

A remarkable evanioid wasp in mid-Cretaceous amber from northern Myanmar (Hymenoptera: Evanioidea)



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ABSTRACT

A remarkable new wasp of the superfamily Evanioidea (Apocrita: Evaniomorpha) is described and figured from a female preserved in mid-Cretaceous amber from the Hukawng Valley of northern Myanmar. *Othniodellitha mantichora* Engel and Huang, gen. et sp. nov., is characterized by its unique combination of primitive and derived features in mesosomal and metasomal construction and wing venation, along with its peculiarly blocky head with a prominent facial horn, clypeal projection, and massive, squared mandibles, among other traits. The genus is placed in the new family, Othniodellithidae Engel and Huang, fam. nov., and is among the lower Evanioidea and distinguished from the Praeaulacidae and other Mesozoic evanioid families.

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1. Introduction

The apocritan superfamily Evanioidea includes three extant families of distinctive wasps (Mason, 1993; Grimaldi and Engel, 2005), with a collective modern diversity of about 2200 species (Huber, 2009; Engel and Krombein, 2012; Aguiar et al., 2013). The smallest of the three families, the Aulacidae, retains the greatest number of generalized traits and also have a more characteristically primitive biology — parasitoids of wood-boring beetles and wood wasps (Jennings and Austin, 2004; Grimaldi and Engel, 2005). The aulacids are most closely related to, and sometimes united with, the Gasteruptionidae, a group of what are best termed predators in the nests of wasps and solitary bees, preying on the host larva outright rather than living on them ectoparasitically, and before then becoming acting as a kind of cleptoparasite and consuming the host's brood cell provisions (e.g., Grimaldi and Engel, 2005). The most distinctive of these families, the ensign wasps (Evanidae), are

predators on the eggs of roaches. The adult females oviposit into the oothecae and the larva consumes the developing roach immatures before pupating (Grimaldi and Engel, 2005). The superfamily is supported by the articulation of the metasoma in a strongly dorsal position, well above and separated from the metacoxal articulations, among other traits largely from the endoskeletal and musculature (e.g., Vilhelmsen et al., 2010) as well as molecular data (e.g., Dowton and Austin, 1994; Dowton et al., 1997; Sharkey et al., 2012).

Evanioidea are known from as far back as the Middle Jurassic, and were then diverse by the latest Jurassic and Early Cretaceous (e.g., Rasnitsyn, 1972, 1990; Oberprieler et al., 2012; Li et al., 2014), although largely represented by the plesiomorphic Praeaulacidae. Praeaulacidae were a perhaps a stem group to all other Evanioidea, and the family is presently defined largely by the lack of more derived evanioid features (e.g., Rasnitsyn, 1972, 1990; Zhang and Rasnitsyn, 2008; Li et al., 2013). Additional extinct families among the lower Evanioidea are also known from the same time periods (e.g., Rasnitsyn, 1975, 1980, 1991; Zhang and Rasnitsyn, 2004, 2007; Li et al., 2013), and reflect a broad morphological disparity than is present today, particularly as by the Cretaceous stem groups to the Evanidae and Aulacidae become apparent. By

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the start of the Cenozoic only the three extant families remained among evanioid diversity. While the more familiar Evaniidae and Aulacidae are documented from Cretaceous amber (e.g., Basibuyuk et al., 2000, 2002; Deans et al., 2004; Jennings et al., 2004, 2013; Engel, 2006; Peñalver et al., 2010), the various extinct families are poorly documented from these same deposits, save for isolated Baissidae and Praeaulacidae (e.g., Engel, 2013; Li et al., 2015).

Here we report a rather monstrous appearing evanioid wasp discovered in the mid-Cretaceous amber of northern Myanmar. The new wasp intermingles features of the lower Evanioidea, while still having a more tubular petiolate and compressed metasoma, analogous to the Evaniidae. The new fossil is described here in order to bring its unique features to the attention of hymenopterists and in the hopes that the as-of-yet unknown males might be discovered.

2. Material and methods

The unique female was found in a moderately sizeable piece of clear yellow Burmese amber, the piece is roughly scalene triangular in cross section, with its largest face of length 24 mm by 18 mm wide, and a maximum depth of 8.5 mm. It was possible to polish flat surfaces alongside the right of the wasp (Fig. 1) and for a slightly oblique frontal view, but surrounding inclusions and internal fractures prevented optimal perspectives from other angles. Nonetheless, virtually all details of the wasp are observable. The legs are positioned beneath the body and the wings, although folded back and slightly alongside the body, have no imperfections hampering an interpretation of the venation. The hind wing can be discerned through the forewing and its venation and margins throughout are clear. There are a number of internal fractures around the petiole and gaster, and across the hind legs and antennae, but these do not obscure or distort important characters. There is some organic debris about in the piece but again, these are in positions whereby they do not present any difficulty to studying the wasp. Descriptive terminology generally follows that presented by Huber and Sharkey (1993), and the description is presented in the context of furthering data for the eventual exploration of

Table 1
Hierarchical classification of evanioid wasps (Evanioidea s.l.).

