

## A fossil dung midge in Mexican amber (Diptera: Scatopsidae)

André Nel and David Coty

### ABSTRACT

The first fossil representative of Psectrosciariinae, *Psectrosciara fossilis* sp. nov., is described and figured from the Late Oligocene to Middle Miocene Mexican amber of Totolapa. It belongs to the *brunnescens*-group sensu Cook, but differs from all the modern representatives in the presence of two foliaceous lobes at the extremity of the gonostyles, base of M1 clearly visible, and 10-segmented antennae.

André Nel. Institut de Systématique, Évolution, Biodiversité, ISYEB - UMR 7205 – CNRS, MNHN, UPMC, EPHE, Muséum national d'Histoire naturelle, Sorbonne Universités, 57 rue Cuvier, CP 50, Entomologie, F-75005, Paris, France. [anel@mnhn.fr](mailto:anel@mnhn.fr)

David Coty. Institut de Systématique, Évolution, Biodiversité, ISYEB - UMR 7205 – CNRS, MNHN, UPMC, EPHE, Muséum national d'Histoire naturelle, Sorbonne Universités, 57 rue Cuvier, CP 50, Entomologie, F-75005, Paris, France. [coty.david@gmail.com](mailto:coty.david@gmail.com)

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### INTRODUCTION

The Scatopsidae are small to minute dark flies found worldwide, but with a poorly known fossil record (see Amorim, 1998; Nel and Prokop, 2004; Fate et al., 2013). The family is divided into four subfamilies, Aspistinae Rondani, 1840, Ectaeiinae Enderlein, 1936, Psectrosciariinae Cook, 1963, and Scatopsinae Newman, 1834 (Amorim, 1994; Huerta and Hribar, 2015). Since now, no fossil is recorded for the small subfamily Psectrosciariinae that comprises only the two genera *Psectrosciara* and *Anapausis*. Nevertheless Amorim and Haenni (1992) made the hypothesis that the origin of the *scatopsiformis*-group of species of *Psectrosciara* is

somewhat earlier than the Lower Jurassic, on the basis of biogeographic considerations. Thus it was surprising that this subfamily had no known fossil representative. Here we describe the first fossil *Psectrosciara* from the Miocene Mexican amber.

