

Additions to morphology
and nesting biology of a neotropical centridine bee,
Melacentris dorsata (Lepeletier)
(Anthophila)

Adições à morfologia
e à biologia da nidificação de uma espécie neotropical
de Centridini, *Melanocentris dorsata* (Lepeletier)
(Anthophila)

SEBASTIÃO LAROCA¹
SANDOR CHRISTIANO BUYS²
& PAUL DECELLES³

The name *Melacentris* was created by MOURE (1995) to accommodate a group of bee previously called as *Melanocentris*, since this name was a synonym of *Ptilotopus* due to the designation by SANDHOUSE (1943) of *Centris atra* (which is a *Ptilotopus*) as the type species of *Melanocentris*.

In our paper (LAROCA, REYNAUD DOS SANTOS & SCHWARTZ FILHO, 1993) in which we studied several life history aspects of this species, we used the old name of this species, *Melanocentris dorsata*. Among several aspects, we postulated that *Ptilotopus* and *Melanocentris* together are a monophyletic group, *Ptilotopus* being a *Melacentris*-derived group (called by us in that occasion as *Melanocentris*). Our suspicion was based on morphological similarities among the groups and in the fact

¹ Professor Sênior do setor de Ciências Biológicas da Universidade Federal do Paraná (Curitiba, PR). E-mail: slaroca@netpar.com.br. ^{1 e 2} colaboradores do Laboratório de Biodiversidade Entomológica do Instituto Oswaldo Cruz (RJ), ³ Professor of Biology at Johnson County Community College, Overland Park, Kansas (USA).

that besides *Ptilotopus* only one species — *Melacentris thoracica* (Lepelletier) — constructs its nest in arboreal nests of termites.

Centris is a relatively diversified genus of medium to large bees. In neotropical sites they are quiet common in the Brazilian “cerrado” (a type of savanna) and other open vegetations as well as in forest habitats. M. C. de Almeida (ALMEIDA & LAROCA, 2013) observed a relatively rich fauna of this genus in a cerrado state park (“Parque Estadual de Cerrado de Jaguariaíva”, Paraná state). The species collected by Almeida mentioned in her thesis were: *Centris (Centris) aenea* Lepeletier, *Centris (Centris) nitens* Lepeletier, *Centris (Centris) spilopoda* Moure, *Centris (Centris) varia* (Erichson in Schomburgk), *Centris (Hemisiella) tarsata* Smith, *Centris (Paracentris) burgdorfi* Friese, *Centris (Paracentris) klugii* Friese, *Centris (Ptilotopus) atra* Friese, *Centris (Trachina) fuscata* Lepeletier, *Centris (Xanthemisia) lutea* Friese and four species of *Melacentris* as follow: *Centris (Melacentris) mocsary* Friese, *Centris (Melacentris) xanthocnemis* (Perty in Spix & Martius); as well as *Centris (Melacentris) dorsata* Lepeletier.

The bees of this genus together with Euglossine, hummingbirds and hawk moths form an assemblage of long distance pollinating organisms in tropical savanna and in forests. The activities of this bees in the flowers are variable, since they visit flowers for nectar, pollen, and in various cases also for oil as well as for resins.

In Castro (PR) as well as in several other area in Paraná state the main source of pollen is the flower of the legume *Senna multijuga* (Rich.) H. S. Irwin & Barneby, which native from South America, but today it is cultivated as ornamental in several regions. The main pollen collecting method (or perhaps the unique) adopted by the species of this genus of bees is the *buzzing method*. Females of *Melacentris* are also able to collect oils from floral elaiophores (see for instance GOTTSBERGER, 1986; GAGLIANONE, 2003).

MOURE (1995), made rapid comments about the two morphs of *C. (Melacentris) dorsata*. He says that I had collect the two morphs at the same area in littoral of Paraná state on the flowers of *Senna multijuga*, but I do not recall this fact, on the other hand in an yearly census, from that area I only collected one specimen of *dorsata* (belonging to the darker form). However, in the First Plateaux of Paraná (Curitiba and Castro), I located three large aggregations of this bee's nests, in which there were only individuals of the darker morph. Observation made in one of those aggregation is presented in our paper of 1993 (*cf.* LAROCA, REINAULD DOS SANTOS & SCHWARTZ, 1993). Therefore, it is probable that we are talking of two different subspecies or even species. This is reason

we are presenting additional notes on morphology and nesting biology of the present organism.

PROCEDURES

These additional records are based on specimens (females and males) collected on flowers from nest aggregations of this species in Curitiba, Castro and Alexandra (only one specimen on flower) (PR, southern Brazil).

