

Papéis Avulsos de Zoologia

MUSEU DE ZOOLOGIA DA UNIVERSIDADE DE SÃO PAULO

ISSN 0031-1049

PAPÉIS AVULSOS DE ZOOL., S. PAULO 40(23): 359-367

13.X.1998

MISCHOCYTTARUS (MISCHOCYTTARUS) ARIPUANAENSIS. A NEW SOCIAL WASP FROM WESTERN-CENTRAL BRAZIL, AND REDESCRIPTION OF *MISCHOCYTTARUS LINDIGI* RICHARDS (HYM., VESPIDAE, POLISTINAE)

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ABSTRACT

Mischocyttarus aripuanaensis, sp. n. is described from Brazil/MT, and aspects of its external morphology are compared to those of species of the subgenera *Mischocyttarus* s. str., *Saussure* and *Clypeopolybia Brèthes*. *Mischocyttarus lindigi* Richards is redescribed. Information on phylogenetic relationships between the above subgenera is presented and discussed.

Keywords: *Mischocyttarus*, Polistinae, Vespidae, new species, phylogeny.

INTRODUCTION

Mischocyttarus Saussure is the largest genus of social wasps with more than two-hundred described species (Cooper, 1996; Gadagkar, 1991; Richards, 1945, 78; Zikán, 1949). The genus has been of great importance to the knowledge of sociobiology in vespids, the species proving to be very useful in the elaboration and testing of hypotheses of behavior evolution in wasps. The comparatively small size of nest populations and the uncovered combs facilitate the observation of the relevant behavioral characteristics, as well as the

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measurement of such important parameters as genetic relatedness among individuals (Gadagkar, 1991; Queller *et al.*, 1992; Strassmann *et al.*, 1995).

One of the best known groups within *Mischocyttarus* regarding social organization and behavior is that formed by the species allied to *M. labiatus* and *M. drewseni*, which constitute the subgenus *Mischocyttarus*, *s. str.* (Jeanne, 1972; Litte, 1981; Richards, 1978). While studying the collection of the Museu Goeldi, I found a single female specimen from Mato Grosso state (Brazil) that presents some unusual characters for that subgenus. The peculiar morphology clearly indicates that the specimen is a representative of an undescribed species, in some features broadening the morphological limits of the subgenus. On the other hand, because the original description of *M. lindigi* in Richards (1945) seemed to fit well in some respects the specimen from Mato Grosso, and also because of that author's more recent uncertainty about the validity of *M. lindigi* (Richards, 1978; p. 280), I decided to examine the holotype of the species. Observation of the type revealed that Richards' original description is inaccurate in some important aspects, and that his later comments on the possibility of synonymy with *M. labiatus* are unjustified. *M. lindigi* is a valid species, similar in structure to *M. smithii* Saussure, and is redescribed here so that it can be more easily recognized by eventual collectors.

***Mischocyttarus aripuanaensis*, sp. n.**

(Figs. 1,5,7,8a,9)

Holotype

Female, Brasil: MT, Aripuanã, Reserva Humboldt, iii/1977, W. L. Overal coll. The single specimen is in the collection of the Museu Goeldi.

Distribution and etymology

The species is so far only known from the type-locality, and the name is a reference to Aripuanã, in Mato Grosso state.

Diagnosis

Large dark brown *Mischocyttarus* species, length of forewing 16.4 mm; apex of clypeus markedly bidentate (Fig. 5); proximal half of posterior (ventral) margin of mandible blunt, not produced into a flange; occiput centrally compressed but not carinate; pronotum with lateral foveae, carina well developed, high and sharp throughout; fore and mid femora presenting a basal ring-like sulcus; inner larger claw of hind tarsus sharply pointed; first segment of metasoma rather short (Fig. 9), as long as hind femur, ventral portion produced

into a longitudinal round keel, width of apical region 1.8 times greater than that at base of segment; second tergum not laterally compressed, 1.3 times wider than long (Fig. 7).

Description of female.

Size. Length of forewing: 16.4 mm.

