

## A new genus and species of Middle Jurassic rhagionids from China (Diptera, Rhagionidae)

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**Abstract:** Rhagionidae is one of the most primary families of the lower Brachycera. Many rhagionid genera and species have been found in the Mesozoic. Their fossils came from Asia, Europe, Australia and North America. In the present paper, descriptions of a new genus and species of Rhagionidae from the Middle Jurassic of China, *Achrysoptilus neimenguensis* gen. et sp. n. and a key to genera of Chinese fossil rhagionids are given.

**Key words:** Diptera; Rhagionidae; new genus; new species; China; Middle Jurassic

### Introduction

Rhagionidae is a cosmopolitan family of usually small to medium-sized flies. It occurs in all continents of the world, excluding Antarctica. To date, there are 30 named fossil genera that have been found all over the world (Rohdendorf 1938; Kovalev 1981, 1982; Kalugina & Kovalev 1985; Jell & Duncan 1986; Zhang et al. 1993, 2006; Evenhuis 1994; Ren et al. 1995; Ansonge 1996; Kovalev & Mostovski 1997; Nagatomi & Yang 1998; Ren 1998; Grimaldi & Cumming 1999; Mostovski 2000; Mostovski & Jarzembowski 2000; Mostovski et al. 2000, 2003; Krzemiński & Krzemińska 2003; Krzemiński & Ansonge 2005). Most of them are known predominantly from Laurasian deposits. The oldest named fossil rhagionid is *Gallia alsatica* Krzemiński et Krzemińska, 2003 from the early Middle Triassic deposits of the Vosges Mts, Alsace, France (Krzemiński & Krzemińska 2003). In addition to the identified genera, unidentified materials of this family have been found from the Lower Jurassic of Europe (Ansonge 2003), Middle-Upper Jurassic of Kazakhstan (Mostovski & Jarzembowski 2000), Lower Cretaceous of Mongolia (Kovalev 1986), Lower Cretaceous French amber (Perrichot 2004), Lower Cretaceous Lebanese amber and Upper Cretaceous New Jersey amber (Grimaldi & Cumming 1999). However, the genera *Dipterites* Heer, 1849, *Ija* Kovalev, 1981, *Mesorhagiphryne* Hong et Wang, 1990, *Mesostratiomyia* Hong et Wang, 1990, *Mongolomyia* Kovalev, 1986 and *Stratiomyopsis* Hong et Wang, 1990 are questionable to be included in the family Rhagionidae, their famil-

ial placement is not clear. As defined here, the family is represented in the Mesozoic of China by six monobasic fossil genera, viz. *Basilorhagio* Ren, 1995 (Upper Jurassic), *Oiobrachyceron* Ren, 1998 (Upper Jurassic), *Orsobrachyceron* Ren, 1998 (Upper Jurassic), *Pauromyia* Ren, 1998 (Upper Jurassic), *Scelorhagio* Zhang, Zhang et Li, 1993 (Upper Jurassic) and *Sinorhagio* Zhang, Yang et Ren, 2006 (Middle Jurassic).

In the present paper, a new genus and species of Rhagionidae is described from the Middle Jurassic of China. The holotype was found in the deposits of the Jiulongshan Formation near the village of Daohugou in the Ningcheng County, Chifeng City, Inner Mongolia. In the recent years, numerous superbly preserved animals and plants, such as insects, conchostracans, salamanders, pterosaurs, gymnosperms, etc., have been found in these deposits (Zhang et al. 2006; Shen et al. 2003; Gao & Shubin 2003; Ji & Yuan 2002; Mi et al. 1996). This is the second record of Rhagionidae in these sediments. The first one is *Sinorhagio daohugouensis* Zhang, Yang et Ren, 2006.

### Material and methods

The study is based on one specimen housed in the fossil insect collection of the Key Lab of Insect Evolution & Environmental Changes, Capital Normal University, Beijing, China.

Line drawing was prepared with the aid of a camera lucida attached to a LEICA MZ12.5 stereomicroscope. Basic terminology follows McAlpine (1981) and James & Turner (1981).

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## Taxonomy

### Family Rhagionidae Latreille, 1802

#### *Achrysopilus* gen. n.

**Type species.** *Achrysopilus neimenguensis* sp. n.

**Diagnosis.** Body with dense setulae. Wing: membrane infuscated. Vein Sc ending at wing midlength. Pterostigma distinct. Vein R<sub>5</sub> longer than distance between base of vein R<sub>4</sub> and crossvein r-m. Crossvein r-m at basal 1/4 of cell d. Veins M<sub>1</sub> and M<sub>2</sub> bifurcating distad of crossvein m-m. Vein CuA<sub>1</sub> arising from base of cell d. Veins CuA<sub>2</sub> and A<sub>1</sub> converged apically with a short petiole. Anal lobe distinct. Five posterior cells open wide, mouth of cell m<sub>2</sub> about two times as wide as that of cell m<sub>3</sub>. Abdomen robust, with 9 segments visible; segment II widest.

