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A new species of *Duckeanthidium* Moure & Hurd (Megachilidae: Anthidiini) from Colombia, with notes on *D. thielei* Michener in Panama

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Abstract. A new species of the Neotropical genus *Duckeanthidium* Moure & Hurd is described and illustrated from the Amazon basin in Colombia. ***Duckeanthidium silvicola*** Guevara & Gonzalez, new species, is known from the female and exhibits intermediate features between the Central American species *D. thielei* Michener and the Amazonian species *D. atropos* (Smith). In addition, we report long-term observations on *D. thielei* from Panama for the first time, along with notes on nesting and sex ratio.

INTRODUCTION

The purpose of this contribution is to describe a new species of *Duckeanthidium* Moure & Hurd from the Colombian Amazon. This rare group of anthidiine bees comprises relatively robust, chalicodomiform species found in tropical rainforests from Costa Rica to Brazil and French Guiana (Michener, 2002, 2007). To date, fewer than 10 species are known (Urban *et al*., 2022), including those formerly separated generically in *Grafanthidium* by Urban (1995) and later synonymized by Michener (2007).

Duckeanthidium is relatively rare in collections, with most species represented by only a few specimens. A possible explanation for this rarity is their specialized nesting and foraging habitats. Today, at least one species, *D. thielei* Michener, appears to be highly seasonal, oligolectic on *Bauhinia* L. (Fabaceae), and is found in forest canopies (Thiele, 2002), making it challenging for the average bee collector to obtain specimens. Thus, it is particularly exciting when specimens of this group are encountered in collections or the field.

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The distinctiveness of the species treated in this contribution has been recognized for the past five years, but we refrained from describing it because it is represented by a single female specimen. Despite extensive searches in collections, no additional specimens of this bee have been found. Therefore, we have decided to formally describe the species and document it, providing a foundation for future researchers to search for and study it further. The megachilid fauna of Colombia remains poorly studied, yet ongoing research has yielded significant findings, including notable range extensions and the detection of invasive species in the country (Gonzalez *et al*., 2019; Guevara *et al*., 2022). In addition, we report *D. thielei* for the first time from Panama and provide notes on its nesting there.

MATERIAL AND METHODS

Morphological terminology and measurements follow Michener (2007) while the description follows the format of Michener (2002). Measurements were taken using an ocular micrometer on a Leica® MZ125 stereomicroscope, which was calibrated using a stage micrometer. We generated images with the Macropod Pro 3D (www.macroscopicsolutions.com) and process them with Zerene Stacker software package. We used the abbreviations F, S, T, and PW for flagellomere, metasomal sterna and terga, and puncture width, respectively. Biological observations on *D. thielei* were conducted by D.W.R. in the province of Colón, on the Pacific side of Panama.

SYSTEMATICS

Genus *Duckeanthidium* Moure & Hurd
Duckeanthidium silvicola Guevara & Gonzalez, new species
ZooBank: urn:lsid:zoobank.org:act:4F5AF9E1-8BAF-4B71-89F6-C17C11D97104
(Figs. 1–4)

DIAGNOSIS: This species, currently known only from the female, is similar to *D. thielei* from Costa Rica in having a black body integument (compare Figs. 1, 3 with Figs. 5–7) and punctation of the terga (Figs. 4, 8), with the depressed premarginal zone more densely punctate than the disc. However, it can be easily distinguished from that species by the dark reddish-brown pubescence on the head and mesosoma (largely black in *D. thielei*), corkscrew-like setae on procoxa, protrochanter, profemur, protibia, and protarsi (absent in *D. thielei*), and the metasomal scopa, which is black except white on S2, S3, and S4 laterally (black except white on S2 laterally in *D. thielei*). The lighter pubescence of the head and mesosoma is similar to that of the likely sympatric species *D. atropos* (Smith) from the Brazilian Amazon. However, in *D. atropos*, the setae on the legs are plumose, not modified, and the depressed premarginal zones of the terga are dark brown as well as densely and finely punctate, similar to the black discs (See Supplemental Material).

DESCRIPTION: *Female.* Total body length 12.0 mm, forewing length 8.5 mm. Head wider than long, width 4.1 mm, length 3.6 mm; compound eye length 3.3 mm; upper interorbital distance 2.4 mm, lower interorbital distance 2.3 mm. Scape length 1.3 mm, longer than alveolocellar distance, alveoloocellar distance 1.1 mm; F1 longer than wide, longer than F2, remaining flagellomeres about as long as wide to slightly longer than wide, except clearly F10 longer than wide. Clypeus broader than long, approximately 1.9 wider than long, length 1.2 mm, width 2.3 mm. Malar area very short, virtually

