

Stingless bees of the Golfo Dulce region, Costa Rica (Hymenoptera, Apidae, Apinae, Meliponini)

Las abejas sin aguijón de la región de Golfo Dulce, Costa Rica (Hymenoptera, Apidae, Apinae, Meliponini)

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Abstract: Stingless bees are a group of advanced eusocial bees found in the tropical and subtropical areas of the world. Unlike solitary bees, they are particularly abundant in the wet rainforests, where they play a key role as pollinators. Their species composition is unknown for many regions, however, and the biology and ecology of most species is not well studied. As a basis to better understand the annidation of the stingless bee species in the Pacific lowland rainforest of south-eastern Costa Rica, we present a preliminary account of this group of insects from the Golfo Dulce region. So far, 26 species have been identified in this area, which is approximately 54% of the stingless bee species reported for the whole of Costa Rica. Our findings underline the rich biodiversity of the Golfo Dulce region and the urgent need to conserve its natural habitats.

Key words: Stingless bees, Meliponini, species list, Golfo Dulce, Costa Rica

Resumen: Las abejas sin aguijón son un grupo de abejas altamente eusociales que se encuentra en las áreas tropicales y subtropicales del mundo. Al contrario de las abejas solitarias las abejas sin aguijón son especialmente abundantes en los bosques lluviosos, donde tienen mayor importancia como polinizadores. Sin embargo, la composición de especies no es conocida en muchas regiones, y la biología y ecología de la mayor parte de las especies ha sido muy poco investigada. Como base para un mejor entendimiento de la comunidad de las abejas sin aguijón en el bosque lluvioso de las tierras bajas de la región Pacífico sur de Costa Rica, presentamos un inventario preliminar de este grupo de insectos en la región de Golfo Dulce. Hasta ahora, 26 especies fueron colectadas en esta área, la cual equivale aproximadamente al 54% de las especies de abejas sin aguijón conocidas en Costa Rica. Este resultado demuestra la gran riqueza en biodiversidad que posee la región de Golfo Dulce y la importancia de preservar sus hábitats naturales.

Palabras clave: Abejas sin aguijón, Meliponini, inventario de especies, Golfo Dulce, Costa Rica

Introduction

To date, about 16.000-17.000 species of bees have been described (MICHENER 2000). However, given the number of cryptic species that will probably be identified with modern analytical methods and the number of bees that still have to be discovered in hitherto little-studied areas, the total number of species could well be 20.000 or even 30.000 (MICHENER 2000). Bees are found in almost all terrestrial habitats except the extreme Arctic regions. They are most abundant and diverse in certain warm temperate, xeric regions, but arid tropical habitats and tropical savannahs have poor bee faunas (MICHENER 1979). The moist tropics vary considerably in abundance and diversity of bees (MICHENER 1979). It is here in particular where the advanced eusocial stingless bees (Apidae, Meliponini) can frequently be encountered – or where they frequently en-

counter the visitor, seeking his sweat or sweet soda pops.

Stingless bees live in large, perennial colonies that in general have only a single queen and, depending on the species, a few dozens to many tens of thousands of workers. They are polylectic bees that visit a large number of flowering plants, but they also collect other resources such as membracid exudates or even flesh from dead animals. Because of their need to visit flowers in order to collect food, bees in general are among the most important groups of pollinators (MICHENER 2000). Apart from food, they collect plant resins or fibres and earth for the construction of their nests. The nest location and the external structure of the entrance are often highly species-specific.

The occurrence of stingless bees is essentially restricted to the tropical and subtropical areas of the world,

extending a little to temperate regions in the Southern Hemisphere. There are several hundred species, but most genera have not yet been well enough analysed to warrant exact numbers (MICHENER 2000). In addition, adequate collections are lacking for many regions, which makes it likely that new forms still await discovery.

Here we present a first account of the stingless bees of the Pacific lowland rainforest of the Golfo Dulce region in the south-west of Costa Rica. This area, with its wide variety of environmental conditions, harbours some of the country's most species-rich life zones (WEISENHOFER 2001).

