

**FINAL INSTAR CATERPILLAR AND METAMORPHOSIS OF
ACHERONTIA STYX MEDUSA MOORE, 1858 IN SINGAPORE
(LEPIDOPTERA: SPHINGIDAE: SPHINGINAE: ACHERONTIINI)**

Tzi Ming Leong^{1*} and Andrew Tay²

¹Central Nature Reserve, National Parks Board, 601 Island Club Road,
Singapore 578775, Republic of Singapore

²38 Toa Payoh Lorong 5, #08–499, Singapore 310038, Republic of Singapore

(*Corresponding author: leong_tzi_ming@nparks.gov.sg, banjarana@gmail.com)

INTRODUCTION

The hawkmoth, *Acherontia styx medusa* Moore, 1858 has an East and Southeast Asian geographic distribution, occurring in China, Korea, Japan, Vietnam, south Thailand, Peninsular Malaysia, Sumatra, Java, Borneo, the Philippines, and south Moluccas (Inoue et al., 1997; Pittaway & Kitching, 2010). Singapore records are substantiated by specimens, deposited at the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research (RMBR), National University of Singapore (see: Material Examined — Table 1). This paper reports and illustrates the discovery and successful rearing to adult of a pale green form of the final instar larva of *Acherontia styx medusa*.



Fig. 1. Final instar larva of *Acherontia styx medusa*, feeding on the pea eggplant, *Solanum torvum* (Solanaceae). It was first found on 31 Jan.2009 from Pulau Ubin. Its body length was 92 mm, with a tail horn length of 10 mm.

OBSERVATIONS

On 31 Jan.2009, a mature larva of *Acherontia styx medusa* was found on the velvety leaves of the pea eggplant, *Solanum torvum* (family Solanaceae) on the island of Pulau Ubin (Fig. 1). It was reared in captivity and fed with the leaves of this larval hostplant. The larva attained a total length of 92 mm, with a tail horn length of 10 mm. Its ground colour was pale olive-green, with white, oblique bands on its flanks from its first abdominal segment (A1) to its seventh (A7). The shade of green above these bands was somewhat darker. Each spiracle consisted of a black central slit, encircled with white. The head was a light, jade green, while the tail horn was yellow, conical with a mild curvature, and its entire surface was armed with dense spines.

On the morning of 4 Feb.2009, the larva began to exhibit the first signs of prepupal behaviour and colouration. It had ceased to feed and began to pace about in search of a suitable pupation site. The green colours of its head and body had faded to pale-yellow, and a pink blush appeared along its mid-dorsum (Fig. 2). By 6 Feb.2009, the larva had contracted to a length of 57 mm and its colour was a pale beige-yellow (Fig. 3). The inter-segmental constrictions were prominent at this point. It is also worth noting that the prepupa had also now anointed itself with a salivary secretion, making it look wet, or even slimy. The function of this secretion is not entirely clear, though it may aid moulting in some way.

On the morning of 8 Feb.2009 (1025 hours), pupation was complete with the shedding of the larval exuvia. The fresh pupa was initially golden-yellow, but darkened progressively over the next few hours, with its abdomen being first to turn brown (Fig. 4). In time, the pupa became a rich, chestnut-brown, with a smooth, glossy texture; it measured 50 × 14 mm (Fig. 5). In ventral view, a double row of dark, file-like, raised ridges can be observed along the proboscis region (Fig. 5a). On its dorsum, a pair of elliptical metathoracic plates (tapered inwards) was located at the third thoracic segment (T3), exhibiting a coarse, granular texture within (Fig. 5c). The pupa is known to be tolerant of extremes of moisture and desiccation (Pittaway & Kitching, 2010).

