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First record of the parasitoid Melittobia hawaiiensis (Hymenoptera: Eulophidae) associated with Emphorini bees (Hymenoptera: Apidae)

Daniel Alejandro Aquino[a], Leopoldo Jesús Alvarez[a], Mariano Lucia[a] & Alberto Horacio Abrahamovich[a]

[a] División de Entomología, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, Argentina

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SHORT COMMUNICATION

First record of the parasitoid *Melittobia hawaiiensis* (Hymenoptera: Eulophidae) associated with Emphorini bees (Hymenoptera: Apidae)

Daniel Alejandro Aquino*, Leopoldo Jesús Alvarez, Mariano Lucia & Alberto Horacio Abrahamovich

División de Entomología, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, Argentina

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Melittobia hawaiiensis Perkins (Hymenoptera: Eulophidae), a common gregarious ectoparasitoid of aculeate Hymenoptera and other orders of insects, is reported for the first time as a parasitoid of *Melitoma segmentaria* (Fabricius) (Hymenoptera: Apidae) in Buenos Aires, Argentina.

Keywords: Tetrastichinae; parasitoid; Anthophila

Introduction

The genus *Melitoma* Lepeletier and Serville belongs to the Emphorini, a tribe of bees restricted to the Western Hemisphere (Michener 2007). Species of *Melitoma* range from the central USA to Buenos Aires, Argentina, and so far about 10 species are described (Michener 2007). The genus is morphologically homogeneous, and many of its species are difficult to determine. It is characterized by the long mouthparts, the tip of the resting proboscis reaching or surpassing the mid coxae (Roig Alsina 2009), and all known species are specialized collectors (oligolectic) of pollen on *Ipomoea* and related Convolvulaceae, as well as possibly Malvaceae (Linsley et al. 1980; Bullock et al. 1991; Michener 2007).

Nests of *Melitoma* are usually built in vertical clay banks and frequently nest sites are found near flowering *Ipomoea* plants, from which food resources are obtained, and near water which is used to soften the hard clay in which nest burrows are usually made (Dulantro Bartra 1958; Linsley et al. 1980).

The cells are urn-shaped, with smooth earthen walls such that they can easily be separated intact from the earthen matrix in which they are constructed (Figure 1–2) (Michener 2007).

The genus *Melittobia* Westwood belongs to the chalcidoid family Eulophidae, subfamily Tetrastichinae. This genus is cosmopolitan with 14 described species and species are commonly gregarious ectoparasitoids of aculeate Hymenoptera, but also attack insects of at least four other insect orders (Dahms 1984; González & Matthews 2002, 2005; Gonzalez et al. 2004). Sexual dimorphism in the genus is so extreme that the sexes cannot be associated by morphology alone. Males are greatly modified including highly modified antenna (Figure 3), reduction of eyes (Figure 4) and wings (Figure 5), which can be related to the restriction of male activity to mating (Dahms 1984).

According to Linsley et al. (1980) and Noyes (2014) there are several species of natural enemies associated with species of *Melitoma* (*M. segmentaria*, *M. marginella* (Cresson) and *M. taurea* (Say)): *Nemognatha chrysomeloides* (L.), *Pyrota* sp. Dejean, *Tetraonyx* sp. Latreille, *Meloe laevis* Leach (Coleoptera: Meloidae), *Cymatodera hopei* Gray (Coleoptera: Cleridae), *Trogoderma* sp. Dejean (Coleoptera: Dermestidae), *Plega melitomae* Linsley and MacSwain (Neuroptera: Mantispidae), *Dasymutilla canina* (Smith) (Hymenoptera: Mutillidae), *Monodontomerus* sp. Westwood, *Monodontomerus mandibularis* Gahan, *Glyphomerus stigma* (Fabricius) (Hymenoptera: Torymidae), *Anthrax cintalapa* Cole and *A. mexicana* Cole (Diptera: Bombyliidae).

Here we report the first evidence for *Melittobia hawaiiensis* as a parasitoid of *M. segmentaria*.

