



Descriptions of the first-instar larva of the hypogaecic species *Neobidessodes limestoneensis* (Watts & Humphreys) and of the third-instar larva of *Hydroglyphus balkei* Hendrich (Coleoptera: Dytiscidae: Bidessini) with phylogenetic considerations

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Abstract

The first-instar larva of *Neobidessodes* Hendrich & Balke (through the hypogaecic species *N. limestoneensis* (Watts & Humphreys)) and the third-instar larva of *Hydroglyphus* Motschulsky (through *H. balkei* Hendrich) (Dytiscidae: Bidessini) are described and illustrated in detail for the first time, including detailed morphometric and chaetotaxic analyses of the cephalic capsule, head appendages, legs, last abdominal segment and urogomphi. A cladistic analysis including 51 characters and 32 hydroporine taxa is performed, which supports the inclusion of both genera in the tribe Bidessini based on the absence of the primary pore ABC on the last abdominal segment. The third instar of *H. balkei* is characterized by the absence of secondary setae on the urogomphi and anterior secondary setae on the coxa, and the presence of 8–9 secondary setae on the mesofemur. On the other hand, the first instar of *N. limestoneensis* bears 14 lamellae clypeales on the anteroventral margin of the nasale. This species has evolved several morphological characters that are probably associated with its hypogaecic existence, including a lightly sclerotized body, relatively longer cephalic capsule and mandibles, a strongly reduced occipital foramen, absence of stemmata, and short claws. However, primary chaetotaxy apparently has remained as a very conservative expression of the phenotype.

Key words: Diving beetles, larva, epigaeic, hypogaecic, morphometry, chaetotaxy, phylogenetic relationships

Introduction

The dytiscid tribe Bidessini is a large and diverse group of small beetles which inhabit a wide range of aquatic habitats, mainly those rich in vegetation (Balke & Ribera 2004). Bidessines also radiated extensively in underground waters (Watts & Humphreys 2003, 2009 and references therein). At the present time Bidessini are postulated to include more than 600 species distributed over approximately 40 different genera (Nilsson 2001, 2003, 2004; Nilsson & Fery 2006). This paper deals with two of these genera, namely *Neobidessodes* Hendrich & Balke and *Hydroglyphus* Motschulsky. The former was erected recently to accommodate the Australasian species previously placed in *Bidessodes* Régimbart (Hendrich *et al.* 2009) and includes seven epigaeic (distributed in Australia, western Papua, and Indonesia (Hendrich *et al.* 2009)) and two hypogaecic species (endemic to the Three Rivers calcrete in the Yilgarn, Western Australia (Watts & Humphreys 2003)). *Hydroglyphus*, on the other hand, is comprised of approximately 87 species distributed in the Afrotropical, Australian, Oriental and Palaeartic regions (Nilsson 2001). Within Bidessini, DNA sequence data place *Neobidessodes* as the sister group of a clade comprised of *Uvarus* Guignot (*U. pictipes* (Lea), unlikely to be congeneric with non-Australian *Uvarus*), *Gibbidessus* Watts, *Allodessus* Guignot and *Limbodessus* Guignot (Leys *et al.* 2003; Ribera *et al.* 2008). *Hydroglyphus*, on the other hand, is postulated to share a close relationship with *Papuadessus* Balke and *Clypeodytes* Régimbart (Leys *et al.* 2003; Balke & Ribera 2004;