

**FINAL INSTAR CATERPILLAR AND METAMORPHOSIS OF
CHIASMIA OZARARIA (WALKER, 1860), IN SINGAPORE
(LEPIDOPTERA: GEOMETRIDAE: ENNOMINAE)**

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INTRODUCTION

The geometrid moth, *Chiasmia ozararia* (Walker, 1860), belongs to the tribe Macariini Guenée, and has been recorded from the Indian Subregion, Borneo, Sumatra, and Java (Holloway, 1993—as *Godonela ozararia*). The genus *Godonela* Boisduval, 1840, has since been included into a broader concept of the genus *Chiasmia* Hübner, 1823, and may be defined by the presence of a distinctive sclerite in the tegumen of the male genitalia (Scoble, 1999; Scoble & Krüger, 2002). In Singapore, the diagnostic larva of *Chiasmia ozararia* has been previously encountered in the nature reserves, with recent attempts at successful rearing to metamorphosis confirming its identity. In this article, the final instar larva and subsequent pupa are illustrated, and a possible defensive strategy of automimicry is proposed for its boldly patterned larvae.



Fig. 1. Final instar larva of *Chiasmia ozararia* on its hostplant, jering (*Archidendron jiringa*, Fabaceae), encountered at the Bukit Timah Nature Reserve on the night of 3 Dec.2009 (ca. 2130 hours). Its total length was 32 mm. The leaves were still wet, as it had rained in the afternoon.

OBSERVATIONS

On the night of 3 Dec.2009 (ca. 2130 hours), two final instar larvae of *Chiasmia ozararia* were found beside the Keruing Hut, at the Bukit Timah Nature Reserve. One larva was perched at the leaf margin of its hostplant (Fig. 1), while the other was suspended vertically via a silken thread (Fig. 2). Both larvae were approximately at eye-level. The hostplant was subsequently identified to be a native legume, jering, *Archidendron jiringa* (family Fabaceae). The total length of the larvae was 32 mm.

The larval head was brownish-orange, while the thoracic segments were a paler shade of orange, ornamented with black dots. Its thoracic legs were black, with orange at the base. Its dorsal and ventral markings were visually striking, but differently patterned, and clearly demarcated by a continuous, yellowish, mid-lateral line. On its underside, there were two series of four to five (one more irregular) black rectangles, with black dots in between, flanking a central white stripe that runs the length of the body (Fig. 2a). The ventral, black rectangles occur on the first five abdominal segments (A1–A5).