Methods

Bees were collected at the Tropenstation La Gamba of the University of Vienna near Golfito and on its surrounding trails at flowers or other resources and at entrances to their nests in July 2003, April 2005, and March 2006. In addition, the collection of the Museo Entomológico of the Universidad de Costa Rica in San José was checked for stingless bees collected in the Golfo Dulce region.

Information on worker features, nesting biology, and distribution is based on personal observations and/or taken from the literature (in particular SCHWARZ 1948, WILLE 1965a, WILLE & MICHENER 1973, ROUBIK 1983, 1992, AYALA 1999).

Results

Our own collecting activity at the Tropenstation La Gamba and its close surroundings and that by Paul Hanson from the Universidad de Costa Rica (UCR Museum collection) on the Osa Peninsula (3 km S and SW of Rincón) as well as 10 and 24 km W of Piedras Blancas resulted in the identification of 26 species of stingless bees from the lowland tropical wet forest of the Golfo Dulce region (Table 1).

In the following section we provide information about the distribution of the identified species, about

their nesting habits and nest entrance structures, and about some morphological features of the worker bees. The nest entrances for some of the species are shown in tables 2 and 3, illustrating the great diversity of forms and structures. The morphological terminology used here is in accordance with MICHENER (2000).

1. *Cephalotrigona zexmeniae* (COCKERELL, 1912)

Trigona zexmeniae COCKERELL, 1912: 313-314 [cited in SCHWARZ 1948].

Worker features

The bees are black with a dark orange to brown (occasionally also black) metasoma, narrow yellow stripes on the lateral sides of the scutum, and sometimes also with yellow markings on the axillae. The body is ca. 8.5 mm long.

Nest location and entrance structure

Nests are built in cavities in living or dead trees. The entrance is a small hole, allowing just one bee to pass at a given time, without any conspicuous ornamentation. Large amounts of resin can be deposited around it, especially beneath it.

Geographical distribution

C. zexmeniae occurs from the south-east of Mexico throughout Central America to northern Colombia.

2. *Dolichotrigona schulthessi* (FRIESE, 1900)

Trigona schulthessi FRIESE, 1900: 386.

Worker features

The bees are black and slightly shiny. The scapes of the antennae are long, reaching the upper rim of the eyes. The tibiae of the hind legs are also noticeably elongated (5 times as long as greatest width). The body is 3.2 mm long.

Nest location and entrance structure

No nest descriptions are available, except one reference to *Trigonisca* aff. *schulthessi* that nests in living trees (ROUBIK 1992), but which was originally described as a nest of *Trigona* (*Trigonisca*) *buyssoni* by ROUBIK (1983).

Table 1: Stingless bees (Hymenoptera, Apidae, Apinae, Meliponini) collected in the Golfo Dulce region, Costa Rica. The use of generic names follows CAMARGO & PEDRO (1992).

1. <i>Cephalotrigona zexmeniae</i>	10. <i>Plebeia frontalis</i>	18. <i>Tetragona perangulata</i>
2. <i>Dolichotrigona schulthessi</i>	11. <i>Plebeia minima</i>	19. <i>Trigona corvina</i>
3. <i>Lestrimelitta mourei</i>	12. <i>Plebeia tica</i>	20. <i>Trigona fulviventris</i>
4. <i>Melipona fasciata</i>	13. <i>Ptilotrigona occidentalis</i>	21. <i>Trigona fuscipennis</i>
5. <i>Nannotrigona mellaria</i>	14. <i>Scaptotrigona mexicana</i>	22. <i>Trigona nigerrima</i>
6. <i>Nogueirapis mirandula</i>	<i>subobscuripennis</i>	23. <i>Trigona silvestriana</i>
7. <i>Oxytrigona mellicolor</i>	15. <i>Scaptotrigona pectoralis</i>	24. <i>Trigonisca atomaria</i>
8. <i>Paratrigona opaca</i>	16. <i>Scaura latitarsis</i>	25. <i>Trigonisca buyssoni</i>
9. <i>Partamona orizabaensis</i>	17. <i>Tetragona dorsalis</i>	26. <i>Trigonisca discolor</i>



