

**A NEW NEOTROPICAL FUNGUS GNAT  
(DIPTERA: SCIAROIDEA: KEROPLATIDAE) WITH  
MYRMECOPHAGOUS LARVAE**

LOÏC MATILE

Laboratoire d'Entomologie et EP 90 du CNRS, Muséum national d'Histoire naturelle, 45 rue Buffon, F-75005 Paris

*Abstract.*—The imago of *Proceroplatus belluus* n. sp. from Panama, a Keroplatidae with myrmecophilous larvae, is described. Other than its biology, the species is remarkable by its pectinate antennae, up to now unknown in *Proceroplatus*. Its taxonomic position is discussed; the species belongs to an inferred monophyletic group comprising two other species from Paraguay and Bolivia.

The larvae of Keroplatidae have very contrasting trophic specializations, being either ferocious predators, killing their prey by way of toxic diffuse nets (*Arachnocampa*, *Macrocera* and most *Orfeliini*), or fungicolous insects, spinning sheet-like webs to gather the spores of polyporous fungi (most Keroplatini) (see Matile, 1997, for a phylogenetic classification of the family). A phylogenetic study has shown that predation is most probably the ancestral diet of the Keroplatidae (Matile, 1997), and in the last few years, three species of Keroplatidae with ant-eating larvae have been discovered. Two of them are Oriental and belong to the genera *Truplaya* Edwards and *Platyceridion* Tollet (Kovac and Matile, in press, Chandler and Matile, in prep.); the larva of the first spins its web in bamboo internodes, that of the second in the internodes of an ant-plant (Krombein, pers. comm.). The third one is Neotropical (Panamá) and belongs to *Proceroplatus* Edwards. The purpose of this paper is to provide a name and description for this Neotropical species, the biology of which is discussed elsewhere in this journal (Aiello and Jolivet, 1996). The larva of this very interesting species will be described in another paper.

*Proceroplatus* is a mainly pantropical genus of Orfeliini comprising 33 described species, with a few northern representatives such as *Proceroplatus elegans* (Coquillett), which covers North America from Florida to Quebec (Laffoon, 1965). A fossil species, *P. hennigi* Schmallfuss is also known from the Oligocene-Miocene Dominican amber (Schmallfuss, 1979). The species described here differs from all the previously described species of the genus by its pectinate antennae. Nothing was known until now of the biology of any *Proceroplatus*; the larvae of *Proceroplatus belluus* have been discovered in one of the two pouches of ant-plants of the genus *Besleria* (Gesneriaceae), where they prey on the ants living in the other pouch (Jolivet, 1996; Aiello and Jolivet, 1996; Windsor and Jolivet, in press)—it is not yet known whether other species of *Proceroplatus* worldwide are associated with ants.

MATERIAL AND METHODS

In the course of the present study, I have studied 13 of the 16 described Neotropical species of the genus [not seen: *P. borgmerieri* (Shaw), *variventris* (Edwards)]

and *vitattus* (Fisher)], and about twice this number of undescribed ones; they stand in the collections of the Muséum national d'Histoire naturelle, Paris, or in Lane's material kept in the Museo de Zoologia, São Paulo, and kindly loaned by Dr. N. Papavero. I also have examined about 20 described or undescribed species from various other biogeographical regions.

The morphological terminology follows Matile (1990). The drawings have been done under the camera lucida, for the genitalia after treatment with potassium hydroxide (KOH). By convention, the macrochaetae of the genitalia are represented on the left side of the drawing only. Measurements were taken by means of ocular and objective micrometers. The holotype, in perfect condition, is glued at the tip of a triangular piece of cardboard; the pregenital segments and genitalia are stored in a microvial with glycerine.

DESCRIPTION

*Proceroplatus belluus*, new species  
(Fig 1, 2)

**Description** (male only).—A *Proceroplatus* with pectinate antennae and wings strongly darkened at apex but without clear round spots (fig. 1). Length of wing: 4.4 mm.

**Head:** occiput brown black. Three ocelli near middle of frons, the outer large, the median punctiform. Ocellar calli black. Frons dark brown. Antennae: scape and pedicel discoid, the scape black brown, the pedicel yellow. Flagellum: segments 1–13 with long and simple pectinations bearing dense fine setae. First flagellomere yellow, the following brownish yellow, the pectinations brown, narrowly yellowed at basis. Face brownish yellow, palpi brown black, the last palpomere yellow.

**Thorax:** prothorax, scutum, scutellum and mediotergite yellow. Pleurae and laterotergite yellow, mesanepisternite brownish, with a group of small dorsal setae, mesokatepisternite light brown. Laterotergite with long erect posterodorsal setae.

Coxae and legs yellow, the tarsi darkened. Spurs black, the I and outer II–III minute, the inner II–III very long. Protarsus I longer than tibia (5.5:4).