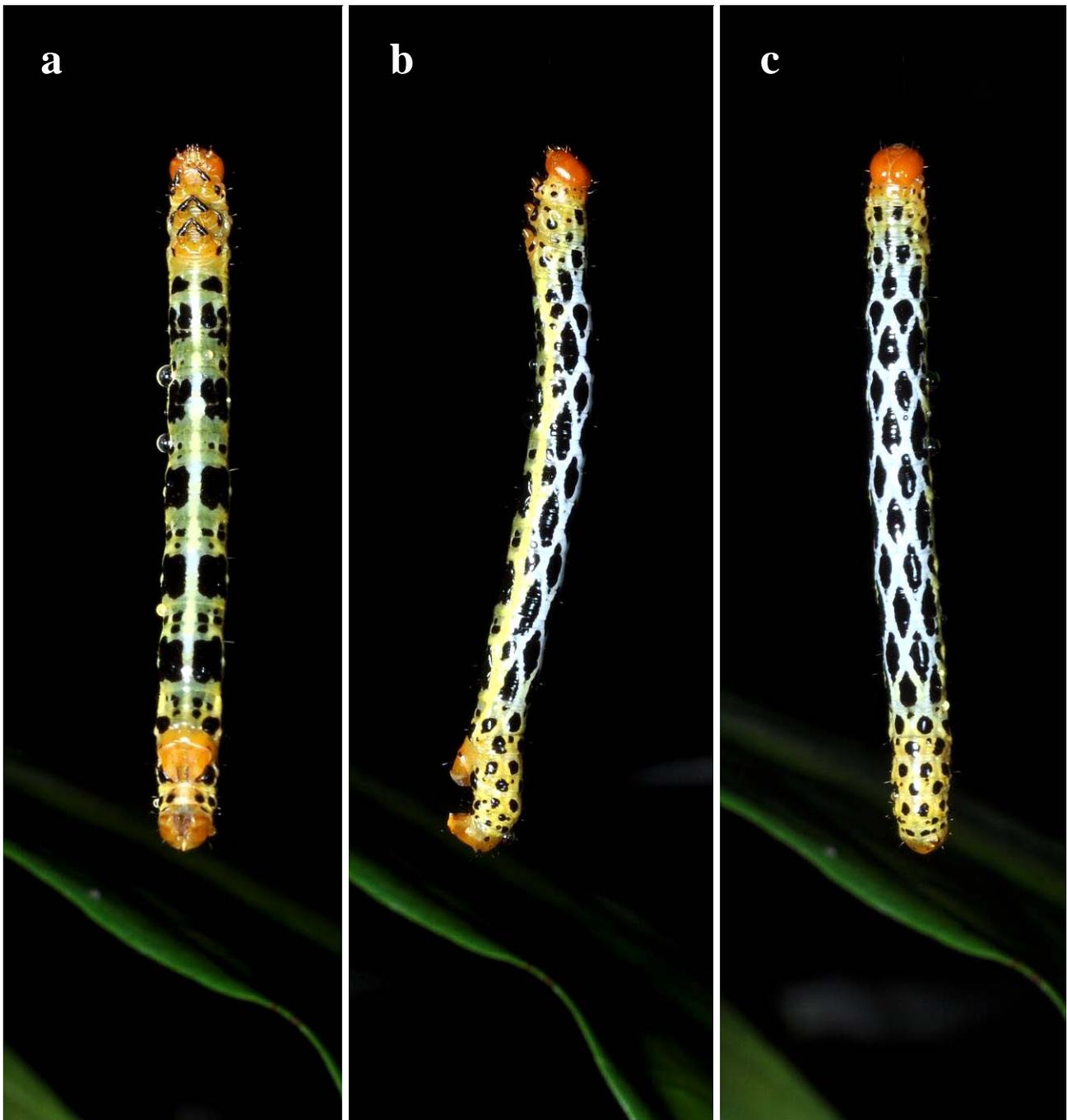


Fig. 2. Ventral (a), lateral (b), and dorsal (c) views of final instar larva suspended by fine silk from its hostplant. Note remarkable resemblance of the posterior end to its anterior. The shape and colour of its anal prolegs appear to be similar to that of its head.

On its dorsum, the markings were even more striking, consisting of evenly spaced, black diamonds against a network of clean white (Fig. 2c). These larvae matched earlier descriptions/illustrations of the species in Borneo very closely (Holloway, 1993; Chey, 1996). Upon closer examination of the larva, it became apparent that its posterior half was almost an exact mirror image of its anterior half. In particular, the colour and shape of its anal prolegs bore a remarkable resemblance to its actual head. This may be an example of automimicry, whereby one portion of its body mimics another (often the head, as a decoy), as a possible form of anti-predator defence.

In captivity, both larvae consumed the jering leaves at a moderate, but consistent pace. The first larva demonstrated pre-pupal behaviour and colour changes on the night of 5 Dec.2009, with pupation complete by the pre-dawn hours of 7 Dec.2009. The second larva entered the pre-pupal phase on the afternoon of 6 Dec.2009 and completed its pupation by the morning of 8 Dec.2009. Both pupae measured 14 mm by 4 mm, and were an even, honey-brown colour, with the anterior and posterior apices being marginally darker (Fig. 3). There were numerous, fine, indented stipples on the abdominal segments, and the cremaster was drawn out as a short, sharp spine with a bifid tip. There was a moderate, inter-segmental constriction at the middle section of the abdomen.

During a routine pupal inspection on the morning of 13 Dec.2009, one of the pupae was observed to have been infected by fungus and appeared lifeless. The other pupa was still viable and wriggled its abdominal segment when examined. The infected pupa was then removed and preserved. On the following morning (14 Dec.2009), an adult moth successfully eclosed from the remnant pupa and was determined to be a female (Fig. 4). The wing shape, colouration, and patterns of this moth agreed positively with published illustrations for the species (Holloway, 1993: Pl. 8—Moth 19; Scoble & Krüger, 2002: Fig. 46).

On its thorax, there was a noticeable, dark brown pattern that somewhat resembled a simple ‘smiley face’. Over its abdominal segments, there were also pairs of blackish dots that faded towards the posterior. The emergent moth was then deposited at the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research (RMBR), National University of Singapore. It was catalogued as ZRC.LEP.269 (body length: 12 mm, forewing length: 16 mm). Upon searching through the ZRC geometrid collection, there did not appear to be prior specimens of this species.

