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Notes on the Nesting Biology of *Melipona capixaba* (Hymenoptera, Apidae)

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ABSTRACT: *Melipona capixaba* Moure & Camargo, a recently described species, seems to be restricted to the montane forest of a small region in the State of Espírito Santo, Brazil. The nest architecture is similar to that of other *Melipona*. Among the 17 colonies examined, the nest entrance was quite variable, ranging from a simple to very elaborate structure. Larvae and puparia of milichiid flies were found in great numbers inside the nests. This is the first report of an association between Milichiidae and stingless bees.

Melipona capixaba was described recently by Moure and Camargo (1995) from the State of Espírito Santo, Brazil. The discovery of a new stingless bee in southeast Brazil was surprising, since the fauna of this region has been studied for a long time and also because this is a relatively large bee (11 mm). It is difficult to imagine that it would have been overlooked by collectors. In reality, the very limited distribution of this species seems to be responsible for delaying its discovery.

The first specimens of *M. capixaba* that I examined were collected on flowers by Dr. Fernando Silveira. As mentioned by Moure and Camargo (1995), these specimens were thought to be from colonies collected in the Amazon region and transferred to Espírito Santo, since they suggested an

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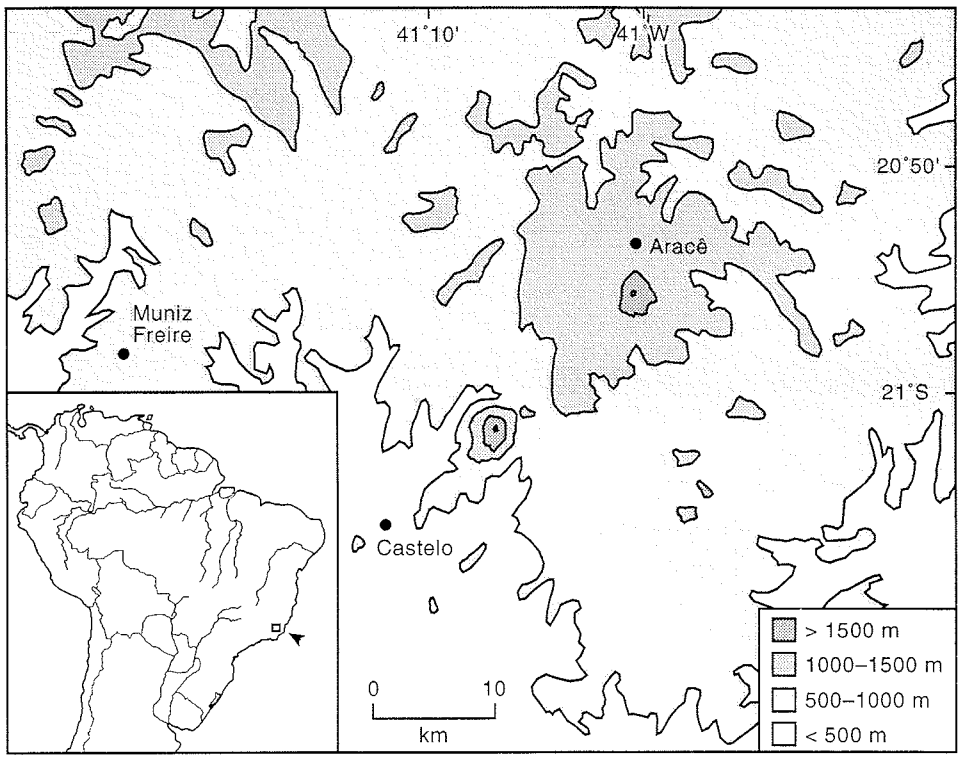


