



A new true dragonfly (Odonata, Anisoptera, Gomphaeschnaoidini) from mid-Cretaceous Burmese amber



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ABSTRACT

A new dragonfly, *Cretagomphaeschnaoides jarzembowskiae* gen. et sp. nov., is described from mid-Cretaceous Burmese amber. *Cretagomphaeschnaoides* gen. nov. is of a small size, has a three-celled discoidal triangle, and more undulating vein MAb than other genera in the extinct tribe Gomphaeschnaoidini of the extant family Gomphaeschnidae. This fossil is the second record of Anisoptera in Cretaceous amber.

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1. Introduction

Fossil odonatanans are quite rare in amber compared to sedimentary deposits with sporadic records in Baltic, Dominican, Burmese, French, Jordanian, South Dakotan and Lebanese amber (Bechly, 1996a, 1998; Fleck et al., 2000; Bechly and Wichard, 2008; Lak et al., 2009; Nel et al., 2010; Azar et al., 2010; Poinar et al., 2010; Bechly et al., 2013). In Asia, many odonatanans have been discovered in Mesozoic-Cenozoic sedimentary rocks, but only a few have been recently described from Burmese amber despite a century of study of insect inclusions (Poinar et al., 2010; Bechly et al., 2013; Huang et al., 2015; Schädel and Bechly, 2016; Zheng et al., 2016a,b,c,d).

The dragonflies (sensu stricto Anisoptera) are extremely rare in amber. Damselflies are smaller and more easily trapped and enclosed in resin than the larger dragonflies; damselflies also tend to fly in dense vegetation, while dragonflies live in mostly open areas, making the former more likely to occur in amber (Larsson,

1978; Bechly, 1998). Until now, only five true dragonflies have been recorded in fossil resin: one is in an undescribed Miocene 'amber' from the Dominican Republic (probably a recent copal, Bechly, 1996a); another two specimens are preserved in Eocene Baltic amber but one was lost at the beginning of the last century (Bechly, 1996a, 1998; Fleck et al., 2000); a fourth is a fragmentary wing described from the lowermost Eocene amber of France (Fleck et al., 2000); and the last is fragmentary hindwings from mid-Cretaceous Burmese amber (Schädel and Bechly, 2016). This paper describes the second anisopteran from Cretaceous amber which is attributed to the extant family Gomphaeschnidae Tillyard and Fraser, 1940 and extinct tribe Gomphaeschnaoidini Bechly et al., 2001.

2. Material and methods

The specimen described herein was collected in the Hukawng Valley of Kachin Province, Myanmar (locality in Kania et al., 2015: fig. 1). The age of the Burmese amber is 98.79 ± 0.62 Ma (earliest Cenomanian) based on U–Pb zircon dating of the volcanoclastic matrix (Shi et al., 2012).

The amber containing the dragonfly is yellow and transparent. Photographs were taken using a Zeiss Stereo Discovery V16 microscope system and Zen software. In most instances, incident

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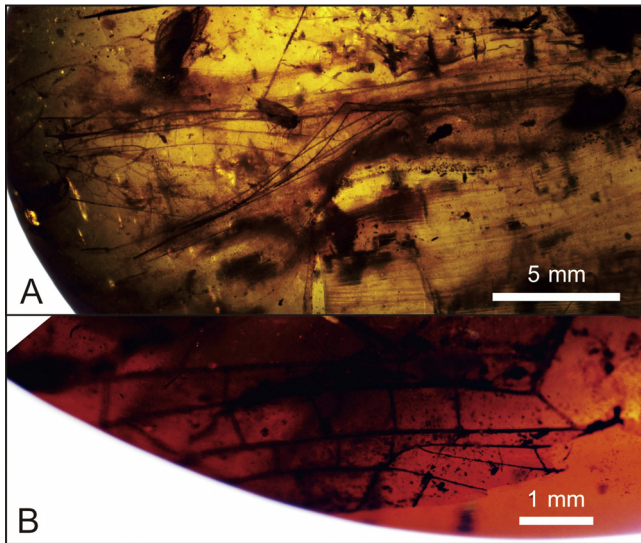


Fig. 1. *Cretagomphaeschnaoides jarzembowskae*, holotype, NIGP164770, photograph of specimen.

and transmitted light were used simultaneously. All images are digitally stacked photomicrographic composites of approximately 40 individual focal planes using the free software Combine ZP for a better illustration of the 3D structures. The line drawings were prepared from photographs using image-editing software (Corel-Draw X7 and Adobe Photoshop CS6). The specimen is housed in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS).