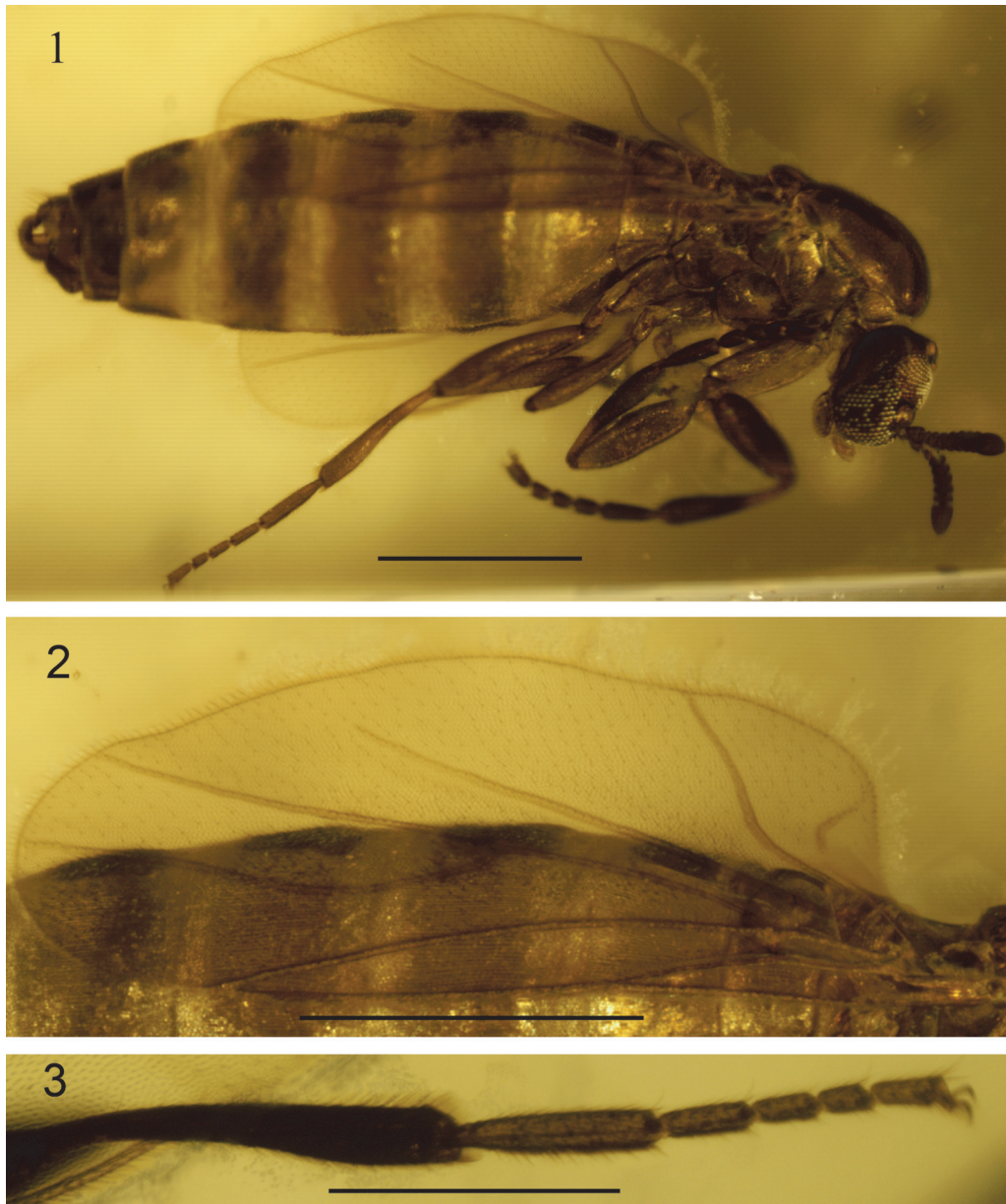
### MATERIAL AND METHODS

Totolapa is located in the central depression of Chiapas, 70 km at the south-east of Tuxtla Gutiérrez, the capital of Chiapas State. Salt River mine, exploited since 2007, is 1 km north of Totolapa, on the banks of the Salt River. As a complete geological study is lacking, we are therefore in the incapacity to give a precise age and consider that the

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**FIGURE 1.** *Psectrosciara fossilis* sp. nov., holotype MNHN.F.A57265. 1, general habitus; 2, wing; 3, hind leg. Scale bars represent 0.5 mm (1), 0.5 mm (2), 0.25 mm (3).

amber from Salt River Mine must be from Late Oligocene to Middle Miocene (25-15 Ma. see Coty et al., 2014 for a synthesis on this problem).

The original external surface of the amber piece has been removed by polishing; final lustration was done using diatomite powder. The specimen was examined under Nikon SZ10 and Olympus SZX9 stereomicroscopes. Photos were taken with an Olympus E-3 digital camera. Several digital pictures were reconstructed using Helicon Focus software.