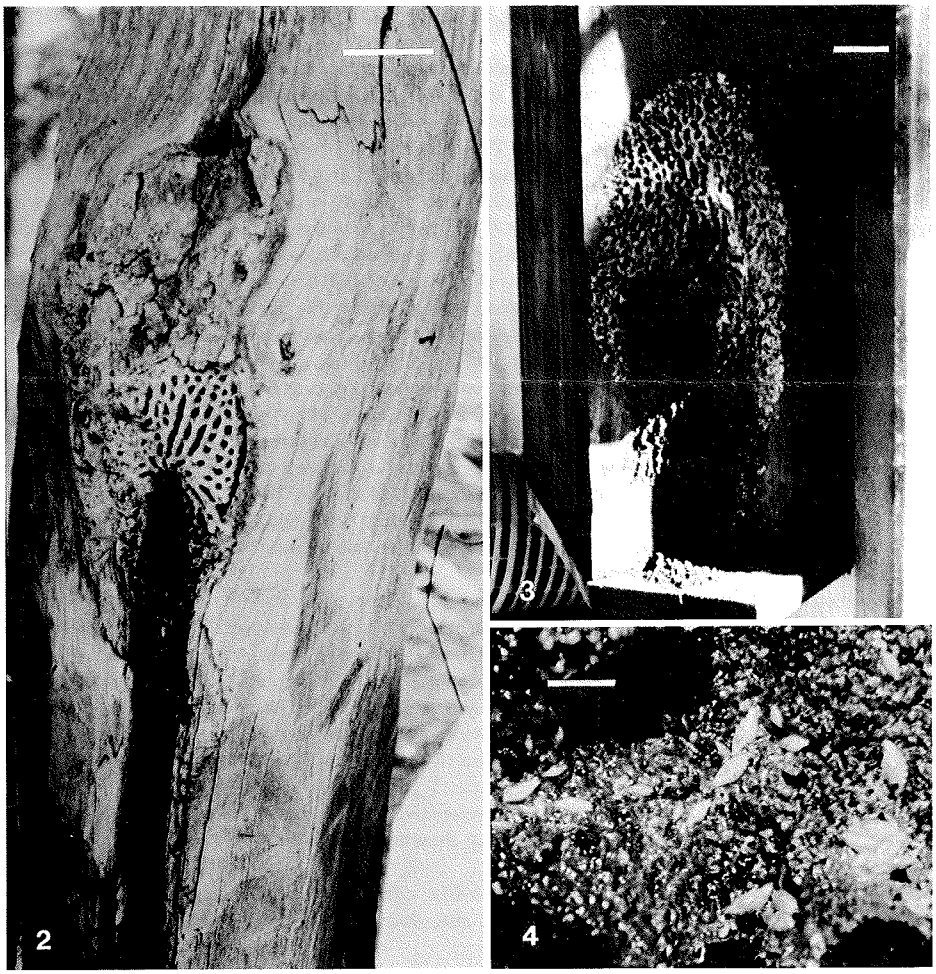
Fig. 1. Map of the area in the State of Espírito Santo, Brazil, where the type material of *Melipona capixaba* was collected.

Amazonian species. However, in 1992, Prof. Alfredo Goicochea Huertas of the Federal University of Viçosa, in Minas Gerais, was able to contact a beekeeper in the State of Espírito Santo who had colonies of this new *Melipona,* and in August of that year, thanks to Prof. Huertas, I was able to visit this beekeeper, Mr. Alvino Pianzolli.

The region visited is near the town of Aracê (see Fig. 1). *Melipona capixaba* seems to be restricted to the montane forest, in areas above 900 to 1000 meters altitude. Mr. Pianzolli has bought several colonies through the years, and said that all of them came from the small area around Aracê. He and other local people have never heard of any colony being found outside this area. The absence of this species among bees collected around Santa Teresa, an area with similar montane forests located approximately 60 km northeast of Aracê, is further evidence for its restricted distribution (Pe. J. S. Moure, pers. comm.). Additional collecting in this region of Espírito Santo is necessary to determine with more precision the distribution of *M. capixaba.* If confirmed, this distribution is one of the smallest known among the stingless bees.

The presence of an endemic species in this area may be an indication of different ecological and historical conditions in comparison to nearby similar areas. More extensive sampling should be carried out in this area to detect other possible endemic species in various other groups of organisms. Four other relatively widespread species of *Melipona* occur in this region: *M. bicolor, M. marginata, M. quadrifasciata* and *M. rufiventris.* However, Mr. Pianzolli told me about a nest found some years ago of a stingless bee fitting the description of *M. fuliginosa.* This species occurs in Central America and northern South America, but Ducke (1916) recorded it from Rincão, in the State of São Paulo. It is possible that this species or a closely related one still occurs around Aracê, or might have become extinct in recent years.