Table 2: Nest entrances of stingless bees. (a) *Plebeia frontalis*, (b) *Scaptotrigona mexicana subobscuripennis*, (c) *Partamona orizabaensis* (arrow points to nest entrance), (d) *Paratrigena opaca*, (e) *Scaptotrigona pectoralis*.



a



b



c



d



e

Table 3: Nest entrances of stingless bees.
 (a, b) *Trigona corvina*,
 (c) *Trigonisca buyssoni*, (d) *Tetragona dorsalis*,
 (e) *Lestrimelitta mourei*.

Therefore, it is uncertain whether the nest really belonged to *D. schulthessi* (CAMARGO & PEDRO 2005).

Geographical distribution

South-eastern Mexico to the north of Colombia.

Comments

The genus *Dolichotrigona* is not recognised by MICHENER (2000) who includes *D. schulthessi* in the genus *Trigonisca*.

3. *Lestrimelitta mourei*

FREITAS DE OLIVEIRA & MARCHI, 2005

Lestrimelitta mourei FREITAS DE OLIVEIRA & MARCHI, 2005: 2.

Worker features

The general coloration of *L. mourei* workers is deep brown, but the propodeum, the first two metasomal tergites, the legs, and the mandibles are lighter brown. The cuticle is smooth and the entire body noticeably shiny. The corbiculae are reduced. The body is 6-7 mm long.

Nest location and entrance structure

Nests are found in living trees, occasionally also in artificial cavities within walls – depending on the original location of the host nest of this cleptobiotic robber bee. The entrance is a broad cylindrical tube, up to 25 cm long and slightly funnel-shaped at its opening. At its base and the underside, short, truncated projections protrude from it (Table 3e).

Geographical distribution

This species was recently separated from *L. limao* (FREITAS DE OLIVEIRA & MARCHI 2005) and is so far known only from Costa Rica.

4. *Melipona fasciata* LATREILLE, 1811

Melipona fasciata LATREILLE, 1811: 173-174, 291-292 [cited in SCHWARZ 1932].

Worker features

The bees' colour is mainly dark brown; only the first metasomal tergite is brighter brown, at least basally. The apical margins of the metasomal tergites have thin, cream-coloured bands. The thorax is covered with reddish-brown and black hairs. The body is robust, honey-bee-like (but metasoma rounded at apex) and 8.5-10 mm long.

Nest location and entrance structure

Nests are built in cavities within living trees. The entrance is a round, unornamented hole, slightly larger than the diameter of a worker's head. It is surrounded by a broad rim made of mud and can be part of a perforated batumen plate that delimits the nest cavity to the outside.

Geographical distribution

Mexico and Central America.

5. *Nannotrigona mellaria* (SMITH, 1862)

Trigona mellarius SMITH, 1862: 42 [cited in MICHENER 1954].

Worker features

The bees are dark grey with pale, yellowish markings along the lateral margin of the mesothorax, on the axillae, the apical margin of the scutellum, and on the hind tibiae. The reddish antennae have a fringe of long hairs on the scape. The body is ca. 5 mm long.

Nest location and entrance structure

N. mellaria builds its nests in living trees or, according to ROUBIK (1992), occasionally in the ground. The nests are usually associated with nests of aggressive ants, but the colony we saw at the Tropenstation La Gamba was within a tree trunk, close to the entrance of an *Oxytrigona mellicolor* nest. The entrance structure is a long, cylindrical tube, up to 20 cm long and about 1.5 cm in diameter. Its tip is perforated and brighter than the rest of the tube.

Geographical distribution

Costa Rica to Colombia.

6. *Nogueirapis mirandula* (COCKERELL, 1917)

Trigona mirandula COCKERELL, 1917: 122.

