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A review of the genus *Palaeomedeterus* Meunier, 1895 from Eocene Baltic amber with the description of three new species (Diptera: Dolichopodidae)

Igor Ya. Grichanov

ABSTRACT

Palaeomedeterus manukyani sp. nov., *P. subignavus* sp. nov. and *P. sublentus* sp. nov. from the late Eocene Baltic amber are described and illustrated. The monotypic genus *Sympycnites* Grimaldi et Cumming, 1999 is placed in synonymy with *Palaeomedeterus* Meunier, 1895 (syn. nov.) and associated with the Peloropeodinae. *Sympycnites primaevus* Grimaldi et Cumming, 1999 is transferred to *Palaeomedeterus* (comb. nov.) and placed in synonymy with *Palaeomedeterus horridus* (Meunier, 1907) (syn. nov.). *Palaeochrysotus fessus* Meunier, 1907 is synonymized with *Palaeomedeterus lassatus* (Meunier, 1907) (syn. nov.). The genus comprises now 12 species from the Baltic amber including one doubtful species. It has been also reported from the Rovno amber, Ukraine, and Cambay amber, India. *Palaeomedeterus* is the only extinct genus placed in the extant subfamily Peloropeodinae. A key to eleven recognizable species of *Palaeomedeterus* from the Baltic amber is proposed for the first time.

Igor Ya. Grichanov. All-Russian Institute of Plant Protection, St. Petersburg, Pushkin, 196608, Russia, grichanov@mail.ru

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INTRODUCTION

The long-legged fly genus *Palaeomedeterus* Meunier was included in the extant subfamily Peloropeodinae (Grichanov and Negrobov, 2018) containing ca. 20 genera and ca. 250 species (Grichanov, 2025). This is the only extinct genus in the subfamily known from Eocene ambers (Gricha-

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nov, 2023), comprising ten Baltic amber species described by Meunier (1907, 1908). It was included into the key to extinct dolichopodid genera from the Baltic amber (Grichanov, 2023). The genus was also reported from the Rovno amber, Ukraine (see Grichanov, 2000, as *Palaeomedeterus* sp.) and Cambay amber, India (see Bickel et al., as *Palaeomedeterus cambayensis* Bickel, 2022).

It is worth noting that Meunier's nominal species were made available in a key published in September, 1907 (Meunier, 1907), and this date has a priority. However, their descriptions were published later, in 1908 (Meunier, 1908).

This paper aims to describe and illustrate three recently discovered new species. All recognizable species of *Palaeomedeterus* from the Baltic amber are also reviewed and keyed.

MATERIALS AND METHODS

The Baltic amber pieces with inclusions were selected from a rich collection of the Kaliningrad Amber Museum, Kaliningrad, Russia (KAM), storing about 550 stones with dolichopodids. The amber pieces were mined near the village of Yantarny in the Sambian Peninsula, Kaliningrad Region, Russia. They were studied and illustrated with a ZEISS Discovery V-12 stereomicroscope and AxioCam MRc5 camera. The digital database of the Geoscience Museum at the Georg-August University in Göttingen, Germany (GMUG) also contains photos of a few unrecognized *Palaeomedeterus* species from the Baltic amber (E.E. Perkovsky, Copenhagen, Denmark, pers. comm.). Morphological terminology and abbreviations follow Cumming and Wood (2017) and Grichanov and Brooks (2017). All measurements are expressed in millimeters. The body length is measured from the base of the antenna to the tip of abdominal segment 6. The antenna length is measured from the frons to the stylus apex. The wing length is measured from the base to the wing apex.

SYSTEMATIC PALEONTOLOGY

Class INSECTA Linnaeus, 1758
Order DIPTERA Linnaeus, 1758
Superfamily EMPIDOIDEA Latreille, 1804
Family DOLICHOPODIDAE Latreille, 1809
Subfamily PELOROPEODINAE Robinson, 1970
Genus *PALAEOMEDETERUS* Meunier, 1895

Palaeomedeterus Meunier, 1895: 174.

Type species. *Palaeochrysotus ignavus* Meunier, 1907, designated by Grichanov and Negrobov, 2018: 96.

Gheynia Meunier, 1899: 322 (synonymized by Grichanov and Negrobov, 2018: 96). Type species: *Gheynia bifurcata* Meunier, 1907, by subsequent monotypy in Meunier (1907: 199) (as *"Gheynius bifurcatus"*).

Palaeochrysotus Meunier, 1907: 199 (a new unnecessary name for *Palaeomedeterus*); Evenhuis, 1994: 366 (as synonym of *Palaeomedeterus* Meunier, 1895). Type species: *Palaeochrysotus horridus* Meunier, 1907, by subsequent designation of Spahr (1985: 36).

Sympycnites Grimaldi et Cumming, 1999: 67; Ulrich, 2003: 322 (questionable synonym of *Prohercostomus* Grichanov); Bickel et al., 2022: 486 (as synonym of *Prohercostomus*), syn. nov. Type species: *Sympycnites primaevus* Grimaldi et Cumming, 1999, original designation.

Species composition. In all, 13 species are known. Three new species described below and nine recognized species are included:

Palaeomedeterus bifurcatus (Meunier); *P. hirsutus* (Meunier); *P. horridus* (Meunier); *P. ignavus* (Meunier); *P. languidus* (Meunier); *P. lassatus* (Meunier); *P. lentus* (Meunier); *P. praeconcinnus* (Evenhuis); *P. tertiarius* (Meunier).

Age and occurrence. Late Eocene (Priabonian), 37.8–33.9 Ma (Cohen et al., 2013); Baltic amber, Kaliningrad Region of Russia.

In addition, *Palaeomedeterus cambayensis* Bickel was described from Cambay amber, India, as a new species; age: early Eocene (Ypresian), 56–47.8 Ma (Cohen et al., 2013).

Remarks. See diagnoses of the genus, illustrations of four species and discussion in Grichanov and Negrobov (2018) and Bickel et al. (2022). It differs from other extinct dolichopodid genera in antennal scape dorsally bare; arista-like stylus dorsal to dorsoapical, rarely subapical, or if apical, then inserted in deep slit of postpedicel (*P. bifurcates*); flattened posterior mesonotum, veins R_{4+5} and M_{1+2} subparallel, and anterior preapical setae present on mid and hind femora.

See Key to Extinct Species for species identification.

