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A new species of the predaceous midge genus *Metahelea* from Baltic amber (Diptera: Ceratopogonidae)

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ABSTRACT. A new species of the predaceous midge of the tribe Heteromyiini, *Metahelea serafini* sp. n., from Eocene Baltic amber is described and illustrated. This is the first fossil species of *Metahelea* which includes two extant species from Australia and the Philippines. Evidence is presented that suggests that *Neurohelea cothurnata* (MEUNIER, 1904) from Baltic amber is actually a member of the tribe Heteromyiini.

KEY WORDS: Diptera, Ceratopogonidae, Heteromyiini, fossil, Tertiary, Baltic amber, *Metahelea*, new species.

INTRODUCTION

The predaceous midges of the small tribe Heteromyiini (subfamily Ceratopogoninae) includes 7 genera as recently defined by BORKENT (1998): *Heteromyia* SAY (North and South America), *Pellucidomyia* MACFIE (Pantropical), *Tetrabezzia* KIEFFER (Afrotropical and Oriental regions), *Clinohelea* KIEFFER (worldwide), *Neurohelea* KIEFFER (Europe), *Physohelea* GROGAN et WIRTH (southern South America) and *Metahelea* EDWARDS (Australia and Philippines). Earlier, BORKENT (1995) concluded that the character state of 2 scutal apodemes is a good synapomorphy for the clade Heteromyiini + Sphaeromiini + Palpomyiini + Stenoxenini. As a result of this conclusion, BORKENT (1995) transferred *Neurohelea* and *Neurobezzia* WIRTH et RATANAWORABHAN from the Heteromyiini to the Ceratopogonini because these two genera possessed 3 scutal apodemes.

Subsequently, BORKENT (1998) studied the type-species of *Neurohelea, Ceratopogon luteitarsis* WALTL, found that it had 2 scutal apodemes and reassigned *Neurohelea* to the tribe Heteromyiini. In this article, BORKENT also described the new genus *Atyphohelea* BORKENT to which he assigned the extant *Neurohelea macroneura* MALLOCH as type-

species, a species that had been traditionally treated as a member of *Neurohelea*. Finally, BORKENT also assigned the Baltic amber *Neurohelea cothurnata* (MEUNIER) to his new genus *Atyphohelea*, despite the fact that he was unable to examine its scutal apodemes. I believe this to be an unwise decision, due to the fact that the scutal apodeme character could not be observed in *Neurohelea cothurnata*, and also because an extant species of *Neurohelea* (*N. luteitarsis*) inhabits Europe today! I provide two forms of evidence to this effect below.

Apparently BORKENT'S (1998) sole reason for assigning *N. cothurnata* to *Atyphohelea* was "because the fore fifth tarsomere is only slightly swollen and the species otherwise fits the diagnosis of the genus". Commenting further on the swollen fifth tarsomere of fore leg character that has traditionally been used to define members of the tribe Heteromyiini (GROGAN & WIRTH 1979), BORKENT proposed that this character be defined as the "objective ratio" obtained by the value of the width at midlength of the fifth tarsomeres of the fore leg, divided by the same value of the fifth tarsomere of the midleg. In fact, this ratio may actually be more subjective than the simple description "fore fifth tarsomere swollen", which compares the aspect ratio of the fore fifth tarsomere to those of the mid and hind legs. This becomes evident when using BORKENT'S formula which will produce ratios greater than 1.0 when the fifth tarsomeres of the fore leg are not swollen, but those of the midleg are slender. Similarly, the ratio will be 1.0 when both the fore and mid fifth tarsomeres are evidently swollen. For example, *Metahelea* has swollen fifth tarsomeres on all of it legs.

Furthermore, I recently reexamined a female of *Neurohelea cothurnata* in the Museum of the Earth, Warsaw, and found that its thorax has a very broad paratergite and a very narrow anepisternal cleft. Such a broad, often almost triangular paratergite is found within the clade Heteromyiini + Sphaeromiini + Palpomyiini + Stenoxenini, whereas all Ceratopogonini have narrow paratergite (Kaczorowska, personal comm.). The broad paratergite which is readily visible through the amber in this fossil species, is further evidence which shows that *Ceratopogon cothurnatus* cannot be member of the Ceratopogonini, and therefore, I reassign it to the genus *Neurohelea* in the tribe Heteromyiini.

