Two new species of Scaptotrigona Moure, 1942 from the Amazon forest (Hymenoptera: Apidae: Meliponini)

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Abstract. The aim of this study was to describe Scaptotrigona nigrohirta sp. nov. and Scaptotrigona hylaeana sp. nov., in order to make their names valid, since at least one of these species has already been widely studied and cited, however, never been formally validated. Also, we have added some comparative notes among some species.

Keywords: Anthophila; bee; morphology; stingless bee; taxonomy.

The Neotropical genus Scaptotrigona Moure, 1942 is characterized by having bees with a projected scutellum and an uncut apex; mesonotum with fine, dense and strong punctuation; malar space, in general, greater than antennal socket diameter; with terga finely matte punctate (Moure 1942). Despite this genus had been considered to be related to Namnotrigona Cockerell, 1922 (Moure 1942, 1951; Silveira et al. 2002; Michener 1990, 2007), having as shared characters, for example, the punctuation of the head and mesosoma, the scutellum projected on the metanotum and the presence of a depression in the scutellum near the scutellum-scutellar suture, Rasmussen & Cameron (2010), using molecular characters in a Bayesian analysis, recovered Oxytrigona Cockerell, 1917 as its sister-group. However, another genus, Meliwellia Roubik, Lobo & Camargo, 1997, with only one relictual species, was not included in Rasmussen & Cameron (2010) analysis but can be the most related genus by three synapomorphic characters: i. large gena (at the level of lower tangent orbital), ii. presence of long and sinuous hairs on venter, and iii. presence of tomentum on terga (Roubik et al. 1997).

Scaptotrigona does not have its taxonomy revised and there are several new species to be described (Rasmussen & Cameron 2010; Pedro 2014), consequently the identification of its species is confusing, mainly due to the fact that there may be species complexes that are difficult to separate (Silveira et al. 2002), even if they are widely used for breeding by indigenous people and stingless bees beekeepers in the Amazon (Posey 1986; Camargo & Posey 1990; Venturieri & Imperatriz-Fonseca 2000; Ferreira et al. 2020).

The aim of this study was to describe two new species of Scaptotrigona from the Amazon forest, since at least one of them is widely used in meliponiculture (Posey 1986; Camargo & Posey 1990; Barbosa-Costa et al. 2012; Barbosa-Costa & Carvalho-Zilse 2013) and has been cited in the literature since Posey (1982).

MATERIAL AND METHODS

All specimens studied belong to the Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia (INPA, Manaus, Brazil) and Zoologische Staatssammlung München (ZSM, Munich, Germany). But four paratypes will be donated to collections (three of Scaptotrigona nigrohirta sp. nov. and one of Scaptotrigona hylaeana sp. nov. for each collection, presented in the section Material Examined): Museu Paraense Emílio Goeldi (MPEG - Belém, Pará, Brazil), Museu de Zoologia da Universidade de São Paulo (MZSP - São Paulo, São Paulo, Brazil), Coleção Prof. J.M.F. Camargo, Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras (RPSD - Ribeirão Preto, São Paulo, Brazil) and Zoologische Staatssammlung München (ZSM, Munich, Germany).

In the material examined, data on each label were transcribed following the state or province in alphabetical order. In descriptions “S” was used for sterna and “T” for terga. Distribution records were obtained from data labels of the specimens, as well as from
**RESULTS AND DISCUSSION**

*Scaptotrigona nigrohirta* sp. nov. Nogueira & Santos-Silva

**Description**: Worker (Figures 1, 2A, 2C, 2E, 2B and 2A).


**Punctuation**: Integument predominantly punctate. Head and mesosoma shiny and punctate. Legs and sterna smooth and shiny with pilligera punctuation with rugose aspect. Terga matte.

