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Larvae of *Hydromanicus* (Insecta: Trichoptera: Hydropsychidae) from Thailand

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Abstract

Larvae of only 2 of the 13 species of *Hydromanicus* known from Thailand have been described previously. In this research, the "metamorphotype method" was used to associate yet-unidentifiable larvae and pupae with their identifiable adults: Pupal identifications were based on genitalic features in common with described adults, and larvae were associated with the pupae. Herein, the final larval instar of *Hydromanicus malayanus*, *H. abiud* and *H. inferior* are described and illustrated.

Key words: Description, *Hydromanicus malayanus*, *Hydromanicus abiud*, *Hydromanicus inferior*

Introduction

The net-spinning Hydropsychidae are one of the largest families of caddisflies (Trichoptera), with about 1,756 described adult species worldwide (Morse 2011). Larvae of hydropsychids live in running waters and are generally collectors-filterers, although some species are predators of larval black flies (Merritt & Cummins 1996). They usually construct a silken filter net at the entrance to their fixed tubular retreat (Wiggins 1996). Larvae present a high ecological diversity and display a wide range of tolerance to different levels of pollution, which makes them very useful organisms in biological water quality monitoring programs (Resh 1995). Among the 998 species of caddisflies in Thailand (Malicky 2010), only about 3% have been described in their larval stages (e.g., Laudee 2008; Malicky & Chantaramongkol 1991; Prommi *et al.* 2006a, 2006b, 2006c; Peumwarunyoo & Prommi 2013; Thamsenanupap *et al.* 2005). Hydropsychid caddisflies are extremely important in the ecology of running waters because of their high density and biomass (Wiggins 2004). Nevertheless, few species are identifiable as larvae because their immature stages have not yet been associated with the corresponding identifiable male adults.

The genus *Hydromanicus* Brauer 1865 contains approximately 68 species worldwide (Morse 2009). Until now, larvae of *Hydromanicus* have been distinguished from those of other hydropsychid genera by the following combination of characteristics: The head has few hairs or setae and has a glossy sheen; the upper branch of the forked foretrochantin is about 50% longer than the lower branch (which bears bristles) and is wide basally; the anterior margin of the submentum is concave, not cleft; the mesosternum has one pair of gills; the metasternum has two pairs of gills; abdominal segments I to VI bear ventral gills; and segment VII lacks gills (Prommi *et al.* 2006b). Of 68 species, 13 are found in Thailand (Malicky 2010), but larvae of only two species (*Hydromanicus adonis* Malicky & Chantaramongkol 1996, and *H. klanklini* Malicky & Chantaramongkol, 1993) have been described (Prommi *et al.* 2006b). Herein we describe and figure the larvae of *Hydromanicus abiud* Malicky & Chantaramongkol 1993, *H. inferior* Chantaramongkol & Malicky 1995, and *H. malayanus* Banks 1931, from Thailand. A revised description of larvae of this genus and some notes on the biology of these species are provided.

Material and methods

The taxonomy of Trichoptera is based almost exclusively on adult male genitalia, with most females, larvae, pupae,

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and the yellow band on the midline of the frontoclypeus is wider anteriorly; in contrast the head and thoracic nota of *H. adonis* are much darker and the frontoclypeus has three yellow areas on the midline. The ventral surface of the head of *H. klanklini* is brown; whereas, the venter of the head of *H. adonis* has dark-brown to black areas. Second, the abdominal segments are densely covered with black, cone-like hairs varying in size in *H. klanklini*, whereas the abdominal segments of *H. adonis* are densely covered with the same size of black, cone-like hairs and club-like hairs. In general, *H. adonis* is more robust and larger than *H. klanklini* (Prommi *et al.* 2006b).

For the two Chinese *Hydromanicus* species for which larvae are known (*H. canaliculatus* Li, Tian, & Dudgeon 1990; and *H. umbonatus* Li 1993, in Tian *et al.* 1993), the head and thorax the larva of *H. canaliculatus* are brownish orange. The abdomen of *H. canaliculatus* appears grayish brown when alive. The muscle scars on the head in *H. canaliculatus* are more conspicuous on the light background. Setae 17a and 17b do not appear to share a setal socket. Seta 17b is brownish and not transparent in *H. canaliculatus*. The dorsal branches of the foretrochantins are as long as or shorter than the ventral branches. The anterolateral corner of each lateral posterior prosternal sclerites is the darkest part of the four pieces. The larva of *H. umbonatus* can be easily differentiated from that of *H. canaliculatus* by the presence of densely distributed secondary setae on dorsal and lateral surfaces of the head and thoracic nota. Additionally, the anterior margin of the frontoclypeus in *H. umbonatus* is complete and symmetrical (Zhou 2007).

All of these the *Hydromanicus* species characteristics are summarized in Table 1.

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