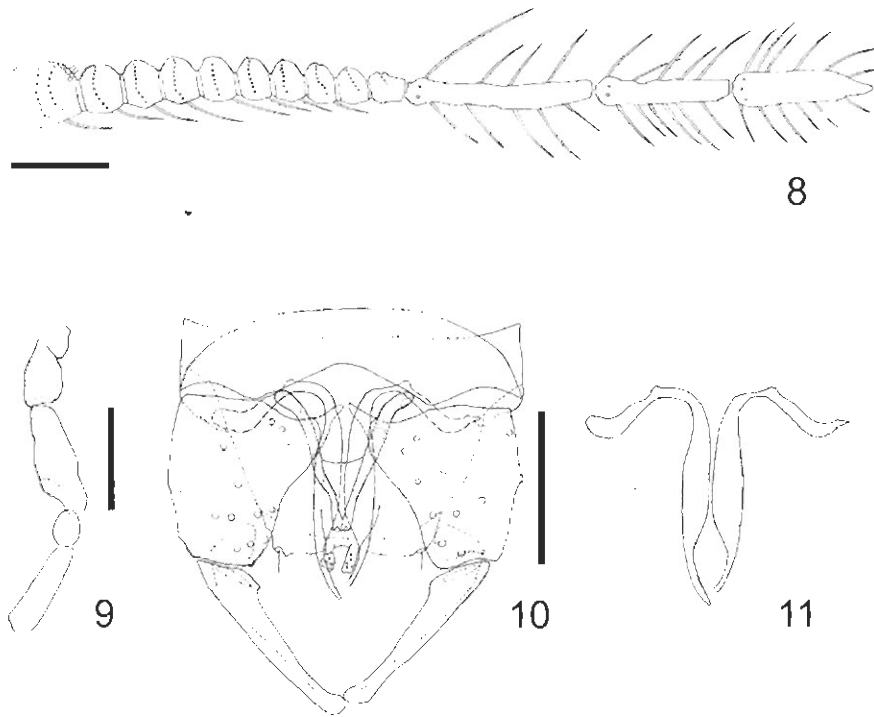
Argentina, Neuquen prov. Parque Nacional Nahuel Huapi, mallín La Helder, 41°00'56"S 71°49'45.4"W, 878 m, 7-I/4-II-2007, A. Garré-F. Montes de Oca, 3 females, Malaise trap (NHM); Río Negro prov., Parque Nacional Nahuel Huapi, Puerto Blest, Lago Cántaros, 41°00'23"S 71°49'18.4"W, 887 m, 7-I-2007, A. Garré-F. Montes de Oca, 1 male, sweep net (NHM); Río Negro prov., Parque Nacional Nahuel Huapi, Biological Station Puerto Blest, 41°01'34.4"S 71°48'55.7"W, 791 m, 6-13-I-2007, A. Garré-F. Montes de Oca, 3 males, 2 females, at light (MLPA); Chubut prov., Parque Nacional Los Alces, El Alerzal, 540 m, 22-I-1988, G. Spinelli, 1 female, sweep net (holotype, MLPA).

Taxonomic Remarks. Males were collected in association with females at the Biological Station of Puerto Blest, Argentina.

The male of *N. pilosa* keys to couplet 38 in Borkent and Spinelli (2007) where it may be distinguished from males of *Macruwohelea* by the foreleg with palisade setae on tarsomeres 1-2 and the hind leg with palisade setae on tarsomeres 1-3; palisade setae are present on only tarsomere 1 of the fore- and hind leg in *Macruwohelea*.



Figs. 1-7: *Notiohelea pilosa*, male. 1. Head, in anterior view; 2. Thorax, in lateral view; 3. Foreleg tarsomeres 1-3; 4. Hind leg tarsomeres 1-3; 5. Wing; 6. Genitalia, in ventral view; 7. Genitalia in dorsal view.



Figs. 8-11: *Notiohelea pilosa*, male. 8. Flagellum; 9. Palpus; 10. Genitalia, in ventral view; 11. Parameres. Scale bars: 0.05 mm.

Other minor differences between males of these genera are the presence of macrotrichiae on veins R_1 and R_3 in *Notiohelea*, which are absent in *Macrurohelea*. In addition, the gonostylus is nearly straight in *Notiohelea* but deeply to slightly curved in *Macrurohelea* (abruptly bent subapically, forming an angle of 90° in one species).

A female specimen of *Notiohelea* from Fundo San Martín, Valdivia Province, Chile ($39^\circ 38' S$, $73^\circ 11' W$), collected 17-XII-1984, J. A. Downes (CNCI) is very similar to females of *N. chilensis*, but has abundant interommatidial spicules. It may represent an undescribed species, but direct comparison with the holotype of *N. chilensis* is necessary to determine this.

