

**PRELIMINARY STUDIES ON THE LARVAL
CHARACTERIZATION OF THE GENUS *HENOSEPILOACHNA* LI
(COLEOPTERA: COCCINELLIDAE: EPILACHNINAE)**

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ABSTRACT

Larval studies on five species belonging to two genera of Epilachninae were made and larval characters were compared with those of previously studied species. The presence of setulae on the scoli of *Henosepilachna* is exclusive to this genus and can prove to be a taxonomic character at the generic level.

KEY WORDS: Coccinellidae, Epilachninae, *Henosepilachna*, larvae, scoli, setulae, oriental,

INTRODUCTION

Coccinellidae, including beneficial predator and harmful phytophagous forms, have been actively studied in both adult and larval stages. The adults occur in color-aberrant forms posing problems to taxonomists. It thus becomes pertinent to study the larval forms, which may provide certain additional characters helpful in reducing the problems. The genus *Henosepilachna* was erected by Li (Li and Cook, 1961) out of *Epilachna* Chevrolat, based upon the fact that in the former genus the last abdominal sternite is always longitudinally split in the middle in females and is undivided in males, whereas in the latter genus the sternite is undivided in both sexes. However, this view is not acceptable to Kapur (1966). So far, the species of *Henosepilachna* studied for their larval characters are included in the works of Sasaji (1968b) on *H. boisduvali* (Mulsant), *H. vigintioctopunctata* (Fabricius) and *H. vigintioctomaculata* (Motschulsky), and Savoiskaya and Klausnitzer's (1973) work on *H. argus* (Geoffroy), *H. vigintioctopunctata* and *H. elaterii* (Rossi). Despite enormous work on the larvae of Coccinellidae, the generic characters of *Henosepilachna* still remain to be defined properly. The present work includes studies on the larvae of five species viz. *Henosepilachna vigintioctopunctata*, *H. vigintioctomaculata*, *H. pusillanima* (Mulsant), *H. ocellata* (Redtenbacher) and *Afidenta misera* (Weise) and is aimed at drawing the larval characters of *Henosepilachna*.

MATERIALS AND METHODS

The larval material for the species studied was obtained after rearing field-collected adult beetles in laboratory cages. For subsequent studies the larvae were killed in boiling water and preserved in 70% alcohol. Larvae were dissected, cleared in 10% KOH and mounted after

proper staining and dehydration. For terminology of setose projections, Gage (1920) and Savoiskaya and Klausnitzer (1973) have been followed. However, certain additional delicate setae-like projections on the body of scoli have been recorded and called here setulae. The descriptions and discussion provided in the work refer to mature fourth-instar larvae unless otherwise specified.

OBSERVATIONS AND DISCUSSION

From observations on the presently studied species it appears that the head, head appendages and thoracic appendages are of no help in separating *Henosepilachna* from the rest of Epilachninae genera. In some cases (Sasaji, 1968a,b) the shape of mala and the arrangement of setae and hairs on it are helpful at the subfamily and at the species level but are of no significance in sorting out *Henosepilachna*.

Likewise, the mandibles are not helpful at the generic level, though they may be relevant when separating the subfamily Epilachninae as a whole from the rest of Coccinellidae. However, Kapur (1950), Kamiya (1964), Sasaji (1968b), and Sasaji and Tsubokawa (1983) find the presence of terminal spatulate setae on the tibia important taxonomically. We do not think that these setae are valuable, especially in Epilachninae where their number is very large and their counting in two-dimensional prepared slides is not feasible.

In Coccinellidae, the abdomen and thorax of larvae bear setose projections arranged symmetrically on either side of the mid-dorsal line in three distinct groups on each segment, viz. starting from the mid-dorsal line outwards, they are dorsal ('d'), dorsal-lateral ('dl') and lateral ('l'). This arrangement is almost constant throughout the family but the shape of the setose projections varies considerably and is of taxonomic significance. Kamiya (1964) and Phaloura and Singh (1991) found these projections of extreme importance in sorting out the larvae of *Harmonia* Mulsant. In Epilachninae, the scoli are always multibranching and most of the branches are five times or more longer than wide, except for *Cynegetis* Chevrolat, *Chnootriba* Chevrolat and *Merma* Weise where they are 2–3 times longer than wide (Kapur, 1950). The rest of the genera viz. *Henosepilachna* (four species included in the present study), *Afidenta* (represented by *A. misera*), *Epilachna* and *Afissa* (Kapur, 1950) bear branches which are 5–7 times longer than wide. Kapur (1950) and Kamiya (1964) considered the number of branches per scolus of taxonomic value. The present study shows that the range of the number of branches per scolus is constant in a species but liable to overlap with the increase in the number of species considered. For example, *H. ocellata* and *A. misera* bear the 'dl'-I scoli with 14–16 branches. *H. vigintioctomaculata* and *H. pusillanima* also bear 12–14 and 10–12 branches, respectively, showing a slight overlapping. This indicates that the number of branches per scolus cannot be considered significant at either the specific or generic levels. However, in *H. ocellata*, *H. vigintioctopunctata*, *H. vigintioctomaculata* and *H. pusillanima* all the thoracic and abdominal scoli bear a few setulae interspersed on their branches as well as main stems (Figs. 1a,b,c,d). These setulae are either slightly (*H. ocellata* and *H. vigintioctopunctata*) or strongly (*H. pusillanima*) spatulate but they are lacking altogether in *A. misera*. This character can prove to be significant at the generic level, but it must find support with the analysis of some more species of both genera and, of course, of other genera of Epilachninae.