#### SYSTEMATIC PALAEOLOGY

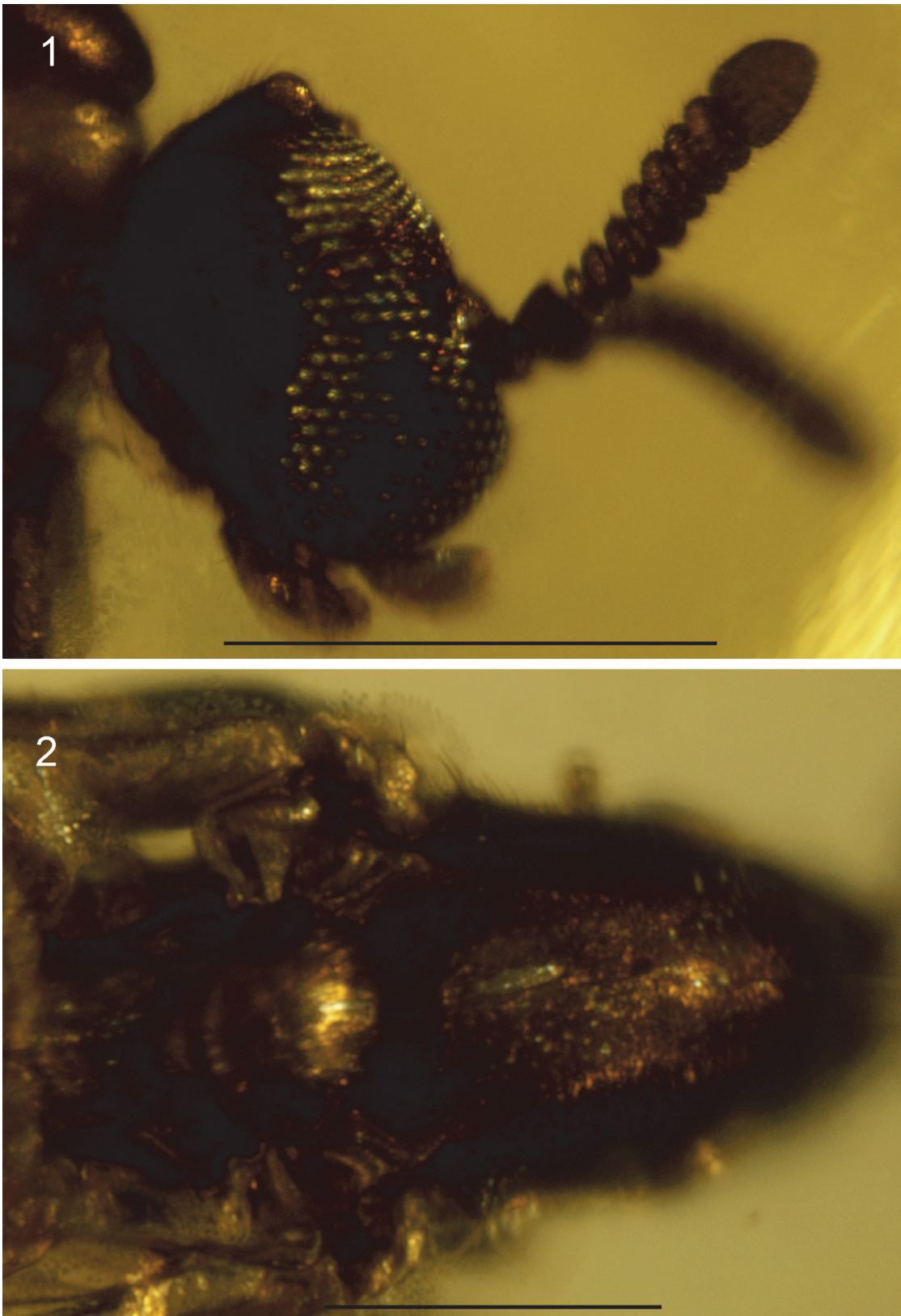
Order DIPTERA Linnaeus, 1758  
Family SCATOPSIDAE Newman, 1834  
Subfamily PSECTROSCIARINAE Cook, 1963  
Genus PSECTROSCIARA Kieffer in Enderlein,  
1911

