

Notes on the Preimaginal Stages of two Malaysian Hymenoptera

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i. *Eumenes maxillosus* var. *circinalis* Fabr.

The ethology of *Eumenes maxillosus* and its several varieties has been studied by several observers, and a bibliographical summary is given by Dr. J. Bequaert in his admirable work on the Vespidae of the Belgian Congo¹. It seems to be very similar in all the forms. Maindron² has noted the nesting habits of the species discussed here, but I have not been able to consult his paper.

Though the ethology of many wasps has been described, the larvæ and pupæ of very few species are known. This is to be deplored, as I think that a knowledge of the structure of the pre-imaginal stages of *Hymenoptera* would have much taxonomic value,

¹ Bull. Amer. Mus. Nat. Hist., XXXIX, pp. 65—67, 1918.

² Ann. Soc. Ent. France, (6), II, p. 172, 1882.

especially in closely related forms like *E. marillosus* and its varieties. Indo-Malayan *Hymenoptera*, and this note is published to encourage their collection and description by local students.

The nest from which my larva and pupa was collected was about five inches long with five chambers, the chamber at each extremity rounded and large and not covered over. The three chambers in the body of the nest were lined with parchment and the openings closed with the same material. The rounded bottom chamber contained a rod-shaped egg about 4 mm. long, and a green butterfly caterpillar which had been stored alive by the parent wasp as food for the future larva; the next chamber contained a nearly full grown larva, the next a pupa, the next an imago which had not yet freed itself from the pupal skin, and the last a full-grown imago which was more or less ready for flight. The nest was composed of clay, the inner portion being smooth and flat, the edges raised, the outer portion rounded and not at all even. The larva is a little over 20 mm. in length, and is of a dirty cream color, the posterior half shaded with blackish-grey; body wrinkled; segments more or less of equal size, except the first which is very narrow; spiracles placed towards the anterior end of each segment on the sides of segments 2—11 inclusive; head smooth and shining, indistinctly longitudinally carinate on the vertex with an oblique, inwardly directed groove on each side of the face about the middle; towards the anterior margin there are two ocelli nearly twice as far away from each other as they are from the extreme edge of the head; between these ocelli and a little above them are two closely set pits, and just above each ocellus there is also a shallow, indistinct depression; clypeus very much broader than long, posterior margin rounded, anteriorly roundly toothed; labrum in two bean-shaped lobes below; mandibles two-jointed, basally very much broader than long, triangular towards the apex, which is strongly chitinised, with three sharp teeth visible from above; labium squarish, convex, slightly emarginate above, somewhat rounded at the sides and below, indistinctly longitudinally grooved, and apparently with a few irregular tiny tubercles, a brownish palp on each side above towards the sides; maxillæ broad and rounded at their apex, narrower at base, with the palpi in the middle at the extreme apex; no legs.

The pupa is of a dirty creamy-yellow color, and shows all the imagine structures through the thin enveloping caul; eyes black; inter-antennal space not distinctly raised as in adult, and clypeus only very slightly convex, the latter shaped as in imago otherwise, but finely and transversely striate not punctured; mandibles as in imago, little darker than the clypeus; antennæ very pale, joints visible but not very distinct, bent forward over the clypeus and mouth-parts and extending to the base of the petiole; mesonotum and scutellum distinctly longitudinally grooved with traces of fine, transverse striation, not coarsely punctured as in adult, the former

with a distinct circular elevation in the centre reminiscent of a papilla or sucker, greyish-black, except for two triangular creamy markings antero-laterally, this marking being very similar in shape to that in the imago, and provides a good character for recognising the pupa as that of *circinalis*; the scutellum is unmarked; the sides of the thorax in the adult have a black stripe extending downwards from in front of the tegulae, which is also distinguishable in the pupa; periole broad and flat, with a greyish-black marking medially above; basal two abdominal segments above blackish, the rest pale; wings small and narrow, with an outer flavo-hyaline sheath enclosing a soft white pulp; legs unmarked; size about the same as that of the imago.

ii. *Eumenes caffer* var. *esuriens* Fabr.

The following descriptions of the larva and pupa of *Eumenes caffer* var. *esuriens* Fabr., are intended to supplement our knowledge of the life-history of this wasp.¹

The egg is rod-shaped, as in other Eumenids, and is about 2.5 mm. in length. It is enclosed in a transparent membranous case, the actual body of the egg, which is cream coloured, being a little smaller than the whole structure.

The full grown larva is of the general Rumenid type and coloration (dirty cream or pale flesh color), and is about 12 mm. long by 5 mm. broad. The segmentation is very distinct, the individual segments being more or less equal in size. The spiracles are as in *E. maxillosus* var. *circinalis*. The head is rounded, slightly broader than long, with an indistinct longitudinal groove; an oblique groove on each side of the face marks the inner orbital margins of the future eyes, between these grooves there is a row of four shallow pits extending almost in a straight line, the two centre ones being situated close together; below each lateral pit there is an "ocellus", which is really the antennal bud; the clypeus is roughly rectangular, about twice as long as broad, posterior margin somewhat rounded, sides parallel, anterior margin almost transverse; the labrum is in two bean-shaped lobes below, much as in *E. maxillosus* var. *circinalis*; mandibles short and broad, divided at apex into three short, obtuse teeth; labrum convex, broader above than below, upper margin transverse, lower margin rounded, palps situated near the upper margin towards the sides; maxillae elongate, medially constricted, broadest at apex, palps situated about the middle at the apical margin.

The pre-pupa is similar to the larva, but differs in that the segmentation is not distinct, and the legs and wings, enclosed in their hypodermal sacs, may be clearly distinguished. The head is deeply depressed longitudinally as the result of internal changes,

¹ Horne, Trans. Zool. Soc. London, vii, 3, p. 166, 1870; Dutt, Mem. Dept. Agric. Ind., Entom. ser., iv, 4, p. 229, 1912; Roubaud, Ann. Sc. Nat. Zool., (50), 1, p. 60, 1916.