Worker features

The general colour of *N. mirandula* is ferruginous or red. They have a large bilobed black spot on the upper part of the head, dark markings on the mesothorax, the hind tibiae and tarsi, and a dark band distally on each metasomal tergite. Yellow maculations are present on the face. The head is large and broader than the thorax, and the bees' size is about 5 mm.

Nest location and entrance structure

N. mirandula builds its nests in the ground. The entrance structure is a soft waxy tube with numerous perforations, which protrudes for a few centimetres above the soil.

Geographical distribution

Costa Rica and Panamá.

7. *Oxytrigona mellicolor* (PACKARD, 1869)

Trigona mellicolor PACKARD, 1869: 56-57.

Worker features

The bees are amber-coloured to orange with dark maculations on the propodeum and surrounding the ocelli. The head is shiny and broad and the metasoma elongated. The body is approximately 6.5 mm long.

Nest location and entrance structure

Nests are built in cavities within living trees. The entrance is an elongate slit, often in a groove in the tree

trunk. The groove around the actual entrance hole(s) is lined by cerumen, a mixture of wax and plant resins.

Geographical distribution

From Honduras to Ecuador and Venezuela.

8. *Paratrigona opaca* (COCKERELL, 1917)

Trigona opaca (*lineata* subsp.?) COCKERELL, 1917: 126-127.

Worker features

Bees black with bright yellow markings on the face (along inner eye margins, on clypeus, between the antennal sockets), ventrally on the scape of the antennae, along the lateral margin of the mesothorax, continuing on the axillae and the round margin of the scutellum, and the tibiae of the legs. The cuticle is dull in appearance. The body is about 4 mm long.

Nest location and entrance structure

P. opaca builds its nests in the open, between the roots of epiphytes. The nest often is well masked by ferns and mosses growing on it. The entrance tube is a short flattened cylinder made of cerumen. The margin of the opening is fimbriate and slightly outwardly bent (Table 2d).

Geographical distribution

Belize to Colombia.

9. *Partamona orizabaensis* (STRAND, 1919)

Trigona orizabaensis STRAND, 1919 (1917): 71.

Worker features

The bees are mainly black and have an orange or ferruginous labrum, mandibles and tarsomeres. Thin, yellowish lines run along the inner eye rims, and almost reach the upper end of the eyes. The corbiculae are broad and somewhat spoon-shaped. The body is 6 mm long.

Nest location and entrance structure

Nests of *P. orizabaensis* can be found in cavities in the soil or in trees, between the leaves of palm trees or the roots of epiphytes, in abandoned bird nests, or they are partly or entirely exposed. The funnel-shaped nest entrance is made of soil and resins and has a more or less triangular opening with the tip pointing upwards (Table 2c). The outer margin of the opening is fimbriate and bent back.

Geographical distribution

From south-east Mexico to north-west Panamá (PEDRO & CAMARGO 2003).

10. *Plebeia frontalis* (FRIESE, 1911)

Trigona frontalis FRIESE, 1911: 455 [cited in MICHENER 1954].

Worker features

The bees' general colour is black, but the metasoma is occasionally lighter. Yellow maculations are present on the face, along the lateral margin of the mesothorax, continuing on the axillae and the margin of the scutellum, on the posterior part of the pronotum (an uninterrupted band), and on the base of all tibiae. The cuticle is smooth and the bees appear polished. The body is 3.5-4.5 mm long.

Nest location and entrance structure

Nests are made in slender tubular cavities in living trees. The entrance is a simple, round hole, not much larger than the width of a worker's head. It is often surrounded by small droplets of resin and white or pale green material (Table 2a).

Geographical distribution

From Mexico to northern South America.

11. *Plebeia minima* (GRIBODO, 1893)

Trigona ? minima GRIBODO, 1893: 261 [cited in SCHWARZ 1934].

Worker features

Very small, black bees that have pale, yellowish maculations on the face and the pronotum, along the lateral margin of the mesoscutum, and a thin pale stripe at the posterior margin of the scutellum that is well separated from the maculated axillae. The body is 2-2.5 mm long.

