

Stingless robber bees of the genus *Lestrimelitta* in Colombia (Hymenoptera: Apidae: Meliponini)

Abejas ladronas sin aguijón del género *Lestrimelitta* en Colombia (Hymenoptera: Apidae: Meliponini)

Diego A. Guevara¹ | Victor H. Gonzalez^{2*} | Rodulfo Ospina¹

- Received: 4/oct/2018
- Accepted: 4/oct/2019
- Published online: 19/dec/2019

Citation: Guevara DA, Gonzalez VH, Ospina R. 2020. Stingless robber bees of the genus *Lestrimelitta* in Colombia (Hymenoptera: Apidae: Meliponini). *Caldasia* 42(1):17–29. doi: <https://dx.doi.org/10.15446/caldasia.v42n1.75511>.

ZooBank LSID: urn:lsid:zoobank.org:pub:B71C458E-FD8C-4564-9E78-AB7CC2668F80

ABSTRACT

Stingless bees (Apidae: Meliponini) are culturally and economically important bees and they represent a major component of the Colombian melittofauna. However, the bee fauna of Colombia is still in early stages of exploration and species identification is often difficult or impossible. We revised the species of the cleptobiotic stingless bee genus *Lestrimelitta* in Colombia and recognized the following eleven species: *L. glabrata*, *L. guyanensis*, *L. rufa*, *L. rufipes*, and *L. spinosa*, which are recorded for the first time for the country; *L. huilensis*, *L. opita*, *L. piedemontana*, and two new species, *L. diminuta*, sp. n. and *L. galvisi* sp. n. We also confirmed the presence of *L. limao* in the Colombian Amazon and provide new geographical records with an updated key to species from Central America and northern South America.

Keywords. Anthophila, Apoidea, Colombia, Meliponini, taxonomy

¹ Universidad Nacional de Colombia (Sede Bogotá). Departamento de Biología, Laboratorio de Investigaciones en Abejas. Colombia. saguevaraf@unal.edu.co, rospinat@unal.edu.co

^{2*} Undergraduate Biology Program and Department of Ecology and Evolutionary Biology, Haworth Hall, 1200 Sunnyside Avenue, University of Kansas, Lawrence, Kansas 66045, USA. victorgonzab@gmail.com

* Corresponding author



RESUMEN

Las abejas sin aguijón (Apidae: Meliponini) son cultural y económicamente importantes y representan un componente significativo de la melitofauna colombiana. Sin embargo, la fauna de Colombia todavía está en vía de exploración y la identificación de especies es algunas veces difícil o imposible. Revisamos las especies del género de abejas ladronas sin aguijón *Lestrimelitta* en Colombia y reconocemos las siguientes once especies: *L. glabrata*, *L. guyanensis*, *L. rufa*, *L. rufipes* y *L. spinosa*, las cuales registramos por primera vez para el país; *L. huilensis*, *L. opita*, *L. piedemontana* y dos especies nuevas: *L. diminuta*, sp. n. y *L. galvisi* sp. n. También confirmamos la presencia de *L. limao* para la Amazonia colombiana y presentamos registros geográficos nuevos con una clave actualizada para las especies de Centroamérica y norte de Suramérica.

Palabras clave. Anthophila, Apoidea, Colombia, Meliponini, taxonomía

INTRODUCTION

Stingless bees (Hymenoptera: Meliponini) are social, honey-making bees that represent about 2.5 % of the global melittofauna. Yet, they are among the most ecologically, economically, and culturally significant bees in tropical and subtropical areas of the world. Indigenous and non-indigenous human populations use stingless bees and their products (honey, pollen, propolis, etc.) for diverse purposes including food, medicine, and crafts (Gonzalez *et al.* 2018). However, the identity of many species of stingless bees is problematic and species identification is often difficult or impossible. The purpose of this work is to address the taxonomy of the stingless bee genus *Lestrimelitta* (Apidae: Meliponini) in Colombia. These bees are obligate robbing or cleptobiotic bees widely distributed in the Neotropical region, which despite having nests of their own, they steal food and nest materials from other stingless bees, such as species of *Nannotrigona*, as well as honey bees (Portugal-Araújo 1958, Sakagami *et al.* 1993).

Lestrimelitta consist of 24 species, with its greatest diversity occurring in Brazil (Camargo and Pedro 2007, Gonzalez and Griswold 2012). Until recently, records of this genus in Colombia consisted of *L. limao* (Smith, 1836) only.

However, taxonomic studies during the last two decades documented morphological features reliable in species identification and demonstrated the existence of multiple species under this name (*e.g.*, Ayala 1999, Oliveira 2002, Melo 2003, Oliveira and Marchi 2005, Marchi and Melo 2006, Camargo and Pedro 2007, Gonzalez *et al.* 2010, Gonzalez and Griswold 2012). Thus, previous records of *L. limao* in Colombia remain doubtful and some of them might correspond to unrecognized species.

As an attempt to reveal the identity of the species of *Lestrimelitta* from Colombia, Gonzalez *et al.* (2010) and Gonzalez and Griswold (2012) recognized and described three new species: *L. huilensis* Gonzalez and Griswold, 2012, *L. opita* Gonzalez and Griswold, 2012, and *L. piedemontana* Gonzalez and Rasmussen, 2010. However, because their work did not include an exhaustive study of material from Colombia, other species are thus likely to occur. Herein we confirm the presence of *L. limao* in Colombia, record five additional species of this genus for the country, and describe two other species as new. Thus, this work increases to eleven the number of species of *Lestrimelitta* in Colombia. We also provide new geographical records and an updated key to species from Central America and northern South America.

MATERIAL AND METHODS

Morphological terminology and measurements (*e.g.*, interalveolar, alveolocular, ocellocular distances, etc.) follow Michener (2007), except for torulus instead of antennal alveolus. We prefer to use torulus because it is in broader application across Hymenoptera. Measurements were taken using an ocular micrometer on a Leica® MZ12 stereomicroscope. We took photomicrographs with a Leica MC 170HD camera attached to a Leica M205A stereomicroscope. We used the abbreviations S, T, and OD for metasomal sterna and terga, and median ocellar diameter, respectively. The symbol for female and the word itself refers to the worker caste, not the queen.

To map the distribution of each species, we used the geographical coordinates associated with specimen labels and, for records that did not have exact geographical information, we used Google Earth (Google, Mountain View, CA, USA) to acquire their coordinates. We assembled 36 occurrence records for all species and generated maps using SimpleMappr (Shorthouse 2010). We reproduced label data as appearing on the labels attached to the same specimen. We separated information on different labels by a single slash (/) and indicated annotations to clarify information in square brackets. To avoid repetition of label data, we used “*ut supra*” (as above) instead of “*idem*” to indicate the same information in the preceding label. The Latin term “*idem*” is more broadly used to replace the name of a male author in academic texts, although it has also been used in taxonomic works to avoid repetition of label data.

We used the following institutional abbreviations for repositories holding specimens studied during the course of this work: LABUN, Laboratorio de Investigaciones en Abejas, Universidad Nacional de Colombia, Bogotá, Colombia; MPUJ, Museo Javeriano de Historia Natural Lorenzo Uribe, S.J., Universidad Javeriana, Bogotá, Colombia; SEMC, Division of Entomology, Snow Entomological Collection, University of Kansas Natural History Museum, Lawrence, Kansas, USA.

SYSTEMATICS

Tribe Meliponini Lepeletier de Saint Fargeau, 1836

Genus *Lestrimelitta* Friese, 1903

Lestrimelitta diminuta, new species

ZooBank LSID: urn:lsid:zoobank.org:act:472FC958-6FCE-41BB-8CEA-833D91D3E8CA

Holotype. COLOMBIA. **Guainía:** ♀, San Felipe, 8 m [m.a.s.l.], 15-V-2014 [15 May 2014], Col: J. M. Rosso / 31086 (LABUN).