Wings yellow with brown spots. A costal median spot, reaching to C and M4; R4 narrowly seamed with brown, a wide apical spot, apex of M2 and M4 narrowly brownish, Culb widely seamed with brown at apex, and a weaker spot in the anal field. Costa reaching middle of section R5–M1. Subcosta short, ending in costa a little after level of rs. R4 strongly oblique, as long as costal section R1–R4. Radial-omedian fusion much shorter than stem of anterior fork (0.8: 3.2). Anal long and fine, reaching wing margin. Halteres orange yellow.

**Abdomen:** Pattern obscured by the ciliation. Tergite I yellow, II yellow, apex slightly brownish; III brown, indistinctly yellow a little before apex; IV yellow dorsally, with a narrow postbasal brown band; V yellow, VI–VII brown, dark yellow at basis. Sternites with the same pattern as tergites.

Hypopygium (Fig. 2) yellow on basal half, brown on distal half. Ninth tergite shorter than synsclerite, wider than long, concave at basis, slightly convex at apex. Cerci wide, subtriangular with rounded corners. Synsclerite simple, with a wide triangular ventral notch. Gonostyles deeply divided into two strongly sclerotized arms, the anterior regularly pointed, the posterior one wider at basis.

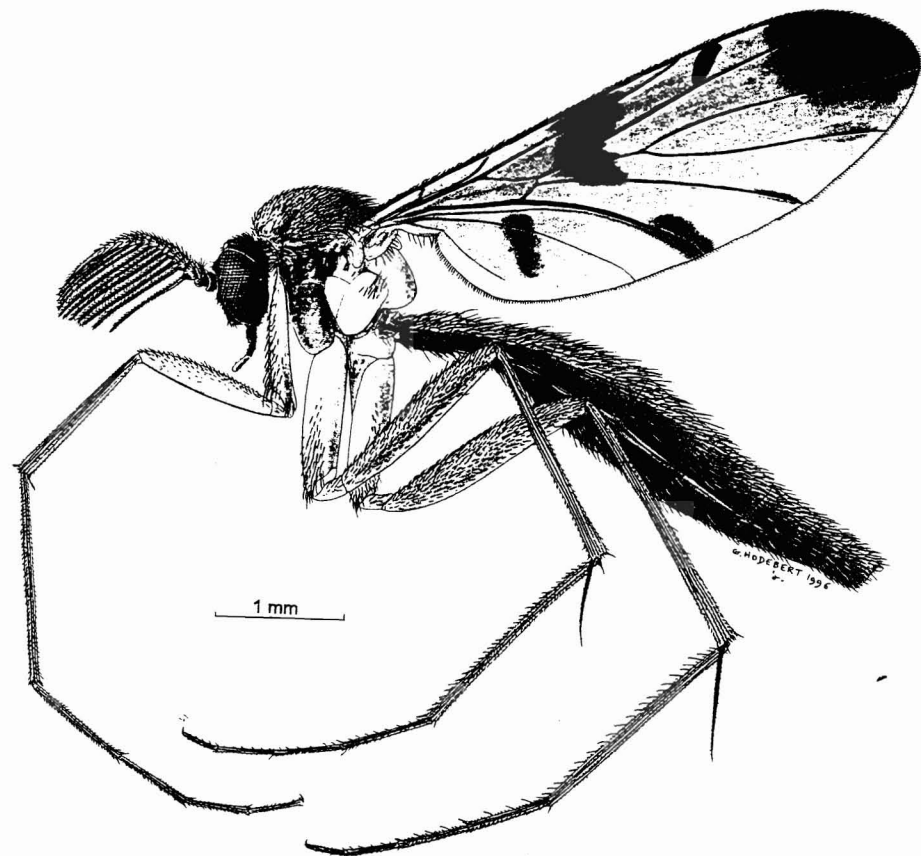


Fig. 1. *Proceroplatus belluus* n. sp., male holotype, habitus.

*Holotype*: male, "Panama, Cocle Prov. above El Copé, ex larva, 8 Nov. 1992 (Jolivet, Windsor, Aiello)/Ant-eating larva on silk inside inflated lvs of *Besleria formicaria*. Adult fly 3 Jan 1984 Aiello Lot 92-87 #3." Muséum national d'Histoire naturelle, Paris.

*Etymology*: From the Latin *belluus*, monster, as the larva of this species was first nicknamed by its discoverers.

