Int. J. Sustain. Agril. Tech. 2(5):01-05, July 2006
An on line Journal of "G-Science Implementation & Publication"

SOME INVESTIGATION ON THE LARVAL MORPHOLOGICAL PROPERTIES OF *Epilachna pusillanima* MULSANT (COLEOPTERA: COCCINELLIDAE)

B. ELORA[1], K. ISLAM[2] AND Z. FERDOUSI[1]

[1]Department of Genetics & Breeding, Rajshahi University, Rajshahi-6205, Bangladesh, [2]Department of Genetics, Shahjalal University of Science & Technology, Sylhet-3114, Bangladesh.

ABSTRACT

The study of external morphological properties of fourth instars larva of *Epilachna pusillanima* is carried out at the field of Rajshahi University campus in 2001for study of larval morphology. Very little information about the morphology of the fourth instars has been known. In the study special reference is given to the scoli with branches found in the different region of the body. A little emphasis is given to their external views as of different segment. In this investigation it has already been revealed that the shape, colour and number of branches differ in different segment of the larval body.

Key Words: *Epilachna pusillanima,* Morphology and Phytophagous.

INTRODUCTION

The species of Epilachna have been long regarded as major pest of plants under the Cucurbitaceae, Solanaceae and Leguminosae family. The larva of the sub-family Epilachnae is phytophagous like the adults. The larval bodies are usually clothed with long branches and spinous process. The larvae of *Epilachna pusillanima* are well known as pests have not been hitherto studied in much detail. Mulsant (1948), Caneze (1961) and Grandi (1913) were described one or two larvae of the sub-family. Boving (1917), Gage (1920), Strouhal (1926) and a few others reported that have studied the larvae of Coccinellids in general, have also described the structure of one or two species only. Larvae of *Harmonia quadripunctata* have been described with illustrations by several European authors (e.g. Strouhl, 1926; Klausnitzer, 1973; Hodek, 1973), but the said species have no detail information. Very little information on the morphology of these insects is available. The present study was conducted on the external larval morphological properties in the laboratory. The number and arrangement of scoli in different region of the body given rather than their external views such as body colour and shape of different region. The present observation was based on the fourth instar larva of *E. pusillanima.*

MATERIALS AND METHODS

Materials examined in this study were get by rearing in the laboratory from female adults collected from the host plant Cucurbitaceae family at the field of Rajshahi University campus in 2001. Collected beetles were reared in the plastic pot, the mouth of the pots were covered with muslin cloth secured with rubber band. Eggs deposited on the leaves and inside the pot were collected for rearing after hatching, immediately the preferred host plants were supplied as food for the collected larvae. After completion three times molting of larvae, the fourth instar larvae were collected for segment observation. Description and illustration were made from the specimens preserved in 70% alcohol, but the colourations were observed by the fresh materials. Each segment was separated carefully from the different parts of the body of larvae with the help of binocular dissecting microscope. The photographs were made withy the help of compound microscopic camera.

RESULTS AND DISCUSSION

Larval body elongates ovule, a little longer than twice its width. General colour was pale yellow except for the more heavily sclerotized parts and areas round bases scoli which are brown (Plate-1). Head small, flattened and sub-rounded in appearance; irregularly arranged. Thorax was slightly increasing towards the abdomen. Thorax consists of prothorax, mesothorax and metathorax. The length, breadth and weight of fourth instar larvae were 5.31mm, 2.4mm and 9.45mg respectively.

There is considerable uniformity in the arrangement of scoli on the thoracic and abdominal segments. The three pairs of scoli on each segment are analyzed symmetrically on either side of the median longitudinal line. The scoli nearest the mid-dorsal line is called mid-dorsal scoli, the next is called the dorso-lateral scoli and the third usually on the lateral margin is called the lateral scoli.

Prothorax

Prothorax bears two pairs of scoli, mid-dorsal and two pairs dorso-lateral scoli (Plate-2A). Mid-dorsal scoli slightly long, directed antero-dorsally, fairly wide towards base, with 17-18 branches arising from all around its surface. The branches moderately long, except a few shorter setae (about half as long as a long branch) and two to three very thin, short and colorless setae which very usually disappeared. A large sized setae situated scoli a little long and broader at the base than the dorsal scoli, pointed antero-laterally and slightly upwards, with about 18-20 branches. Mostly as mid-dorsal scoli, but some especially those directed laterally much longer but thinner setae.

