

FINAL INSTAR CATERPILLAR AND METAMORPHOSIS OF *DYSPHANIA GLAUDESCENS* (WALKER) IN SINGAPORE (LEPIDOPTERA: GEOMETRIDAE: GEOMETRINAE)

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INTRODUCTION

In Singapore, five species of geometrid moths in the genus *Dysphania* Hübner, have been previously recorded, with the mature larva of *Dysphania malayanus* (Guérin-Ménéville, 1843), being recently documented (Leong et al., 2009). Here, the final instar larva and pupa of *Dysphania glaucescens* (Walker, 1861) are described and illustrated (possibly for the first time), based on a successful attempt at rearing to metamorphosis. The geographical range of *Dysphania glaucescens* encompasses Sumatra, Peninsular Malaysia and Borneo, with a recognised subspecies (*Dysphania glaucescens tsukadai* Yazaki, 1989) occurring on the Philippine island of Palawan (Holloway, 1996).

OBSERVATIONS

On the night of 3 Dec.2009 (ca. 2225 hours), a penultimate instar larva of *Dysphania glaucescens* (Fig. 1) was found perched just above eye-level, on the leaf margin of its hostplant, *Pellacalix saccardianus* (family Rhizophoraceae), at the Bukit Timah Nature Reserve (BTNR), near Keruing Hut. Its body was a uniform leaf green, with numerous blue spots well distributed throughout. There was also a pale, mid-lateral stripe along its flanks. Its total length was 30 mm.



Fig. 1. Penultimate instar larva (pre-moult phase) of *Dysphania glaucescens* on its hostplant, *Pellacalix saccardianus* (Rhizophoraceae), encountered at the Bukit Timah Nature Reserve (near Keruing Hut) on the night of 3 Dec.2009 (ca. 2225 hours). Its total length was 30 mm.

The larva was in its pre-moult phase, as it had adopted a typical posture with its head tucked ventrally, accompanied by post-cephalic swelling. This larva was collected to be reared in captivity, and moulted to its final instar during the pre-dawn hours of 4 Dec.2009. The larval head capsule of the penultimate instar was preserved. By the afternoon of 4 Dec.2009, it had resumed feeding on the leaves provided for it.

The final instar larva (Figs. 2, 3) displayed a slightly deeper shade of leaf green, with darker blue spots. The mid-lateral yellow line originated at its first abdominal segment and continued towards its posterior-most segment, contacting the spiracles throughout. The spiracles were greyish, with a well defined blackish margin. At its posterior end, the supra-anal flap was triangular in shape and coloured a light, rusty brown (Fig. 4). At its anterior, its head was a light, yellowish green, with sparse setae. Its thoracic legs were orange towards their ends, with a single blue spot at each base (Fig. 5). In captivity, the larva fed at a steady pace and grew to a maximum total length of 53 mm.



Fig. 2. Lateral view of final instar larva. It attained a total length of 53 mm.



Fig. 3. Dorsal view of final instar larva (head towards right).



Fig. 4. Dorsal close-up of supra-anal flap. Note its triangular shape.



Fig. 5. Ventro-lateral close-up of head and thoracic region.