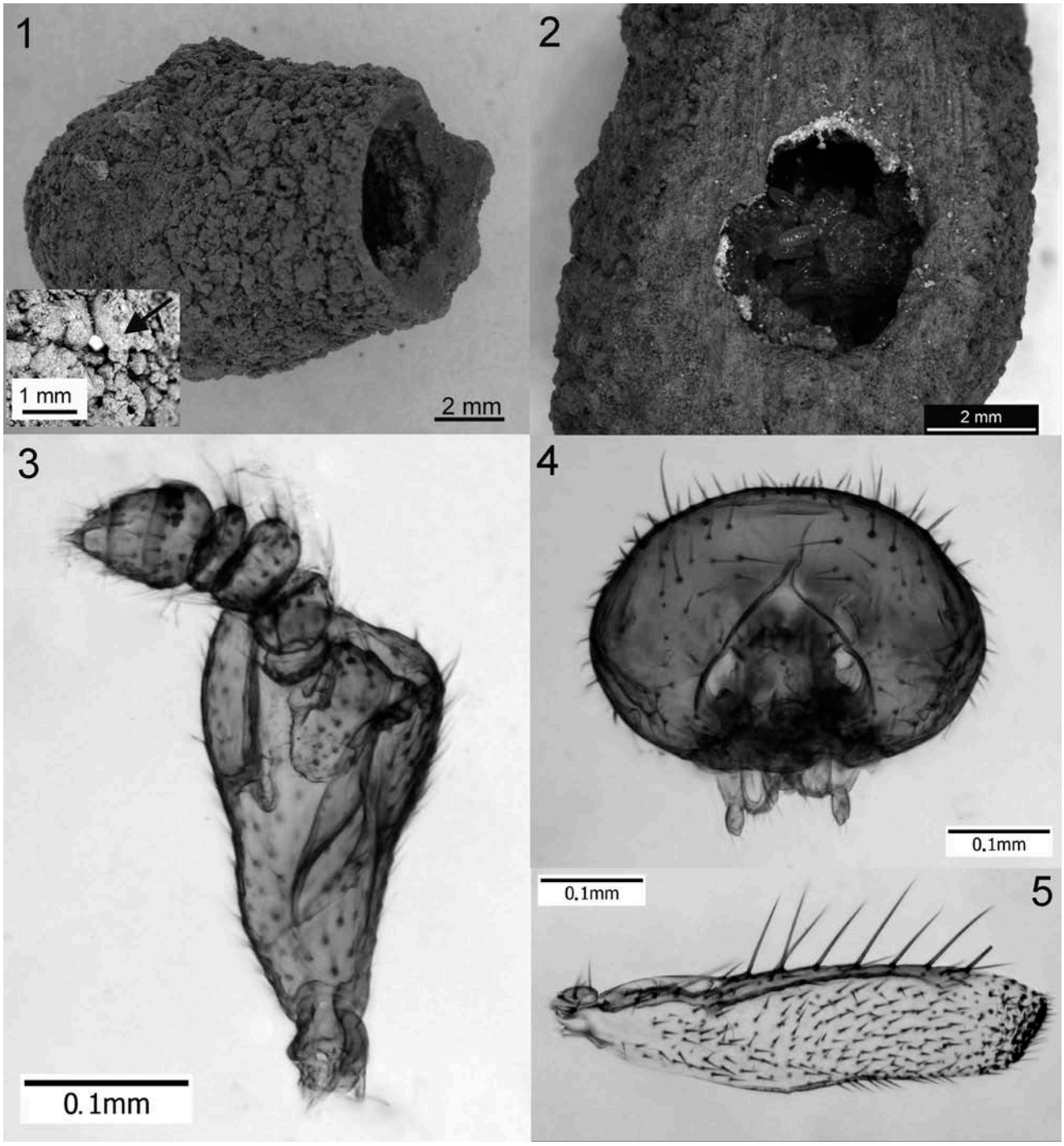
Biological notes

A nest of *M. segmentaria* was found in Berisso, Buenos Aires province on 12 May 2012, located in a vertical clay bank near to a stream (34° 51′ 38″ S, 57° 52′ 33″ W, 6 m asl) and it housed seven closed cells. Each brood cell was individually placed in acrylic containers and kept in the laboratory until the emergence of the adults.

