Zootaxa 3069: 63–68 (2011)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

A new fossil *Tanytarsus* from Eocene Baltic amber, with notes on systematics of the genus (Diptera: Chironomidae)

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Abstract

Tanytarsus fereci **sp. nov.** is described from a specimen found in Eocene Baltic amber. The new species is compared with the fossil *Tanytarsus serafini* Giłka and with the extant *T. aculeatus* Brundin. Following the analysis of morphological diagnostic characters, *T. fereci* is placed in the *mendax* species group.

Key words: Diptera, Chironomidae, *Tanytarsus*, systematics, new species, Baltic amber, Eocene

Introduction

The oldest known Eocene chironomids of the tribe Tanytarsini are three well defined species of the genera *Stempellina* Thienemann *et* Bause, *Stempellinella* Brundin and *Tanytarsus* van der Wulp (Seredszus & Wichard 2007, Giłka 2010). The recently described *Tanytarsus serafini* Giłka (2010) and *T. fereci*, described in this work, provide unique data on genealogical relationships within the genus. A detailed analysis of morphological structures showed the two species to belong to different systematic groups; on the other hand, *T. fereci* and the extant *T. aculeatus* Brundin share a number of unique characters. Some of these features were used in the group diagnosis of the monotypic *aculeatus* group (Reiss & Fittkau 1971). Following the recently published phylogenetic analyses, the *aculeatus* group was included into the *mendax* species group (Ekrem 2003). Consequently, *T. fereci* becomes the oldest member of the latter.

The morphological terminology and methods used in this work follow Giłka (2010). The holotype of *Tanytarsus fereci* is deposited in the Museum of Amber Inclusions (MAI) at the Department of Invertebrate Zoology, University of Gdańsk, Poland. The specimens of *Tanytarsus aculeatus* used in the analysis were collected from several sites in Finland by author.

Systematics

Tanytarsus fereci sp. nov.

Type material. Holotype, No. MAI 4356, adult male, completely preserved inclusion in a light-yellow, manually ground and polished cubicoid piece (6 x 5 x 2 mm) of Baltic amber collected on the coast of the Gulf of Gdańsk.

Derivation of the name. The species name is a tribute to Mr Janusz Feręc (Elbląg, Poland) who has kindly donated the inclusion.

Diagnosis. AR 0.82. Palpus long, palp length / head length ratio c. 1.6; ultimate palpomere with strong stiff apical seta. Sc long, ending slightly distally of Cu_1. VR_{Cu} 1.26. LR_1 2.44. Anal tergite with longitudinal crest-like hump bearing short median setae. Anal point slender, becoming pointed distally, bearing spinulae between long crests. Median volsella extending to more than half-length of inferior volsella.

Accepted by J.K. Moulton: 4 Oct. 2011; published: 26 Oct. 2011

FIGURE 1. *Tanytarsus fereci* **sp. nov.**, male. A: habitus; B, C: head; D: ultimate palpomeres showing stiff apical setae (arrow).