Mesothorax

Mesothorax with three pairs of scoli; mid-dorsal, dorso-lateral and lateral pairs are in plate-2B. The mid-dorsal scoli directed upward, slightly anteriorly and toward the middle of segment; dorso-lateral scoli slightly longer, directed dorso-laterally but otherwise similar to the mid-dorsal scoli. The lateral scoli also similar to the dorso-lateral scoli which consists of 15-17, 15-16 and 17-18 branches respectively. The base of dorso-lateral and mid-dorsal scoli jointed each other.

Metathorax

Metathorax also bears three pairs of scoli. This segments slightly wider than the metathorax but otherwise similar to the mesothorax. Each mid-dorsal, dorso-lateral and lateral scoli consists of 10-12, 13-15 and 12-14 branches respectively (Plate-2C). The base of dorso-lateral and mid-dorsal scoli are also similar to these of mesothorax. But the distance of two mid-dorsal scoli is different from mesothorax.

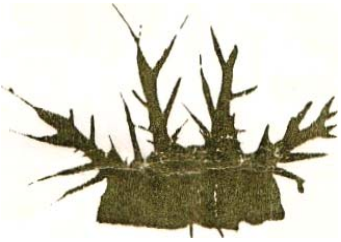
Abdomen

Abdomen eight segmented, each abdominal segment bears scoli with bristle of setae, arranged in row. First to seventh abdominal segment bears three pairs of scoli and eight abdominal segments bear two pairs of scoli, but the number of branches and setae in each scoli is not constant.

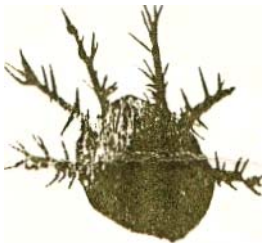
First abdominal segment

In the first abdominal segment, each mid-dorsal, dorso-lateral and lateral scoli consists of 8-10, 9-11 and 10-12 branches respectively (Plate-2D). The bases of mid-dorsal scoli are jointed and other scoli were separated from each other on its bases. Dorso-lateral scoli with sclerotised area is around its base; lateral scoli also distinct with sclerotised area around their bases, similar in structure to the dorso-lateral scoli. Lateral and dorso-lateral scoli are slightly longer than mid-dorsal scoli.

Plate 1 4th instar larva of *E. pusillanima*



Prothorax-A

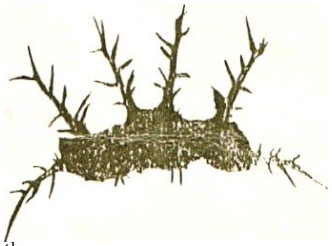


Mesothorax-B

1st abdominal segment-D

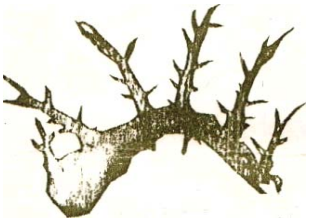
2nd abdominal Segment-E

3rd abdominal Segment-F



4th abdominal Segment-G

5th abdominal segment



6th abdominal segment

7th abdominal segment

8th abdominal segment

Plate 2 Larval scoli of each segment of *E. pusillanima*

Second abdominal segment
In the second abdominal segment, each mid-dorsal, dorso-lateral and lateral scoli consists of 11-12, 10-11 and 11-12 branches respectively (Plate-2E). The base of mid-dorsal scoli is also similar to the first abdominal segment and other characters also similar to the first abdominal segment; but all scoli in same size.

Third abdominal segment
The number of branches in each mid-dorsal, dorso-lateral and lateral scoli consists of 11-12, 10-11 and 11-12 branches respectively (Plate-2F). Mid-dorsal scoli is slightly shorter than dorso-lateral and lateral scoli and other character similar to the second abdominal segment.

Fourth-Sixth abdominal segment
Each mid-dorsal, dorso-lateral and lateral scoli of this three (4^{th}, 5^{th} and 6^{th}) segments bears 13-14, 12-14 and 12-13 branches. Other characters of these segments are similar to the preceding abdominal segments. The length in fourth to sixth segment is decreasing (Plate-2G, H & I) and the branches of scoli gradually becoming reduced. In the seventh segment of lateral scoli is smaller than other scoli.

Seventh abdominal segment
In the seventh abdominal segment, the mid-dorsal, dorso-lateral and lateral scoli consists of 10-12, 12-14 and 9-10 branches (Plate-2J). Lateral scoli very smaller than mid-dorsal and dorso-lateral scoli same in sizes and others structure as same as preceding segments.