**Type species.** *Psectrosciara mahensis* Kieffer, 1912

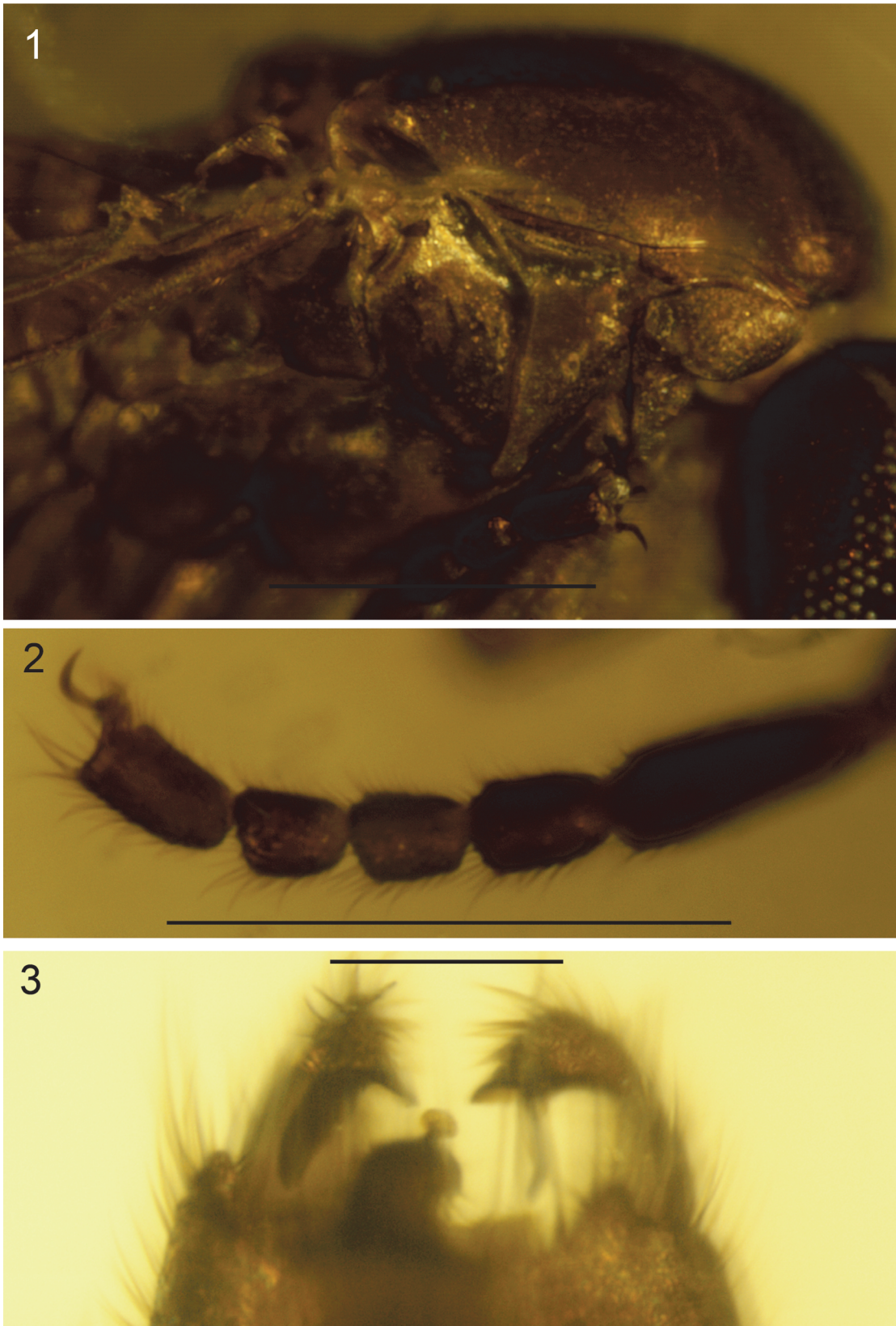
*Psectrosciara fossilis* sp. nov.  
(Figures 1-3)

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**FIGURE 2.** *Psectrosciara fossilis* sp. nov., holotype MNHN.F.A57265. 1, head; 2, dorsal view of thorax. Scale bars represent 0.5 mm (1) and 0.25 mm (2).



**FIGURE 3.** *Psectrosciara fossilis* sp. nov., holotype MNHN.F.A57265. 1, lateral view of thorax; 2, fore tarsi; 3, genitalia. Scale bars represent 0.5 mm (1), 0.25 mm (2), 0.01 mm (3).



**Etymology.** Named after the fact that it is the first fossil record of the genus.

**Holotype.** MNHN.F.A57265 stored at the MNHN, Paris.

**Type horizon.** Late Oligocene–Middle Miocene,

**Type locality.** Salt River mine, Totolapa, Chiapas, Mexico.

**Diagnosis.** Male characters only. Presence of two foliaceous lobes at the extremity of the gonostyles; base of M1 clearly visible; 10-segmented antennae.

**Description.** Body 2.7 mm long; head 0.25 mm long, dark; antennae with 10 segments, the first flagellomere very short, last flagellomere bullet-shaped; eyes holoptic, lateral margin oblique. Thorax compressed laterally, brown; mesonotum bare, uniformly light brown; scutellum and metanotum light brown. Wing length 1.44 mm, width 0.61 mm; C extending 82% of wing length, Sc short; macrotrichia on all veins and on membrane posteriorly to vein R4+5; membrane covered with microtrichia; all veins brownish, posterior ones less so but clearly contrasting with wing membrane; base of vein M1 more diffuse than other veins but still clearly visible; base of M clearly visible; vein CuA1 not reaching wing margin; A1 strongly curved. Halter with knob and stem bare. Legs brown; fore coxa long, almost as long as femur; tibiae and tarsi not armed with stout, short spine-like setae but tibiae with very short ventro-apical spines; fore tibia with distal half distinctly dilated; mid and hind tibiae gradually dilated in all its length; hind 1st tarsomere longer than other tarsomeres.