Paratypes. 2♀, same data as holotype but with catalogue numbers 31087 (SEMC) and 31088 (LABUN).

Diagnosis: This species resembles *L. nana* Melo, 2003 in the small body size (head width, ~1.6 mm), pro- and mesotibiae without erect setae on outer surfaces, mesoscutellum flattened and not covering metanotum medially, and mesotibial spur normal (Fig. 1). It can be separated from that species by the following combination of features: propodeal spiracle elongate (5.9× longer than wide), pronotal lobe and mesoscutum with erect setae, mesepisternum with decumbent setae, terga with erect or semi-erect setae at least laterally, and mandible with a single tooth on apical margin. In *L. nana*, the propodeal spiracle is much broader, 3.0× longer than wide, the mesoscutum, mesepisternum, and terga are glabrous (except on T6), and the mandible is bidentate. *Lestrimelitta diminuta* shares with *L. monodonta* Camargo and Moure, 1989 the mandible with a single apical tooth, the propodeal spiracle elongate, and vertex, mesoscutum, mesepisternum, and terga with setae. However, *L. monodonta* is larger (head width: 2.2 mm vs. 1.6 mm), the setae on mesepisternum are long and erect (short and decumbent in *L. diminuta*), the mesotibial spur is reduced (long in *L. diminuta*, 1.2× mesobasitarsal width basally), and the mesoscutellum is elevated, not flattened and partially covering metanotum medially (mesoscutellum flattened, not covering metanotum medially in *L. diminuta*).

Description. ♀. Total body length 4.8 mm; forewing length 3.4 mm; head width 1.6 mm; maximum width of T2 1.3mm. Head 1.3× broader than long; inner orbits of compound eyes subparallel; malar area 0.9× median ocellar diameter; clypeus 2.8× broader than long; intertorular distance shorter (0.9×) than torular diameter; torulorobital distance 1.5× torular diameter, 1.7× intertorular distance; intercellular distance 2.3× median ocellar diameter, shorter (0.7×) than ocellocular distance; scape about 5.7× longer than wide; pedicel longer than broad (1.5×); first flagellomere about as long as broad (1.1×), longer than second flagellomere (1.9×), remaining flagellomeres broader than long, except apical flagellomere much longer than broad; compound eye 2.4× longer than broad; gena broader than width of compound eye in profile (1.3×); mandible with a single tooth on apical margin. Mesoscutellum flattened, not covering metanotum medially; propodeal spiracle

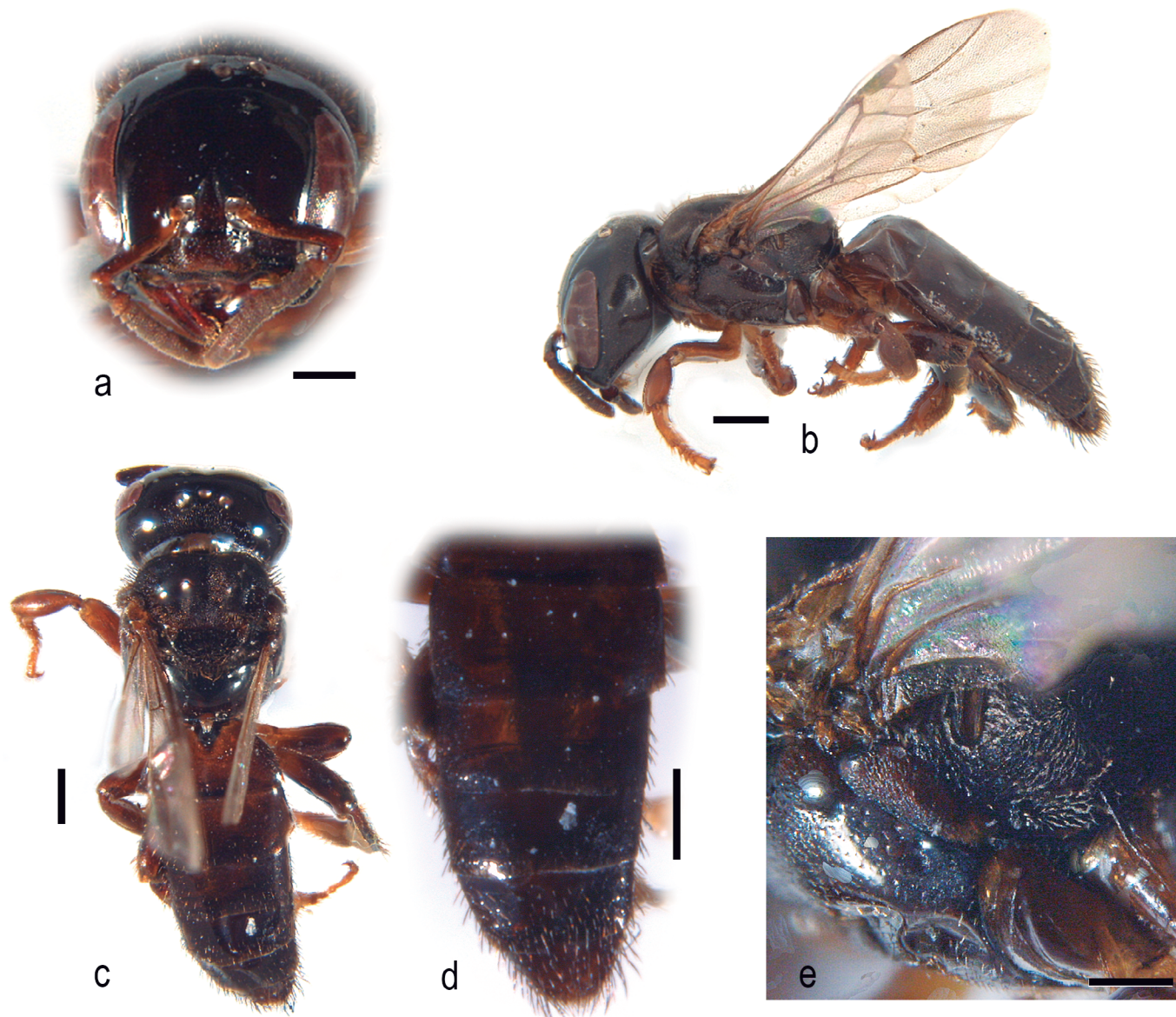


Figure 1. Female holotype of *Lestrimelitta diminuta* Guevara, Gonzalez and Ospina, new species. **a.** facial habitus; **b.** lateral habitus; **c.** dorsal habitus; **d.** metasoma in dorsal view; **e.** propodeal spiracle. Scale bar: 0.5 mm except 0.25 mm in figure e.

elongate, about 5.9× longer than wide; mesotibial spur long, about 1.2× mesobasitarsal width basally; metatibia about 3.0× longer than broad.

Integument smooth and shiny between minute, sparse punctures as in other species of the genus; sterna weakly lineolate-imbricate.

Color predominantly dark reddish-brown, lighter on labrum, mandible (except basally), clypeal margin, pro-, meso-legs, and sterna. Wing membrane hyaline; veins and pterostigma brown.