Macrurohelea is a Transantarctic genus with 12 species occurring in the Neotropical Region and another three in Australia, from which the males of 11 species are known. In addition, we have seen two undescribed species from western Australia (Borkent, pers. obs.) and four more from South America. The general features of the male genitalia of both genera are also very similar, especial-

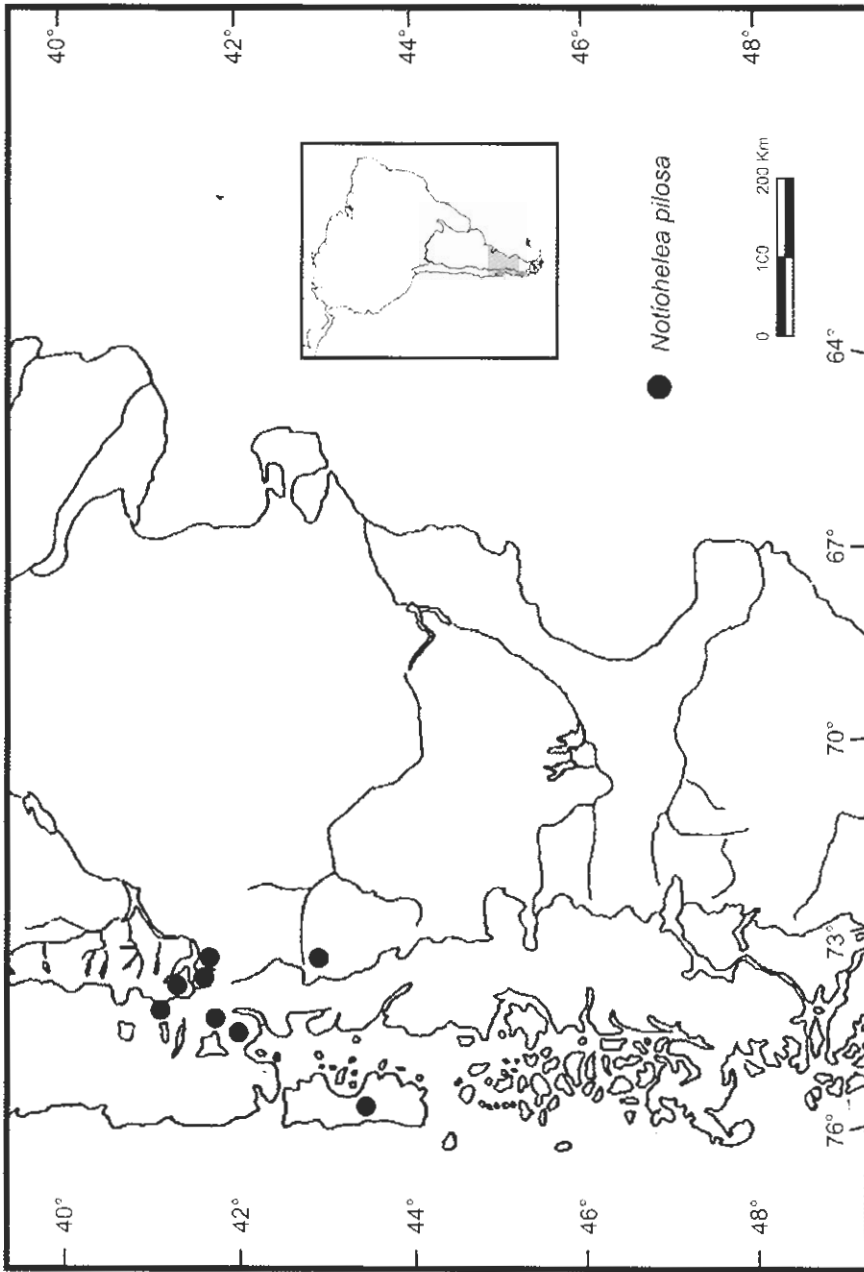


Fig. 12. Distribution of *Notiochelea pilosa* in southern Argentina and Chile.

ly the presence of short apicolateral processes with 1-2 slender setae, stout gonocoxite with conspicuous anteromesal process, separate parameres, and triangular aedeagus. However, in all known males of *Macrurohelea* the tergite 9 is narrower distally and the distal portions of their parameres are divergent or subparallel, not directed posteromesally as they are in *Notiohelea*. Apart from the presence or absence of palisade setae on the hindleg tarsomeres 2-3, females of both genera are easily distinguished on the basis of the tenth segment which is normally developed in *Notiohelea* and greatly elongate and bent anteroventrally in *Macrurohelea*.

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