The cells were urn-shaped with the internal wall smooth and the external granulated (Figure 1–2) and the approximate measurements are ($\bar{x}$ ± SD)

*Corresponding author. Email: daquino@fcnym.unlp.edu.ar

9.8 ± 1.1 mm in width and 13.3 ± 1.1 mm in length (n = 5). In the laboratory we observed four cells with a round hole in the mud wall (approximately 0.26 mm) at one side of the cell and we noticed that they were parasitized (Figure 1 arrow). Only two bees reached the adult stage (1♂ and 1♀) and emerged on 31 October 2012 and 5 November 2012, respectively. In the four brood cells, 672 (131, 163, 59, 319 on each nest) females and 19 (2, 2, 3, 12 on each nest) males of *M. segmentaria* emerged between 28 August 2012 and 1 November 2012, over a total period of about two months. The males did not leave the brood cell. The



Figures 1–5. 1–2, Brood cells of *Melitoma segmentaria*: 1, lateral view of brood cell, arrow shows the hole of entrance of parasitoid; 2, brood cell with larvae of *Melittobia hawaiiensis* inside. 3–5, male of *Melittobia hawaiiensis*: 3, antenna; 4, head, frontal view; 5, forewing.

remaining cell was broken and the bee larva was kept in alcohol.

Identity of the parasitoid

The parasite was identified as *M. hawaiiensis* Perkins using the keys provided by Dahms (1984) and Gibson et al. (1997) and compared with specimens deposited at the collection of Museo de La Plata. The females of *Melittobia* offer few specific characters and it is possible that several of the described species are synonyms. That is because the species are distinguished by the form of the antennae of the male. In *M. hawaiiensis* the scape is broader and more curved than in *Melittobia acasta* (Walker), the pedicel being almost hidden inside it (Figure 3) (Ferrière 1933). Males of *M. hawaiiensis* and *M. australica* are very similar in most respects and their variations overlap between species. Only one consistent feature serves to distinguish the species and that is the number of setae on the scape. The flange overhanging the groove of the scape, on the same side as the pedicel is attached, is relatively longer, and has more than five setae, most of which are arranged on the edge of the flange; the proximal floor of the groove has more than two setae as opposed to 1–2 in *M. australica*. The last-mentioned setal arrangement appears very reliable in all specimens of the species that were examined (Dahms 1984).

General distribution

Antilles, Argentina, Brazil, Guam, Hawaii, Indonesia, Malaysia, New Caledonia, New Zealand, Seychelles, Solomon Islands (Dahms 1984; Torretta & Durante 2011; Noyes 2014).

Hosts of M. hawaiiensis

Apis mellifera L., *Bombus* sp. (Latreille), *Scaptotrigona postica* (Latreille) (Hymenoptera: Apidae), *Hylaeus* sp. Fabricius (Hymenoptera: Colletidae), *Megachile aetheria* Mitchell, *M. gomphrenae* Holmberg, *M. disjuncta* (Fabricius), *M. pacifica* (Panzer), *M. pallefacta* Vachal, *M. palmarum* Perkins, *M. rotundata* Fabricius (Hymenoptera: Megachilidae), *Chalybion zimmermanni* Dahlbom, *Pison* sp., *P. argentatum* Shuckard, *P. spinolae* Shuckard, *Sceliphron caementarium* (Drury), *Trypoxylon* sp. Latreille (Hymenoptera: Sphecidae), *Eumenes germaini* Lucas, *Odynerus nigripennis* (Holmgren), *Vespula germanica* (Fabricius) (Hymenoptera: Vespidae), *Ereunetis flavistriata* Walsingham (Lepidoptera: Tineidae), *Brachymeria salamonis* (Cameron) (Hymenoptera: Chalcididae), *Argyrophylax leefmansi* Baranov, *Bessa remota* (Aldrich), *Ptychomyia remota* Aldrich (Diptera: Tachinidae) (Matthews et al. 2009; Noyes 2014)

Voucher specimens are deposited in the Colección Entomologica of Museo de La Plata, Argentina (MLP).

Conclusions

Melittobia species have reached economic pest status (Dahms 1984), and major losses in valuable stocks of bumble bees (Apidae: *Bombus*) colonies and leafcutter bees (Megachilidae) can occur unless an effort is made to maintain colonies free of this pest (Macfarlane & Donovan 1989). Nevertheless, the permanent elimination of *M. hawaiiensis* from economically important bee populations can be difficult because of its wide range of alternative hosts and its highly female biased sex ratio (95% or more are females). These factors assign *Melittobia* a huge multiplier effect with a potentially devastating impact on pollinator populations (Matthews et al. 2009). The novel record of *Melittobia hawaiiensis* attacking underground nests with brood cells encapsulated by mud demonstrates that is necessary to increase the knowledge about bees and the impact of *Melittobia* species on host populations.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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