An earlier hostplant record for *Chiasmia ozararia* was the exotic softwood, black wattle (*Acacia mangium*; Fabaceae), based on Bornean accounts (Holloway, 1993). Among the documented larval hostplants for members in the moth genus *Chiasmia*, legumes (Fabaceae) have been predominantly featured; although a few non-legumes have also been accepted, including: *Camellia* (Theaceae), *Elaeagnus* (Elaeagnaceae), *Terminalia* (Combretaceae), and *Tamarix* (Tamaricaceae) (Holloway, 1993; Robinson et al., 2009—as *Godonela*). In Borneo, at least nine species of *Chiasmia* have been recorded (Holloway, 1993—as *Godonela*), whereas in Singapore, its actual representation and diversity remains to be further investigated.

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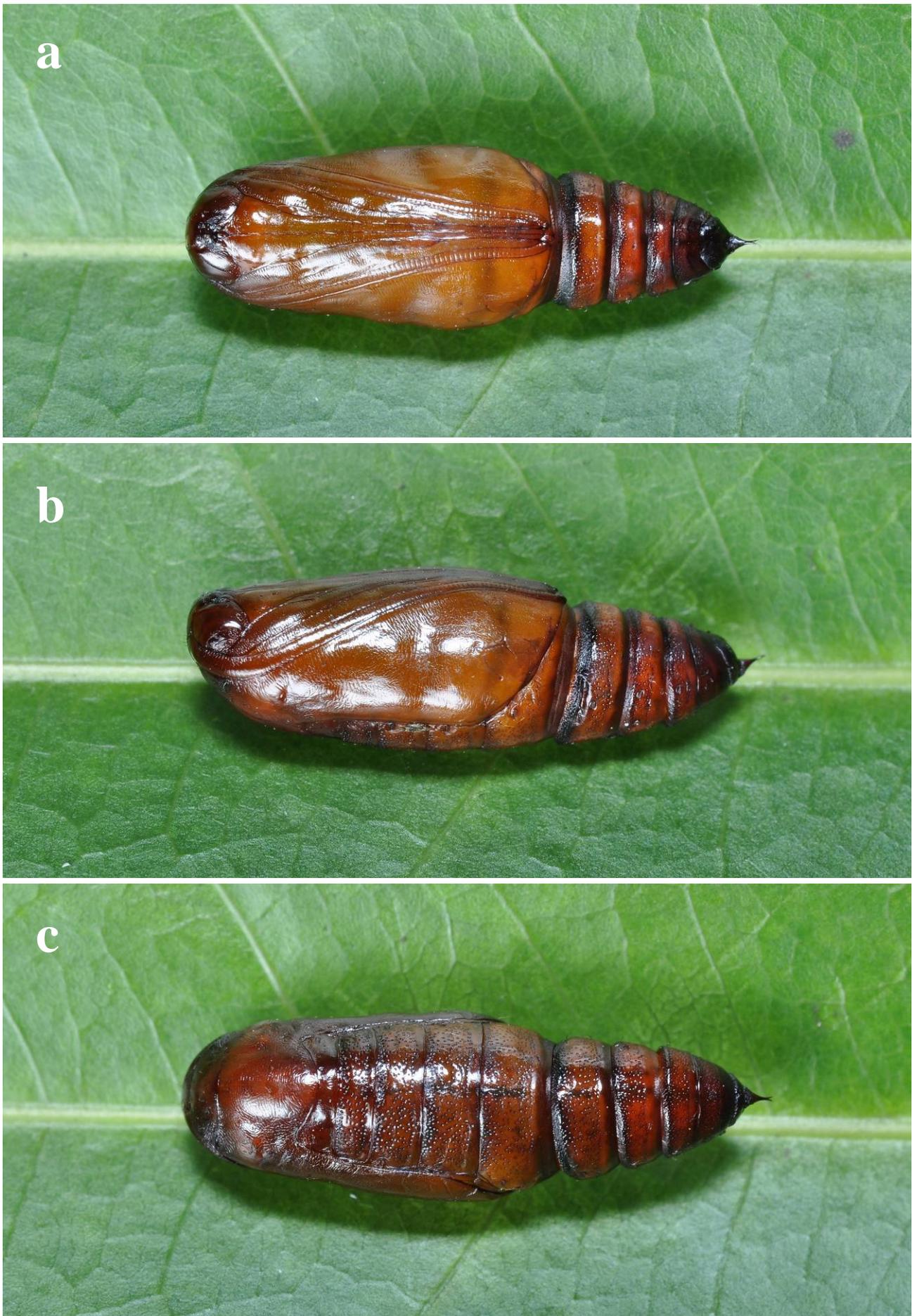


Fig. 3. Ventral (a), lateral (b), and dorsal (c) views of the pupa. The pupa was 14 mm by 4 mm.



Fig. 4. Freshly emerged female moth (ZRC.LEP.269, body length: 12 mm, forewing length: 16 mm), eclosed on the morning of 14 Dec.2009. Note presence of a 'smiley face' on its thorax.