

**LATE INSTAR CATERPILLAR AND METAMORPHOSIS OF  
THE HAWKMOTH *EUPANACRA AUTOMEDON* (WALKER)  
(LEPIDOPTERA: SPHINGIDAE: MACROGLOSSINAE)**

**T. M. Leong**

Central Nature Reserve, National Parks Board,  
601 Island Club Road, Singapore 578775, Republic of Singapore  
(E-mail: [leong\\_tzi\\_ming@nparks.gov.sg](mailto:leong_tzi_ming@nparks.gov.sg), [banjarana@gmail.com](mailto:banjarana@gmail.com))

**INTRODUCTION**

The hawkmoth *Eupanacra automedon* (Walker, 1856) (family Sphingidae) has been recorded from Northeast India, Nepal, Myanmar, Thailand, Peninsular Malaysia, Sumatra, Nias, Java, and Borneo (Inoue et al., 1997; Beck & Kitching, 2008). A descriptive account of the late instar larva, pupa and emergent adult is reported and illustrated from an individual caterpillar found from the Bukit Timah Nature Reserve in Singapore.

**OBSERVATIONS**

A single penultimate instar hawkmoth caterpillar was found feeding on the leaves of a native aroid, geli geli (*Lasia spinosa*) (family Araceae), growing along the banks of a stream on 17 Feb.2008 at the Bukit Timah Nature Reserve (BTNR). It was immediately photographed in situ and subsequently reared to adulthood to determine its identity. When first measured, its body length was 48 mm and tail horn was 6 mm. The ground colour of its body was jade-green without distinct markings, and its tail horn was pale beige (Fig. 1). Upon closer inspection of its anterior region, a pair of faint ocelli was barely visible on the first abdominal segment (Fig. 2).



Fig. 1. Penultimate instar caterpillar of *Eupanacra automedon* on its host plant, geli geli (*Lasia spinosa*) encountered in the Bukit Timah Nature Reserve on 17 Feb.2008. This caterpillar was 48 mm long, with a tail horn 6 mm in length.



Fig. 2. At close range, a pair of ocelli (one arrowed) is faintly discernible at the anterior of its first abdominal segment.

On 18 Feb.2008, the caterpillar exhibited typical pre-moulting behaviour, as it remained motionless and did not feed for an entire day. On the afternoon of 19 Feb.2008, it moulted into its final instar and resumed feeding within a few hours. It was allowed to feed and grow in size and was measured on 21 Feb.2008 to have a body length of 85 mm and tail horn of 3 mm. The body ground colour was a fairly uniform brown with an unmistakable pair of anterior ocelli located at its first abdominal segment and a tail horn that was shorter and back-curved (Fig. 3).

The tail horn was dark brown with a pale beige apex (Fig. 4). A thin black, mid-dorsal stripe ran from the anterior of the head capsule past the ocelli and onto the third abdominal segment, where it faded off. The elaborate ocellar markings consisted of jet black ovals facing inward and forward, flanked by white crescents with orange at the base. Each ocellus was clearly outlined in black. Just beyond its anterior margin, a black dash seemed to render 'eyebrows' above its false eyes. A speckling of uneven white dots was also concentrated in the space between the ocelli (Fig. 5).

On 22 Feb.2008, the caterpillar seemed to stop feeding and was behaving in a restless manner, crawling about and finding a suitable site in which to pupate. Unlike some other sphingid larvae previously reared, this species did not appear to change colour or pattern prior to pupation except for a slight darkening of its body. By 23 Feb.2008, it began to weave silken threads onto leaves and later started the process of bodily contraction and fluid secretion. At this point, the inter-segmental constrictions became more noticeable (Fig. 6).

Shortly after midnight on 25 Feb.2008, the exuvium of its final instar was sloughed off toward its posterior, revealing a raw, fragile pupa that was translucent -white (Fig. 7). This pupa then sclerotised and darkened. It measured 40 mm long and 9 mm wide. It was light brown, with a concentration of black pigmentation around the proboscis region, giving the impression of having a 'beard'. Along the mid-ventral of its abdominal segments, a distinct black stripe was noticeable (Fig. 8). The pupal abdomen was mostly flexible and mobile when regularly monitored.





Fig. 3. The final instar of *Eupanacra automedon* is brown, with a pair of prominent false eye-spots on the first abdominal segment. This caterpillar attained a total length of 85 mm.



Fig. 4. Lateral close-up of posterior tail horn (3 mm) of the final instar of *Eupanacra automedon*.





Fig. 5. At its anterior region, a thin, black, mid-dorsal stripe runs from behind its head, in between its ocelli and fades off into the third abdominal segment. There is also an aggregation of uneven-sized, white dots just between the false eyes. The black dashes over the anterior margin of the 'eyes' seem to resemble 'eyebrows'. This caterpillar was photographed feeding on 22 Feb.2008.





Fig. 6. By the night of 23 Feb.2008, the prepupa had already woven silken threads around itself and began contracting its body progressively while simultaneously releasing ecdysial fluid.



Fig. 7. Just past midnight on 25 Feb.2008, the pupating larva shed its final larval exuvium (bottom right); its translucent, pale white colour darkened over time (see Fig. 8).





Fig. 8. Views of *Eupanacra automedon* pupa ( $40 \times 9$  mm): a, ventral; b, lateral; c, dorsal. Note the presence of a symmetrical, black 'beard' near the anterior end of the ventral surface and a distinct, black mid-ventral stripe on the abdominal segments. The pupa was able to move its abdomen sideways at this time. This was photographed on 27 Feb.2008.





Fig. 9. On 7 Mar.2008, the pupa became increasingly darker, especially around its wing discs (compare with Fig. 8a).



Fig. 10. On 8 Mar.2008, the adult female *Eupanacra automedon* (ZRC.LEP.55, forewing length: 23 mm, body length: 31 mm) eventually emerged.





Fig. 11. The pupal case of *Eupanacra automedon* (ZRC.LEP.55), after successful emergence of the adult moth. Note anterior opening through which the adult emerged.

As the time for emergence drew closer, the pupa darkened, especially beneath the wing discs (Fig. 9). By the morning of 8 Mar.2008, a well-formed, adult female had emerged (Fig. 10). It was subsequently preserved as a voucher specimen in the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research (RMBR), National University of Singapore (ZRC.LEP.55, forewing length: 23 mm, body length: 31 mm). The remnant, empty pupal case (Fig. 11) was also preserved and catalogued.

Dupont & Roepke (1941) described the larva and pupa of this hawkmoth species in Java. In Thailand, the larva of this species has also been documented to consume *Lasia spinosa* (Robinson et al., 2009). Apart from the aroid genus *Lasia*, the caterpillars of *Eupanacra automedon* have not been recorded feeding on any other host plants. This seems to be a highly specialised choice of host plant, as *Lasia* has a preference for swampy, water-logged habitats. One other Southeast Asian sphingid, *Eupanacra busiris* (Walker, 1856) is also known to feed on *Lasia* (Inoue et al., 1997), but this species has yet to be documented in Singapore.

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