Nest location and entrance structure

P. minima uses slender tubular cavities in various substrates as nesting sites. The entrance is a thin, cylindrical tube, a few centimetres long, made of yellowish wax.

Geographical distribution

From Costa Rica to the northern states of South America and Amazonia.

12. *Plebeia tica* (WILLE, 1967)

Trigona (Plebeia) tica WILLE, 1967: 299-302.

Worker features

The general colour of *P. tica* is black. The bees have white or yellowish markings on the face, as a band on the posterior part of the pronotum (interrupted in the middle by a black spot), a narrow line along the lateral margins of the mesoscutum, on the axillae, and on the posterior edge of the scutellum. The cuticle is smooth and only minutely punctate, such that the bees appear polished. The body is 3.5-4 mm long.

Nest location and entrance structure

Nests are constructed in slender tubular cavities in tree branches or lianas. The entrance is a simple hole lined with dark waxy material.

Geographical distribution

Costa Rica (WILLE 1967).

13. *Ptilotrigona occidentalis* (SCHULZ, 1904)

Trigona heideri occidentalis SCHULZ, 1904: 821-822.

Worker features

The bees are generally orange, but the metasomal tergites are darker brownish. The head and hind tibiae are black, the approximately lower two thirds of the face is yellow. The slender body has an elongate metasoma and is about 8 mm long.

Nest location and entrance structure

Nests are usually constructed in cavities within large, living trees. Occasionally, they can also be found in dead trees or in association with termite nests within cavities. The nest entrance is a wide, cylindrical tube made of smooth resin that lacks ornamentation.

Geographic distribution

P. occidentalis mainly occurs from the south of Panamá to north-western Ecuador. The population from the Osa peninsula and the Golfo Dulce region is very probably isolated from the main distribution, because there are no records of this species between there and southern Panamá (CAMARGO & PEDRO 2004).

14. *Scaptotrigona mexicana subobscuripennis* (SCHWARZ, 1951)

Trigona (Scaptotrigona) mexicana variety *subobscuripennis* SCHWARZ, 1951: 11-15.

Worker features

Predominantly black bees with brighter, reddish-brown tarsi and hind tibiae. The lower half of the face is light brown to yellow. The body is approximately 5 mm long.

Nest location and entrance structure

Nests are built in the ground or in tree cavities. The entrance is a short but broad funnel shaped tube with its wall perforated close to the opening (Table 2b).

Geographical distribution

Costa Rica and Panamá.

15. *Scaptotrigona pectoralis* (DALLA TORRE, 1896)

Melipona pectoralis DALLA TORRE, 1896 [cited in AYALA 1999].

Worker features

The bees are predominantly orange, but the apex of the head and the mesoscutum are black. The second meta-

somal tergite is also darker, and so contrasts with the remaining tergites. The body is about 5 mm long.

Nest location and entrance structure

Nests are constructed in tree cavities. The entrance is a simple cylindrical tube, a few centimetres long and about 2 cm in diameter (Table 2e).

Geographical distribution

Mexico to Panamá.

16. *Scaura latitarsis* (FRIESE, 1900)

Trigona latitarsis FRIESE, 1900: 388.

Worker features

Largely black bees with a dark, reddish-brown metasoma. The hind basitarsi are noticeably enlarged and swollen. The body is 3.5-4 mm long.

Nest location and entrance structure

Nests are built in cavities within active, arboreal nests of *Nasutitermes* termites. The entrance tube is cylindrical, less than 1 cm in diameter, and 1-10 cm long. It is made of soft cerumen and has a fimbriate rim at the opening.

Geographical distribution

Widely distributed from southern Mexico to the State of São Paulo, Brazil.

Comments

MELO & COSTA (2004) argued that *S. latitarsis* sensu SCHWARZ (1948) in fact comprises a species complex that needs careful revision. They further suggest that the species name *argyrea*, originally proposed by COCKRELL but placed in synonymy of *latitarsis* by SCHWARZ (1948), should be reinstated for populations of *Scaura* in Central America.

