A new cluster-brood building species of *Plebeia* (Hymenoptera, Apidae) from eastern Brazil[1]

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ABSTRACT. A new cluster-brood building species of *Plebeia* (Hymenoptera, Apidae) from eastern Brazil. A new species of *Plebeia*, the second largest genus of stingless bees in the Neotropical region, is described from eastern Brazil. *Plebeia grapiuna* **sp. nov.**, known only from the lowland forests of southern Bahia, is most similar to *P. lucii* Moure, a species recently described from Minas Gerais. The lack of yellow marks and the smoother integument of the frons and mesoscutum in *P. grapiuna* **sp. nov.** distinguish them. Main features of the nesting habits of the new species are described and illustrated.

KEYWORDS. Atlantic forest; Meliponina; Neotropical region; nesting biology; stingless bees.

RESUMO. Uma nova espécie de *Plebeia* (Hymenoptera, Apidae) do leste do Brasil, com células de cria em cacho. Uma nova espécie de *Plebeia*, o segundo maior gênero de meliponíneos na região Neotropical, é descrita do leste do Brasil. *Plebeia grapiuna* **sp. nov.**, conhecida apenas das florestas de terras baixas do sul da Bahia, é semelhante a *P. lucii* Moure, uma espécie recentemente descrita de Minas Gerais. A ausência de manchas amarelas e o integumento menos rugoso da fronte e do mesoscuto em *P. grapiuna* **sp. nov.** distinguem as duas espécies. Características principais do hábito de nidificação da nova espécie são descritas e ilustradas.

PALAVRAS-CHAVE. Abelhas sem ferrão; biologia da nidificação; Floresta Atlântica; Meliponina; região Neotropical.

Plebeia, the second largest genus of stingless bees in the Neotropical region, currently contains 38 valid species (Camargo & Pedro 2007). Fifteen of these names—about 40% of the genus known diversity—have been proposed in the last fifteen years. The genus richness is likely to be much higher, and when fully revised, it will probably surpass that in *Melipona*.

The distribution range of *Plebeia* almost encompass the entire distribution of the stingless bees in the New World, being found from Nuevo Léon, in Mexico (Ayala 1999) to Uruguay, in the south (Camargo & Pedro 2007). Differently from most stingless bee genera, *Plebeia* possesses a large number of species either south or north of the 15º parallels. The fauna of Mexico, for example, contains 11 species of *Plebeia*, by far the richest stingless bee genus in that country (Ayala 1999).

In this paper, we describe a new species of *Plebeia* from the Atlantic forest of southern Bahia. The Brazilian Atlantic forest, despite the long history of anthropogenic interference, contains a very rich insect fauna which is still poorly known. Also, as regards to stingless bees, many genera contain endemic species associated to the lowland Atlantic forests of eastern Brazil, as for example *Lestrimelitta* (Marchi & Melo 2006), *Partamona* (Pedro & Camargo 2003) and *Scaura* (Melo & Costa 2004).

MATERIAL AND METHODS

In this study, the morphological terminology follows Michener (2000), except for the propodeal triangle, here the metapostnotum. All measurements are in millimeters. The density of punctation, intervals between punctures, was based on relative puncture diameter, pd (e.g. 2 pd: about 2x the puncture diameter between the punctures). The color images were obtained on camera Leica DFC 500 associated to stereomicroscope MZ 16 and processed by the software Automontage (Syncroscopy). The material cited in this study belongs to the Departamento de Zoologia, Universidade Federal do Paraná, Coleção Pe. J. S. Moure, Curitiba, Brazil (DZUP).

Plebeia grapiuna sp. nov.

(Figs. 1–12)

Diagnosis and Comments. *Plebeia grapiuna* **sp. nov.** is easily distinguished from other species of *Plebeia* by its small size, lack of yellow marks on the head, mesoscutum and scutellum, by the finely plumose feather-like hairs on frons, finely rugulose anterior portion of mesoscutum, and by the conspicuously areolate metapostnotum. *P. grapiuna* sp. nov. is apparently restricted to the lowland Atlantic forests of