Structure. **Clypeus** 1.2 times higher than broad, somewhat flattened, apex markedly bidentate, quite well produced below and slightly bent forward, indentations adjacent to lateral lobes moderately deep (Fig. 5); **tentorial pits** just as far from eyes as from antennal sockets, **interantennal space** narrow, not salient, with a short vertical linear impressed mark; **mandible** with proximal half of the posterior (ventral in Richards, 1978) margin blunt, not produced into a sharp flange; **gena** about as wide as ventral lobe of the eye in lateral view; profile of the **posterior region of the head** as seen from above little concave backward, **occiput** centrally much compressed but not carinate; **ocelli** equidistant, separated by one diameter; **pronotum** with lateral foveae, anterior margin with a very narrow lamella and no carinate secondary margin behind it; **pronotal carina** well developed and sharp (lamellate) throughout, in lateral view obliquely produced like a roof over the anterior margin of the pronotum (Fig. 9), seen from above strongly convex forward and presenting a small central notch; **fore coxa** with the proximal internal margin produced into a low slightly reflexed lamella; fore and mid femora presenting a basal ring-like sulcus, evanescent on hind femur; first segment of **hind tarsus** short for the subgenus, about 0.9 times the height of the mesopleuron, the inner larger tarsal claw very sharply pointed; **dorsal mesepisternal plate** rather narrow, its ventral delimiting sulcus strongly oblique, lower extremity acutely angular; portion of mesoscutum opposite tegula unmarginated on anterior two-thirds; forewing with prestigma long, pointed, and pterostigma quite slender, more than 3 times as long as wide (Fig. 8a); **propodeum** with a long triangular and very deep median cavity, propodeal valves widely lamellate; **first segment** of the metasoma (Figs. 1,9) short for the subgenus (4.3 mm), about as long as hind femur, 1.3 times longer than the height of mesopleuron, spiracles weakly projecting, apex of tergum 1.8 times as wide as the basal petiole, sides of the postspiracular portion diverging gradually, preapical region not markedly bulging, lateral margins of first tergum practically touching each other below and laterally compressed so that the whole segment (tergum plus sternum) is produced ventrally into a blunt "keel"; **second tergum** of the metasoma not compressed laterally, sides with a curvilinear contour as seen from above, 1.3 times wider than long (Fig. 7).

Color. Whole insect dark brown, metasoma darker; antenna from distal

part of third segment on, patches on inner orbits, apex of all femora, and posterior margin of pronotum testaceous; wings yellowish brown, costal region a little darker.

* Male, larva, and nest are unknown.

Mischocyttarus lindigi Richards, 1945: 332. (Figs. 3,4)

Holotype: female, Colombia (MNHU)

Description of female

Size. Length of forewing: 16 mm.

Structure. **Clypeus** 1.2 times higher than broad, slightly narrower (relative to total width of head) and more convex than usual in the subgenus, apex narrowly truncate and very weakly bidentate (Fig. 4), indentations adjacent to lateral lobes moderately deep, inner corner of the lateral lobes not strongly projecting; **tentorial pits** noticeably closer to eyes than to antennal sockets, **interantennal space** narrow, not salient; **mandible** with proximal half of the posterior (ventral in Richards, 1978) margin not quite blunt but not produced into a sharp flange; **gena** clearly narrower than ventral lobe of the eye in lateral view; **eyes** with scattered small hairs; profile of the **posterior region of the head** as seen from above well concave backward, **occiput** rounded, not compressed; **ocelli** separated by just less than one diameter; **pronotum** with lateral foveae, anterior margin with a very narrow lamella and no carinate secondary margin behind it; **pronotal carina** high throughout but not sharp, not lamellate, in lateral view almost vertical, not strongly produced over the anterior margin of the pronotum; **fore femur** presenting a basal ring-like sulcus, evanescent on mid and hind femora; **hind tarsus** with larger inner claw rather pointed, but not sharp; portion of **mesoscutum** opposite tegula unmarginated on anterior two-thirds; **forewing** with prestigma pointed and pterostigma very long; **propodeum** with a deep but rather wide median cavity, propodeal valve narrowly lamellate, not much expanded back and dorsally; **first segment** of the metasoma short for the subgenus (4.3 mm; Fig. 3), 1.4 times longer than the height of mesopleuron, spiracles moderately projecting, apex of tergum 1.9 times as wide as the basal petiole; preapical region noticeably bulging so that there is a shallow constriction near the apex, lateral margins of first tergum touching each other below, the whole segment much compressed forming a ventral blunt "keel"; postpetiolar **metasoma** not compressed laterally but considerably slender, **second tergum** about 1.3 times wider than long.

