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First soldier fly from the mid-Cretaceous Burmese amber (Diptera, Stratiomyidae)

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ABSTRACT

Stratiomyidae, or soldier flies, are a relatively primitive and diverse group of Brachycera, but definitive stratiomyids from the Mesozoic are rare. Here we describe the first soldier fly, *Lysistrata burmensis* sp. nov., in the mid-Cretaceous amber from northern Myanmar. The new species mostly resembles *Lysistrata emerita* Grimaldi and Arillo from the upper Lower Cretaceous Spanish amber and *Montsecia martinezdelclosi* Mostovski from the Lower Cretaceous Montsec Formation of Spain based on the general characters of venation, antennae and cerci. The new form displays an unusual feature (tibial spurs formula 0-1-0) that is confined exclusively to the modern genus *Allognosta* Meigen.

1. Introduction

With nearly 100,000 extant species, Brachycera is an extremely successful group of Diptera that originated in the Triassic. Stratiomyomorpha is one of the most basal groups of Brachycera, including the small family Xylomyidae, and the large family Stratiomyidae (Grimaldi and Engel, 2005). Stratiomyidae include over 3000 described species and 82 genera grouped into 12 subfamilies. Adults of solder flies feed mainly on nectar, while most larvae are necrophagous (Yang, 2014).

Mesozoic stratiomyid fossils are very sparse. The earliest known soldier fly, *Montsecia martinezdelclosi* Mostovski, is from the Lower Cretaceous Montsec Formation of Spain (Mostovski, 1999). In addition, two problematic stratiomyid fossils are described or illustrated from the Lower Cretaceous Yixian Formation of northeastern China (Huang and Lin, 2007) and the Upper Cretaceous of Russian Far East (Blagoderov et al., 2002), but the former considered not belonging to Stratiomyidae (Grimaldi et al., 2011). Three Mesozoic representatives are represented in ambers, including *Lysistrata emerita* Grimaldi and Arillo from the upper Lower Cretaceous amber in the Escucha Formation of Alava, Spain (Grimaldi et al., 2011), *Cretaceogaster pygmaeus* Teskey from the Upper Cretaceous Canadian amber (Teskey, 1971), and an unnamed form from the Upper Cretaceous New Jersey amber (Grimaldi and Cumming, 1999). Besides, multiple stratiomyid larvae are also recorded from the Montsec Formation of Spain (Whalley and Jarzembowski, 1985). Compared the Mesozoic stratiomyid, more fossils have been reported in Cenozoic strata, from the upper Eocene Florissant deposits in Colorado (James, 1937; Melander, 1949; Carpenter, 1992), mid-Miocene Mexican Chiapas amber (James, 1971; Coty and Nel, 2013), Eocene Baltic amber and lower Miocene Dominican amber (Evenhuis, 1994).

Here we describe a new species belonging to Stratiomyidae based on a well-preserved individual from the mid-Cretaceous amber of Myanmar, which represents the first fossil record of Stratiomyidae from the deposits.

2. Material and methods

The female and male individuals were obtained from the amber deposit in the Hukawng Valley of northern Myanmar. Its geological settings and the amber deposits were summarized by Grimaldi et al. (2002) and Ross et al. (2010). Recent U–Pb zircon dating constrained the Burmese amber to a maximum age of 98.79 ± 0.62 Ma (Shi et al., 2012), which indicates a late Albian to early Cenomanian age for the fossilized inclusions. The specimens