During my visit in 1992, I saw 16 active nests of *M. capixaba* (12 from Mr. Pianzolli, and four from another farmer) housed in rustic wooden boxes or in segments of the original tree where they were found. Colonies of this species and of *M. quadrifasciata* are kept for honey production. I was



Figs. 2–3. Nest entrances of colonies of *Melipona capixaba* (Scale = 3 cm).
Fig. 4. Larvae of milichiid fly found inside nests of *M. capixaba* (Scale = 1 cm).

told that a strong colony of *M. capixaba* can produce up to 15 liters of honey per year, while for *M. quadrifasciata* a good harvest would be one liter per colony.

A 17th colony was found under natural conditions in a tree (popular name: "catinga de bode") along a trail in the forest. Although this *Melipona* is called locally "pé-de-pau", in reference to having the nest entrance close to the base of the tree trunk, this wild colony had its entrance nearly 2 m above the ground (another local name for this species is "uruçu-negra"). In contrast to the workers of colonies kept in captivity, the guards in this colony were quite aggressive. Just standing in front of the nest entrance was enough to elicit a strong attack by the guards. About 20 bees flew around my head, and some of them landed on me to bite my ears, nose, lips and eyelids. When I moved away from the nest, the bees stopped the attack. The difference in behavior between the wild and captive colonies probably is related to the size of the worker population in these colonies; large colonies usually are more aggressive.

The bees that I collected near Aracê were originally labeled as from the town of Domingos Martins, since the area of Aracê politically belongs to Domingos Martins and also because this was the largest town nearby. This is the information published for the type specimens by Moure and Camargo (1995). However, I later changed the locality labels of specimens remaining in my collection to: "Aracê—

ES, 20°22'S 41°00'W, BRASIL 14.08.1992, G. A. R. MELO". The additional label "BR 262, Km 95" was retained.

Among the colonies examined, the nest entrance was quite variable, ranging from simple structures, like a few short radiating ridges of mud mixed with resin around the entrance orifice, to the elaborate pattern shown in Figs. 2 and 3. Several colonies had a protuberant nest entrance (Fig. 3) with the area around the orifice shaped as a shallow funnel. The orifice itself is approximately 10 mm in diameter.

Three nests housed in segments of tree trunks were opened and transferred to wooden hives. The adult population in each colony was not counted, but probably was composed of a few thousand workers, as in typical colonies of *M. scutellaris*. The internal nest architecture in this species is similar to that of other *Melipona*. Regarding nest inquilines, two associations are worth mentioning. The first was a dark purple septate fungus growing on some parts of the batumen plates. The hyphae were short and erect, and grew in small bunches, giving the whole area the appearance of a miniature short grass lawn. I have not seen this kind of fungus in other stingless bee nests and could not find any reference to such a fungus in the literature.

The second association refers to flies of the family Milichiidae. Larvae of all sizes and puparia were found in great numbers on the wet areas of the internal walls of the nest (Fig. 4). This is the first report of an association of Milichiidae with stingless bees. The larvae in this family are saprophagous or coprophagous (Sabrosky, 1987). Some species are associated with ants, and several of them have been reared from the refuse material of leaf-cutting ant nests (Kistner, 1982). Association with bees of the genus *Megachile* has been reported by Krombein (1967) and De Santis (1981). Krombein (1967) reports that the fly larvae feed on the stored pollen rather than on the bee eggs or larvae, although the hosts are destroyed during the process.

The species found in nests of *M. capixaba* seems to have a mutualistic or at least commensal relationship with the bees, since the larvae were seen feeding on bee feces, but were not observed inside or near storage pots or brood combs. Also, the bees defecate randomly on those wet areas and not in restricted areas as is usual among other stingless bees. This could be another evidence of a close interrelation with the flies. The newly emerged adult flies leave the nest in the early morning, with the wings not yet expanded. They hide in crevices near the nest entrance where the wings expand after a few minutes. In a nest transported to Viçosa (Minas Gerais State), the number of flies around the entrance in the early morning varied from 2 to 11 per day (m = 6 flies per day) in 12 days of observation. Specimens of this Milichiidae were examined by Armando L. Serra (Museu de Zoologia da Universidade de São Paulo), who concluded that they belong to a new species and probably a new genus.

Besides those two associations, usual inquilines like mites (two species) and leiodid beetles (two species, possibly belonging to *Scotocryptus*) were also observed.

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