

## Discovery of the bee genus *Perdita* in the West Indies (Hymenoptera: Andrenidae): a new species from Isla Cabritos in the Dominican Republic

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**Abstract.** The bee genus *Perdita* Smith, 1853 (Panurginae) is recorded from the West Indies based on the new species, *Perdita (Perdita) islacabritosensis* sp. nov. from Isla Cabritos, a xeric island within salty Lago Enriquillo in the southeastern part of the Dominican Republic. The species is described and figured, and compared with putative relatives among the hyperdiverse subgenus *Perdita*.

**Key words.** Hymenoptera, Anthophila, Apoidea, Andrenidae, Panurginae, taxonomy, new species, Dominican Republic, Hispaniola

### Introduction

The West Indian bee fauna has received increased scrutiny during the last 15 years and numerous advances made toward understanding its diversity, historical biogeography, relation to mainland faunas, as well as the documentation of biological observations of the constituent species including floral associations (e.g., SNELLING 2005; GENARO 2006, 2007, 2008, 2009; GENARO & FRANZ 2008; ENGEL 2006a,b, 2011a,b; GIBBS 2012). For a long time the andrenid subfamily Panurginae, and indeed the entire family Andrenidae, were considered absent from these islands, including Hispaniola and the other Greater Antilles, although a fossil protandrenine was described from Early Miocene amber of the Dominican Republic (ROZEN 1996). It was not until samples collected between 1979 and 1981 were sent to the late George C. Eickwort (1940–1994) that Recent Andrenidae were first recognized from the West Indies (MICHENER 2000, 2007), all collected from the Dominican Republic. This material was subsequently restudied by ASCHER (2004) and reported by GENARO (2007), but the species remained undescribed and without further documentation. Among this material are two specimens of a new species of the North American hyperdiverse genus *Perdita* Smith, 1853

(Fig. 1). With more than 600 species in 17 subgenera, *Perdita* is abundant and diverse in the deserts of North America, particularly in the southwestern United States (MICHENER 2007). Herein we describe this species so as to put the species on official record, to make known its characters and possible affinities, and to draw it and its extraordinary xeric island habitat to the attention of melittologists working in the region in the hopes that additional specimens, particularly of the unknown female, might be discovered along with other xerophilic bee species, and their floral associations documented and nests located.

### Material and methods

Morphological terminology follows that of ENGEL (2001) and MICHENER (2007), while the format for the description generally follows that employed elsewhere in *Perdita* (e.g., TIMBERLAKE 1958, 1960, 1962, 1964, 1968, 1971, 1980; NEFF 2003, 2010; GRISWOLD & MILLER 2010). Measurements were prepared using an ocular micrometer on an Olympus SZX-12 stereomicroscope. Photomicrographs were prepared using a Nikon D1x digital camera attached to an Infinity K-2 long-distance microscope lens. Measurements are those of the holotype, with metrics from the paratype in parentheses. Primary types are deposited in the Museo Nacional de Historia Natural de Santo Domingo, Santo Domingo, Dominican Republic (MHND) and the Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas, USA (SEMC).

### Systematics

#### *Perdita (Perdita) islacabritosensis* sp. nov.

(Figs. 1–4)

**Type material.** HOLOTYPE: ♂, Isla Cabrito [= Isla Cabritos or Little Goat Island], Descubierta, Prov. Independencia, R.D. [República Dominicana], 7-vii-1979 [7 July 1979], col. Marcano (SEMC). PARATYPE: ♂, same as that of the holotype (MHND).

**Diagnosis.** The new species is superficially similar to *Perdita (Perdita) stottleri* Cockerell, 1896 and will run to this species in TIMBERLAKE'S (1958) key to the *zonalis* species group but differs in its facial maculation (Fig. 3; cf. COCKERELL 1896) and its noticeably smaller size (length around 6 mm in *P. stottleri* vs. about 4.5 mm in the new species). The species share the presence of yellow anteriorly on the mesosternum and completely yellow face below the level of the antennae, the finely and even faintly imbricate (= evanescent tessellation *sensu* Timberlake) integument of the mesoscutum, and the shorter mandibles which extend at most to the far side of the proboscival fossa. Such characters are perhaps not indicative of genealogical relationship and considerable phylogenetic work is needed in *Perdita (Perdita)* (*vide* Discussion, *infra*).