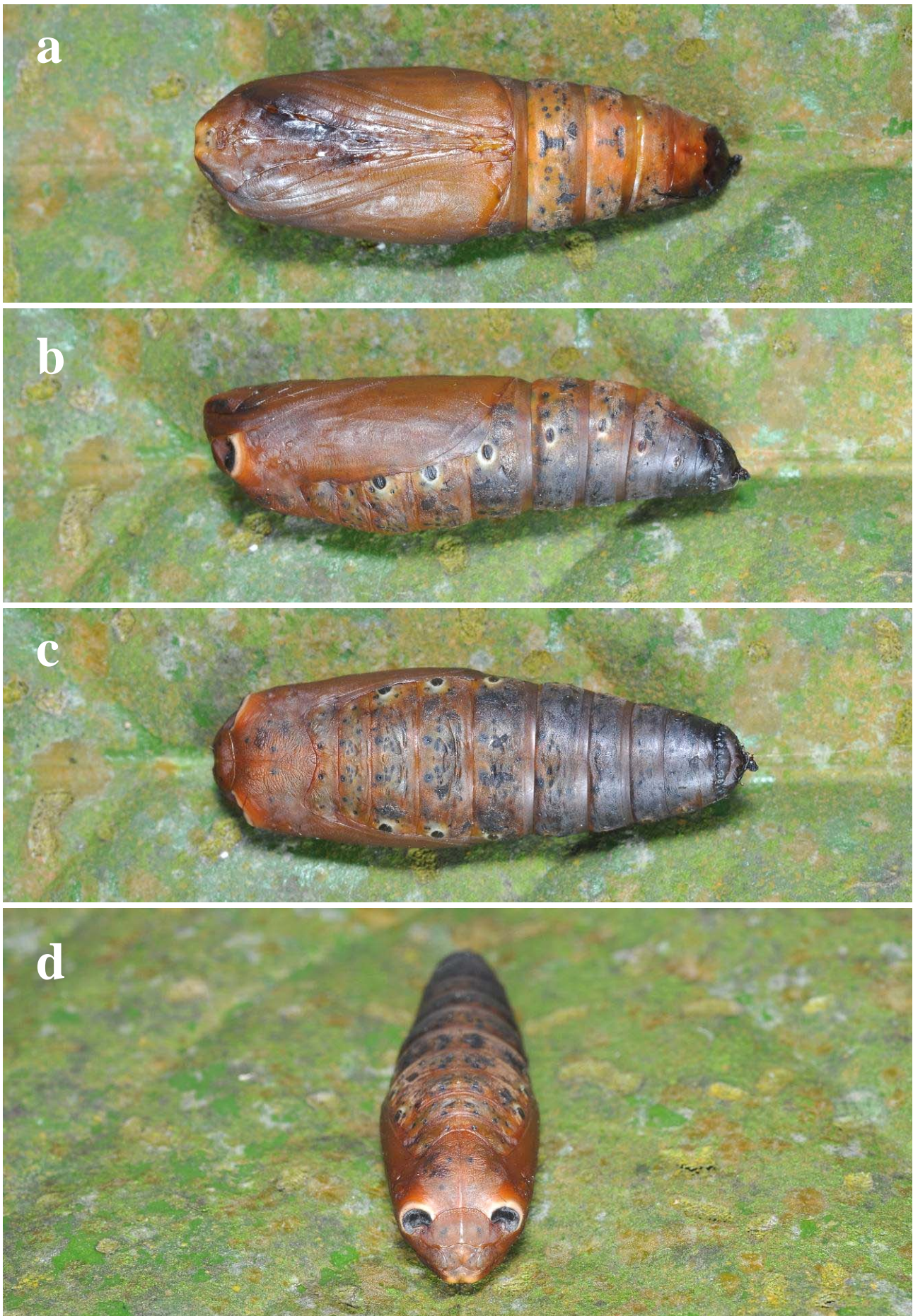


Fig. 6. Ventral (a), lateral (b), dorsal (c), and frontal (d) views of pupa. The pupa was 25 by 8 mm.

By the morning of 13 Dec.2009, the larva had enclosed itself with adjacent leaves, carefully secured by strong, resilient, silk threads. On the 14 Dec.2009, its body began to contract, accompanied by the simultaneous release of dark fluids from within. By the 15 Dec.2009, pupation had been completed. The larval exuvia of its final instar was then preserved. The pupa (Fig. 6) was subsequently measured to be 25 × 8 mm. It was an overall caramel colour, lightly speckled with small, black dots. Its abdominal spiracles were a prominent black, with whitish, outer rings. From the anterio-dorsal perspective, a striking pair of false eyes (black centre, outlined with white) was present, a seemingly consistent pattern observed in the pupae of *Dysphania* (e.g. Leong et al., 2009).