**Pubescence**: Frons with yellow simple setae (0.2 mm). Malar area practically glabrous with very short setae (0.03 mm). Basin area of scape with long, simple and yellowish setae (0.10 mm). Vertex with black long simple setae (0.26 mm). Clypeus and supraclypeal area in lateral view with decumbent yellow simple setae (0.01 mm). Labrum with yellow simple setae (0.21 mm). Coxae with whitish simple hairs: procoxa (0.25 mm), mesocoxa (0.29 mm) and metacoxa (0.42 mm). Mesoscutum and metacoxa with hairs with delicate crimped apex. Trochanters with whitish hairs with delicate crimped apex: protrochanter (0.25 mm), mesotrochanter (0.24 mm) and metatromatler (0.37 mm). Basal area of profemur with whitish simple hairs with delicate crimped apex (0.21 mm), and short branched hairs (0.07 mm) and apical area with erect setae (0.11 mm) and very short branched hairs on ventral face of profemur (0.04 mm). Basal area of mesofemur with whitish simple hairs with delicate crimped apex (0.26 mm), and short branched hairs (0.05 mm), and apical area with short erect brown setae (0.07 mm) and very short branched hairs on ventral face of mesofemur (0.05 mm). Metafemur with whitish hairs with delicate crimped apex on basal area (0.09 mm) and with long erect branched brown to black setae on apical area (0.26 mm). Protibia (0.24 mm), mesotibia (0.35 mm) and metatibia (0.36 mm) with simple and branched black setae on posterior border. Corbicula area with long black setae with delicate crimped apex (0.61 mm). Probosces with brown to black
simple setae (0.33 mm). Mesobasitarsus with brown to black simple and branched setae and branched hairs (0.26 mm). Metabasitarsus with simple brown and black setae (0.27 mm). Mesoscutum with decumbent simple (0.05 mm) and branched (0.08 mm) yellowish hairs and anterior area with erect simple and branched black setae (0.20 mm). Mesoscutellum with simple (or with branch) yellow and black setae (0.37 mm). Sides of propodeum with long simple yellowish hairs (0.22 mm) and short branched hairs (0.10 mm). Mesepisternum with simple erect yellowish setae (0.14 mm) and branched decumbent yellowish hairs (0.05 mm). Inferior area of mesepisternum with simple yellowish hairs with delicate crimped apex (0.35 mm). Metepisternum with very abundant decumbent yellowish branched hairs (0.05 mm). T1 with decumbent yellowish branched hairs (0.05 mm). T2 with decumbent yellowish branched hairs (0.10 mm) and long simple and branched black setae (0.15 mm). T3 with branched black setae (0.19 mm) and simple decumbent branched yellowish hairs (0.11 mm). T4 with branched black setae (0.24 mm) and branched yellowish hairs (0.14 mm). T5 with branched and simple brown to black setae (0.20 mm) and branched yellowish hairs (0.08 mm). T6 with branched and simple brown to black setae (0.21 mm) and decumbent branched yellowish hairs (0.08 mm). Sterna with abundant long yellowish hairs with delicate crimped apex (0.42 mm).

**Figure 1.** Holotype of *Scaptotrigona nigrohirta* sp. nov. Metatibia and metabasitarsus (A), head in frontal view (B), metasoma in dorsal-posterior view (C), body in lateral view (D) and body in dorsal view (E). Scales 0.5 mm (A and B) and 1 mm (C, D and E). Source: authors.

