



Descriptions of unknown sexes, new geographical records, and host associations for two South American species of *Megachile* (Hymenoptera: Megachilidae)

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Abstract

The cosmopolitan genus *Megachile* include many species described on the basis of only one sex. Sexual dimorphism is very pronounced in these taxa and therefore sexes are often difficult to associate, thus making species identification nearly impossible. The females of *M. (Chrysosarus) concava* and *M. (Pseudocentron) variplantis* are described and illustrated. Additional geographical and host records are provided as well as comments on their diagnostic features and identification based on existing keys.

Key words: Leafcutter bees, Megachilini, description, Neotropical

Introduction

Females of nesting species of the family Megachilidae are easily recognized by their long tongue and sternal metasomal scopa (Michener, 2007). This cosmopolitan family includes large numbers of genera and species (Michener, 2007). In most species, sexual dimorphism is very pronounced, making sex associations difficult and species identification usually impossible.

The phylogenetic relationships of Megachilidae were recently revised by Gonzalez *et al.* (2012). Following Michener's classification (op. cit.), the tribe Megachilini includes four genera, *Coelioxys* Latreille, *Megachile* Latreille, *Noteriades* Cockerell and *Radoszkowskiana* Popov (Gonzalez *et al.* 2012). As in many other bee groups, descriptions of many megachiline species have been based on the description of a single sex. *Megachile (Chrysosarus) concava* and *M. (Pseudocentron) variplantis* were described by Mitchell (1930) and Vachal (1909), respectively; both species based only on the males. In this paper, we describe the females of *M. concava* and *M. variplantis*, and provide new geographical records and floral hosts associations for the two species.

Material and methods

The material studied is deposited in the Facultad de Agronomía, Universidad de Buenos Aires, Argentina (FAUBA) and in the Museo de La Plata (MLP), La Plata, Buenos Aires, Argentina. The following abbreviations are used in the descriptions: S1–S8, first to eighth metasomal sterna; T1–T6, first to sixth metasomal terga. Measurements were taken using an ocular micrometer on a Leica MZ12 stereomicroscope. The scale corresponds to 0.5 mm.

***Megachile (Chrysosarus) concava* Mitchell, 1930**

(Figs. 1–4)

Megachile concava Mitchell, T. B. (1930): 242. Male. Villarrica, Paraguay.

Megachile (Chrysosarus) concava; Moure *et al.*, 2007: 955; Raw, 2007: 33; Moure *et al.*, 2012.

Description. *Female.* (Nine individuals) Total length 11–12.50 mm. Head, maximum width 4.55 mm, maximum length 3.25 mm; forewing length 9.20 mm. *Integument.* Black (Fig. 1) except: dark reddish brown flagellum and tarsus; brown on legs, ferruginous on tibial spurs 1 and pretarsal claws (dark brown apically); dark brown on tibial spurs 2 and 3. Wings yellowish-hyaline; tegula veins and stigma ferruginous. *Vestiture.* Black and dense ferruginous (Figs. 1–3); upper half of head, mesosoma, inner surfaces of tibiae and T1 ferruginous; basal half of mesosoma and legs white yellowish; clypeus, anterior area of gena and hypostomal area dark brown; legs and T2–T6 black, hind tibiae with brown tomentum; T2–T6 covered with short hairs and terga usually with complete yellow and tomentose bands (Fig. 4); T2–T5 with patch of yellow tomentum, more wide on T3–T5; scopa yellowish on S2–S4, in S3–S4 laterally black and S5–S6 with well dispersed black scopal hairs. *Punctation.* Integument of the head generally coriaceous, densely punctate; clypeus and supraclipeal area denser puncture, separated by 0.2–0.3 times a puncture diameter; central disc of supraclipeal area impunctate. Mandibles coriaceous, scarcely punctate; vertex small, punctate. Scutum, scutellum and axila with large punctures, punctures separated by 1–2 times a puncture diameter on scutellum and separated by 0.1–0.2 times a puncture diameter on scutellum and axilla. T2–T6 with smaller punctures separated by 2–6.5 times a puncture diameter, more separate medially on T3. *Structure.* Inner margin of eyes slightly concave above (Fig. 3); paraocular carina present. Proportional length of scape, pedicel and first three flagellomeres 1.00:0.22:0.22:0.26:0.28; distal flagellomere broader than long (0.46:0.22). Interantennal distance subequally to antennoclypeal distance (0.90:0.82), longer than antennocular distance (0.90:0.54), and longer than antennal insertion to median ocellus (0.90:0.60). Clypeus and supraclipeal area nearly flat; apical margin of clypeus as in figure 3; mandible with four teeth, without cutting edge; fourth mandibular tooth as in figure 3. Median ocellus located above supraorbital line; interocellar distance equal to ocellocular distance (0.64:0.64) longer than ocelloccipital distance (0.64:0.52). Gena narrower than eye (0.66:0.90), in lateral view. Scutellum rounded, not protuberant in profile. Metasoma, cordate, T6 straight in profile, dorsally rounded.

