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Proclinopyga ulrichi sp. nov.: the first fossil aquatic dance fly of the subfamily Clinocerinae (Diptera: Empididae)

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Abstract. *Proclinopyga ulrichi* sp. nov. is described from Baltic amber, and represents the first definitive clinocerine fossil species. *Palaeoparamesia proosti* Meunier, 1902, considered a possible species of Clinocerinae, is transferred to the Trichopezinae.

Key words. Taxonomy, Baltic amber fossil, new species, morphology

INTRODUCTION

The Empidoidea comprise five families and numerous subfamilies of mostly predaceous flies (Sinclair & Cumming 2006). Some 150 fossil species of Empidoidea (exclusive of Dolichopodidae s.str.) are described (Evenhuis 1994; Solórzano Kraemer et al. 2005). Fossils are described from most major empidoid lineages, extending the origin of these lineages to at least the Cretaceous period (Grimaldi & Cumming 1999).

The subfamily Clinocerinae consists of primarily aquatic associated taxa, with adults mostly encountered on emergent rocks in streams and rivers (Sinclair 1995). Two fossil species have been classified as clinocerines. *Fushunempites furvus* Hong, 2002, from Eocene Chinese amber is possibly a clinocerine on the basis of the long and narrow cell r_4. Unfortunately the photo of the specimen (Hong 2002a, b) does not permit a definitive decision concerning subfamily assignment. *Palaeoparamesia proosti* Meunier, 1902 has also been viewed as a possible clinocerine. A specimen of this Baltic amber species, identified by Meunier (1908), was examined in this study and found not to represent a clinocerine (see Discussion). Consequently, the description herein of a new Baltic amber species of the recent genus, *Proclinopyga* Melander, represents the first unequivocal clinocerine fossil. The age of Baltic amber is assumed to be 40 million years (Eocene).

MATERIALS AND METHODS

To prepare the pieces for identification, the amber was cut and polished using an IsoMet® Low Speed Saw (Buehler, Lake Bluff, Illinois, USA) cutting machine and a Phoenix® Beta Grinder-Polisher (Buehler) polishing machine with SiC grinding paper for metallography, grit 800, 1200 and 2500, Microcut® Abrasive Paper (Buehler) plain backing P 4000, and paperboard. To protect the holotype of the new species the piece was embedded in synthetic resin Araldite® 2020 (XW396/XW397) (Huntsman Advanced Materials, Everberg, Belgium) (M. Solórzano Kraemer, Bonn, pers. comm. 2008).

Terms used for adult structures primarily follow those of McAlpine (1981), except for the antenna where terms of Stuckenberg (1999) were used. Homologies of the male terminalia follow those of Sinclair & Cumming (2006).

The Baltic amber specimen of *Palaeoparamesia* examined in this study was on loan from the Geoscience Centre of the University of Göttingen (Germany).