The nomenclature of the dragonfly wing venation used in this paper is based on the interpretations of Riek (1976) and Riek and Kukalová-Peck (1984), as modified by Nel et al. (1993) and Bechly (1996b). The higher classification of fossil and extant Odonatoptera, as well as family and generic characters followed in the present work, is based on the phylogenetic system proposed by Bechly et al. (2001). Wing abbreviations are as follows: Arc, arculus; Ax2, second primary antenodal crossvein; C, costa; CuA, anterior cubitus; IR2, intercalary radial vein; MA, anterior median;

MP, posterior median; Msp1, median supplement; N, nodus; PsA, pseudo-anal vein; Pt, pterostigma; RA, anterior radius; RP, posterior radius; ScP, posterior subcosta; Sn, subnodal crossvein; T, discoidal triangle.

3. Systematic palaeontology

Order Odonata Fabricius, 1793

Suborder Anisoptera Selys-Longchamps, 1854

Clade Aeshnoptera Bechly, 1996b

Family Gomphaeschnidae Tillyard and Fraser, 1940

Subfamily Gomphaeschnaoidinae Bechly et al., 2001

Tribe Gomphaeschnaoidini Bechly et al., 2001

Typical genus *Gomphaeschnaoides* Carle and Wighton, 1990

New genus *Cretagomphaeschnaoides* gen. nov.

Type species: *Cretagomphaeschnaoides jarzembowskae* sp. nov.

Diagnosis.

Wing quite small, estimated complete length 27–29 mm; discoidal triangle three-celled; MAb quite undulate; at least five antesubnodal crossveins present between Arc and subnodus; three aligned antenodal crossveins present basal of nodus; Pt short, covering one or two cells.

Etymology.

Named after the latin stem of the Cretaceous Period (Creta-) and the typical genus *Gomphaeschnaoides*.

Cretagomphaeschnaoides jarzembowskae sp. nov. (Figs. 1–3)

Diagnosis.

As for genus diagnosis.

Holotype.

NIGP164770, a fragmentary forewing in amber jewel. It is deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China.

Locality and Horizon.

Hukawng Valley, Kachin Province, Myanmar; lowermost Cenomanian, lowermost Upper Cretaceous.

Etymology.

The specific name is in memoriam of the late Mrs Halina Jarzembowska, mother of a coauthor.

Description.

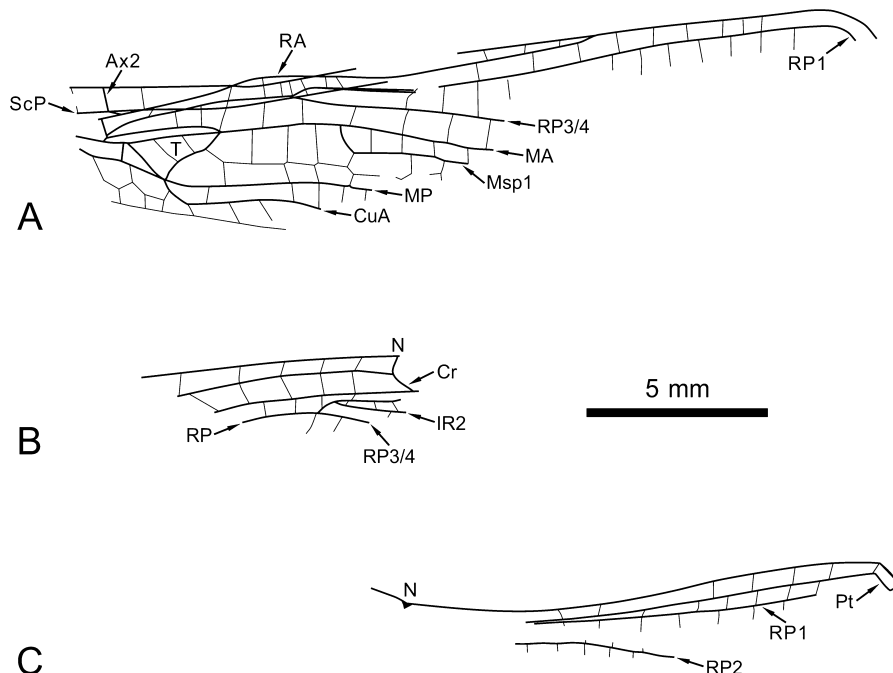


Fig. 2. *Cretagomphaeschnaoides jarzembowskae*, holotype, NIGP164770, line drawing showing venation of forewing.

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