southern Bahia, being known only from Ilhéus and Camacan, two localities situated about 80 km apart. Among the species of *Plebeia* found in eastern Brazil, *P. grapiuna* sp. nov. is most similar to *P. lucii* Moure, both having a reduced body size, finely plumose feather-like hairs on the frons (more distinctive in *P. grapiuna* sp. nov.), rugulose mesoscutum and areolate metapostnotum, as well as in nest characteristics, both species arranging the brood cells in clusters. They differ, however, in their color pattern (*P. lucii* possesses numerous yellow marks), in the microsculpture of the frons and of the mesoscutum (in *P. lucii*, the reticulation of the frons is more conspicuous, and the rugosity of the mesoscutum is more pronounced), and in the shorter distance between the anterior lamella of pronotum and pronotal collar (this distance is unusually long in *P. lucii*). Two other available names applied to species of *Plebeia* from the Atlantic forest, *P. mosquito* (Smith, 1863) and *P. droryana* (Friese, 1900), have also to be considered. The callow worker preserved as type specimen of *Trigona mosquito* in the Natural History Museum (London) has been briefly examined by the first author and photographed a few years ago while in loan to Prof. Moure. It is clearly not closely related to the new species proposed here, being structurally similar to *P. droryana* auctorum and related species. As regards to *P. droryana*, although the type material has not been examined, Friese's description clearly indicates possession of pale markings on the head and mesosoma, what excludes *P. grapiuna* sp. nov.

Description. Worker holotype. Body length: 3.5 mm; maximum head width: 1.4 mm; forewing length: 3.0 mm; maximum width of T2: 1.2 mm. Color: Integument predominantly black (as in Figs. 1–3). Mandibles, scape radicle, last flagellomere, legs (except for reddish brown fore tibia and tarsi), pronotal lobes, tegulae, metanotum, basal half of T1 and sterna, brown to dark brown. Pronotal collar with two narrow transverse pale yellow stripes. Wing membrane hyaline; veins and pterostigma, dark brown. Pubescence. Predominantly white, except for reddish brown setae on inner surface of tarsi and brown microtrichiae on wings; setae of penicillum and rastellum brown. Face and lateral portion of mesepisternum with conspicuous decumbent finely plumose hairs (as in Figs. 4–6); those on head almost feather-like (as in Fig. 6). Longest erect setae on clypeus with 0.07–0.09 mm in length; those on scape, with 0.04–0.05 mm; on vertex, with 0.11–0.14 mm. Erect setae on anterior corner of mesoscutum finely plumose, with 0.18–0.25 mm; disc covered with dense, mostly simple, very short pubescence (setae with 0.02–0.04 mm in length), and a few sparse longer setae, with 0.07–0.09 mm. Longest setae on posterior margin of scutellum with few short branches, and about 0.2–0.25 mm in length. Erect setae along omaular area plumose, those on lateral mesepisternum mostly simple. Integumental surface: Mostly smooth and shinny, piligerous punctation conspicuous on face and mesoscutum (as in Figs. 3, 6). Upper half of clypeus and frons weak and finely granulose (more visible at certain light), punctures about 2–5 pd apart. Anterior one-quarter and lateral margins of mesoscutum finely rugulose due to weak transverse and longitudinal wrinkles, respectively; surface between punctures on central and posterior portions of mesoscutum mostly smooth, punctures about 2–4 pd apart. Entire metapostnotum conspicuously areolate. Structure (measurements in mm): Space between denticles of mandible in a concave emargination (as in Fig. 7); head about 1.2x wider than long (1.4:1.2); proportion between upper (tangential to lower rim of mid ocellus), maximum and lower interorbital distances, 0.95:1.0:0.72 (0.93:0.98:0.71); clypeus 2.1x wider than long (0.7:0.33); scape, excluding radicle, about 4.8x longer than its maximum width (0.48:0.1); proportion between pedicel, 1st and 2nd flagellomeres 1.4:1.0:0.9 (0.14:0.1:0.09); malar space very narrow, about 0.21x the diameter of 2nd flagellomere (0.025:0.12); eye about 2.5x longer than its maximum width (0.97:0.38), in lateral view, about 1.3x wider than maximum width of gena (0.31:0.24); ocelo-orbital distance, in dorsal view, about 0.5x the distance between posterior ocelli (0.16:0.29). Distance between anterior lamella of pronotum and pronotal collar, measured along midline, short (0.05); scutellum about 2x wider than long (0.62:0.30).