As already mentioned, the generic characters of *Henosepilachna* still remain to be defined properly. Sasaji (1968b) has separated *H. boisduvali*, *H. vigintioctopunctata* and *H. vigintioctomaculata* from *Epilachna* stating that 'dl' pro- is absent in the latter genus. On the other

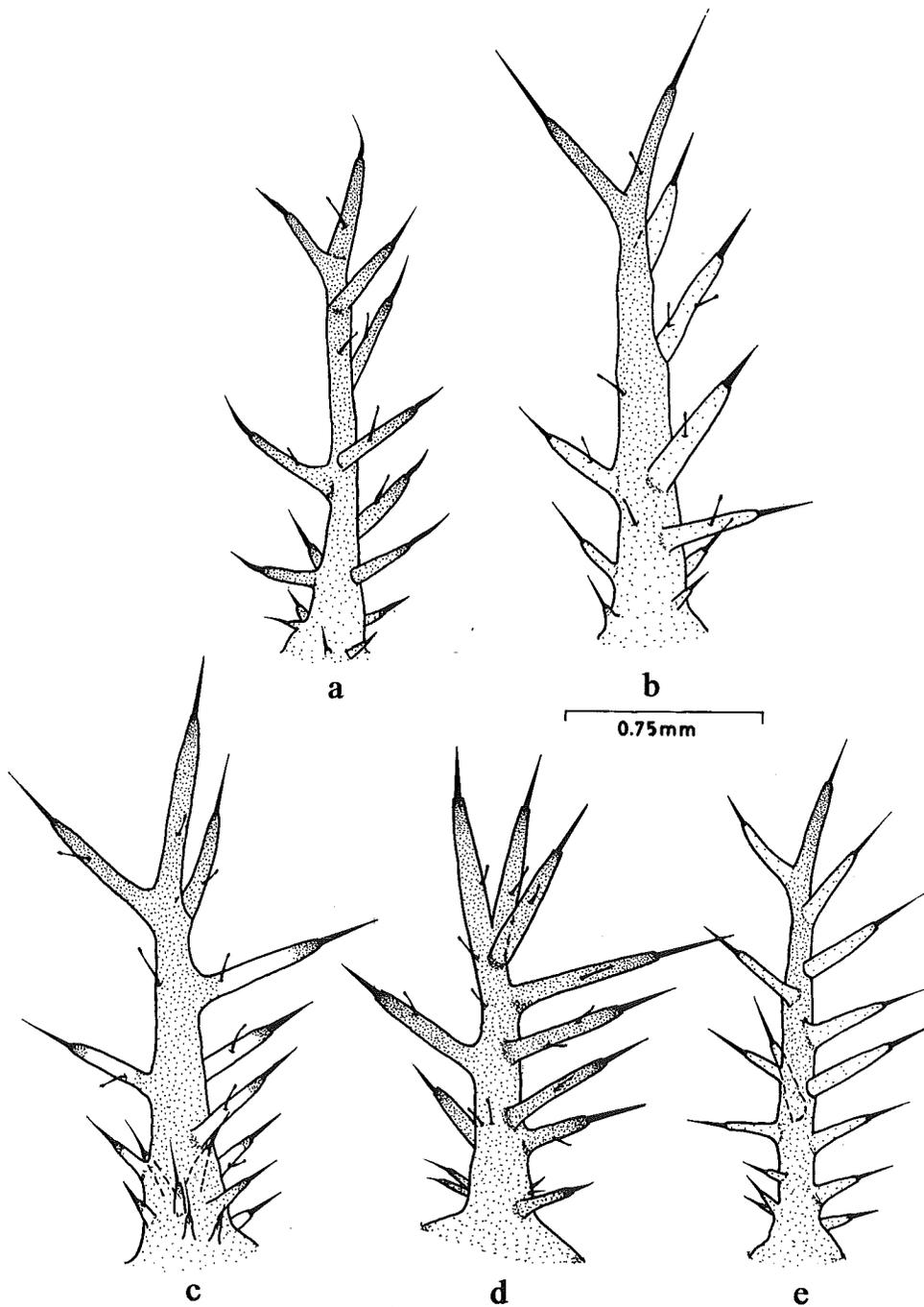