**Structures:** Body length 6.06 mm. Head 1.24x wider than long (2.24 mm: 2.79 mm, length and width, respectively). Forewing length 5.77 mm. Length of compound eye 3.82x breadth (1.57 mm: 0.41 mm, length and width of the compound eye, respectively). Inner orbits concave, converging downwards (1.76 mm: 1.64 mm, superior and inferior interorbital distance, respectively). Maximum interorbital distance greater than the length of the eyes (1.89 mm: 1.57 mm). Malar area 2.12x of the flagellum diameter (0.34 mm: 0.16 mm). Clypeus with width 1.85x its length (0.7 mm: 1.3 mm = length and width of clypeus respectively). Clypeus-ocellar distance equal to interalveolar distance (0.50 mm). Vertex slightly convex. Ocellorhinal distance slightly greater than interocellar distance (0.52 mm: 0.50 mm). Scape length 6.73x its width (1.01 mm: 0.15 mm). Flagellum width slightly greater than the pedicel width (0.16 mm: 0.13 mm). Mandible with the second tooth wider than the first. Mesotibia with triangular corbicula; length of metatibia 2.1x its width (2 mm: 0.95 mm). Metabasitarsus 1.78x longer than broad (1.14 mm: 0.64 mm) and with posterior bord angled and projected. Intertegular distance 1.82 mm. With 7 hamuli on posterior wing. Mesoscutellum 1.27x wider than long (0.79 mm: 1.27 mm, length and width, respectively).
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**Etymology and remarks:** This species has been widely cited in the literature, however, it has never been officially published to this moment. It was being described by Jesus Santiago Moure, however, he did not have the opportunity to publish it before his death. The specific epithet given by him was “nigrohirta”, which we decided to keep in his honor. The etymology comes from Latin which means “black erect setae”, and probably alludes to the simple setae present in the vertex, basitarsi and terga of most specimens. When we are studying nest material, we noticed that this character varies, as there are individuals with yellowish-brown setae in these areas. Also, this name can be an allusion to the setae present in the anterior portion of the mesoscutum, as they are black and elongated in relation to the setae of the same region in S. xanthotricha, which are shorter and brownish.

Several studies that used other species names such as S. xanthotricha (or S. aff. xanthotricha) to refer to S. nigrohirta sp. nov. (e.g., Coimbra Jr. 1985; Baumgartner & Roubiik 1989; Nates-Parra 2001; Costa 2010; Carvalho-Zilse 2013; Barbosa-Costa & Carvalho-Zilse 2013; Ferreira et al. 2020; Maia et al. 2020; Pires et al. 2020; Viana et al. 2021), however, it is evident that they are distinct species, since the T1 of S. nigrohirta sp. nov. it has abundant branched hairs while S. xanthotricha are sparse (Figure 2A and B), the shape of the metabasitarsus is different, with the middle posterior border of S. xanthotricha is angled and S. nigrohirta sp. nov. is rounded (Figure 2E, F and G), in addition to the M and Cu1 veins of the forewing being strong in S. nigrohirta sp. nov. (Figure 3A, B and C). In relation to S. pectoralis (Dalla Torre, 1896), the yellow depigmentation on the forehead is lower, until the midline of the antennal socket in S. nigrohirta sp. nov. (Figure 1B and 2D) and S. xanthotricha (Figure 3D).

Based on the distribution of species presented by Camargo & Pedro (2013) and Pedro (2014), on the genetic support presented by Duarte et al. (2014) and in the data presented in this present study, we define here that the distribution of occurrence of S. xanthotricha is restricted to areas of Atlantic forest and S. nigrohirta sp. nov. to areas of the Amazon.

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Figure 2. Structures of Scaptotrigona Moure, 1942. T1 and T2 of S. nigrohirta sp. nov. (A) and S. xanthotricha Moure, 1950 (B). Head in lateral view of S. nigrohirta sp. nov. (C) and S. pectoralis (Dalla Torre, 1896) (D). Metabasitarsus of S. nigrohirta sp. nov. (E), S. xanthotricha (F) and S. pectoralis (G). Scales: 0.5 mm (A, B, C and D) and 0.25 mm (E, F and G). Source: authors.
rainforest.

Furthermore, *S. nigrohirta* sp. nov. can be distinguished from *S. fulvicutis* (Moure, 1964), which is the other yellow Amazonian species, because *S. fulvicutis* has a yellow mesoscutum, the face in frontal view with strong punctuation and clypeus with abundant setae, while *S. nigrohirta* sp. nov. has dark brown to black mesoscutum, face with punctuation sparse and the clypeus practically glabrous, with sparse and very short setae.

**Variations:** Some individuals from Campo Novo (Rondônia, Brazil), Barcelos and Jaú National Park (Amazonas, Brazil) have a yellow (depigmented) spot on the forehead above the upper socket line, as well as in *S. pectoralis* (Figure 2D). An individual from Terra Indígena São Marcos-Guaribas (Roraima, Brazil) has a black spot at the base of the clypeus. Some individuals from Belterra (Pará, Brazil) have two yellow triangles joined by a vertex at T2 (Figure 2A).

