

Research Article

Two new Brazilian species of oil-collecting bees of the genus *Centris* (*Ptilotopus*) Klug (Hymenoptera: Apidae)

Dos nuevas especies brasileñas de abejas recolectoras de aceite del género *Centris* (*Ptilotopus*) Klug (Hymenoptera: Apidae)

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Abstract. *Centris* (*Ptilotopus*) *auriceps* **sp. nov.** and *C. (Ptilotopus)* *neglecta* **sp. nov.** from South America are described and illustrated. The description of the first species is based on a single male specimen collected in Pará state, northern Brazil, while the second species is based on four female specimens collected in Goiás state, central Brazil. A comparative note with superficially similar species is provided.

Key words: Anthophila, Centridini, Neotropical Region, taxonomy, solitary bees.

Resumen. *Centris* (*Ptilotopus*) *auriceps* **sp. nov.** y *C. (Ptilotopus)* *neglecta* **sp. nov.** de Sudamérica son descritas e ilustradas en este trabajo. La descripción de la primera especie se basa en un único espécimen macho recolectado en el estado de Pará, norte de Brasil, mientras que la segunda especie se basa en especímenes hembra recolectados en el estado de Goiás, región central de Brasil. Se proporciona una nota comparativa con especies someramente similares.

Palabras clave: Abejas solitarias, Anthophila, Centridini, Región Neotropical, taxonomía.

Introduction

Centris (*Ptilotopus*) Klug, 1810 contains the largest and most stunning oil-collecting bees in the Neotropical Region (Michener 2007). Despite their attractiveness, the species of this subgenus have not received much attention, leaving several aspects of their bionomy completely unknown. The most relevant aspect of the biology of the species of this lineage is their association with arboreal termitaria which females use to construct their nests (Silveira *et al.* 2002; Snelling 1984). Some species of *C. (Ptilotopus)* are frequently cited in the literature for their role as pollinators of flora of commercial interest (Gaglianone *et al.* 2010; Vilhena & Augusto 2007). However, the vast majority of them are poorly known and in some cases, difficult to identify.

Centris (*Ptilotopus*) is one of the most characteristic and well-defined subgenus of Centridine bees. The presence of a strong tubercle on anterior lower part of

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hypoepimeral area, the well-defined bare areas on mesoscutellum and sometimes on mesoscutum, and the female's primary basitibial plate with abundant and dense pubescence on disc, clearly without secondary plate are some of the traits useful to identify the species of this group.

According to Moure *et al.* (2007), Vivallo (2016, 2018) and Vélez & Vivallo (2018), in *Centris* (*Ptilotopus*) there are 23 currently valid species distributed mainly in South America, with records from Southern Brazil and Paraguay (Michener 2007; Silveira *et al.* 2002) north to Panama (Vélez & Vivallo 2018).

The lack of taxonomic revisions using modern methodologies with detailed studies of type specimens, as well as the nonexistence of identification keys have originated some confusion on the true identity of the species belonging to this subgenus (see Vivallo 2018). As a consequence, the difficulty in the recognition of described species avoids the discovery of potential new taxa currently unknown to science.

In this paper two new species of *C. (Ptilotopus)* are described based on specimens collected in northern and central Brazil, respectively.

Material and Methods

General morphological terminology follows Michener (2007); mandible morphology follows Michener & Fraser (1978) and the oil-collecting apparatus (elaiospathe) is named according to Neff & Simpson (1981). Metasomal terga and sterna are indicated as T and S, respectively. Measurements are given in millimeters (mm). The position of the 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 eyes, in frontal view. The lower interocular distance (LID) was measured at the same level of the maximum clypeal width. The length of the antennal flagellomeres was measured along their midline. 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. The morphological structures and the characters of coloration and sculpture surface mentioned in the descriptions of the new species have interspecific variation, facilitating comparisons between the species of the subgenus. The genital capsule and hidden sterna of *C. auriceps* **sp. nov.** were not dissected because in *Centris* these structures exhibit strong intraspecific variation (see De la Hoz 1970), and thus they do not provide reliable characters in species identification. Specimen labels were transcribed exactly as found. The backward slash (\) indicates different labels on the pin of the same specimen. Photographs were taken using a Leica DFC 450 camera attached to a Leica M205C stereomicroscope and using Extended-focus software Leica Application Suite v4.8.0. All images were prepared using CombineZP v7.0.0.1 software, and then enhanced with Adobe Photoshop® (ver. 7.0) without distorting the morphological characters of the specimens. The female of *C. moerens* (Perty, 1833) of Fig. 6 contained the following data label: Coleção Campos Seabra\ Vitoria da Conquista Bahia, Brasil jane. 1963 F. M. Oliveira. This specimen was housed at the Collection of Entomology of the MNRJ (Museu Nacional of Rio de Janeiro, Brazil). All specimens here mentioned were lost in the fire that destroyed the Museu Nacional on September 02, 2018. The morphological analysis, descriptions and diagnoses were made before the fire and were based directly on the study of the pinned specimens, not on the photographs included in this article.