The Heteromyiini are rarely represented in fossil material and to date only 4 species have been found in Tertiary ambers, only in extant genera as follows:

Neurohelea cothurnata (MEUNIER, 1904), Eocene Baltic amber, Europe.

Physohelea obtusa (MEUNIER , 1904), Eocene Baltic amber, Europe.

Heteromyia dominicana SZADZIEWSKI et GROGAN, 1997, Oligocene/Miocene Dominican amber, Hispaniola.

Metahelea serafini sp. n. described below, Eocene Baltic amber, Europe.

Acknowledgements

I would like to express my sincere thanks to Professor William L. Grogan, Jr. of Salisbury State University, USA, for critical review of the manuscript and correction of English.

DESCRIPTION

Metahelea EDWARDS, 1929

Metahelea EDWARDS, 1929: 12.

Type-species: *Metahelea metallescens* EDWARDS, 1929, by monotypy.

Diagnosis

Only genus within the family with females having deeply bilobed fourth tarsomeres; fifth tarsomeres similar on all legs, each with a distinct ventral swelling, claws greatly unequal, fused basally; fore femur slender or enlarged, armed with ventral spines. Males unknown.

Metahelea serafini sp. n.

Figs. 1, 3, 4

Diagnosis

Females distinguished from all fossil and extant species by having deeply bilobed fourth tarsomeres, each lobe subdivided into two arms, the lower arm bearing a large apical spine; fore femur enlarged and armed with ventral spines on distal half. Males unknown.

Description

Male. Unknown.

Female. Complete, well preserved in the amber, with one side of body covered with milky cloud (Fig. 3A). Body length, without flagellum, 4.4 mm. Head: Eyes contiguous, probably for a long distance. Flagellum length greater than 1.6 mm, distal 5 flagellomeres cylindrical, their combined length 1.23 mm, proportions of flagellomeres 9-13 as follows: 30-30-32-32-40 (Fig. 1A); flagellomeres 1-8 short, obliquely situated in amber, their combined length at least 0.41 mm. Antennal ratio about 2.8. Proboscis moderately long (Fig. 4A). Palpus 5-segmented, distal segments slender, cylindrical (Fig. 1B); third palpal segment bearing at least 3 sensilla capitata, length 150 μm; fourth segment armed with one seta, length 75 μm; fifth segment elongate, length 135 μm.

Thorax: Scutum with distinct anterior tubercle, surface nearly bare, with only some distinct supraalar and prescutellar setae readily visible. Scutellum with 8 marginal setae. Paratergite large, bare. Sternite I large, shield-shaped. Hind coxa with some lateral setae, other coxa bare. Femur of fore leg 1.06 mm long, slightly swollen and armed with 17 small ventral spines on distal half (Fig. 1C); distal spines in 2 rows. Mid and hind femora 1.31 mm and 1.56 mm long respectively, both slender, without ventral spines, each with a subapical projection (Fig. 1C). Fore tibia 0.86 mm long, somewhat bent at base, 1.2 times shorter than fore femur. Mid tibia 1.06 mm long, with a distinct subapical spine, 1.23 times shorter than mid femur. Hind tibia 1.36 mm long, 1.15 times shorter than hind femur; tibial comb composed of 8 fine spine-like setae. Mid and hind basitarsi with palisade setae. Hind basitarsus bent at base and bearing 2 rows of palisade setae; subbasal spine absent, only 2