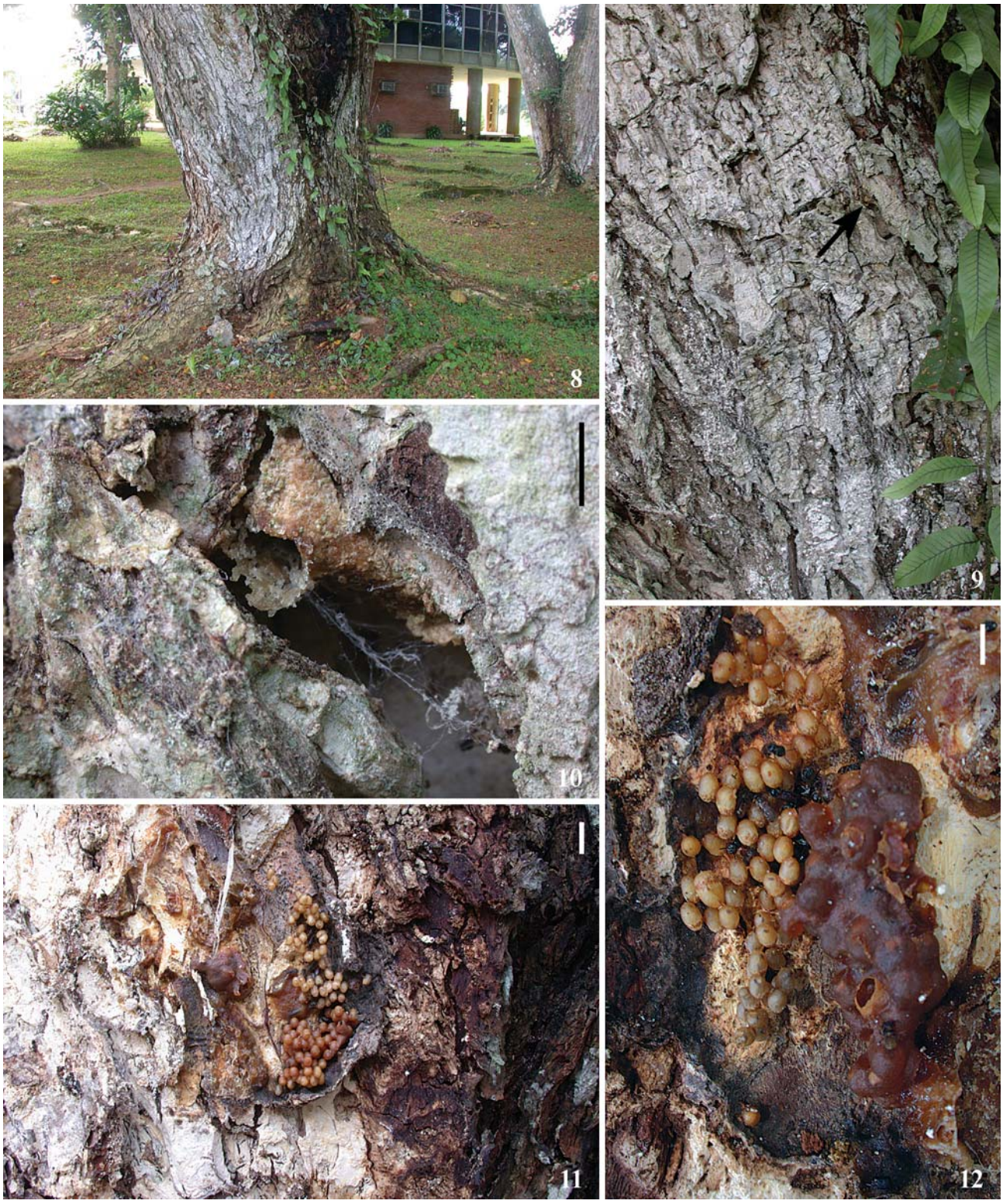
Type Material. Worker holotype "Brasil, Bahia, Ilhéus, Campus da UESC, 17.i.2007, Melo & Costa, em ninho". Paratypes: 8 workers, same data as holotype; 7 workers, "Brasil, Bahia, Ilhéus, Campus da UESC, 10.i.2003, G. Melo & M. Costa Ninho" "Ninho sob casca de árvore *Albizia inopinata*"; 5 workers, "Brasil, Bahia, Camacã, Faz. Sta. Bárbara, 200m, 15° 23' S, 39° 32' W, 14.i.2007, Melo & Carvalho Fo."; 3 workers, "Brasil, Bahia, Camacã, Faz. Sta. Bárbara, 200m, 15° 23' S, 39° 32' W, 14.i.2007, Carvalho Fo."; 3 workers, "Brasil, Bahia, Camacã, Faz. Paris, 200m, 15° 25' S, 39° 32' W, 18.i.2008, M. A. Costa & A. Carvalho Fo., ninho".