#### DISCUSSION

In his very short generic description, Edwards (1925) mentioned the antennae of *Proceroplatus* as "much flattened, the flagellar segments deeper than long, and generally articulated above the middle." This is the condition of the males of all known species except the present one (the state of the character is attenuated in females). Pectination has appeared several times in different clades of the Keroplatinae and the Sciaroidea (see Matile, 1990:395, for a discussion of this character and its re-

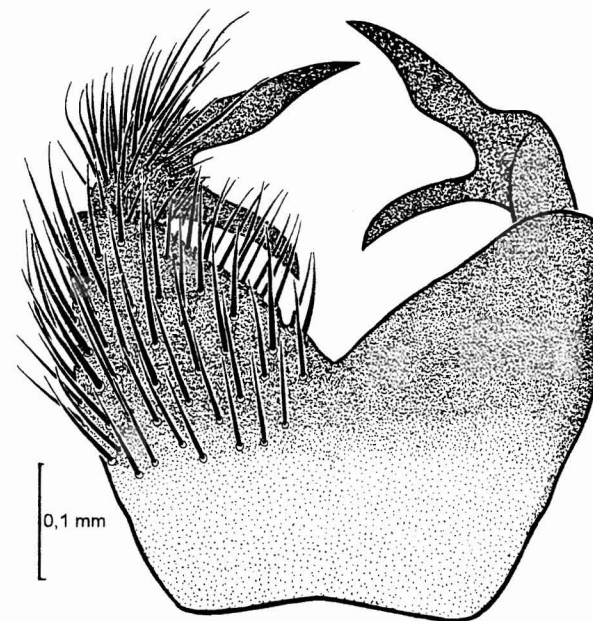


Fig. 2. *Proceroplatus belluus* n. sp., male holotype, synclerite and gonostyles, ventral view.

partition), and no other imaginal character has been found to support a generic distinction between the species described here and the rest of *Proceroplatus*. A similar situation exists in the mycetophilid genus *Metanepsia*, from the Old World tropics, where the male flagellum is very similar to *Proceroplatus*, except for an Afrotropical species that has pectinate antennae (Matile, 1980).

The two-armed structure of the male gonostyles of *P. belluus* is of the common *Proceroplatus* type, found worldwide in many species. This structure probably corresponds to the groundplan of the genus, and is therefore of little use in assessing the phylogenetic relationships of the new species.

However, the description of *P. variventris* Edwards, a Bolivian species known only from the female holotype (Edwards, 1931), agrees rather closely with that of *P. belluus*, notable differences being the antennal scape and the whole palpi, "ochreous" instead of black in the Bolivian species, and the pleural sclerites entirely yellow. The coloration of the abdomen is also different, being more strikingly banded.

Most *Proceroplatus* have pictured wings with roundish apical and marginal clear spots, usually between C and R5 and between each of the posterior veins. *Proceroplatus belluus* and *P. variventris* differ from these species by having the wing mainly clear and deprived of these round spots, while the apex of the wing is more markedly brown. A female from Paraguay shows a similar wing pattern, the main difference from the other two species being the presence of a complete transverse dark band through the posterior fork, instead of a single spot above Culb. In most *Proceroplatus* worldwide as well as in the Cenozoic species, the wings are orne-

mented with round clear spots which are sometimes more or less completely fused, and I have little doubt that this is the plesiomorphic state of the genus (an autapomorphy with regards to the other genera of Orfeliini). On the basis of this deviation from the groundplan, it thus can be inferred that *P. variventris*, *P. belluus* and the Paraguayan undescribed species together form a monophyletic group. It is of course impossible to know whether the males of the two South American species have also pectinate antennae, and if the biology of these species is the same.

## ACKNOWLEDGMENTS

I am very grateful to Drs Annette Aiello (Smithsonian Tropical Research Institute, Panamá) and Pierre Jolivet, who gave me the opportunity to describe this interesting species and generously deposited the holotype in the Muséum national d'Histoire naturelle, Paris, and to Dr Nelson Papavero (Museu de Zoologia, Sao Paulo) for the loan of the Orfeliini of Lane's collection. Thanks are heartily given to Gilbert Hodebert (Laboratoire d'Entomologie, Muséum national d'Histoire naturelle, Paris) for the fine illustration of the habitus of the new species.

