NOTES ON THE LARVA AND PUPA OF *AMPHIPSYCHE INDICA* MARTYNOV [INSECTA: TRICHOPTERA].

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INTRODUCTION.

Large numbers of larvae and pupae of a Trichopteran of the family Hydropsychidae were found attached to the walls of the main storage tanks and filter-beds of the main water pumping station at Pulta which is situated on the southern bank of the river Hooghly about seventeen miles north of Calcutta. They were met with during May, 1936, in the course of an investigation of the biology of the aquatic fauna of the main pumping station undertaken by the Zoological Survey of India at the instance of the Calcutta Corporation. The adults of the species, which were sent to Dr. A. B. Martynov, Moscow, have been identified as *Amphipsyche indica* Martynov[1]. The earlier stages of no species of the genus *Amphipsyche* McLachlan have, so far as I am aware, been described, and as *A. indica* appears to have some importance in connection with the filter-beds, I have thought it opportune to record my observations on its biology and describe its larval and pupal stages.

I am obliged to Dr. A. B. Martynov, U.S.S.R., for the identification of the adult Caddis-flies, and to Dr. Baini Prashad, Director, Zoological Survey of India, for help in preparing this paper for the press.

DESCRIPTION.

Larva (Text-fig. *a*).—Length 12 mm., width 3 mm. General colouration greenish approaching Roman green dorsally; ventrally somewhat lighter. All horny parts of head and thorax yellowish brown with black markings in the lateral margins of pro-, meso-, and metathorax. Thorax as a whole paler than head, which is dark brown; dorsal surface flattened forming a broad disc or the false clypeus, beset with numerous closely placed bristles and enclosed by a heavy horse-shoe-shaped carina. The carina crosses the true clypeus near its apex, but does not distinctly set off the small triangle characteristic of genera like *Macronema* Pict. Long bristles at the anterior corners of head just above the lateral eyes, which are of a dark brown colour. Mandibles dark brown, with long stiff hairs at the outer margin posteriorly. Right mandible with five teeth on its inner margin, fifth situated about the middle (Text-fig. *b*). Left mandible with six teeth, fifth and sixth situated close together about the middle (Text-fig. *c*). The first tooth in both the mandibles is raised above the second and pointed; the rest in one plane and blunt; sixth tooth of left mandible with a dent in the middle.

Legs yellowish brown, beset with numerous hairs. Coxae with black markings at points of attachment to body. Short accessory claws present in all legs. Accessory claws of prolegs absent.

[1] Martynov, A. B., *Rec. Ind. Mus.*, XXXVII, p. 199 (1935).

Thoracic and abdominal tracheal gills present. Anal gills absent. The following table shows the distribution and arrangement of gills on the left side of the larva :

	Thoracic segments.		Abdominal segments.							
	II	III	I	II	III	IV	V	VI	VII	VIII
D.	*nil*	1	*nil*	2, 1	2, 1	2, 1	2, 1	2, 1	2, 1	2
L.	*nil*	*nil*	1	2	2	2	2	2	2	*nil*
V.	1	1	1	1	1	1	1	1	*nil*	*nil*

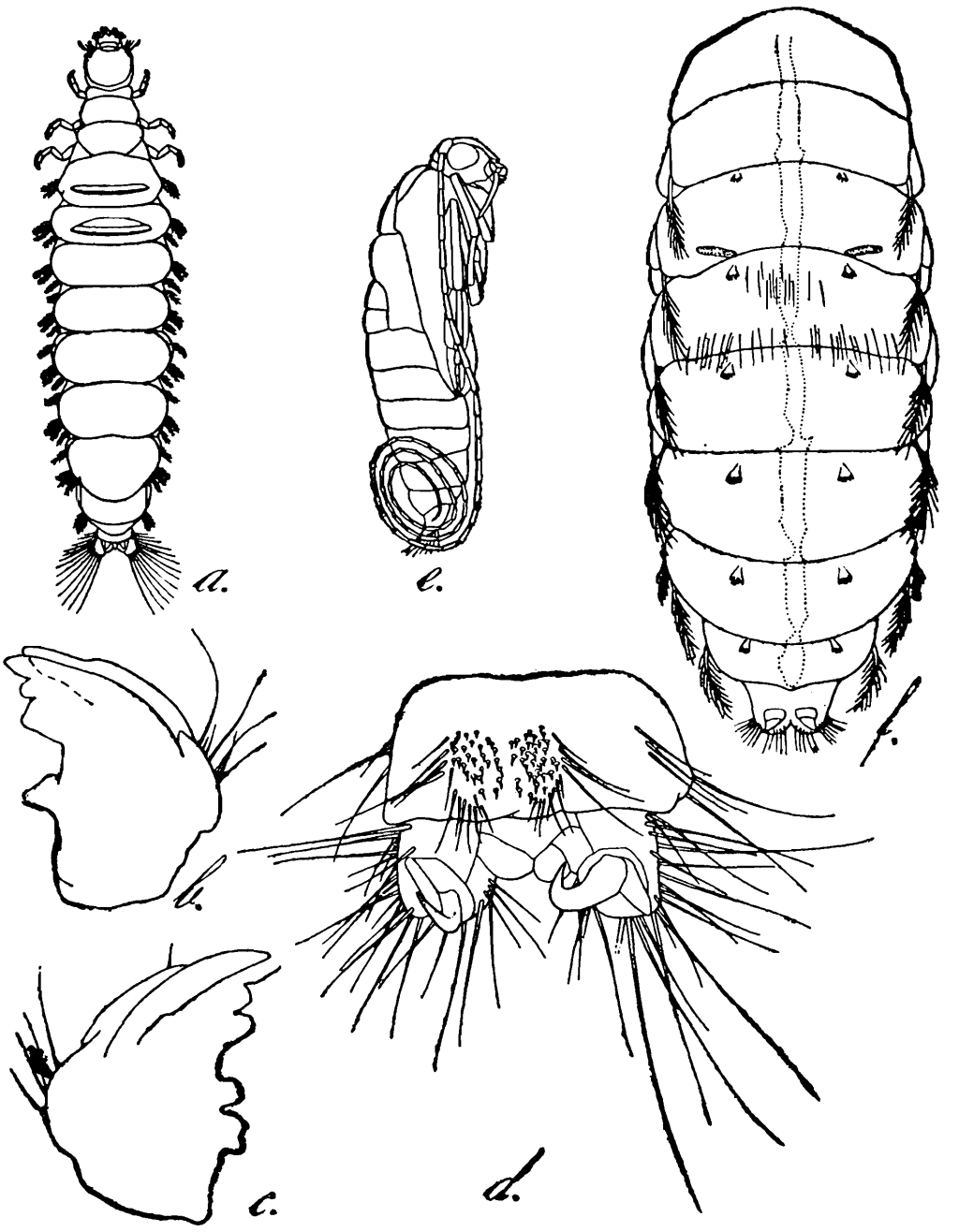
D.=Dorsal; L.=Lateral (half-way between D. and V.); V.=Ventral; 1.=single filamentous gill, and 2.=gill composed of two separate filaments.