Eighth abdominal segment
Eighth abdominal segment bears only two pairs of scoli; mid-dorsal and dorso-lateral. Each mid-dorsal scoli bears 4-5 branches and dorso-lateral scoli bears 3-4 branches (Plate-2K). Dorsal scoli in this segment equal to about two third to the length of corresponding one of the preceding segments, narrower and short branches. Dorso-lateral scoli in this segment equal to about two-thirds to the length of the dorsal one of the same segment but otherwise similar.

Morphology in the biological sense is the science form living organisms and it seeks to find the reason for structure and to understand the relation of different structural forms to one another (Snodgrass, 1937). The morphology and taxonomy of Coccinellid larvae have as yet been incompletely studied. The subject was tacked by Boving (1917) and soon afterwards Gage (1920) described 14 species of American Coccinellids. Savoiskaya (1964) has published a series of works to the morphology and taxonomy (with keys) for 81 species of Coccinellid larvae in the Soviet Union. The morphology of *E. pusillanima* was described in detail by Li and Cook (1961) and Katakura *et al* (1988) as *Epilachna dodecastigma*

The larval study on *E. pusillanima* has no detailed information. In the present observation, structure and larval scoli were similar to Kapur,s (1950) observation on *Epilachna vigintioctopunctata* but they differ from the genital organs, shape of abdominal segment and genetic relationship. According to Kapur (1950) the fourth instar larvae about 6mm long and 2.8mm wide across the third abdominal segment. The present findings showed that the fourth instar larvae 5.91mm long and 2.45mm wide. The larval scoli of several segments were similar to the Islam (2001) observation of *Epilachna vigintioctopunctata*, but little difference to the number of branches and position of scoli on several segments were detected. So, it is felt necessary to study the detail larval morphology of the species.

REFERENCES

Boving, A.G., 1917. A generic synopsis of the Coccinellid larvae in the United States National Museum, with a description of the larva of *Hyperaspis binotata Saj. Proc. U.S. Nat. Mus.* 51: pp621-650

Caneze, E.C.A., 1961. Historie des metamorphoses de quelques coleopteres exotiques, *Mem. Soc. Liege.*8: pp1-313

Gage, J.H., 1920. The larvae of the Coccinellidae. III *Biol. Monogr.* 6: pp233-294

Grandi, G., 1913. Studi sui Coccinellide, *Boll. Lab. Zool. Portici,*7: pp288-292

Hodek, I., 1973. *Biology of Coccinellidae,* pp260, 64pls, Pragne.

Islam, K., 2001. Morphology, Comparative biology and Genetics of *Epilachna* Spp. (Coleoptera:Coccinellidae), *M. Sc. Thesis, Dept. Genetics & Breeding, Rajshahi Univ.* pp86

Kapur, A.P., 1950. The biology and external morphology of the larvae of Epilachnae(Coleoptera:Coccinellidae), *Bull. Ento. Res.* 41:61-208

Katakura, H., Abbas I, Nakamura K & Sajaji H 1988. Records in the Epilachninae crop pests (Coleoptera:Coccinellidae) in Sumatera Barat, Sumatera, Indonesia, *Ent. Soc. Japan,* 56(2):281-297

Klausnitzer, B., 1973. Zur Kenntris der larven der palaearktischen. Arten von *Harmonia* Muls. *Adonia* Muls. Und *Tytthaspis* Crotch (Cole.:Cocci.), *Ann. Zool. Warzawa*, 30:375-385

Li, C.S., and Cook, E.F., 1961. *The Epilachninae of Taiwan* (Col:Coccinelliae), *Pac. Insects,* 3(1):31-91

Mulsant, E., 1948. Historie naturelle des Coleopteres de France, 4. Sulcicolles:Securipalpes, Paris pp1-28

Savoiskaya, G.I., 1964. Materials on morphology and systematics of larvae of tribe (Coccinellini), *Trudy Inst. Zashist. Rast.*8:310-357(In Russian)

Snodgrass, R.E., 1937. Arevised interpretation of external reproductive organs of male insects, *Smithsonian misc* Colllect, 135(6); 1-11, 28-31

Strouhl, H., 1926. Die lrven der palaearktischen Coccinellini und psylloborini(Coleopt.), *Arch. Naturg.* 92, A(3):1-63