Body largely glabrous, sparsely covered with minute, appressed, simple, yellowish setae on head and mesosoma, setae longer and denser on mesoscutum, mesepisternum, and metepisternum. Propodeum laterally with short, appressed, minutely branched, whitish setae (integument largely visible among setae). Erect, long, stout, dark brown setae on: distal margin of labrum and inferior margin of mandible (longest, $\geq 2.0 \times OD$); vertex and preoccipital border with few, sparse setae (at most half width of OD); anterior ($2.0 \times OD$) and lateral margins (next to axilla) of mesoscutum ($1-1.2 \times OD$); axilla ($\sim OD$); pronotal lobe ($\sim OD$); mesoscutellum with sparse setae on disc ($\sim OD$),

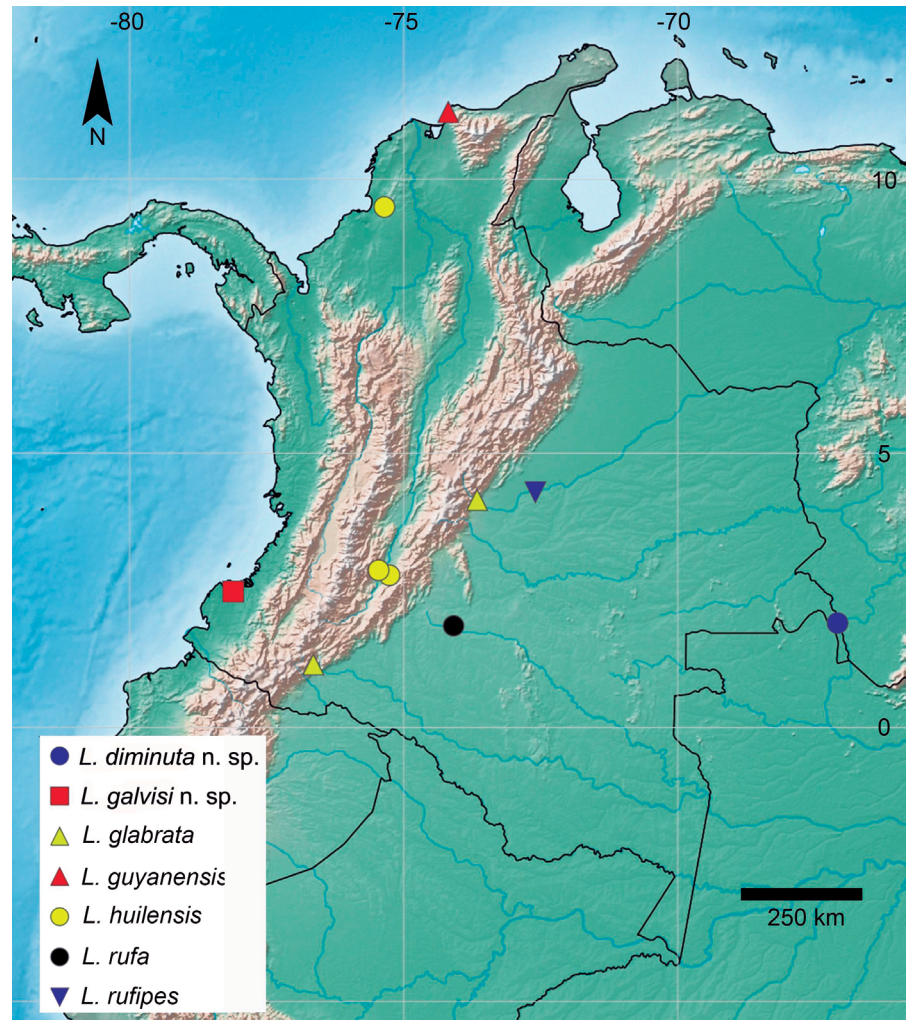


Figure 2. Collection localities for the stingless bee genus *Lestrimelitta* in Colombia.

much longer ($2.0 \times OD$) on distal margin; meso- and metacoxae, mesotibia, and propodeum ($1-1.5 \times OD$); posterior margin of metatibia ($0.9-1.5 \times OD$), side of T1 ($0.5 \times OD$), sides of T2–T4, entire T5 and T6 ($0.6-2.0 \times OD$).

Etimology. The specific epithet, *diminuta*, refers to the small body size of this species.

Comments. This species is known from the type locality in the Colombian Amazon (Fig. 2). Marchi and Melo (2006) indicated that some specimens of *L. monodonta* from Pará (Tucuruí and Jacareacanga) and Maranhão (Urbano Santos), Brazil, are smaller than are specimens from other localities. These authors did not mention the size of these specimens, but they might be confused with *L. diminuta*. However, Marchi and Melo (2006) were not able to find significant differences in other features besides body size with the typical specimens of *L. monodonta*. Thus, small specimens of *L. monodonta* can be separated from *L. diminuta* by the same features indicated in the key to species.

Lestrimelitta galvisi, new species

ZooBank LSID: urn:lsid:zoobank.org:act:B459FD76-60B8-4B87-858D-2FFFA4A3196A

Holotype. COLOMBIA. Nariño: ♀, El Charco, nido en Avicenia [*Avicennia* sp.], xi-16-82 [15 Nov. 1982] / 14417 / LABUN010988 (LABUN).

Paratypes. 4♀, same data as holotype but with catalogue numbers 14418–14419 (LABUN), 14421 (SEMC).

Diagnosis. This species can be easily recognized by the following combination of features (Fig. 3): propodeal spiracle elongate; vertex, preoccipital margin, anterior margin of mesoscutum, and terga with erect, long setae; propodeum laterally with short, sparse, simple setae; and mesotibial spur reduced. This species runs to *L. huilensis* in the key to species of *Lestrimelitta* from Central America and Northern South America by Gonzalez and Griswold (2012). It differs from that species in the mesotibial spur

