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Second species of *Augochlorodes* (Hymenoptera: Halictidae: Augochlorini) with known males and first record for the genus in Argentina

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Abstract

The bee genus *Augochlorodes* Moure, up to now only known from Brazil, is recorded for the first time for Argentina. *Augochlorodes politus* Gonçalves & Melo was found in the south of the province of Buenos Aires, mideastern Argentina, being the southernmost record for the genus. The female of *A. politus* is redescribed and the male described for the first time, being the second male known for this genus. The phylogenetic position of *Augochlorodes* among Augochlorini is briefly discussed.

Key words: Province of Buenos Aires, South America, sweat bees, taxonomy

Introduction

Augochlorodes Moure are small, bright-green bees of the tribe Augochlorini. The genus was described by Moure (1958) based on the single species *Augochlorodes turrifaciens* Moure. Recently, five species were added to the genus: *A. clementis* Gonçalves & Melo, *A. incomitatus* Gonçalves & Melo, *A. politus* Gonçalves & Melo, *A. rostratus* Gonçalves & Melo and *A. vachali* Gonçalves & Melo (Gonçalves & Melo 2008). Both sexes are known for *A. turrifaciens*, but only female specimens are known for all other described species.

Species of *Augochlorodes* resemble small *Augochlorella* Sandhouse and *Augochlora* Smith in appearance, although they can be differentiated by the noncarinate preoccipital ridge, the obtusely angled paraocular lobe, and the pectinate inner hind tibial spur of the female (Eickwort 1969; Engel 2000; Michener 2007). Nests were described for *A. turrifaciens* by Michener and Seabra (1959); they consist in short burrows in the soil, terminating in clusters of cells. This species was classified as having solitary and semisocial behavior by Danforth & Eickwort (1997), and it is the only one for which there is information about its biology.

Augochlorodes is known to occur from Minas Gerais to Rio Grande do Sul, Brazil, on the border with Uruguay (Michener 2007; Gonçalves & Melo 2008). One male and two females of *A. politus* from the province of Buenos Aires, Argentina, were recently added to the Entomology Collection of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”. A fourth female specimen of the collection was identified as belonging to the same species. These specimens agree with *Augochlorodes* in the key to halictine genera of Michener (2007), and with previous diagnoses for the genus (Moure 1958; Eickwort 1969; Engel 2000, Gonçalves & Melo 2008). The aims of this contribution are to redescribe the female and describe the male of *A. politus*, reporting the southernmost record for the genus, and to discuss the phylogenetic position of *Augochlorodes* among Augochlorini.

Material and methods

Higher-level classification of Halictidae and terminology for structures follow Michener (2007), except that *metapostnotum* is used instead of *basal area of propodeum* (Brothers 1976). Terminology for surface sculpture follows Harris (1979). The abbreviation MOD stands for median ocellar diameter, and it is used to give a relative

equivalent to those of Brazil. This pattern of distribution with species in the temperate areas of Buenos Aires and the mountain ranges of the southeast of Brazil, is observed in other halictids, such as in the genus *Halictillus* Moure (González-Vaquero 2010), *Ruizantheda divaricata* Vachal (González-Vaquero & Roig-Alsina 2009) and *Pseudagapostemon hurdi* Cure (Cure 1989).

Phylogenetical position. The genus *Augochlorodes* does not belong to any of the genus-group clades that have been consistently recognized within the Augochlorini. The phylogenetic analyses of Danforth & Eickwort (1997) and Engel (2000) show different relationships for *Augochlorodes*, and Gonçalves & Melo (2008) qualified its relationships as uncertain. In the cladograms presented by Danforth & Eickwort (1997) *Augochlorodes* is a rather basal line in the phylogeny, branching after the basalmost *Corynura* Spinola and *Rhinocorynura* Schrottky groups, *Neocorynura* Schrottky, and *Thectochlora*, switching positions with *Paroxystoglossa* Moure depending on the cladograms, followed by the remaining genera of Augochlorini. In the consensus tree presented by Engel (2000) *Augochlorodes* belongs in a major clade, Engel's Augochloromorpha, basal to the *Augochlora* Smith and *Pseudaugochlora* Michener + *Megaloptidia* Cockerell groups. Engel (2000) placed *Augochlorodes* in a monotypic genus-group and listed four putative characters as synapomorphies for the genus. These four characters are homoplasious in his analysis and, interestingly, are all shared with *Augochloropsis*, as discussed below.

Eickwort (1969) pointed out the striking similarities of the male sterna and genitalia of *Augochlorodes turrifaciens* to species of *Augochloropsis*. These similarities also hold for *A. politus*, and are even more striking. The S4 has the gradulus and the antecosta meeting medially, the posterior margin has a median projection, and the lateral apical corners are produced bearing modified setae (Fig. 5). The S6 has a medially notched apex. The S7 has a truncate, setose median projection (Fig. 8). The S8 has a broad spiculum, and is weakly produced posteriorly into a bilobed median projection (Fig. 7). The ventral prong of the penis valve is rudimentary, and the inner apical angle of the volsella is digitiform (Fig. 6), although not as long as in species of *Augochloropsis*.