Superfamily Evanioidea Latreille	Family †Praeaulacidae Rasnitsyn
	Family †Nevaniidae Zhang and Rasnitsyn
	Family †Andreneliidae Rasnitsyn and Martínez-Delclòs
	Family †Othniellithidae, fam. nov.
Neoevanioidea Engel	
	Family †Anomopterellidae Rasnitsyn
Aulaciformes Grimaldi and Engel	
	Family †Baissidae Rasnitsyn
Euaulacides Engel	
	Family Gasteruptiidae Ashmead
	Subfamily †Kotujellitinae Rasnitsyn
	Subfamily Hyptiogastrinae Crosskey
	Subfamily Gasteruptiinae Ashmead
	Family Aulacidae Hedicke
	Subfamily †Hyptiogastrinae Engel
	Subfamily Aulacinae Hedicke
Evanioformes Grimaldi and Engel	
	Family Evaniidae Latreille ^a

^a Inclusive of Cretevaniidae Rasnitsyn as this comprises a grade to modern Evaniidae (Peñalver et al., 2010).

evolutionary patterns (sensu Grimaldi and Engel, 2007). Microphotography was done using a Canon 7D digital camera attached to an Infinity K-2 long-distance microscope lens, and measurements of the specimen were taken with an ocular micrometer on an Olympus SZX12 stereomicroscope. The classification of Evanioidea followed herein is outlined in Table 1.

The geological setting of Burmese amber has been outlined in detail by Cruickshank and Ko (2003), and maps of the locality provided by those authors as well as Grimaldi et al. (2002). The fossiliferous resins of these sediments have been dated to the earliest Cenomanian, near the Albian boundary based on U-Pb radiometric dating (Shi et al., 2012). To date a broad spectrum of biological inclusions have been recovered, and the vast majority of these represent virtually all terrestrial arthropod lineages (e.g., Grimaldi et al., 2002; Ross et al., 2010).

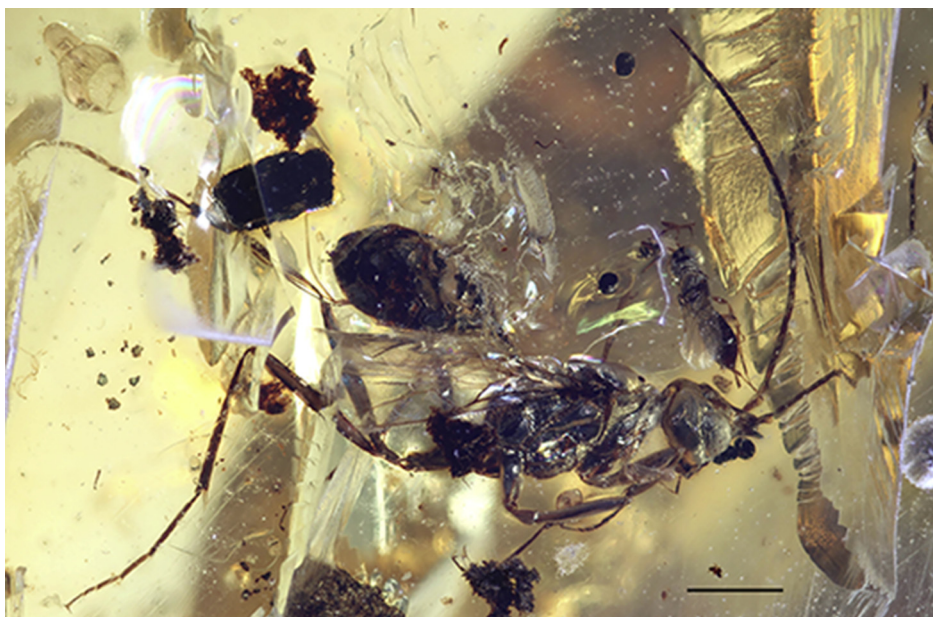


Fig. 1. Microphotograph of holotype (NIGP 163254) female of *Othniellitha mantichora* Engel and Huang, gen. et sp. nov., in mid-Cretaceous amber from Myanmar (Scale bar = 1 mm).

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