Palaeomedeterus bifurcatus (Meunier, 1907)

Gheynia bifurcata Meunier, 1907: 199; 1908: 58 (as *Gheynius bifurcatus*); Ulrich and Schmelz, 2001: 89; Evenhuis, 1994: 366. Possible syntypes in GMUG collection.

Palaeomedeterus bifurcatus: Grichanov and Negrobov, 2018: 97, figures 1–8 (description and photos).

KEY TO EXTINCT SPECIES OF *PALAEOMEDETERUS* (MALES)

Incompletely described *Palaeomedeterus tertiarius* is not included in this key. The characters of the antenna and genitalia are crucial for the species identification.

1. Arista-like stylus apical or strictly subapical 2
   – Arista-like stylus dorsal, at most inserted in small notch of postpedicel 5
2. Postpedicel reniform, distinctly wider than long 3
   – Postpedicel longer than wide, with one or two drawn-out apices 4
3. Arista-like stylus less than 3 times longer than antennomeres combined (Meunier, 1908: figure 70); hypopygium is “salient”; body length 1.75–2.25 mm; wing length 1.75–2 mm
   ..... *P. lentus*
   – Arista-like stylus nearly 5 times longer than antennomeres combined (Figure 3B); hypopygium rather small (about 0.6 mm); body length 3.8 mm; wing length 3.1 mm
   ..... *P. sublentus* sp. nov.
4. Arista-like stylus apical, inserted in deep slit of postpedicel (Meunier, 1908: figure 81; Grichanov and Negrobov, 2018: figure 3); body length 2–2.25 mm; wing length 1.9–2 mm
   ..... *P. bifurcatus*
   – Arista-like stylus strictly subapical; postpedicel with one drawn-out (male; Figure 1B) or angular (female; Figure 1F) apex; body length 1.7 mm; wing length 1.7 mm
   ..... *P. manukyani* sp. nov.
5. First two segments of hind tarsus subequal in length (Meunier, 1908: figure 61; Grimaldi and Cumming, 1999: Pl. 5d); body length 3–3.5 mm; wing length 2–2.7 mm
   ..... *P. horridus*
   – Hind basitarsus distinctly shorter than next segment 6
6. Postpedicel sub-reniform, with pointed apex (Meunier, 1908: figure 59); body and wing length 1 mm (male)
   ..... *P. praeconcinnus*
   – Postpedicel sub-triangular or conoid; if postpedicel sub-reniform, then body longer, 1.5–3 mm long 7
7. Cercus with several long cilia at apex; surstylus lanceolate; phallus long and cylindrical; body length 2 mm; wing length 1.5 mm (Meunier, 1908: 54)
   ..... *P. languidus*
   – Another combination of characters; cercus with short hairs at apex 8
8. Cercus stalk-like, much shorter than surstylus; surstylus narrow, straight almost to apex (Meunier, 1908: figure 65); body length 3 mm; wing length 2.25–2.5 mm
   ..... *P. hirsutus*
   – Cercus about as long as surstylus 9
9. Cercus rounded-ovate, flat, slightly longer than wide, with long ventral and dorsal marginal setae, with short hairs at apex (Figure 2D); body length 2.4 mm; wing length 2.2 mm
   ..... *P. subignavus* sp. nov.
   – Cercus much longer than wide, with short setae 10
10. Cercus swollen at base, narrow distally, with flattened and slightly enlarged apex (Meunier, 1908: figure 80; Grichanov and Negrobov, 2018: figure 15); postgonite projected, rhomboid, nearly half as long as cercus; body length 1.5–1.75 mm; wing length 1–1.65 mm
    ..... *P. lassatus*
    – Cercus ribbon-like, with rounded apex (Meunier, 1908: figure 80; Grichanov and Negrobov, 2018: figure 20); postgonite strongly projected, with hooked pointed lobes, slightly longer than cercus; body length 2.5–3 mm; wing length 2–2.3 mm
    ..... *P. ignavus*

Diagnosis and Remarks. *Palaeomedeterus bifurcatus* (with body length 2–2.25 mm) is a rather common species in the Baltic amber (Grichanov and Negrobov 2018). I saw many dozens of amber pieces with this species in different museums. Meunier (1908) listed inclusions with 45 males and 38 females of the species. He gave quite general species description and noted a certain extent of variability in both male and female postpedicels. The main difference of *P. bifurcatus* from all other species is its antenna morphology. The postpedicel is swollen at its base, flattened laterally, longer than high at base (12/10), with two drawn-out apices; the ventral process of postpedicel is usually longer than the dorsal process; the arista-like stylus is inserted in the apical incision, filiform, with its 1st segment very short. Recently, Ulrich and Schmelz (2001) found a female of this species with a possible prey, enchytraeid worm, as a syninclusion.

Palaeomedeterus hirsutus (Meunier, 1907)

Palaeochrysotus hirsutus Meunier, 1907: 210; 1908: 49. Possible syntypes in GMUG collection.

Palaeomedeterus hirsutus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 101 (in key).

Diagnosis and Remarks. (Based on published description and figures of *Palaeochrysotus hirsutus*.) The species was described from three males and 43 females. Measurements (mm): body length 3.0, wing length 2.25–2.5. The postpedicel is "dome-shaped", higher than long; arista-like stylus dorsal; hind basitarsus distinctly shorter than next segment; cercus with short hairs at apex; stalk-like, much shorter than surstylus; surstylus narrow, straight almost to apex (Meunier, 1908: figure 65).

Palaeomedeterus horridus (Meunier, 1907)

Palaeochrysotus horridus Meunier, 1907: 210; 1908: 47. Possible syntypes in GMUG collection.

Palaeomedeterus horridus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 101 (in key).

Sympycnites primaevus Grimaldi et Cumming, 1999: 67, syn. nov.

Prohercostomus primaevus: Bickel et al., 2022: 486 (as synonym of *Prohercostomus noxialis* (Meunier)).

Palaeomedeterus primaevus (Grimaldi et Cumming, 1999), comb. nov.

