

Scientific Note/Comunicação Científica

Notes on the nesting biology of five species of Euglossini (Hymenoptera: Apidae) in the Brazilian Amazon

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EntomoBrasilis 10 (1): 64-68 (2017)

Abstract. Orchid bees (Euglossini) are medium to large-sized species with fully or partially metallic body that are relatively common in the Neotropical Region. Nevertheless, the nesting biology of many species remains unknown. Therefore, the objective of this paper is to provide new information on the nesting biology of five species of Euglossini found in urban and forested sites of Brazilian Amazon. The nests of *Eufriesea pulchra* (Smith) and *Euglossa chalybeata* Friese were recorded for the first time, found in an active nest of the ant *Azteca* sp. and in a fallen rotting tree, respectively. The nest of *Euglossa townsendi* (Linnaeus) was found in the leaf of an ornamental plant *Cordyline* sp. (Asparagaceae), also newly recorded. *Euglossa intersecta* Latreille was recorded nesting in an abandoned termite nest, and *Euglossa cordata* Cockerell was found nesting in a tubular metal window handle.

Keywords: Apinae; Bee; *Eufriesea*; *Euglossa*; Nest.

Notas sobre a biologia de nidificação de cinco espécies de Euglossini (Hymenoptera: Apidae) na Amazônia Brasileira

Resumo. As abelhas-da-orquídea (Euglossini) possuem tamanho médio a grande, corpo parcialmente ou completamente metálico e são relativamente comuns na região Neotropical. Apesar disso, a biologia de nidificação da maioria das espécies permanece desconhecida. Portanto, o objetivo deste estudo é fornecer novas informações sobre a biologia de nidificação de cinco espécies de Euglossini encontradas em área urbana e florestada da Amazônia Brasileira. Os ninhos de *Eufriesea pulchra* (Smith) e *Euglossa chalybeata* Friese foram registrados pela primeira vez, encontrados dentro de ninho de formiga *Azteca* sp. e em uma árvore apodrecida caída, respectivamente. O ninho de *Euglossa townsendi* Cockerell foi registrado pela primeira vez em uma folha da planta ornamental *Cordyline* sp. (Asparagaceae). *Euglossa intersecta* Latreille foi registrada nidificando dentro de um ninho abandonado de cupim e *Euglossa cordata* (Linnaeus) foi encontrada nidificando em uma maçaneta tubular de metal de uma janela.

Palavras-Chave: Abelha; Apinae; *Eufriesea*; *Euglossa*; Ninho.

The corbiculate apines (pollen-basket bees) comprise about 890 described species divided in four tribes: Apini (honey bees), Meliponini (stingless bees), Bombini (bumble bees) and Euglossini (orchid bees) (MARTINS *et al.* 2014). The orchid bees are the only ones that do not exhibit large colonies, and they may be solitary, communal, semisocial, or social. In addition, some species are cleptoparasites in nests of other orchid bees (RAMÍREZ *et al.* 2002).

The Euglossini is Neotropical in distribution and comprises 187 species of medium to large-sized (8.5-29.0 mm length), moderately to densely hairy bees arranged in five current genera: *Aglae*; *Eufriesea*; *Euglossa*; *Eulaema*; and *Exaerete* (RAMÍREZ *et al.* 2002; MICHENER 2007; MARTINS *et al.* 2014). Information about the known nesting biology of orchid bees was summarized by RAMÍREZ *et al.* (2002), reporting that these bees nest in hollow trees, in bamboo stems, under tree bark, in wooden boxes made by humans, in ground cavities, under rocks, inside active nest of ants and termites, in abandoned carton nests of social wasps, and in nests of carpenter bees excavated in wood, in abandoned

dens of small mammals and land crabs, in aerial nests made of resin and attached to the undersides of leaf or twigs, and in buildings.

The bees of this tribe are relatively common within their areas of geographical distribution, and many species have a fully or partially metallic body (RAMÍREZ *et al.* 2002; CAMERON 2004), making them attractive to professionals and amateur collectors. Males are attracted to various aromatic compounds (WILLIAMS & WHITTEN 1983), making them easily collectable, and consequentially they are well represented in entomological collections. In spite of this, the nests of orchid bees are difficult to find in natural substrates, and the nesting biology of many species remains undocumented (RAMÍREZ *et al.* 2002). Therefore, the objective of this study is to provide new information about the nesting biology of five species of Euglossini found in Brazilian Amazon.

