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An apterous scelionid wasp in mid-Cretaceous Burmese amber (Hymenoptera: Scelionidae)

Une guêpe scélionide sans aile dans l'ambre du Crétacé moyen birman (Hymenoptera : Scelionidae)

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ABSTRACT

A remarkably specialized parasitoid wasp of the family Scelionidae (Platygastroidea) is described and figured from mid-Cretaceous (Cenomanian) amber of the Hukawng Valley in northern Myanmar. *Geoscelio mckellari* Engel and Huang, gen. et sp. nov., is unique for its combination of a compact body, 12 antennal flagellomeres, a 1-2-2 tibial spur formula, a distinct malar sulcus, deeply impressed notauli, complete reduction of the wings, and basal crenulae on the metasomal terga and sterna, among many other features, and is placed within a separate tribe, Geoscelionini Engel and Huang, trib. nov. This is the first flightless species of Platygastroidea known from the Mesozoic, and its affinities with other Mesozoic and extant lineages are discussed.

Mots clés :
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RÉSUMÉ

Une guêpe parasitoïde remarquablemeent spécialisée de la famille des Scelionidae (Platygastroidea) est décrite et figurée de l'ambre du Crétacé moyen (Cénomanien) de la vallée de Hukawng dans le Nord du Myanmar. *Geoscelio mckellari* Engel et Huang, gen. et sp. nov., est unique par sa combinaison d'un corps compact, d'antennes à 12 flagellomères, d'une formule 1-2-2 d'éperons tibiaux, d'un sulcus malaire distinct, de notauli profondément impressionnés, d'une réduction complète des ailes, de crénulae basales sur les terga et

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sterna métasomaux, parmi plusieurs autres caractères, et est placée dans une tribu séparée, Geoscelionini Engel et Huang, trib.nov. C'est la première espèce non volante de Platygastroidea connue du Mésozoïque, et ses affinités avec d'autres lignées mésozoïques et actuelles sont discutées.

1. Introduction

It is a well-known fact that the parasitoid wasp family Scelionidae is remarkably diverse in Cretaceous ambers (Engel, unpubl. data; Grimaldi and Engel, 2005; Grimaldi et al., 2002; Ortega-Blanco et al., 2014). Indeed, individuals of scelionids are also among the most abundant of hymenopteran fossils in most fossiliferous resins from the Mesozoic, and one might regard the Cretaceous as the 'Age of Platygastroids'. Yet, despite this staggering breadth in numbers, the diversity is often tightly confined to those more early-diverging groups among the Scelionidae, with many resembling the putatively basal Nixoniini, Sparasionini, and 'lower' Scelioninae (Johnson et al., 2008a; Ortega-Blanco et al., 2014). More specialized scelionids and certainly platygastrids have been hitherto absent, although such forms are well documented among the Cenozoic, particularly the Eocene fauna of Europe (e.g., Brues, 1940; Kononova and Simutnik, 2010, 2013; Masner et al., 2007a; Szabó and Oehlke, 1986). Today the superfamily comprises approximately 5400 species (Aguiar et al., 2013), and encompasses a diversity of parasitoids of insects and spiders, including idiobiont egg parasites as well as koinobionts of various immature insects, although the available biological data is rather taxonomically restricted (Austin et al., 2005). The paleobiology of the numerous fossil species is unknown, but might encompass the putatively groundplan condition of egg endoparasitoidism (Austin et al., 2005).

Here, we report the first rather specialized scelionid wasp from the Mesozoic. The new genus and species is the first truly wingless scelionid found from the Cretaceous. While it is still representative of the lower 'Scelionidae' owing to its primitive retention of traits, such as 12 flagellomeres in the antenna and a 1-2-2 tibial spur formula (Masner, 1976, 1980), the loss of wings and reduction of the basal pteralia is quite specialized, analogous to conditions seen among some modern scelionids in the subfamily Teleasinae or even scattered genera from elsewhere across the family (Austin et al., 2005). The present contribution is meant to document this unique form, and highlight the morphological diversity and disparity present among these otherwise lower members of the superfamily.

2. Material and methods

A unique individual was discovered in a large piece of mid-Cretaceous amber from the Hukawng Valley (Kachin State) in northern Myanmar. Through trimming of the piece, the wasp was isolated into a largely clear, light yellow block of amber, square in shape and with dimensions of approximately 8 mm long, 8 mm wide, and 1.5 mm deep. The piece includes a few isolated plant trichomes and other minor organic debris, but none of these are in a position to obscure the wasp, and there are minimal internal distortions from flow lines within the resin, fractures, or bubbles. There is a sizeable bubble beneath the apex of the metasoma that extends along the left side and expands along the posterior of the mesosoma and around the mesosomal-metasomal articulation (Fig. 1), but really only poses a challenge for views of the apicalmost sterna. Fine internal fractures filled with air also extend around the margins of the metasoma, most prominently along the right side, but these are short and slightly reflective; they do not impose restrictions on structural views of the inclusion. The antennae are extended to the left of the inclusion, and the legs are positioned beneath (but not fully tucked under) and outward from the body. The head is somewhat dipped downward and with the mouthparts positioned toward the propleura, and therefore everything other than the mandibles are rendered impossible to observe.

We have provided the description here with the goal of furthering paleontological work on Hymenoptera, and expanding our knowledge of character diversity among lower Platygastroidea, so that this might inform future phylogenetic inquiry and the discovery of explanatory patterns (sensu Grimaldi and Engel, 2007). Morphological terminology used in the description generally follows that of Masner (1976) and Mikó et al. (2007), while the higher classification adopted is modified from that of Masner (1976), Johnson and Masner (2006), Johnson et al. (2008b), and Masner et al. (2007a). We follow the position of Engel and Krombein (2012) and McKellar and Engel (2012) in the retention of multiple families within Platygastroidea, and advocate for the elevation of at least Nixoniini and Sparasionini, if not other clades, to familial rank alongside Platygastridae s.str. and a more narrowly circumscribed Scelionidae. Measurements were taken with ocular micrometers attached to an Olympus SZX12 stereomicroscope and an Olympus BX41 compound microscope. Microphotographs were prepared with a Canon 7D digital camera attached to an Infinity K-2 long-distance microscope lens.

The amber-bearing deposits of the Hukawng Valley have been studied geologically and mapped by Cruickshank and Ko (2003), while the age has been most extensively covered by Shi et al. (2012). Grimaldi et al. (2002) and Ross et al. (2010) provide further information on the locality, as well as a preliminary overview of the biotic diversity and abundance of various lineages. The taxonomic actions established herein are registered under ZooBank LSID urn:lsid:zoobank.org:pub:2AC79FD9-48AF-41D5-A6C8-FB04960CE84A.

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