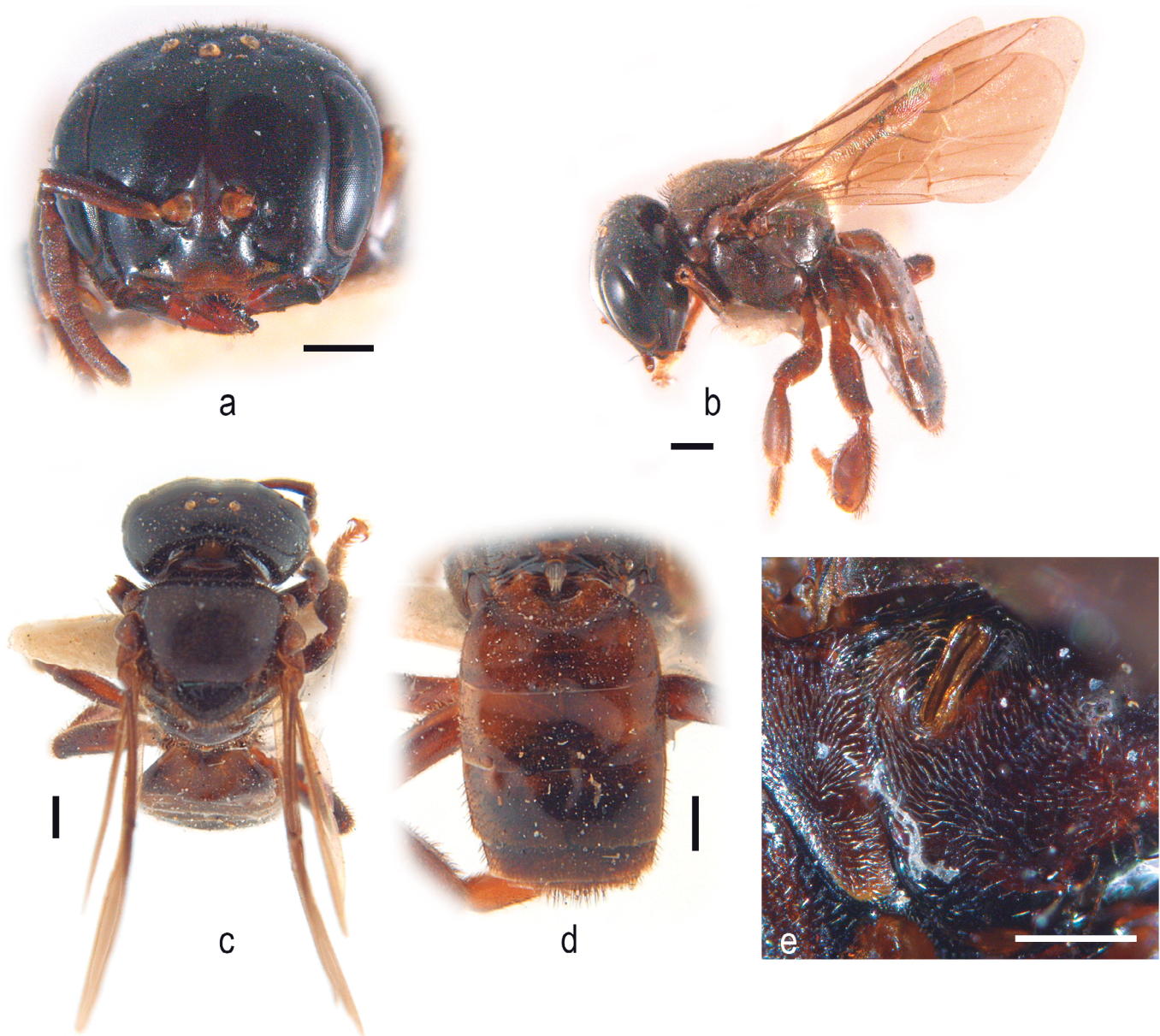


Figure 3. Female holotype of *Lestrimelitta galvisi* Guevara, Gonzalez and Ospina, new species. **a.** facial habitus; **b.** lateral habitus; **c.** dorsal habitus; **d.** metasoma in dorsal view; **e.** propodeal spiracle. Scale bar: 0.5 mm except 0.25 mm in figure e.

reduced ($1.3\times$ mesobasitarsal width basally in *L. huilensis*) and mesepisternum and disc of mesoscutum with short but distinct, decumbent setae (glabrous or nearly so in *L. huilensis*). In addition, both species are geographically separated and inhabiting different ecosystems. *Lestrimelitta galvisi* occurs in tropical rain forests of the Choco bioregion whereas *L. huilensis* in dry tropical forests along the Magdalena valley in Colombia.

Description. ♀. Total body length 6.9 mm; forewing length 4.8 mm; head width 2.2 mm; maximum width of T2 1.8 mm. Head $1.2\times$ broader than long; inner orbits of com-

pound eyes subparallel; malar area $1.4\times$ OD; clypeus $3.5\times$ broader than long; intertorular distance shorter ($0.8\times$) than torular diameter; torulorbital distance $2.4\times$ torular diameter, $2.5\times$ intertorular distance; interocellar distance $2.2\times$ OD, shorter ($0.8\times$) than ocellocular distance; scape about $6.5\times$ longer than wide; pedicel longer than broad ($1.2\times$); first flagellomere slightly longer than broad ($1.1\times$), longer than second flagellomere, remaining flagellomeres broader than long, except apical flagellomere much longer than broad; compound eye $2.5\times$ longer than broad; gena broader than width of compound eye in profile; mandible bidentate. Mesoscutellum elevated, not flattened, par-

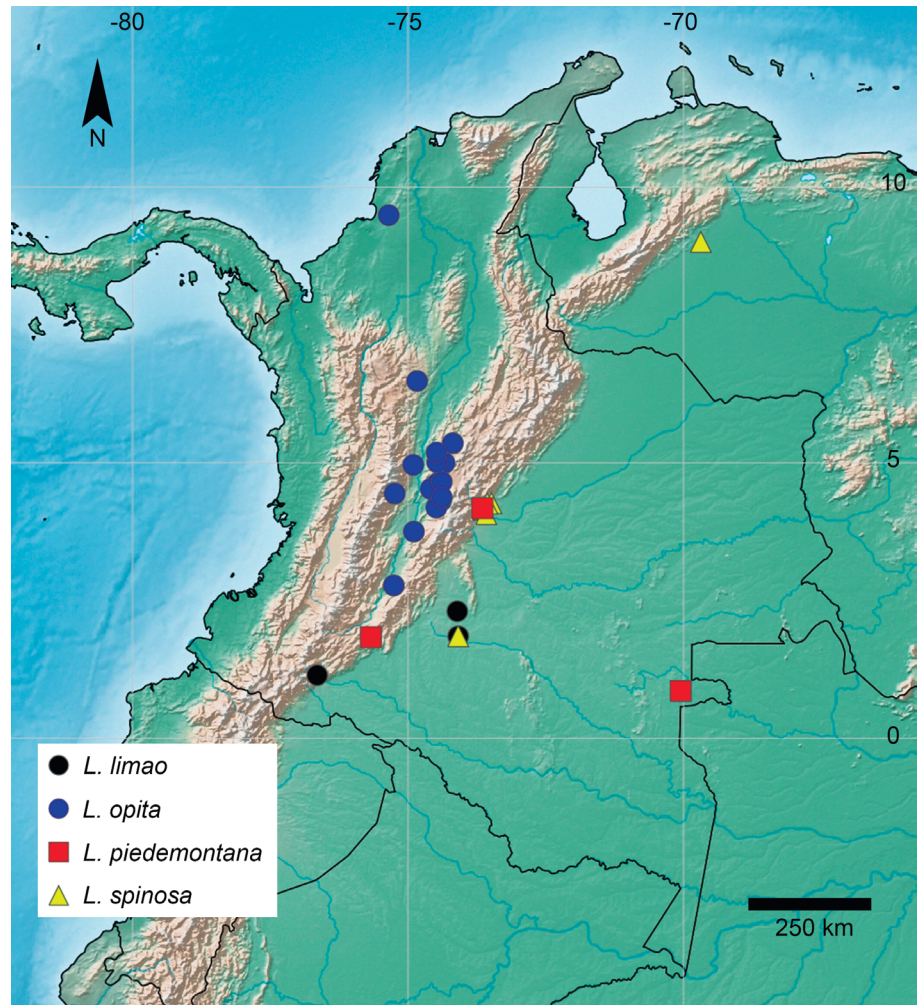


Figure 4. Collection localities for the stingless bee genus *Lestrimelitta* in Colombia.

tially covering metanotum medially; propodeal spiracle elongate, about $4.7\times$ longer than wide; mesotibial spur reduced; metatibia about $3.0\times$ longer than broad.

Integument smooth and shiny between minute, sparse punctures as in other species of the genus; terga and sterna weakly lineolate-imbricate.

Color predominantly dark reddish-brown, lighter on labrum, mandible (except basally), clypeal margin, scape, legs, T1 and T2, and sterna. Wing membrane light brownish; veins and pterostigma brown.

Body largely glabrous, sparsely covered with minute, appressed, simple yellowish setae, denser on head and mesosoma. Propodeum laterally with short, sparse, fine setae. Erect, long, stout, dark brown setae on: distal margin of labrum and inferior margin of mandible (longest, $\geq 2.0\times$ OD); vertex and preoccipital border ($0.6\times$ OD), anterior and lateral margins (next to axilla) of mesoscutum ($1-1.5\times$

OD); axilla ($0.5\times$ OD); mesoscutellum with sparse setae on disc ($0.6\times$ OD), much longer ($1.8\times$ OD) on distal margin; pro-, meso-, metacoxae, mesotibia ($0.5\times$ OD), and propodeum laterally ($1-1.2\times$ OD); posterior margin of metatibia ($0.6-2.0\times$ OD); T1 ($0.4\times$ OD), T2, and T3 laterally ($0.6\times$ OD), and entire T4–T6 ($0.7-1.3\times$ OD).