Color. Whole insect dark brown, pronotum, mesoscutum and distal bands on metasomal terga and sterna darker; distal part of dorsal surface of antennal scape, ventral surface of scape and remaining antennal segments testaceous; wing membrane with small hairs brown, venation light reddish brown.

* Male, larva, and nest are unknown.

A comment on Richards' statements about *M. lindigi*

Richards (1945) noticed the shorter first metasomal segment of *M. lindigi*, but not to the point of perceiving the striking similarity with *M. smithii*. In his 1978 key to species of the subgenus, he says incorrectly that the first segment of *M. lindigi* is comparable to that of *M. rotundicollis*, and in p. 280 he suggests that *M. lindigi* might be a "form of *M. labiatus*", which is also plainly incorrect. Similarities between *M. lindigi* and *M. smithii* can also be seen in the narrower and more convex clypeus, the tentorial pits being considerably closer to eyes than to antennal sockets, and the gena distinctly narrower than eye in lateral view.

DISCUSSION

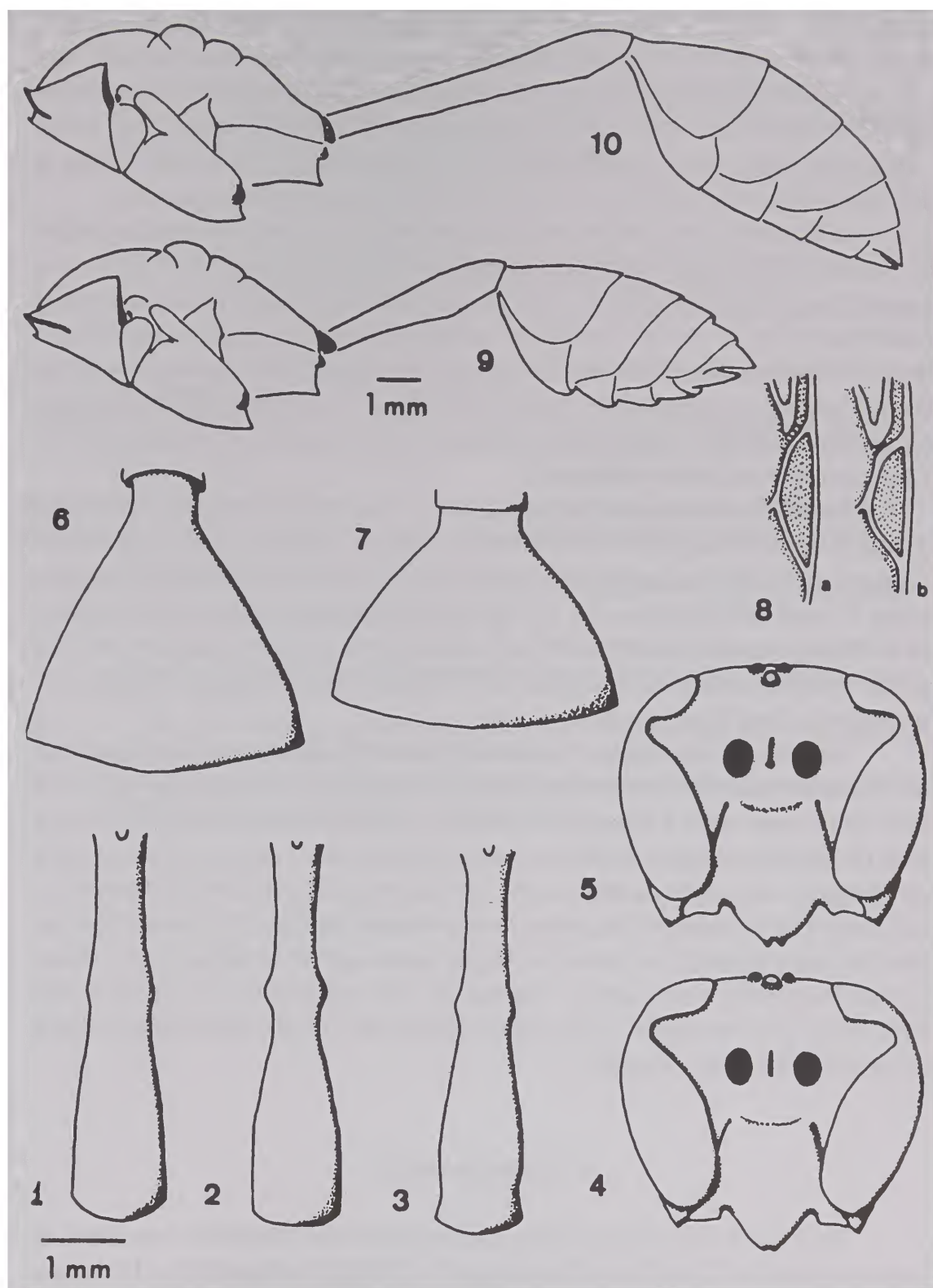
In his first revision of *Mischocyttarus*, Richards (1945) included his group of *M. flavicans* (consisting of this species plus *M. carbonarius*, and *M. duckei*) in the nominotypical subgenus. However, he considered as "probable" that the two groups (*labiatus* and *flavicans* groups) in the subgenus *Mischocyttarus* were "not really very closely allied", having "little in common other than the characters given in his key". In fact, most states of characters in Richards' key shared by the groups of *labiatus* and *flavicans* seem to be plesiomorphic in the genus. Richards (1945) had already noticed that *Clypeopolybia* Brèthes (a name first used at the genus level) was a synonym of *Mischocyttarus*, but only after seeing the type of *C. duckei* he recognized that Brèthes' species was a synonym of *M. flavicans* (Fabricius). In the 1978 book, Richards used the name *Clypeopolybia* for a subgenus comprising the *flavicans* group plus several (undoubtedly related) smaller species described by Zikán (1935, 49). But he also included in the subgenus his 1945 group of *M. heliconius* (with one additional new species, *M. sericeus*).

