

**Description of the male, new geographical record, and biological notes
on the small resin bee *Hypanthidioides (Ctenanthidium) bifasciata*
(Urban, 1993) (Hymenoptera: Megachilidae)**

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Abstract. We describe and figure the previously unknown male of *Hypanthidioides (Ctenanthidium) bifasciata* (Urban, 1993) based on specimens reared from a trap nest along with a female. This species, originally known only from the type specimen collected in Colonia, Uruguay, is also newly recorded from Buenos Aires, Argentina. We provide for the first time information on the nest structure and, based on the analysis of pollen grains from brood cells, record five host plant species belonging to the families Apiaceae, Asteraceae, Brassicaceae, and Fabaceae. Most pollen grains belong to an undetermined species of the genus *Melilotus* L. (Fabaceae).

Key Words. Anthophila; Argentina; host plant; pollen; pollinator.

INTRODUCTION

The purpose of this contribution is to provide information on the taxonomy and biology of the small resin bee *Hypanthidioides (Ctenanthidium) bifasciata* (Urban, 1993), a member of a widespread, yet poorly known, Neotropical anthidiine genus. Although *Hypanthidioides* Moure, 1947 (sensu Michener 2007) includes more than 50 species grouped into 10 subgenera, most species are rarely collected, some are known only from the type material or a single sex, and their biology is largely unknown. The females of certain species in the subgenera *H. (Michanthidium)* Urban, 1995 and *H. (Larocanthidium)* Urban, 1997 have curved or hooked hairs on the labiomaxillary complex, while those of the subgenus *H. (Ctenanthidium)* Urban, 1993 possess a tuft of bristles on the apex of the labrum (Gonzalez & Griswold 2011, Parizotto & Urban 2013). Such morphological modifications suggest special adaptations to collect and manipulate pollen, as is seen in many megachilids, but behavioral observations and floral records are lacking for groups such as *H. (Ctenanthidium)* (Gonzalez et al. 2012, 2013).

Herein, we provide the first description and illustrations for the previously unknown male of *H. (Ctenanthidium) bifasciata*, record the species from Argentina, and provide information on its nesting biology and host plants. This species is one of the five

presently known in *H. (Ctenanthidium)*, a subgenus that occurs in Bolivia, Argentina, Uruguay, and Brazil (Table 1).

MATERIAL AND METHODS

Two males and one female of *H. bifasciata* were obtained from a trap nest set up in Berisso (Los Talas, 34°52'25" S, 57°50'18" W, 3 m.a.s.l), a locality in northeastern Buenos Aires Province, Argentina. Specimens were captured as part of an on-going study of the diversity of native bees in the area and are deposited at the Museo de La Plata, Buenos Aires, Argentina (MLP). External morphological structures were studied using a Nikon SMZ 750T stereomicroscope and photographs were taken with an attached Canon Power Shot® A520 digital camera. Digital images were assembled using Combine ZM Open Software (Hadley 2011). Morphological terminology used in this work is that proposed by Michener (2007) and Parizotto & Urban (2013). The abbreviations T and S are used in the description for metasomal terga and sterna.

To determine the host plants of *H. bifasciata*, palynological analyzes of a mixed sample consisting of pollen grains taken from both feces and unconsumed brood provisions were conducted. Pollen samples were treated following Woodehouse (1935) and were mounted in glycerin jelly. Pollen grains were examined with an optical microscope at 40× and 100× magnification and were identified with a reference palynological collection of the study area developed by the Laboratorio de Estudios de Anatomía Vegetal Evolutiva y Sistemática, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata. To estimate the relative percentage of pollen of each plant species, a total of 400 grains were counted.