The studied nests were discovered by Mr. José Luiz Weiss and were located in front of his house in the center of Castro city. Specimens were preserved dried and in 70 % alcoholic solution. The yellow banded specimens were from Pratápolis (MG) and Chapada dos Guimarães (MT) and are preserved dried.

RESULTS

DARKER MORPH

FEMALES

DIMENSIONS (in mm)— Body length approximately: 20.3 mm; forewing length: 19.0 mm; maximum head width: 7.3 mm.

INTEGUMENT COLOR — Head, thorax and legs and abdomen black, but T3, T4 and T5 black with paler reflex in the direction of apical margin; T2 paler reflex restricted to back lateral area; pigdial plate yellowish ferruginous; mandibles yellow from near base of the teeth to the margin area; margin area is blackish.

SCULPTURING (PUNCTUATION) — Punctuation of clypeus rough in lateral margins; disc smooth and brilliant, but with some scattered punctures; basal area tessellate, less brilliant. Interspace variable but in general larger than diameter of punctures.

PILOSITY — Black, but in scutellum margin the hairs a little paler; in the half margin of T3 as well as in T4 and T5 the setae with golden reflex; the apex of T5 with a dense yellowish ferruginous vibrissae, basally darker; In T6 relatively long yellowish pilosity.

MEASURES AND PROPORTIONS (in mm) — Head width less than thorax width and greater than its length (7.3: 10.3: 5.6); compound eyes longer than wider; this more than gena width (4.16: 2.3: 1.5); eyes convergent above, upper interorbital distance greater than lower (4.04: 3.6); clypeus wider than long (3.2: 2.39); pedicel 1.8 times longer than scape (18:10); length of first flagelomere nearly equal to diameter and 1.5 time the malar area length (0.45: 0.50: 0.3); forewing nearly as long as body length (20.3: 19.0).



Fig. 1. Female of *Centris (Melacentris) dorsata* (darker morph) collected on a nest aggregation in Castro (Paraná state, southern Brazil) in March 29, 2019. A, above view; B, front view of the head.

