# A new species of Ferneiella from the Eocene French amber (Diptera: Scatopsidae)

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**A new species of *Ferneiella* from the Eocene French amber (Diptera: Scatopsidae)**

Working title: fossil Scatopsidae in amber

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**Abstract**

We describe the first fossil representative of the genus *Ferneiella*, *F. gallica* sp. nov., in the earliest Eocene Oise amber.

**Key words**: Insecta; Diptera; Scatopsidae; French amber.

**Introduction**

The Scatopsidae are small to minute dark flies found worldwide, but with a poorly known fossil record (Amorim 1998; Nel & Prokop 2004; Fate et al. 2013). The family is divided into four subfamilies, Aspistinae Rondani, 1840, Ectaetiinae Enderlein, 1936, Psectrosciarinae

Cook, 1963, and Scatopsinae Newman, 1834 (Amorim, 1994). We herein describe the first fossil representative of the modern scatopsine (Colobostematini) genus *Ferneiella* Cook, 1977 from the Oise French amber. Fossil Colobostematini are very scarce: *Procolobostema hurdi* Cook, 1971, *Procolobostema incisum* Cook, 1971, *Procolobostema obscurum* Cook, 1971, *Procolobostema roseni* Amorim, 1998 from the Miocene amber of Mexico and Dominican Republic, and *Cookella eocenica* Nel & Prokop, 2004 from the same Oise amber amber are known to date (Cook, 1971; Amorim, 1998; Nel & Prokop, 2004). The genus *Ferneiella* currently comprises the two Palaearctic species *F. incompleta* (Verrall, 1886) and *F. brevifurca* (Enderlein, 1912), plus the Australian type species *F. angusta* Cook, 1977 (Evenhuis et al., 2008; Systema Dipterorum at http://www.diptera.org/NomenclatorSearch.php). The latter is the type species by monotypy as the name was validated in Cook (1977) because Cook (1974) failed to designate a type species. Unfortunately, it is the less well known species of the genus. It seems that it has never been revised. The genus could be paraphyletic.

**Deposit, material and methods**

Oise amber is dated from the Earliest Eocene. A summary on the current state of knowledge on this amber is given in Nel & Brasero (2010).

The original external surface of the amber piece has been removed by polishing; final polish was done using diatomite powder. The specimens were examined under Nikon SZ10 and Olympus SZX9 stereomicroscopes. Photos were taken with an Olympus E-3 digital camera. Extended depth of field images were reconstructed using Helicon Focus software. We follow the body and wing venation nomenclature of Amorim (2009).

**Systematic palaeontology**

Order Diptera Linnaeus, 1758

Family Scatopsidae Newman, 1834

Subfamily Scatopsinae Newman, 1834

Tribu Colobostematini Amorim, 1994

*Ferneiella* Cook, 1977

*Ferneiella gallica* sp. nov.

(Figures 1-4)

**Material**. Holotype male and paratype female PA 16627 1-2/3, in the same piece of amber with a very small Hymenoptera, stored in the collection of Palaeontology, Muséum national d'Histoire naturelle, Paris.

**Etymology**. Named after Gallia, Latin name for France. The species epithet is an adjective

**Type horizon**. Lowermost Eocene, circa - 53 Myr, Sparnacian, level MP7 of the mammal fauna of Dormaal.

**Type locality**. Farm Le Quesnoy, Chevrière, region of Creil, Oise department (north of France).

**Diagnosis**. Palpus not very large; proboscis less than half height of head; scutum without a U-shaped ridge; thorax narrow and longer than wide; anterior spiracular plate about as long as high, with a relatively large spiracle; no lower epimeral setae present; no spiniform setae on sternum; fore tibia not produced apically; metathoracic tarsomere 1 longer than tarsomere 2; wing hyaline densely covered with microsetae; C not swollen at junction with R4+5; wing with false vein present midway between M2 and CuA1; stem of halter with setae; no setae on CuA2; stem of M1+2 shorter than its fork; an incomplete supernumerary crossvein on M1; R2+3 distinctly above wing apex; R4+5 extending beyond middle of wing (at 55% of wing length); CuA2 curved but not sharply bent along its course, distally weakened; no median

triangular emargination on female abdominal sternite 7; female genitalia with a pair of elongate valvifers on sternite 8 placed close together, male genitalia rotated, with three pairs of appendages, including long cerci, penis stout at its apex.