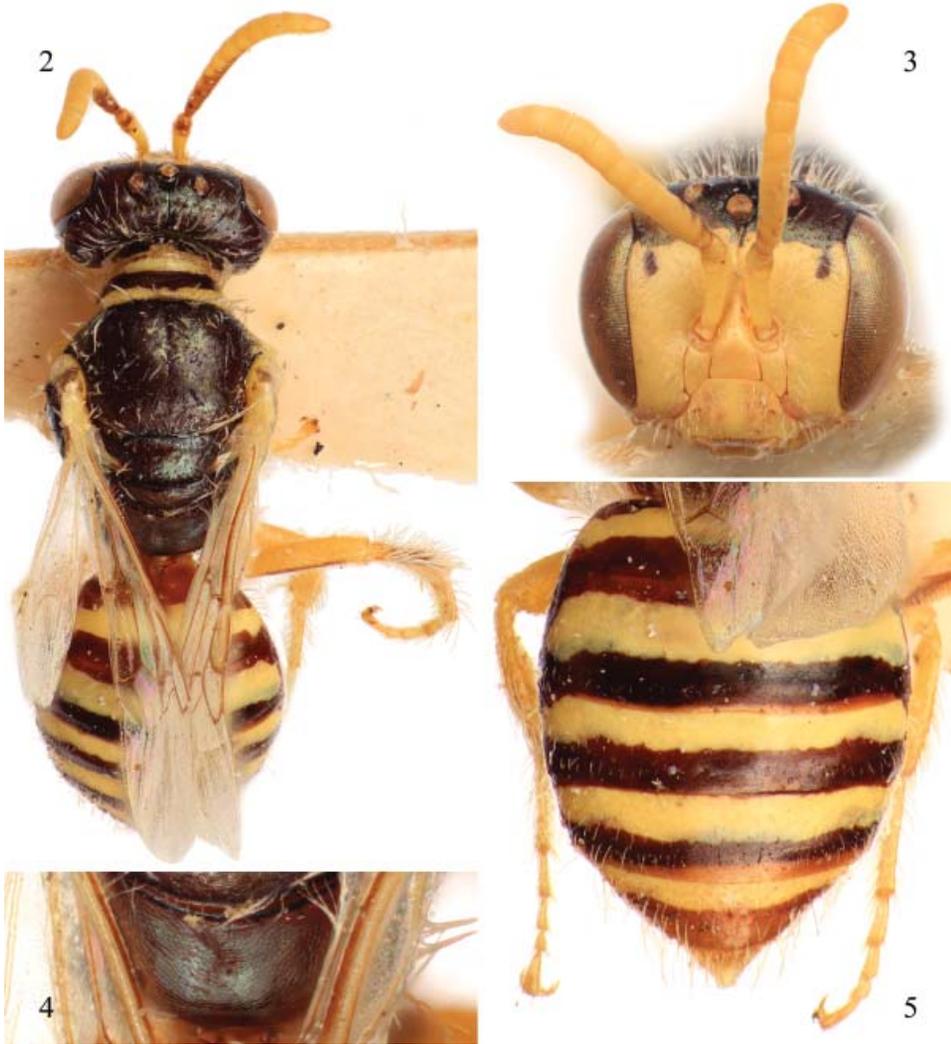
**Description. Male.** Total body length 4.42 mm (4.25 mm); forewing length 2.92 mm (2.88 mm). Head wider than long, length 1.07 mm (1.01 mm), width 1.35 mm (1.29 mm); mandible simple, not elongate or falcate, extending at most to far margin of proboscival fossa when closed; gena narrower than compound eye; facial fovea weakly impressed, a little less than one-half median ocellar diameter in width, about twice as long as wide. Pronotum



Fig. 1. Lateral habitus of holotype male of *Perdita (Perdita) islacabritosensis* sp. nov.

with medial, transverse ridge running laterally into lateral grooves which curve posteriorly anterior of pronotal lobe. Intertegular distance 0.97 mm. Pygidial plate tapering apically to acutely-rounded point.

Integument of head and mesosoma gently and finely imbricate (= evanescent tessellation *sensu* Timberlake) (consistent with *zonalis* group); labrum impunctate; clypeus impunctate medially otherwise with small, shallow, and faint punctures separated by 1–2 times a puncture width; supraclypeal area impunctate; face with small, shallow, and faint (only visible under raking light) punctures separated by 1–3 times a puncture width; vertex sculptured as on face, integument shiny; gena as on vertex except punctures more sparse. Pronotum impunctate; mesoscutum with small, shallow, faint punctures separated by 1.5–3.5 times a puncture width; mesoscutellum and metanotum as on mesoscutum although punctures separated by 1–2.5 times a puncture width and imbrication stronger on metanotum; mesepisternum with small, shallow, and faint punctures separated by 2–5 times a puncture width; metepisternum impunctate; basal area of propodeum impunctate (Fig. 4); lateral and posterior surfaces of propodeum impunctate. Metasoma faintly imbricate.



Figs. 2–5. *Perdita (Perdita) islacabritosensis* sp. nov., male holotype: 2 – dorsal habitus; 3 – facial view; 4 – dorsal detail of base of propodeum; 5 – dorsal view of metasoma.

