



A new genus of Protosmylinae from the Middle Jurassic of China (Neuroptera: Osmylidae)

YONGJIE WANG¹, ZHIQI LIU^{1,3}, DONG REN^{2,3} & CHUNGKUN SHIH²

¹ Department of Entomology, China Agricultural University, 2 Yuanmingyuanxilu, Beijing 100193, China.

² College of Life Sciences, Capital Normal University, 105 Xisanhuanbeilu, Beijing 100037, China.

³ Corresponding author: rendong@mail.cnu.edu.cn; zhiqiliu@cau.edu.cn

Abstract

Three new fossil lacewings, *Juraheterosmylus antiquates* **gen. et sp. nov.**, *Juraheterosmylus astictus* **sp. nov.** and *Juraheterosmylus minor* **sp. nov.** are described from the Middle Jurassic of Daohugou, Inner Mongolia, China. The new genus, assigned to Protosmylinae, is the oldest record of the subfamily. A diagnosis of Protosmylinae is provided and biogeographical distribution of Protosmylinae is discussed.

Key words: Osmylidae, Protosmylinae, Middle Jurassic, Jiulongshan Formation, biogeography

Introduction

The osmylid subfamily Protosmylinae (Insecta: Neuroptera) was founded by Krüger (1913) based on the type species *Protosmylus pictus* (Hagen, 1852). However the subfamily was not well defined because of sharing many characters with Spilosmylinae. Extant Protosmylinae are rare in collections, consisting of three extant genera (*Heterosmylus* Krüger, *Gryposmylus* Krüger and *Paryphosmylus* Krüger). The subfamily exhibits distinct vicariant distributions with extant genera mainly concentrating on the Oriental Region (India and southern China), with one genus (*Paryphosmylus*) in South America (Ecuador). The huge geographical gap indicates that present distribution patterns are the results of the dispersal of ancestors. Fossil protosmylines are also scarcely known. Two Tertiary genera are recorded so far, *Protosmylus* in Baltic Amber and *Osmylidia* in Florissant Shales. Recently, Jepson *et al.* (2009) discovered a new species *Protosmylina bifasciata* from the Lower Cretaceous of Southern England. Another species, *Mesosmylus atalantus* Panvilov, 1980, from the Late Jurassic also should be assigned to the subfamily. Based on these deposits, the historical distribution of the subfamily was much wider than it is today (Carpenter 1943).

Herein we reported a new genus with three new species: *Juraheterosmylus antiquates* **gen. et sp. nov.**, *Juraheterosmylus astictus* **sp. nov.** and *Juraheterosmylus minor* **sp. nov.** from Jiulongshan Formation in Daohugou, Inner Mongolia, China, which are the oldest known members of Protosmylinae. *Juraheterosmylus* shows evident characters that belong to the subfamily: membrane hyaline, with few spots; costal cross-veins simple; cross-veins in radial sector few, arranged regularly, forming 3–4 rows of gradate series; Rs branches slightly sinuous. Discovery of *Juraheterosmylus* was greatly helpful in understanding the dispersal of Protosmylinae. It connects these discrete localities, suggesting northeast of China was likely the dispersal centre.

Materials and methods

The specimens were examined using a Leica MZ12.5 dissecting microscope and illustrated with the aid of a drawing tube attachment (line drawings of *J. antiquates* **gen. et sp. nov.** and *J. astictus* **sp. nov.**). Line