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THE LARVA OF *MACROMIA CINCTA* RAMBUR, WITH A KEY TO THE KNOWN *MACROMIA* LARVAE OF THE MALAYSIAN PENINSULA (ANISOPTERA: MACROMIIDAE)

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A ♀ final instar larva (reared) from the Malaysian Peninsula is described and illustrated in detail. A comparison to other larvae of the genus inhabiting this Peninsula is made, and a key is provided. The unique features in the larva of *M. cincta* are: premental setae 4+2 or 4+3, dorsal protuberances on abdominal segments 3-10, increasing gradually to the rear but suddenly reduced on 10, and the presence of a basal tubercle on the inner margin of the galeolacinia.

INTRODUCTION

Macromia is a very speciose genus of dragonflies, with 119 species known to date (BRIDGES, 1991; MAY, 1997; WILSON, 1998; ZHOU, 2003), and with a nearly world-wide distribution, except for Central and South America and northern Europe (DAVIES & TOBIN, 1985; MAY, 1997). Probably this number of species could be reduced in the future if the genus *Phyllomacromia* is resurrected as was proposed by MAY (1997). According to LIEFTINCK (1950, 1954), DAVIES & TOBIN (1985), and WILSON & REELS (2001) on the Malaysian Peninsula live 7 species, one with 2 subspecies: *M. callisto* Laidlaw, *M. cincta* Rambur, *M. cydippe* Laidlaw, *M. gerstaeckeri* Krüger, *M. moorei fumata* Krüger, *M. m. malayana* Laidlaw, *M. septima* Martin, and *M. westwoodi* Selys, of which the larvae of 4 species are known to date [all of them described by LIEFTINCK (1950)]: *M. cydippe*, *M. gerstaeckeri*, *M. moorei fumata* and *M. westwoodi*. In this paper we describe the larva of *M. cincta,* based upon reared material.

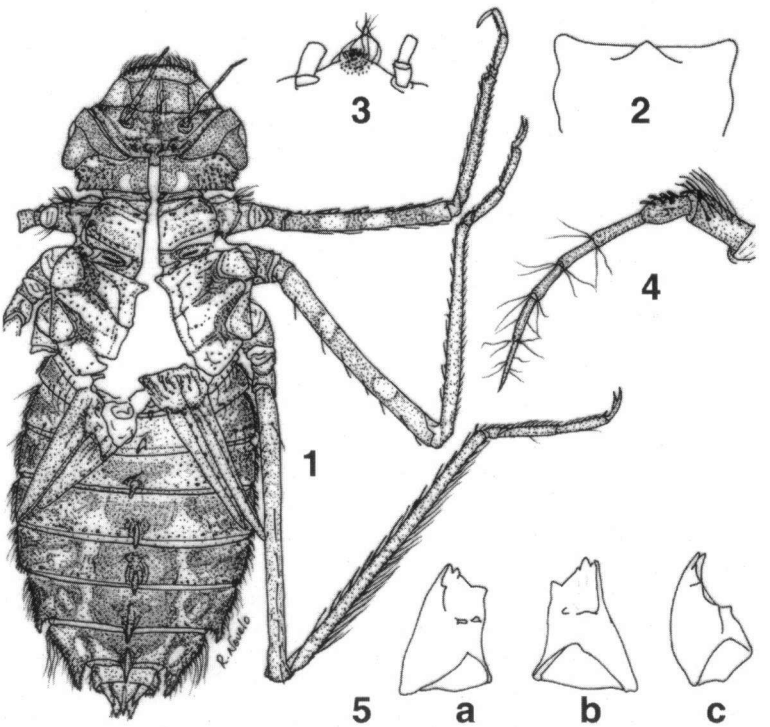
MACROMIA CINCTA RAMBUR

Figures 1-10

M a t e r i a l. – 3 exuviae (2♂, 1♀, reared). MALAYSIA: Kedah, Sekdang River, 17-III-2003 (emerged), Wahizatul Afzan leg. Deposited in Colección Entomológica del Instituto de Ecología, A.C. (IEXA), Xalapa, México (1♀), and in School of Biological Sciences, Universiti of Sains Malaysia (2♂).

DESCRIPTION. – Exuviae reddish brown; body stout, scarcely pilose; legs very long; abdomen with spine-like dorsal protuberances, and large lateral spines on the rear (Fig. 1).

H e a d. – Wider than long, compound eyes small, strongly protruding dorsally; lateral margins slightly converging, cephalic lobes rounded, covered with scale-like setae and with a posterolateral nipple-shaped tubercle on either side, occipital margin more or less straight. Frontal shelf high, widely rounded api-



Figs 1-5. *Macromia cincta* larva: (1) dorsal aspect of the female exuviae; – (2) frontal view of the head showing the upturned frontal shelf; – (3) anterodorsal view of the apex of the frontal shelf; – (4) left antenna, lateral view; – (5) mandibles: a, right mandible, ventrointernal view; b, left mandible, internal view; c, the same, dorsal view.