Diagnosis and Remarks. (Based on published descriptions and figures of *Palaeochrysotus horridus* and *Sympycnites primaevus*.) Measurements (mm): body length 3.0–3.5, wing length 2.0–2.7. Proboscis relatively large and broad, protruding; antenna with scape without dorsal setae; postpedicel as long as high, conoid, triangular in lateral view; arista-like stylus middorsal, bisegmented, microsetulose; 6–7 pairs of dorsocentrals present; two rows of acrostichals; scutellum with two pairs of setae; mid and hind femora with preapical seta; fore and mid tibiae with distinct antero- and posterodorsal setae; hind tibia with row of stiff dorsal setae; first two segments of hind tarsus subequal in length; wing veins R_{4+5} and M_{1+2} almost straight and subparallel behind *dm-m.*

Bickel et al. (2022) found that the piece with *Sympycnites primaevus* inclusion was in error associated originally with the Lebanese Cretaceous amber, being in fact of the Baltic origin. The authors synonymized *Sympycnites* with *Prohercostomus* despite apparently glabrous antennal scape, as clearly figured by Grimaldi and Cumming (1999). The key to the Baltic amber dolichopodid genera (Grichanov, 2023) takes *S. primaevus* to *Palaeomedeterus.* The description and figures of this species are very similar to those provided by Grichanov and Negrobov (2018) for three *Palaeomedeterus* species. Their key to *Palaeomedeterus* species leads *S. primaevus* to *P. horridus*, the only species in the genus with subequal in length hind tarsomeres 1 and 2. The antennae figured by both Meunier (1908: figure 60) and Grimaldi and Cumming (1999: figure 44) are identical. Therefore, I consider the two names as synonyms.

Palaeomedeterus ignavus (Meunier, 1907)

Palaeochrysotus ignavus Meunier, 1907: 210; 1908: 50. Possible syntypes in GMUG collection.

Palaeomedeterus ignavus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 101 (description and photos); Bickel et al., 2022: 479, figure 3e (photo).

Diagnosis. (After Grichanov and Negrobov, 2018.) Measurements (mm): body length 2.5–3, wing length 2–2.3. Face moderately broad, slightly narrowed towards clypeus; postpedicel flattened laterally, with ventral projection at apex, subtriangular, longer than high (10/7); arista-like stylus inserted in dorsoapical emargination; hind basitarsus distinctly shorter than next segment (21/33); cercus long, narrow, about as long as surstylus, with rounded apex, densely covered with short cilia; postgonite strongly projected, with hooked pointed lobes, slightly longer than cercus.

Palaeomedeterus languidus (Meunier, 1907)

Palaeochrysotus languidus Meunier, 1907: 210; 1908: 54. Possible syntypes in GMUG collection.

Palaeomedeterus languidus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 101 (in key).

Diagnosis and Remarks. (Based on published description and figures of *Palaeochrysotus languidus*.) The species was described by two males and three females. Measurements (mm): body length 2, wing length 1.5. According to Meunier (1908), the species is similar to males and females of *P. ignavus*; therefore, the postpedicel is supposed to be subtriangular, with dorsal arista-like stylus. The hind basitarsus is distinctly shorter than the next segment; cercus with several long cilia at apex; surstylus lanceolate; phallus long and cylindrical (Meunier, 1908: 54).

Palaeomedeterus lassatus (Meunier, 1907)

Palaeochrysotus lassatus Meunier, 1907: 210; 1908: 55. Possible syntypes in GMUG collection.

Palaeomedeterus lassatus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 98 (description and photos).

Palaeochrysotus fessus Meunier, 1907: 210; 1908: 55, syn. nov.

Palaeomedeterus fessus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 97.

Diagnosis and Remarks. (After Grichanov and Negrobov, 2018.) Measurements (mm): body length 1.5–2, wing length 1–1.65. Face moderately broad; postpedicel flattened laterally, with small pointed ventral projection at apex, higher than long (9/5); arista-like stylus inserted in subapical emargination; hind basitarsus distinctly shorter than next segment (15/18); postgonite projected, rhomboid, nearly half as long as cercus; cercus long, almost as long as epandrium, swollen at base, narrow distally, with flattened and slightly enlarged apex, covered with short cilia, with long dorsal preapical bristle.

Meunier (1908) described only the postpedicel and hind tarsus of *Palaeochrysotus lassatus*, with note of the body length being 1.5 mm in four males and four females. Nevertheless, he figured the male antenna, hind tarsus and hypopygium. *Palaeochrysotus fessus* was described from six females with the body length of 2 mm (Meunier, 1908). The line drawings of the antenna are very similar in the two species, and the only character mentioned by the author in the text and distinguishing the two species is their size. Grichanov and Negrobov (2018: figures 9–15) redescribed *Palaeomedeterus lassatus* male with the intermediate size (1.75 mm). I consider here the two names as synonyms.

Palaeomedeterus lentus (Meunier, 1907)

Palaeochrysotus lentus Meunier, 1907: 210; 1908: 52. Possible syntypes in GMUG collection.

Palaeomedeterus lentus: Evenhuis, 1994: 366; Grichanov and Negrobov, 2018: 101 (in key); Grichanov, 2023: 257.

Diagnosis and Remarks. (Based on published description and figures of *Palaeochrysotus lentus.*) This species was described as having the dorsal arista-like stylus, but was pictured with the apical stylus (Meunier, 1908: figure 70). An amber piece with the *Palaeomedeterus sublentus* inclusion housed in the KAM collection shows that *Palaeochrysotus lentus* can belong to the genus *Palaeomedeterus* despite the presence of apical stylus. The species has a short postpedicel and keys to the extinct medeterine genus *Medeterites* Grichanov (Grichanov et al., 2014; Grichanov, 2023), which differs from *P. lentus* and *P. sublentus* in the absence of the anterior preapical seta on the mid and hind femora. Both species have an enlarged reniform postpedicel, hind basitarsus about half as long as next tarsomere, but the hypopygium is "salient" in *P. lentus* and rather small (about 0.6 mm) in *P. sublentus*, arista-like stylus is less than three times longer than all antennomeres combined in *P. lentus* and nearly five times longer than all antennomeres combined in *P. sublentus*. Two males with the body and wing lengths of 2 mm and five females (1.75–2.25 mm) were used for the original description of *P. lentus*. The examined male of *P. sublentus* is larger, with the body length 3.8 mm (see below).

Palaeomedeterus manukyani Grichanov sp. nov.
Figure 1A–F

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Types. Holotype male: KAM, no. 4825a, one almost completely preserved male (with segments 2–5 of right hind tarsus missing) enclosed in a polished piece of yellow Baltic amber. Paratype: 1 female: KAM, no. 4825b, one partly damaged female (with fore and mid tarsi missing) in the same piece of Baltic amber.

Etymology. The name of the new species is dedicated to the Russian entomologist, Senior Research Scientist Dr Andranik R. Manukyan (Kaliningrad Amber Museum, Russia).