Work in progress on phylogeny within *Mischocyttarus* (at the subgenus level) indicates that the species of Richards' former *heliconius* group are not closely related to either *Clypeopolybia* or *Mischocyttarus s. str.*, since they share with all remaining groups of the genus the apomorphic absence of a ring-like sulcus on the base of fore femur. *M. heliconius* and allies also have the proximal inner margin of the fore coxa high and reflexed, which is a derived feature

shared with subgenera other than *Clypeopolybia* and *Mischocyttarus s. str.* On the other hand, evidence is now appearing supporting a monophyletic group formed by *Mischocyttarus s. str.* and “true” *Clypeopolybia* (*M. heliconius* and allies removed). They share two putative synapomorphies: first metasomal segment laterally much compressed, with tergal lateral margins very closely approximated below, forming a ventral blunt “keel”; portion of mesoscutum opposite tegula unmarginated on anterior two-thirds (equivalent to “absence of the scutal lamella” in Carpenter, 1991). However, while *Mischocyttarus s. str.* seems clearly to be a monophyletic group from such characters as the exceedingly narrow first metasomal segment, the more flattened clypeus, and (probably) the long central peduncle and regularly circular comb of nests, the monophyly of *Clypeopolybia* can not yet be taken for granted. All *Clypeopolybia* (in the sense of this paper) share the apomorphy of the clypeus with very deep lateral indentations, the median ventral angle appearing as if “detached” from the sides, but conflict between this and some other characters was found in preliminary analyses. The form of the anterior margin of the larval first abdominal segment, with three rounded processes, is also probably apomorphic, but this character has been observed only in *M. carbonarius* (Reid, 1942) and *M. flavicans* (personal unpublished observations).