For two of the features just mentioned, our observations on *A. politus* are in disagreement with Eickwort's (1969) account on *Augochlorodes*. The apical margin of S4 is depicted as medially straight for *A. turrifaciens*, although Moure (1958) states that S4 is similar to S3, which is described as medially projected in this species. In *A. politus* both S3 and S4 have a median projection, rounded on S3 and pointed on S4. The apical median projection of S8, although weakly produced, is bilobed in *A. politus*, much as in several species of *Augochloropsis*. For *A. turrifaciens*, Eickwort (1969) describes and illustrates this sternum as apically straight and not produced posteriorly.

The matrix modified from Engel (2000) gives a consensus tree with the same topology to the one obtained in that study. Even though the position of *Augochlorodes* does not change, the remarkable similarities of the male structures of *Augochlorodes* and *Augochloropsis* remain as a challenge for future analyses, which might recover them as true synapomorphies of the two genera.

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References

- Brothers, D.J. (1976) Modifications of the metapostnotum and the origin of the 'propodeal triangle' in Hymenoptera Aculeata. *Systematic Entomology*, 1, 177–182.
<http://dx.doi.org/10.1111/j.1365-3113.1976.tb00036.x>
- Cure, J.R. (1989) Revisão de *Pseudagapostemon* Schrottky e descrição de *Oragapostemon*, gen.n. (Hymenoptera Halictidae). *Revista Brasileira de Entomologia*, 33, 229–335.
- Danforth, B.N. & Eickwort, G.C. (1997) The evolution of social behavior in the augochlorine sweat bees (Hymenoptera: Halictidae) based on a phylogenetic analysis of the genera. In: Choe, J.C. & Crespi, B.J. (Eds.), *The Evolution of Social Behavior in Insects and Arachnids*. Cambridge University Press, Cambridge, pp. 270–292.

- Eickwort, G.C. (1969) A comparative morphological study and generic revision of the augochlorine bees (Hymenoptera: Halictidae). *University of Kansas Science Bulletin*, 48, 325–524.
- Engel, M.S. (2000) Classification of the bee tribe Augochlorini (Hymenoptera: Halictidae). *Bulletin of the American Museum of Natural History*, 250, 1–89.
[http://dx.doi.org/10.1206/0003-0090\(2000\)250<0001:cotbta>2.0.co;2](http://dx.doi.org/10.1206/0003-0090(2000)250<0001:cotbta>2.0.co;2)
- Goloboff, P.A. (1993) NONA, version 1.6. Computer software and manual distributed by the author, San Miguel de Tucumán.
- Goloboff, P.A., Farris, J.S. & Nixon, K.C. (2008) TNT, a free program for phylogenetic analysis. *Cladistics*, 24, 774–786.
<http://dx.doi.org/10.1111/j.1096-0031.2008.00217.x>
- Gonçalves, R.B. & Melo, G.A.R. (2008) New species of the bee genus *Augochlorodes* Moure (Hymenoptera, Apidae s. l., Halictinae). *Journal of Natural History*, 42, 1385–1403.
<http://dx.doi.org/10.1080/00222930802105148>
- González-Vaquero, R.A. (2010) Revisión sistemática del género *Halictillus* (Hymenoptera: Halictidae: Augochlorini) en la Argentina. *Revista de la Sociedad Entomológica Argentina*, 69, 65–89.
- González-Vaquero, R.A. & Roig-Alsina, A. (2009) The bee genus *Ruizantheda* (Hymenoptera: Halictidae), its scope and description of a new species. *Zootaxa*, 2282, 62–68.
- Harris, R.A. (1979) A glossary of surface sculpturing. *Occasional Papers in Entomology*, 28, 1–31.
- Michener, C.D. (2007) *Bees of the World*. The Johns Hopkins University Press, Baltimore, Maryland, 953 pp.
- Michener, C.D. & Seabra, C.A.C. (1959) Observations on the behaviour of Brazilian halictid bees (Hymenoptera, Apoidea) VI, Tropical species. *Journal of the Kansas Entomological Society*, 39, 19–28.
- Moure, J.S. (1958) *Augochlorodes*, a new genus of Halictinae from Brazil (Hymenoptera, Apoidea). *Journal of the Kansas Entomological Society*, 31, 53–55.
- Silveira, F.A. & Cure, J.R. (1993) High-altitude bee fauna of Southeastern Brazil: Implications for biogeographic patterns (Hymenoptera: Apoidea). *Studies on Neotropical Fauna and Environment*, 28, 47–55.
<http://dx.doi.org/10.1080/01650529309360887>