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A new genus and species of hawker dragonfly of uncertain affinities from the Middle Jurassic of China (Odonata: Aeshnoptera)

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Abstract

The new aeshnopteran genus and species *Sinocymatophlebiella hasticercus* is described from the Middle Jurassic Jiulongshan Formation of Inner Mongolia. It shows important similarities with the Jurassic genus *Cymatophlebiella* from Karatau, suggesting they could belong to the same family, but the latter genus is too poorly known to accurately establish its affinities. The present discovery supports the evolutionary scenario of a Jurassic rapid and massive diversification of the Aeshnoptera, followed by important extinctions during the Late Mesozoic.

Key words: Odonata, Aeshnoptera, Mesozoic, Jiulongshan Formation, Daohugou, systematics, palaeodiversity

Introduction

The clade Aeshnoptera ('aeshnid' dragonflies sensu lato) was very diverse during the Late Jurassic and the Early Cretaceous, with numerous families now extinct (Bechly *et al.*, 2001). China can now be considered as a 'hot spot' of diversity for this group during the Mesozoic with several new families and genera recently described (see references in Nel and Huang, 2009, 2010). The taxa of the basal lineages (Cymatophlebiidae, Progobiaeshnidae, Liupanshaniidae, etc.) are especially well represented among them. Nevertheless, we were surprised to discover a new genus and species in the Jiulongshan outcrop, strikingly similar to the genus *Cymatophlebiella* Pritykina, 1968 from the Middle Jurassic of Karatau (Kazakhstan), suggesting close affinities between them. The high diversity of these basal Aeshnoptera during the Jurassic fits well with a scenario of rapid and massive diversification for this group followed by massive extinctions in the early Late Cretaceous (illustrated by the case of the Aeschnidiidae, see Fleck and Nel, 2003), maybe in relation with the important changes in the aquatic biotas that occurred at that time.

Material and method

The study is based on one specimen (CNU-ODO-NN2010004, Part & Counterpart) housed in the Key Laboratory of Insect Evolution & Environmental Changes, Capital Normal University, Beijing, China. The specimen was examined with a Leica MZ12.5 dissecting microscope and illustrated with the aid of a drawing tube attached to the microscope. Line drawings were made using Adobe Photoshop CS graphic software.

Wing venation nomenclature used in this paper follows Riek (1976) and Riek & Kukalova-Peck (1984), as amended by Nel *et al.* (1993) and Bechly (1996). We use the following standard abbreviations: AA anal vein, AP anal posterior, Ax0 Ax1 Ax2 primary antenodal cross-veins, CuAa distal branch of cubitus anterior, CuAb proximal branch of cubitus anterior, IR1, IR2 intercalary radial veins, MAa distal branch of median anterior, MAb pos-

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