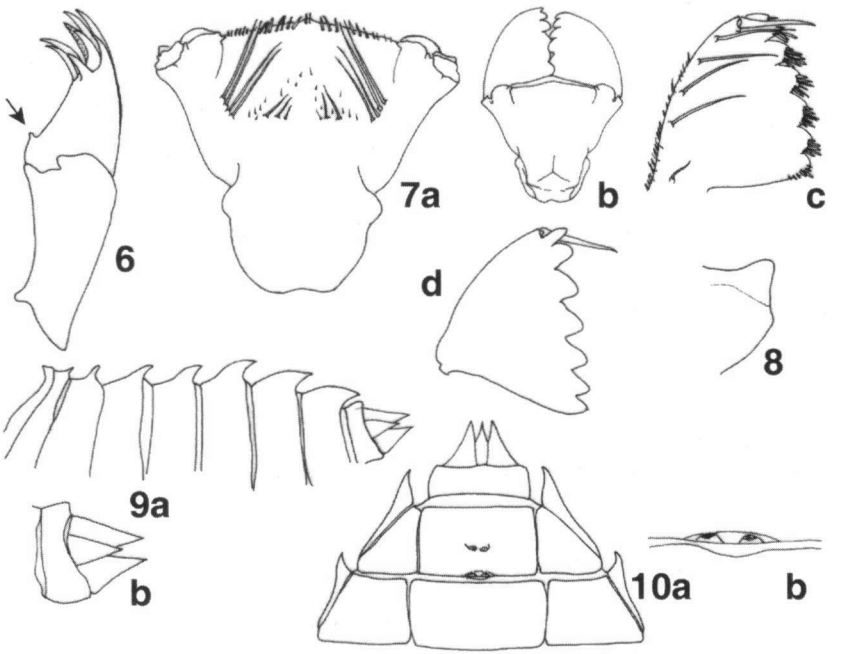
cally as seen in frontal aspect (Fig. 2), its entire border covered with a row of long and stout setae, and a tuft of short scale-like setae on the highest part of the shelf (Fig. 3). Antenna 7-segmented (Fig. 4), relative size of antennomeres: 0.9, 0.8, 1.0, 0.8, 0.7, 0.9, 1.0. Labrum widely notched at apical margin and with a series of long setae. Mandibles (Fig. 5) with four incisor cusps, molar area with two low, blunt cusps. Ventral pad of hypopharynx rectangular, 2.3 times wider than long, densely setose on anterior and lateral margins, a transversal row of stout setae at middle of ventral surface. Maxillae: Galeolacinia with seven teeth of different size and robustness, three short, robust, slightly incurved teeth on ventral margin, three long slightly incurved teeth on dorsal margin; a short, basal, blunt spine at inner margin (Fig. 6). Labium: Prementum-postmentum articulation reaching middle part of mesosternum; prementum (Fig. 7a-b) wider than long, lateral margins gradually converging to the basal part then suddenly narrowed at basal 0.40, beset with abundant setae which become spiniform setae to the lateroventral part; premental setae 4+2 or 4+3 and several minute spiniform setae at middle part of prementum; ligula widely rounded, poorly developed (Fig. 7b), with its border finely serrulated, and a dorsal subapical row of about 35 setae which increase in size and robustness to the center, two isolated setae at the extreme tip of ligula. Labial palp (Figs 7c-d) with 4 long setae and one setella close to the palp's articulation, distal margin with 7 widely rounded crenations bearing strong large setae, dorsal margin with a row of abundant setae, ventral margin slightly serrulated.

T h o r a x. – Prothorax narrower than head; pronotal disc rectangular, with a low, blunt tubercle on each posterolateral corner, proepisternum projected forwardly on the inferolateral portion as a small blunt cone (Fig. 8). Synthorax scarcely wider than head, covered with some scattered scale-like setae, and a row of long setae on inferolateral margins. Wing sheaths smooth except for a dorsal row of withish scale-like setae, anterior wing sheaths not reaching posterior margin of abdominal segment 6, posterior ones surpassing it. Legs very long (e.g.: when fully extended, posterior end of metafemur reaching posterior margin of abdominal segment 10; profemur as long as width of head but markedly shorter than width of synthorax; femora and tibiae with long setae and scale-like setae, mainly on dorsal and ventral borders, notoriously more abundant on tibiae; tarsi with two ventral rows of intermingled hair-like and scale-like setae, these scale-like setae multidentate.

