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Life history and larval morphology of the Giant Microcaddisfly, Ugandatrichia kerdmuang MALICKY & CHANTARAMONGKOL 1991 (Hydroptilidae: Trichoptera)

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Abstract. The life history and larval morphology of Ugandatrichia kerdmuang MALICKY and CHANTARAMONGKOL 1991 were studied in Vipavadee waterfall, southern Thailand. The adults and pupae occurred in all seasons. Adults of Ugandatrichia kerdmuang showed a non-seasonal life cycle. Frequency analysis of the larval head capsule width revealed the presence of five instars. The larval feed mainly on filamentous algae and benthic diatoms. Ultra structure and morphological details of the last instars are given.

Introduction. Hydroptilidae are a diverse family of tiny caddisflies, the vast majority of which are under 6 mm long. They are often referred to as microcaddisflies. The larvae are free living for the first four instars and build a case in the final instar. The three thoracic nota are covered with sclerotized plates, abdominal gills are lacking, and long setae on the head and thoracic nota are present. There is usually a sclerotized plate on the dorsum of abdominal segment IX (WIGGINS 1996; MALICKY, 1999; DUDGEON, 1999).

The preliminary survey of caddisflies in Thailand by MALICKY & CHANTARAMONGKOL (1999) included only two genera of microcaddisflies, Orthotrichia and Ugandatrichia, but many more are to be expected. Five species of Ugandatrichia, U. hairanga OLÁH 1989, U. honga OLÁH 1989, U. maliwan MALICKY & CHANTARAMONGKOL 1991, U. sanana OLÁH, 1987 and U. kerdmuang were reported in Thailand. MALICKY (1999) described the morphology and biology of U. maliwan larva. The larvae construct a slender subcylindrical case and a flat net to collect fine organic particle for food. U. maliwan and U. kerdmuang differed in the ventral sclerites of abdominal segments 4 and 5. U. maliwan larvae have purse cases which are fastened by with 4 stalks to the rocky surface. In contrast, U. kerdmuang were bag cased with only 2 anterior stalks.

THANI (1999) studied the life cycle of *U. maliwan* in Mae Klang stream, Doi Inthanon National Park, Northern Thailand. The result showed that the caddisfly had non-seasonal life cycle and the frequency analysis of the larval head capsule width revealed the presence of five instars.

The African U. rhodesiensis SCOTT 1976 does not construct a case at all (SCOTT 1976), and U. africana MARLIER & VAILLANT 1967 has a case similar to *Stactobia* (VAILLANT 1984), so case building within the genus is unusually variable.

The present research aimed to investigate the life cycle, some biology, and larval morphology of *U. kerdmuang*. Based on the knowledge of larvae morphology in this study, the details may be used to identify the species which was found in Thailand only.

Material and Methods. The life history, larval morphology, and biology of Ugandatrichia kerdmuang MALICKY CHANTARAMONGKOL 1991 was studied at Vipawadi waterfall, Surat Thani province, Thailand. Larvae of U. kerdmuang were collected every 2 months by hand picking from stream sites during April 2003 - February 2004. Adults were collected with small portable light traps. The head capsule widths were measured with an ocular micrometer. The distribution of head capsule width was plotted to determine the instars larvae of the insect. To study the feeding behavior, larvae were collected from the study sites. The heads were pulled off by forceps. Each fore-gut, which should remain intact and attached to the head, was dissected and examined under a compound microscope. The food in each gut was identified. For ultra-structure information, specimens were fixed in 2.5% glutaraldehyde in phosphate buffer, pH 7.4, and 1% osmium tetroxide for 24 and 2 hours respectively. Fixed specimens were dehydrated with a graded series of ethanol and acetone, and finally dried in a critical point dryer. The dried samples were mounted on stubs, coated with gold, and examined with a Scanning Electron Microscope.

Results.

Life cycle. The results of seasonal light trap collecting (hot season: March 2003; rainy season: July 2003; cool season: October 2003) of Ugandatrichia kerdmuang adults indicated that the caddisfly had a non-seasonal life cycle.

From bimonthly samples, a total of 101 larvae were gathered. The head capsule widths were discontinuously distributed from 0.10-0.43 mm. Distribution ratio of each instar is shown in Figure 1. Frequency analysis of the larval head capsule width revealed the presence of five instars. The ranges and mean \pm SD of head capsule width of each instar are: Instar 1: HCW = 0.10-0.13 mm, 0.11\pm0.02 mm (n=8), Instar II: HCW = 0.17-0.19 mm, 0.18\pm0.01 mm (n=4), Instar III: HCW = 0.24-0.25 mm, 0.24\pm0.01 mm (n=2), Instar IV: HCW = 0.28-0.30 mm, 0.29\pm0.01 mm (n=9), Instar V: HCW = 0.34-0.43 mm, 0.39\pm0.00 mm (n=78).