17. *Tetragona dorsalis* (SMITH, 1854)

Trigona dorsalis SMITH, 1854 [cited in AYALA 1999].

Worker features

The bees are orange with a darker head and thorax. The lower half of the face and the scapes of the antennae are yellow, the corbiculae black. The metasoma is elongated, finger-shaped, and lacks dark bands. The body is ca. 6 mm long.

Nest location and entrance structure

T. dorsalis nests are found among the roots or in cavities within living trees. The entrance is a long tube (sometimes more than 20 cm) made of brittle resin, which is perforated near the tip and has thin root-like projections hanging from it (Table 3d).

Geographical distribution

Nicaragua to Brazil.

18. *Tetragona perangulata* (COCKERELL, 1917)

Trigona perangulata (*clavipes* subsp.?) COCKERELL, 1917: 125.

Worker features

The bees are orange with a darker head and thorax and four dark brown bands on the metasoma. The corbiculae are almost entirely black. The lower half of the face and the scapes of the antennae are yellow. The metasoma is elongated and finger-shaped. The body is ca. 7 mm in length.

Nest location and entrance structure

Nests are built in cavities within living trees. The nest entrance made of black, brittle resin is elongate and funnel-shaped, but hardly projects beyond the surface of the tree trunk.

Geographical distribution

Costa Rica to Colombia.

Comments

This species is very similar to *Tetragona dorsalis*, but can easily be distinguished from it by the larger size and especially by the dark bands on the metasoma.

19. *Trigona corvina* COCKERELL, 1913

Trigona ruficrus corvina COCKERELL, 1913: 12.

Worker features

The bees are entirely black, with only reddish or brownish mandibles (except the teeth, which are also black). The scapes of the antennae have erect black bristles. The metasoma is short and broad. The body is 5.5-6 mm long.

Nest location and entrance structure

The exposed, large, spherical or ovoid nests are built on tree branches (Table 3a). The entrance is short and wide with rootlet-like projections hanging from it (Table 3b).

Geographical distribution

Southern Mexico to Colombia.

Comments

T. corvina is very similar to *T. fuscipennis*, but can be distinguished from it by the slightly larger body size, the reddish mandibles, and the presence of black bristles on the scapes.

20. *Trigona fulviventris* GUÉRIN, 1829-1844

Trigona fulviventris GUÉRIN, 1829-1844: 464 [cited in SCHWARZ 1948].

Worker features

The head, thorax, and legs of the bees are black; the metasoma is fulvous or reddish, narrower than the thorax and elongate. The body is approximately 6 mm long.

Nest location and entrance structure

T. fulviventris builds subterranean nests among roots at the base of large trees or between the decaying roots of old trees, occasionally also in open soil. The entrance is funnel-shaped, protrudes from the surface or is attached to a buttress, and has a wide opening.

Geographical distribution

Widely distributed from Mexico to Brazil.

21. *Trigona fuscipennis* FRIESE, 1900

Trigona fuscipennis FRIESE, 1900: 385.

Worker features

T. fuscipennis workers are entirely black, with the exception of a narrow reddish band just before the apex of the mandibles. The scapes of the antennae lack erect black bristles. The metasoma is short and broad, and the body is about 5 mm long.

Nest location and entrance structure

Nests of *T. fuscipennis* are almost exclusively built in cavities within active *Nasutitermes* nests, which were probably made by birds. The entrance is funnel- or ear-shaped. It projects only 3 cm from the nest's surface and can be up to 13 cm wide.

Geographical distribution

From Mexico throughout Central America to South America as far as Brazil.

Comments

T. fuscipennis can easily be mistaken for *T. corvina* in the field, but it differs from it in body size, coloration of mandibles, and the lack of black bristles on the scape.

22. *Trigona nigerrima* CRESSON, 1878

Trigona nigerrima CRESSON, 1878: 181 [cited in SCHWARZ 1948].