Fig. 1. 'dl'-I scolus of (a) *Henosepilachna ocellata*, (b) *H. pusillanima*, (c) *H. vigintioctomaculata*, (d) *H. vigintioctopunctata*, (e) *Afidenta misera*.

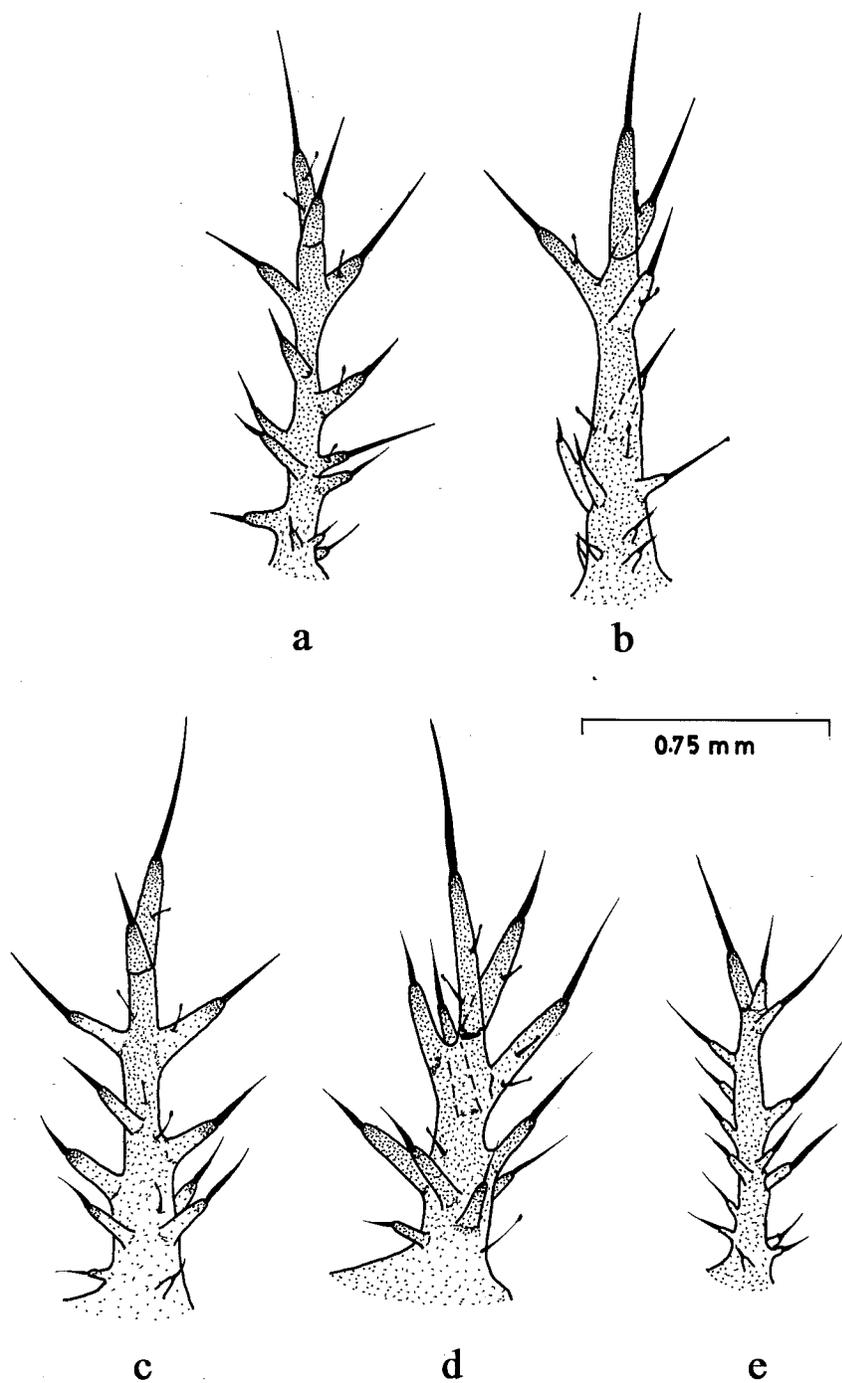


Fig. 2. 'dl'-VII scolus of (a) *Henosepilachna ocellata*, (b) *H. pusillanima*, (c) *H. vigintiotomaculata*, (d) *H. vigintioctopunctata*, (e) *Afidenta misera*.