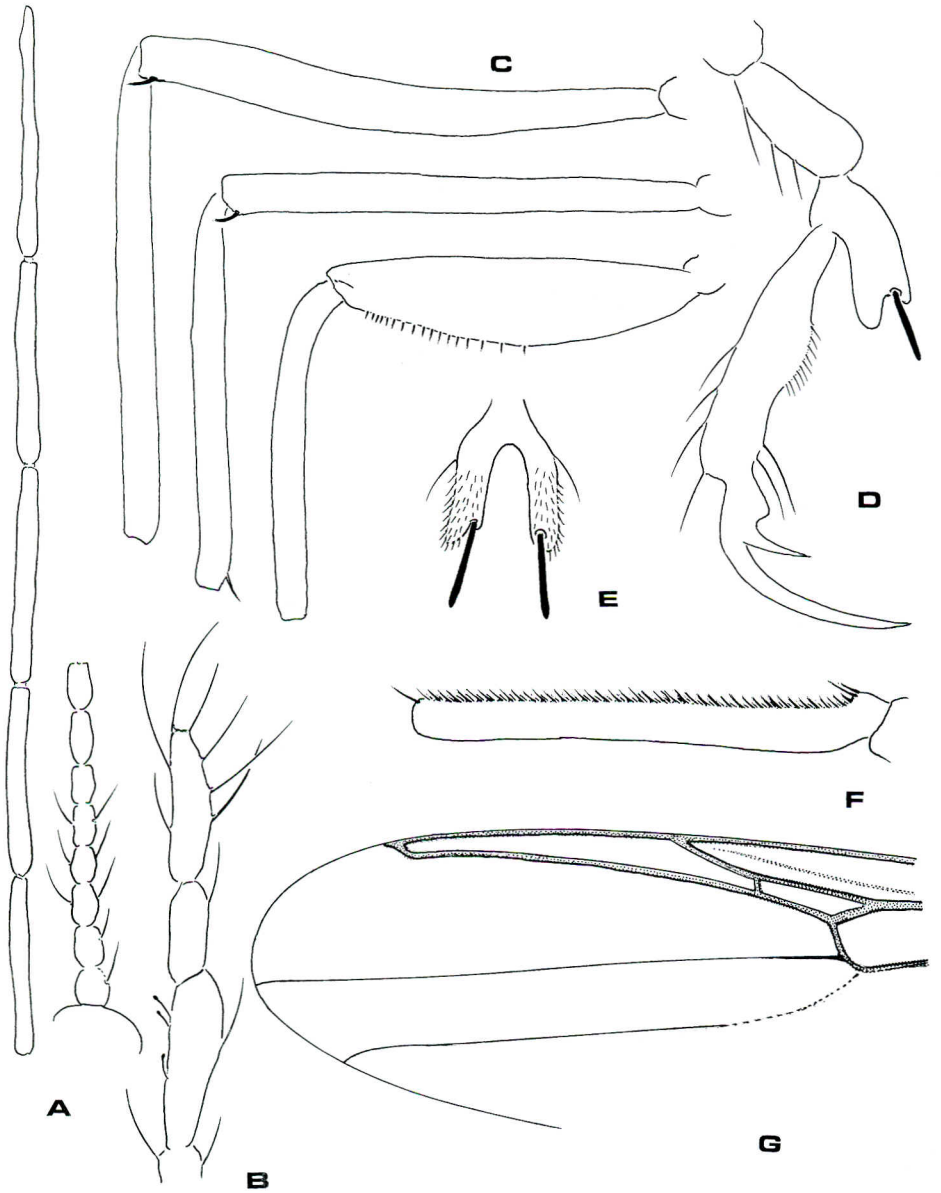

Fig. 1. *Metahea serafini* sp. n., female. A - flagellum, B - palpus, C - femur and tibia of hind, mid and fore legs, D - distal tarsomeres of hind leg, E - ventral aspect of fourth tarsomere of fore leg, F - first tarsomere of hind leg, G - distal portion of wing.

