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First record of the orchid bee *Euglossa dilemma* (Hymenoptera: Apidae) in Hispaniola, the Antilles

Julio A. Genaro

Ismael A. Hinojosa-Díaz

Lisa McDowell Johnson

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First record of the orchid bee *Euglossa dilemma*
(Hymenoptera: Apidae)
in Hispaniola, the Antilles

Julio A. Genaro
Florida State Collection of Arthropods
1911 SW 34th Street
Gainesville, FL 32608-1268, USA

Ismael A. Hinojosa-Díaz
Departamento de Zoología, Instituto de Biología
Universidad Nacional Autónoma de México (UNAM)
Tercer Circuito s/n, Ciudad Universitaria, Copilco, Coyoacán, A.P. 70-153
Mexico City, Mexico, C. P. 04510.

Lisa McDowell Johnson
El Barco, vía La Lomoto, El Cabirmal
Altamira, Puerto Plata, Dominican Republic

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Julio A. Genaro

Florida State Collection of Arthropods
1911 SW 34th Street
Gainesville, FL 32608-1268, USA
polimita@hotmail.com

Ismael A. Hinojosa-Díaz

Departamento de Zoología, Instituto de Biología
Universidad Nacional Autónoma de México (UNAM)
Tercer Circuito s/n, Ciudad Universitaria, Copilco, Coyoacán, A.P. 70-153
Mexico City, Mexico, C. P. 04510.
hinojosadiaz@gmail.com

Lisa McDowell Johnson

El Barco, vía La Lomoto, El Cabirmal
Altamira, Puerto Plata, Dominican Republic
sy_sd@yahoo.com

Abstract. The occurrence of the orchid bee *Euglossa dilemma* Bembé and Eltz (Hymenoptera: Apidae) is recorded for the first time for the island of Hispaniola in the Greater Antilles. Males were observed visiting varieties of sweet basil plants (*Ocimum basilicum* Linnaeus (Lamiaceae)) to obtain fragrances used during courtship and reproduction. Our observations showed that the species is established in Hispaniola and that it does not require the presence of orchids for reproductive success, being able to adapt to new plant resources it finds in the areas it colonizes. These observations correspond to what was found in Florida, United States, where *Euglossa dilemma* was also recently introduced. It is not clear how the species was introduced to Hispaniola, but *Euglossa dilemma* is clearly an adventive species that is colonizing the Antilles in addition to peninsular Florida.

Key words. Anthophila, Euglossini, orchids, adventive species.

Resumen. Se registra por primera vez la presencia de la abeja de orquídeas *Euglossa dilemma* Bembé y Eltz (Hymenoptera: Apidae) para la isla La Española, Antillas Mayores. Fueron observados machos acudiendo a variedades de plantas de albahaca (*Ocimum basilicum* Linnaeus) para obtener fragancias utilizadas durante el cortejo y la reproducción. Nuestras observaciones demuestran que la especie está establecida en La Española y que no requiere de la presencia de orquídeas para el éxito reproductivo, pudiendo adaptarse a los nuevos recursos vegetales que encuentra en las áreas que coloniza. Estas observaciones se corresponden con lo hallado en La Florida, Estados Unidos, donde fue introducida recientemente. *Euglossa dilemma* es una especie no nativa que además de La Florida está colonizando las Antillas.

Palabras clave. Anthophila, Euglossini, orquídeas, especie introducida.

Introduction

Orchid bees inhabit the tropics of America and are distinguished by their long tongues and by a series of secondary morphological characters involved in the collecting behavior of aromatic fragrances by the male bees that play a role in territorial display and courtship (Eltz et al. 2005), while at the same time makes them important for pollination of the orchids (Roubik and Hanson 2004; Michener 2007). Male orchid bees have secondary sexual characters involved in the manipulation and storage of the fragrances notably an enlarged hind tibia (storage) and setose areas and patches in the mid tibia (Dressler 1978).

Skov and Wiley (2005) registered for the first time *Euglossa viridissima* Friese for Florida (USA), which turned out to be *E. dilemma*, a sibling species of *E. viridissima* recently segregated from the latter (Eltz et al. 2011). *Euglossa dilemma* is distributed from Mexico to Costa Rica, being recently introduced in southern Florida (USA).