Late on the night of 24 Feb.2009, the adult moth emerged (Fig. 6). It was a female (ZRC.LEP.187, body length: 44 mm, forewing length: 46 mm) and agreed closely with published illustrations of the subspecies (e.g., Inoue et al., 1997: Pl. 39 — Fig. 4b). Its vacated pupal case was cleaned and preserved. According to compiled larval hostplant records for *Acherontia styx*, it is clearly a polyphagous species that has been known to consume at least 30 genera of plants in 12 families, with preferences for species of the Bignoniaceae, Verbenaceae, and Solanaceae (Robinson et al., 2010; Pittaway & Kitching, 2010).



Fig. 2. The initial signs of prepupal colouration and behaviour were observed on the morning of 4 Feb.2009. A blush of pink appeared along its dorsum and it paced about in a restless manner. The tail horn length was 10 mm.

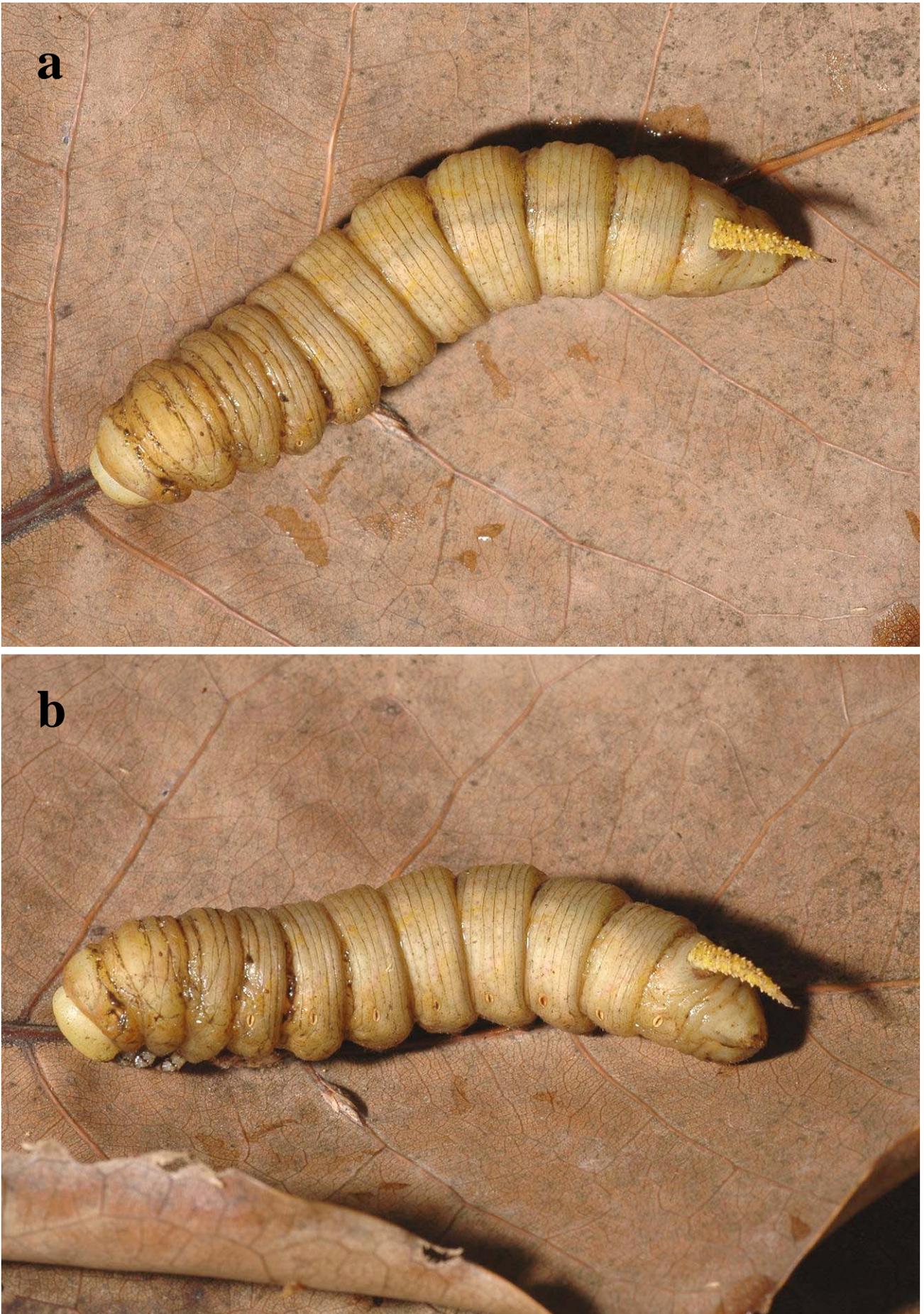


Fig. 3. Dorsal (a) and lateral (b) views of advanced prepupal stage. Note degree of constriction between the segments. Its total length had contracted to 57 mm (measured and photographed on the morning of 6 Feb.2009).



Fig. 4. Ventral view of freshly pupated hawkmoth with its larval exuvia, photographed on the morning of 8 Feb.2009 (1025 hours). Length of pupa = 50 mm.

MATERIAL EXAMINED

Table 1. Specimens of adult *Acherontia styx medusa* at the ZRC, RMBR. [PM = Peninsular Malaysia, SP = Singapore, M = male, F = female, BL = body length (mm), FW = forewing length (mm)].

ZRC.LEP.	sex	BL	FW	Locality	Collected by	Date
183	F	48	52	PM: Perak; Maxwell's Hill, 4700 ft.	K. Subramaniam	6 Jan.1955