Worker features

Entirely black bees with an elongate, finger-shaped metasoma. The wings are dark, but the tips are generally light. Long bristles are present on the clypeus. The body is 7-8 mm long.

Nest location and entrance structure

Nests are exposed, ovoid, and built on small tree branches. The entrance is a brittle tube protruding 5-8 cm.

Geographical distribution

Occurs from Mexico to Colombia.

Comments

T. nigerrima is very similar to *T. silvestriana*, but can be distinguished from it by the elongate metasoma and the erect bristles on the clypeus.

23. *Trigona silvestriana* VACHAL, 1908

Trigona silvestriana VACHAL, 1908: 121-122 [cited in SCHWARZ 1948].

Worker features

Generally black bees, with only parts of the hind tibiae and tarsi testaceous or reddish. The metasoma is short and broad, not finger-shaped. The wings are very dark, and the clypeus lacks long bristles. The body is 8-9 mm long.

Nest location and entrance structure

T. silvestriana constructs exposed, spherical nests resting on large tree branches or between the bases of palm leaves. The nest entrance is broadly funnel-shaped but without ornamentation and projects only slightly from the nest surface.

Geographical distribution

Southeast Mexico and throughout Central America.

Comments

See *T. nigerrima*.

24. *Trigonisca atomaria* (COCKERELL, 1917)

Trigona atomaria COCKERELL, 1917: 127.

Worker features

The bees are honey-coloured to orange with dark brown bands on the distal margins of the metasomal tergites, distally on the dorsal part of the metathorax, and on the apex of the head (between the upper eye rims crossing the ocelli). The body is about 3 mm long.

Nest location and entrance structure

Nests are constructed in slender, tubular cavities in living trees. The entrance is a simple hole large enough for several bees to pass at the same time.

Geographical distribution

From Costa Rica probably to northern South America.

25. *Trigonisca buyssoni* (FRIESE, 1902)

Trigona buyssoni FRIESE, 1902: 383.

Worker features

Small, black or deep brown bees. The head and thorax are densely punctuated, and thus dull in appearance. The metasoma is smooth and shiny. The body is approximately 2.5-3 mm long.

Nest location and entrance structure

Nests are built in slender tubular cavities within trees or lianas. The entrance is a simple hole or elongate slit. It is lined with cerumen and resin and is big enough for several bees to pass at the same time (Table 3c). Small droplets of resin can be deposited around the nest entrance.

Geographical distribution

Widely distributed from Mexico to South America.

26. *Trigonisca discolor* (WILLE, 1965)

Trigona (Trigonisca) discolor WILLE, 1965b: 140-141.

Worker features

Small, light brown bees. The lower half of the head and the forelegs and middle legs are yellowish-ferruginous. The head and thorax are densely punctuated, and thus dull in appearance. The metasoma is smooth and shiny. The body is 2.5-3 mm long.

Nest location and entrance structure

No description found.

Geographical distribution

Costa Rica (WILLE 1965b).

Discussion

In the present paper we give a first survey of the stingless bee fauna of the Golfo Dulce region in the Pacific lowland rainforest of south-western Costa Rica. The list presented here must be taken as preliminary until systematic and more extensive collection activities at various locations in the area provide a more complete picture of the situation. Nevertheless, the number of species already recorded represents as much as 54% of all the stingless bee species so far listed for Costa Rica in GRISWOLD et al. (1995) and about 44% of the number of species known from Panamá (ROUBIK 1992). This finding clearly illustrates the outstandingly rich biodiversity of the Golfo Dulce region and underlines the strong need to conserve its natural habitats. The uniqueness of this geographic area is further demonstrated by the isolated occurrence of *Ptilotrigona occidentalis*. This species has not been found at any other location in Central America between the Golfo Dulce region and its main area of occurrence from the very south of Panamá to north western Ecuador (CAMARGO & PEDRO 2004).

Further efforts should be taken in the future to complete the list of the stingless bee species living in the Golfo Dulce region and to better understand the biology of this interesting and ecologically important group of insects.

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