

**NEW 'HEMEROSCOPID' LARVAE FROM THE LOWER
CRETACEOUS OF CHINA: SYSTEMATIC AND
PHYLOGENETIC IMPLICATIONS
(ANISOPTERA)**

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A large number of fossil dragonfly larvae have been collected in Lushangfen Formation (Lower Cretaceous), SW of Beijing, China. All the well-preserved specimens are closely similar to the larvae attributed by L.N. PRITYKINA (1977, *Trans. Soviet-Mongol paleontol. Exped.* 4: 81-96) to *Hemeroscopus baissicus* Pritykina, 1977, particularly for the labial mask structures.

INTRODUCTION

The fossil family Hemeroscopidae was erected by PRITYKINA (1977) on the basis of both adult and larval remains. The correspondence between the larvae and adults gave rise to many discussions (BECHLY et al., 1998; NEL et al. 1998; ZHANG, 1999a, 1999b, 2000). Different authors pointed out that the labial mask described by PRITYKINA (1977) has no relation with the larval body and the larva is not conspecific with the adult (BECHLY et al., 1998; NEL et al., 1998). The main arguments were:

- There is no direct evidence in support of the attribution of the adult and larvae to the same species;
- There are other odonate taxa in the Transbaikalian and Mongolian outcrops that may have rendered these fossils (PRITYKINA, 1977).
- In general habitus, the larvae are very similar to those of the Aeschnidiidae.

The larva of *Hemeroscopus baissicus* was transferred, as an unnamed species, to the Sonidae by BECHLY et al. (1998).

Since 1995, more than one hundred larvae have been collected from Lushangfen

Formation of the Lower Cretaceous near the village of Lushangfen, SW of Beijing, China. Some of them are well-preserved, with even the fine hairs visible. About two dozen masks of fossil larvae have been discovered, most of them in connection with the body, only a few isolated. This material may help to solve some questions relative to the systematic position of the specimens attributed to *Hemeroscopus baissicus*.

SYSTEMATIC PALAEOLOGY

Order: Odonata

Suborder: Anisoptera

Taxon: Cavilabiata

Family: Hemeroscopidae Pritykina, 1977 (?)

'HEMEROSCOPID LARVA'

Figures 1-3

Material. — More than one hundred specimens have been collected. Here we only show two of them. They are deposited in the Nanjing Institute of Geology and Palaeontology, Academia Sinica.

AGE AND OUTCROP. — Lushangfen Formation, Lower Cretaceous, Lushangfen village, SW of Beijing, China.

DESCRIPTION. — The present description is based on all the available material from the Lushangfen Formation.

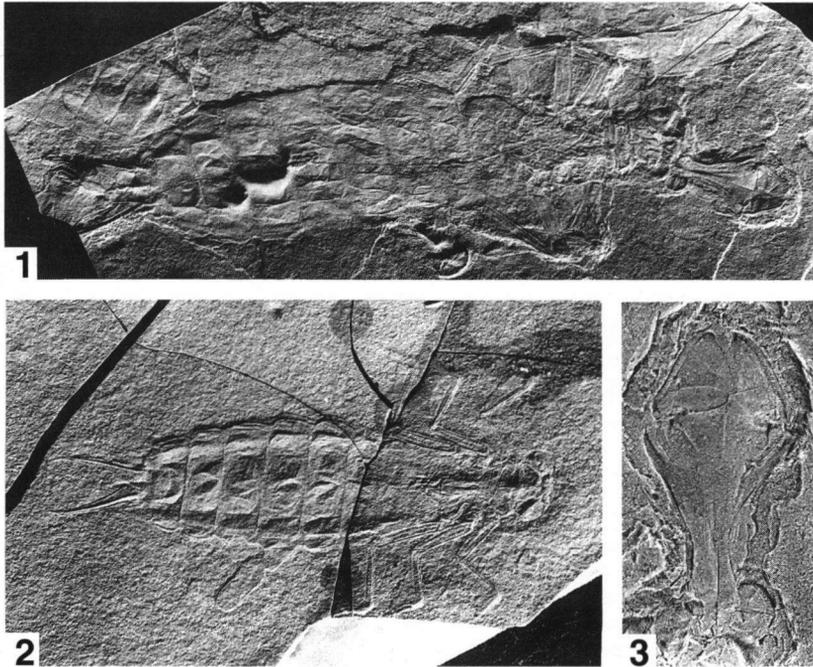
Abdomen very elongated; eyes rather large, produced anteriorlaterally; mask spoon-shaped, prementum widened and protruded apically, but hollow in the middle anterior margin, with long and dense premental setae; labial palp rather triangular, with some smooth teeth along anterior margin, and a row of setae in each lateral margins; wing sheaths parallel; legs rather long and thin, armed with long comb-like hairs; claws forked and sharp; abdominal segments armed with tiny setae near their posterior margins and with fur laterally; 9th abdominal segment armed with small lateral spines; paraproct very developed, epiproct spine-like, cerci very small.