**Remarks**. - The two specimens are fossilized in mating position with the genitalia extremely close. They probably separated when they were embedded in the fresh resin.

- Haenni (pers. comm. in Chandler, 2016) put some doubt about the assignment of *Ferneiella* to the Colobostematini. This author preferred to 'regard them as Scatopsinae incertae sedis', but without further arguments.

**Description**. Male. Body 1.44 mm long. Shining dark brown in general color, with contrasting yellow tarsi. Head, 0.2 mm long, 0.22 mm height; shining black; eyes touching above antennae; antenna longer than head height, slightly clavate, with eight flagellomeres, all except distal flagellomere ca. twice as broad as long, last flagellomere bullet-shaped; palpus not very large, slightly reniform, not pointed at apex; proboscis at most a fourth the head height. Thorax 0.48 mm long, narrow and much longer than wide; scutum covered with rather dense small setae; margin of scutellum with eight relatively long setae; pleurae bare of setation, shining; anterior spiracular sclerite small, slightly longer than high, with a large spiracle. Wing, 1.19 mm long, hyaline, membrane entirely covered with dense microtrichia; R1 reaching C 0.36 mm from wing base, R4+5 reaching C 0.66 mm from wing base, at ca. 55% of wing length; radial veins brown; 13 dorsal setae on portion of R basal of fork into R1 and R4+5, no dorsal setae on R4+5, no dorsal setae on R1; posterior veins translucent; fork of M long and narrow, M1 0.57 mm long, M2 0.59 mm long, stem of M shorter than its fork; M1 with a distinct angle near its base, a short spur (false crossvein) not reaching R4+5, M1 and M2 distally slightly diverging near apex ; fold between M2 and M4 present; CuA1 clearly sigmoid, CuA2 curve close to margin, without setae, weakening close to apex; CuP and A1 absent. Halter brown, with somewhat yellow brownish stem bearing four dorsal setae; legs

light brown, strongly contrasting with the body color; metathoracic tarsomere 1 0.08 mm long, slightly longer than tarsomere 2, 0.05 mm long; hind tibia not flattened. Abdomen ca. 0.76 mm long. Tergites 1–6 dark brown, with sparse coarse dark pilosity; tergite 7 without acute projections posteriorly. Genitalia (fig. 4b): genital capsule without developed lateral projections, genitalia with two visible pairs of appendages, viz. gonocoxites hardly visible but rounded at apex, with long apical setae, cerci longer with a row of long dark setae along the inner margin, and penis valves short; penis nearly stout at apex, completely extruded from the abdomen (probably due to a mechanical trauma when the male and female separated when embedded in the fresh resin).

Female. Body 1.6 mm long. Wing 1.19 mm long. Body dark brown; general morphology similar to that of male, except for the longer abdomen; head 0.2 mm long, eyes touching above antennae; thorax 0.4 mm long, 0.24 mm wide. Abdomen 1.09 mm long; no median triangular emargination on sternite 7, presence of a set of small spiniform setae on mid part of posterior margin of sternite 7; female genitalia with a pair of elongate setose valvifers on sternite 8 placed close together, a pair of long setose lobes of sternite 8, cerci short setose.

**Discussion**. Following the key to genera of Cook (1981) or Haenni (1997), *Ferneiella gallica* sp. nov. falls in the Scatopsinae for the following characters: scutum without a U-shaped ridge; fore tibia not produced apically; C not swollen at junction with R4+5; crossvein r-m present near base of R4+5; hind tibia not flattened; wing with false vein present midway between M2 and CuA1. It shares with the Scatopsini (sensu Cook, 1981) (= Colobostematini + Scatopsini sensu Amorim, 1994) the following characters: stem of halter with setae; no setae on CuA2; anterior spiracular plate about as long as high, with a relatively large spiracle; stem of M1+2 shorter than its fork; R4+5 extending beyond middle of wing (at 60% of wing length); CuA2 curved but not sharply bent along its course.