Material studied. (Nine females and ten males) ARGENTINA. Ciudad Autónoma de Buenos Aires, 1 female, 08/12/2004, D. Medan leg. (FAUBA). Formosa, 1 male, Reserva El Bagual, 19/08/2001, Torretta leg. (on *Handroanthus heptaphyllus*, Bignoniaceae); 1 male, Reserva El Bagual, 20/08/2001, Torretta leg. (on *Fridericia dichotoma*, Bignoniaceae); 1 female, Reserva El Bagual, 08/10/2002, J.P. Torretta leg. (on *Handroanthus heptaphyllus*); 8 males and 7 females, Reserva El Bagual, emerged between 08/01/2013 and 31/07/2013, J.P. Torretta leg. (reared from five nests; Torretta & Durante, unpublished information).

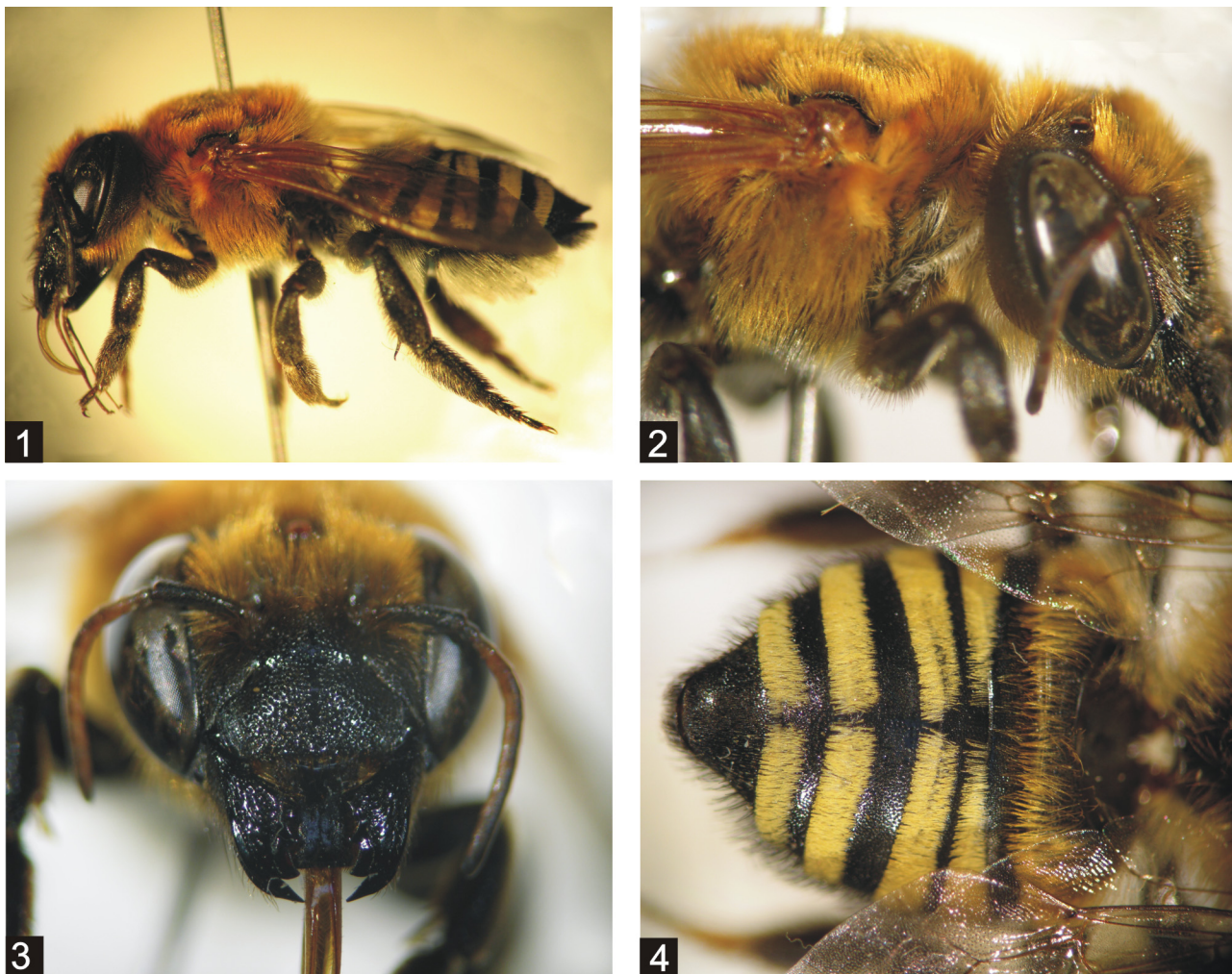
Distribution: PARAGUAY. Guairá, Villarrica. ARGENTINA. Santa Fe (Raw 2007); new records: Buenos Aires and Formosa.