**Abdomen brown, cylindrical, long, distinctly overpassing tip of wings.** Tergite 1 short, wider than long; tergite 2 divided in a small anterior sclerite and a larger posterior sclerite; tergites 3-5 rectangular, longer than wide; tergite 5 somewhat wider; tergite 6 quadrate; tergite 7 somewhat wider than long; tergite 8 short, projecting latero-posteriorly, with very long hairs and a pair of dorsolateral spiracles, well distant each other; tergites 1-8 with an anterior slight emargination, sternite 7 entire.

**Genitalia.** Epandrium bottle-shaped, with a preapical strangulation; gonocoxites well developed, long, with long hairs; gonostyles very long and narrow, with two leaf-like apical expansions, curved upwards and inwards, with long hairs.

## DISCUSSION

Following the key to the Nearctic scatopsid genera of Cook (1981) and the revision of *Anapausis* by Amorim and Balbi (2006), *Psectrosciara fossilis* sp. nov. falls in the genus *Psectrosciara*

(*Psectrosciariini* Cook, 1963) for the characters: body elongate and compressed laterally, scutum without a U-shaped ridge; fore tibia not produced apically; C not swollen at junction with R4+5; eyes holoptic; wing with false vein absent; wing membrane and veins with obvious setae; base of M, arising at base of R4+5 (*Psectrosciariinae* Cook, 1963); R4+5 long, extending beyond middle of wing, not strongly curved, intersecting C at an acute angle; presence of vein A1; stem of halter without setae, anterior spiracle situated on anepisternum, unlike in *Anapausis* Enderlein, 1912 (see Amorim and Balbi, 2006, p. 4). Lastly the spiracles of tergite 8 are well distant each other (not near each other mesally on the tergite, unlike in *Anapausis* (*Anapausini* Amorim, 1994) (Amorim, 1994, p. 110).

The tibiae and tarsi not armed with stout, short spine-like setae, sternite 7 not divided into two lobes, and long gonocoxites are characters of the *brunnescens*-group as defined by Cook (1958, p. 589) (see also Amorim and Haenni, 1992; Huerta and Hribar, 2015). Amorim (1982) confirmed the monophyly of the two *brunnescens*- and the *scatopsiformis*-groups of species within *Psectrosciara*. The *brunnescens*-group is widespread from Southeast Asia to North America. An obvious difference between our fossil and the modern representatives of the genus *Psectrosciara* is the vein M1 complete, not interrupted at the base, which is probably a plesiomorphy. Cook (1958, p. 588) indicated that few modern species, e.g. *P. brunnescens* (Brunetti, 1911) and *P. forcipata* Cook, 1958, have a 'faint connection with M'. Also *P. ampullacea* Carles-Tolrá, 2008 has a base of M1 still visible, even if it is faint (Carles-Tolrá, 2008, fig. 3).

After Cook (1958, 1978) and Haenni (1990, pers. comm.), the *brunnescens*-group comprises the following species: *P. brunnescens* (Brunetti, 1911) (Ceylon, Seychelles Islands); *P. luzonensis* Edwards, 1929 (Philippine Islands); *P. brevicornis* Johannsen, 1946 (Guam); *P. forcipata* Cook, 1958 (California); *P. discata* Cook, 1958 (California); *P. oregonensis* Cook, 1958 (Oregon); *P. bakeri* Cook, 1958 (California); *P. brevistylis* Cook, 1958 (Iran); *P. stonei* Cook, 1958 (Texas); *P. arnaudi* Cook, 1978 (Mexico); *P. africana* Cook, 1965 (Africa); *P. asklepios* Haenni, 1990 (Greece); and *P. ampullacea* Carles-Tolrá, 2008 (Spain). *P. fossilis* differs from all these species except *P. stonei* and *P. brevicornis* in the presence of two foliaceous lobes at the extremity of the gonostyles. *P. africana* has a R4+5 distinctly longer than in *P. fossilis* (Cook, 1965). *P. stonei* has the base of M1 absent, unlike

*P. fossilis* and *P. brevicornis* (Cook, 1958). *P. arnaudi* has M1 scarcely connected to the base of M, unlike *P. fossilis* (Cook, 1978). *P. fossilis* has 10-segmented antennae instead of nine-segmented in *P. brevicornis*. *P. asklepios* has broadly club-shaped gonostyles but differs from *P. fossilis* in the 10-segmented antennae and the basal part of M1 very faint (Haenni, 1990).

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