184	F	44	48	SP: 'Singapore'.	Unknown	23 Jun.1949
185	F	52	53	SP: NUS campus; Sheares Hall.	'LCF'	15 Nov.1981
186	M	45	46	SP: Telok Kurau, reared from mature larva on <i>Clerodendrum</i> (Verbenaceae). Pupated: 16 Feb.2005; Emerged: 7 Mar.2005	V. D'Rozario	14 Feb.2005
187	F	44	46	SP: Pulau Ubin, reared from mature larva on <i>Solanum torvum</i> (Solanaceae). Pupated: 8 Feb.2009; Emerged: 24 Feb.2009	A. Tay	31 Jan.2009
284	F	52	54	SP: Joo Chiat Road, private residence, found freshly dead.	D. Mok	3 Feb.2010

ACKNOWLEDGEMENTS

We wish to thank Vilma D'Rozario, and Dawn Mok for sharing their encounters with this hawkmoth and kindly donating the voucher specimens. We are grateful to Kelvin K. P. Lim and Lua Hui Kheng (Raffles Museum of Biodiversity Research) for facilitating access to examine the sphingid specimens in the ZRC Lepidoptera Collection. The original manuscript benefited from detailed comments by an anonymous lepidopterist reviewer.

LITERATURE CITED

- Inoue, H., R. D. Kennett & I. J. Kitching, 1997. *Moths of Thailand, Vol. Two – Sphingidae*. Chok Chai Press, Bangkok. 149 pp., 44 col. pls.
- Pittaway, A. R. & I. J. Kitching, 2010. Sphingidae of the Eastern Palaearctic. <http://tpittaway.tripod.com/china/china.htm> (Accessed: 5 Dec.2010)
- Robinson, G. S., P. R. Ackery, I. J. Kitching, G. W. Beccaloni & L. M. Hernández, 2010. *HOSTS—A Database of the World's Lepidopteran Hostplants*. Natural History Museum, London. <http://www.nhm.ac.uk/research-curation/research/projects/hostplants/>. (Accessed: 5 Dec.2010).