The single filamentous " Dorsal " abdominal gills situated near the posterior margins of their respective abdominal segments and dorsad of the other " Dorsal " gills which are composed of two distinct filaments. The ninth abdominal segment bears ventrally two somewhat oval patches of short, spike-like, dark brown bristles ; those forming the outer fringe are considerably longer than the middle ones (Text-fig. *d*).

Pupa (Text-fig. *e*).—Length 10 mm., width 2·5 mm. The pupae when removed from their sheaths are dull greenish to dirty whitish. Head and thorax not chitinized. Eyes large and well developed. Legs white, well developed and compactly placed on the ventral side. Antennae whitish, long, and closely pressed against the sides of the entire length of the body, ends curled up into coils at the posterior extremity. White leaf-like developing wings closely pressed against the sides of the thorax. The two oval patches of bristles on the ninth abdominal segment present in the larval stage have disappeared. Abdominal gills present though somewhat degenerate. Fourth abdominal segment dorsally hairy. Abdominal segments 3, 4, 5, 6, 7 and 8 bear dorsally on either side of the mid-dorsal line near the upper margin a pair of minute reddish pectinate structures lying flatly on the segments with the teeth of the combs pointed backwards. Segment 3 near the lower margin with a pair of narrow obliquely situated patches of minute reddish bristles in addition to the pair of pectinate structures (Text-fig. *f*). Long stiff hairs on the anal segment posteriorly. Mouth parts fairly well developed ; mandibles folded on each other transversely like the blades of a penknife, with the right one anterior to the left.

Larval and pupal cases.—Length 11 mm., diameter 3·5 mm. The cases of both the larvae and the pupae are cylindrical and somewhat arched in the middle. They are made of some tough material, with minute sand grains mixed in it. Posterior end rounded and closed. Anterior end closed with a firmly attached disc-like plate in the pupae only. Both the disc and the rounded posterior end are provided with a number of minute slits in their middle. The cases are attached side by side like a honey-comb in two to three tiers.

Large mats of these cases were found attached to the sides and bottom of the outlet channel which discharges water from the final settling tank



Amphipsyche indica Martynov.

a. Dorsal view of larva, ×4 ; *b.* right mandible of larva, × 40 ; *c.* left mandible of larva, ×40 ; *d.* ventral view of the posterior extremity of larva showing the two ovalish patches of bristles on the 9th abdominal segment and the prolegs, ×30 ; *e.* side view of pupa, ×5 ; *f.* dorsal view of the abdominal segments of pupa showing the position of pairs of pectinate structures and patches of bristles on the third segment, ×12·5.

to the various filter-beds. Along with these mats of cases, some of them measuring 18 inches by 12 inches, colonies of the fresh water sponge, *Corvospongilla lapidosa* Ann., were found adhering to the sides and bottom of the outlet channel. A few larvae were also found living in the channels of the sponges. Large numbers of dead larvae and pupae were found in the intake chambers of the filter-beds. A few pupae were collected from the walls of the filter-beds. The larvae invariably perished in

aquaria in the laboratory and hence their feeding habits could not be studied.

Dense swarms of the adult *A. indica* were observed on 15th May 1936 at about 6-15 P.M. just before dark flying low over thick growth of plants in the compound of the water-works in the neighbourhood of the filter-beds and the final settling tank. Comparatively larger numbers of these were also attracted to light on this particular night.

The larva of *A. indica* shows characters common to the subfamily Macronematinae but differs from the genus *Macronema* Pict. in the absence of the small triangle set off on the dorsal surface of the head, where the carina or the false clypeus crosses the true clypeus near its apex. The closely related genus *Hydropsyche* Pict. differs from *Amphipsyche* McLachlan in the absence of the carina.

Reference to literature.

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