

University of Udaipur
Agricultural Experiment Station
Udaipur (India)

L. M. L. MATHUR & B. K. SRIVASTAVA

On the immature stages of *Stethorus gilvifrons* Mulsant

(Coleoptera: Coccinellidae)

With 10 textfigures

The genus *Stethorus* is widely distributed throughout the world. In India three species of *Stethorus*, *S. pauperculus* (Weise), *S. gilvifrons* (Mulsant) and *S. tetranychii* sp. n. are found preying on mites which are harmful to agricultural crops (Kapur, 1948). The general description of the immature stages of a few species of *Stethorus* are available. Boving (1917) gave diagnostic features of the larvae of *Stethorus punctum* (Leconte) and *S. utilis* (Horn). The immature stages of *S. punctillum* (Weise) have been briefly described by Putman (1955).

So far the immature stages of any of the species occurring in India have not been described. In the present paper a detailed morphological description of the immature stages of *S. gilvifrons* is given. This species is very abundant on castor plants in the arid and semi arid regions of Rajasthan and feed actively on the mite *Tetranychus telarius* Linnaeus.

Material and Method

Insects for the present investigations were drawn from the laboratory maintained cultures. These insects were raised on the mite colonies of *T. telarius* infesting castor leaves. For preparing permanent slides about 15 specimen of each stage were mounted in Canada balsam after dehydration in alcohol and clearing in clove oil. Drawings were made to scale using calibrated micrometer eye piece and a camera lucida.

Egg

It is elongated with bluntly rounded ends measuring 0.23 to 0.26 mm by 0.34 to 0.39 mm (fig. 1). When fresh, the chorion is thick and white which becomes pale to yellow as the embryo grows. The eggs are placed singly on the substratum in a horizontal position guarded under the web of the mites.

Larva

Early instars

The newly hatched larva is pale in colour bearing few setae on the head and body tubercles. The number of setae and the marked black patches on the body increase with the age of the larva. The measurements of the various larval instars excepting the final instar are as follows: first instar body length, 0.52

to 0.79 mm, width of the head capsule, 0.144 mm; second instar, 0.89–1.08 mm and 0.184 mm; third instar, 1.21–1.85 mm and 0.235 mm.

Fourth instar larva

The body is elongate and oval, widest in the middle near the metathorax and first abdominal segment (fig. 2). The colouration is very variable especially on the dorsal surface of the body. The head is piceous to brown. The thoracic

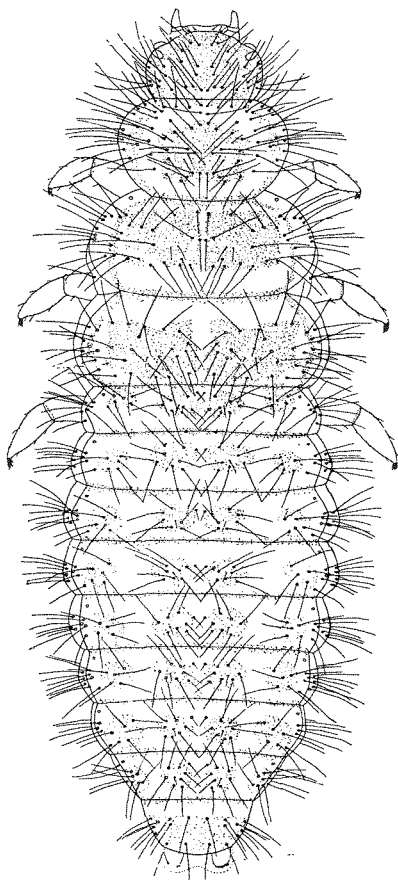


Fig. 2. Fourth instar larva ($\times 50$)



Fig. 1. Egg ($\times 30$)

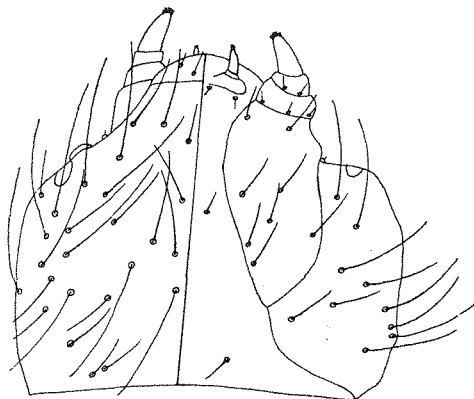


Fig. 3. Dorsal and ventral views of the head ($\times 125$)

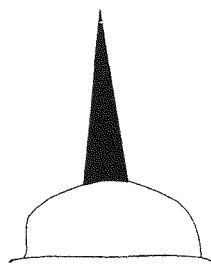
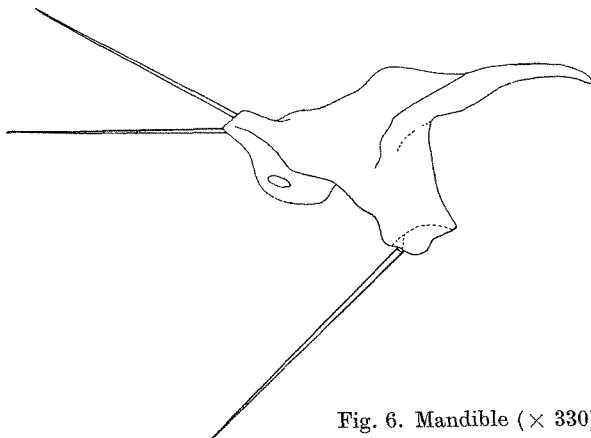