**Etymology.** The generic name is derived from the Greek “A” (non) and the genus “*Chrysopilus*” (rhagionid fly).

**Distribution.** The genus is known only from China and is currently represented by one species.

**Remarks.** Judging from the wing venation, *Achrysopilus* could be placed next to the extinct genus *Paleochrysopilus* Grimaldi et Cumming, 1999 from the Lower Cretaceous Lebanese amber in having vein Sc ending at the wing midlength, vein R<sub>1</sub> short, veins M<sub>1</sub> and M<sub>2</sub> bifurcating distad of crossvein m-m, vein CuA<sub>1</sub> present, veins CuA<sub>2</sub> and A<sub>1</sub> convergent distally with a petiole. However, *Achrysopilus* is easily separated from *Paleochrysopilus* by having the pterostigma, vein R<sub>5</sub> slightly shorter than stem of vein R<sub>4</sub>, crossvein r-m at base of cell d, vein CuA<sub>1</sub> arising from cell d, mouth of cell r<sub>2+3</sub> subequal to that of cell r<sub>4</sub>, cell d larger than that of *Paleochrysopilus*, cell bm much wider than cell br; in *Paleochrysopilus*, pterostigma absent, vein R<sub>5</sub> longer than stem of vein R<sub>4</sub>, crossvein r-m at middle of cell d, vein CuA<sub>1</sub> arising from cell bm, mouth of cell r<sub>2+3</sub> much longer than that of cell r<sub>4</sub>, cell d smaller than that of *Achrysopilus*, width of cell bm subequal to that of cell br (Grimaldi & Cumming 1999).

Meanwhile, *Achrysopilus* is somewhat similar to *Ptiolinites* Kovalev, 1986, but can be easily distinguished from the latter by the shorter crossvein r-m, longer vein R<sub>2+3</sub>, larger cell d, and narrower mouth of cell r<sub>2+3</sub>.

#### Key to genera of Chinese fossil rhagionid flies

- 1 Pterostigma absent; vein R<sub>2+3</sub> bent upward apically . . . . . *Scelorhagio* (Laiyang Formation; Upper Jurassic)
- Pterostigma present; vein R<sub>2+3</sub> straight . . . . . 2
- 2 Length of base of cell m<sub>1</sub> subequal to that of cell m<sub>2</sub> . . . . . 3
- Length of base of cell m<sub>1</sub> much shorter than that of

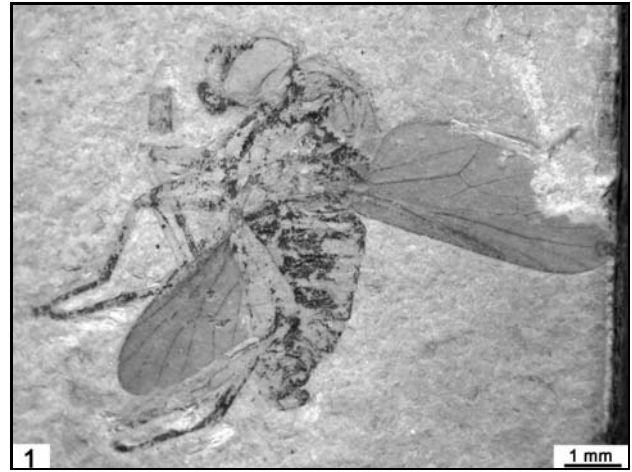


Fig. 1. *Achrysopilus neimenguensis* sp. n. No. CNU-DB-NN2006-001. Body, photograph.