Diagnosis. *Palaeomedeterus manukyani* sp. nov. male keys to *P. bifurcatus* (see above), differing from the latter in the strictly subapical arista-like stylus on the subtriangular postpedicel that has one pointed apex. *Palaeomedeterus bifurcatus* male has the arista-like stylus inserted in the apical

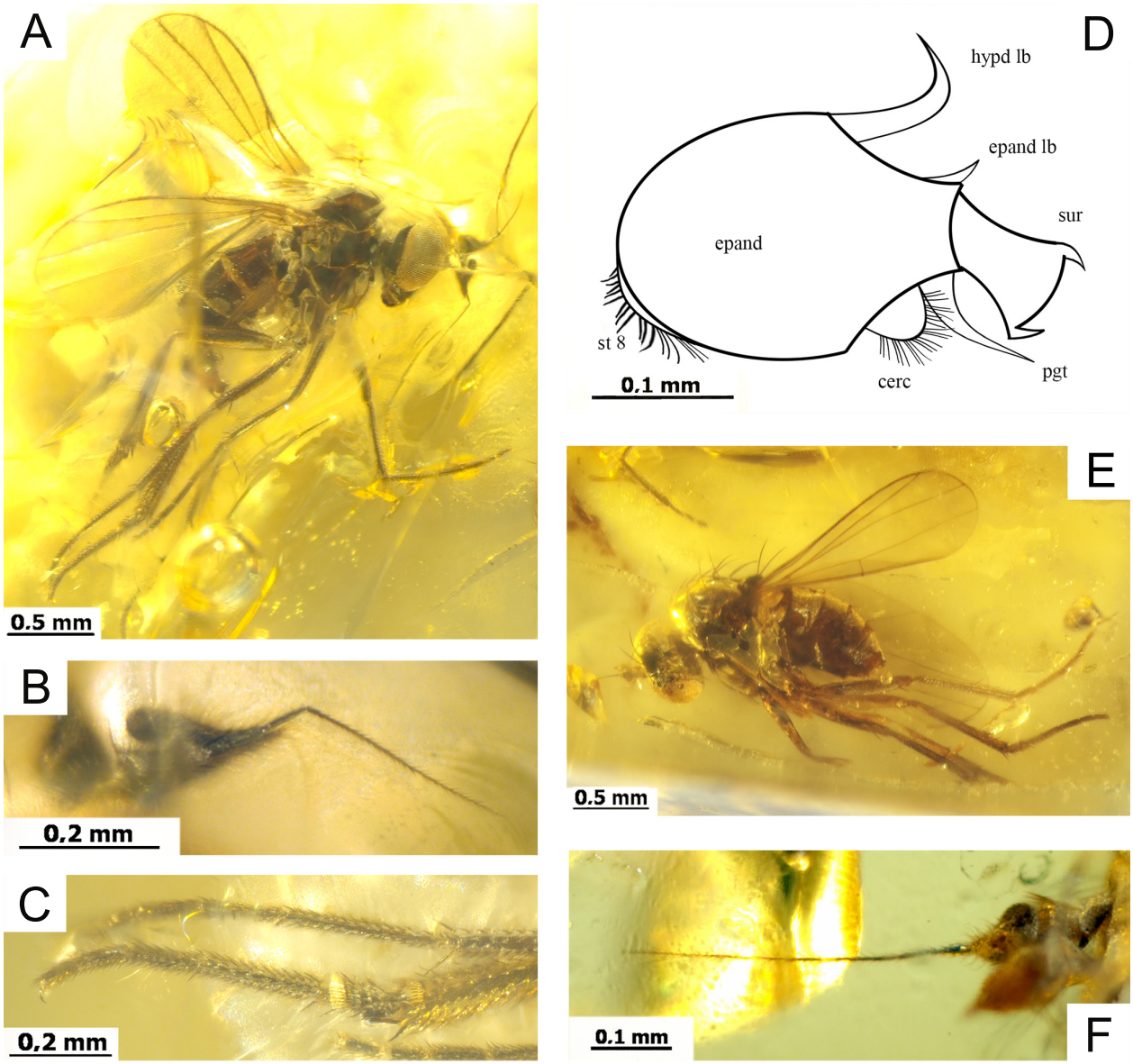

FIGURE 1. *Palaeomedeterus manukyani* sp. nov., KAM no. 4825a, holotype male (**A-D**), KAM no. 4825b, paratype female (**E, F**). **A, E**, Habitus; **B, F**, Antenna; **C**, Mid and hind tarsi; **D**, Hypopygium, right lateral view (schematically). Abbreviations: cerc, cercus; epand lb, epandrial lobe; epand, epandrium; hypd lb, hypandrial lobe; pgt, postgonite; st 8, sternite 8; sur, surstylus.

incision of the postpedicel that has two drawn-out apices (Grichanov and Negrobov, 2018: figure 3). Female of *P. manukyani* sp. nov. has a subtriangular postpedicel, with the angular apex, whereas female of *P. bifurcatus* has the postpedicel with a short ventral process and a weakly pronounced dorsal process.

Description. Male (Figure 1A). Measurements (mm): body length 1.7, antenna length 0.7, wing length 1.7, wing width 0.8. Head: vertex not excavated; vertical bristle strong and long, positioned at upper corner of frons; short postvertical seta as linear continuation of postocular setal row; one pair of strong ocellar bristles (adjacent hairs not visible); single row of short simple postoculars of about equal length; face (poorly visible) moderately broad; antenna (Figure 1B) with scape and pedicel small, simple; scape vase-like, glabrous; pedicel globular, with circlet of apical setulae of approximately equal length, with 1 dorsal seta strong; postpedicel flattened laterally, with pointed apex, as long as high at base, haired; arista-like stylus strictly subapical, filiform, pubescent; lengths (mm) of scape, pedicel, postpedicel, arista-like stylus

(aristomeres 1 and 2), 0.06/0.07/0.19/0.09/0.32; palpus and proboscis small, sparsely haired; palpus with strong apical bristle.

Thorax: posterior third of mesonotum distinctly flattened; two regular rows of 6 strong dorsocentrals decreasing in length anteriorly; acrostichals irregularly biserial, distinct, reaching posterior depression of mesonotum; one pair of strong scutellars, as long as posterior dorsocentrals, and two lateral hairs; postnotum small; one strong proepisternal bristle just above fore coxa; proepimeron without strong setae.