Bionomic observations. Seven females and eight males were obtained from the same trap-nests (Torretta & Durante, unpublished information). Furthermore, males and females were observed hovering around and foraging on flowers of *Handroanthus heptaphyllus* and *Fridericia dichotoma* (both Bignoniaceae, Torretta *pers. obs.*). The two sexes are similar in the color of the flagellum, tibial spurs, tarsi, wing, veins and stigma, body pilosity, and the punctures of vertex.

In the key to the species of *Megachile* of Mitchell (1930), the females of *M. concava* run to couplet 94, agreeing with the characteristics indicated for the female of *M. diversa*. The key can be amended as follows:

94. Fifth sternum with a white apical fascia; terga with fasciae not more than a third the width of each segment. *M. vestis* Mitchell
- Sterna not fasciate; terga with broad fasciae, covering more than half of each segment 94'
94'. Mandible, legs and basal segment of metasoma pale ferruginous, terga with very broad fasciae, covering more than half of each segment *M. diversa* Mitchell
- Mandible, legs and basal segment of metasoma black or dark brown, terga with broad fasciae, covering half of each segment *M. concava* Mitchell

Remarks. Based on Mitchell's (1930) detailed description it is possible to recognize this species with certainty, in spite we have not seen the type specimen. *M. (C.) concava* is easily separated from other species of the subgenus by the pale pubescence of the mesonotum [in *M. (C.) guaranitica* Schrottky, *M. (C.) catamarcensis* Schrottky the pubescence is dark], by brown legs [in *M. (C.) melanopyga* Friese it is ferruginous], by the dark integument of the metasoma [in *M. (C.) rufula* Friese it is ferruginous], by the narrow tergal bands [in *M. (C.) diversa* Mitchell it is very broad, covering over half of each segment] and by the fifth sternum without apical bands [in *M. (C.) vestis* Mitchell fifth sternum have a white apical band].



FIGURES 1–4. *Megachile (Chrysosarus) concava* Mitchell. Female. 1, habitus, lateral view. 2, head and mesosoma, lateral view. 3, head, frontal view. 4, metasoma, dorsal view.

***Megachile (Pseudocentron) variplantis* Vachal, 1909**

(Figs. 5–8)

Megachile variplantis Vachal, J. (1909): 9.

Megachile (Pseudocentron) variplantis; Raw, 2002: 31; Moure *et al.*, 2007: 988; Moure *et al.*, 2012.