Systematics

Centris (Ptilotopus) auriceps sp. nov. (Figs. 1, 2)

Diagnosis. This new species is easily recognized by the yellowish coloration of clypeus and labrum, by the yellowish pubescence on T2 (Fig. 2) and the yellowish-orange hairs on head and fore legs that contrast with the brown pilosity on the rest of the body (Figs. 1, 2).

Description. Holotype male. *Measurements (mm):* Approximately body length: 25.1. Head width: 6.7. Forewing length: 20.1. Mandible basal width: 1.8. Mandible length: 3.4. Escape length: 1.0. F1 length: 1.6. F2 length: 3.5. F3 length: 4.5. UID: 2.7. DII: 3.4. *Coloration:* Integument of head in general dark brown, but mandible light brown with dark brown apex (Fig. 1). Labrum, clypeus, supraclypeal and paraocular areas yellowish (Fig. 1). Antenna brown, escape, pedicel and F1 slightly reddish brown. Forelegs and pronotal lobe light brown. Mesoscutum, mesoscutellum and tegula dark brown (Fig. 2). Hypoepimeral tubercle, metanotum, metepisternum and propodeum reddish brown. Middle and hind legs brown (Fig. 2). Terga and sterna brown with yellowish brown distal margin. Wings brown with slight violet iridescence (Fig. 2). *Pubescence:* Head and forelegs yellowish-orange (Figs. 1, 2). Mesosoma with brown hairs, slightly darker on mesoscutum and mesoscutellum (Fig. 2). Middle and hind legs with dark brown hairs (Fig. 2). Metasoma with brown hairs, similar to those on mesoscutum, except T2 with yellowish hairs (Fig. 2). *Integument and sculpture surface:* Labrum with fine areolation, almost absent, with coarse and relatively scattered punctation, with a narrow and not well-defined smooth longitudinal area. Clypeus strongly areolate and with fine and dense punctation, coarser and scattered towards the lateral sides. Distal margin of terga and sterna smooth. *Structures:* Maxillary palpus with five palpomeres (relative lengths: $2^{nd} > 3^{rd} > 1^{st} > 4^{th} \approx 5^{th}$). Mandible with three apically acute teeth, except second widely rounded (relative lengths: $1^{st} > 2^{nd} > 3^{rd}$) (Fig. 1). Apical tooth widely separated from the others (Fig. 1). Third tooth with apex directed upwards. Trimmal angle absent. Acetabular carina reaching the base of second tooth (Fig. 1). Labrum relatively semicircular, without longitudinal carina (Fig. 1). Clypeus convex (lateral view) and with concave upper half (dorsal view). Central area of epistomal suture slightly more convex than central area of clypeal lower margin (Fig. 1). Inner orbits of compound eyes slightly diverging downwards (Fig. 1). Occipital area not visible behind the eyes (frontal view) (Fig. 1). Vertex slightly above the upper orbital tangent. External lateral area of lateral ocelli with a deep longitudinal cavity directed backwards. Pronotal lobe rounded. Mesoscutum without glabrous area on posterior half. Mesoscutellum with two rounded glabrous protuberances. Axilla raised, rounded and glabrous. Tegula with a small rounded protuberance on central inner side. Hypoepimeral area with relatively acute protuberance. Claws with well-developed internal tooth.

Type specimen. Holotype male, with the following data label: Coleção Campos Seabra\ Cachimbo Pará - Brasil julho 1955 F. M. Oliveira (MNRJ).

Etymology. From Latin *aureus* (golden) and *ceps* (head) due to the yellowish-orange pubescence on head.

Distribution. The distribution of this new species remains restricted to Cachimbo, in the Amazonian state of Pará, northern Brazil.

Comments. This species exhibits a unique pattern of coloration of pilosity that makes it easily recognized and unmistakable between the species of *Centris (Ptilotopus)*. The female of this new species is unknown.



Figures 1-4. 1-2. Holotype male of *Centris auriceps* **sp. nov.** 1. Head, frontal view (scale bar: 1 mm). 2. Habitus, lateral view (scale bar: 5 mm). 3-4. Holotype female of *Centris neglecta* **sp. nov.** 3. Head, frontal view (scale bar: 1 mm). 4. Habitus, lateral view (scale bar: 5 mm).