Head dark brown with a blue-green tint except yellow on mandible (red at apex), labrum, clypeus, most of face below level of ocelli as depicted in Fig. 3 (consistent with the *zonalis* group), and antenna except brown on dorsum of pedicel, flagellomeres I–IV, less so on flagellomeres V–VII, and dorsobasally on flagellomere VIII (Fig. 2). Pronotum yellow with broad transverse band of dark brown with blue-green tint medially (Fig. 2), laterally band not

reaching to ventral margin; propleura yellow; mesoscutum dark brown with blue-green tints; tegula light translucent yellow; mesoscutellum and metanotum as on mesoscutum; pleura dark brown with blue-green tints except yellow anteriorly on mesepisternum as depicted in Fig. 1; propodeum dark brown with blue-green tint. Legs yellow except brown on posterior surface of metafemur, outer surface of metatibia, and dark brown dorsally on metacoxa. Wing membranes hyaline and clear; veins light yellow brown. Metasomal terga dark brown except extensively marked with yellow to create banded appearance (consistent with the *zonalis* group); tergum I with yellow laterally and forming a broad band across disc at bend between anterior- and dorsal-facing surfaces, band of yellow only slightly narrower than apical margin of dark brown, anteromedially notched; tergum II–V each with broad medial band of yellow across disc, bands of terga II–IV broader than apical dark brown areas (Fig. 5); pygidial plate brown; sterna yellow except extreme base of sternum I dark brown.

Pubescence typical for males of subgenus *Perdita* and generally white throughout.

**Female.** Unknown.

**Etymology.** The specific epithet is taken from the type locality, Isla Cabritos, Dominican Republic.

**Comments.** An attempt was made to dissect the material but after considerable time in a humidification chamber the apical metasomal segments were unrelenting and we opted to refrain from further manipulation lest the specimen become damaged. It is greatly hoped that extensive sampling of bees in the Dominican Republic might bring forth additional material, including females, so that the species can be more fully characterized and compared with its congeners.

## Discussion

The new species will run loosely to *P. stottleri* using TIMBERLAKE'S (1958) key to species of the *zonalis* group, a moderately common species widely distributed in the western United States, the region of highest diversity for the genus. For example, about 200 species of *Perdita* are known from the Mojave Desert alone (GRISWOLD & MILLER 2010). In the absence of a comprehensive phylogeny for the subgenus *Perdita* it is impossible to determine conclusively the closest mainland relative of *P. islacabritosensis* sp. nov., and it is unlikely that *P. stottleri* is the sister of the island form. Problems in placing the new species arise because *Perdita* (*Perdita*) is the most diverse of any North American bee subgenus, with 448 described species encompassing all species of *Perdita* not suitably accommodated elsewhere. The five species groups of *Perdita* (*Perdita*) are based on "characters of the male genitalia, other structural characters, coloration, and sculpture" (TIMBERLAKE 1958: 303), but the diagnosis for the *zonalis* group mentions only sculpture and color. At least by those criteria the new species fits within the *zonalis* group, but lack of solid structural characters for Timberlake's groups do not allow for definitive placement. Indeed, the nominate subgenus and its constituent species groups may not be monophyletic (DANFORTH 1996), further complicating consideration of relationships and biogeography. We can say at this time that the new species can be considered a xeric disjunct element in the West Indian fauna, as the vast majority of *Perdita*

(*Perdita*) species occur in the southwestern United States and adjacent northern Mexico. The relatively few species of *Perdita* present in the southeastern United States mostly belong to subgenera or species groups quite divergent morphologically from the new species. The 53 species in the *zonalis* group occur no further east than Texas and Montana in the United States and Saskatchewan in Canada, so presence of a similar and potentially related species on Hispaniola is quite surprising.

The type locality, Isla Cabritos (Little Goat Island), known by the indigenous people as Guarizacca, is the largest island within Lago Enriquillo in the southeast portion of the Dominican Republic between the provinces of Independencia and Pedernales. This saltwater lake of approximately 265 km<sup>2</sup> (but in recent years significant flooding has increased it to ca. 350 km<sup>2</sup>) has no outlet and is three times saltier than the ocean. Located within the Hoya de Enriquillo rift valley at about 140 feet below sea level, it is the largest lake in the Caribbean and the lowest point in that region and on any oceanic island. Isla Cabritos is known as a “desert island” and is about 12 km long (BOLAY 1997). The ecological importance of Lago Enriquillo and its islands have long been recognized, and the area is formally protected as Parque Nacional Isla Cabritos. It is famous for its extraordinarily dense population of about 500 American Crocodiles (*Crocodylus acutus* Cuvier, 1807) and is also known for its flamingos (*Phoenicopterus ruber* Linnaeus, 1758) and iguanas (*Cyclura cornuta* (Bonnaterre, 1789) and *C. ricordi* Duméril & Bibron, 1837).

Unlike most Caribbean sites, Lago Enriquillo has a hot, semiarid climate with an average annual rainfall of only about 24 inches, although regional weather has departed from long-term norms in recent years. Xerophytic plants such as cactus thrive on the island so occurrence of xerophytic bee taxa such as *Perdita* is appropriate.

The new species is potentially oligolectic, as are many if not most *Perdita* (*Perdita*). Several species in the *zonalis* species group including *P. stottleri* are oligolectic on Asteraceae, and mellitologists visiting the islands of Lago Enriquillo (including nearby Barbarita and Islita in addition to Isla Cabritos; in dry periods of low water these are linked by sandbars) should make every effort to survey small bees from this plant family. Researchers must be aware that no unguided visits to the island are allowed.

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