Taxonomy

Genus *Hypanthidioides* Moure, 1947

Subgenus *Ctenanthidium* Urban, 1993

Ctenanthidium bifasciatum Urban, 1993

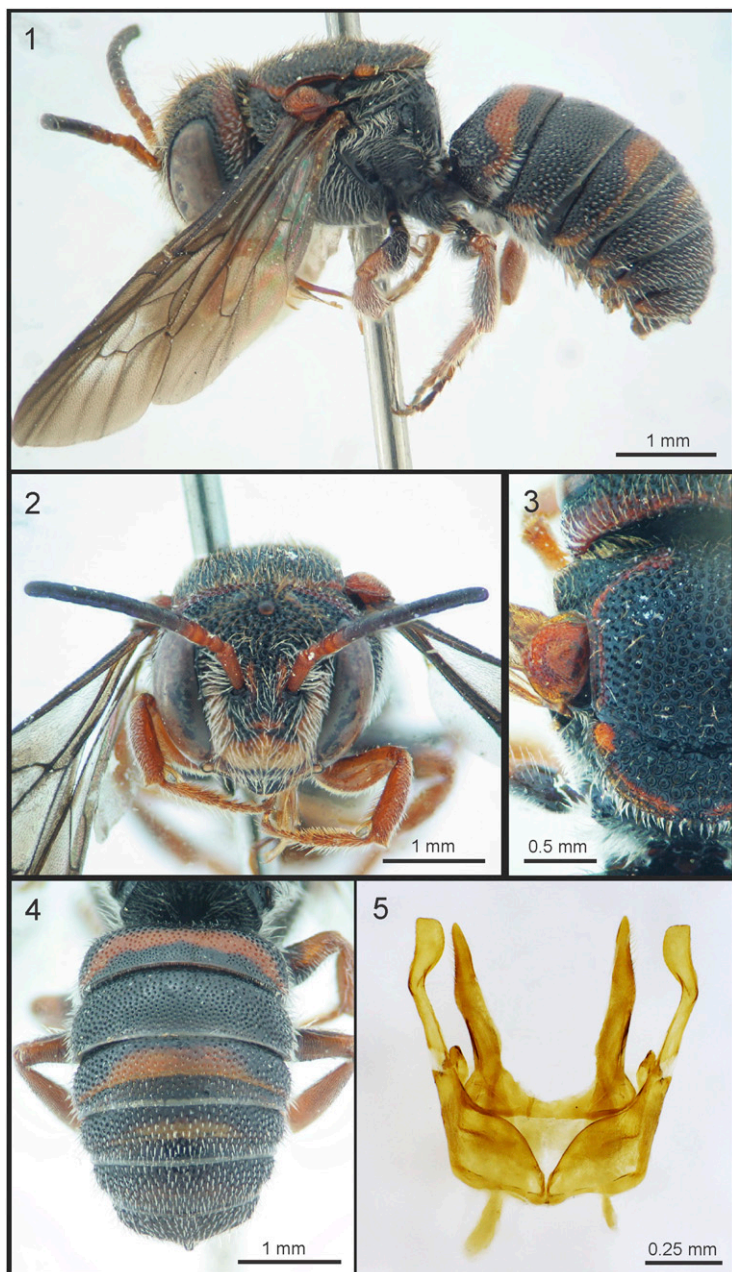
Hypanthidioides (Ctenanthidium) bifasciata (Urban, 1993)

(Figs. 1–5)

Diagnosis. The female of this species can be recognized by the combination of the following characters: mesoscutum black, without yellow maculations, integument dull, microreticulate among strong, coarse punctures; T1 and T3 with yellow bands; disc of T2 with punctures separated by a puncture width. The male of this species can be recognized by the mesoscutum with the integument somewhat dull due

Table 1. Summary of currently included species in *Hypanthidioides (Ctenanthidium)* Urban with information on the known sexes and distribution.

