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A new species of the long-legged fly genus *Microphorites* in Burmese amber (Dolichopodidae: Microphorinae)

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ABSTRACT

We describe *Microphorites pouilloni* sp. nov., as first representative of this Cretaceous–Paleogene genus of Dolichopodidae Microphorinae from the mid-Cretaceous Burmese amber. The oldest records of this genus of small Diptera are from the early Cretaceous Lebanon and Jordan, while the Burmese amber was probably produced on an island during the mid-Cretaceous, which had separated from Gonwana during the Jusassic. This situation suggests a possible late Jurassic origin for the genus *Microphorites*.

Keywords: Diptera

Empidoidea

sp. nov.

paleobiogeography.

1. Introduction

The subfamily Microphorinae is a small group of empidoid flies classified within the Dolichopodidae (Sinclair and Cumming, 2006; Wahlberg and Johanson, 2018). It contains 47 extant described species in two genera and 16 extinct species in two extant and four fossil genera (Brooks et al., 2019). They are recorded in the early Cretaceous Lebanese and Jordan amber, the mid-Cretaceous of Spain and France, the late Cretaceous of France, and the Paleogene amber of Czechia and France. Brooks et al. (2019) recently described two fossil species they attributed to the extant genus *Schistostoma* Becker, 1902, from the mid-Cretaceous Burmese amber. Tang et al. (2019) also described a monospecific genus *Pristinmicrophor* from the same amber. *Microphorites* Hennig, 1971 is the most diverse extinct genus, with eight described species from Lebanon, Jordan, France, Spain, and Moravia. Curiously no Microphorites have been recorded from the very rich Burmese amber (Ross, 2019) until now. Here we describe a new species of *Microphorites* from this amber, based on a well-preserved male specimen. This new finding is of interest for the knowledge of the Cretaceous distribution of this genus.

2. Material and methods

The type of *Microphorites pouilloni* sp. nov. is embedded in a small clear piece of amber together with another small Diptera: Brachycera. They were separated and the type was prepared using a diamond disk and examined using a Nikon binocular microscope SMZ 1500. Photographs were taken with a Nikon camera D800, and the images were treated with Adobe Photoshop Element 12. The piece of Burmese amber was found in deposits in the Hukawng Valley (Kachin) of Myanmar (Yin et al., 2018: fig. 1A). The age of amber is confirmed by radiometric analysis of zircons as earliest Cenomanian, *ca.* 99 Ma. (Shi et al., 2012). We follow the classification of Brooks et al. (2019) for the Microphorinae, and Grichanov and Brooks (2017) for the morphology and venation.

3. Systematic paleontology

Order: Diptera Linnaeus, 1758.

Family: Dolichopodidae Latreille, 1809.

Subfamily: Microphorinae Collin, 1960.

Genus: *Microphorites* Hennig, 1971.

Type species: *Microphorites extinctus* Hennig, 1971, p. 16, figs. 2, 3, 19–25.

Other species: *Microphorites extinctus* Hennig, 1971 (Lower Cretaceous, Lebanese amber); *M. oculeus* Grimaldi and Cumming, 1999, *M. similis* Grimaldi and Cumming, 1999 (both Lebanese amber); *M. deploegi* Nel et al., 2004 (Albian amber, Lower Cretaceous, France); *M. utrillensis* Peñalver in Arillo, Peñalver and Delclós, 2008 (San Just amber, Lower Cretaceous, Spain); *Microphorites pouilloni* sp. nov. (lowermost Cenomanian, Burmese amber, Myanmar); *M. magaliae* Perrichot and Engel, 2014 (Vendean amber, Upper Cretaceous, France), *M. moravicus* Tkoč et al., 2016 (Študlov amber, Cretaceous (Cenomanian) / lower Paleogene, Moravia), *M. erikai* Bramuzzo and Nel, 2017 (lowermost Eocene Oise amber, France).

Microphorites pouilloni Ngô-Muller & Nel, sp. nov.

(Fig. 1)

Holotype. MNHN.F.A71310 (specimen 17A, collection Jean-Marc Pouillon), stored in the collections of the Muséum National d'Histoire Naturelle, Paris, France.

Locality and horizon. Hukawng Valley, Kachin State, northern Myanmar; mid-Cretaceous (lowermost Cenomanian).

Etymology. Named after Jean-Marc Pouillon, who donated the type specimen.

Diagnosis. Postpedicel rather short, triangular; presence of a group of very long bristles on male terminalia; two pairs of scutellar bristles, apical pair more than twice length of lateral pair; no colored pterostigma; basal part of M2 oblique, not perpendicular to M1; costal vein ending between R4+5 and M1.

Description. A well-preserved specimen. Male. Body wholly dark brown, 1.7 mm long, wing 1.4 mm long, 0.5 mm wide. Head hemispheric, 0.4 mm long, distinctly wider than thorax in dorsal view, ca 0.8 as long as thorax in dorsal view; eyes holoptic, close to each other on face, ommatidia uniform, bare; margin of eye with a weak notch near antenna; vertex flat, with a pair of ocellar bristles; ocellar tubercle weakly prominent; occiput round, slightly prominent; antenna located near vertex, brown; scape small, almost bare; pedicel with two dorsal bristles, small, globular; postpedicel nearly triangular, extended basally, rather short, 1.2 times as long as wide; arista-like stylus apical, 3.8 times as long as postpedicel, basal segment very short, simple, with microscopic hairs; palpus appressed to proboscis; palpus thin, finger-like, without distinct apical bristle and some tiny hairs; proboscis large, discoid laterally, with some tiny hairs.

