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Description of two new cases of gynandromorphism in *Paratrigona* Schwarz and *Augochlora* Smith (Hymenoptera: Apidae and Halictidae)

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Abstract

Two new records of gynandromorphism in bees are described and illustrated for *Paratrigona glabella* and *Augochlora amphitrite.* The specimens show a mixture of male and female features, complete in *Augochlora* and on head and mesosoma in *Paratrigona.* Including the specimen described herein, gynandromorphs are now known for a total of three species in Meliponini bees and three species in Augochlorini bees.

Key words: Anthophila, Gynandromorph, Stingless bees, Sweat bees, Argentina

Introduction

Gynandromorphs are sexually abnormal individuals that display secondary characters of both sexes (some regions of the body are male while others are female) (Lucia & Gonzalez 2013). These specimens are interesting because they provide the possibility to recognize female and male characters, allowing matching the different sexes with reasonable certainty when unknown (Lucia *et al*. 2012). The first case of gynandromorphy in the tribe Meliponini (Apidae) was published by Schwarz (1929) based on a specimen of *Partamona testacea* (Klug) (as *P. cupira* var. *rhumbleri* (Friese)) from Peru. Recently two cases of *Melipona mondury* Smith based in specimens collected in Brazil were described by Oliveira & Andrade (2006a, 2006b). On the other hand, only two cases of Augochlorini (Halictidae) gynandromorphs were published (Wcislo *et al*. 2004; Engel & Hinojosa-Díaz 2011). In this contribution we describe two new gynandromorphs on bees: *Paratrigona glabella* Camargo & Moure, 1994 and *Augochlora amphitrite* (Schrottky, 1909). These are the first records for both genera.

Material and methods

External morphological structures were studied using a Nikon SMZ 745T stereomicroscope and photographs were taken with a Canon Power Shot® A520 digital camera attached to it. Digital images were mounted using CombineZM open source software (Hadley 2011). Terms for morphological features follow Michener (2007). The following morphological abbreviations are used: flagellar segment (F), metasomal tergum (T) and metasomal sternum (S). Voucher specimens are deposited in the entomological collection of Museo de La Plata, Argentina (MLP).

Description of gynandromorphs

Paratrigona glabella Camargo & Moure, 1994

(Figs. 1–4)

Description. Body length 4.5 mm, head length 1.56 mm, head width 1.63 mm, mesosoma width (intertegular distance)

