Rev. Biol. Trop., 25(1): 43-46, 1977

# A general review of the fossil stingless bees

by

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(Received for publication October 15, 1976)

**Abstract:** In a study of the fossil stingless bees the following species are discussed: *Electrapis proava, Meliponorytes succini* and *sicula, Trigona devicta, T. silacea, T. dominicana, T. eocenica, T. erythra, T. gribodoi,* and *T. iridipennis.*

In the light of exhaustive comparisons and new information it was found that previous classifications and interpretation of *Electrapis proava, Meliponorytes, Trigona devicta,* and *T. eocenica,* in my opinion, are erroneous.

The purpose of this paper is to offer general information on the present situation of the fossil stingless bees. In my opinion, there are some misinterpretations about certain fossil forms, which should be clarified.

In 1831 Burmeister (as cited by **Kelner-Pillault,** 1969a, 1969b, 1970a) was the first to mention the presence of a *Trigona*-like bee in Baltic amber. Unfortunately he did not describe it, and it has been impossible to trace it.

In 1856 Menge (as cited by **Kelner-Pillault,** 1969a) described an *Apis*-like bee, *Apis proava,* which at present has been placed in the genus *Electrapis* and the subgenus *Roussyana* **(Manning,** 1960). However, in a very recent work on numerical taxonomy **(Kerr** and **Cunha,** 1976), this fossil was transferred into the genus *Trigona,* closely related to *Oxytrigona tataira.* This arrangement turned out to be wrong. I had the opportunity to examine the fossil in the presence of C. D. Michener, from the University of Kansas, and it was clear that the fossil, which shows well-developed wing venation, is close to *Apis,* although it is distinctive enough to be placed in the genus *Electrapis* (erected by **Cockerell** in 1909) as was done by **Manning** in 1960.

The first two genuine stingless bee fossils described were by **Tosi** in 1896, who named them *Meliponorytes succini* and *M. sicula,* both from Sicilian amber. Although this amber has been regarded as middle Miocene, the exact dating remains in doubt. *Meliponorytes succini* was represented by more than one specimen in the same block, and measured 4 mm in length. On the other hand, the only specimen of *M. sicula* was incomplete and deformed. Unfortunately the fossils were destroyed by a bomb during World War II, and their relationship to any known group of Meliponini is doubtful. **Kerr** and **Maule** (1964), however, regarded *Meliponorytes*

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*succini* as belonging to the genus *Meliponula,* but suggested that it should be placed in a different subgenus. I cannot accept this view since *Meliponula,* which contains only one species *(M. bocandei),* is a rather specialized bee **(Wille,** 1963), and the description given by **Tosi** (1896) as well as his drawings do not allow any definite conclusions. In a very recent paper by the late **Zeuner** and **Manning** (edited by S. F. Morris in 1976) this species has been placed in the subgenus *Tetragona.* According to them "If Tosi's figures are carefully examined the inner surface of the hind tibia shows both a main ridge and also a clear dark zone posterior to it".

The third stingelss bee fossil was described by **Cockerell** (1912) as *Meliponorytes devictus,* from Burmese amber. **Kelner-Pillault** (1969) as well as **Zeuner** and **Manning** (1976) list the fossil as belonging to the Pleistocene. This fossil, of about 3 mm in length, has been placed by **Kerr** and **Maule** (1962) and **Kerr** and **Cunha** (1976) in the genus *Trigona,* close to *T. iridipennis,* and has been renamed *Trigona devicta.* If one follows **Moure's** classification (1961) the fossil can be included in the genus *Tetragonula,* otherwise it should be placed in the subgenus *Tetragona.* Personally, I have never been able to find any consistent differences between the American and the Indo-Malayan *Tetragona.* I also had the opportunity to examine this fossil *(T. devicta);* I agree with **Kerr** and **Cunha** that it is closely related to *T. iridipennis.* **Zeuner** and **Manning** (1976) on the other hand regarded this specimen as *T. iridipennis.* The fossil, however, shows some important differences from that of *iridipennis,* differences which they considered as due to accidents of fossilization. For example, they believed that the larger abdomen of *T. devicta* was ". . . inflated by gases of putrefaction . . ."