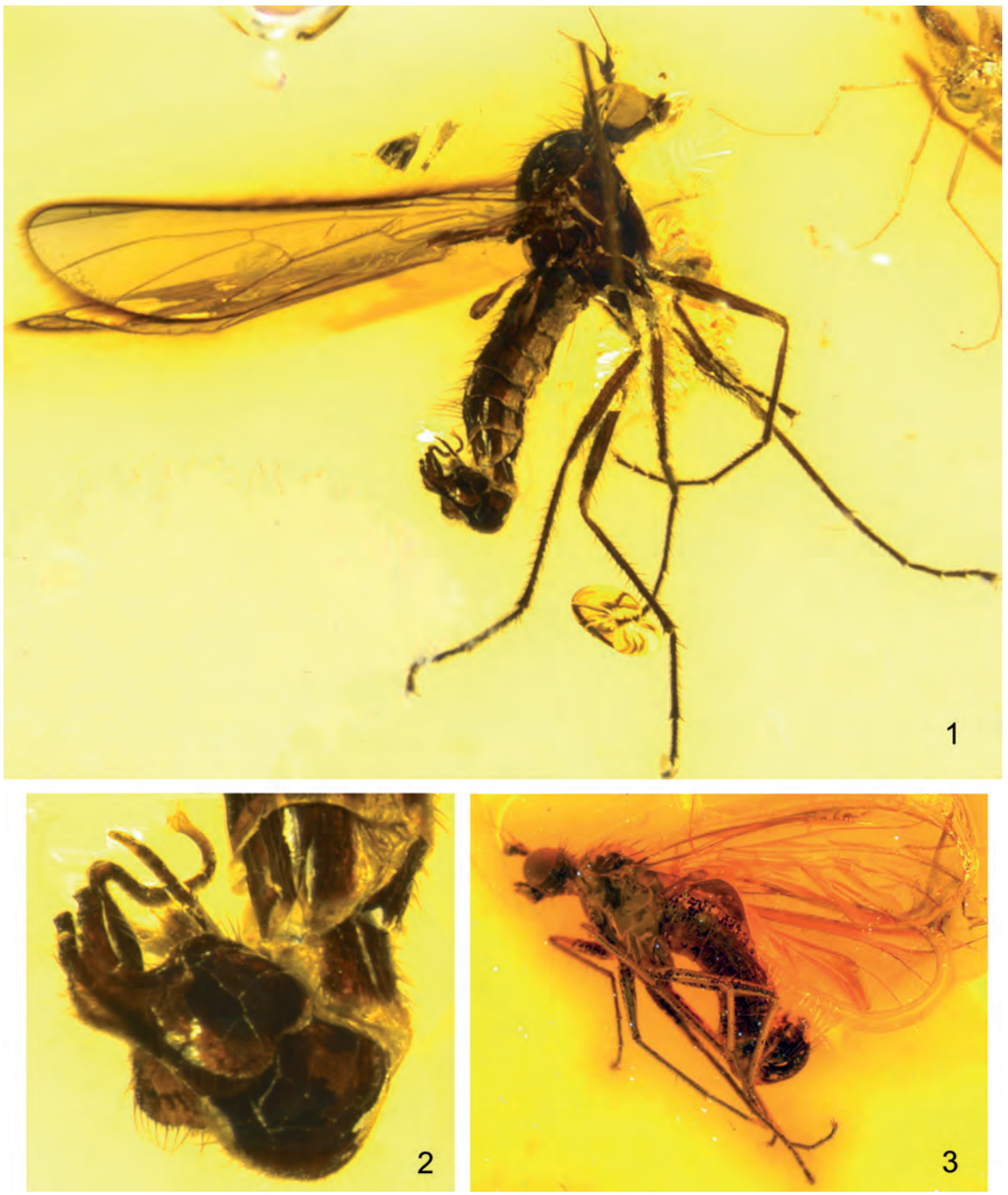
Genus *Proclinopyga* Melander

Proclinopyga Melander, 1928: 220. Type-species, *Proclinopyga amplectens* Melander, 1928 (original designation).

Diagnosis. *Proclinopyga* is distinguished from other genera of the Clinocerinae by its protruding face, bare eyes, labellum with pseudotracheae, broad wings with Sc evanescent, fifth tarsomere lacking extension, dorsal margin of the epandrium expanded with setae and female abdomen truncate with stout and ridged cercus.

***Proclinopyga ulrichi* sp. nov.** (Figs. 1, 2, 4, 5)

Type Material. Male holotype in Baltic amber, with following label data: "HOLOTYPE/ Proclinopyga/ ulrichi/ Sinclair"; "CNC DIPTERA/ # 12248"; amber is imbedded in resin with following dimensions: 11 x 9 x 6 mm;



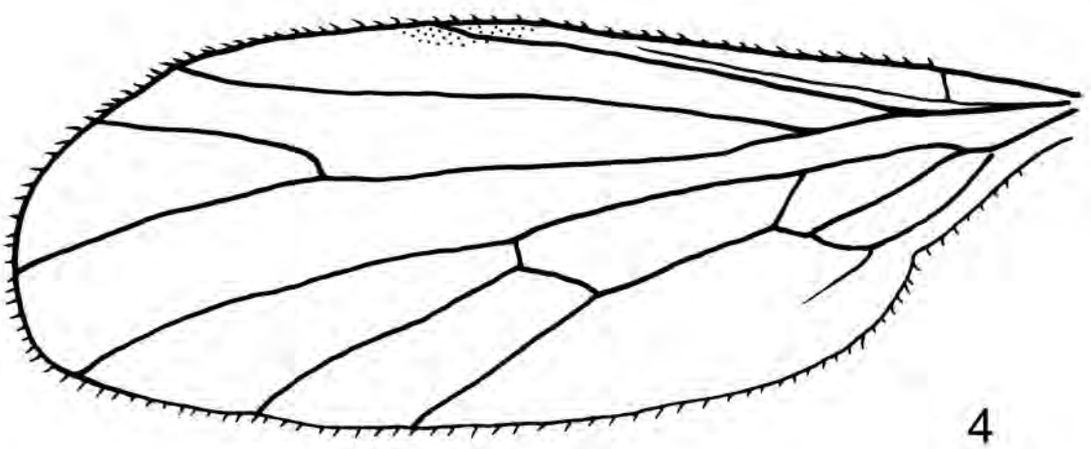
Figs 1–3. 1. *Proclinopyga ulrichi*, habitus. 2. *Proclinopyga ulrichi*, male terminalia, postero-lateral view of right side. 3. *Palaeoparamesia proosti*, habitus.