Etymology. This species is a patronymic honoring Germán Galvis Vergara, friend and colleague from the Department of Biology, Universidad Nacional de Colombia, Bogotá, in recognition for his efforts in documenting and protecting the biodiversity of Colombia.

Additional material examined. Two females with the same data as holotype but with catalogue numbers 14439 and 14422 (not designated as paratypes). One of them is a callow specimen judging by its body yellow coloration (14439). The other specimen has a normal adult coloration but all legs and metasoma are missing. Both specimens are in LABUN.

Comments. This species is known from the type locality in the Colombian Pacific coast (Fig. 2). According to the label information, all specimens of this species were collected from a nest found in a mangrove (*Avicennia* sp., Acanthaceae).

NEW RECORDS

Lestrimelitta glabrata Camargo and Moure, 1989

Lestrimelitta glabrata Camargo and Moure, 1989: 199 [♀].

Material examined ($n = 10♀$). COLOMBIA. **Meta:** 5♀, Villavicencio, Jardín Botánico, 4°9'3.2" N 73°39'4.6" W, nido semiexpuesto, tronco en árbol vivo, N 11, 12 feb. 2004, Col E. Palacios y B. Mantilla / 17632-34 / LABUN010996-98 (LABUN). **Putumayo:** 5♀, Mocoa, CEA [Centro Experimental Amazónico], 10 feb 2018/31597-601 (LABUN).

Comments. This new record expands the distribution of this species from its previously known range: Brazil, Guyana, and Ecuador (Gonzalez and Griswold 2012). In Colombia, this species occurs in the Amazon and Orinoquia regions between 467 and 604 m. (Fig. 2).

Lestrimelitta guyanensis Roubik, 1980

Lestrimelitta guyanensis Roubik, 1980: 263 [♀].

Material examined. COLOMBIA. **Magdalena:** 1♀, Santa Marta, Universidad del Magdalena, 40 m, 1 dic. 2006, col: A. Parra / 24299 / LABUN011039 (LABUN).

Comments. The specimen from Magdalena, Colombia, closely matches the description of *L. guyanensis*, a species currently known from French Guiana. However, both middle legs are missing from this specimen and thus more material is required to confirm our identification.

Lestrimelitta huilensis Gonzalez and Griswold, 2012

Lestrimelitta huilensis Gonzalez and Griswold, 2012: 231 [♀].

Material examined ($n = 34♀$). COLOMBIA. **Huila:** 1♀, Rivera, cementerio, 745msnm, col: Sandra cruz / 14411 / LABUN011065; 1♀, *ut supra*, G. Nates / 14446 / LABUN011060; 12♀, *ut supra*, 30 mar. 1994 / 14412, 36-37, 44-45, 47-49, 23176-77, 23516,22 / LABUN 011057-59, 61-64, 66-70; 1♀, *ut supra*, 1 abr. 1994 / 23511 / LA-

BUN011070; 2♀, *ut supra*, 2 abr. 1994, col: A. Sarmiento / 23058 / LABUN008186; 1♀, *ut supra*, 716, cp00051, 11 jun. 2014, col: G. Nates / 24304 / LABUN011036; 1♀, *ut supra*, cp0060, col: A. Rodríguez / 24303 / LABUN011037; 1♀, *ut supra*, cp00061 / 24305 / LABUN011035; 1♀, *ut supra*, cp00062 / 24306 / LABUN011034; 1♀, *ut supra*, cp00063 / 24307 / LABUN011033; 3♀, El Pital, cementerio, 5 abr. 1994 / 23055-57 / LABUN008183-85; 4♀, [without data] / 14440-43 / LABUN010992-95. **Sucre:** 3♀, Colosó, Pajarito Jorro, 214 msnm, 7 dic. 2010, col: Morelo y Vanegas / 24288-90 / LABUN 010999-01100; 2♀, Sereno Alto, 204 msnm, 23 feb. 2010, col: Morelo y Vanegas / 24291-92 / LABUN011002-03.

Comments. This species was previously known from the type locality in Rivera, Huila. The material examined confirms the suspicion of Gonzalez and Griswold (2012) that *L. huilensis* occurs along the Magdalena valley, overlapping in distribution with *L. opita*, and reaching the Caribbean region (Fig. 2). It has been recorded from elevations ranging from 170 to 921 m.

Lestrimelitta limao (Smith, 1863)

Trigona limao Smith, 1863: 506 [♀].

Material examined ($n = 4♀$). COLOMBIA. **Caquetá:** 3♀, San Vicente del Caguán, Ciudad Yari, Puerto Mosco 2, 1°51'20.6" N, 74°05'24.9" W, 194 m [msnm], 17 mar. 2017, Col E. Henao / 28278, 81, 83; 2♀, *ut supra*, Puerto Mosco, 1°05'05.7" N, 74°17'10.9" W, 230 m [msnm], 14/15 mar. 2017, Col E. Henao/28500, 28501 (LABUN). **Putumayo:** 1♀, Mocoa, San Jose del Pepino, CEA [Centro Experimental Amazónico], 8 sep 2018 / (LABUN).

Comments. This species is currently known from Bolivia, Brazil, and Ecuador. The records above confirm the presence of this species in the Colombian Amazon (Fig. 4; 194-540 m.). A specimen from Peru deposited in SEMC and standing under *L. limao* turned out to be a female worker of *L. rufa* (Friese, 1903) (see below). Thus, *L. limao* does not occur in Peru.

Lestrimelitta opita Gonzalez and Griswold, 2012

Lestrimelitta opita Gonzalez and Griswold, 2012: 233 [♀].

Material examined ($n = 104♀$, 7♂). COLOMBIA. **Antioquia:** 7♀, San Roque, 850 m, 6°29'8.21" N 74°50'8.59", col: German Lotero, 1 oct 2019, M31 (muestra 31), atacando

Tetragonisca angustula/ (LABUN). **Cundinamarca:** 9♀, Apulo, Vda San Antonio, orilla Rio Lindo, 15 may. 1988 / 14424-14431 / LABUN002343-50; 1♀, *ut supra*, G. Nates / 14433 / LABUN002352; 4♀, Bosachoque, atacando nido de *Nannotrigona*, 11 sep. 2013, col: J. Diaz / 30630-33; 4♀, Fusagasugá, Vda Espinalito, 1395 m, 7 may. 2011, nido, col: FMVZ / 22311, 22313-15 / LABUN011006-9; 6♀, La Mesa, Cementerio, 23 may. 2004, col: A. Rodríguez / 24295-98 / LABUN011010-13; 2♀, mayo 1988, base de lápida, entrada tubular pequeña, N4, col: G. Nates / 14423,35 / LABUN002342, 54; 1♀, *ut supra*, 18 may. 1994, en Nido 1 / 14432/LABUN002351; 6♀, Paime, VDA Tautao, 1400 m, 7 ene. 1999, col: Maecha O. / 23120-23, 28-29 / LABUN008117-22, 00811; 6♀, *ut supra*, 18 abr. 1999 / 23136-40, 49 / LABUN008101, 12-16; 2♀, Pandi, 13 mar. 1977, col: G. Nates / 14409-14410 / 002338-39; 2♂, *ut supra*, al vuelo en iglesia, 21 abr. 1977, col: G. Nates; 1♀, Tena, cementerio, 1450 m, 26 nov. 2006, col: I. A. Lotta / 24275 / LABUN010959; 2♂, Utica, nido c, 6 dic. 1980, col: Nates y colaboradores / 3486-14434; 2♂, *ut supra*, [without nest data] / 14415-16 / 002340-42; 5♀, La Vega, Finca El Naranjal, 14 ene. 2012, col: C. Villalba / 24276, 77, 79-81 / LABUN010961, 62, 64-65; 12♀, Villeta, 900 msnm, 14 abr. 2018, Col: L. Ucros / 18166-77 / LABUN011014-25. **Huila:** 1♂, 1♀, Rivera, cementerio, 716, 11 jun. 2011, 00050, 2, col: G. Nates / 24302, 308 / LABUN011032, 38. **Tolima:** 1♀, Coello, Reserva El Neme, 1.5 km, 223 m 23-27 feb 2015, D. Moreno / MPUJ_ENT 00384286; 6♀, Ibagué, agos. 2017, col: C. Vargas / 30037-40, 30183,84; 14♀, Represa Prado, 7 sep. 1975, col: G. Nates / 14394-404, 06-08 / LABUN011040-52,56; 3♀, atacando nido, 1 mar. 1980, col: A. Lievano / 14413-14, 38 / 011053-55. **Sucre:** 4♀, Colosó, Pajarito Jorro, 7 dic. 2010, 185 msnm, col: Morelo y Vane-gas / 24425-28 / LABUN010969-72; 2♀, *ut supra*, 21 feb. 2010 / 24282-83 / LABUN010967-68; 7♀, [without label data], / 24315-21 (LABUN).