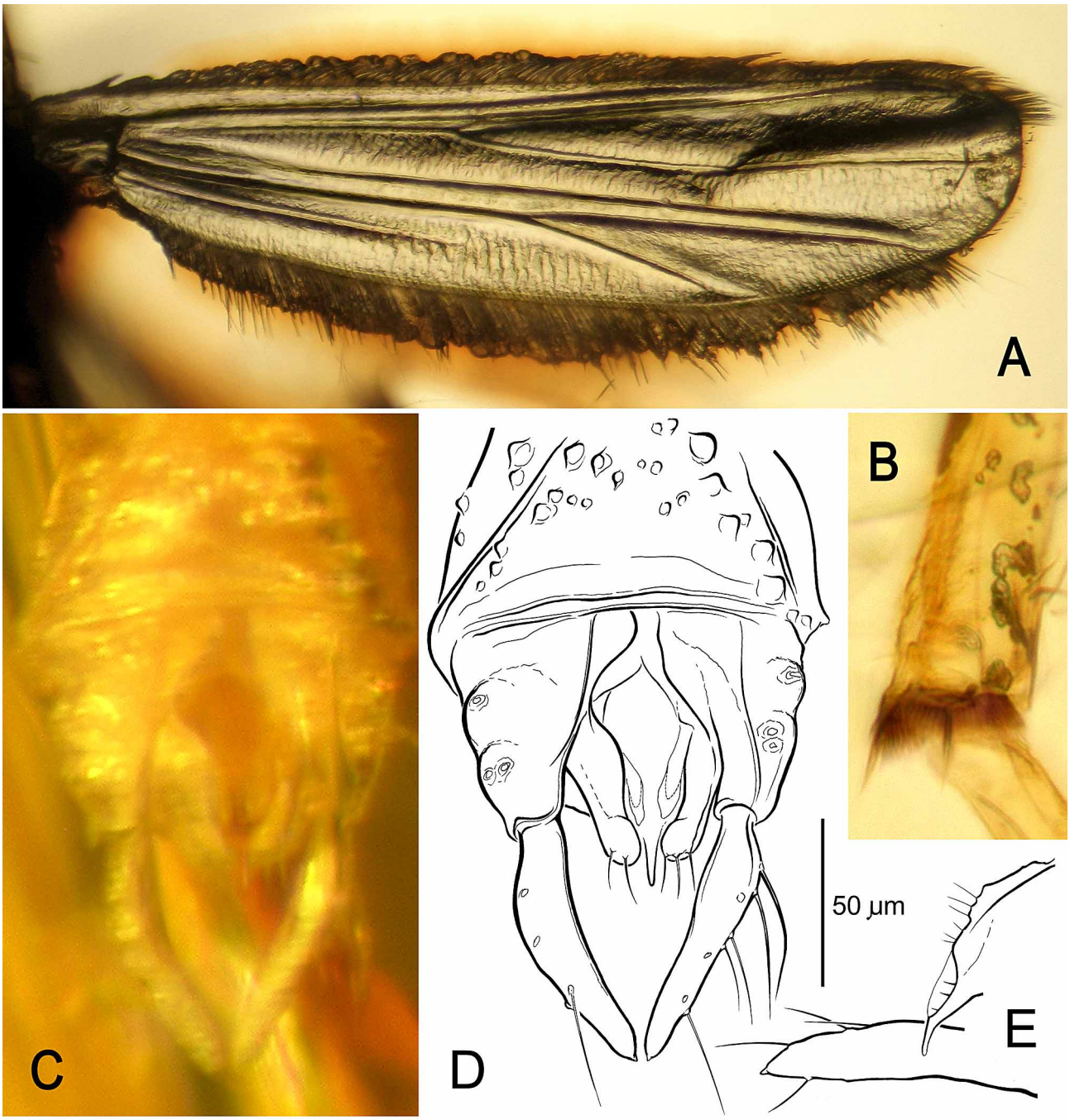

FIGURE 2. *Tanytarsus fereci* **sp. nov.**, male. A: wing; B: tibial armature of hind leg; C–E: hypopygium in ventral view (C, D) and in lateral view (E).

Description. Adult male (Fig. 1A).

Total length 1.85 mm; wing length (arculus-tip) 1.08 mm.

Head (Fig. 1A–D). Eyes bare, reniform, with broad dorsomedian extension. Frontal tubercles unobservable. Antenna with 13 distinctly separated flagellomeres; ultimate flagellomere 360 µm long, AR 0.82, plume well developed. Palp long (c. 445 µm in total, lengths of palpomeres 2–5 in Table 2) (Fig. 1B–D), palp length / head length ratio c. 1.6, ultimate palpomere with strong, 12 µm long, stiff apical seta (Fig. 1D).

Thorax chaetotaxy. At least 16 acrostichals placed in double row reaching antepronotum; 7–8 dorsocentrals on each side of thorax; 4 strong scutellars in row.

Wing (Fig. 2A). Squama bare. Wing slender, length / width ratio 3.89; anal lobe reduced. Length of M 397 µm; wing length / M length ratio 2.72. Sc long, ending slightly distally of Cu_1. R_1 fades before reaching C (indistinct). End of R_{2+3} indistinct. R_{4+5} ending far distally of M_{3+4} and slightly proximally of M_{1+2}. FCu placed distally of RM.

Cu longer than M, VR_{Cu} 1.26. Cu_1 distinctly curved apically. Sc, M, RM, R_{2+3}, and short proximal section of M_{1+2} bare, other veins with macrotrichia. Membrane setation as in most extant *Tanytarsus*: area above Cu bare, other cells with dense macrotrichia.

Legs (Fig. 1A, 2B). Tibial spur and apical bristles in fore leg absent. Middle and hind leg with separated tibial combs, each composed of 10 and 12 (mid leg) or 13 and 18 (hind leg) teeth; each comb bearing slightly bent spur, 20 and 22 μm long on mid leg, 22 and 26 μm long on hind leg; spurs about twice the length of teeth (Fig. 2B). Two or three hook-shaped sensilla chaetica on ta_1 of p_2. Pulvilli not observed. See Table 1 for lengths of leg segments and Table 2 for leg ratios.

TABLE 1. Lengths (μm) of leg segments of male *Tanytarsus fereci* **sp. nov.**

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	560	270	660	345	280	220	105
p_2	595	470	310	145	120	80	60
p_3	615	535	410	230	210	120	75

Hypopygium (Fig. 2C–E). Gonostylus about 75 μm long, distinctly longer than gonocoxite, slender, slightly curved and directed posteromedially; tip blunt with apical tubercle (Fig. 2 C, D). Anal tergite with distinct longitudinal hump bearing several short median setae; anal point slender, becoming pointed distally, bearing 3 spinulae between long crests (Fig. 2E). Superior volsella roundish, with at least 2 strong setae in apical part (well-visible in dorsolateral aspect). Digitus not observed. Median volsella well developed, extending to more than half-length of inferior volsella, about 30 μm long, stem (25 μm long) slightly curved and directed posteromedially, distal lamellae spindle-shaped (glued together with resin). Ventromedian margin of gonocoxite widely rounded. Inferior volsella stout, but reaching slightly beyond base of gonostylus, broad in proximal part, with median margin convex, narrowed in half-length, with globular distal lobe directed medially, armed with several stout setae (Fig. 2C, D).

