

THE LARVAL AND PUPAL STAGES OF AULACODES SP.
(HYDROCAMPINAE-LEPIDOPTERA)
FROM FORMOSA

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ONE PLATE

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INTRODUCTION

The aquatic lepidopterous larvae and pupae from rapid streams are rather uncommon, and only a few cases have been described. In 1909 Poulton recorded a Chinese species *Aulacodes simplialis* Snell; in 1914 Lloyd described an American species of genus *Elophila*; and recently in 1928 Pruthi studied the Indian species of *Aulacodes peribocalis* Wlk. I have been collecting lepidopterous larvae from rapid mountain streams of Japan proper, and have been much interested in studying the life-history of them. Professor S. Issiki of Formosa Higher School of Agriculture and Forestry, happened to discover a Formosan species in a mountain stream near Kōshun and delivered the material to me for examination. As the life-history of this insect is as yet unknown, I wish to report here on the morphology of the larva and pupa only. I am indebted to Professor T. Kawamura for his kind guidance, and to Professor Issiki for collecting the specimens.

MORPHOLOGY OF LARVA AND PUPA

Larva

General aspect—The length of mature larva (fig. 1) is about 18 mm., its greatest breadth (4 mm.) being in the region of the prothorax. The body is depressed, tapering gradually from its pro-

thorax to the end of tenth abdominal segment. The ground color is yellow and shaded with brown. There are three pairs of legs and five pairs of prolegs. The branched hairlike tracheal gills arise on each side of the thorax and abdomen. The spiracles on I-VII abdominal segments are well developed but are rudimentary on the prothorax and eighth abdominal segment. The skin bears many short setae.

Head—The breadth is much wider than the length, the cephalic index being 162.5, and is heavily chitinized. The anterior margin is blackish brown, and the center of posterior margin is concave with triangular and adfrontal sclerites. The frons are well developed and are W-shaped in lateral and caudal margins. A V-shaped black marking and group of spots are present on the frons. Each parietal plate bears six ocelli, three of which seems to be rudimentary.

The antenna (fig. 5) has three articles on its cardo. The second article (fig. 6) has a long hair, three hairy processes and a yellow article with hairy process. The labrum (fig. 2) is yellowish brown, concaved in the anterior margin, and has five pairs of yellow setae on the dorsal surface and a pair of leafing processes. The mandible (fig. 4) is blackish brown, with two teeth on its tip and two setae on its dorsal side. The maxillae are like the antenna, each bearing a three jointed palpus. The palpus is very long; the first joint of it is thicker and bears many hairs, while the second and third joints are slender, and the later has a sensory process. The maxilla (fig. 3) is short and bears a yellow process and many hairs on its tip. The spinneret of labium (fig. 3) is conical, and the labial palpus consists of two joints.

Thorax—The first thoracic segment is heavily chitinized and lacks the gills. The meso- and metathoracic segments are soft membranous and on each side present a gill which is branched from one stem. The legs (fig. 7) are almost same in length and each consists of three segments and a claw. The basal chitinous plate and each segment of the leg have many yellow setae. The sensory processes are present on the inner side of the claw and on the third segment (fig. 8).

Abdomen—Each gill (fig. 9) is tuft-like and is branched from

one stem. The first and second abdominal segments bear each a pair of gills on its lateral side. Each of the III–VIII abdominal segments has two pairs of gills on its lateral and dorsal sides, of which the dorsal gills are smaller than the lateral ones. The ninth abdominal segment bears three pairs of gills (fig. 1). The spiracles are present, but their openings seem to be almost closed. The prolegs are present on the ventral side of III–VI abdominal segments and also on the last segment. The proleg (fig. 10) is triordinal in form and bears many clochets of yellowish brown chitin. The clochets on III–VI abdominal segments are complete circles in shape but the last one is penellipse in form.

Food of larva—The contents of the stomach consisted entirely of the filamentous algae; most abundant among others were *Ulthrix* sp., *Microspora* sp. etc.

Pupa

The pupa (fig. 12, 13) is much smaller than the larva, being 10 mm. in length, and 3.5 mm. in breadth in the region of fifth abdominal segment. The head is smaller than the abdomen, being 2.3 mm. in breadth. The color of alcoholic specimens is dark yellow, excepting the black eyes. The proboscides (fig. 13, pb), mid legs (fig. 13, $1g_2$) and hindlegs (fig. 12, $1g_3$) are much longer than the body. No gills. The spiracles (fig. 12, sp), brown in color are present on the III–V abdominal segments.

Case. Unknown.

Locality. Shijû-kei, Takao prefecture, Formosa (Jan. 6, 1926, S. Issiki).

The present specimen is allied to Chinese species *Aulacodes simplialis* Snell. and Indian species *Aulacodes peribocalis* Wlk., differing however from either in the following points.

- Larva:
1. Prothorax is broader than the mesothorax.
 2. The dorsal sides of III–IX abdominal segments bear the small gills.
 3. Mandible with two teeth on its apex.

Pupa: The cases of proboscides, midlegs and hindlegs are much longer than the body.

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PLATE

PLATE 1

EXPLANATION OF FIGURES

ABBREVIATIONS

a, Antenna. *ab*₁, The first abdominal segment *cx*, Coxa of foreleg *e*, Eye
*lg*₁-*lg*₃, Legs *pb*, Proboscis *sp*, Spiracle *th*₁-*th*₃, Thoraces. *vt*, Vertex
*W*₁-*W*₂, Wings

- 1 Larva of *Aulacodes* *sp.*, dorsal view. × 7
- 2 Labrum. × 25
- 3 Maxilla and labium. × 25
- 4 Left mandible. × 25
- 5 Antenna. × 25
- 6 Tip of antenna. × 110
- 7 Foreleg. × 25
- 8 Claw of foreleg. × 110
- 9 Abdominal gill. × 15
- 10 Proleg. × 25
- 11 Clochet of proleg. × 110
- 12 Pupa, ventral view. × 5
- 13 Pupa, dorsal view. × 5

LARVA AND PUPA OF AULACODES

MASATOSHI IWATA

PLATE 1