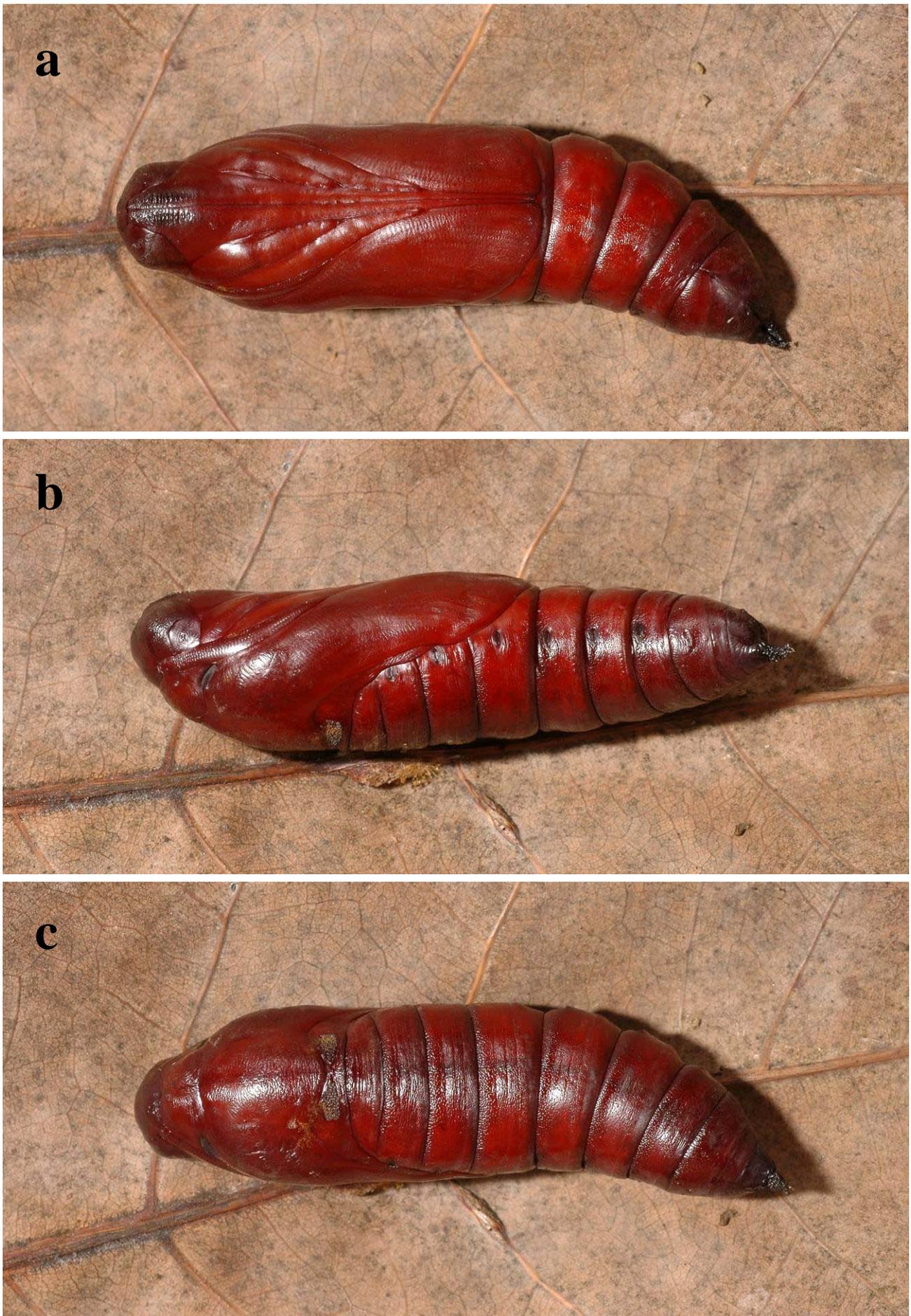


Fig. 5. Ventral (a), lateral (b), and dorsal (c) views of the pupa (50 × 14 mm). Measured and photographed on 10 Feb.2009.



Fig. 6. Female hawkmoth (ZRC.LEP.187, body length: 44 mm, forewing length: 46 mm) freshly emerged late on the night of 24 Feb.2009.