



A water-skiing chresmodid from the Middle Jurassic in Daohugou, Inner Mongolia, China (Polyneoptera: Orthoptera)

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Abstract

A new genus with a new species (*Jurachresmoda gaskelli* gen. et sp. nov.) of Chresmodidae (Insecta: Polyneoptera: Orthoptera) is described and illustrated. They were collected from the Middle Jurassic in Daohugou, Jiulongshan Formation, Inner Mongolia (Nei Mongol Autonomous Region), China. *J. gaskelli* have fringing hairs on tarsi and a part of tibiae of mid legs. These hairs and leg structures were probably associated with its water-skiing locomotion on freshwater. A high number of tarsomeres, e. g. ultra-articulated tarsi as reported in other species of Chresmodidae, are also found for this new species. But, these true tarsi are mixed with some wrinkles resulted from dehydration and compression during fossilization process. Nymphs of the new species are also described. This is the first time that long and segmented cerci of the nymph are described in Chresmodidae.

Key words: fossil insect, Chresmodidae, water-skiing, Middle Jurassic, Jiulongshan Formation, China

Introduction

Chresmodidae, a rare extinct family, is quite enigmatic. It is supposed to be an aquatic insect, probably carnivorous (Baudoin, 1980; Nel *et al.*, 2004; Nel *et al.*, 2005). Having been found in Eurasian region and Brazil, chresmodids are believed to have lived during Upper Jurassic to Upper Cretaceous (David and Michael, 2005; Nel *et al.*, 2005). Some of them were found possessing an extraordinarily high number of tarsomeres, named as ultra-articulated tarsi by Nel *et al.* (2004, 2005) which is unique among Hexapoda. It is probably associated with their ability of skiing on water surface. Nel *et al.* (2004) hypothesized that its occurrence could be caused by mutation of some genes that control leg development and segmentation, probably transformation of genes of legs into antenna.

Recently, we collected several well-preserved chresmodid fossils from Jiulongshan Formation, Middle Jurassic, Daohugou Village, Shantou Township, Ningcheng County, Inner Mongolia (Nei Mongol Autonomous Region), China. Due to similar characteristics among these new specimens and *Chresmoda obscura*, *Sinochresmoda magnicornia* and *Saurophthiroides mongolicus*, we assigned them to Chresmodidae. According to their different and unique morphological characters, we erected a new genus with a new species, *Jurachresmoda gaskelli* gen. et sp. nov., and described the female and nymphs of this species. These specimens included well-preserved head, body, and legs. New knowledge of these specimens would greatly enhance our understanding of this enigmatic fossil family.

The age of the Daohugou fossil-bearing beds is still being debated (Wang *et al.* 2007; Gao & Ren 2006; Ren & Engel, 2007; Huang *et al.* 2007; Liu *et al.* 2007; Yao *et al.* 2007). It is impossible to draw a conclusion according to our specimens. We considered the age to be the Middle Jurassic (Jiulongshan Formation) here.