The Scatopsini Newman, 1834 (sensu Amorim, 1994) comprise the genera *Scatopse* Geoffroy, 1762, *Apiloscatopse* Cook, 1974, *Reichertella* Enderlein, 1912, and *Pharsoreichertella* Cook, 1974 (originally considered as a subgenus of *Reichertella* by Cook, 1974). *Reichertella* and *Pharsoreichertella* have no spiniform setae on sternite 7, unlike *Ferneiella gallica*, *Scatopse*, and *Apiloscatopse* (Cook, 1974). Affinities with *Apiloscatopse* and *Reichertella* are unlikely for the presence of the supernumerary crossvein on M1 in the new species. On the contrary, *Ferneiella gallica* has the metathoracic tarsomere 1 slightly longer than tarsomere 2 as in *Apiloscatopse* and *Reichertella*, instead of being shorter or subequal as in *Scatopse* (Cook, 1974). The rather enigmatic genus *Aztecatopse* Haenni & Huerta, 2014 (in Swammerdamellini or Scatopsini) differs from *Ferneiella gallica* in the absence of the supernumerary crossvein or an angle on M1, and radial sector reaching costa about middle of wing or hardly beyond (Haenni & Huerta, 2014).

Among the Colobostematini sensu Amorim, 1994, the genera *Holoplagia* Enderlein, 1912, *Colobostema* Enderlein, 1926, *Procolobostema* Cook, 1971, *Borneoscatopse* Freeman, 1990, and *Lumpuria* Edwards, 1928 differ from *Ferneiella gallica* in the thorax stout, as wide as long (Cook, 1981; Amorim, 1998; Haenni, 1988, 2013, Freeman, 1990). *Ferneiella gallica* shares with *Efcookella* Haenni, 1998 (*Cookella* Freeman, 1985) a slender thorax, shining and hyaline wings, and strongly curved CuA1, but it differs from it in the presence of spiniform setae on sternite 7, absence of a wide and deep triangular emargination on sternite 7, an incomplete crossvein between M1 and R4+5, and wings densely covered with microtrichia (Freeman, 1985).

We attribute *Ferneiella gallica* to the genus *Ferneilla* because it shares with the two Palaearctic species currently attributed to *Ferneiella* the typical cluster of short spiniform setae on mid part of posterior margin of sternite 7 (Freeman, 1985; Haenni, 1997), the same shape of sternite 7, compressed thorax, posterior basitarsus of male longer than second

segment, wing membrane densely clothed with microtrichia, female genitalia with a pair of elongate valvifers on sternite 8 placed close together, male genitalia rotated, with three pairs of appendages, including long cerci, gonocoxites and penis valves, penis stout at its apex (Duda, 1929; Freeman, 1985). *Ferneiella gallica* also shares with *Ferneiella* the CuA2 distally weakened and the secondary r-m vein partially present, putative apomorphies of the genus, after Amorim (1998). On the other side, it does not have the synapomorphies of the clade constituted by the Colobostematini except *Ferneiella*, which are scutum short, male cerci lost (Amorim, 1998). Its tarsi are yellowish, an apomorphy of the Colobostematini except *Ferneiella*, but the color characters have to be taken with caution for fossils in amber. The last synapomorphy of the Colobostematini except *Ferneiella* 'CuA2 curved continuously, reaching the wing margin in a proximal position' is not present in *Ferneiella gallica* that has the same shape of CuA2 as *Ferneiella incompleta*. Of course, a revision of the whole genus *Ferneiella* is necessary, including a comparison of the Australian type species with the two Palaearctic ones.

*Ferneiella gallica* differs from the two modern Palaearctic species *Ferneiella incompleta* and *Ferneiella brevifurca* in the following characters: penis valves short, wings apparently not infuscate, R4+5 just below wing apex, R2+3 distinctly above wing apex. It differs from the Australian *Ferneiella angusta* in the following characters: wing hyaline and shorter (ca. 1 mm long instead of 2 mm); female cerci distinctly smaller (Cook, 1977).

The Eocene scatopsine genus *Sinoscatopse* Hong, 2002 has a strange wing venation with apex of R1 in a very distal position (Hong, 2002). After Jean-Paul Haenni (pers. comm.) '*Sinoscatopse* clearly does not belong to Scatopsidae for its palpi four-segmented, structure of antennae, tibiae with paired apical spurs, and Cu fork of Sciaroidea type'.