Comments. This species was previously known from the type locality in Armero, Tolima. The material examined here indicates that *L. opita* also occurs in sympatry with *L. huilensis* along the Magdalena valley, reaching as far north as Sucre, in the Caribbean region of the Colombia (Fig. 4). Specimens of this species have been collected from 170 to 1765 m.

Lestrimelitta piedemontana Gonzalez and Rasmussen, 2010

Lestrimelitta piedemontana Gonzalez and Rasmussen, in Gonzalez et al. 2010: 320 [♀].

Material examined. COLOMBIA. **Vaupés:** 1♀, Vda. Bogotá Cachivera, 31 dic. 2017, col: W. Estrada / 31085 (LABUN).

Comments. This species occurs in the Amazon and Orinoquia regions of Colombia, from 182 to 860 m. (Fig. 4). It is morphologically similar to *L. rufa*, differing primarily in the length of the mesotibial spur (long in the former and reduced in the latter species). Both species might be conspecifics (Gonzalez et al. 2010), but until further studies demonstrate this, we consider them as different biological units.

Lestrimelitta rufa (Friese, 1903)

Trigona (Lestrimelitta) limao rufa Friese, 1903: 361 [♀]

Material examined. COLOMBIA. **Caquetá:** 4♀, San Vicente del Caguán, Ciudad Yari, Puerto Mosco 2, 1°51'20.6" N 74°05'24.9" W, 194 m [msnm], 17 mar. 2017, Col E. Henao / 28282, -85, -87, -88 (LABUN).

Comments. This species is currently known from Bolivia, Brazil, and Ecuador (Gonzalez and Griswold 2012). A specimen from Peru in the SEMC, with the following label data, has been identified as *L. limao*: PERU. **Junin:** Dept. Villa-Oxapampa Rd., 1050 m, 10°48'36" S, 75°19'54" W, 18 OCT 1999, R. Brooks, PERU 1B99 053, ex. Under stones along creek / SMO144188. However, this specimen belongs to *L. rufa* and thus, this species is newly recorded from Peru. The records provided here expand the geographical range of the species. *Lestrimelitta rufa* occurs in the Amazon region of Colombia (Fig. 2).

Lestrimelitta rufipes (Friese, 1903)

Trigona (Lestrimelitta) limao rufipes Friese, 1903: 361 [♀]

Material examined. COLOMBIA. **Meta:** 1♀, Pto. Lopez, Remolinos, al vuelo, 3 sep. 2015, col: electiva II-2015 (LABUN).

Comments. This species is widely distributed in Brazil (Marchi and Melo 2006). Gonzalez et al. (2010) recorded it from the Province of San Martín, in northern Peru. The record from Colombia in the Orinoquia region represents the northwestern-most locality for this species (Fig. 2).

Lestrimelitta spinosa Marchi and Melo, 2006

Lestrimelitta spinosa Marchi and Melo, 2006: 25 [♀].

Material examined ($n = 34♀$). COLOMBIA. **Caquetá:** 3♀, San Vicente del Caguan, Ciudad Yari, Puerto Mosco 2, 1°51'20.6" N, 74°05'24.9" W, 194 msnm, 17 mar. 2017, Col E. Henao / 28284, 86, 89 (LABUN). **Casanare:** 1♀, Villa Nueva, 17 dic. 2012, col: J. H. Gomez / LABUN30634. **Meta:** 5♀, Meta, Villavicencio, 500 msnm, nido, 21 sep. 2007, col: electiva II-2007 / 19618–22 / LABUN010979–83; 4♀, *ut supra*, 418 [m], 13 abr. 2012, col: J. Combita / 25136–39 / LABUN014313–16; 1♀, *ut supra*, Las Acacias, 560 m, 8 abr. 2001, col: E Osura / 22812 / LABUN010984; 2♀, *ut supra*, EBTRF [Estación de Biología Tropical Roberto Franco], 7 abr. 2001, col: L. Benavidez / 22821, 23 / LABUN010974–75; 2♀, *ut supra*, 18 ene. 2002, col: G. Nates / 24293–94 / LABUN008176–77; 2♀, Cumaral, parque central, 30 mar. 2003, col: J. Mora y B. Mantilla / 16297–98 / LABUN010977–78; 1♀, Pto. Caldas, Las Brisas, 350, 21 mar. 1993, col: G. Nates / 8914 / LABUN010973; 2♀, Bosque de Bavaria, 594 m, 14 abr. 2012, col: Electiva 2012 / 24579, 24649; 1♀, Restrepo, nido iglesia escalera, 16 abr. 2003, col: A. Rodriguez y D. Velez / 16439 / LABUN010976; 1♀, via Restrepo-UNILLANOS [Universidad de los Llanos], 467 msnm, 13 abr. 2012, col: Electiva 2012 / 24667 / LABUN010960; 3♀, Unillanos, 500 msnm, 1 oct. 2011, col: Electiva II 2012 / 24129, 24300–01 / 01004–05; 1♀, *ut supra*, col: A. Pulido, C. Gomez y D. Triana / LABUN26568. VENEZUELA: 6♀, Portuguesa, Guanare, Liceta, 12 sep. 1997, col: G. Nates / 24309–14 / LABUN011026–31.

Comments. This species is presently known from Trinidad and Tobago, Guyana, and the Amazon regions of Brazil and Venezuela. The records from Colombia in the Amazon and Orinoquia regions (Fig. 4) expand westward the distribution of this species.

DISCUSSION

The true diversity of stingless bees in Colombia is at most a guess, with available literature records differing in the number and identity of the species occurring in the country (e.g., Nates-Parra 2006, Camargo and Pedro 2007, Ascher and Pickering 2018). Although many studies summarize various aspects of the nesting biology, management, and local uses of stingless bees in Colombia (see Nates-Parra

2006), only a few have assessed their taxonomy. Thus, species identification remains difficult and in many cases impossible. To date, only the Colombian species of *Duckeola* Moure (Gonzalez and Nates-Parra 2004), *Geotrigona* Moure (Gonzalez and Sepúlveda 2007, Gonzalez and Engel 2012), *Parapartamona* Schwarz (Gonzalez and Nates-Parra 1999), *Paratrigona* Schwarz (Gonzalez and Vélez 2007), and *Oxytrigona* Cockerell (Gonzalez 2007, Gonzalez and Roubik 2008) have been revised. Such works, including ours, have documented several new species and clarified the identity and distribution of many others.