A label of one of the bees from Campo Novo (Rondônia, Brazil) was handwritten “Scaptotrigona nigrohirta var. xanthina in litt.”, however, without identifying who wrote. And another from the Toototobi indigenous area (Yanomami indigenous people, Barcelos, Amazonas, Brazil) written “N. (Scaptotrigona) chorerraensis Schwarz MS, Camargo 1982Det.”, but this name was never formally published for the species.

**Biological notes:** Bees are highly defensive and build the nest entrance in a cylindrical shape (Figure 4A) (Posey & Camargo 1985; Costa 2010; Barbosa-Costa & Carvalho-Zilse 2013).

**Geographical distribution** (Figure 6): Brazil (Acre, Amazonas, Maranhão, Pará, Rondônia, Roraima), Peru (Nauta).

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Diagnosis: This species is distinguished by being shorter body length when compared to other known species with black integument (S. tubiba (Smith, 1863) or S. postica (Latreille, 1807), for example), having short setae on the forehead with an appearance velvety, mesosoma with short, sparse setae, finely matte-punctate integument of the clypeus and 3rd cell rs-m (between the second and third submarginal cell) vestigial (Figure 3A) (absent in S. nigrohirta sp. nov. and S. xanthotricha (Figure 3B, 3C).

Description: Worker (Figures 3A, 4B-F and 5).


Punctuation: Integument predominantly punctate. Head matte and punctate with shiny areas on clypeus, malar space and paraocular area. Mesosoma matte and punctate. Legs and sterna smooth and shiny with pilligera punctation with rugose aspect. Terga matte.

Pubescence: Frons with yellow very short simple setae (0.03 mm). Malar area practically glabrous with very short setae.
Variations: The three workers from Ilha de Maracá (Roraima, Brazil) studied differ from the others in that they have a large part of the integument slightly lighter, stained black, mainly the metanotum which is pale yellow, the erect setae of T6 are yellowish-brown in contrast to the black setae of specimens of the type locality, this pattern is repeated, for example, in the erect black setae mixed with white pubescence around the propodeal spiracle; the sterna pubescence is pale yellow in the Roraima specimens have the apical band of T4-T5 continuous, unlike the typical form which has slightly yellowish pubescence on sterna and apical bands of T4-T5 that are clearly interrupted in the median region.

Biological notes: When workers are handled, they fly around the enemy but do not attack, even when they are provided with a lot of stored honey.

They do not build cylindrical nest entrance as is common in other Scaptotrigona species. Its entrance is constructed of dark-colored cerumen in a circular shape, measuring 3.5 cm in diameter, with a central diagonal division more pronounced than the edges of the circle, with no airstrip (Figure 4B and C). Guard bees are around the entrance landing on the substrate (Figure 4C). The brood comb is horizontal shape (Figure D). This species produces a lot of food in pots with an average of 3.3 cm in height and 3.0 cm in diameter (Figure 4E).

Geographical distribution (Figure 6): Brazil (Amazonas, Roraima).


ACKNOWLEDGEMENTS

This research was financially supported by the Governo do Estado do Amazonas, Secretaria de Estado de Desenvolvimento Econômico, Ciência, Tecnologia e Inovação (SEDECTI) and Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM) - Editais POSGRAD and Mulheres na Ciência and by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) - Finance code 001. DNS thanks for the support of Instituto Federal de Educação, Ciência e Tecnologia do Amazonas (IFAM), JASS received a scholarship from CAPES as a MSc student of the Programa de Pós-Graduação em Entomologia (PPG-Entomologia) of the Instituto Nacional de Pesquisas da Amazônia (INPA); RMOA receive a scholarship FIXAM II from FAPEAM Edital 001/2021. MLO thanks CNPq-Brasil for the productivity grant (305150/2020-0). We thank Stefan Schmidt for sending us specimens for this study from Zoologische Staatssammlung München (ZSM).
Figure 6. Distribution records of some species of Scaptotrigona Moure, 1942: S. hylaeana sp. nov., S. nigrohirta sp. nov., S. fulvicutis (Moure, 1964), S. pectoralis (Dalla Torre, 1896) and S. xanthotricha Moure, 1950.

REFERENCES