Nel & Prokop (2004) described another scatopsid species from the same Oise amber, viz. *Cookella eocenica* (to be placed in the genus *Efcookella* as *Cookella* is a unavailable

name being a homonym). *Ferneiella gallica* differs from *Efcookella eocenica* in the presence of the wing membrane densely clothed with microtrichia, and anterior crossvein between M1 and R4+5 not reaching R4+5.

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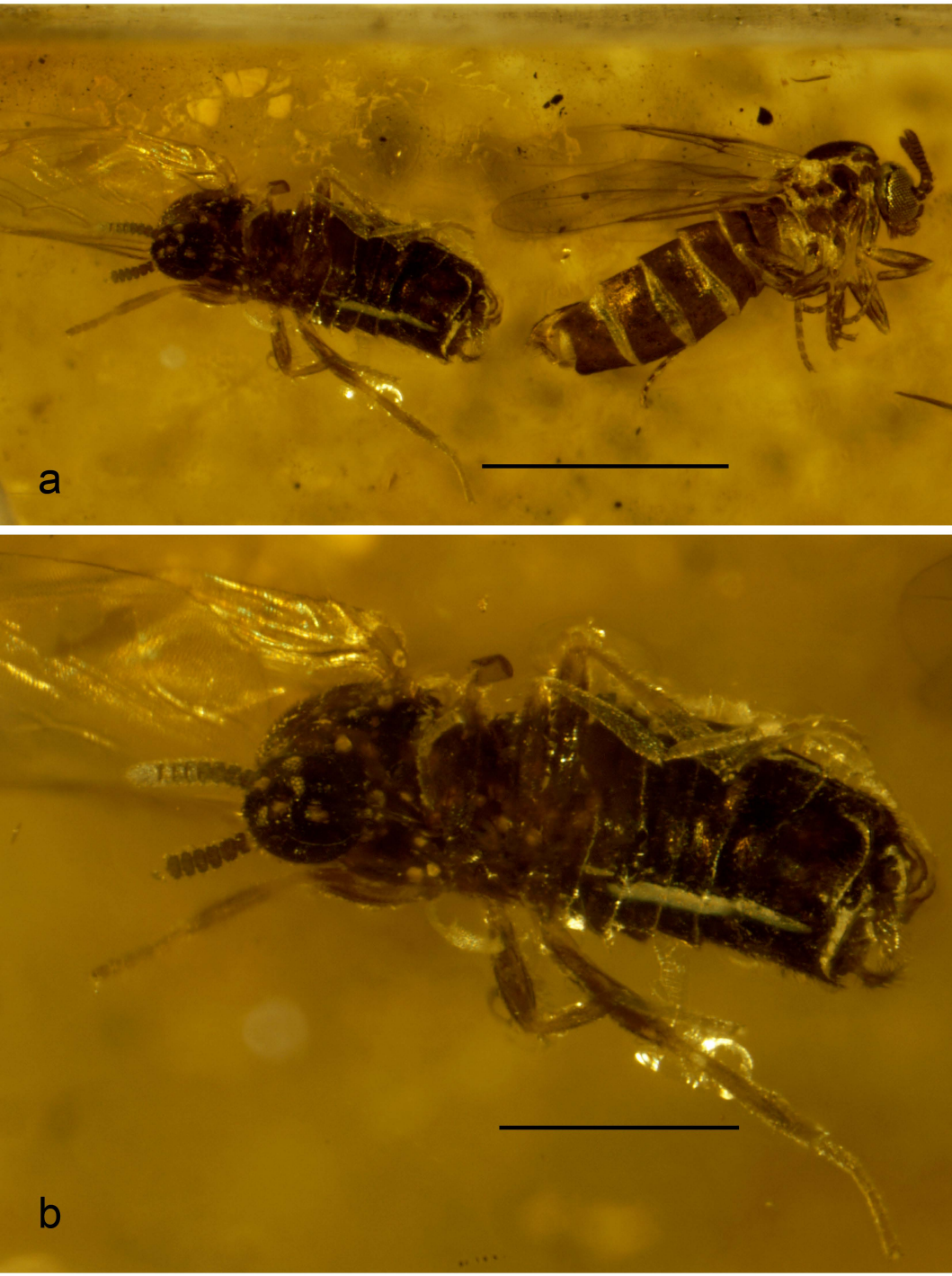
**FIGURE 1.** *Ferneiella gallica* sp. nov., holotype male and allotype female PA 16627 1-2/3. (a) habitus; (b) habitus of male. Scale bars represent 1 mm (a) and 0.5 mm (b).

