

Article

Two new species of oil-collecting bees of *Centris* (*Melanocentris*) from Colombia (Hymenoptera: Apidae)

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ABSTRACT. In this article are described two new species of oil-collecting bees of *Centris* (*Melanocentris*) from Colombia. *Centris* (*Melanocentris*) *marinae* sp. nov. occurs in the northeast, César Department, while *C. (Melanocentris) germani* sp. nov. occurs in the southeast, in the Caquetá, Meta and Vaupés Departments, as well as in the Amazonas State in northwestern Brazil. Photographs of both new species and a distribution map are also presented.

KEYWORDS. Biodiversity, Centridini, Neotropical Region, solitary bees, Taxonomy.

RESUMO. Duas espécies novas de abelhas coletoras de óleo de *Centris* (*Melanocentris*) da Colômbia (Hymenoptera: Apidae). Neste artigo são descritas duas novas espécies de abelhas coletoras de óleo do subgênero *Centris* (*Melanocentris*) da Colômbia. *Centris* (*Melanocentris*) *marinae* sp. nov. ocorre no nordeste do país, no Departamento de César, enquanto *C. (Melanocentris) germani* sp. nov. ocorre no sudeste, nos Departamentos de Caquetá, Meta e Vaupés, assim como também no Estado do Amazonas, no noroeste do Brasil. Fotografias das duas novas espécies e um mapa de distribuição também são apresentados.

PALAVRAS-CHAVE. Biodiversidade, Centridini, Região Neotropical, abelhas solitárias, Taxonomia.

The species of *Centris* Fabricius, 1804 comprise a group of oil-collecting solitary bees widely distributed in the Americas, from southern United States to the Chilean-Argentinean Patagonia (MICHENER, 2007). Currently it contains more than 250 species described (MOURE *et al.*, 2007; VIVALLO, 2020) grouped in 13 subgenera, most of them distributed in South America. In general terms, the actual number of species that occur in the Neotropical Region is unknown due the lack of complete taxonomic revisions of most subgenera, mainly those with the highest species richness, like *Centris* (*Centris*) and *C. (Melanocentris)* Friese, 1901.

Important contributions on the biodiversity of the genus in some South American countries have been published in the last decades. Some examples of this can be found in ROIG-ALSINA (2000) and VIVALLO *et al.* (2002, 2003) who revised the species that occur in Argentina and Chile, respectively. In the last years, new contributions on the species richness of the genus were published by VÉLEZ & VIVALLO (2012, 2018), VIVALLO & VÉLEZ (2016) and VIVALLO *et al.* (2013, 2016). These authors revised the species that occur in Colombia, describing some new species and citing for the first time several others for the country. Despite these contributions, the actual number of species of *Centris* that

occur in Colombia is still unknown, and it is very likely that new species will be described in the future, especially from the Andes, as well as from jungle areas with difficult access in the south.

In this article are described two new Colombian species of *C. (Melanocentris)* from the northwest and southeast of the country as a new contribution to the knowledge of the South American species of that subgenus.

MATERIAL AND METHODS

General morphological terminology follows MICHENER (2007). Antennal flagellomeres are indicated as F1, F2, etc.; metasomal terga and sterna as T1, T2, and S1, S2, etc., respectively. All measurements are given in millimeters (mm). The position of vertex in relation to the compound eyes was considered in frontal view. The upper interocular distance (UID) was measured considering the shortest distance between the compound eyes, in frontal view. The lower interocular distance (LID) was measured at the same level of the maximum clypeal width. Mandibular length was measured from the acetabulum to the apex of the apical tooth. Mandibular teeth were numbered from the apex to the base of the mandible. Maxillary palpomeres were numbered

from the base to the apex of the palpus. The genital capsule and hidden sterna were not dissected because in *Centris* these structures exhibit strong intraspecific variation and they do not provide reliable characters in species identification (VIVALLO *et al.*, 2016).

Specimen labels were transcribed under the section “Type data”. The backward bar (\) indicates different labels on the pin of the specimen. The material studied belongs to the following collections: Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (ICN), Laboratorio de Investigaciones en Abejas Silvestres, Universidad Nacional de Colombia, Bogotá, Colombia (LABUN), and Museu Nacional/ Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ). The distribution map was created using ArcGis software (ver. 9.8.1). Before photographing the specimens, they were subjected to a deep cleaning process following the methodology indicated by VIVALLO (2020). Photographs were taken using a camera Leica DFC 450C attached to a stereomicroscope Leica M205. All images were treated using Auto-Montage Leica Application Suite (ver. 4.8.0) or Combine ZP (ver. 7.0.0.1) software of the “Projeto de Informatização da Coleção Entomológica do Museu Nacional/ UFRJ”, SIBBR/CNPq. All images obtained were enhanced with Adobe Photoshop® (ver. 7.0) without affecting the morphology of the specimens. The specimens marked with a cross “[†]” were lost in the fire that destroyed the Museu Nacional of Rio de Janeiro on September 2nd, 2018.