On the 25 Dec.2009, alternate black and white bands were visible at its wing cases, but by the next day, the entire wing case had darkened. On the morning of 27 Dec.2009, the wing cases were still dark and signaled the onset of eclosion (Fig. 7). By the same evening (ca. 2000 hours), the moth eventually emerged and was determined to be a female (Fig. 8). The form and colour patterns of its body/wing agreed closely with earlier illustrations of this species (Holloway, 1996: Pl. 4—moth 4). Both wings were attractively patterned with black and silvery white, with yellow on the inner margins of its hindwings. There was a subtle, overall bluish sheen over the wings. Its abdomen was uniform greyish white and tipped with yellow. Ventrally, its underwing patterns (Fig. 9) are largely similar to its upper wings. The underside of its thorax and abdomen are adorned with yellow hairs.

This female moth was subsequently preserved as a voucher specimen at the Zoological Reference Collection (ZRC) at the Raffles Museum of Biodiversity Research, National University of Singapore, with measurements of its body length (BL) and forewing length (FW) obtained: ZRC.LEP.272 (BL: 23 mm, FW: 31 mm). The vacated pupal case was cleansed, preserved, and similarly catalogued.

During an earlier faunal survey at the BTNR, an adult example of this geometrid was encountered and photographed by Celine H. S. Low (survey volunteer) along the Cave Path on the night of 13 Dec.2008 at ca. 2045 hours (Fig. 10). The moth was slightly worn and was suspected to be a male, judging from the relatively longer pectinations of its antennae. This moth was not collected.

During a recent nocturnal survey on 9 Jan.2010 (also at the BTNR), four early instar larvae (total lengths: 10–12 mm) were detected on the very same shrub (*Pellacalyx saccardianus*) near Keruing Hut, where the penultimate instar was first discovered. They were a uniform light olive green, with dark grey dots. The larvae were photographed in-situ, but not collected for rearing. Their identity was most likely to be *Dysphania glaucescens*, based on the prior record.

In the geometrid collection of the ZRC, there are existing specimens of *Dysphania glaucescens* from Singapore: ZRC.LEP.164 (female, BL: 21 mm, FW: 33 mm, coll. R. Morrell, 15 Apr.1955, “Singapore”); ZRC.LEP.165 (male, head and tip of abdomen displaced, FW: 32 mm, coll. D. H. Murphy, 17 Apr.1967, Bukit Timah Nature Reserve); ZRC.LEP.144 (female, BL: 21 mm, FW: 33 mm, coll. Mishak, 26 Dec.2008, Bukit Timah Nature Reserve). In addition, there is also a historical specimen of the same species from Peninsular Malaysia: ZRC.LEP.274 (male, BL: 21 mm, FW: 35 mm, coll. H. M. Pendlebury, 17 Apr.1926, Selangor, Bukit Kutu, 3,500 feet).



Fig. 7. Ventral view of pupa, prior to imminent eclosion. Note considerably darkened wing cases (compare with Fig. 6a). Photographed on the morning of 27 Dec.2009 (ca. 1000 hours).



Fig. 8. Dorsal view of freshly emerged female moth (ZRC.LEP.272, body length: 23 mm, forewing length: 31 mm), eclosed on the evening of 27 Dec.2009 (ca. 2000 hours). In this species, the abdomen is devoid of black, inter-segmental bars. The abdominal tip is yellow.



Fig. 9. Ventral view of female moth (ZRC.LEP.272).