Legs: including coxae simple, evenly covered with ordinary setulae, with strong bristles; fore coxa with short simple hairs and several subapical setae anteriorly; mid coxa with some anterior setae; hind coxa with one strong lateral bristle at middle; claws and pulvilli of all legs small; mid trochanter with one dorsal seta; mid and hind femora with strong anterior preapical bristle, as long as or slightly longer than femur height; fore tibia with 2–3 short apical setae; mid tibia with two pairs of antero- and posterodorsals including short subequal in length posterodorsal bristles, with proximal anterodorsal about two times longer than distal anterodorsal, with four strong apicals; hind tibia with 1 short dorsal seta on basal half, 1 strong dorsal at distal 2/3, dorsal row of short setae on distal third, with dorsal subapical bristle and 3–4 apical bristles; hind tibia and basitarsus with dorsoapical comb of short setulae (Figure 1C); tarsomeres of all legs with very short apical setae; lengths of femur, tibia and tarsal segments (in mm): fore leg: 0.49/0.46/0.29/0.17/0.12/0.09/0.09, mid leg: 0.57/0.63/0.36/0.12/0.11/0.09/0.09, hind leg: 0.61/0.69/0.14/0.29/0.13/0.11/0.09.

Wing: hyaline, with dark veins; R_1 ending far before level of dm-m; R_{2+3} and R_{4+5} gradually diverging to wing apex, R_{2+3}, R_{4+5} and M_{1+2} almost straight; $R_{4+5 \text{ and } M1+2}$ subparallel behind *dm-m;* M_{1+2} joining costa right behind wing apex; length (mm) of part of costa between R_{2+3} and R_{4+5} to this between R_{4+5} and $M_{1+2,}$ 0.28/0.19; length (mm) of crossvein dm-m to this of distal part of M_4, 0.18/0.30; crossvein dm-m nearly straight, forming right angles with M_{1+2} and with M_4 veins, as long as maximum distance between R_{4+5} and M_{1+2} veins; lower calypter with long setae; haltere with well-developed rounded knob, shorter than its stem.

Abdomen: conoid, covered with hairs, with short marginal tergal setae; sterna 2–4 well sclerotised; tergum 6 small, bare or with microscopic hairs; segment 7 small; segment 8 obscured, positioned left basodorsally; epandrium (Figure 1D) globular; hypandrium raised from middle of epandrium, projected, bilobate, with short curved lobes; phallus not visible; distoventral epandrial lobe reduced; surstylus with only one large lobe visible, elongate-triangular, with broad apex, with small distoventral and distodorsal processes, without distinct setae; postgonite projected, narrow, as long as surstylus; cercus small, rounded, covered with short cilia.

Female (Figure 1E). Similar to male except lacking male secondary sexual characters. Measurements (mm): body length 1.7; antenna length 0.6; wing length 1.7; wing width 0.8. Head: antenna (Figure 1F) with subtriangular postpedicel, with angular apex; lengths (mm) of scape, pedicel, postpedicel, arista-like stylus (aristomeres 1 and 2), 0.06/0.06/0.11/0.04/0.38. Legs: lengths of hind femur, tibia and tarsal segments (in mm): 0.66/0.68/0.11/0.23/0.14/0.09/0.09. Wing: length (mm) of part of costa between R_{2+3} and R_{4+5} to this between R_{4+5} and M_{1+2}, 0.31/0.19. Abdomen with 5 visible segments; oviscapt concealed, with two or three thick setae on each acanthophorite.

Range. Late Eocene (Priabonian), 37.8–33.9 Ma (Cohen et al., 2013).

Occurrence. Baltic amber, Kaliningrad Region of Russia.

Palaeomedeterus praeconcinnus (Evenhuis, 1994)

Chrysotus praeconcinnus Evenhuis, 1994: 360 (nom. nov. for *Chrysotus concinnus* Meunier, 1907, nec Zetterstedt, 1843).

Palaeomedeterus praeconcinnus: Grichanov, 2023: 257.

Chrysotus concinnus Meunier, 1907: 209; 1908: 46 (nec Zetterstedt, 1843). Possible syntypes in GMUG collection.

Palaeomedeterus concinnus: Grichanov, 2023: 257.

Diagnosis and Remarks. (Based on published description and figures of *Chrysotus concinnus*.) This small-sized species was described from a male (body length 1 mm) and a female (1.5 mm), and generally fits the generic concept of *Palaeomedeterus.* The postpedicel is sub-reniform, with a pointed apex and dorsal arista-like stylus (Meunier, 1908: figure 59); hind basitarsus distinctly shorter than next tarsomere; male hypopygium with rather robust cercus and surstylus ("crochets copulateurs").

Palaeomedeterus subignavus Grichanov sp. nov.
Figure 2A–D

zoobank.org/09C3F419-DCC9-4022-800E-B61FCE0D4A8E

Type. Holotype male: KAM, no. 4925, one completely preserved male enclosed in a polished piece of yellow Baltic amber.

Etymology. The new species is named because of its similarity with *P. ignavus*. From Latin *"sub"* (near, under) + *ignavus.*

Diagnosis. *Palaeomedeterus subignavus* sp. nov. is very close in habitus to P. ignavus and P. lassatus, differing from them in the morphology of the hypopygium. The male of the new species has the cercus rounded-ovate, flat, slightly longer than wide, with long ventral and dorsal marginal setae, and with short hairs at apex. Males of P. ignavus and P. lassatus differ in their elongate cerci, which are much longer than wide and with short setae (Grichanov and Negrobov, 2018: figures 15, 20; Bickel et al., 2022: figure 3e).

Description. Male (Figure 2A). Measurements (mm): body length 2.4, antenna length 0.8, wing length 2.2, wing width 0.8. Head: vertex not excavated; vertical bristle strong and long, positioned at upper corner of frons; short postvertical seta as linear continuation of postocular setal row; one pair of strong ocellar bristles with adjacent hairs; single row of short simple postoculars of about equal length; eyes with microscopic hairs between facets; upper and lower facets about equal in size; face moderately broad, under antennae as wide as height of postpedicel, gradually narrowed towards clypeus; antenna (Figure 2B) about as long as eye height; scape and pedicel small, simple; scape vase-like, glabrous, with angular inner apex; pedicel globular, with circlet of apical setulae of approximately equal length, with 1 dorsal seta strong; postpedicel flattened laterally, with pointed apex, 1.5 times as long as high at base, haired; arista-like stylus rising at distal 2/3, filiform, pubescent; lengths (mm) of scape, pedicel, postpedicel, arista-