In comparison to other stingless bee genera, specimens of *Lestrimelitta* are rare in insect collections. Although we examined specimens from all natural regions of Colombia, the majority of them are from two species (*L. huilensis* and *L. opita*) occurring along the Magdalena River valley in Cundinamarca and Tolima. This is surely a sampling bias because main insect collections in Colombia are in Bogotá and many regions of the country remain unexplored. Previous authors have noted similar sampling bias for other stingless bees, as well as for other bee taxa, in the country (e.g., Gonzalez 2007, Smith-Pardo and Gonzalez 2007). Further works on the Colombian species of *Lestrimelitta* should try to elucidate the identity of the species from the Caribbean coast that we have tentatively identified as *L. guyanensis*. In addition, the species status of *L. piedemontana* requires revision, as this species might be conspecific with *L. rufa* given that both species are morphologically similar (Gonzalez et al. 2010).

Keys to workers of *Lestrimelitta* from Central America and Northern South America (Modified from Gonzalez and Griswold 2012)

Note: A reference to works illustrating morphological features and their corresponding figures are indicated in the couplets.

- 1. Propodeal spiracle ovoid, 2–3 times longer than broad (c.f. Marchi and Melo 2006; fig. 1) **2**
 - . Propodeal spiracle elongate, at least 4.6 times longer than broad (c.f. Marchi and Melo 2006; fig. 2) **6**
- 2(1). Lateral surface of mesepisternum practically glabrous, without dense, stout, erect simple setae **3**
 - . Lateral surface of mesepisternum distinctly covered by stout, erect, simple setae (c.f. Marchi and Melo 2006; fig. 14) **4**

- 3(2). Anterior margin of mesoscutum, and often pronotal lobe, practically glabrous, without dense, stout, erect simple setae (c.f. Gonzalez and Griswold 2012; fig. 12) ***L. opita* Gonzalez and Griswold**
- . Pronotal lobe and anterior margin of mesoscutum distinctly covered by stout, long (1–1.4 times median ocellar diameter), erect, simple setae ***L. limao* (Smith)**
- 4(3). Vertex, and often preoccipital border, with few, sparse, short erect setae restricted to interocellar area; disc of mesoscutum practically glabrous, not densely covered by short, fine setae, without a tomentose appearance; Trinidad and Tobago, Venezuela, Brazil, Colombia ***L. spinosa* Marchi and Melo**
- . Vertex and preoccipital border with longer, denser setae throughout; disc of mesoscutum densely covered by short, fine setae giving a tomentose appearance from which sparse, long, stout setae arise **5**
- 5(4). Mesotibial spur very reduced, apex barely visible; Bolivia, Brazil, Colombia, Ecuador, Peru ***L. rufa* (Friese)**
- . Mesotibial spur normal, about as long as or slightly shorter than mesobasitarsus width basally; Colombia ***L. piedemontana* Gonzalez and Rasmussen**
- 6(1). Vertex, preoccipital border, and anterior margin of mesoscutum practically glabrous, without erect setae, at most with sparse, short setae restricted to interocellar area and anterolateral corner of mesoscutum; disc of mesoscutum practically glabrous, with minute, appressed setae barely visible **7**
- . Preoccipital border, anterior margin of mesoscutum, and often vertex, with long, erect setae; disc of mesoscutum with variable pubescence, practically glabrous or densely covered by short, fine setae giving a tomentose appearance from which sparse, long, stout setae usually arise **10**
- 7(6). Small bees (body length 5 mm; head width 2.2 mm); mesoscutellum distally with short (about twice as long as median ocellar diameter), erect setae; mesotibia with few long, stout, semierect or erect setae along anterior and posterior margins **8**
- . Larger bees (body length 6–7.4 mm; head width at least 2.3 mm); mesoscutellum distally with long (at least three times as long as median ocellar diameter), erect setae; mesotibia distinctly covered by long (about as long as median ocellar diameter or longer), erect, stout setae **9**
- 8(7). Lateral surface of propodeum covered by relatively long and dense pubescence, integument visible among setae; mesotibial spur very reduced; Mexico ***L. chamelensis* Ayala**
- . Lateral surface of propodeum sparsely covered by fine, short setae (setae barely visible); mesotibial spur long, normal; Brazil, French Guyana ***L. glaberrima* Oliveira and Marchi**
- 9(7). Anterolateral corner of mesoscutum with abundant, long, erect setae; pronotal lobe with long, erect setae inferiorly, with branched setae relatively long and dense on posterior margin; mesotibial spur very reduced; T2–T5 laterally with long setae (at least 1.3 times median ocellar diameter); body length ~ 6 mm; head width 2.3 mm; French Guyana ***L. guyanensis* Roubik**
- . Anterolateral corner of mesoscutum and pronotal lobe distinctly glabrous, at most with very short, sparse setae; mesotibial spur normal; T2–T6 with shorter setae (about as long as median ocellar diameter), progressively increasing in length towards apical terga; body length ~ 7.3 mm; head width 2.6 mm; Brazil, Guyana, Ecuador, Colombia ***L. glabrata* Camargo and Moure**
- 10(6). Mandible with a single, small basal tooth; mesepisternum laterally with erect or decumbent setae **11**
- . Mandible with two small basal teeth; mesepisternum with variable pubescence, glabrous or with fine, decumbent setae **12**
- 11(10). Large bees (6.1 mm in body length); mesepisternum laterally with erect setae, setae longer near omaulus, below pronotal lobe; propodeum laterally with long, branched setae; mesoscutellum elevated, not flattened and partially covering metanotum medially in dorsal view; mesotibial spur reduced, not visible ***L. monodonta* Camargo and Moure**
- . Small bees (4.8 mm); mesepisternum laterally with short, decumbent setae; propodeum laterally with short, appressed, minutely branched setae; mesoscutellum flattened, not covering metanotum medially; mesotibial spur long, 1.2× mesobasitarsal width basally ***L. diminuta* sp. n.**
- 12(10). Metasoma with erect setae on all terga, at least laterally, except on T1; South America **13**
- . Metasoma with erect setae on apical terga only; Central America **15**

- 13(12). Head and mesosoma predominantly dark ferruginous (c.f. Gonzalez and Griswold 2012; figs. 1–3); disc of mesoscutellum largely glabrous (c.f. Gonzalez and Griswold 2012; fig. 3); sides of T2 with long setae (about as long as median ocellar diameter) (c.f. Gonzalez and Griswold 2012; fig. 4); Venezuela ***L. catira* Gonzalez and Griswold**
- . Head and mesosoma much darker, predominantly dark brown to black; disc of mesoscutellum sparsely covered with erect, short (about as long as median ocellar diameter) setae; sides of T2 with minute erect setae (at most half width of median ocellar diameter); Colombia **14**
- 14(13). Mesepisternum and disc of mesoscutum with short but distinct decumbent setae; mesotibial spur very reduced, apex barely visible; Colombian Pacific ***L. galvisi* sp. n.**
- . Mesepisternum and disc of mesoscutum glabrous or nearly so; mesotibial spur long, 1.3× mesobasitarsal width basally; Colombia, Magdalena valley ***L. huilensis* Gonzalez and Griswold**
- 15(12). Mesotibial spur normal, long; disc of mesoscutum practically glabrous, with fine, minute setae barely visible; erect setae on anterolateral corner of mesoscutum distinctly longer and denser than those on along anteromedial margin ***L. danuncia* Oliveira and Marchi**
- . Mesotibial spur reduced; disc of mesoscutum more densely covered by short, fine setae giving a tomentose appearance; erect setae on anterolateral corner of mesoscutum about as dense as and about as long as those along anteromedial margin **16**
- 16(15). Discs of mesoscutum and mesoscutellum with erect setae arising from short, fine pubescence, longer and denser on mesoscutellum; Mexico ***L. niitkib* Ayala**

