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The immature stages of *Polypedilum* (*Pentapedilum*) *nodosum* (Johannsen) and *Polypedilum* (*Tripodura*) *masudai* (Tokunaga) (Diptera, Chironomidae, Chironominae)

HONG-QU TANG^{1,6}, PETER S. CRANSTON², JIAN-GANG ZHAO¹, CHAN-WA LOK³,
KAI-CHIN WONG⁴ & ZHI-QIANG LI^{5,6}

¹Department of Ecology, Jinan University, Guangzhou, 510632, China

²Evolution, Ecology & Genetics, Australian National University, Canberra, ACT 0200, Australia

³Macau Meteorological and Geophysical Bureau (SMG), Taipa, Macau

⁴Department of Gardens and Green Areas, Civic and Municipal Affairs Bureau of Macau Special Administrative Region (IACM), Coloane, Macau

⁵Guangdong Entomological Institute, Guangzhou, 510260, China

⁶Corresponding authors. E-mail: townningt@gmail.com, lizq@gdei.gd.cn

Abstract

Based on associated material collected from Macau and Guangxi, the pupae and larvae of *Polypedilum* (*Pentapedilum*) *nodosum* Johannsen and *P. (Tripodura) masudai* Tokunaga are described completely for the first time. Both species are newly recorded from China. Characters for distinguishing the immature stage of these species from other allied *Polypedilum* species are noted. The previously recorded *Polypedilum* (*Pentapedilum*) ‘K1’ of Cranston (1996) is shown to be *P. nodosum*. Information is provided on distribution and ecological tolerances.

Key words: *Polypedilum*, pupa, larva, biology, new record

Introduction

Polypedilum Kieffer 1912 is one of the largest genera in the tribe Chironomini, with the larvae occurring in all kinds of waterbodies (Maschwitz & Cook 2000, Epler 2001, Epler *et al.* 2013). At present, at least 60 species are recorded in China (Zhang 2005, R.L. Zhang *pers. comm.*) in 7 subgenera except subgenus *Kribionympha* Kieffer. Saether *et al.* (2010) recognised 8 subgenera largely in order to maintain a monophyletic sub-generic concept based only on species with known larvae. Nonetheless, there remain many unresolved problems and conflicts regarding evolutionary relationships and allocation to subgenera between life stages (Kawai *et al.* 2012). As is typical for the study of Chironomidae, descriptions rely on the adult stage, especially features of the male hypopygium. The association of immature stages that are valuable in environmental monitoring, with named adults has proceeded slowly. Although several works narrow the gap, e.g. Rossaro 1985 (Europe), Maschwitz & Cook 2000 (North America), Langton & Visser 2003 (western Europe), Cranston 1996, 2000 (Australia), our knowledge of the immature stages of even some common species of *Polypedilum* remains inadequate. This is especially so for taxa occurring in the subtropics and tropics including those of Asia with only few abundant and conspicuous species described (Cranston 2007, Cranston *et al.* 2013).

In seasonal surveys of the Macau benthos from late winter to spring, large populations emerged of two common species of *Polypedilum*, namely *Polypedilum nodosum* Johannsen 1932 and *Polypedilum masudai* Tokunaga 1938. Rearing and the sheer abundance of specimens allow us to associate the immature stages with adult forms. *P. nodosum*, an Austro-oriental taxon (Johannsen 1932, Tokunaga 1964, Sasa & Hasegawa 1983, Cranston 1996, Sasa & Suzuki 2002, Oyewo & Saether 2008, Yamamoto *et al.* 2012), allocated to s.g. *Pentapedilum* on the basis of the macrotrichiose wing, is recorded here for the first time from China. The previous associated immature stages of *Polypedilum* (*Pentapedilum*) ‘K1’ of Cranston (1996) from Australia are considered

Conclusions

Pupae of *P. nodosum* can be distinguished from other *Polypedilum* by tergite VII with anterior and paired posterior spinule patches, and each wing pad with a distinct nose. The larvae can be distinguished with certainty from other *Polypedilum* larvae by the clear 3 inner mandible teeth. The relative lengths of antennal segments 3 and 4 may prove to be valid characters for species separation.

Pupae of *P. masudai* can be separated from other members by the reduced median spinulation on tergites II–V and relatively well developed cephalic tubercles and frontal setae. Larvae of this species have relatively well developed segments 2 and 4, and reduced segments 3 and 5. The larvae can be readily separated from others by comparing the antenna and darker postmentum.

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