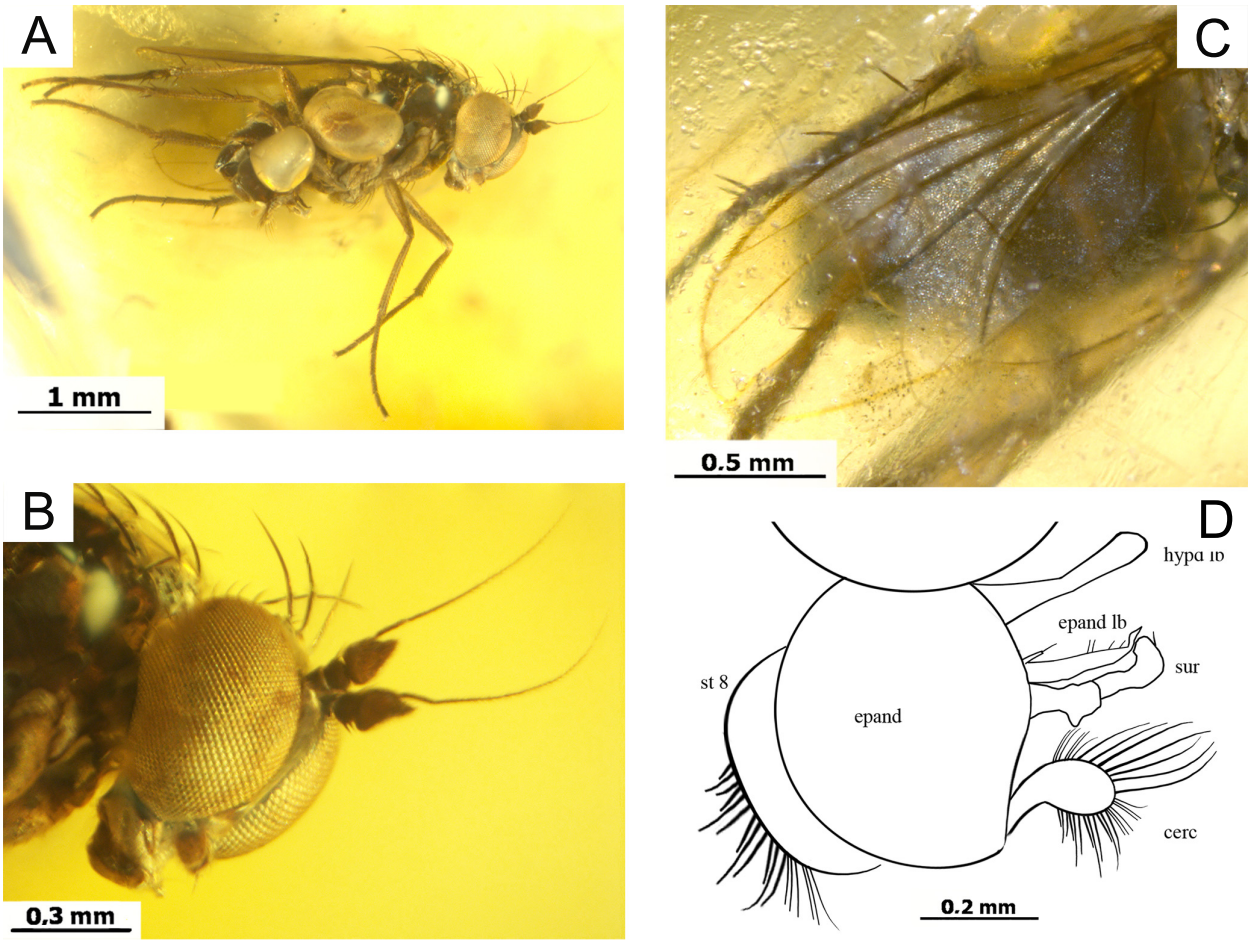

FIGURE 2. *Palaeomedeterus subignavus* sp. nov., KAM no. 4925, holotype male. **A**, Habitus; **B**, Head; **C**, Wing; **D**, Hypopygium, right lateral view (schematically). Abbreviations: cerc, cercus; epand lb, epandrial lobe; epand, epandrium; hypd lb, hypandrial lobe; sur, surstylus.

like stylus (aristomeres 1 and 2), 0.06/0.06/0.15/0.09/0.53; palpus and proboscis small, sparsely haired; palpus with strong apical bristle.

Thorax: with posterior third of mesonotum distinctly flattened; two regular rows of 5 strong dorsocentrals decreasing in length anteriorly; acrostichals biserial, distinct, reaching posterior depression of mesonotum; few hairs on anterior slope of mesonotum; one pair of strong scutellars, as long as posterior dorsocentrals, and two short lateral setulae, adjacent to median bristles; postnotum small; one strong proepisternal bristle just above fore coxa; proepimeron without strong setae.

Legs including coxae simple, evenly covered with ordinary setulae, with strong bristles; fore coxa with short simple hairs and several subapical setae anteriorly; mid coxa with some anterior setae; hind coxa with one strong lateral bristle at middle; claws and pulvilli of all legs small; mid trochanter with two dorsal setae; mid and hind femora with strong anterior preapical bristle, slightly longer than femur height; fore tibia without distinct setae, with 2–3 short apical setae; mid tibia with two pairs of strong antero- and posterodorsals including longer and subequal in length anterodorsal bristles, with additional short anterodorsal at base, and with four strong apicals; hind tibia with 2 anterodorsal and 1 posterodorsal setae on basal half, dorsal row of short setae on distal third, with dorsal subapical bristle and 3–4 apical bristles; tarsomeres of all legs with very short apical setae; lengths of femur, tibia and tarsal segments (in mm): fore leg: 0.55/0.61/0.29/0.16/0.14/0.11/0.11, mid leg: 0.84/0.86/0.39/0.23/0.17/0.11/0.08, hind leg: 0.86/0.88/0.22/0.33/0.21/0.14/0.11.

Wing (Figure 2C): hyaline, with dark veins; R_1 ending not far before level of *dm-m;* R_{2+3} and R_{4+5} gradually diverging to wing apex, R_{2+3}, R_{4+5} and M_{1+2} almost straight; R_{4+5} and M_{1+2} subparallel behind dm-m; M_{1+2} joining costa right behind wing apex; length (mm) of part of costa between R_{2+3} and R_{4+5} to this between R_{4+5} and M_{1+2}, 0.34/0.21; length (mm) of crossvein dm-m to distal part of M_4, 0.2/0.4; crossvein dm-m nearly straight, forming right angles with M_{1+2} and with M_4 veins, as long as maximum distance between R_{4+5} and M_{1+2} veins; lower calypter with long setae; haltere with well-developed rounded knob, as long as its stem.