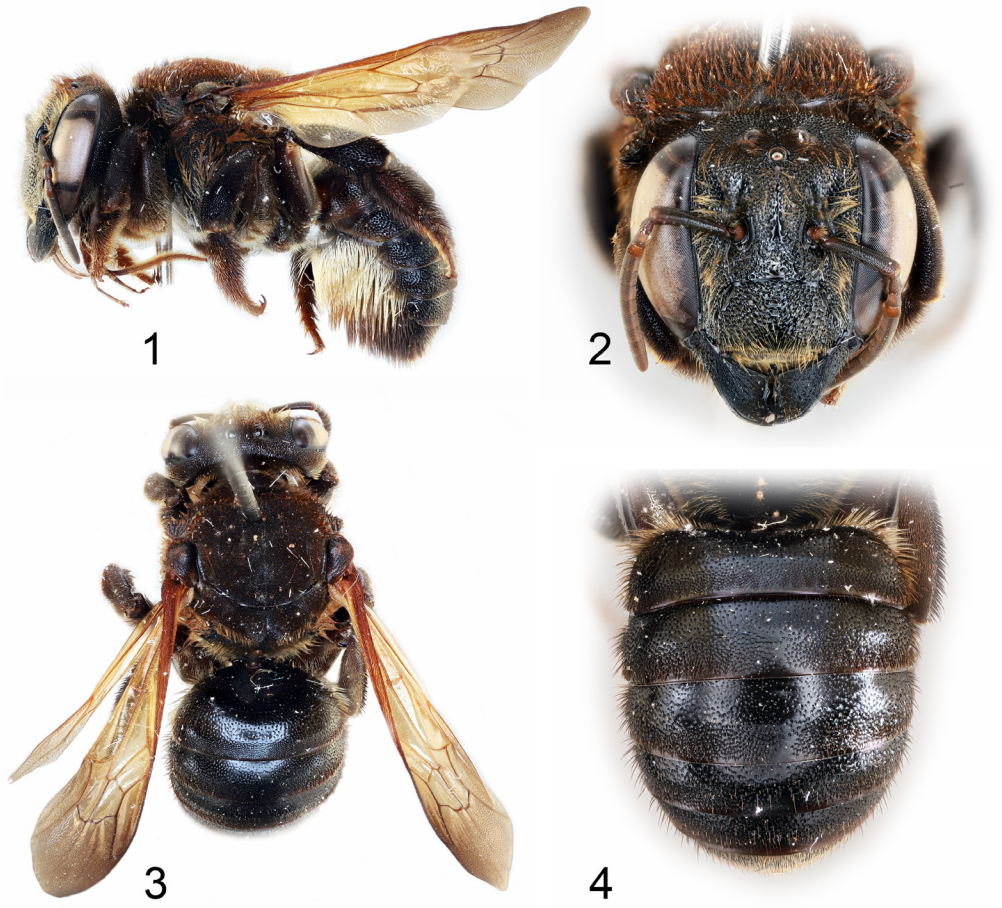
absent. Mesoscutum wider than long, width 3.4 mm, length 3.0 mm; mesoscutellum bigibbous, wider than long, width 2.4 mm, length 0.9 mm; metatibia longer than wide, length 2.8 mm, width 0.9 mm; metabasitarsus longer than wide, length 1.7 mm, width 0.6 mm; T2 width 4.6 mm.

Structure. Mandible 4-dentate, first dental interspace deeper and shorter than second and third dental interspace; blade of galea about three-fourths as long as eye, outer margin with row of strong setae, mostly hooked at apices; maxillary palpus with long curved setae, basal segment small and not well differentiated from rest of maxilla; second segment of labial palpus 0.8x shorter than first; juxtantennal carina present, 1.3 longer than alveoli, extending below lower margin of alveoli; preoccipital border shaped. Pronotal lobe with ridge elevated at lower extremity to form small rounded projection; omaular carina limited to upper half of mesepisternum; mesoscutellum overhanging metanotum, rounded (not carinate) posteriorly, with median, longitudinal, nearly bare depression; forewing with basal vein meeting cu-v, first and second recurrent veins (m-cu) both almost three vein widths distal to first and second submarginal crossveins respectively; front tibial spur broad, malus extending little beyond velum so that whole spur seems broadly truncate; middle tibial spur weakly hooked at apex; spurs of hind tibia strongly hooked at apices; arolia absent but small dark projection, tapering distally; propodeum with basal zone vertical, divided into numerous small, mostly irregular foveae open posteriorly, a long strong carina behind spiracle forming long fovea; propodeal surface dull, foveae not shiny.

Coloration. Black, except: Small spot yellow on inferior paraocular area; dark reddish on antenna, metanotum, profemur, mediotarsus, distitarsus, metafemur, outer surface of metabasitarsus, lateral region of propodeum close to propodeal fovea, marginal zone of terga; tegula black with small reddish spot medially and posteriorly; wings yellowish with yellow-brown venation except vein C of forewing brown and forewing beyond venation, including costal part of marginal cell, dusky, veins in and near dusky area blackish.