Etymology. The name 'grapiuna' is applied to the cocoa-producing region of southern Bahia, as well as a nickname for its inhabitants; from the Tupi-Guarani *guirá*, bird, plus *piuna*, dark skin, used here in allusion to the dark integument of the worker bees.

Biology. Four nests of *P. grapiuna* sp. nov. were found, two underneath the bark of the same live tree (*Samanea inopinata*, Mimosaceae) in the campus of the Universidade Estadual de Santa Cruz, in Ilhéus, Bahia (Fig. 8), and the other two inside crevices underneath wooden doorframes of buildings (one in the campus of UESC, and the other in the Fazenda Paris, in Camacan). The nest entrances were located between 1 and 1.5 m above ground. They are small and short tubes made of hardened resin, light (Fig. 10) to dark brown in color. Those in the tree were very inconspicuous and somewhat hidden between the bark cracks, and were found only because of the occasional workers flying toward the nests. Workers of *P. grapiuna* sp. nov. are very timid and display no aggressive defense behavior, the entrance guards usually hiding within the nest when disturbed.

One of the nests, shown in Figs. 9–12, was dissected. The entrance orifice had an oval shape (Fig. 10) and measured about 3.5 mm in width and 2.5 mm in height. The orifice opened in a relatively large entrance tunnel, about 6–7 mm in width. The nest was built in the narrow space (ca. 1 to 1.5 cm) between

Figs. 1-7. *Plebeia grapiuna* **sp. nov.**, worker paratype from Ilhéus, Bahia (Figs. 1-6) and worker paratype from Camacan, Bahia (Fig. 7). 1, Habitus, lateral view. 2, Same, dorsal view. 3, Detail of the mesosoma, dorsal view. 4, Same, lateral view. 5, Head, frontal view. 6, Detail of frons, frontal view. 7, Detail of head, frontal view (scale bar: 0.3 mm). Figs. 1 and 2 at same scale (scale bar: 1 mm); scale bar of Figs. 3-6: 0.5 mm; scale bar of Fig. 7: 0.3 mm.



Figs. 8-12. *Plebeia grapiuna* **sp. nov.**, nesting habits. 8, Base of tree trunk (*Samanea inopinata*), at the campus of the Universidade Estadual de Santa Cruz, in which two nests were found. 9, Closer view of the tree bark, with black arrow pointing to entrance tube. 10. Close-up view of the entrance tube. 11. Interior of the nest (portion that remained attached to the trunk after the nest was opened), showing brood cell cluster (center right) and small block of food pots (center left); part of the nest batumen appears as the dark sheath below and at the right of the cell clusters. 12, Detail of nest interior (portion that remained attached to the piece of bark covering the nest chamber), showing part of the cell clusters and a large block of food pots (at the left); a large deposit of stick resin appears at the upper right corner. Scale bars of Figs. 10 and 12: 5 mm; scale bar of Fig. 11: 10 mm.

adjacent bark pieces of the outermost bark layer. There was clear evidence that the workers expand the nest chamber by scraping the soft inner layers of the bark. Examination of bark pieces covering the nest chamber, under a dissecting microscope, showed large areas in which the inner layers have been removed.

The entire nest chamber had an irregular shape and measured about 11 x 8 cm. The chamber was sealed by a 1–1.5 mm layer of dark hardened resin mixed with bark chips. Most of the inner space was occupied by the brood cells, food pots and large deposits of stick resin. The brood cells were arranged in clusters, lacking any sort of involucrum around them. Worker cells measured about 4 x 2.5 mm, while one larger queen cell found had 5 x 3 mm. The food pots formed three compact blocks, a larger one with 54 x 25 mm, and two smaller with about 23 x 23 mm. They were located between the end of the entrance tunnel and the brood cells. Each food pot had about 6–7 mm in diameter. Although the total number of workers was not counted, the nest had a small population, less than 100 workers in total. Regarding inquilines, very small white acari were observed inside the nest.

Besides *P. grapiuna* **sp. nov.**, construction of brood cells in clusters is found in a few other species of *Plebeia*, including *P. lucii*, *P. minima* (Gribodo, 1893) and *P. tica* (Wille, 1969) (Wille 1969; Roubik 1983; Drumond *et al.* 2000; Moure 2004).

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