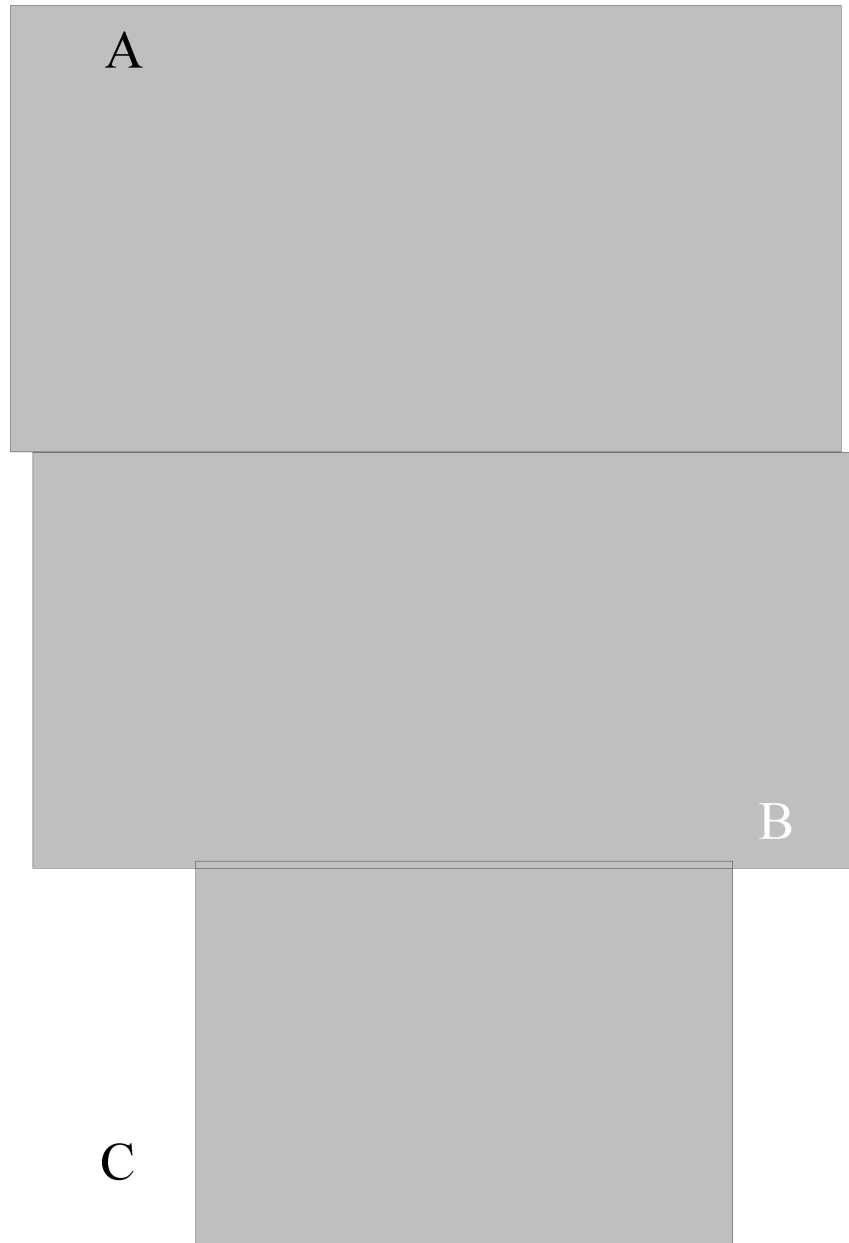
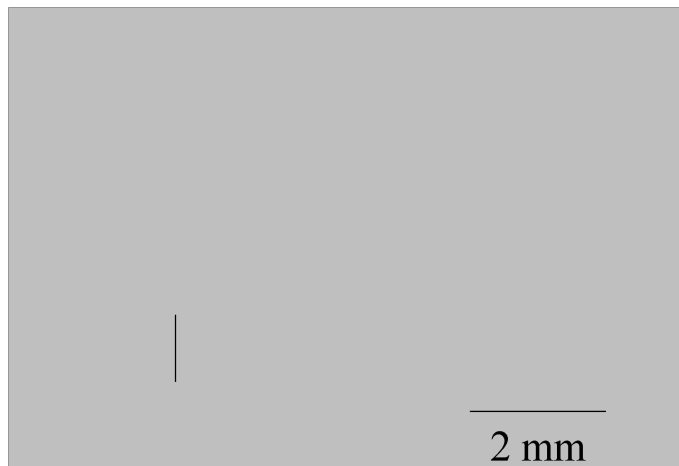
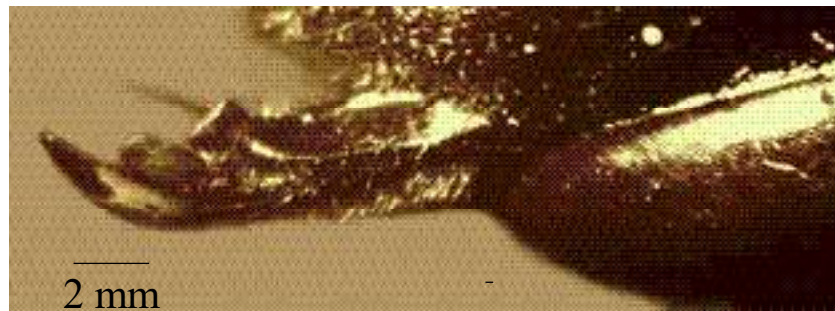


Fig. 2. Female of *Centris (Melacentris) dorsata* (darker morph) collected on a nest aggregation in Castro (Paraná state, southern Brazil) in March 29, 2019. A, mandible (above view); B, oil collecting and transporting structure of the front basitarsus (internal side); C, abdomen posterior view.



Fig. 3. Male of *Centris (Melacentris) dorsata* (darker morph) collected on a nest aggregation in Castro (Paraná state, southern Brazil) in March 29, 2019. A, above view; head in front view.

A



B

Fig. 4. Male of *Centris (Melacentris) dorsata* (darker morph) collected on a nest aggregation in Castro (Paraná state, southern Brazil) in March 29, 2019. A, mandible (above view); B, abdomen (in posterior view).

MALES

DIMENSIONS (in mm)— Body length approximately: 19.5 mm; forewing length: 18.0 mm; maximum head width: 6,3 mm.

INTEGUMENT COLOR — Head, thorax and legs and abdomen black but T3, T4 and T5 black with paler reflex in the direction of apical margin; T2 paler reflex restricted to back lateral area; T6 and T7 tending to yellowish ferruginous; mandibles yellow from near base of the teeth to 2/3 of margin area; 1/3 of margin area is blackish.

SCULPTURING (PUNCTUATION) — Clypeus finely punctuate in lateral margins; disc smooth and brilliant; basal area less brilliant. Interspace subequal the diameter of punctures.