Discussion

Tanytarsus fereci and *T. serafini*, show distinctly different characters which clearly indicate that the two species have to be placed in separate groups. These characters are primarily the wing shape and venation pattern. In *T. fereci*, the anal lobe is much better developed, the veins R and M are much longer, and the wing length / M length and VR_{Cu} ratios are much lower than in *T. serafini*. The stout tibial apical bristles in fore leg of *T. serafini* are absent in *T. fereci*. *T. fereci* and *T. serafini* differ also in body size, the palp length / head length ratio (less than 1.3 in *T. serafini*), proportions of leg segments as well as in the shape of gonostylus, hypopygial anal point and volsellae [Tables 1, 2; see also Giłka (2010)]. The two fossil species are distinct in having long Sc vein, ending distally of Cu_1, whereas the Sc ends proximally of Cu_1 in extant *Tanytarsus*. The presence of the single stiff seta placed on apex of ultimate flagellomere in *T. fereci* appears to be unique character within the genus.

Interestingly, *Tanytarsus fereci* displays a set of characters very similar to those found in the extant North-Palaearctic *T. aculeatus*. The anal tergite in both species is almost identical in shape and bears a longitudinal hump which, in lateral view, resembles a crest-like structure; the shape of the anal point in lateral aspect, including anal crests and arrangement of spinulae is also similar (cf. Fig. 2E and fig. 3 in Reiss & Fittkau 1971). Unfortunately, the hypopygium of the specimen described lies in a fractured face of the piece of amber, which makes it impossible to examine the dorsal aspect; however, the arrangement of median setae is presumably similar to that found in *T. aculeatus* (placed symmetrically in pairs). Other diagnostic structures are the gonostylus and inferior volsella, which are also similar in the two species (cf. Fig. 2C, D and fig. 2 in Reiss & Fittkau 1971). Despite the distinct similarities, *T. fereci* and *T. aculeatus* clearly differ in size and proportions of antennal and leg segments, correlated in the usual manner with dimensions of the body (lower AR and higher LR values in smaller specimens) (Table 2). The relatively small size of fossil chironomid representatives found in Eocene amber, in comparison with the closely related extant taxa, confirm the rule derived from other nematoceran families (e.g. Szadziewski 1988). *T. fereci* is one of the smallest species in the genus *Tanytarsus*.

TABLE 2. Comparison of diagnostic characters of *Tanytarsus aculeatus* Brundin [according to Brundin (1949) and Reiss & Fittkau (1971), completed], *T. serafini* Giłka and *T. fereci* **sp. nov.** Lengths in μm, except for wing.

Character \ species	*T. aculeatus*	*T. fereci*	*T. serafini*
Wing length (mm)	2.55–3.50	1.08	1.23–1.37
Wing length / width ratio	3.58–3.66	3.89	3.84–4.03
Wing length / M length ratio	2.40–2.49	2.72	3.90–4.05
VR_{Cu}	1.10–1.14	1.26	1.70
Sc - Cu_1 configuration	Sc ending well proximally of Cu_1	Sc ending slightly distally of Cu_1	Sc ending distally of Cu_1
RM - FCu configuration	FCu placed slightly distally of RM	FCu placed distally of RM	FCu placed far distally of RM
AR	1.43–1.70	0.82	c. 0.75
Pm_2 (length)	63–70	28	36–40
Pm_3 (length)	156–163	95	109–119
Pm_4 (length)	142–155	103	107–115
Pm_5 (length)	226–231	199	190–198
Palp length / head length ratio	c. 1.1	c. 1.6	less than 1.3
LR_1	1.50–1.60	2.44	2.03–2.11
LR_2	0.54–0.56	0.66	0.55–0.56
LR_3	0.65–0.67	0.77	0.63–0.64
ta_4 / ta_5 length ratio in p_1	1.90–1.94	2.09	3.25–3.32
ta_4 / ta_5 length ratio in p_3	1.64–1.68	1.60	2.67–2.92
ta_3 / ta_4 length ratio in p_2	1.35–1.40	1.50	0.90
Tibial spur of p_1	present	absent	absent
Tibial apical bristles of p_1	2–3, weak	absent	2–4, strong
Gonostylus (length)	160–170	c. 75	100–105
AP	pointed	pointed	apically blunt
Median setae	8–12	6	not observed
SVo anteromedian setae	2 strong + 1 weak	at least 2	2
Digitus	stout	not observed	not observed
MVo stem (length)	45–50	c. 25	c. 45

Acknowledgements

I thank Dr. Bohdan Bilyj (Etobicoke, Ontario) and Dr. John Epler (Wakulla Springs, Florida) for their comments on an earlier version of the manuscript.

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