Pubescence. Reddish-brown, except pale (whitish to yellowish) on clypeus, paraocular area, ventral margin of mandible, mesepisternum ventrally, coxae, trochanters, posterior margin of probasitarsus and remaining segments, tarsi of posterior leg, and T6; black on anterior region of protibia and probasitarsus, meso- and metatibia, meso- and metabasitarsus; long erect setae on lateral margins of T2–T6; scopal setae white on S2–S3, and S4 laterally, black on S4 medially and S5–S6; ventral surface of mesepisternum, procoxa, protrochanter, base of profemur, posteroapical region of protibia, and posterior margin of protarsi densely covered by corkscrewlike setae.

Surface sculpturing. Supra-clypeal area with irregular shining longitudinal ridge extending up weakly on frons to ocellus; clypeus, supraclypeal area, and paraocular area with punctation contiguous to dense (≤0.5 PW); frons, vertex, and gena with punctures contiguous and smaller than clypeus; labrum dull and imbricate with separated minute punctures, erect hairs, and midapical tuft of long erect bristles. Mesoscutum and mesoscutellum with punctures smaller, denser, and surface therefore duller than on rest of body; mesepisternum and metepisternum with punctures as on clypeus; metanotum and propodeum imbricate with minute and sparse punctures. Disc of T1–T4 shiny, weakly imbricate, with sparse punctures (1.0–2.5 PW) on basal half, and contiguous on apical half (medially sparse on T2–T4), marginal zone of T1–T5 shiny and impunctate; T6 with punctures contiguous; S1 weakly imbricate with punctures sparse; S2–S6 with contiguous and coarsely punctate, punctures smaller on basal sterna.

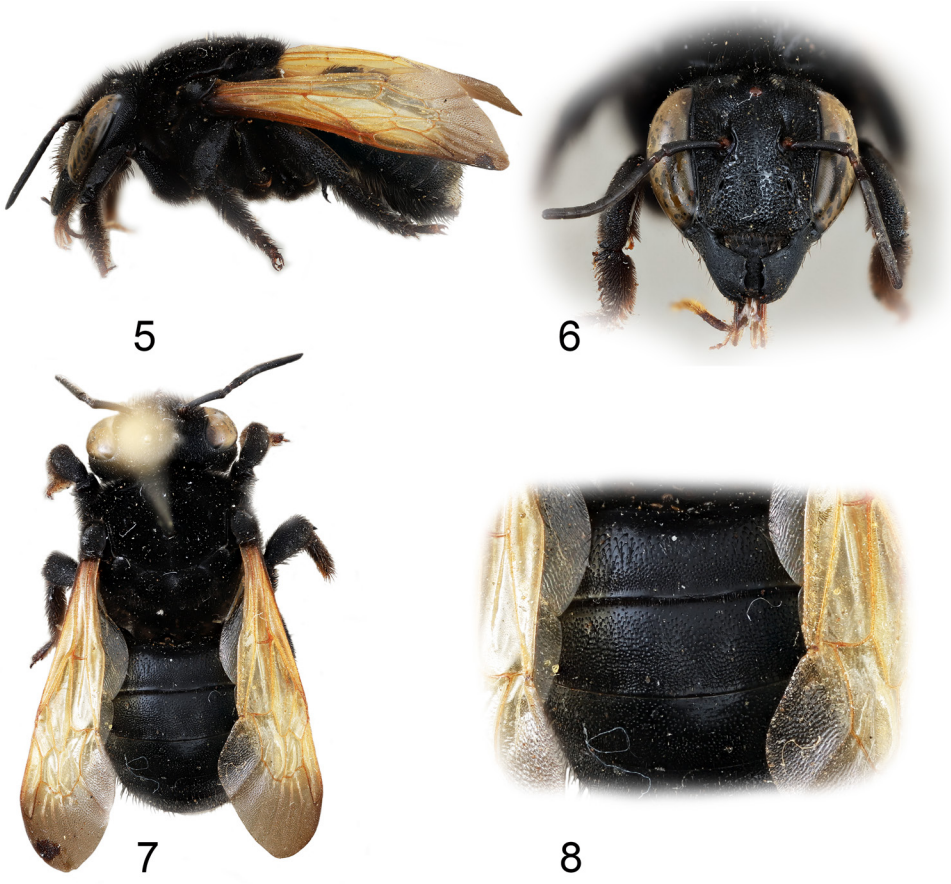


Figures 1–4. Holotype female of *Duckeanthidium silvicola* Guevara & Gonzalez, new species. **1.** Lateral habitus. **2.** Facial view. **3.** Dorsal habitus. **4.** Detail of dorsum of metasoma.