The fourth fossil, *Trigona silacea,* described in 1959 **(Wille,** 1969), from Chiapas amber (México), has been regarded to be late Oligocene or early Miocene. This form, which measured 3 mm in length, is closely related to *T. mirandula* from Costa Rica, and *T. butteli,* from the upper Amazon basin. All these bees, including the fossil species, belong to the subgenus *Nogueirapis.* This relationship has been shown in a later work **(Wille,** 1964), where a new description of *T. silacea* based on new and better material is also given.

The fifth fossil, *Trigona dominicana,* **(Wille** and **Chandler,** 1964), from the Dominican Republic, regarded by Brouwer to be from the Oligocene **(Sanderson** and **Farr,** 1960), constitutes the second fossil record of this group in the Western Hemisphere. This minute bee (2.95 mm) of the subgenus *Hypotrigona,* is related to the group *Liotrigona* **(Moure,** 1961), which includes three African species. The occurrence of *T. dominicana* on the island of Hispaniola is of special interest since no member of the group Meliponini is otherwise known from the Greater Antilles.

The last fossil stingless bee is *Trigona eocenica,* from Baltic amber, presumably of the late Eocene. This is also a smallbee (3 mm) described by **Kelner-Pillault** (1970b) who believed it to be *Hypotrigona,* but its exact taxonomic position, in my opinion, still remains somewhat in doubt. Certain key structures, such as the penicillum, rastellum, corbicula, and nature of the inner face of the hind tibia, are not mentioned in her description. Some of her drawings, like those of the antenna and hind leg, actually suggest that the bees may be males rather than workers, and if that is the case, it would be still more difficult to place them in the right subgenus. On the other hand, if these fossils were actually workers, lacking penicillus and rastellum, as the drawings seem to imply, and if the inner surface of the hind tibia had a broad raised pubescent area and a relatively narrow, glabrous, gently depressed margin, then one is bound to believe them to be *Hypotrigona.*

In order to complete this work it seems advisable to mention three more fossils of *Trigona* which obviously belong to recent species. This has been discussed recently by **Zeuner** and **Manning** (1976). One of them is *Trigona erythra* Schletterer, from Pleistocene East African copal. I agree with **Moure** (1961) that this form belongs to a new group, *Axestotrigona.* There are two closely related species of *Axestotrigona: erythra* and *togoensis,* which, according to **Moure** (1964), are separated by the fact that *erythra* is " . . . clearly larger than *togoensis* . . ." and " . . has a largely reddish abdomen and the wings are moderately brownish." According to Zeuner and Manning the description of this fossil " . . .agrees in all essential respects with the original description of *T. togoensis* by Stadelman." They, however, had followed Schwarz who regarded those differences as simple variations, considering them as races of a single species, *T. erythra.*

**Zeuner and Manning** (1976) studied a series of specimens found in 19 pieces from East African copal (Late Pleistocene), which they regarded as *Trigona (Hypotrigona) gribodoi* Magretti. It is interesting, and perhaps significant, that some specimens were found with a very reduced venation, mostly in the posterior apical region of the forewing.

The last species studied by Zeuner and Manning was *Trigona (Tetragona) iridipennis* Smith, from Burmese amber (probably Pleistocene), they however included also the specimen (In. 20702) already discussed as *Trigona devicta.* The other specimen (In. 43809) was regarded by **Cockerell** (1922) as *Trigona laeviceps,* which is synonymous with *Trigona iridipennis* Smith.

## ACKNOWLEDGMENTS

This study was made possible thanks to a personal invitation by Dr. C. D. Michener, from the University of Kansas, to do research on stingless bees in the Snow Entomological Museum. I am also grateful to him for the loan of some important amber fossil bees. The Consejo Nacional de Investigaciones Científicas y Tecnológicas de Costa Rica (CONICIT) financed part of this study. I want to express my sincere thanks to Mr. Manuel Chavarría and Dr. C. D. Michener for reading the manuscript and for offering valuable suggestions. Finally, I wish to thank Miss Marielos Serrano Elizondo, for typing the manuscript.

## RESUMEN

En un estudio de las abejas Melipónidas fósiles se discute las siguientes especies: *Electrapis proava, Meliponorytes succini* y *sicula, Trigona devicta, T. silacea, T. dominicana, T. eocenica, T. erythra, T. gribodoi* y *T. iridipennis.*

En vista de extensas comparaciones y nueva información, se llegó a la conclusión de que algunas clasificaciones e interpretaciones de *Electrapis proava, Meliponorytes, Trigona devicta* y *T. eocenica* son, en mi opinión, totalmente erróneas.

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