

**Amber full of surprises – Achilidae (Hemiptera: Fulgoromorpha) and related taxa from
Cretaceous Burmese amber**

A.M. Brysz & J. Szwedo

Department of Invertebrate Zoology and Parasitology, University of Gdańsk, 59 Wita Stwosza St., PL80-308
Gdańsk, Poland

Achilidae Stål, 1866 is one of the smaller Fulgoromorpha families – counting about 500 species in 161 genera (Bourgoin 2017). To this day it is not very well investigated – its biology is full of supposition and lacks proven information. It is known that adult forms are connected to angiosperm and gymnosperm trees, while larvae are supposed to feed on fungi occurring in decaying wood (Asche 2015). The family fossil record is even more poorly studied. To this day there have been described only 13 fossil genera with 16 species (Brysz & Szwedo 2017), with 8 more species and 1 new genus not yet published (Brysz & Szwedo in prep.).

Achilidae for years have been divided into 3 subfamilies (Achilinae, Achilixiinae and Bebaiotinae), with only Achilinae divided to tribes (11 extant and 2 extinct) and present in fossil record. Curiously most of extant tribes of Achilinae lack fossil record even though Achilidae are quite common among *e.g.* amber inclusions. Another matter is domination of known fossil record by only one tribe, poor in extant taxa – Achilini (Brysz & Szwedo 2017).

Based on molecular data 2 out of 3 Achilidae subfamilies – Achilixiinae and Bebaiotinae – are currently placed back as a separate family Achilixiidae Muir, 1923 (Urban & Cryan 2007), as they were placed originally (Muir 1923). This state of affairs is confirmed by taxa found in Cretaceous Burmese amber, in which we have found representatives of both Achilixiinae and Bebaiotinae subfamilies. This not only concludes with molecular data but also sets a lot of questions concerning the lack of fossil record for these groups in other, younger fossil sources, especially that related families, such as Achilidae, Cixiidae and Derbidae are relatively commonly found *e.g.* among Baltic amber inclusions.

In Burmese amber we have also found representatives of the Achilinae tribe dominating in the extant fauna, *i.e.* Plectoderini. This tribe to this day has also been bereft of any fossil record. The abundance of Plectoderini taxa in Cretaceous amber seems to validate thesis of both Fennah (1950) and Emeljanov (1992) in which this tribe is placed at base of the phylogenetic tree of Achilidae family. However, the most recent tribe relationships tree drawn by Emeljanov (1992) is quarter of century old, and it did not take into consideration fossil material, it is clear that Achilidae systematics require revision with both extant and fossil data.

Apart from those two surprising findings from two already known families in Burmese amber, representatives of another, new to science and extinct family were identified. This fossil seems to belong in phylogenetic tree somewhere between Achilidae-Derbidae lineage and Cixiidae-Delphacidae, as it offers combination of characters connecting these groups, *i.e.* hind legs of Achilidae-Derbidae type, with weak or without lateral spines, and subapical setae on metaleg tarsomeres, Cixiidae/Delphacidae head capsule structure with double carination between frons and vertex, and trigons developed and tegmina structure with functional pterostigmal area developed. Another group superficially resembling Achilidae in venational



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pattern but differing in leg structures, head capsule, pronotum and mesonotum characters from known Achilidae as well as Cixiidae was found.

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