## LITERATURE CITED

- Aiello, A. and P. Jolivet. 1996. Myrmecophily in Keroplatidae (Diptera, Sciaroidea). *J. New York Entomol. Soc.* 104:226-230.
- Edwards, F. W. 1925. British Fungus-Gnats (Diptera, Mycetophilidae), with a revised Generic Classification of the Family. *Trans. Entomol. Soc. Lond.* 1924 (1925):505-670.
- Edwards, F. W. 1931. Die Ausbeute der deutschen Chaco Expedition 1925-6. Diptera. XXIII. Bibionidae and XXIV. Mycetophilidae. *Konowia* 10:74-78.
- Jolivet, P. 1996. Ants and Plants. An Example of Coevolution (Enlarged Edition). Backhuys, Leiden, 303 pp.
- Kovac, D. and L. Matile. in press. *Truplaya ferox*, a new Malayan keroplatid from bamboo phytotelmata with larvae predaceous on ants (Diptera, Mycetophiloidea). *Bull. Raffles Mus.*
- Laffoon, J. 1965. Family Mycetophilidae (Fungivoridae): 196-229. In: A. Stone, et al. (eds.), A Catalog of the Diptera of America north of Mexico. *Agric. Handb.* 276, iv + 1-1696.
- Matile, L. 1980. Nouvelles données sur les *Metanepsia* afrotropicaux (Diptera, Mycetophilidae). *Revue fr. Entomol.*, N.S. 2(3):119-122.
- Matile, L. 1990. Recherches sur la systématique et l'évolution des Keroplatidae (Diptera, Mycetophilidae). *Mém. Mus Natl Hist. Nat., Sér. A, Zool.* 148:1-682.
- Matile, L. 1997. Phylogeny and Evolution of the Larval Diet in the Sciaroidea (Diptera, Bibionomorpha) since the Mesozoic. In Grandcolas, P. (ed.), The origin of biodiversity in insects: phylogenetic tests of evolutionary scenarios. *Mém. Mus. Nat. Hist. Nat.*, 173: 273-303.
- Schmallfuss, H. 1979. *Preceroplatus hennigi* n. sp., die erste Pilzmücke aus dem Dominikanischen Bernstein (Stuttgarter Bersteinsammlung: Diptera, Mycetophiloidea, Keroplatidae). *Stuttgarter Beitr. Naturk.*, ser. B 49:1-9.
- Windsor, D. and P. Jolivet. in press. Aspects of the morphology and ecology of two panamanian ant-plants, *Hoffmannia vesciculifera* (Rubiaceae) and *Besleria formicaria* (Gesneriaceae). *J. Trop. Ecol.*, 12.

Received 28 November 1996; accepted 27 March 1997.

TWO NEW SPECIES OF *MEGASTYLUS* FROM THE NEW WORLD  
(HYMENOPTERA: ICHNEUMONIDAE; ORTHOCENTRINAE)

DAVID B. WAHL

3005 SW 56th Ave., Gainesville, Florida 32608-5047  
phone/fax: (352) 377-6458; e-mail dbwahl@delphi.com.

*Abstract.*—Two new species of the orthocentrine genus *Megastylus*, *Megastylus fallax* and *Megastylus panamensis*, are described. *Megastylus panamensis* constitutes the first record of this genus from the Neotropical Region. The systematics of New World *Megastylus* are briefly discussed. Orthocentrinae are shown to be koinobiont endoparasitoids.

The orthocentrine genus *Megastylus* is distributed worldwide with about 30 described species. As with many ichneumonid genera, this represents only a fraction of the total number of species. In the New World, no species have been described south of the United States. Dr. Annette Aiello and her colleagues in Panama recently reared a *Megastylus* from a dipterous (Keroplatidae) ant-predator. It is a new species and is described here as *Megastylus panamensis* to complement the biological studies of the host. An unforeseen byproduct of this study is the discovery of a new species of Nearctic *Megastylus* from Arizona that was confused with *petilus* Dasch; it is described here as *Megastylus fallax*.

Specimens examined in this study are in the American Entomological Institute (Gainesville, Florida: AEIC). Morphological terminology mostly follows Townes (1969) as modified by Wahl (1989), with the exception that the "apical transverse carina" is referred to as the *posterior transverse carina*. *MSI* stands for the first metasomal segment. *T1*, *T2*, *S1*, *S2*, etc., are used for the various metasomal tergites and sternites. When the lengths of the body and wing are given, the values in parentheses are those of the holotype.

## NEW WORLD MEGASTYLUS

The genus *Megastylus* is monophyletic, defined by the autapomorphies of: 1) an inflated scape that has the posterior margin membranous and infolded, and 2) long notauli that extend to the mesoscutal center (Wahl and Gauld, unpublished ms.). Ichneumonologists have previously been aware of its presence in the Neotropical Region, although no species have been described from there. The late Henry Townes sorted out 38 Neotropical species in the American Entomological Institute collection; they are distributed from Mexico to Chile. Ian Gauld (pers. comm.) has found 24 undescribed species in Costa Rica alone.

Dasch (1992) recognized 14 Nearctic species, dividing them into the *Megastylus* Group (10 species) and the *Dicolus* Group (4 species). These are defined as having the "anterior transverse groove of propodeum" close to the metanotum in the *Megastylus* Group or separated by about 0.3× the propodeal length (as measured from the metapostnotal posterior margin to the propodeal apex) in the *Dicolus* Group. Dasch's "anterior transverse groove" is the metapostnotum (Wahl, 1985) and the