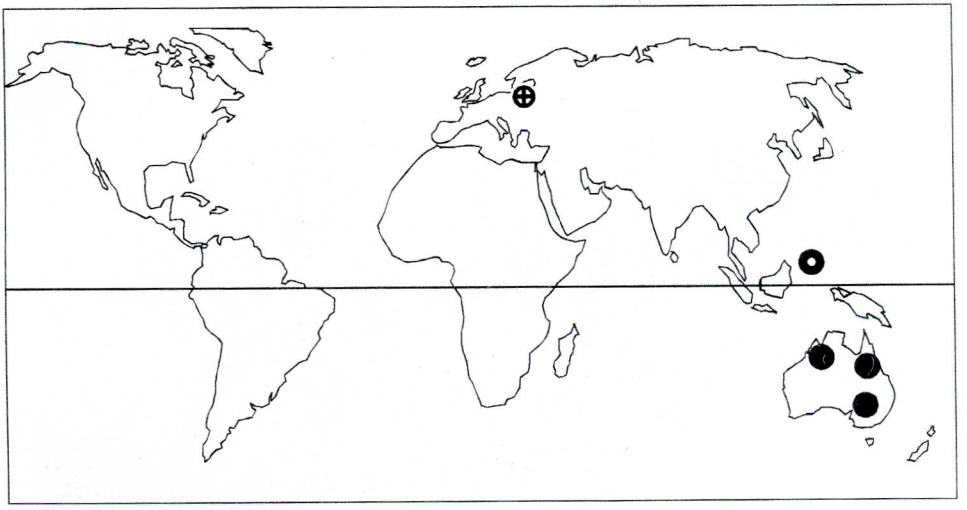

Fig. 2. Locality records of fossil and extant species of *Metahelea*. ⊕ - fossil *M. serafini* sp. n., O - extant *M. metallescens* EDWARDS, ● - extant *M. bifasciata* (KIEFFER).

elongate setae present subapically (Fig. 1F). Tarsal ratio of mid and hind legs 2.5. Fourth tarsomeres similar on all legs, deeply bilobed, each lobe with two distinct arms; ventral arm shorter and bearing long, blunt spine; dorsal arm longer, unarmed (Figs. 1D,E, 3B). Fifth tarsomeres similar on all legs, long, each with distinct ventral swelling covered with fine setae at midlength; claws single, shorter than fifth tarsomere, each with distinct short basal tooth (Fig. 1D).

Wing length 2.76 mm. Costal ratio 0.88. Costa slightly prolonged beyond vein R3. Media broadly sessile forking proximal to crossvein r-m (Fig. 1G). Two distinct radial cells present. Cell r2 about 3.4 times longer than cell r1. Wing membrane without macrotrichia. Anal lobe distinct, obtuse. Darkened radial veins and proximal portion of M1 (Fig. 4B) suggests that wing membrane and veins were originally patterned as in extant species.

Abdomen petiolate at base. Cerci not visible. Genitalia barely visible, apparently without special armature or setae.

Material examined

Holotype female, in Eocene Baltic amber. The amber was probably collected at Kaliningrad on Sambian Peninsula, Russia. Jacek Serafin purchased this piece of amber and presented as a gift for University of Gdańsk. The holotype is deposited in the Museum of Amber Inclusions, University of Gdańsk, Pilsudskiego 46, 81-378 Gdynia, inventory number 111.

Etymology

This species is named in honour of Jacek Serafin (Kasparus, Poland) the most important private Polish collector of Baltic amber inclusions, in recognition of his entomological experience and generosity in understanding the scientific importance of amber inclusions.