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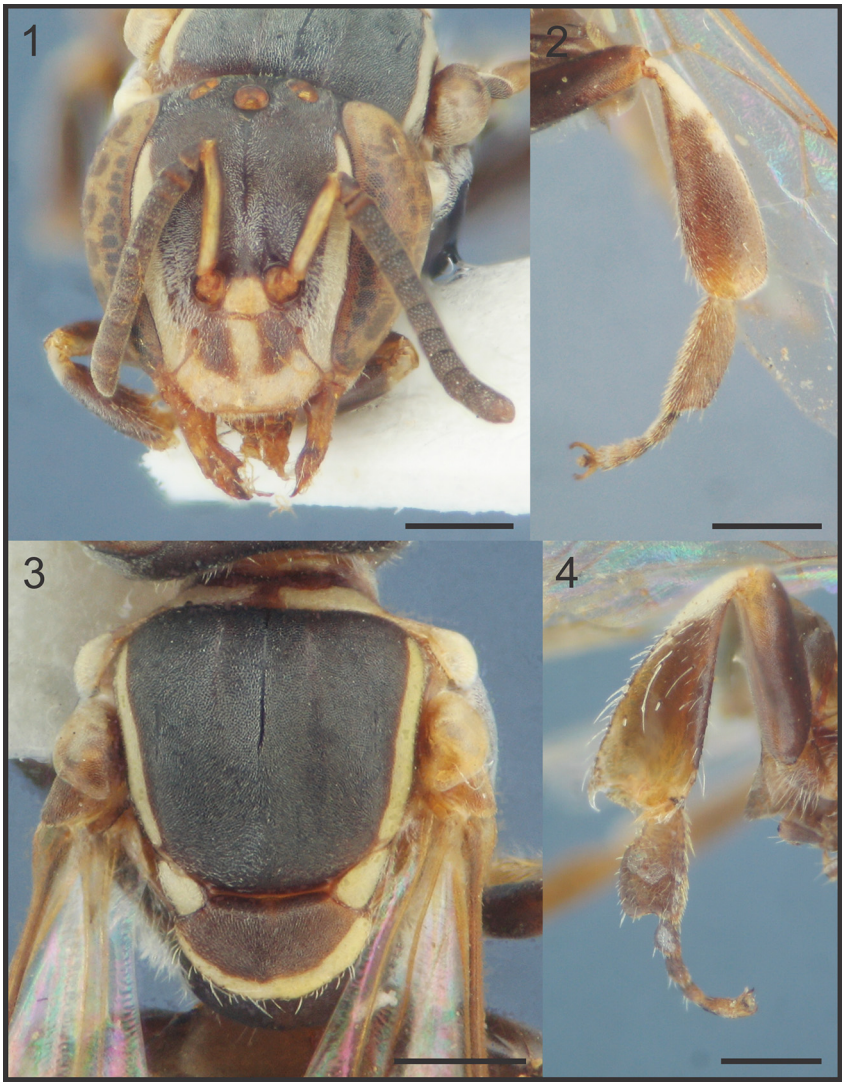
1.16 mm, metasoma width (measured across T2) 1.67 mm. Color predominantly black, with yellow maculations on head and mesosoma (Figs. 1–3), integument dull, finely and densely punctate. ***Head*** mixed (Fig. 1). *Right side*: worker-like, mandible quadridentate, antenna normally developed with ten flagellomeres and scape long and slender (0.64 mm in length, 0.1 mm in width), alveolocular distance 0.24 mm, distance between lateral and median ocellus 0.1 mm, eye (in frontal view) 5.1 times longer than broad. *Left side*: male-like, mandible edentate longer than males, antenna with eleven flagellomeres and scape thicker and shorter than workers (0.5 mm in length, 0.12 mm in width), alveolocular distance 0.2 mm, distance between lateral and median ocellus 0.08 mm, eye (in frontal view) 3.5 times longer than broad. ***Mesosoma*** mixed (Fig. 3). *Right side*: with worker features, including all right legs. Hind tibia 2.77 times longer than broad, corbicula normally developed, hind basitarsus about twice as long as broad with strongly projecting on posterodistal margin (Fig. 4). Yellow spots are intensely colored. *Left side*: with male features, including all left legs. Hind tibia 3 times longer than broad, and without corbicular depression; hind basistarsus 2.8 times longer than broad without projection on posterodistal margin (Fig. 2). Yellow spots more discolored and slender than in the worker. ***Metasoma*** symmetric, with features of workers. Genital structure developed as a normal reduced sting. ***Material examined*:** Argentina, Salta, Finca del Rey, 31–XI–1952, Coll. A. Ogloblin.



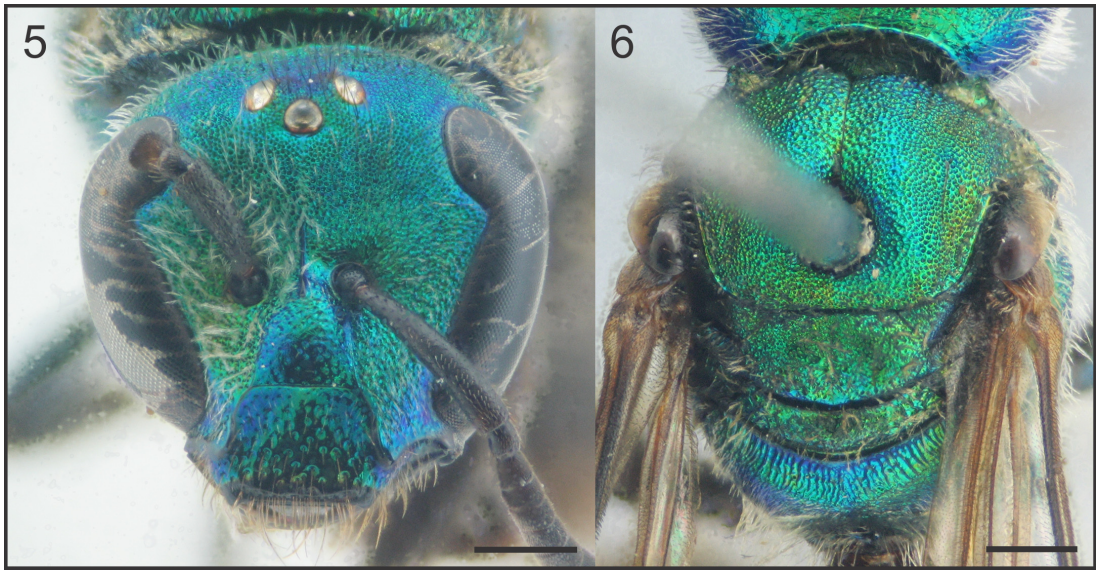
FIGURES 1–4. Gynandromorph of *P. glabella.* 1, head in frontal view; 2, tibia and basitarsus of left hind leg; 3, mesosoma in dorsal view; 4, tibia and basitarsus of right hind leg. Scale bars: 0.5 mm.