Thorax narrow and strongly arched, 0.9 as long as high, setulae and bristles black; numerous biserial acrostichal and dorsocentral setulae anteriorly, two long strong dorsocentral bristles in posterior half, two notopleural bristles, one supra-alar bristle; pronotum small; mesonotum distinctly raised at middle and posterior area; scutellum with one pair of long apical bristles more than twice as long as a short pair of lateral bristles.

Legs wholly brown, fore coxa with three lateral bristles, mid and hind coxae each with two lateral bristles, outer bristle not visible; hind femora with a series of bristles; all tibiae with two rows of long lateral bristles.

Wings wide, 2.8 times longer than wide, hyaline, entirely covered with microtrichia, with long setulae on posterior margin, veins dark brown. Costal vein with row of short spine-like bristles;

Rs base situated at 0.18 times wing length, short, with two branches; Sc ending at basal third of Costa, no clearly darkened pterostigma; h very bold; R2+3 and R4+5 diverged at basal 1/4, parallel apically; R2+3 straight apically; R4+5 slightly arched apically, unforked, ending near wing tip; M with three branches M1, M2 and M4; short r-m crossvein present at basal 1/3 of wing; cell bm triangular; crossvein dm-m complete.

Abdomen short and cylindrical, ca 1.8 times as long as thorax; tergites I to VII all with spine-like dorsal bristles apically and near their middle; male genitalia: hypopygium large, rotated and lateroflexed with three long apical setae.

4. Discussion

Microphorites pouilloni sp. nov. can be attributed to the Dolichopodidae subfamily Microphorinae because of the following characters: antennal arista-like stylus two-articled, male eyes holoptic, wing with costal vein circumambient, crossvein bm-m complete, wing cell dm present (cell dm absent in the extinct genus *Avenaphora* Grimaldi and Cumming, 1999, excluding affinities of *Microphorites pouilloni* sp. nov. with this last genus) and emitting three branches.

Except for *Avenaphora*, the Microphorinae comprise the following genera, after Brooks et al. (2019) and Tang et al. (2019): extant *Microphor* Macquart, 1827 and *Schistostoma*, and extinct *Curvus* Kaddumi, 2005; *Meghyperiella* Meunier, 1908, *Pristinmicrophor* Tang et al., 2019, and *Microphorites*. *Curvus* is a very poorly known genus with one species *C. khuludi* Kaddumi, 2005 from the early Cretaceous of Jordan. *Microphorites pouilloni* sp. nov. differs from *Curvus* at least in the distinctly shorter cell dm (Kaddumi, 2005). *Meghyperiella* from the Baltic amber, has also never been revised. According to Meunier (1908: 112) it has a stylus shorter than the first flagellomere, unlike *Microphorites pouilloni* sp. nov. *Microphorites pouilloni* sp. nov. has two pairs of scutellar bristles, unlike *Microphor* (Shamsev and Sinclair, 2006). *Microphorites*

pouilloni sp. nov. differs from *Microphor* and *Schistostoma* in the small, not right-angled, anal lobe (Brooks et al., 2019). *Microphorites pouilloni* sp. nov. differs from *Pristinmicrophor* in the postpedicel distinctly shorter, only 1.2 times as long as wide, instead of 3.0 times in the later, a median vein with three branches, and no colored pterostigma instead of having a triangular one. *Microphorites pouilloni* sp. nov. has the typical characters for *Microphorites*, viz., antennae located near middle of anterior margins of eyes; arista two-articled; anal margin of wing not making a strong curvature (putative synapomorphy); three radial veins; crossvein r-m in basal fourth of wing; crossvein dm-m complete; cell dm present; three complete medial branches (Bramuzzo and Nel, 2017).

Microphorites pouilloni sp. nov. differs from *M. moravicus* and *M. erikai* in the absence of a clearly colored pterostigma (Tkoč et al., 2016; Bramuzzo and Nel, 2017). *Microphorites pouilloni* sp. nov. differs from *M. magaliae* in the presence of a group of very long bristles on male terminalia, and of two pairs of scutellar bristles, instead of only one pair in *M. magaliae* and *M. deploegi* (Nel et al., 2004; Perrichot and Engel, 2014). *Microphorites utrillensis* and *M. extinctus* have two strong subequal pairs of scutellar bristles, instead of one long apical pair more than twice as long as the lateral pair as in *Microphorites pouilloni* sp. nov. and in *M. similis* (Hennig, 1971; Grimaldi and Cumming, 1999; Arillo et al., 2008). *Microphorites pouilloni* sp. nov. differs from *M. similis* in basal part of M2 oblique, not perpendicular to M1, in the longer flagellomere I, in the costal vein ending between R4+5 and M1, not at apex of R4+5 (Grimaldi and Cumming, 1999). *Microphorites pouilloni* sp. nov. shares with *M. oculeus* the long flagellomere I, but its costal vein ends between R4+5 and M1. The number and shape of scutellar bristles is unknown in *M. oculeus*.

5. Conclusion

The mid-Cretaceous Burmese amber was deposited on a land that is currently supposed to have been an island in the Tethys Ocean at that time (Metcalfe, 1996; Rasnitsyn and Öhm-Kühnle, 2018). It was possibly separated from the Gondwana paleocontinent during the Jurassic and fused to Asia around 87 Ma. ago (Seton et al., 2012). The presence of *Microphorites*, a genus known in the early Cretaceous of Lebanon that was a part of Gondwana at that time, suggests that this genus is possibly late Jurassic.

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Fig. 1. *Microphorites pouilloni* sp. nov., holotype MNHN.F.A71310. A, habitus, arrows scutellar bristles; B, wing and abdomen, lateral view; C, terminalia, lateral view; D, head, oblique view Scale bar = 1 mm (A); 0.5 mm (B); 0.1 mm (C); 0.2 mm (D).


dm
dm-m
r-m
M2


R1
R2+3
R4+5
r-m
M1
M2
dm-m
M4