



The first Middle Jurassic *Protobrachyceron* Handlirsch fly (Diptera: Brachycera: Protobrachyceridae) from Inner Mongolia (China)

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Protobrachyceridae, which is an archaic representative of the Brachycera with only one known genus and two species, *Protobrachyceron liasinum* Handlirsch, 1920 and *P. zessini* Krzeminski & Ansoerge, 2000, has been described from the lower Toarcian of Germany. The family can be distinguished by the following characters: vein Sc ending at midwing, both vein R₄ and cell d distinctly shorter than vein M₁ in length, vein CuP well visible, mouth of cell r₁ narrow, five posterior cells widely open, cells m₃ and cup narrowly open.

Originally, the genus *Protobrachyceron* Handlirsch was treated as a member of Xylophagidae (Handlirsch 1920). Then, it was upgraded as a separate family Protobrachyceridae (Rohdendorf 1962, Nagatomi and Yang 1998). In 2000, the second species of this family, *P. zessini*, from the same locality was reported (Krzeminski and Ansoerge 2000). Krzeminski and Ansoerge (2000) also re-examined the holotype of *P. liasinum* Handlirsch, 1920 and revised the original description. It was unfortunate that only wings had been preserved of both of these two known species. Recently, we found a new species *P. sinensis* sp. nov. with good preservation of both wings and most of the body from Daohugou village, Inner Mongolia of China, which is the first record from China. Unfortunately, the missing antennae in the new Chinese fossil can not solve the question whether Protobrachyceridae is a valid family or whether *Protobrachyceron* belongs to any other Lower Brachyceran families. The age of the new species is Middle Jurassic (Jiulongshan Formation), which is about 10 to 20 million years younger than the two other known species.

During recent years, the Daohugou biota, which extends along the boundary between Inner Mongolia, Hebei and Liaoning Provinces, plays a vital role in the study of Middle Jurassic biota of China. So far, many insect fossils were found in this Late Mesozoic stratum, such as Coleoptera (Tan, Ren and Shih 2006), Ephemeroptera (Huang *et al.* 2007), Grylloblattida (Huang, Nel and Petrulevičius 2008), Plecoptera (Liu *et al.* 2006), Homoptera (Wang, Ren and Shih 2007), Hymenoptera (Rasnitsyn and Zhang 2004), Neuroptera (Ren 2002), etc. Regarding Brachyceran flies, we have found archisargid, nemestrinid and rhagionid flies (Zhang *et al.* 2006, 2007, 2008) in this locality.

Materials and methods

This study is based on a specimen housed in the fossil insect collection of the Key Lab of Insect Evolution and Environmental Changes, Capital Normal University, Beijing, China. Line drawings were prepared with the aid of a camera lucida attached to a LEICA MZ12.5 stereomicroscope. Basic terminology follows McAlpine (1981).

Key to species of *Protobrachyceron*

1. Vein Rs slightly longer than distance between beginning of vein R₂₊₃ and crossvein r-m; vein CuA₁ arising from cell d..... *sinensis* sp. nov.
Vein Rs more than twice as long as distance between beginning of vein R₂₊₃ and crossvein r-m; vein CuA₁ arising from the infall of cell d and cell bm (basal medial)..... 2
2. Mouth of cell sc much longer than that of cell r₁; mouth of cell cua₁ about 12 times as long as that of cell m₃.....
..... *liasinum* Handlirsch
Mouth of cell sc slightly shorter than that of cell r₁; mouth of cell cua₁ about 3 times as long as that of cell m₃.....
..... *zessini* Krzeminski & Ansoerge