The observations on euglossine nesting biology reported here were made in Belém, state of Pará, Brazil, in three distinct

Edited by:

Wesley Dáttilo

Article History:

Received: 10.xii.2016

Accepted: 25.ii.2017

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🚫 No ORCID record

Funding agencies:

↪ Without funding declared

localities: 1) forest border in the research campus of Museu Paraense Emílio Goeldi (MPEG) (1°27'06.00"S 48°26'37.85"W); 2) in a house in the urban center (1°25'49.50"S 48°27'09.84"W); and 3) in a protected urban forest in the Parque Estadual do Utinga (PEUt) (1°25'20.32"S 48°26'25.14"W). Nests were collected and maintained in plastic boxes in the laboratory until the emergence of adults. The specimens were identified by comparison with previously identified individuals, with taxonomic keys and redescrptions of species (KIMSEY 1982; ROUBIK 2004; NEMÉSIO & FERRARI 2011). All bees are deposited in the entomological collection of MPEG.

In the MPEG site, on 5 November 2009, the nest of *Eufriesea pulchra* (Smith), containing a series of three cells, was found inside a small active carton nest of an ant species of the genus *Azteca* Forel (Formicidae: Dolichoderinae) located about 70 cm from the ground on the underside of a branch of a lemon tree (Figure 1). The cells were attached to the tree bark and composed of small pieces of reddish wood cemented with a yellow resin (Figures 1 and 2). This is the first record of the nest biology of this species and the second record of *Eufriesea* nesting in active ant nest. The other species nesting in active ant nest is *Eufriesea lucifera* Kimsey, whose cells were found in the nest of another Dolichoderinae [*Monacis valida* = *Dolichoderus validus* (Kempf)] in Panama (KIMSEY 1982), a species that also constructs carton nests. An undetermined species of *Euglossa* have been recorded nesting in a rotting cacao pod that was also occupied by a nest of ant *Crematogaster limata* Smith in Costa Rica (YOUNG 1986). In the phylogenetic hypothesis of RAMÍREZ *et al.* (2010), *E. lucifera* is sister species of *E. pulchra*, and *Eufriesea ornata* (Mócsary) is the sister species of these two. However, as the biology of *E. ornata* is unknown, it is not possible to assess if the nesting in ant nests is a widespread behavior in these clade or if it is restricted to the clade formed by *E. lucifera* and *E. pulchra*.

Also in the MPEG site, on 12 August 2012, the nest of *Euglossa (Glossuropoda) intersecta* Latreille, was found inside a small (19 x 22 cm) abandoned termite nest (probably *Nasutitermes*) (Figure 3) located in a tree fork about 1.70 m from the ground. The opening of the nest was in the middle of the basal surface of the termite nest, and it was located in a chamber in the center of the termite nest, containing a cluster of 28 black cells of resin, tightly fused one to one another, forming a rigid aggregate (Figure 4). This species utilizes active and abandoned arboreal termite nests, since it has been previously recorded nesting only in active nests of *Nasutitermes* sp. (ZUCCHI *et al.* 1969; RAMÍREZ *et al.* 2002).

Bees nesting in termite nests are not common among *Euglossa* species, but this habit is widespread among *Eufriesea* species (RAMÍREZ *et al.* 2002). Due to this, the behavior of *Euglossa intersecta* Latreille nesting in a termite nest caught our attention. This species is one of the largest *Euglossa* species (about 19 mm length) in Brazilian Amazon and is very similar to *E. pulchra* (14-19 mm length) (Figures 5, 6) in also having a color pattern quite different from that of most *Euglossa* species (that usually have a fully strong metallic body) (WILLIAMS & WHITTEN 1983; CAMERON 2004). Most species of *Eufriesea* have a color pattern with strong metallic areas interspersed with darker portions (KIMSEY 1982; CAMERON 2004). Many species of bees from different families nest on nests of *Nasutitermes* spp. and it has been suggested that the termites offer protective advantage for the bees (CARRIJO *et al.* 2012). However, as some species of bees utilize both abandoned and occupied nests, it is possible that bees prefer termite nests because it is a large substrate that can be excavated and/or provide a regulated nest environment, without excessive humidity for example (CARRIJO *et al.* 2012).