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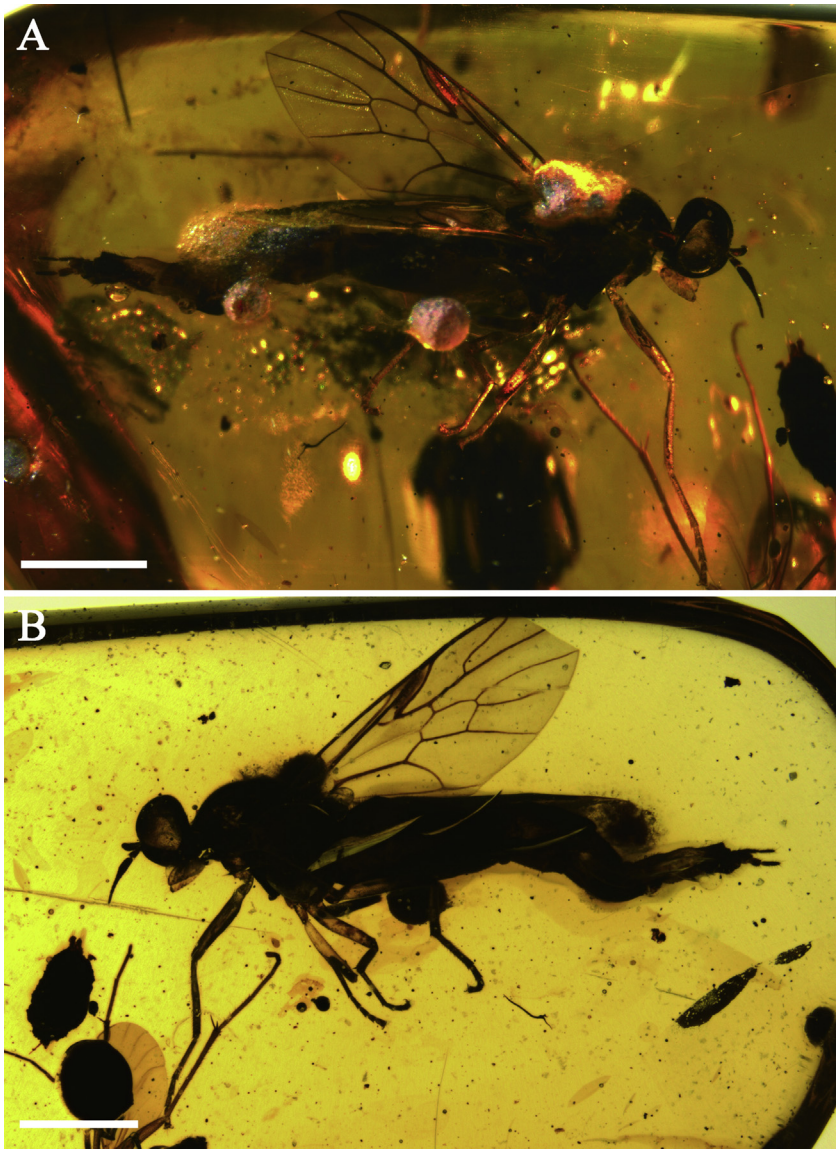

Fig. 1. *Lysistrata burmensis* sp. nov. (NIGP164040) in mid-Cretaceous amber from northern Myanmar. A. left lateral view; B. right lateral view. Scale bars: 1 mm.

(NIGP164040 and NIGP164891) are preserved in pieces of relatively clear, yellow amber. The amber containing the holotype is 1.6 cm long, 0.9 cm wide and 0.5 cm thick. The holotype is nearly complete except the right hind leg and apex of left wing damaged. The amber containing the allotype is relatively poorly-preserved, with bubbles surround the insects. The ambers were prepared using a mini table-saw, polished with emery papers with different grain sizes, and finally buffed with polishing powder. Photographs were taken using a Zeiss Discovery V20 stereo microscope and a Zeiss Axio Imager 2 compound microscope with a digital camera attached, respectively. We follow the nomenclature of (McAlpine, 1981).

All taxonomic acts established in the present work have been registered in ZooBank (see below), together with the electronic publication under: urn:lsid:zoobank.org:pub:EEBDE07E-A60A-49F9-B091-E1ADC09FFD61.

3. Systematic palaeontology

Order: Diptera Linnaeus, 1758
Family: Stratiomyidae Latreille, 1802
Genus: *Lysistrata* Grimaldi et al., 2011
Type species: *Lysistrata emerita* Grimaldi et al., 2011

Lysistrata burmensis sp. nov.
(urn:lsid:zoobank.org:act:43EB638B-8F28-4D91-B546-122BC3B2047E)
(Figs. 1–4)

Etymology. The specific epithet is derived from “Burma”, from where the holotype was discovered.
Material. Holotype, NIGP164040; allotype, NIGP164891; both deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China.
Locality and horizon. Upper Albian to lower Cenomanian, Hukawng Valley, northern Myanmar
Diagnosis. Antenna with 8 tapering flagellomeres, first flagellomere large, 8th flagellomere elongate; pro- and metatibia without spurs, mesotibia armed with one apical spur; scutellum without spines; R_4 relatively short, forming distinct angle with R_5; cell d not very elongate, approximately twice as long as wide; M_3 absent; and abdomen elongate, 7-segmented.
Description. Female, slender (Fig. 1), body length 5.08 mm, pilose.