- . Discs of mesoscutum and mesoscutellum practically without erect setae arising from short, fine pubescence, at most with few, short, erect setae on mesoscutellum; Costa Rica ***L. mourei* Oliveira and Marchi**

LITERATURE CITED

- Ascher JS, Pickering J. c2018. Discover Life bee species guide and world checklist (Hymenoptera: Apoidea: Anthophila). [last accessed: 25 Sep 2018]. <https://www.discoverlife.org/mp/20q?search=Apoidea>
- Ayala R. 1999. Revisión de las abejas sin aguijón de México (Hymenoptera: Apidae: Meliponini). *Fol. Entomol. Mex.* 106:1–123.
- Camargo JMF, Moure JS. 1989. Duas espécies novas de *Lestrimelitta* Friese (Meliponinae, Apidae, Hymenoptera) da Região Amazônica. *Bol. Mus. Para. Emílio Goeldi. Sér. Zool.* 5(2):185–212.
- Camargo JMF, Pedro SRM. 2007. Meliponini Lepageletier, 1836. In: Moure JS, Urban D, Melo GAR, editors. Catalogue of Bees (Hymenoptera, Apoidea) in the Neotropical Region. Curitiba, Brazil: Sociedade Brasileira de Entomologia. p. 272–578. [Also available at <http://www.moure.cria.org.br/catalogue>]
- Friese H. 1903. Neue Meliponiden II. *Zeitsch. f. Syst. Hym. u. Dipt.* 3:359–361.
- Gonzalez VH. 2007. Distribución geográfica de las abejas del fuego en Colombia (Hymenoptera, Apidae, Meliponini, *Oxytrigona*). *Rev. Colomb. Entomol.* 33(2):188–189.
- Gonzalez VH, Nates-Parra G. 1999. Sinopsis de *Parapartamona* (Hymenoptera: Apidae: Meliponini), un género estrictamente andino. *Rev. Acad. Colomb. Cienc. Ex. Fis. Nat.* 23 (Suplemento especial):171–179.
- Gonzalez VH, Nates-Parra G. 2004. *Trigona* subgenus *Duckeola* in Colombia. *J. Kans. Entomol. Soc.* 77(3):292. doi: <https://doi.org/10.2317/0309.02.1>.

AUTHOR'S CONTRIBUTION

DAG, VH, and RO conceived and performed study, analyzed the data, and wrote the paper. All authors have read and approved the submitted manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGMENTS

We are grateful to Amy Comfort and anonymous reviewers for their comments and suggestions that improved this manuscript. Support to V.H.G. was provided by US National Science Foundation's REU program (DBI 1560389) and Universidad Nacional de Colombia throughout a visiting professor scholarship. This is a contribution of the Laboratorio de Investigaciones en Abejas, Departamento de Biología, Universidad Nacional de Colombia, and Division of Entomology, University of Kansas Natural History Museum.

- Gonzalez VH, Sepúlveda P. 2007. Una especie nueva de *Geotrigona* (Hymenoptera, Apidae, Meliponini), con comentarios del género en Colombia. *Acta Biolo. Colomb.* 12S:107–112.
- Gonzalez VH, Vélez D. 2007. Una especie nueva de *Paratrigona* (Hymenoptera, Apidae, Meliponini), con una sinopsis del género en Colombia. *Bol. Mus. Entomol. Univ. Valle* 8(2): 9–13.
- Gonzalez VH, Roubik DW. 2008. Especies nuevas y filogenia de las abejas de fuego, *Oxytrigona* (Hymenoptera, Apidae, Meliponini). *Acta Zool. Mex.* 24(1):43–71. doi: <https://doi.org/10.21829/azm.2008.241615>.
- Gonzalez VH, Engel MS. 2012. A new species of *Geotrigona* Moure from the Caribbean coast of Colombia (Hymenoptera, Apidae). *Zoo-Keys* 172:77–87. doi: <https://doi.org/10.3897/zookeys.172.2735>.
- Gonzalez VH, Griswold TL. 2012. New species and previously unknown males of neotropical cleptobiotic stingless bees (Hymenoptera, Apidae, *Lestrimelitta*). *Caldasia* 34(1):227–245.
- Gonzalez VH, Rasmussen C, Velázquez A. 2010. Una especie nueva de *Lestrimelitta* y un cambio de nombre en *Lasioglossum* (Hymenoptera: Apidae, Halictidae). *Rev. Colomb. Entomol.* 36(2):319–324.
- Gonzalez VH, Amith JD, Stein TJ. 2018. Nesting ecology and the cultural importance of stingless bees to speaker of Yolojóchitl Mixtec, an endangered language in Guerrero, Mexico. *Apidologie* 49(5):625–636. doi: <https://doi.org/10.1007/s13592-018-0590-2>.
- Lepeletier de Saint Fargeau ALM. 1836. *Histoire Naturelle des Insectes—Hyménoptères* [vol. 1]. Paris: Librairie Encyclopédique de Roret.
- Marchi P, Melo GAR. 2006. Revisão taxonômica das espécies Brasileiras de abelhas do gênero *Lestrimelitta* Friese (Hymenoptera, Apidae, Meliponina). *Rev. Bras. Entomol.* 50(1):6–30. doi: <https://doi.org/10.1590/S0085-56262006000100002>.
- Melo GAR. 2003. Notas sobre meliponíneos neotropicais, com a descrição de três novas espécies (Hymenoptera, Apidae). In: Melo GAR, Alves-dos-Santos I, editors. *Apoidea Neotropica: Homenagem aos 90 Anos de Jesus Santiago Moure*. Criciúma, Brazil: Editora UNESC. p. 84–91.
- Michener CD. 2007. *The Bees of the World* [2nd Edition]. Baltimore: Johns Hopkins University Press.
- Nates-Parra G. 2006. *Abejas Corbiculadas de Colombia*. Hymenoptera: Apidae. Bogotá: Universidad Nacional de Colombia.
- Oliveira FF. 2002. The mesotibial spur in stingless bees: a new character for the systematics of Meliponini (Hymenoptera: Apidae). *J. Kansas Entomol. Soc.* 75:194–202.
- Oliveira FF, Marchi P. 2005. Três espécies novas de *Lestrimelitta* Friese (Hymenoptera, Apidae) da Costa Rica, Panamá e Guiana Francesa. *Rev. Bras. Entomol.* 49(1):1–6. doi: <https://doi.org/10.1590/S0085-56262005000100002>.
- Portugal-Araújo V. 1958. A contribution to the bionomics of *Lestrimelitta cubiceps*. *J. Kansas Entomol. Soc.* 31(3):203–211.
- Roubik DW. 1980. New species of *Trigona* and cleptobiotic *Lestrimelitta* from French Guiana (Hymenoptera: Apidae). *Rev. Biol. Trop.* 28(2):263–269.
- Sakagami SF, Roubik DW, Zucchi R. 1993. Ethology of the robber stingless bee, *Lestrimelitta limao*. *Sociobiology* 21(2):237–277.
- Shorthouse DP. 2010. SimpleMappr, an online tool to produce publication-quality point maps. [last accessed: 17 Feb 2018]. <http://www.simplemappr.net>
- Smith F. 1863. Descriptions of Brazilian Honey Bees belonging to the genera *Melipona* and *Trigona*, which were exhibited, together with samples of their honey and wax, in the Brazilian Court of the International Exhibition of 1862. *Trans. Entomol. Soc. Lond.* 11:497–512. doi: <https://doi.org/10.1111/j.1365-2311.1863.tb01298.x>.
- Smith-Pardo A, Gonzalez VH. 2007. Diversidad de abejas (Hymenoptera, Apoidea) en estados sucesionales del bosque húmedo tropical. *Acta Biolo. Colomb.* 12 (1):43–56.