included in amber block is a male chironomid (missing abdomen). The holotype is housed in the amber collection of Dr. Hans Ulrich at the Zoologisches Forschungsmuseum A. Koenig (Bonn, Germany).

Recognition. This species (Fig. 1) is distinguished by the lengthened, attenuated apical half of the postpedicel, convoluted phallus with its hair-pin bend at mid-length and row of stout posteroventral setae on the male mid-femur.

Description. Male. Eye bare, dichoptic; lower half of face with slight protuberance in profile. Antenna with scape slightly longer than pedicel; postpedicel pointed ovate, longer than pedicel and scape combined, strongly attenuated and prolonged in apical half; arista-like stylus 1.5 times longer than postpedicel. Proboscis short; palpus club-shaped; labellum held in horizontal position, sucker-like.

Alternating biserial row of acrostichal setae, ending at



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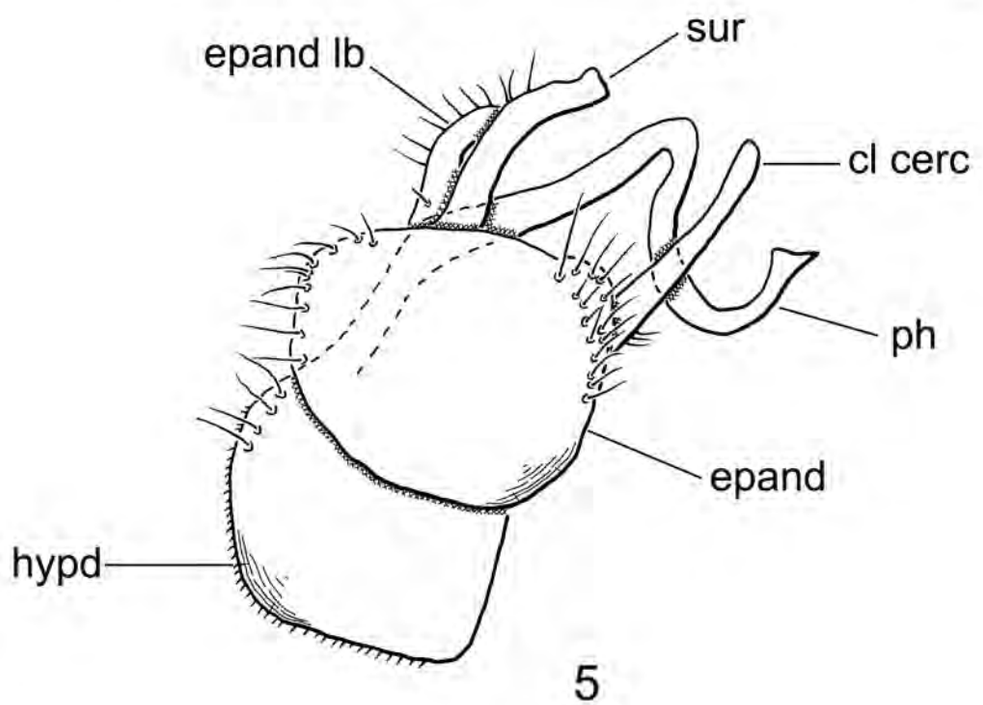

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Figs 4–5. 4. *Proclinopyga ulrichi*, wing. 5. *Proclinopyga ulrichi*, male terminalia, lateral view of right side. Abbreviations: cl cerc – clasping cercus; epand – epandrium; epand lb – epandrial lobe; hypd – hypandrium; ph – phallus; sur – surstylus.

prescutellar depression; 6–7 dorsocentral bristles, foremost large and positioned toward postpronotal lobe; 1 postpronotal bristle; 1 presutural supra-alar bristle; 2 notopleural bristles; 2 postsutural supra-alar bristles; 1 postalar bristle; 4 scutellar bristles. Laterotergite with short, black setae in row.