RESULTS

Centris Fabricius, 1804

Subgenus *Centris* (*Melanocentris*) Friese, 1901

***Centris* (*Melanocentris*) *germani* sp. nov.**

urn:lsid:zoobank.org:act:3F5360F0-3322-4FF3-B2F7-

344F8A375F56

(Figs 1, 2)

Diagnosis. Male: integument dark brown, almost blackish (Figs 1, 2). Labrum and lower paraocular and supraclypeal areas yellow (Fig. 1). Clypeus yellow with lower margin mahogany and upper half with two brown longitudinal stains (Fig. 1). Pubescence dark brown, lighter on gena and fore legs. Mesosoma with orange hairs (Figs 1, 2). Mandible curved distally with three teeth; first tooth acute and the other two with truncate apex (Fig. 1). Acetabular carina extended between the base of the second and third tooth (Fig. 1). Central area of epistomal suture relatively straight, slightly concave in the middle (Fig. 1). Central area of the lower margin of clypeus concave (Fig. 1). Shortest distance between lateral ocellus and compound eye almost equal to the diameter of that ocellus. Female: unknown.

Description. Male. Measurements (mm): approximate total length: 24.1; head with: 9.4; UID: 2.8; LID: 4.3; mandibular length: 4.0; F1 length: 1.9. Coloration: integument dark brown, almost blackish (Figs 1, 2). Mandible and antenna brown. Labrum and lower paraocular and supraclypeal

areas yellow (Fig. 1). Clypeus yellow with lower margin mahogany and upper half with two brown longitudinal stains (Fig. 1). Distal margins of terga and sterna light brown, slightly translucent. Wing membranes dark brown with violet/ greenish iridescence (Fig. 2). Integument and sculpture surface: clypeus with relatively fine and dense punctation, very scattered on disc (Fig. 1). Labrum with similar punctation, but denser than on clypeal disc (Fig. 1); basal margin with narrow smooth surface (Fig. 1). Terga and sterna with narrow smooth distal margin. Terga with fine and very dense punctation, sparser on distal half of T1 and coarser and sparser on distal segments. Pubescence: dark brown, lighter on gena and fore legs. Mesosoma with orange hairs (Figs 1, 2). Coxae with light brown pubescence (Fig. 2). Structures: mandible curved distally, with three teeth; first tooth acute and the other two with truncate apex (Fig. 1). Maxillary palpus with four palpomeres. Acetabular carina extended between the base of the second and third tooth (Fig. 1). Trimmal angle relatively acute. Central area of lower margin of clypeus concave (Fig. 1). Labrum slightly semicircular to triangular with gently convex lateral margins (Fig. 1). Shortest distance between clypeus and compound eye less than the basal width of F1 (Fig. 1). Central area of epistomal suture relatively straight, slightly concave in the middle (Fig. 1). Inner orbits of compound eyes converging above (Fig. 1). Vertex below the upper interocular tangent (Fig. 1). Shortest distance between lateral ocellus and compound eye almost equal to the diameter of that ocellus (Fig. 1). F1 slightly shorter than F2+F3+F4.

Type material. Holotype male with the following information: [white label, printed] COLOMBIA Caquetá Solano PNN Chiribiquete R. Mesay Captura manual 300m 00°14'N 02°56'W 01.ii.2000 F. Quebedo, leg. [with label with barcode] ICN 012301 [red label, printed] HOLOTYPE (ICN). Paratypes males with the following information: [white label, printed] COLOMBIA Caquetá Solano PNN Chiribiquete R. Mesay Captura manual 300m 00°14'N 02°56'W 01.ii.2000 F. Quebedo, leg. [with label with barcode] ICN 012300 [yellow label, printed] PARATYPE (ICN). [white label with black rim, handwritten] Soratama Apaporis Mun. Meta III-52 [white label, printed] Soratama Apaporis Mun. Meta III-52 [white label with upper half light yellow, printed] 0340 [white label, handwritten] *Centris Melanocentris cf. atra* ♂ Det: Moure mayo/90 [yellow label, printed] PARATYPE (LABUN). [white label with black rim, printed] COLOMBIA. VAUPES Mitu, Isana, Pto. Arenal N01°40'18,4" W70°07'26,6" 200 msn, SP, T1 Colector: Hollman Miller H Fecha: 24/01/07 [yellow label, printed] PARATYPE (LABUN).