hand, Kapur (1950) uses the same character in separating *Afissa* Dieke from the genera *Chnootriba*, *Cynegetis*, *Epilachna* and *Subcoccinella* Guérin-Ménéville. Savoiskaya and Klausnitzer (1973) listed the generic characters of *Henosepilachna* as "branches of scoli 5–7 times longer than wide, thorns (apical) of scoli 2–3 times shorter than the branches or at the most of the same length." But the present observations on all four species of this genus show that most of the branches end in terminal setae considerably longer than the branches (Figs. 2a,b,c,d). The branches of *A. misera* are also 6–7 times longer than wide (Fig. 1e), hence suggesting its inclusion under *Henosepilachna*, which is not tenable; thus, this character, too, becomes redundant.

As previously mentioned, the presence of setulae on the scoli can prove to be a valid generic character of *Henosepilachna*. This finds support in Kapur (1950), who described two species of *Henosepilachna* (*Epilachna* of Kapur, later transferred to *Henosepilachna*, i.e. *H. argus* and *H. vigintioctopunctata*), seven species of *Epilachna* and one each of *Subcoccinella*, *Cynegetis*, *Afissa*, *Chnootriba* and *Merma*. Comparison of the figures of scoli in all these species show the presence of setulae only in the species of *Henosepilachna*. The figures of *H. elaterii* (Savoiskaya and Klausnitzer, 1973) are inadequate for comparison and it appears that Sasaji (1968b) did not pay attention to these setulae while describing *H. vigintioctopunctata*, *H. vigintioctomaculata* and *H. boisduvali*. The presence of setulae thus appears to be exclusive to *Henosepilachna*, but more species and genera of Epilachninae need to be observed for this character before a final characterization of this genus is attempted.

ACKNOWLEDGMENTS

The authors are thankful to Director-General of CSIR, New Delhi, for providing necessary financial assistance. Thanks are also due to Dr. R.G. Booth (CIE, London) for identifying the adult coccinellids.

REFERENCES

- Gage, J.H. 1920. The larvae of the Coccinellidae. *Illinois Biological Monograph* 6(4):233–294.
- Kamiya, H. 1964. Comparative morphology of larvae of the Japanese Coccinellidae, with special reference to the tribal phylogeny of the family (Coleoptera). *The Memoirs of the Faculty of Education, Fukui University, Ser. II (Natural Science)* 14:83–100.
- Kapur, A.P. 1950. The biology and external morphology of the larvae of Epilachninae (Coleoptera, Coccinellidae). *Bulletin of Entomological Research* 41:161–208.
- Kapur, A.P. 1966. The Coccinellidae (Coleoptera) of the Andamans. *Proceedings of National Institute of Science, India* 32B (3&4):148–189.
- Li, C.S. and Cook, E.F. 1961. The Epilachninae of Taiwan (Col. Coccinellidae). *Pacific Insects* 3:31–91.
- Phaloura, S.P.S. and Singh, T. 1991. Larval chaetotaxy of three species of genus *Harmonia* Mulsant (Coleoptera: Coccinellidae) and phylogenetic relationship amongst its species. *Elytron* 5:39–46.
- Sasaji, H. 1968a. Phylogeny of the family Coccinellidae (Coleoptera). *Etizenia. Fukui* 35:1–37.
- Sasaji, H. 1968b. Descriptions of the coccinellid larvae of Japan and the Ryukyus (Coleoptera). *The Memoirs of the Faculty of Education, Fukui University, Ser. II (Natural Science)* 18:93–136.
- Sasaji, H. and Tsubokawa, R. 1983. Supplementary descriptions of the Coccinellid larvae of Japan (Coleoptera). *The Memoirs of the Faculty of Education, Fukui University, Ser. II (Natural Science)* 32(2):33–66.
- Savoiskaya, G.I. and Klausnitzer, B. 1973. Morphology and taxonomy of the larvae with keys for their identifications. In: *Biology of Coccinellidae*. Dr. W. Junk NV Publisher, The Hague. pp. 36–55.