One of the main features pointed by Richards (1978) separating *Clypeopolybia* and *Mischocyttarus s. str.* was the shape of the first metasomal segment, with the species of the second subgenus presenting a much longer and narrower segment. Observation of this character in the other subgenera, and outside the genus *Mischocyttarus*, indicates that the shorter and wider segment of *Clypeopolybia* species is primitive. This subgenus also seems to retain the plesiomorphic state in some other characters as the shape of the digitus of the male genitalia, and shape of the postpetiolar metasoma. *M. aripuanaensis* here described is evidently part of *Mischocyttarus s. str.*, as seen from the very narrow first metasomal tergum (see Fig. 1), the slender pterostigma (Fig. 8), and the more flattened clypeus. However, it is intermediate regarding some elements of shape of the first metasomal segment, and presents the primitive condition with respect to the postpetiolar part. It is also intermediate in the shape of the dorsal mesepisternal plate.

The first segment of the metasoma of *M. aripuanaensis* is very short when compared to that of the great majority of species of the subgenus *Mischocyttarus*. In this respect, compare proportions between *M. aripuanaensis* and *M. tomentosus* (a typical petiole-elongated species) in figures 9 and 10. Only *M. smithii* and *M. lindigi* seem to present a similarly short first segment (Figs. 2,3). However, while in *M. aripuanaensis* the sides of the first tergum diverge more gradually to the apex, in the other two species the postspiracular



Figs. 1-3, first metasomal tergum; 4-5, anterior aspect of head; 6-7, second metasomal tergum; 8, anterior wing prestigma and pterostigma; 9-10, lateral aspect of meso- and metasoma; *M. aripuananensis* (1,5,7,8a,9), *M. smithii* (2), *M. lindigi* (3,4), *M. tomentosus* (6,10), *M. flavicans* (8b).

portion is narrowly campanulate just as in other typical species of the subgenus. In *M. smithii* and *M. lindigi*, the segment has also a slender basal petiole, and the spiracles are more projecting. *M. drewseni* is another species with a rather short first segment, but the apex of the tergum is actually narrower than in the other mentioned species, and typically campanulate. The linear aspect is accentuated due to flattening of the basal petiolar part of the tergum.

In most *Mischocyttarus* s. str. the postpetiolar part of the metasoma has a characteristic laterally compressed appearance, with a proportionately long second tergum which may be indeed somewhat petiolate (see the typical condition in fig. 6). In *M. lindigi* the postpetiolar metasoma does not attain a truly compressed condition but it is typically slender. In *M. aripuanaensis* the second tergum is comparatively much wider (Fig. 7), and the metasoma is well expanded laterally, being quite similar to the primitive state found in *Clypeopolybia* and other subgenera.

Most *Mischocyttarus* groups, as well as basal polistine genera, present a dorsal mesepisternal plate that terminates ventrally in an acutely angular lobe. *Clypeopolybia* species present this state, the plate being also generally narrow, while in most *Mischocyttarus* s. str. the plate is distinctly wider and terminates in a bluntly rounded lobe. In *M. aripuanaensis* the ventral extremity of the dorsal mesepisternal plate is angular as in *Clypeopolybia*, but the whole plate is wider as in other *Mischocyttarus* s. str.

Several derived states are shared by the larger species of *Clypeopolybia* (*carbonarius* and *flavicans*) and subsets of species in *Mischocyttarus*, s. str. Such is the case with a pronotal carina that is strongly projecting, like a roof, over the anterior margin of the pronotum (*aripuanaensis* and *tomentosus*), with an elongate, very deep median cavity on the propodem (all *Mischocyttarus* s. str.), and with a strongly compressed occiput near the top of the head, this last feature being typically observed in *M. flavicans* and *M. aripuanaensis*. These facts, along with intermediate aspects of *M. aripuanaensis*, point to the hypothesis of a paraphyletic *Clypeopolybia* (in the sense of this paper), which is currently being investigated.

ACKNOWLEDGMENTS

This work was supported by a grant from the "Conselho Nacional de Desenvolvimento Científico e Tecnológico" (CNPq). I am grateful to Dr. James M. Carpenter for his comments on an earlier manuscript, and to Dr. Koch Wessel from the Museum of the Humboldt-Universität, Berlin, for the loan of the type of *M. lindigi*.

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