Species	Known sex	Distribution
<i>H. argentina</i> (Urban, 1993)	♂♀	Argentina: Córdoba, San Luis
<i>H. bifasciata</i> (Urban, 1993)	♂♀	Argentina: Buenos Aires; Uruguay: Colonia
<i>H. gracilis</i> (Urban, 1993)	♂♀	Brazil: Paraná
<i>H. nigripes</i> Urban, 1993)	♂♀	Argentina: Jujuy, Salta; Bolivia: Cochabamba, Potosí
<i>H. versicolor</i> (Parizotto & Urban, 2013)	♂	Argentina: Tucumán, Salta and Córdoba



Figures 1–5. Male of *Hypanthidioides (Ctenanthidium) bifasciata* (Urban). 1. Lateral habitus. 2. Frontal view. 3. Mesosoma in dorsal view. 4. Metasoma in dorsal view. 5. Genitalia in dorsal view.

to microreticulations among punctures, and the sparse punctures on the second metasomal tergum.

Description. Male: Total length 5.8 mm, forewing length 4.7 mm, head width 2.0 mm, T3 width 2.0 mm. *Color:* Integument predominantly black, except: clypeus, supraclypeal area, and paracocular area with yellow marks; mandible ferruginous

except on apex and lower margin; vertex with ferruginous band extending to gena; antennae with scape, pedicel and three basal flagellar segments ferruginous, remaining segments dark brown (Fig. 2). Mesoscutum with ferruginous maculae on anterior and lateral margins, on outer margin of axilla, and distal margin of scutellum except medially (Fig. 3). Tegula ferruginous; wing membrane dark brown, infumated, area around second submarginal cell clearer, veins black (Fig. 1). Legs predominantly ferruginous; foreleg with coxa and trochanter black; middle leg with coxa, trochanter and basal third of femur black; hind leg with coxa, trochanter, femur, outer surface of tibia, and two distal most tarsomeres black. T1 with transverse ferruginous band on disc, T2 with lateral ferruginous spot, T3–5 each with ferruginous to yellow band on disc, wider at middle, T6 with lateral ferruginous spot, T7 with apical ferruginous band (Figs. 1, 4); S2 with lateral yellow spot, S3 dark brown, S4–5 ferruginous. *Pubescence*: Predominantly white, face and external surface of scape with long plumose setae. Vertex, dorsum of mesosoma and inner surface of tarsi with yellowish setae. T1–3 with thinner and shorter setae than on remaining terga. Sterna and sides of terga with white, longer plumose setae; S3 with comb of coarse black setae medially on distal margin. *Sculpturing*: Head and mesosoma regularly and densely punctate, punctures separated by less than a puncture width (Figs. 2, 3), integument among punctures weakly microreticulate, somewhat dull (shinier than that of female). T1 and T2 with punctures smaller than in remaining terga, T1–4 with sparse punctures on disc, punctures separated by a puncture width, T5–7 with denser punctures on disc, punctures separated by a half puncture width (Fig. 4). *Structure*: Head broader than long (proportion 1.18–1.24:1), compound eyes converging below (1:0.73–0.75), proportion of interocellar to ocellocular distance 0.88–0.94:1, clypeus 1.73–1.80 times broader than long. Dorsolateral angle of pronotum rounded. Genital capsule as in Figure 5.

Specimens Examined. ARGENTINA: 1♀2♂, Buenos Aires, Berisso, Los Talas, 34°52'25" S, 57°50'18" W, 3 m.a.s.l, 15-III-2011, 19-III-2011, 30-III-2011, L. Alvarez (MLP).

Comments. In the key to species of *H. (Ctenanthidium)* by Parizotto and Urban (2013), the male of *H. bifasciata* runs to the second couplet, which is here amended as follows:

2. T2 with sparse punctures on disc, punctures separated by a puncture width. Female: mesoscutum black, metasoma with yellow bands on T1 and T3 only. Male: mesoscutum with ferruginous maculae... *H. bifasciata* (Urban)

— T2 with dense punctures on disc, punctures separated by half of a puncture width. Both sexes with yellow maculae on mesoscutum, female metasoma with yellow bands on T1, and T3–T5... *H. gracilis* (Urban)

Nest Architecture. The single nest of *H. bifasciata* was built inside a trap nest made of a piece of pine wood (Dimensions: 70 × 20 × 30 mm) that had a single drilled hole (60 mm in depth, 4.0 mm in diameter). The nest contained three cells from which two males (15, 19 March 2011) and a female (30 March 2011) emerged. The inner walls of the tunnel were covered with the same resin from which the serial brood cells and their partitions were made. Cells were built between a vestibule that occupied the first 10 mm of the tunnel and a partition of 0.6 mm in thickness at the other end. The single female emerged from the inner most cell.