Augochlora (*Augochlora*) *amphitrite* (Schrottky, 1909)

(Figs. 5–6)

Description. Body length 8 mm, head length 2.26 mm, head width 2.3 mm, mesosoma width (intertegular distance) 1.65

mm, metasoma width (measured across T2) 2.5 mm. Color predominantly metallic green, with bluish tints. Labrum, apical strip on clypeus and antennae dark brown to black. Scutellum with median longitudinal groove. ***Head*** mixed, labrum, clypeus and supraclypeal area as a female (Fig. 5). *Right side*: male-like, mandible bidentate yellowish and shorter than females. Antenna broken (F2–11 are missing) but scape 0.38 mm in length and 0.12 mm in width as a normal male. Length of eye 1.56 mm, clypeocular distance 0.14 mm and alveolocular distance 0.26 mm. Lower paraocular area with golden reflections and densely punctate. Paraocular area, frons and scape with white, long and abundant plumose setae. *Left side*: female-like, mandible bidentate and black, antenna normally developed with ten flagellomeres, scape 0.6 mm in length, 0.12 mm in width as a normal female. Length of eye 1.66 mm, clypeocular distance 0.2 mm and alveolocular distance 0.42 mm. Lower paraocular area without golden reflections and punctures less dense than males. Paraocular area, frons and scape with white plumose setae but shorter and more scattered than males. ***Mesosoma*** mixed (Fig. 6) *Right side*: male-like including fore and middle legs, hind leg lost in part (coxa featured as a male). Length of forewing 5.5 mm. *Left side*: female-like including all legs. Hind coxa and femur with long and plumose scopal setae. Length of forewing 5.7 mm. ***Metasoma*** mixed, with six exposed terga and sterna, general appearance female-like. T1 asymmetric, with right half tending male-like, S1 with median developed tubercle as a female. Genital structure developed as a sting, corresponding to the female. ***Material examined*:** Argentina, Buenos Aires, Reserva Provincial Punta Lara (34°46'55''S, 58°00'44''W, 2 m.a.s.l), 27–XII–2012, Coll. M. Lucia, L. Alvarez, P. Ramello. The specimen was captured using yellow Moericke traps.



FIGURES 5–6. Gynandromorph of *A. amphitrite*. 5, head in frontal view; 6, mesosoma in dorsal view. Scale bars: 0.5 mm.

Discussion

Currently gynandromorphs are known from 120 species and 30 genera belonging to all families of bees. (Lucia & Gonzalez 2013; Camargo & Gonçalves 2013). The two cases described herein, increase the number of gynandromorphs to 122 species and 32 genera. Gynandromorphs have been traditionally classified in four types: bilateral (divided in left-right), antero-posterior, transverse (dorsal-ventral), and mixed (mosaics or different combinations) (Dalla Torre & Friese 1899). The specimen of *P. glabella* shows bilateral asymmetry on head and mesosoma while the metasoma is worker-like; it would correspond to a bilateral category and shares similarities with the others bilateral gynandromorphs described in stingless bees (Hinojosa-Díaz *et al*. 2012; Wcislo *et al*. 2004). The gynandromorph of *A. amphitrite* has a mix of male and female characters on the head, mesosoma and the first metasomal terga while the remaining parts of the body are female-like and can be assigned to the mixed category. Cases of gynandromorphism in Halictidae are relatively common (20 species), most of them belong to the tribe Halictini (18) and only two cases in Augochlorini (*Megalopta genalis* Meade-Waldo and *Thectochlora alaris* (Vachal)), most of them belonging to mixed category (65%) (Hinojosa-Díaz *et al*. 2012; Wcislo *et al*. 2004). Gynandromorph bees with strong sexual dimorphism and secondary sexual male features are the most common in literature; however the bees with lower degree of dimorphism (as Meliponini and

Halictidae) are less represented in literature and collections. We believe that the diversity of these groups must be greater than currently known.

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