PILOSITY — Black brownish, but in scutellum margin the hairs a little paler; in the half margin of T3 as well as in T4 and T5 the setae with golden reflex; the apex of T5 with a dense yellowish ferruginous vibrissae, basally darker; setae of the lateral apical terga long (reaching more than 1 mm long)

MEASURES AND PROPORTIONS (in mm) — Head width less than thorax width and greater than its length (6,3: 9,3: 5,0); compound eyes longer than wider; this more than gena width (4,6: 1,7: 2,0); eyes convergent above, upper interorbital distance greater than lower (2,3: 3,2); clypeus wider than long (3,0: 2,4); pedicel 1.3 longer than scape whose width less

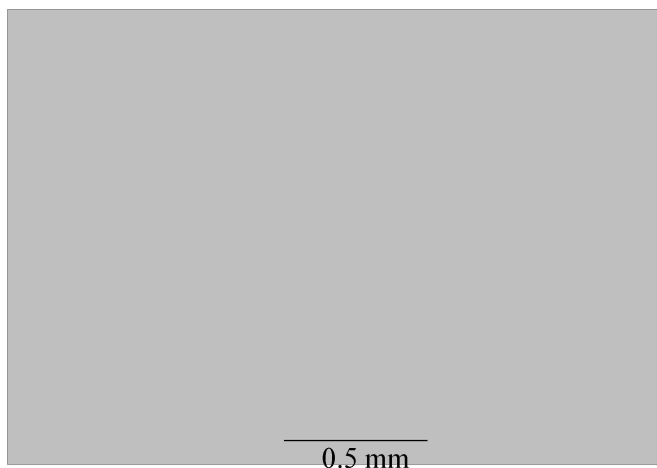


Fig. 5. Male genitalia of *Centris (Melacentris) dorsata* (darker morph) collected on a nest aggregation in Castro (Paraná state, southern Brazil) in March 29, 2019. A, schematic in dorsal view; B. in ventral view.

than half its length (1.0: 1.5: 0.4); first flagelomere as longer as wider (0.4:0.4).

A drawing of male genitalia is presented in figure 5.

MELACENTRIS DORSATA (DARKER MORPH) — NESTING SITE AND DISTRIBUTION OF THE NESTS

The nest aggregation was situated practically in the center of Castro (PR, Brazil), in a somewhat abandoned garden area in front of mr. José Luiz Weiss home, at 24° 47' 33.66" S — 50° 00' 26.26 W; altitude 1002 m above sea level. The nests were in a flat ground covered by grasses and some scattered weeds. The soil in which nests were built was analysed in the laboratories of ABC Foundation (Castro, PR).

Analysis of the soil yielded the following composition. The particle analysis of the soil has showed the following composition: clay: 455 g/kg (45.5 %), silt: 183 g/kg (18.3 %) and sand: 362 g/kg (36.2 %). In Curitiba

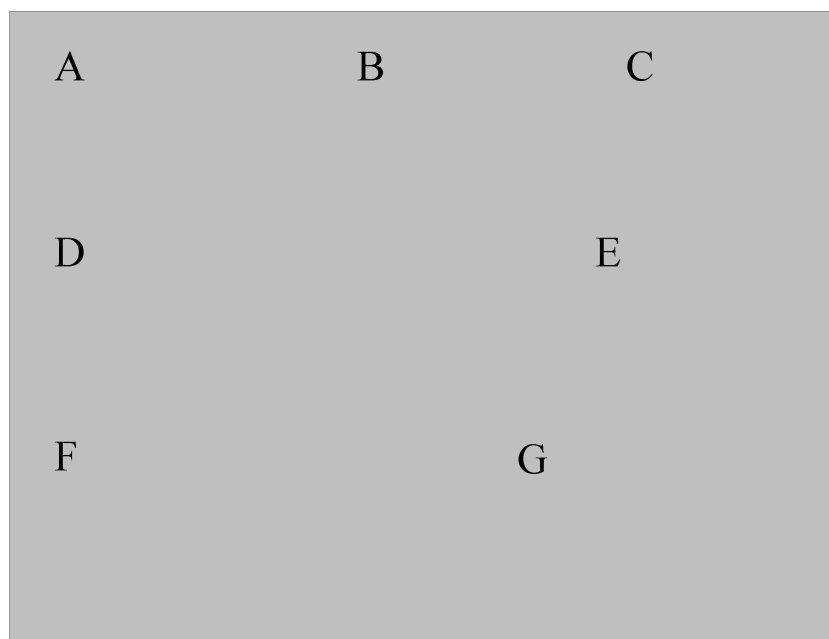


Fig. 5. Nest structures of *Centris (Melacentris) dorsata* (darker morph) observed in a nest aggregation in Castro (Paraná state, southern Brazil) in March 29, 2019. A, used cell in external view; B, cap process; C, inferior view of a cap; D, fragment of an unoccupied cell with its abandoned cocoon; E, cocoon; F, external view of cocoon occupied by a prepupae; G, prepupae.