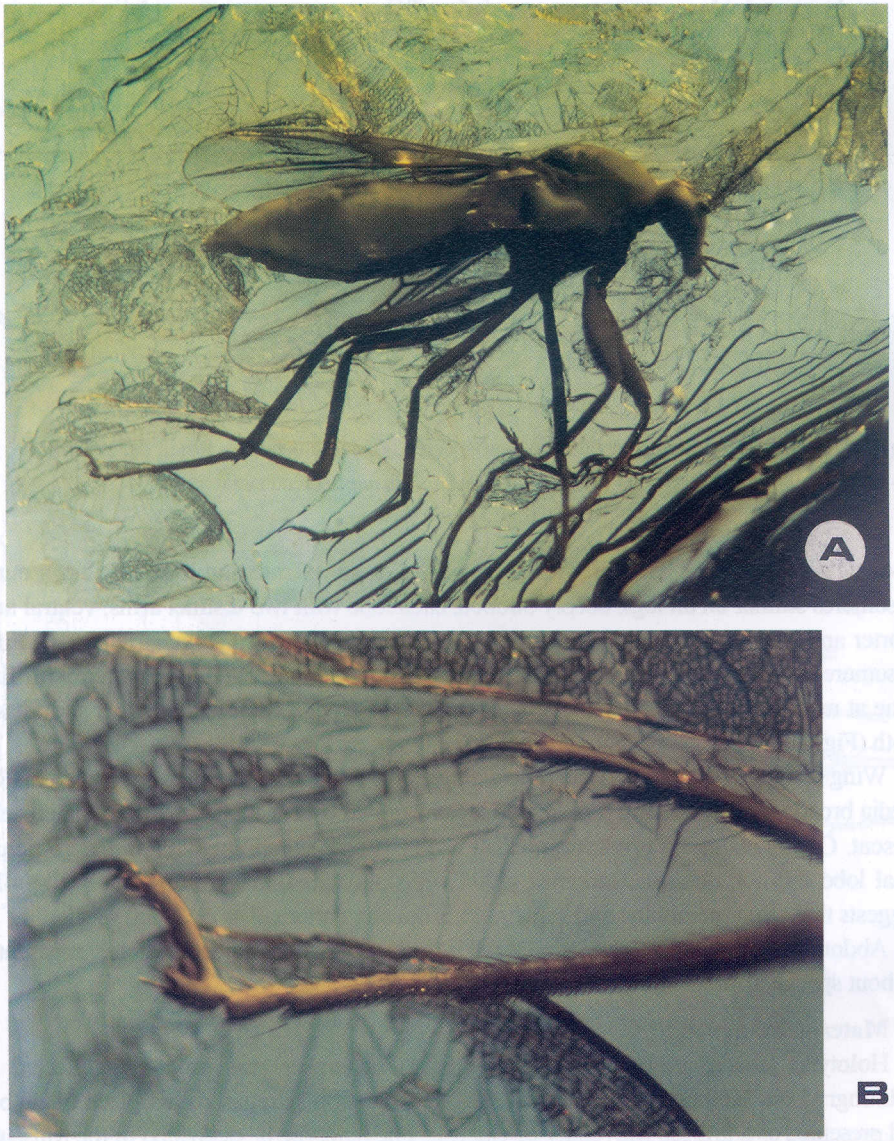

Fig. 3. *Metahelea serafini* sp. n., female. A – total habitus, B – tarsi of hind legs.

Fig. 4. *Metahelea serafini* sp. n., female. A – head, B – wing venation.

DISCUSSION

Only two extant species of *Metahelea* are known, *Metahelea bifasciata* (KIEFFER, 1917) from Queensland, New South Wales and Northern Territory in Australia (DEBENHAM 1974) and *Metahelea metallescens* EDWARDS from the Philippines, Negros (EDWARDS 1929). According to DEBENHAM (l.c.) these two species are very similar morphologically. The fossil species from Baltic amber described herein indicates that *Metahelea* was more widely distributed during the Tertiary, and that this genus is of more limited distribution as a zoogeographic relict (Fig. 2).

This new fossil species is unique within the family in that its deeply bilobed fourth tarsomeres are apically bilobed as well. This indicates that it is possible that a monophyletic genus can contain species with a slender or enlarged fore femur with numerous or a few spines, and these probably homoplastic characters may not be useful in distinguishing genera within the Heteromyiini. For this reason, I am doubtful that two small genera *Neurohelea* (1 extant, 1 fossil species) and *Physohelea* (2 extant, 1 fossil species) are necessary within the Heteromyiini. The only major difference between these two genera is that the fore femur of *Physohelea* bears 4-12 spines, while the fore femur of *Neurobezzia* lacks spines. The presence or absence of spines in these two generea may not by itself be indicative of their uniqueness, and if there are no other distinguishing differences between these taxa, then we should suspect that at least one of them is polyphyletic.

The Heteromyiini as presently understood, is a poorly defined, formally paraphyletic, tribe within "higher" predatory Ceratopogoninae. These include those predaceous midges of the clade formed by Heteromynii + Sphaeromiini + Palpomyiini + Stenoxenini which do not belong to Sphaeromiini (females with batonnets on 5th tarsomeres) or to Palpomyiini + Stenoxenini (females with eversible tubes). The Heteromyiini traditionally included species with markedly swollen or inflated fifth tarsomere of at least the fore legs or in having 4th tarsomeres that are deeply bilobed and armed (DEBENHAM 1974, GROGAN & WIRTH 1979). The enlarged fifth tarsomere may be represent a synapomorphy for the tribe as suggested by GROGAN & WIRTH (l.c.). Only *Tetrabezzia* has non-swollen fifth tarsomeres, but this may be explained by secondary reduction (apomorphy) or reversion to the plesiotypic condition (homoplasy), as members of this genus otherwise overall resemble other heteromyiines.

In the key to genera of Heteromyiini (BORKENT 1998) mistakes were found in couples 7 and 11. Therefore, I propose the following corrections to these couplets as follows (see also GROGAN & WIRTH 1979):

7. Hind leg strikingly elongate 8
-. Hind leg not much longer than other legs 10
11. Ommatidia separated medially; etc. ..... *Clinohelea*
-. Ommatidia contiguous medially; etc. ..... *Metahelea*

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