Centris (*Ptilotopus*) *neglecta* **sp. nov.**
(Figs. 3-5)

Centris (*Ptilotopus*) *atra* Moure, 1995: 951. (Morphology, distribution (Partim)). Silveira *et al.*, 2002: 98. (List, distribution (Partim)).

Diagnosis. Integument and pubescence blackish (Figs. 3, 4). Clypeus areolate with central area of upper margin relatively bright, impunctate, with very fine areolation, almost absent (Fig. 3). Dorsal surface of mesoscutellum with two elliptical, narrow, raised and well-defined glabrous area with lateroposterior margin with elevated ridge (Fig. 5).

Description. Holotype female. *Measurements (mm):* Approximately body length: 30.4. Head width: 9.7. Forewing length: 20.6. Mandible basal width: 2.3. Mandible length: 4.4. Escape length: 1.4. F1 length: 2.0. F2 length: F3 length: 0.5. DIS: 4.7. DII: 4.7. *Coloration:* Head black (Fig. 3), except malar area and center of mandible mahogany. Metepisternum, metanotum, and propodeum brown. Femora, sterna and T1 dark reddish brown. T2-T6 dark brown. Wings dark brown (Fig. 4) with greenish iridescence. Apex of fore and middle femora orange at sides. Central surface of internal half of tegula orange brown. *Pubescence:* Blackish, without yellow hairs on metasoma (Figs. 3, 4). *Integument and sculpture surface:* Clypeus strongly

areolate, with coarse and dense punctation on periphery of disc; central area of upper margin relatively bright, impunctate, with very fine areolation, almost absent (Fig. 3). Labrum with coarse and very dense punctation. Posterior area of ocelli with short linear cavity projected backwards. Posterior area of ocelli with semicircular transversal linear cavity. Distal margin of T2-T4 smooth. *Structures*: Flabellum elliptical. Maxillary palpus with four palpomeres (relative lengths: $2^{\text{nd}} > 3^{\text{rd}} > 1^{\text{st}} > 4^{\text{th}}$). Mandible with three apically rounded teeth (relative lengths: $1^{\text{st}} > 2^{\text{nd}} > 3^{\text{rd}}$) (Fig. 3). Apical tooth separated from the rest, with broad base (Fig. 3). Trimmal angle obtuse, almost absent. Acetabular carina reaching base of second tooth (Fig. 3). Labrum semicircular with well-developed central longitudinal carina. Clypeus convex, slightly concave near lower margin (lateral view). Vertex above the upper interocular tangent. Central area of epistomal suture straighter than central area of clypeal lower margin (Fig. 3). Occipital area well-developed, visible behind the eyes (frontal view) (Fig. 3). Pronotal lobe with acute projection. Hypoepimeral area with rounded tubercle. Mesoscutum with glabrous biconvex area on posterior half (Fig. 5). Mesoscutellum with two elliptical raised divergent posteriorly glabrous areas separated from each other, each with elevated ridge on lateroposterior margin (Fig. 5). Axilla raised and glabrous with relatively flat dorsal surface (Fig. 5). Tegula with a small rounded protuberance on central area of inner half. Primary anterior comb of fore elaiospathae starting below strigilis. Secondary comb formed by four giant apically curved hairs. Basitibial plate elliptical with abundant pilosity on disc, without secondary plate. Pygidial plate with rounded apex, with distal half slightly angled downwards (lateral view), without evident secondary plate. Claws with internal teeth, except hind leg.

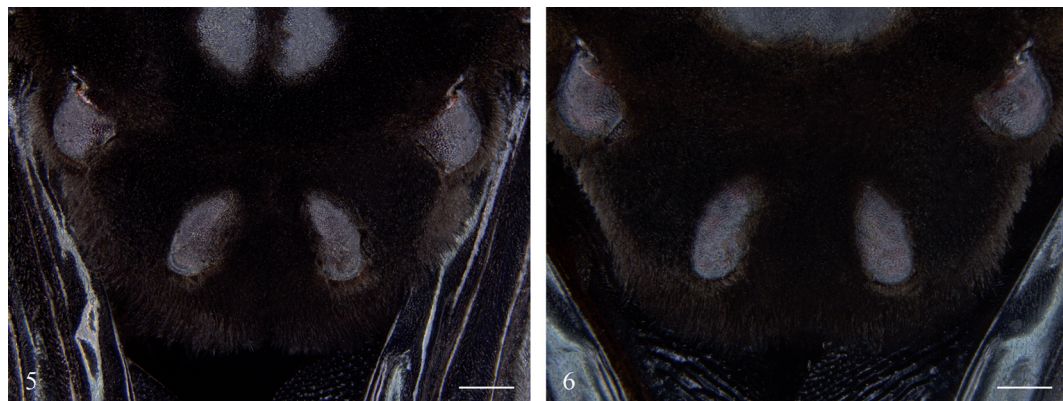
Type material. Holotype female, with the following data label: Coleção Campos Seabra \ Brasil Goiás Minaçu V 1987 Monné & Roppa \ Minaçu Go V. 1987 Monné Roppa. Paratypes: 3 females with the same data label of the holotype. All specimens were deposited at MNRJ.