The nest of *Euglossa (Euglossa) townsendi* Cockerell was found inside a live folded leaf of the introduced ornamental plant *Cordyline* sp. (Asparagaceae) (Figures 7 and 8) in the border

of a secondary forest in the MPEG on 13 June 2010. The leaf contained about six cells made of dark resin and was located about 90 cm from the ground. The walls of the cells were soft and without a noticeable difference in the construction of the caps. The only nesting records of this species are in trap nests made of bamboo (GARÓFALO *et al.* 1993; AUGUSTO & GARÓFALO 2004), and only three species of *Euglossa* have been recorded nesting on leaves: *Euglossa (Euglossa) championi* Cheesman; *Euglossa (Glossurella) dodsoni* Moure; *Euglossa (Glossurella) turbinifex* Dressler (see RAMÍREZ *et al.* 2002 and references therein). The general nesting pattern for the species of the subgenus *Euglossa* s.s., whose biology is known, seems to be cavity nesting (CAMERON 2004). However, the nests of *E. (Euglossa) townsendi* and *E. (Euglossa) championi* are aerial such as that found in the species of the subgenus *Glossurella*.

Inside the hollow of a tubular metallic window handle we found a nest of *Euglossa (Euglossa) cordata* (Linnaeus) on 20 July 2011 (Figures 9 and 10). The window handle is a vertical 8 cm metal tube (Figure 9). The upper opening of the tube was sealed with a pink and black resinous wall in which there was a small circular hole just large enough for the female to pass (Figure 10). The nest contained three cells of pinkish brown resin. Many species of *Euglossa* have already been recorded nesting in tubular objects; such as trap nests made of bamboo cane, and *E. cordata* has previously been recorded nesting in abandoned wasp nests and in wooden boxes (RAMÍREZ *et al.* 2002). The specie *Euglossa cordata* (Linnaeus) is adapted to live in open and dry environments, grasslands, savanna-like vegetation, and secondary forests (DUCKE 1902), as well as in cities (LÓPEZ-URIBE *et al.* 2008), where it also utilizes human made objects as nesting sites, as observed here.

The nest of *Euglossa (Glossura) chalybeata* Friese was found inside a large rotting fallen tree in a primary forest of PEUt on 5 July 2007 (Figures 11 and 12). The nest contained about 10 cells made of dark brown resin, spheroid in shape and arranged in a comb-like fashion with caps composed of a small rounded mass of resin (Figures 12 and 13). This is the first information on the biology of this species and the first record of *Euglossa* nesting in a fallen tree. The species of the subgenus *Glossura* seems to produce irregular clusters of cells (CAMERON 2004) as observed to *E. (Glossura) chalybeata*. However, the cell arrangement pattern is a variable feature inside of the same species and it seems to be related to spatial limitation of the cavity containing the nest as observed in *Euglossa (Glossura) annectans* Dressler (GARÓFALO *et al.* 1998).