Euglossa dilemma can be identified by the presence of three mandibular teeth, with the intermediate tooth placed equidistantly to the other two (closer to the outer tooth in the tridentate individuals of the more commonly bidentate *E. viridissima*); hind tibia less inflated than *E. viridissima*, with its posterodistal edge pointing in a more acute angle, and the two species can be distinguished from other *Euglossa* Latreille in the region (Mexico, Central America and the Antilles) by the presence of two large joining cushions of dense setae on the second metasomal sternum.

Pemberton and Wheeler (2006) listed the plants visited by *E. dilemma* in Florida (as *E. viridissima*), concluding that the bee's ability to live and become abundant in the absence of its orchid mutualists suggests that the orchid bee–perfume orchid mutualism may be facultative for the bees.

Herein we register *E. dilemma* for the first time for Dominican Republic (Hispaniola) and provide observations on the plants used by males to obtain fragrances.

Materials and Methods

The field observations were made by one of the co-authors (LMJ) in a small coffee and avocado farm near Altamira, Puerto Plata, Cordillera Septentrional during April 2020, latitude 19.644207 longitude -70.857325, 760 metres above sea level (Fig. 1). Voucher specimens are deposited in the Museo Nacional de Historia Natural de Santo Domingo, Dominican Republic (MNHNSD). Bees were identified by the second author (IAH) following the taxon concept of Eltz et al. (2011).

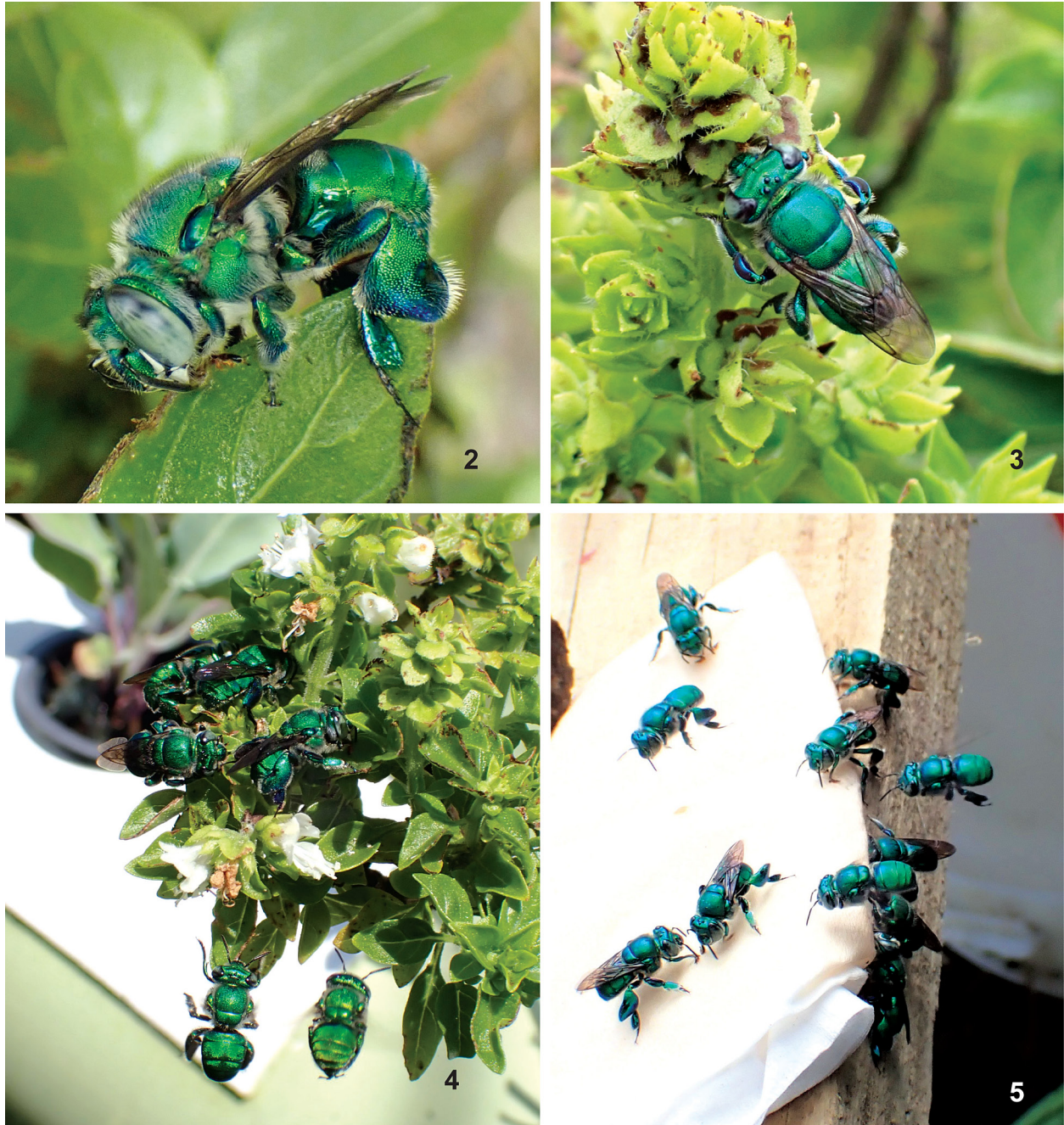
Material examined. HISPANIOLA, Dominican Republic, near Altamira, Puerto Plata, 13–19. iv.2020, latitude 19.644207 longitude -70.857325, coll. L. Johnson, 760 m above sea level (6 males, MNHNSD). Three of the males attracted to clove oil were collected.