Wing (Fig. 4) (length 3 mm) broad, slightly infuscate; basal costal bristle long, reaching to near humeral crossvein; anal lobe well developed; R_4 strongly divergent from R_5.

Legs with evenly scattered setae. Mid femur with posteroventral row of long, stout setae, longer than width of femur. Mid tibia bearing stout, short, erect ventral setae; one antero- and one posterodorsal setae near base. Hind tibia with row of erect dorsal and anteroventral setae on distal two-thirds.

Abdomen with tergite 6 with transverse row of 6 erect dark setae, length more than half width of abdomen. Terminalia (Figs. 2, 5): Hypandrium cone-shaped, as long as epandrium is wide. Phallus long, slender and convoluted, with strong bend at mid-length; apex slightly expanded. Epandrium with expanded posterodorsal margin, bearing long setae and setulae; epandrial lobe continuous with expanded region of epandrium, bearing long setae and attenuated apically. Surstylus closely associated with epandrial lobe; shallow notch proximal to slightly expanded and truncate apex. Clasping cercus digitiform, straight, longer than surstylus; bearing short setulae.

Female. Unknown.

Geographical Distribution and Phenology. Extant species of *Proclinopyga* are confined to the Nearctic, eastern Palearctic, and Oriental regions (Sinclair 1995). This fossil species is the only known representative of this genus in Europe and the western Palearctic Region. Adults of *Proclinopyga* are associated with running water habitats, most commonly collected in streams, creeks, and cascades. The immature stages of this genus are unknown.

Phylogenetic Relationships. *Proclinopyga* comprises ten described species and at least this many undescribed species (Sinclair 1995). The slender, highly convoluted phallus (Fig. 5) of the fossil species is most similar to extant species in North America [e.g., *P. flavicoxa* Melander, 1928 (see Sinclair 1995, fig. 13)].

Etymology. This species is dedicated to Dr. Hans Ulrich who has amassed a rich collection of little known amber species of Empidoidea.

DISCUSSION

Proclinopyga ulrichi represents the first definitive clinocerine fossil taxon. The presence of Clinocerinae in Baltic amber was first definitively stated by Ulrich (2003, table, fig. 1) and was based on the specimen described here (H. Ulrich, Bonn, pers. comm. 2008). As in other subfamilies of the Empidoidea (exclusive of Dolichopodidae s.str.), Baltic amber fossils often belong to Recent genera (see discussion by Ulrich 2003). Clinocerines appear to be underrepresented in amber compared to other groups of empidoids, likely resulting from their very close association with flowing water habitats. Adults are rarely collected away from emergent rocks in streams and rivers and they do not form aerial swarms and consequently rarely would they be associated with tree trunks and other sources of amber.

Palaeoparamesia proosti was described on the basis of a single male specimen (No. 2118) (Meunier 1902). Meunier (1908) listed two additional specimens of this species (Nos. 8437, 7786) in his monograph on Baltic amber Empididae. Only specimen No. 8437 from these original series remains in the Göttingen collection (H. Ulrich, Bonn, pers. comm. 2001). This male specimen was examined and found to be in excellent condition (Fig. 3) and conspecific with *P. proosti*. This examination revealed that *Palaeoparamesia* Meunier should be assigned to a group of several small genera currently found in the western Nearctic region and assigned to the Trichopezinae; i.e., *Boreodromia*, Nearctic species of *Apalocnemis* Philippi and two winter collected species of a genus with antennae morphologically similar to *Gloma* Meigen (Sinclair 2008). *Palaeoparamesia* is characterized by a dichoptic male head, pair of long frontal bristles (rare in empidoids, except for Hilarini), postpedicel somewhat similar to *Gloma*, Trichopezinae-like female terminalia (based on conspecific specimen in Ulrich collection), hypandrium and epandrium fused (at least partially), erect male cerci and ear-like surstyli. On the basis of similarly shaped postpedicel and dichoptic male head, *Palaeoparamesia* and the winter species near *Gloma* are most closely related. These genera will be more thoroughly examined and described in a future publication by the author.

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