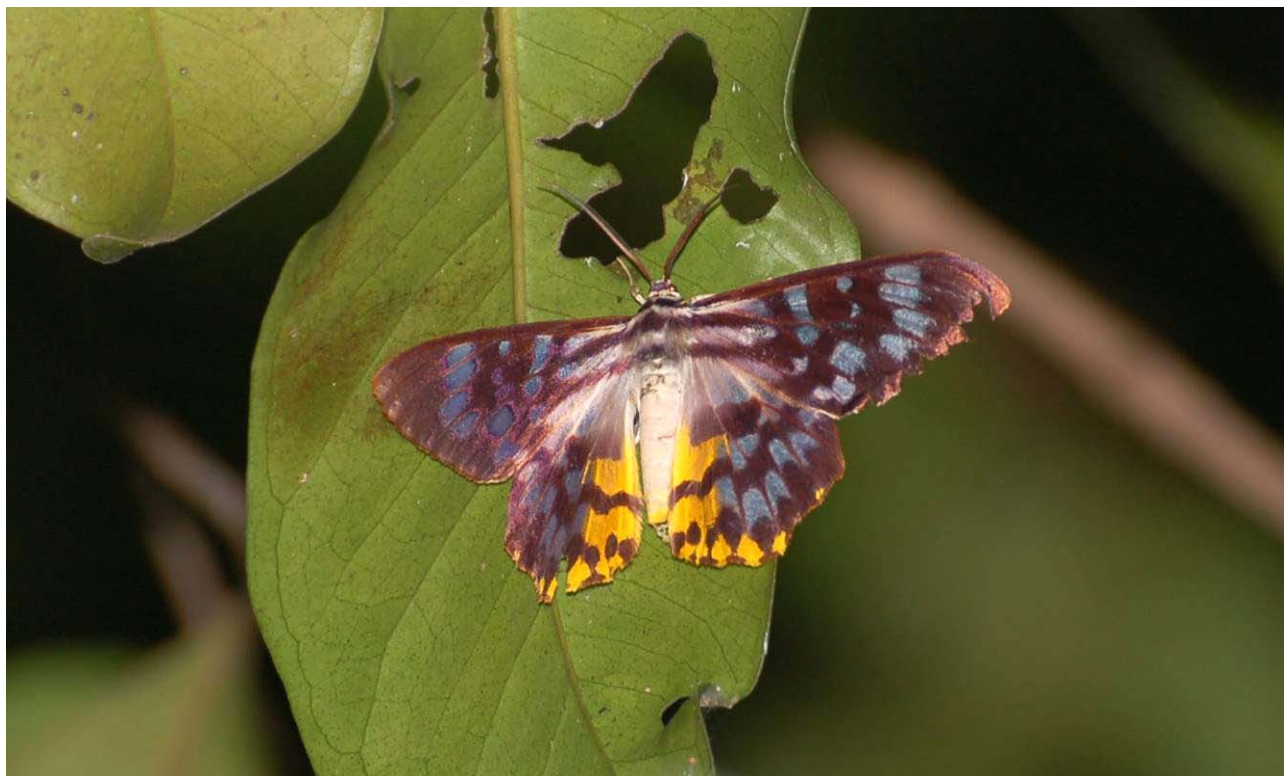


Fig. 10. Dorsal view of possibly male individual resting beneath a leaf along Cave Path, Bukit Timah Nature Reserve, encountered on the night of 13 Dec.2008 (ca. 2045 hours). (Photograph by: Celine H. S. Low).

The present account describes and illustrates the diagnostic larva of this geometrid species with certainty, possibly for the first time. The documented larval hostplant, *Pellacalyx saccardianus* proved to be most consistent with the documented preference for members in the family Rhizophoraceae consumed by larvae in the genus *Dysphania*; hence *Pellacalyx* may now be added to the existing list of plant genera consumed (Leong et al., 2009; Robinson et al., 2009). With continued faunal surveys in our remnant forests, it is hoped that the diagnostic larvae of other native forest species, such as *Dysphania subrepleta* (Walker, 1854), and *Dysphania discalis* (Walker, 1854), may be encountered. These would contribute to a more complete understanding of their larval morphology and hostplant specificity at the inter-specific level.

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