Abdomen: conoid, covered with hairs, with short marginal tergal setae; sterna 2–4 not visible; tergum 6 small, with microscopic hairs; segment 7 small; segment 8 large, positioned left basodorsally, covered with numerous short setae; epandrium (Figure 2D) globular; hypandrium bilobate, with stick-shaped lobes; phallus not visible; distoventral epandrial lobe long and thin, reaching apex of surstylus, with ventral row of setae and short basoventral process bearing long apical seta; surstylus with only one long lobe visible, thin, with curved ventrally apex, without distinct setae; postgonite reduced; cercus rounded-ovate, with 7–8 long ventral, 7–8 shorter dorsal and 7–8 very short apical setae.

Female. Unknown.

Range. Late Eocene (Priabonian), 37.8–33.9 Ma (Cohen et al., 2013).

Occurrence. Baltic amber, Kaliningrad Region of Russia.

Palaeomedeterus sublentus Grichanov sp. nov.
Figure 3A–D

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Type. Holotype male: KAM, no. 5025, one completely preserved male enclosed in a polished piece of yellow Baltic amber.

Etymology. The new species is named because of its similarity with *P. lentus.* From Latin *"sub"* (near, under) + *lentus.*

Diagnosis. The new species is very similar in habitus to *P. lentus* as described and figured by Meunier (1908). Both species have the apical or dorsoapical arista-like stylus on an enlarged reniform postpedicel and the hind basitarsus about half as long as the next tarsomere (see above). The hypopygium was described as "salient" (projected) in *P. lentus*, being rather small (about 0.6 mm) in *P. sublentus*; the arista-like stylus was figured as short, less than 3 times longer than all antennomeres combined in *P. lentus* (Meunier, 1908: figure 70) and nearly 5 times longer than all antennomeres combined in *P. sublentus* (Figure 3B). The examined male of *P. sublentus* is larger, with its body length 3.8 mm vs. about 2 mm in *P. lentus*.

Description. Male (Figure 3A). Measurements (mm): body length 3.8, antenna length 1.1, wing length 3.1, wing width 1.0. Head: vertex not excavated; vertical bristle strong and long, positioned at upper corner of frons; shorter postvertical seta as linear continuation of postocular setal row; one pair of strong ocellar bristles with adjacent hairs; single row of short simple postoculars of about equal length; eyes with microscopic hairs between facets; upper and lower facets about equal in size; face relatively broad, wider than height of postpedicel; antenna (Figure 3B) about as long as eye

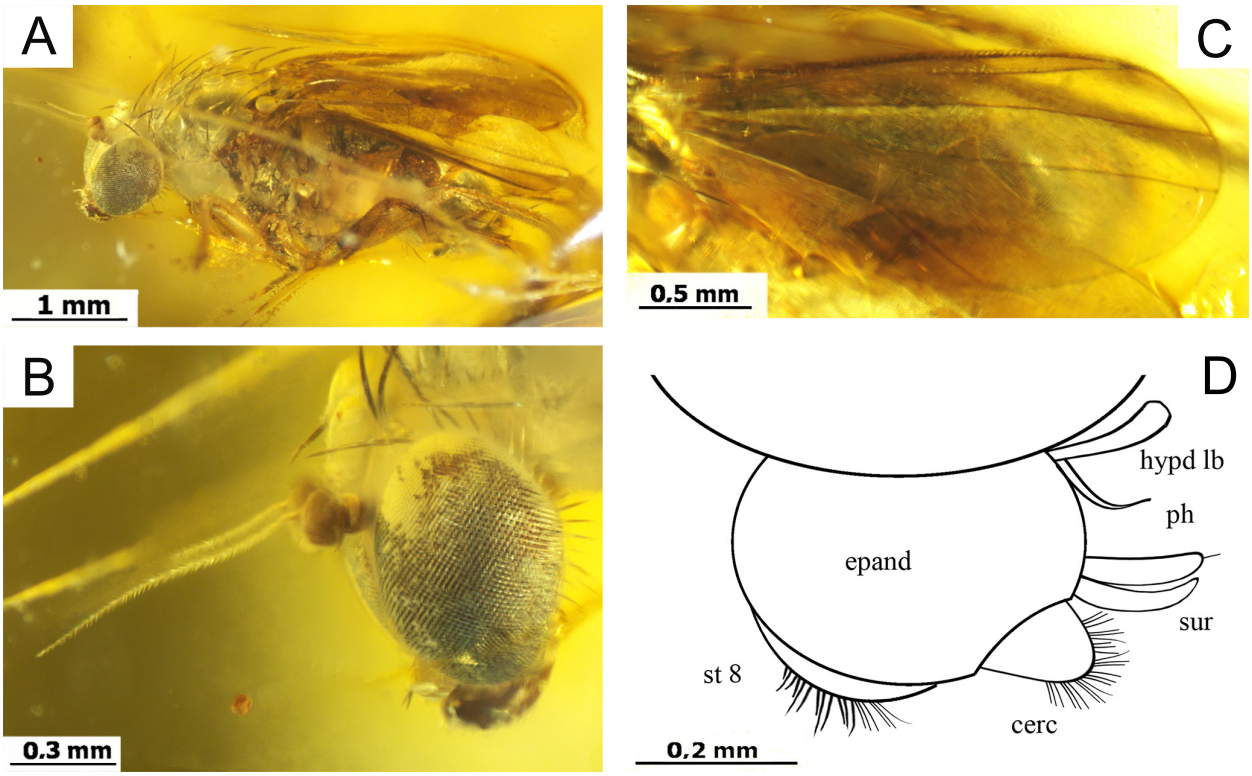

FIGURE 3. *Palaeomedeterus sublentus* sp. nov., KAM no. 5025, holotype male. **A**, Habitus; **B**, Head; **C**, Wing; **D**, Hypopygium, right lateral view (schematically). Abbreviations: cerc, cercus; epand, epandrium; hypd lb, hypandrial lobe; ph, phallus; st 8, sternite 8; sur, surstylus.

height; scape and pedicel small, simple; scape vase-like, glabrous, with angular inner apex; pedicel globular, with circlet of apical setulae of approximately equal length, with 1 dorsal seta strong; postpedicel reniform, with rounded apex, nearly half as long as high at base (0.08/0.15), haired; arista-like stylus dorsoapical, almost apical, filiform, pubescent, with its 1st segment very short; lengths (mm) of scape, pedicel, postpedicel, arista-like stylus (aristomeres 1 and 2), 0.08/0.07/0.08/0.07/0.81; palpus and proboscis small, sparsely haired; palpus with strong apical bristle.