Host Plants. The following five pollen types were found among the pollen grains examined: Fabaceae: *Melilotus* sp. (74.1%), *Lotus* sp. (2.6%); Brassicaceae: Type 1 (11.4%); Asteraceae: *Baccharis* sp. (8.4%); Apiaceae: *Conium maculatum* L. (3.5%).

DISCUSSION

Hypanthidioides bifasciata was previously known only from the female holotype collected in Colonia, Uruguay (Urban 1993). The two males described in the present study were captured in Berisso, Argentina, about 45 km south from the type locality, across the La Plata River. While females of *H. bifasciata* and *H. gracilis* are superficially distinguishable based on their distinct body coloration, males of both species are rather similar in their color pattern. However, males of both species can be reliably separated by the punctuation of the second metasomal tergum, which is densely punctate in *H. gracilis* (punctures separated by half a puncture width) and sparsely punctate in *H. bifasciata* (punctures separated by a puncture width). Additionally, although likely variable, the integumental maculae of the mesoscutum of *H. bifasciata* are ferruginous whereas those of *H. gracilis* are largely yellow. Other differences between the males of both species are the rounded dorsolateral angle of pronotum (angled in *H. gracilis*) and the shape of the gonocoxa in the genital capsule (cf. Fig. 5 with fig. 26 of Parizzoto & Urban 2013).

The pollen analysis indicates that *H. bifasciata* visits both exotic (i.e., *Melilotus*) and native plants (i.e., *Baccharis*) in several different families, thus suggesting a polylectic diet. Undoubtedly, our sample size was small and restricted to a single locality. It would be interesting to know if the tuft of bristles present on the apex of the labrum of *H. (Ctenanthidium)* females is used, if at all, during the collection or manipulation of pollen from these flowers.

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LITERATURE CITED

- Gonzalez, V. H. & T. L. Griswold. 2011. Taxonomic notes on the small resin bees *Hypanthidioides* subgenus *Michanthidium* (Hymenoptera, Megachilidae). *ZooKeys* 117:51–58.
- Gonzalez, V. H., T. Griswold & M. S. Engel. 2013. Obtaining a better taxonomic understanding of native bees: Where do we start? *Systematic Entomology* 38(4):645–653.
- Gonzalez, V. H., T. Griswold, C. P. Praz & B. N. Danforth. 2012. Phylogeny of the bee family Megachilidae (Hymenoptera: Apoidea) based on adult morphology. *Systematic Entomology* 37(2):261–286.
- Hadley, A. 2011. CombineZP - Free image stacking software for depth of field correction. Available from: <http://www.hadleyweb.pwp.blueyonder.co.uk/CZM/combinezm.htm> (accessed 21 September 2011)
- Michener, C. D. 2007. *The Bees of the World*, 2nd ed. Johns Hopkins University Press, Baltimore, Maryland, xvi+[i]+953 pp., 20 pls.
- Parizzoto, D. R. & D. Urban. 2013. Contribution to the knowledge of the *Anthidulum* Michener and *Ctenanthidium* Urban (Hymenoptera, Apidae) with new species from Argentina and Peru. *Zootaxa* 3609(3):311–318.
- Urban, D. 1993. *Ctenanthidium*, gen. n. de Dianthidiini com quatro espécies novas da América do Sul (Hymenoptera, Megachilidae). *Revista Brasileira de Zoologia* 8(1–4) [1991]:85–93.
- Woodehouse, R. P. 1935. *Pollen Grains*. McGraw Hill book Company, New York, 574 pp., 14 pls.

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