Measurements (in mm). — Body length 9.2-66.5, body width 3.0-14.8.

DISCUSSION

These well-preserved specimens are very similar to the larvae attributed by PRITYKINA (1977) to *Hemeroscopus baissicus*. Even if the original description from Transbaikalia and Mongolia does not allow a detailed comparison with our material, we propose to consider the Chinese and Mongolian larvae as conspecific, and we transfer these to the Cavilabiata Bechly, 1996. Numerous Cavilabiata, even Libellulidae, are already known from the Late Mesozoic (FLECK et al., 1999).

Because of the important features of the labial mask, our larvae have no phylogenetic affinities with the sonid larvae (gomphid type of flat labial mask). There



Figs 1-3. Views of the hemeroscopid larva, from Lushangfen Formation, Lower Cretaceous, SW of Beijing, China: (1) ventral view of dorsally compacted specimen, No. 132062, showing the 'libelluloid' type mask [$\times 1.43$]; – (2) dorsal view of complete specimen, No. 132063, showing the mask [$\times 1.47$]; – (3) complete mask of specimen No. 132062 [$\times 4.0$].

are also important differences in the general shape, the claws and the epiproct (PRITYKINA, 1986). The presence of comb-like hairs on legs of both taxa is probably related to similar modes of life.

Our larvae have some similarities with the aeschnidiid larvae in the general body shape, strongly developed paraprocts, very small epiproct and cerci. Even if both have spoon-shaped labial mask, these are fundamentally different, because:

- (1) The labial palps of the aeschnidiid larvae have strong and sharp teeth (G. Fleck, pers. comm.), unlike the smooth teeth in our larvae. ZHANG (1999a, 1999b, 2000) has also described some aeschnidiid larvae from China but his specimens did not show the teeth of the labial palps clearly.
- (2) The labial prementa of the aeschnidiid larvae are much more narrow, unlike those in our larvae (ZHANG, 1999a, 1999b, 2000).
- (3) The legs of the aeschnidiid larvae are smooth, unlike the legs in our specimens, which are provided with long comb-like hairs (ZHANG, 1999a, 1999b, 2000).

Therefore, contrary to the opinion of ZHANG (1999a, 1999b, 2000), our larvae are probably not related to the Aeschnidiidae.

Hemeroscopus baissicus is already known from adult specimens from West Mongolia, Transbaikalia, SW of Beijing, and Korea (PRITYKINA, 1986; REN, 1995; Ueda, pers. comm.). Along with these larvae, in the same outcrop, we have also collected some fossil wings and an adult head, attributable to this species.

The type specimen of *H. baissicus* is an adult. It is very difficult to find strong evidence in favour of the conspecific identity of our larvae and the adult specimens. Nevertheless, *H. baissicus* was considered as a true Cavilabiata by BECHLY (1996), thus there is no argument against the possible attribution of our larvae to this taxon.

As for the aeschnidiid larvae, the discovery of a larva, with its wing tracheae preserved, strongly supports the conspecific status of these larvae and the adult *H. baissicus*.

It is very surprising that the sonid, the aeschnidiid and the larvae herein described, all have strongly curved paraprocts and distinctly smaller epiproct and cerci, though these taxa are clearly not directly related. This situation suggests that this organization of the anal pyramid is plesiomorphic in Anisoptera.

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