Description. *Female.* (Three individuals) Total length 11.50 mm. Head, maximum width 4.75 mm, maximum length 3.50 mm; forewing length 9.30 m. *Integument.* Black (Fig. 5) except: brown on flagellum, tibial spurs 2 and 3; dark reddish brown on apex of distitarsus; ferruginous on tibial spur 1 and claws (dark brown apically). Wings pale brown-hyaline; veins and stigma brown. *Vestiture.* Black and pale yellowish (Fig. 5–7); head black, paraocular areas, pronotal lobe, scutum, scutellum, axillae, metanotum and T1 with abundant pale yellowish pubescence; dark brown on lower surface of gena, lower surface of mesosoma, coxae, trochanters and femora and tomentum on hind

tibia; dark ferruginous on inner surfaces of tarsi; T1–T6 covered with black hairs (Fig. 8); T1–T2 with distal yellowish white pubescence; scopa ferruginous on S2–S5, S1 and basal surface of S2 covered with black scopal hairs; S6 with central area bare, subapical row of short black hairs, and basally dark ferruginous hairs. *Punctuation*. Integument generally coriaceous, densely punctate; clypeus and supraclypeal area more densely punctate, separated by 0.1–0.2 times a puncture diameter with central line shining and impunctate. Mandible coriaceous, scarcely punctate. Scutum, scutellum and axilla with punctures, separated by 0.1–0.2 times a puncture diameter. T2–T5 only coriaceous, T6 micro-sculptured, distal margin shining and impunctate. *Structure*. Inner margin of eyes subparallel (Fig. 7); paraocular carina present. Proportional lengths of scape, pedicel and first three flagellomeres 1.00:0.22:0.36:0.24:0.26; distal flagellomere broader than long (0.40:0.24). Inter-antennal distance longer than antenna-clypeal distance (0.84:0.46), longer than antennocular distance (0.84:0.72), and shorter than antennal insertion to median ocellus (0.84:0.92). Clypeus and supraclypeal area nearly flat; apical margin of clypeus as in fig 13; mandible with four teeth, with complete cutting edge in third interspace and incomplete cutting edge in second interspace (Fig. 15). Median ocellus located below supraorbital line; interocellar distance subequal to ocellocular distance (0.72:0.80) and longer than ocelloccipital distance (0.72:0.52). Gena subequal to eye (1.00–1.00), in lateral view. Scutellum rounded, not protuberant in profile. Metasoma, cordate. T6 straight in profile, dorsally rounded.

Type material studied. Mendoza. 1 male holotype, H. Rolle col. (MNHP).

Other material studied. (Three females and nineteen males) ARGENTINA. Buenos Aires. 1 male, Canal San Fernando, 28-X-1945 (MLP); 1 male, Tandil, 17-XI-1951, Fritz leg. (MLP); 1 male, locality data unknown, 27-III-1904, Bretes leg. (MACN). Catamarca. 1 male, La Viña, 9-XI-1942, A. Ogloblin leg. (MLP); 2 males, Valle Viejo, 17-V-1936 (MLP). Córdoba. 1 male, Río Tercero, 1-XII-1941 (MLP). La Pampa. 1 male, Victorica, 4-XI-1945, Daguerre leg. (MLP). Mendoza. 1 male, Mendoza, Reed leg. (MLP). Misiones. 1 male, Loreto, A. Ogloblin leg. (MLP). Neuquén. 1 male, Neuquén, 22-I-1945, Lloyd leg. (MLP). Río Negro. 2 males, Choele Choel, 23-XI-1946 (MLP); 1 male, El Bolsón, 15-III-1945 Lloyd col. (MLP); 1 male, Río Colorado, III-1958 (MLP). San Juan. 1 male, Villa Colón, 23-XI-1941 (MLP). Santa Cruz. 1 female and 2 males, L. Argentino, El Calafate, 25-I-2005, D. Medan leg. (on *Matricaria inodora*, Asteraceae) (FAUBA); 1 female and 1 male, L. Argentino, El Calafate, 27-I-2005, D. Medan leg. (on *Senecio filaginoides*, Asteraceae) (FAUBA); 1 female, Río Chico, L. Pueyrredón, camping El Tío, 26-I-2010, D. Medan leg. (on *Melilotus albus*, Fabaceae) (MLP). Tucumán. 1 male, Tucumán, Reed leg. (MLP).

Distribution. ARGENTINA. Mendoza, Entre Ríos and Salta (Raw, 2007; Ascher & Pickering, 2011.). New records: Buenos Aires, Catamarca, Córdoba, La Pampa, Misiones, Neuquén, Río Negro, San Juan, Santa Cruz and Tucumán.