**FIGURE 2.** *Ferneiella gallica* sp. nov., allotype female PA 16627 1/3. (a) side view of head and thorax; (b) dorsal view of head and thorax. Scale bars represent 0.25 mm.

**FIGURE 3.** *Ferneiella gallica* sp. nov., PA 16627 1/3. (a) male wing; (b) female hind leg. Scale bars represent 0.5 mm (a) and 0.05 mm (b).

**FIGURE 4.** *Ferneiella gallica* sp. nov., PA 16627 1/3. Side views of genitalia. (a) female, c cercus, t8 tergite 8, v8 valvifer 8; (b) male, p extruded penis, pv penis valve?, ce cercus, g gonocoxite. Scale bars represent 0.05 mm.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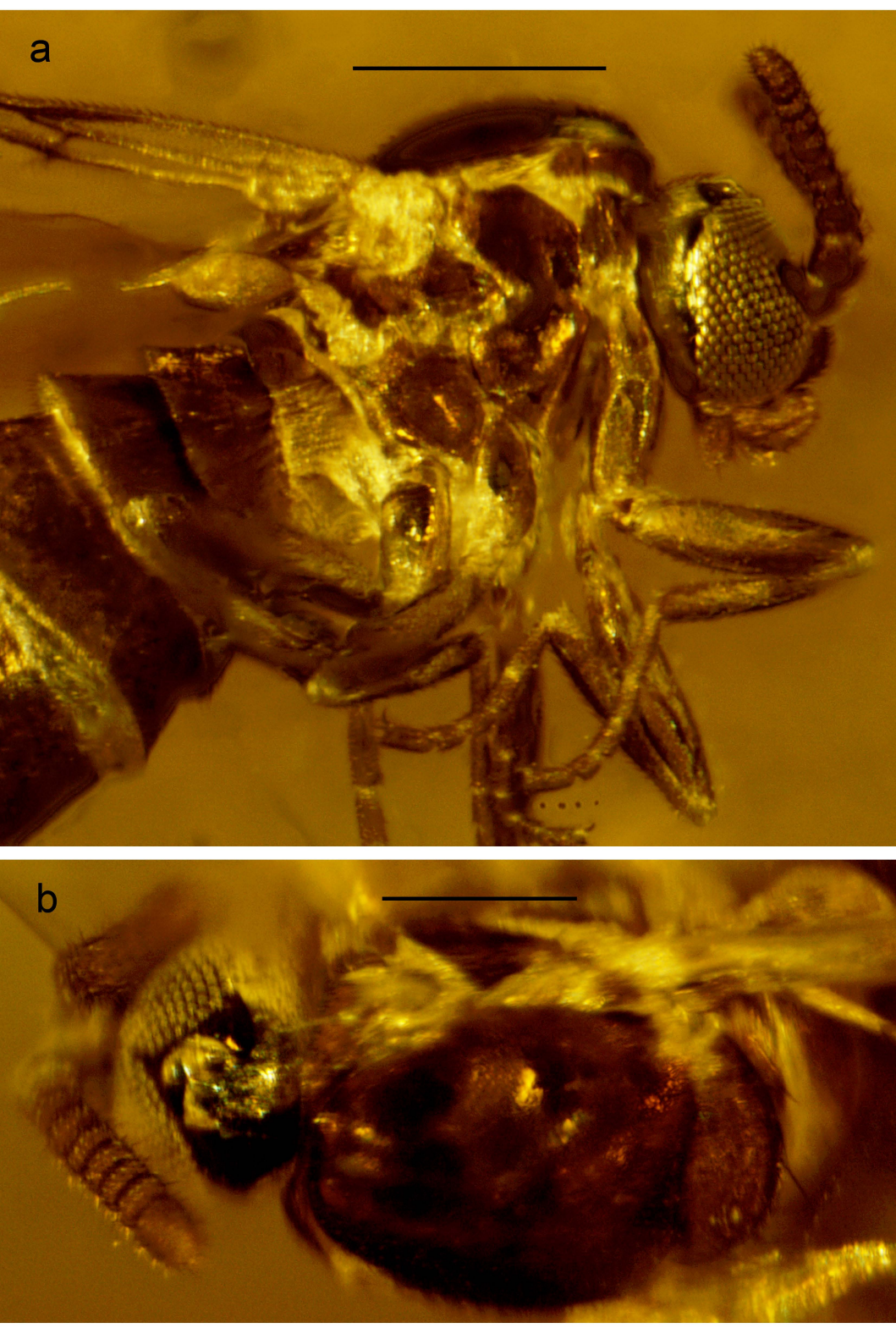
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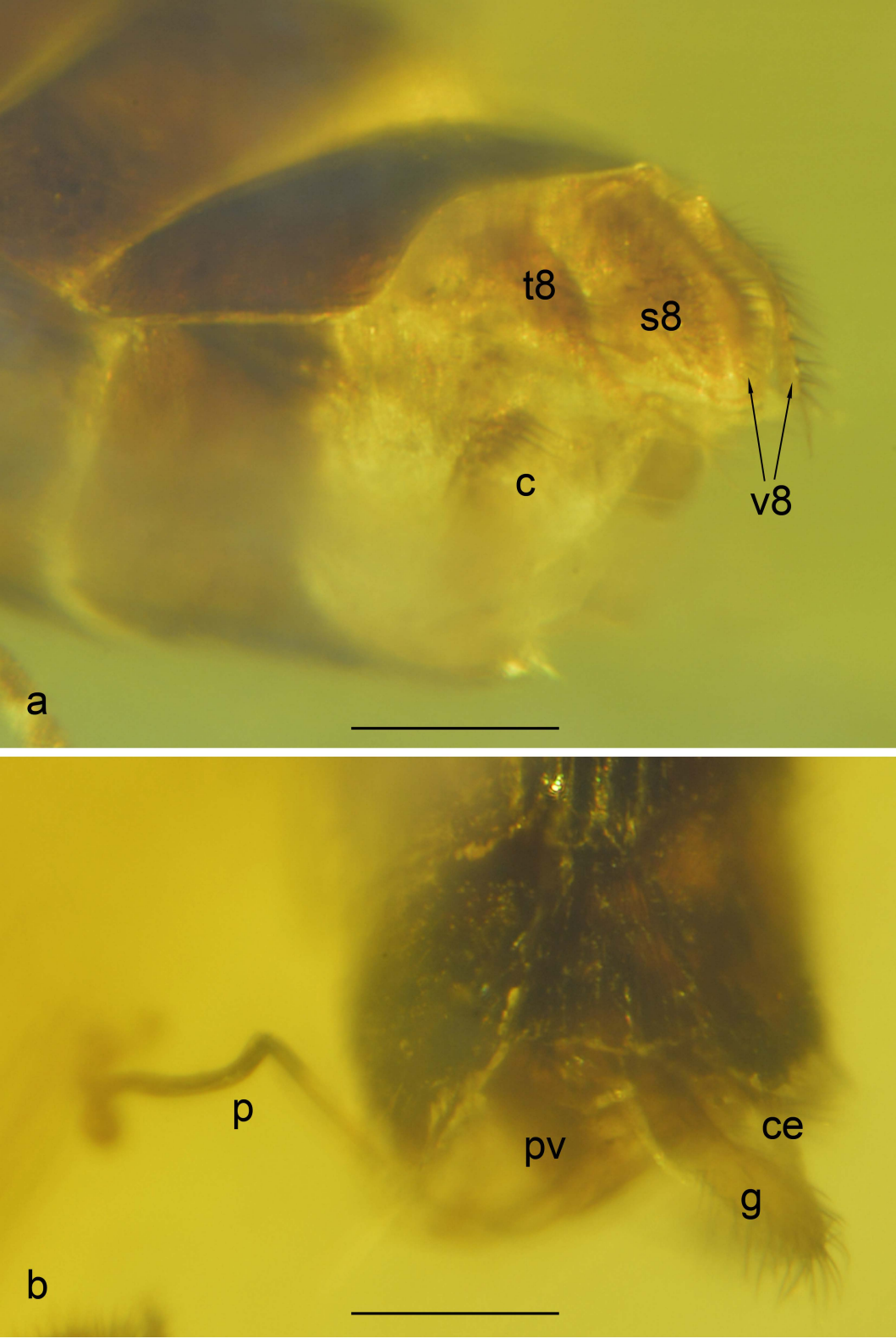
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