



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.

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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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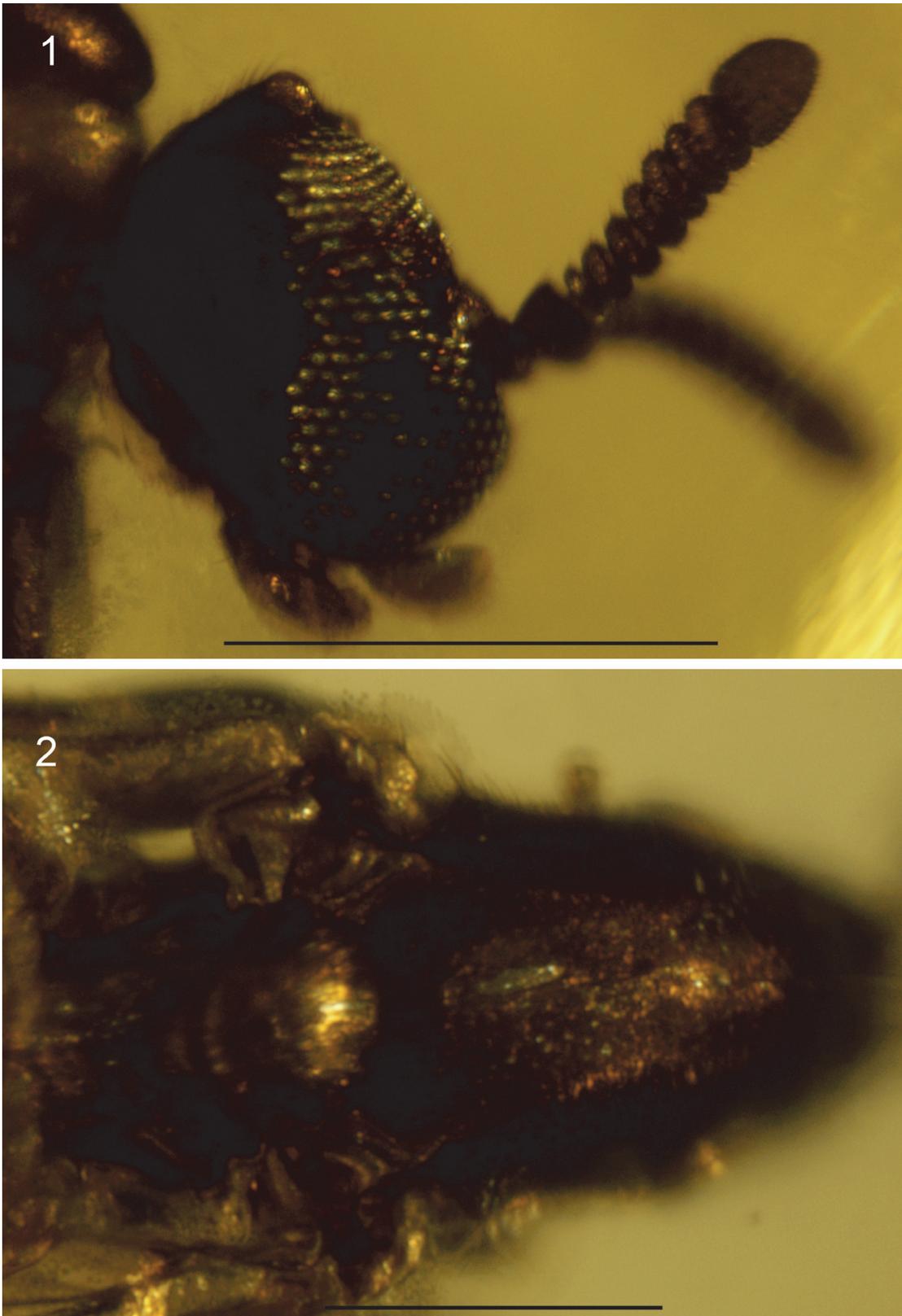


FIGURE 2. *Psectrosciara fossilis* sp. nov., holotype MNHN.F.A57265. 1, head; 2, dorsal view of thorax. Scale bars represent 0.5 mm (1) and 0.25 mm (2).



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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