Figure 1. Distribution of head capsule width (mm) of larvae of Ugandatrichia kerdmuang.

Larval biology. Larvae of Ugandatrichia kerdmuang live in sites where the water runs quickly over smooth granite rocks. The anterior end of the cases and the larvae are directed towards the current. Only the last instar constructs case, the first to four instars are free living and live in the case of the last instar. Gut content analysis showed the predominant items eaten by larvae were benthic diatoms, filamentous and green algae.

Larval morphology. The head of the fifth instar larva is brownish and sclerotized, and the abdomen is white. The head capsule is oval shaped in dorsal view. The frontoclypeus is about three-five of the head capsule length. There are five pairs of setae on the frontoclypeus (Figure 2). The tegumental surface of the head is irregular dome shaped (Figure 3). The sclerotized labrum has six pairs of setae and dense bristles along the antero-ventral of labrum (Figure 4). The spherical palpiger has a labial palp and a silk gland opening at the anterior and dense bristle on the anterior and inside its mouth (Figure 5 and 6). The maxillary palp has four segments, and the maxillary lobe is covered with tufts of bristle (Figure 7). The axe shaped mandible has two setae at the base and a pointed ridge at its base (Figure 8). The pronotum, mesonotum and metanotum are covered by sclerites with numerous of seta (Figures 9 and 10). The tegumental surface of the membrane between the notum has many dome shaped structures (Figure 11). The legs have curved tarsal claws and pointed basal seta. There are two spurs on all tibias (Figures 12-13). The coxa has a stout process (Figure 14). The abdominal segments are membranous. The tegumental surface of the abdominal segments has many dome shaped structures and amoeboid shape (Figures 15 and 16). The ventral sclerites of abdominal segments IV and V are slightly elevated at the posterior edge (Figure 17). The anal claw is bent, and sharply pointed at the apex (Figures 18 and 19). At the end of the abdomen there is a pore situated between the anal claws (Figure 18)

Discussion. The life cycle of *Ugandatrichia maliwan* has been reported form Northern Thailand. THANI (1999) reported that this species has 5 larval instars and a non-seasonal life cycle in Doi Inthanon National Park. The results in *U. kerdmuang* are similar. A comparison of head capsule widths of *U. kerdmuang* to *U. maliwan* in all instars showed similarities in head capsule width. MALICKY (1999) reported on biology and morphology of both species. In the present study, more details of ultrastructure and biology are given. The SEM micrographs of mouthparts of the insect showed the bristle



Figures 2-7. 2: Dorsal view of the head. 3: The tegumental surface of the head. 4: The sclerotized labrum. 5, 6: The spherical palpiger. 7: The maxillary palp and maxillary lobe.

inside the labrum and palpiger, which the insect uses to graze benthic diatom and algae. The gut content analysis shows that the larvae consume benthic algae, predominately diatoms, and green algae.

References.

DUDGEON, D. 1999. Tropical Asian Streams: Zoobenthos, Ecology and Conservation. Hong Kong University Press. Hong Kong.

MALICKY, H. 1999. The net-spinning larvae of the Giant Microcaddisfly, *Ugandatrichia* spp. (Trichoptera, Hydroptilidae). Proc. 9th of Int. Symp. on Trich., 199-204.

MALICKY, H. and P. CHANTARAMONGKOL. 1999. A preliminary survey of the caddisflies (Trichoptera) of Thailand. Study no. 26 on caddisflies of Thailand. Proc. 9th of Int. Symp. on Trich., 205-216.

SCOTT, K.M.F. 1976. The larval and pupal stages of *Ugandatrichia* MOSELY (Trichoptera: Hydroptilidae) from Rhodesia, with the description of a new species. – Ann.Cape Prov.Mus (Nat.Hist.) 11:117-127.

THANI, I. 1999. Life history of *Ugandatrichia maliwan* (Trichoptera: Hydroptilidae) in Mae Klang Stream, Doi Inthanon Range. Northern Thailand. Proc. 9th of Int. Symp. on Trich., 411-413.



Figures 8-13. 8: The axe shaped mandible. 9, 10: The pronotum, mesonotum and metanotum. 11: The tegumental surface of membrane between the notum. 12-13: The legs, claw and tibial spurs.

VAILLANT, F. 1984. The hydroptilid larvae living in dripping rocks. – Proc. 4th Int.Symp.Trich.:407-412. Junk, The Hague.

WIGGINS, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). University of Toronto Press. Canada.

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Figures 14-19. 14: The coxal process. 15, 16: Tegumental surface of abdominal segment. 17: Ventral sclerites of segments 4 and 5. 18, 19: The anal claw and anal pore.

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