Results and Discussion

Males were observed, in an aquaponics system, visiting basil plants (leaves) appearing to be munching on the edges of the leaves, producing a reddish brown edge on them (Fig. 2–4). Common basil (*Ocimum basilicum* Linnaeus) belongs to the family Lamiaceae, and it has been considered an important herb traditionally used in many parts of the world. The major constituents of the essential oil of this plant are linalool, eugenol, methyl cinnamate, and others, changing according to the region and the varieties of plants (Joshi 2014). Males were attracted also to clove oil on a tissue placed near the basil plants



Figure 1. Map of Hispaniola showing the occurrence point (latitude 19.644207, longitude -70.857325) of *Euglossa dilemma* in the Cordillera Septentrional of Dominican Republic.



Figures 2–5. Males of *Euglossa dilemma* in the Cordillera Septentrional, Dominican Republic. **2–3)** Gathering compounds from basil aromatic leaves (*Ocimum basilicum*). **4)** Group collecting fragrances. **5)** Attracted to a tissue containing clove oil (*Syzygium aromaticum*), placed in the basil plant area. Photos: Lisa McDowell Johnson.

(Fig. 5). Clove oil is an essential oil that is derived from flower buds (*is Syzygium aromaticum* (Linnaeus) Merr. & L.M. Perry, Myrtaceae).

Both sexes of *E. dilemma* (as *E. viridissima*) visited numerous plant species in Florida to obtain fragrances, resin, nectar or pollen (Pemberton and Wheeler 2006). Bees adapted to the use of exotic plants in the Dominican Republic as well as Florida, demonstrating behavioral plasticity, which makes it capable of expanding and colonizing new areas.

It is possible that the bee was introduced as immature stages through the trade in agricultural machinery or used cars from Florida, since the species nests inside cavities. It is known that some *Euglossa* species conceal the nest within plant roots, termite nest, cacao fruits and artificial cavities (Cameron 2004).

Only one extant species of orchid bees is native to the Greater Antilles, *E. jamaicensis* Moure, restricted to Jamaica, while the earliest fossil of the genus, *E. moronei* Engel is known from Dominican amber from the Miocene (Engel 1999). The presence of *E. dilemma* on the island of Hispaniola, restores the presence of the genus and confirms the prediction of Hinojosa-Díaz et al. (2009) of the presence of suitable habitat in the island for *E. dilemma*, even if the models were produced with combined data of *E. viridissima* and *E. dilemma*. Interestingly as *E. dilemma* extends its range into the Caribbean region, *E. viridissima* has also recently been found in southern Baja California, beyond its continental known occurrence in Mexico (Falcón-Brindis et al. 2018). Both species seem to be abundant and very vagile in their native range, capable of expanding into new areas as the recent records show. It remains to be seen if changing climate conditions are promoting this.

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