A b d o m e n. – About 1.25 times wider than head, sides slightly convex; dorsal protuberances on segments 3-10 (Fig. 9a) as follows: short, slim, vertical (or almost so), finger-like on 3-4, spine-like, rearwardly directed, increasing in size and robustness posteriorly on 5-9, that on 10 short and blunt, only seen in lateral view, those on 5-9 with the dorsal margins beset with abundant, claviform, whitish setae. Lateral margins of 2-4 slightly convex, straight on 5-7, concave on 8-9 and ending in a strong incurved spine (Fig. 10a), with short scale-like setae and

long claviform setae on 2-6, long hair-like and claviform setae and short spiniform setae on 7-10. Sternites covered with minute setae, 2-9 divided into 3 plates, longitudinal sutures as follows: divergent on 2, parallel on 3, 6-7 and 9, slightly convergent on 4-5, and slightly divergent on 8. Female gonapophyses (Fig. 10a--b): Anterior valvulae small, blunt, conical rudiments; lateral valvulae vestigial, represented by two oval minute areas. Caudal appendages (Fig. 9b): Epiproct and paraprocts pyramidal, sharply pointed; basal width of epiproct 0.80 its length, keeled dorsally, with a row of long claviform setae along its dorsal margin, remainder of surface with spiniform setae; paraprocts mostly setose with short spiniform and long claviform setae, as well as stout, short, hair-like setae; basal width of cercus 0.60 its length, sharply-pointed; relative size: epiproct 1.0, paraproct 0.90, cercus 0.70.

Measurements (in mm). – Total length (including caudal app.) 24.5; abdomen 15; hind femur (dorsal margin) 10.5; maximum width of head 6.5; maximum width of abdomen (ventral) 8.5; epiproct 1.3, paraproct 1.15, cercus 1.0; lateral spine on abdominal segment 8, 0.5; on 9, 1.0.



Figs 6-10. *Macromia cincta* larval details: (6) maxilla, ventral view, showing the basal tubercle (arrow) and the teeth on galeolacinia (dotted area indicates the apex of maxillary palp; all setae omitted); – (7) labium: a, prementum, dorsal view; b, prementum, ventral view; c, left labial palp, dorsal view; d, the same, frontal view; – (8) detail of the inferolateral part of thoracic propleura, dorsal view; – (9) abdomen: a, lateral view of dorsal protuberances; b, detail of the anal pyramid; – (10) ventral view of caudal part of female abdomen: a, sternites 8-10; b, detail of the gonapophyses.

DISCUSSION. – The larva of *Macromia cincta* shares several features in common with others of the same genus inhabiting the Malayan Peninsula; these are as follows: presence of frontal horn (*gerstaeckeri, moorei fumata*); postcephalic tubercle (*cydippe, gerstaeckeri*); palpal setae 4+1 (*cydippe*); ligula poorly developed (*cydippe, gerstaeckeri*); palp with 7 crenulations (*gerstaeckeri, westwoodii*), and large lateral spines on abdominal segments 8-9 (*gerstaeckeri, westwoodii*). As can be seen, the most alike are *M. cincta* and *M. gerstaeckeri*. Three features are unique in the larva of *M. cincta*: the number of premental setae (4+2 - 4+3), the number, size and robustness of the abdominal dorsal protuberances (on segments 3-10, increasing gradually to the rear from 3 to 9, and suddenly reduced on 10), and the basal tubercle on the maxillary galeolacinia. As far as we know, this last feature has not been described previously for any other *Macromia* larva.

KEY TO THE *MACROMIA* LARVAE OF THE MALAYSIAN PENINSULA

1 Postcephalic lobes lacking any kind of tubercles; ligula well developed (free margin triangular-shaped) 2
– Postcephalic lobes with a low and blunt or nipple-shaped tubercles; ligula poorly developed (free margin straight or slightly convex) 3
2 With a well developed frontal horn; prementum with 5 large setae plus 4 or 5 smaller setae; dorsal protuberances on abdominal segments 2-4 erect and slender, that on 6 the highest ..... ***moorei fumata***
– Without frontal horn; prementum with 8 large setae plus 1-3 smaller setae; dorsal protuberances on abdominal segments 2-4 small, sometimes absent on 2 and thumb-shaped on 4, that on 6 as high as that on 7 ..... ***westwoodii***
3 Labial palp with 4 crenations; lateral spines on abdominal segments 7-9, short; without frontal horn; postcephalic tubercle small, low and blunt ..... ***cydippe***
– Labial palp with 7 crenations; lateral spines on abdominal segments 8-9, large; with a frontal horn; postcephalic tubercles nipple-shaped 4
4 Palpal setae 4 plus one basal setella; premental setae 4+2 or 4+3; dorsal abdominal protuberances on 3-10, increasing in size and robustness on 3-9 ..... ***cincta***
– Palpal setae 5 plus one basal setella; premental setae 5+2 or 5+3; dorsal abdominal protuberances on 3-9, high on 3-4, progressively lower on 5-9 ..... ***gerstaeckeri***

The features used to develop this key were extracted from the descriptions provided by LIEFTINCK (1950) except, of course, those of *M. cincta*.

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