analysis of those parameters shown similar results (see LAROCA, REYNAUD DOS SANTOS & SCHWARTZ FILHO, 1993). It was observed a relatively high proportion of organic matter (55 g/dm³). The soil is acid (pH 6) as the one from Curitiba (pH 4.1). In Castro (PR) chemical analysis showed the following results: phosphorus: 62 mg/dm³, potassium: 0.9 mmolc/dm³, calcium: 62 mmolc/dm³, magnesium: 29 mmolc/dm³, boron: 0.28 mg/dm³, iron: 59 mg/dm³, cooper: 3.1 mg/dm³, zinc: 9.8 mg/dm³, surfur: 7 mg/dm³.

The distances (in cm) between the entrance of each nest and the entrance of its nearest neighbour was as follows: 48, 52, 75, 120, 175, 196 and 248 cm; the mean distance (and its standard error) 130.6 ± 29.3 cm. The nest assemblage is smaller than the one of Curitiba and therefore the nests were much more dispersed, but even so, the tendency of aggregation is shown.

The Castro region belongs to the *low montane subtropical moist forest* life zone (Holdridge system). The coldest month is June (mean temperature 13.3° C) and the warmst are January and February (20.9° C); annual precipitation is of approximately 1657 mm and the maximum rainfall is in January (mean rain fall 192 mm) and the minimum is in August (82 mm).

Two nests were dissected in February, all with used and abandoned cells, except one that was with a cocoon occupied by a prepupae (Fig.). Structures of the nests are similar the ones studied in Curitiba (PR) (see LAROCA, REINAUD & SCHWARTZ FILHO, 1993), however all nests were in flat ground not in an earth bank.

FINAL COMMENTS

Melacentris dorsata (Lepelletier) occupies a large Brazilian territory, from the state of Pará to Rio Grande do Sul. It was found also in Cochabamba (Bolivia), It is a strong flier (long distance polinnator) and therefore a high energy consumer. Females visit mainly Caesalpiniaceae (Leguminosae) specially *Senna multijuga* (Rich.) H. S. Irwin & Barneby. It occurs naturally and also as cultivated (ornamental). This bee species depends of other plant species for oil. It is distributed from southern United State of America to *Rio Grande do Sul* (Brazil). As refered above there are yet some taxonomic problems to be solve. In the present paper we present some new informations on morphology and on nesting biology. Therefore, we hope the records here presented would be usefull for this purpose.

SUMÁRIO

Novas informações morfológicas e bionômicas sobre *Centris* (*Melacentris*) *dorsata* Lepeletier (*Anthophila*, *Centridini*), com base em dados coletados em uma agregação de ninhos encontrados em Castro (Paraná, Brasil), são apresentadas. A importância desta espécie como polinizador de longa distância é enfatizada.

Palavras-chave: nidificação; bionomia; taxonomia.

SUMMARY

New morphologic and bionomic informations on *Centris* (*Melacentris*) *dorsata* Lepeletier (*Anthophila*, *Centridini*), based in data collected in a nest aggregation found in Castro (Paraná state, Brazil) are presented. The importance of this species as long distance pollinator of tropical and subtropical forests and savanna is stressed.

Keywords: nest biology; morphology; taxonomy

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BIBLIGRAPHY

- ALMEIDA, M. C. & S. LAROCA. 1913. Biocenótica e taxonomia de abelhas silvestres (Hymenoptera, Anthophila) de áreas restritas de cerrado no município de Jaguariaíva, Paraná, sul do Brasil. *Acta Biol. Par.*, Curitiba, 42 (3-4): 29-194.
- MOURE, J. S. 1995. Reestudo de alguns tipos de abelhas neotropicais descritos por Friese e conservados no Museu de Berlim (Apoidea, Colletidae, Anthophoridae). *Revta bras. Zool.* 12 (4): 939-951.
- GAGLIANONE, M. C. (2003) *Abelhas da tribo Centridini na Estação Ecológica de Jataí (Luis Antônio, SP): composição de espécies e interações com flores de Malpighiaceae*. In: Melo, G.A.R. and Alves-dos Santos, I. (Eds.). *Apoidea Neotropica: Homenagem aos 90 anos de Jesus Santiago Moure*. Editora UNESC, Criciúma. Pp.279-284.
- GOTTSBERGER, G. (1986) Some pollination strategies in neotropical savannas and forests. *Plant Systematics and Evolution*, 152: 29-45.