Bionomical observations. Males and females were captured on flowers of *Matricaria inodora* and *Senecio filaginoides* (both Asteraceae). The two sexes are similar in the color of wing, veins and stigma, body pubescence, and sculpturing of scutum, scutellum and axilla.

In the key to species of *Megachile* of Mitchell (1930), the females of *M. variplantis* run to couplet 8, agreeing with the characteristics indicated for the female of *M. timida*. The key can be amended as follows:

- | | | |
|-----|---|-------------------------------|
| 8. | Dorsum of thorax entirely covered with rather dense fulvous pubescence. | 8' |
| - | Dorsum of thorax with conspicuous black pubescence. | <i>M. velhoensis</i> Mitchell |
| 8'. | Antenna, tegula, veins, wings and legs ferruginous; scopa white and black. | <i>M. timida</i> Mitchell |
| - | Antenna, tegula, veins, wings and legs black or brown; scopa ferruginous and black. | <i>M. variplantis</i> Vachal |

Remarks. *M. (P.) variplantis* is easily separated from other species by the ferruginous scopa (in *M. (P.) poeyi* Guérin [= *M. velhoensis* Mitchell] and *M. (P.) timida* it is white), by the dark ferruginous tomentum on hind tibia and the absence of tergal bands (in *M. (P.) gomphrenae* Holmberg and *M. (P.) gomphrenoides* Vachal is pale yellowish and dark brown tomentum respectively and T2-5 with complete white yellowish apical bands). Moreover, *M. variplantis* is the only species of *Megachile* (*Pseudocentron*) collected in this location with such an austral distribution (Raw, 2007; Moure et al. 2012; this work).



FIGURES 5–8. *Megachile (Pseudocentron) variplantis* Vachal. Female. 5, habitus, lateral view. 6, head and mesosoma, lateral view. 7, head, frontal view. 8, metasoma, dorsal view.

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References

- Ascher J., & Pickering, J. (2011) Bee species guide (Hymenoptera: Apoidea: Anthophila). Available from: http://www.discoverlife.org/mp/20q?guide=Apoidea_species (accessed 2 January 2013)
- Gonzalez, V.H., Grinswold, T., Praz, C.J. & Danforth, B.N. (2012) Phylogeny of the bee family Megachilidae (Hymenoptera: Apoidea) based on adult morphology. *Systematic Entomology*, 37, 261–286.
<http://dx.doi.org/10.1111/j.1365-3113.2012.00620.x>
- Michener, C.D. (2007) *The Bees of the World*. 2nd Edition. Johns Hopkins University Press, Baltimore, Maryland, 953 pp.
- Mitchell, T.B. (1930) A contribution to the knowledge of neotropical *Megachile* with descriptions of new species (Hymenoptera: Megachilidae). *Transactions of the American Entomological Society*, 56, 155–305.

- Moure, J.S., Melo, G.A.R. & DalMolin, A. (2007) Megachilini Latreille, 1802. *In*: Moure, J.S., Urban, D. & Melo, G.A.R. (Orgs.), *Catalogue of Bees (Hymenoptera, Apoidea) in the Neotropical Region*. Sociedade Brasileira de Entomologia, Curitiba, pp. 875–1003.
- Moure, J.S., Melo, G.A.R. & DalMolin, A. (2012) Megachilini Latreille, 1802. *In*: Moure, J.S., Urban, D. & Melo, G.A.R. (Orgs.), *Catalogue of Bees (Hymenoptera, Apoidea) in the Neotropical Region - online version*. Available from: <http://www.moure.cria.org.br/catalogue>. (accessed 15 November 2013)
- Raw, A. (2007) An annotated catalogue of the leafcutter and mason bees (Genus *Megachile*) of the Neotropics. *Zootaxa*, 1601, 1–127.
- Vachal, J. (1909) Espèces nouvelles ou litigieuses d'Apidae du haut Bassin du Parana et des régions contiguës et délimitation d'une nouvelle sous-famille Diphaglossinae (Hym.). *Revue d'Entomologie*, 28 (1/2), 5–64.