Additional specimen. [light yellowish label with black rim, printed] COLEÇÃO CAMPOS SEABRA [light yellowish label with black rim, printed] TABATINGA Amazonas BRASIL [printed] Novembro 1958 [handwritten] F. M. Oliveira [printed] (MNRJ)†.

Etymology. This species is dedicated to Mr. Germán Villamizar Romero.



Figs 1, 2. *Centris* (*Melanocentris*) *germani* sp. nov., holotype male: 1, frontal view (scale bar 2 mm); 2, habitus, lateral view (scale bar 5 mm).

Type locality. COLOMBIA, **Caquetá**: Parque Nacional Natural Chiribiquete.

Distribution. BRAZIL, **Amazonas**: Tabatinga. COLOMBIA, **Caquetá**: Parque Nacional Natural Chiribiquete; **Meta**: Soratama; **Vaupés**: Puerto Arenal (Fig. 5).

Comments. *Centris germani* sp. nov. is superficially similar to *C. fulva* Friese, 1924. However, both species differ by the distance between the lateral ocellus and the inner orbit of the compound eye (approximately half of the diameter of the ocellus in *C. fulva*; relatively equal to the diameter of the ocellus in *C. germani* sp. nov.), by the shape of the brown spots on the upper half of the clypeus (relatively elliptical in *C. fulva*; linear in *C. germani* sp. nov.); and by the coloration of the pubescence of hind legs (yellowish orange in *C. fulva*; dark brown in *C. germani* sp. nov.).

***Centris* (*Melanocentris*) *marinae* sp. nov.**

urn:lsid:zoobank.org:act:8A980E1F-967B-4D9D-997B-B1B9DB9CAFC6
(Figs 3, 4)

Diagnosis. Male: integument and pubescence dark brown, lighter on distal terga and sterna (Fig. 3). Lower paraocular area and clypeal disc yellow (Fig. 3). Mandible curved distally, with three teeth of acute apex. Shortest distance between lateral ocellus and compound eye less than half of the diameter of that ocellus (Fig. 3). F1 slightly shorter than F2+F3+F4 (Fig. 3). Female: unknown.

Description. Male. Measurements (mm): approximate total length: 22.5; head with: 8.7; UID: 2.0; LID: 3.6; mandibular length: 3.2; F1 length: 1.8. Coloration: integument dark brown, almost blackish (Figs 3, 4). Lower paraocular area and clypeal disc yellow (Fig. 3). S5, S6 and T5-T7 light brown (Fig. 4). Wing membranes dark brown with violet/greenish iridescence (Fig. 4). Integument and sculpture surface: clypeus with coarse and relatively dense punctation, scattered on disc (Fig. 3). Surface near the epistomal suture with finer and denser punctures. Labrum with coarse and

fine punctures intermixed, denser than on clypeal disc (Fig. 3). Basal margin with sparser punctation than on the rest of labrum (Fig. 3). Terga and sterna with narrow smooth distal margin. Terga with fine and very dense punctation, sparser on lateral sides of T1 and coarser and sparser on light brown distal segments. Pubescence: dark brown, darker on hind legs and lighter, almost yellowish brown on distal terga and sterna (Figs 3, 4). Discs of T2 and T3 with some yellow, long and simple hairs intermixed, almost forming a transversal line on distal half of T3 (Fig. 4). Structures: mandible curved distally, with three teeth of acute apex (Fig. 3). Maxillary palpus with four palpomeres. Acetabular carina reaching the base of the third tooth (Fig. 3). Trimmal angle acute, almost straight. Central area of lower margin of clypeus relatively straight (Fig. 4). Labrum slightly triangular with rounded lateral margins (Fig. 3). Shortest distance between clypeus and compound eye less than basal width of F1 (Fig. 3). Central area of epistomal suture relatively straight (Fig. 3). Inner orbits of compound eyes converging above (Fig. 3). Vertex below the upper interocular tangent (Fig. 3). Shortest distance between lateral ocellus and compound eye less than half of the diameter of that ocellus (Fig. 3). F1 slightly shorter than F2+F3+F4 (Fig. 3).

Type material. Holotype male with the following information: [white label, printed] COLOMBIA: Dept. Magdalena Valledupar [printed] VI-4-7- [handwritten] 1968 [printed] [white label, printed] Borys Malkin Collector (MNRJ)†.

Type locality and distribution. COLOMBIA, **César**: Valledupar (Fig. 5).

Etymology. This species is dedicated to Mrs. Marina Carvajal.

Comments. This species is only known from the male holotype. Despite the information contained in the label referring to the Department where this new species was collected (Magdalena), Valledupar corresponds to the capital of the César Department, which was created from Magdalena one year before the specimen studied was collected.