Etymology. From Latin *neglectus* (neglected, ignored) due to the misidentification of the specimens of this species with *Centris atra* Friese, 1899 (see below).

Distribution. According to Moure (1995) and Silveira *et al.* (2002), this species occurs in the states of Goiás, Minas Gerais and Tocantins.

Comments. Among the specimens studied was observed only a small variation in the coloration of the pubescence of the mesosoma and legs probably due to conservation conditions. This new species is similar to *C. moerens*. Both are differentiated by the yellow pilosity on T1-T3 (absent in *C. neglecta* sp. nov. (Fig. 4), present in *C. moerens*), by the coloration of clypeus and mandible (mostly black in *C. neglecta* sp. nov. (Fig. 3) and reddish brown in *C. moerens*), by the curvature of the middle area of the upper and lower margins of clypeus (lower greater than upper in *C. neglecta* sp. nov. (Fig. 3) and relatively equal in *C. moerens*), and by the raised lateroposterior margin of glabrous areas of mesoscutellum (present in *C. neglecta* sp. nov. (Fig. 5) and absent in *C. moerens* (Fig. 6)).

Centris neglecta sp. nov. could also be confused with *C. maranhensis* Ducke, 1910, especially with specimens of that species with reduced yellow pubescence on mesosoma and metasoma. Both species are differentiated by the central area of upper margin of clypeus (with fine or absent areolation in *C. neglecta* sp. nov. (Fig. 3), uniformly areolated as on the rest of clypeus in *C. maranhensis*) and by the coloration of tegula (dark brown to black with light brown spot at central area of inner half in *C. neglecta* sp. nov. and uniformly dark brown to black in *C. maranhensis*). Additionally, in *C. neglecta* sp. nov. the pubescence of mesosoma and metasoma is completely blackish (Fig. 4), while in *C. maranhensis* there are yellow hairs generally on mesepisternum, mesoscutellum and on lateral sides of T1 and T2. The male of this new species is unknown.



Figures 5-6. Dorsal surface of mesoscutellum. 5. Holotype female of *Centris neglecta* sp. nov. 6. Female of *Centris moerens* (Brazil: Vitória da Conquista) (scale bars: 1 mm).

Discussion

Moure (1995) identified *Centris atra*, the type species of *C. (Melanocentris)* Friese, 1901 as a species of *C. (Ptilotopus)*. He therefore renamed *C. (Melanocentris)* of authors as *C. (Melacentris)* and proposed *C. (Melanocentris)* as a junior synonym of *C. (Ptilotopus)*. Unfortunately, the taxonomic decisions made by Moure (1995) were not based on the type specimens of *C. atra*, but on specimens of what it was at that moment, an unidentified species of *C. (Ptilotopus)*. Vivallo (2018) studied the type series of *C. atra* recognizing that, unlike that indicated by Moure (1995) those specimens do not belong to *C. (Ptilotopus)*, but to *C. (Melacentris)*. As a result, *C. (Melanocentris)* was withdrawn from the synonymy of *C. (Ptilotopus)* and consequently revalidated, and *C. (Melacentris)* was proposed as its new junior synonym (Vivallo 2018). The specimens cited by Moure (1995) as belonging to *C. atra* deposited in MNRJ, correspond to the species described here as *C. neglecta* sp. nov.

It is necessary to carry out more collecting activities to discover and describe the male of *Centris neglecta* sp. nov. and the female of *C. auriceps* sp. nov. Unfortunately, the unknown sexes of these new species were not located in other institutions visited during the development of this article despite active searching.

A complete taxonomic revision of the species of *C. (Ptilotopus)* is needed to resolve all taxonomic problems of this group, as well as to carry out more field activities to increase the knowledge of various aspects of the bionomy of the species of this subgenus. Nesting activities, interactions with natural enemies and aspects related to reproductive behavior are practically unknown in the species of this interesting and attractive lineage of oil-collecting bees.

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