ACKNOWLEDGMENTS

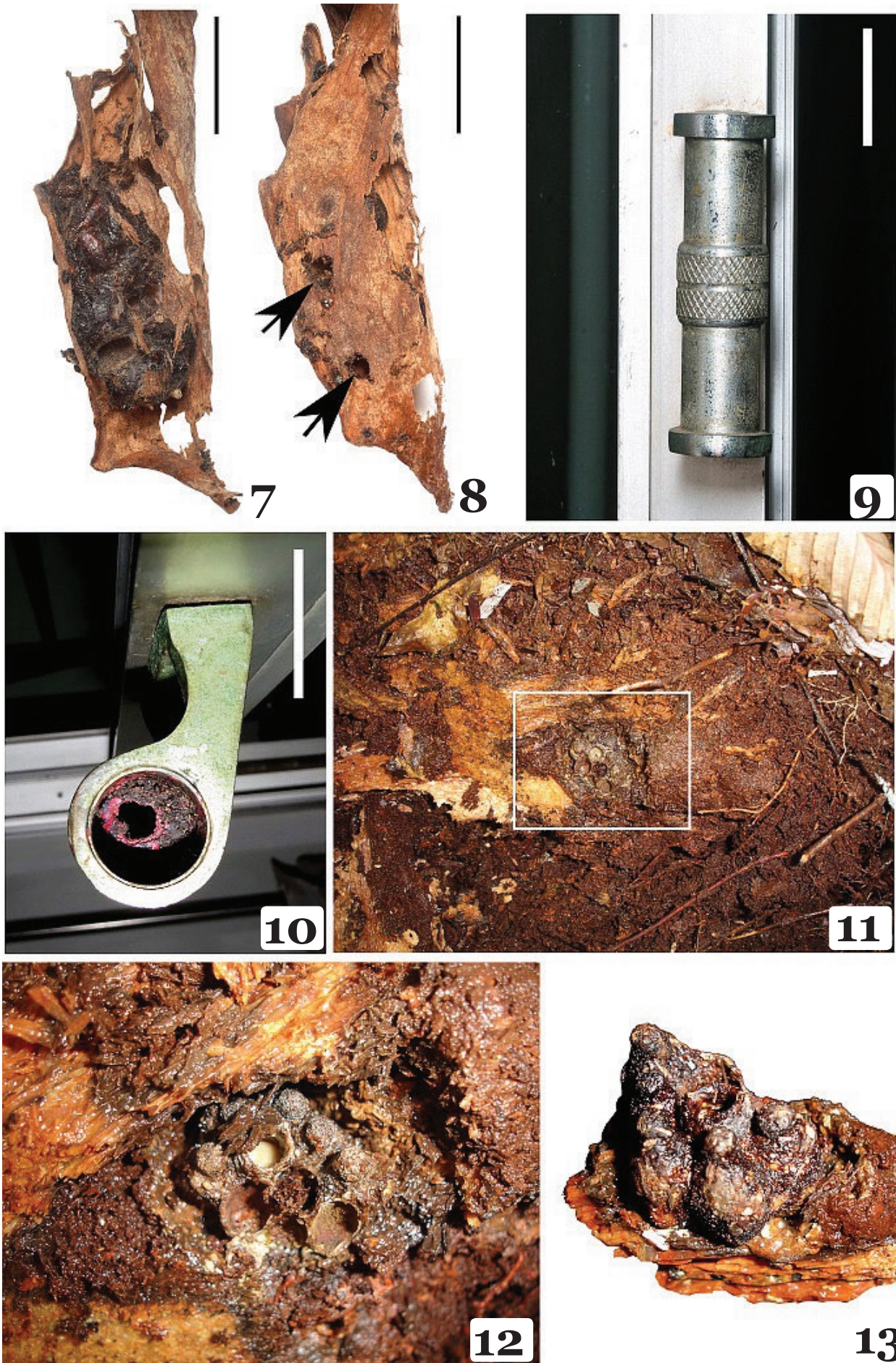
We are grateful to Dr. William L. Overal (MPEG) for revision of the manuscript and help with editing the English version. We thank Adriano Maciel for Figures 11 to 13.

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Figures 1-6. (1) Cells of *Eufriesea pulchra* inside the opened *Azteca* sp. ant nest, lateral view; (2) Cell of *Eufriesea pulchra* with larva, latero-dorsal view; (3) Termite nest with arrow pointing to the nest entrance of *Euglossa intersecta*, ventral view; (4) Termite nest piece containing the cells of *Euglossa intersecta*, lateral view; (5) Habitus of *Eufriesea pulchra*, dorsal view; (6) Habitus of *Euglossa intersecta*, dorsal view. Scale bars = 1 cm, except in Figure 3 where it represents 3.5 cm.



Figures 7-13. (7) Dry leaf with cells of *Euglossa townsendi*, ventral view. (8) Dry leaf with cells of *Euglossa townsendi* with arrows pointing to cell exits, dorsal view; (9) Window handle utilized as nest site by *Euglossa cordata*, lateral view; (10) Nest opening of *Euglossa cordata* inside window handle, ventral view; (11) Fallen trunk with a cluster of cells of *Euglossa chalybeata*, dorsal view; (12) Cluster of cells of *Euglossa chalybeata* inside trunk, dorsal view; (13) Cluster of cells of *Euglossa chalybeata* removed from trunk, lateral view. Scale bars = 2 cm, except in Figure 10 where it represents 2.5 cm.

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Suggestion citation:

Carvalho-Filho, F.S. & F.F. de Oliveira, 2017. Notes on the nesting biology of five species of Euglossini (Hymenoptera: Apidae) in the Brazilian Amazon. EntomoBrasilis, 10 (1): 64-68.

Available on: [doi:10.12741/ebrasilis.v10i1.672](https://doi.org/10.12741/ebrasilis.v10i1.672)