Thorax: with posterior third of mesonotum distinctly flattened; two regular rows of 6 strong dorsocentrals decreasing in length anteriorly; acrostichals biserial, well developed, reaching posterior depression of mesonotum; few hairs on anterior slope of mesonotum; one pair of strong scutellars, as long as posterior dorsocentrals, and two lateral hairs, adjacent to median bristles; postnotum small; one strong proepisternal bristle just above fore coxa; proepimeron without strong setae.

Legs including coxae simple, evenly covered with ordinary setulae, with strong bristles; fore coxa with short simple hairs and several subapical setae anteriorly; mid coxa with some anterior setae; hind coxa with one strong lateral bristle at middle; claws and pulvilli of all legs small; mid trochanter with one dorsal seta; mid and hind femora with anterior preapical bristle, as long as or slightly longer than femur height; fore tibia with at most one weak dorsal, with 2–3 short apical setae; mid tibia with two pairs of strong antero- and posterodorsals including longer and subequal in length anterodorsal bristles, with additional short anterodorsal at base, with four strong apicals; hind tibia with 3 pairs of antero- and posterodorsal setae, dorsal row of short setae on distal third, with dorsal subapical bristle and 2–3 apical setae; tarsomeres of all legs with very short apical setae; lengths of femur, tibia and tarsal segments (in mm): fore leg: 0.91/0.92/0.39/0.26/0.19/0.12/0.11, mid leg: 1.19/1.11/0.59/0.34/0.21/0.15/0.11, hind leg: 1.11/1.24/0.21/0.47/0.21/0.14/0.11.

Wing (Figure 3C): hyaline, with dark veins; R_1 ending not far before level of dm-m; R_{2+3} and R_{4+5} gradually diverging to wing apex, R_{2+3}, R_{4+5} and M_{1+2} almost straight; R_{4+5} and M_{1+2} subparallel behind *dm-m;* M_{1+2} joining costa right behind wing

apex; length (mm) of part of costa between R_{2+3} and R_{4+5} to this between R_{4+5} and M_{1+2}, 0.47/0.24; length (mm) of crossvein dm-m to this of distal part of M_4, 0.25/0.59; crossvein *dm-m* nearly straight, forming right angles with M_{1+2} and with M_4 veins, as long as maximum distance between R_{4+5} and M_{1+2} veins; lower calypter with long setae; haltere with well-developed rounded knob, about as long as its stem.

Abdomen: conoid, covered with hairs, with short marginal tergal and sternal setae on segments 2–5; sterna 2–4 well sclerotised; sternum 5 reduced; tergum 6 and segment 7 almost entirely hidden; segment 8 large, positioned left basodorsally, covered with short setae; epandrium (Figure 3D) globular; cercus and surstylus short, about half as long as epandrium; hypandrium finger-like, rounded at apex; phallus poorly visible, with pointed apex; distoventral epandrial lobe reduced or concealed, not visible; surstylus bilobate, with ventral lobe elongate-ovate, with one distinct seta; dorsal lobe of surstylus curved ventrally, narrow and pointed; cercus small, rounded, covered with short cilia.

Female. Unknown.

Range. Late Eocene (Priabonian), 37.8–33.9 Ma (Cohen et al., 2013).

Occurrence. Baltic amber, Kaliningrad Region of Russia.

Doubtful Species of *Palaeomedeterus*

Palaeomedeterus tertiarius (Meunier, 1907)

Diaphorus tertiarius Meunier, 1907: 210; 1908: 59. Possible syntypes in GMUG collection.

Palaeomedeterus tertiarius: Grichanov, 2023: 257.

Remarks. This small-sized species was described from a female (body length 1.75 mm) and a male (2 mm) that generally fits the generic concept of *Palaeomedeterus.* It differs from other species by a small “subovoid” postpedicel of antenna bearing basodorsal arista-like stylus in *P. tertiarius*.

DISCUSSION

The representatives of extant genera of the subfamily Peloropeodinae are usually small (with the body length of 1–3 mm) and lacking secondary sexual characters in male (e.g., Yang et al., 2011), similar to species of *Palaeomedeterus*. Having studied morphological characters and molecular data, Lim et al. (2010) and Bickel et al. (2022) considered the subfamily paraphyletic. The extinct genus *Palaeomedeterus* differs from all extinct medeterine genera in the presence of the anterior preapical setae on the mid and hind femora. The discovery of the genus in both the early Eocene (Cambay amber) and late Eocene (Baltic and Rovno ambers) are remarkable. It means that *Palaeomedeterus* existed during more than 10 Ma on a vast territory and could give origin to other dolichopodid taxa, e.g., to about 15 extant peloropeodine genera. The extant members of the subfamily are now basically pantropical, supporting opinions about the subtropical climate of the Baltic and Gujarat regions during the Eocene (e.g., Bickel et al., 2022).

Now eight species of *Palaeomedeterus* are described and illustrated. Five Meunier’s species were originally described and figured with male characters allowing their recognition in future. Three new species described herein cannot be associated with the doubtful *Palaeomedeterus tertiarius* or unplaced species of Dolichopodidae (females) listed by Grichanov (2023). At present, the main diagnostic characters for distinguishing *Palaeomedeterus* species are the shape of the antennal postpedicel and the shape and setation of the male cercus; other diagnostic species-specific characters are found in neither the wings nor the legs. The male postpedicel of *P. bifurcatus* and *P. manukyani* sp. nov. is the most remarkable, having attenuated apex with two *(P. bifurcatus)* or one *(P. manukyani* sp. nov.) apical processes, with an apical or strictly subapical arista-like stylus. The postpedicel of *P. lentus* and *P. sublentus* sp. nov. is reniform, distinctly higher than long, with dorsoapical stylus. The other species have intermediate, usually subtriangular, rarely sub-reniform *(P. lassatus* and *P. praeconcinnus)* postpedicels with dorsal or even basodorsal *(P. tertiarius)* styli. The male cercus (if known) is small in the *Palaeomedeterus* species, usually shorter than the surstylus, rounded, subtriangular or elongate-ovate, with usually short cilia and setae, sometimes with long cilia at the apex *(P. languidus)* or with long ventral and dorsal marginal setae *(P. subignavus* sp. nov.).

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