



Descriptions of the final instar larvae of seven Chinese Chlorogomphidae species, with taxonomic notes on adults (Odonata: Anisoptera)

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Abstract

The larvae of seven species of Chlorogomphidae from South China are described based on reared larvae, i.e. *Chlorogomphus kitawakii* Karube, *C. nasutus nasutus* Needham, *C. papilio* Ris, *C. shanicus* Wilson, *C. usudai* Ishida, *C. yokoi* Karube and *Chloropetalia soarer* Wilson. The adult female of *C. kitawakii* is first described. Biological information on Chlorogomphidae is provided and a diagnosis of the family proposed.

Key words: Odonata, Chlorogomphidae, *Chlorogomphus*, *Chloropetalia*, *Watanabeopetalia*, larvae, China

Introduction

The Chlorogomphidae is often treated as a subfamily of Cordulegastridae (Karube 2002, van Tol 2005, Zhang & Tong 2010), but recent molecular studies support its family rank (Dumont et al. 2009, Letsch et al. 2009). Dow & Ngiam (2011) pointed out that there was uncertainty about relationships within the Chlorogomphidae, with some genera such as *Orogomphus* still poorly characterized, as well as some other genera erected by Carle (1995).

A total of 18 valid species in 3 genera have been recorded from Continental China, Hainan and Taiwan (Table 1). They are distributed widely across South China, mainly in montane forest streams and upland running waters at moderate altitudes. To date, the Chinese species are poorly known and poorly studied. Several species are known only from the types, and no attempt has been made to distinguish the larvae. One main reason for the lack of information about the larvae is the difficulty in collecting and rearing them.

The subtropical forests in South and Southwest China are home to an unrivalled variety of this attractive group. These forest-dependent species can only be encountered in well-vegetated forest. Most of them prefer open and shallow streams, with some exceptions occupying shaded narrow streams or seepages. The mature males usually patrol along a suitable site in a very stable and slow flight, while females lay their eggs in very shallow parts of the stream edges and some still water pools near the streams. The larvae can be found in such habitats. These larvae are shallow burrowers with hemicylindrical body with ventral side flattened and the ground color usually identical to the stream bed, which camouflages them from natural enemies. Their strongly divergent wing pads and the trapezoidal prominence ('frontal shelf') on the frons can separate them from some related larvae such as *Anotogaster*. Larvae are fierce predators and prey on any small aquatic insects, fishes and shrimps. They hide themselves in the gravel sand most of the time and will raise their head when after prey; they usually become active and take prey at dawn and dusk.

This paper is aimed at providing an overview of larval morphology of the known species from mainland China.