Figs 3, 4. *Centris* (*Melanocentris*) *marinae* sp. nov., holotype male: 1, frontal view (scale bar 2 mm); 2, habitus, lateral view (scale bar 5 mm).

This new species is similar to *C. obsoleta* Lepelletier, 1841. However, they differ by the distance between the lateral ocellus and the inner orbit of the compound eye (approximately equal to the diameter of the ocellus in *C. obsoleta*; less than half of the diameter of the ocellus in *C. marinae* sp. nov.), as well as by the coloration of the pubescence of the mesosoma (yellow and dark brown or blackish in *C. obsoleta*; completely dark brown in *C. marinae* sp. nov.).

DISCUSSION

The majority of known species of *Centris* (*Melanocentris*) that occur in Colombia are widely distributed in other South American countries, mainly Brazil, through areas of the Amazonia (F. Vivallo, unpubl. data). This characteristic is also observed in *C. germani* sp. nov., which is distributed in both countries, although it is possible that its actual distributional range includes forested areas of Venezuela, Ecuador and/or Peru. This species belongs to a lineage made up of several poorly-known species, which have modifications in their mandibles, mainly in the truncated apex of the innermost teeth (F. Vivallo, unpubl. data). On the other hand, *C. marinae* sp. nov. belongs to the same species-group of *C. obsoleta* Lepelletier, 1841, *C. melanochlenea* Smith, 1874 and probably *C. modesta* Smith, 1854. The species of this group are characterized by the less curved apex of the mandibles, which contrasts with the pattern observed in the other species of *C. (Melanocentris)*, as well as by the acute apex of the teeth, in both sexes. The lineages to which *C. germani* sp. nov. and *C. marinae* sp. nov. belong need a deep and complete taxonomic study, which would allow to recognize the morphological limits of the species already described, as well as to potentially recognize others that have remained unknown by science until now.

In *Centris*, as well as in other genera of Neotropical bees, there are large gaps in knowledge about the identity

of species (Linnean shortfall) and their spatial distribution (Wallacean shortfall). According to the information available, *C. germani* sp. nov. and *C. marinae* sp. nov. are apparently endemic elements of the western portion of the Amazon. Unfortunately, nothing is known about their bionomy, as well as the morphology of the females of both new species.

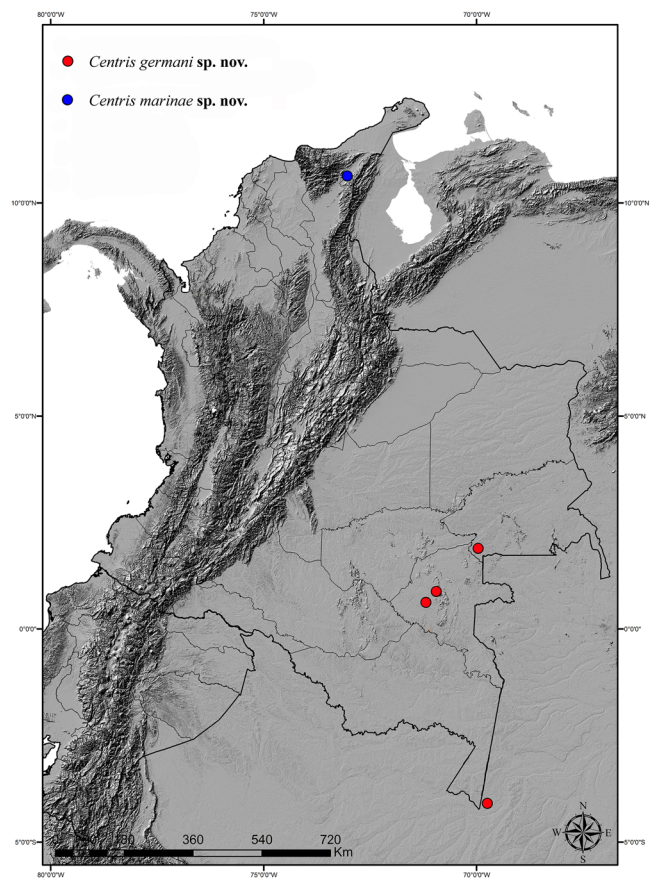


Fig. 5. Distribution records of *Centris* (*Melanocentris*) *germani* sp. nov. and *C. (Melanocentris)* *marinae* sp. nov.

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This article is dedicated to Germán and Paola Villamizar Carvajal. The names of the species described here are a tribute to their parents, Marina Carvajal and Germán Villamizar Romero, who unfortunately left before their time.

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