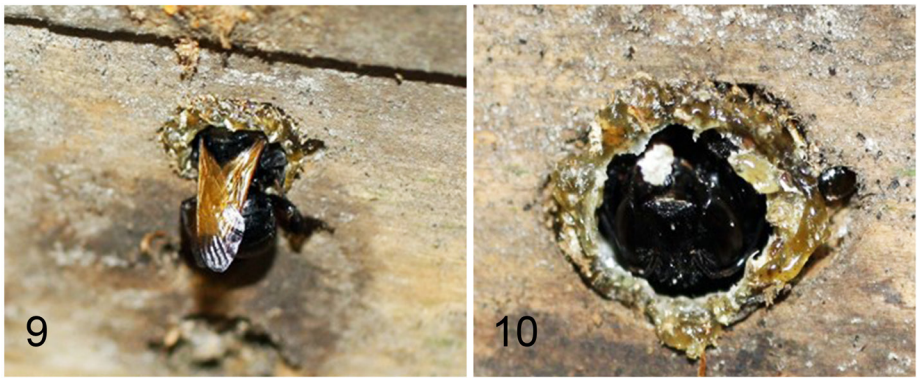
MALE: Unknown.

HOLOTYPE: 1♀, Colombia: Caquetá, Araracuara, 180 msnm. Bosque primario, 15 m. 4 Sep. 1994, G. Gangi/ 14029/ LABUN 005737 (barcode label). The specimen is deposited in the Laboratorio de Investigación en abejas de la Universidad Nacional Bogotá, D.C., Colombia.

ETYMOLOGY: The specific epithet is derived from Latin and means "living in the forest," referring to the primary forest where the specimen was collected in the Amazon basin of Colombia.



Figures 5–8. Paratype female of *Duckeanthidium thielei* Michener (Snow Entomological Collection, University of Kansas SEMC 13217379). **5.** Lateral habitus. **6.** Facial view. **7.** Dorsal habitus. **8.** Detail of T1–T3.



Figures 9–10. Female of *Duckeanthidium thielei* Michener nesting in a tunnel drilled in a bee nesting board in Colon Province, Panama. **9.** Female returning to the trap nest. **10.** Female inside the nest with a white resin ball between her mandibles.

Biological notes on *D. thielei* in Panama

One of us (D.W.R) has observed *D. thielei* nesting in the same cavities used by orchid bees of the genus *Euglossa* Latreille (Apidae: Euglossini) and does not restrict its nesting or foraging activities exclusively to canopy locations. A nest was discovered in a trap nest, an artificial box domicile 5×4×8 cm of plywood with a single entrance hole in one wall, built for orchid bees and maintained in the Roubik Forest Reserve at Santa Rita Arriba, Panama (see also Figs. 9, 10). It was filled with cells of presumably a single female, although no nesting adult was seen. At that site, shortly thereafter, *D. thielei* has nested continuously for the past 12 years in both a solid 'bee board' of pine, drilled with 10 cm holes of several diameters. The next year, nesting females began to utilize a solid tree trunk section repurposed as an outdoor table and provided with several drilled 6 mm x 10 cm holes to attract nesting bees. Likely parasites of *D. thielei*, identified as *Thalestria* spp. (Apidae: Epeolini), have been captured at this nesting site on two occasions. It is interesting to note that its nearly identical mimic, the stingless bee *Melipona fallax* Camargo & Pedro (Apidae: Meliponini), was first described from male bees from a nest in this area. The bright orange waxy resin used by *M. fallax* at its nest entrance tube resembles that employed by *D. thielei*.

The original nest of *D. thielei* contained 14 brood cells, which were reared in an outdoor laboratory and produced 7 males and 7 females. All brood cells were made from a particularly odiferous resin, potentially sourced from the Burseraceae or Fabaceae (*Bauhinia*). Pollen analysis of cells from the nest found in 2012 primarily contained material from Burseraceae, which may suggest a preference for this pollen source. However, it came from a different plant family than that reported by Thiele (2002) from a similar elevation and rainfall region in Costa Rica. In addition, unlike the Costa Rican population, all nests observed in the Panama locality were less than 1 m above ground. Our observations in Panama indicate differences between populations and suggest that *D. thielei* cannot be thought to 'prefer' nesting in the forest canopy. It may often nest in dead standing trees, which eventually fall, as evidenced by a fallen tree within 15 m of the trap nest in Panama; no nests were seen in that tree, but the search was not thorough. The hardwood log used to make a table was about 100 m from the fallen tree and trap nests, suggesting that multigeneration nesting very near the maternal nest was unlikely.

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SUPPLEMENTAL MATERIAL

Figure S1. Photos of the female holotype of *Duckeanthidium atropos* (Smith) deposited in the Natural History Museum, London, England.

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