- cell m<sub>2</sub> . . . . . 4
- 3 Vein R<sub>4+5</sub> forking after level of fork of vein M<sub>1+2</sub>; vein M<sub>3</sub> coalesced with vein M<sub>4</sub> distally . . . . . *Orsobrachyceron* (Yixian Formation; Upper Jurassic)
- Vein R<sub>4+5</sub> forking at same level of fork of vein M<sub>1+2</sub>; veins M<sub>3</sub> and M<sub>4</sub> divergent distally . . . . . *Oiobrachyceron* (Yixian Formation; Upper Jurassic)
- 4 Veins M<sub>1</sub> and M<sub>2</sub> bifurcating before crossvein m-m . . . . . 5
- Veins M<sub>1</sub> and M<sub>2</sub> bifurcating after crossvein m-m . . . . . 6
- 5 Base of cell r<sub>4</sub> sharp; vein R<sub>5</sub> shorter than stem of vein R<sub>4+5</sub> . . . . . *Basilorhagio* (Yixian Formation; Upper Jurassic)
- Base of cell r<sub>4</sub> obtuse; vein R<sub>5</sub> much longer than stem of vein R<sub>4+5</sub> . . . . . *Sinorhagio* (Jiulongshan Formation; Middle Jurassic)
- 6 Vein CuA<sub>1</sub> present; cell cup closed . . . . . *Achrysopilus* gen. n. (Jiulongshan Formation; Middle Jurassic)
- Vein CuA<sub>1</sub> absent; cell cup open . . . . . *Pauromyia* (Yixian Formation; Upper Jurassic)

#### *Achrysopilus neimenguensis* sp. n. (Figs 1–3)

**Description.** Male body length 7.0 mm, wing length 5.5 mm, wing width 2.0 mm.

Head with dense long setulae. Eyes large and round in lateral view. Visible part of proboscis fleshy, short and wide.

Thorax black with long setulae. Mesonotum slight convex. Five legs partially preserved; femora slender, not swollen; first tarsomere distinctly longer than following tarsomeres. Apical spurs not seen on tibiae. Wing: membrane infuscated. Vein Sc ending at mid-wing. Pterostigma distinct, crossing apical half of vein R<sub>1</sub>; all branches of vein R nearly straight, basal half of vein R<sub>1</sub> distinctly thickened; vein Rs short; vein R<sub>5</sub> longer than distance between base of vein R<sub>4</sub> and crossvein r-m, slightly shorter than trunk of veins R<sub>4</sub> + R<sub>5</sub>. Crossvein r-m located at basal 1/4 of cell d. Veins

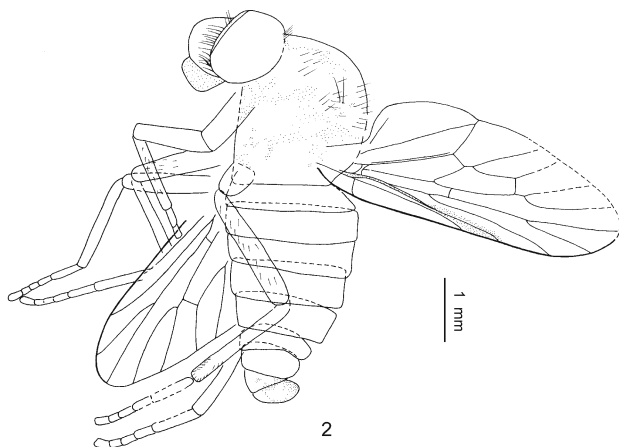


Fig. 2. *Achrysopilus neimenguensis* sp. n. No. CNU-DB-NN2006-001. Body, camera lucida drawing.



Fig. 3. *Achrysopilus neimenguensis* sp. n. No. CNU-DB-NN2006-002. Body, photograph.

$M_1$  and  $M_2$  bifurcating distad of crossvein m-m, fork of veins  $M_1 + M_2$  slightly proximal of that of veins  $R_4 + R_5$ ; vein  $CuA_1$  arising from base of cell d. Veins  $CuA_2$  and  $A_1$  converged apically with a short petiole; vein  $CuP$  present, vein  $A_2$  short and thin. Anal lobe large. Mouth of cell  $r_4$  slight narrower than that of cell  $r_{2+3}$ . Five posterior cells open wide, mouth of cell  $m_2$  about two times as wide as that of cell  $m_3$ . Cell br (= basal radial) much narrower than cell bm (= basal medial). Cell d pentagonal. Cell cup close.

Abdomen robust, covered with setulae, rounded apically. Nine segments visible, segment II widest, then narrowing toward tip, but boundaries of segments I and II, VIII and IV obscure in the specimen.

**Holotype. Male:** body with wings in lateral view, part and counterpart No. CNU-DB-NN2006001, 2006002, deposited in Key Lab of Insect Evolution & Environmental Change, Capital Normal University, Beijing, China.

**Locality and horizon.** Daohugou village, Shantou township, Ningcheng county, Inner Mongolia, China;

Jiulongshan Formation, Middle Jurassic (Aalenian-Bajocian).

**Etymology.** The specific name refers to the Autonomous Region of Inner Mongolia (Nei Menggu).

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