Fig. 4. Antenna ($\times 590$)

segments have piceous patches in the middle and on the lateral sides of the tergites. The abdomen is also piceous dorsally having four distinct dark patches around the setal bases in each segment. The underside body is light brown, piceous or slightly pale on the lateral sides and around the bases of the setae in the middle. The length of the body varies from 2.16 to 2.60 mm and the width of the head is 0.303 mm.

Head: Dorsally the head is more or less rectangular and wider than long (fig. 3). It is widest in the middle, the antero-lateral margin is curved and the occipital margin is nearly straight. The dorsum of the head is without distinct sutures and sclerites. The vertex, the area anterior to the antennal socket, ocelli and antennal segments are piceous while the other parts of the head are brown. The setae are mostly long, finely pectinate and are arranged as represented in figure 3. There are two very large ocelli of nearly equal size on each side. One of which is placed dorsally and the other is ventral on the antero-lateral angle of the head and are directed forwards. A rudimentary ocellus is also present on each side of the head behind the large ocellus. The antenna is much reduced, rounded, wider than long and without segmentation (fig. 4). A stout spine like sensillum is present at the tip which is about 2.5 times as long as rest of the antenna. The labrum is about twice as broad as long, deflexed and broadly curved distally with a deep notch (fig. 5). It bears two pairs of stout setae on the outer side. The mandible is fulcrate, deeply grooved and highly chitinised (fig. 6). It is much longer than broad with a narrow distal end. There is only one blunt mola with two longitudinal ridges. There are three long setae present on

Fig. 5. Labrum ($\times 330$)Fig. 6. Mandible ($\times 330$)

the mandible, two of which are located at the dorsal articulation and the one at the ventral articulation.

The cardo and stipes of maxillae are united, longitudinally ovate and pointed proximally (fig. 3). There are eight moderately long setae present on the cardo-stipes. Each maxillary palp is large and three segmented. The first segment is much wider than long bearing three small setae located near the proximal margin. The second segment is about the same length as the first but narrow and possesses two small setae. The third segment is longer than the first and second segments together. It gradually tapers and ends bluntly. The free end bears about 10 sensilla. The distal end of the maxilla is undivided and largely concealed ventrally by the palp.

The hypopharynx emerginates in the middle and with moderately small setae. The labium is soft with practically sclerotised mentum and without evident division from the gula. The mentum bears two distantly placed setae on each side. The labial palpi are well developed and two segmented. The basal segment is narrow and wide while the distal segment is much longer and ends bluntly. The free end bears numerous peg like sensilla. There are two small setae present at the bases of each palp.

Thorax: The thoracic segments become gradually widened posteriorly (fig. 2). The prothorax is nearly 1.5 times as broad as long with the elliptical pronotum and slightly rounded posteriorly. The setae are long and pectinate

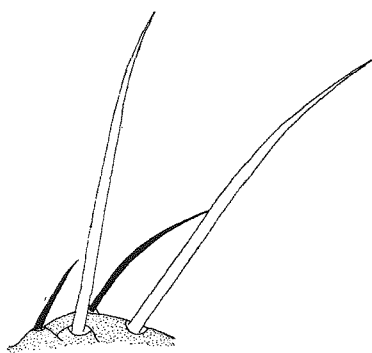


Fig. 7. Body setae and spicules ($\times 330$)

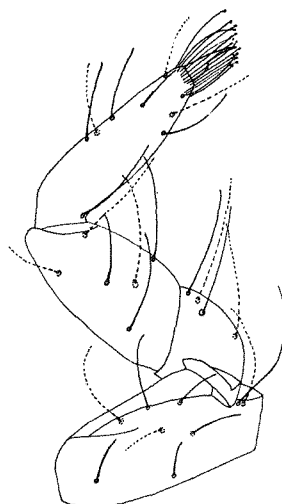


Fig. 8. Leg ($\times 110$)

with few close sets of rigid spicules (fig. 7). The dorsal setae are almost of equal length while the lateral setae are unequal and the longest seta measures 0.5 mm. The surface of the body wall is wrinkled except where strongly sclerotised. The mesothorax is indistinctly divided into two sclerotised patches bearing similar setae and spicules like those of the pronotum. The metathorax resembles very much to the mesothorax except in the sclerotised area which are distinctly separated at the mid-dorsal line. The spiracle of the mesothorax and the rudimentary spiracle of the metathorax are located on the antero-lateral sides of the tergum. There are no setae and spicules present in the spiracular area. The pleurae of the segments are membranous. The sternum of each segment bears one single lightly piceous round area along the middle line. The ventral setae are moderately small than the dorsal setae.

The three pairs of thoracic legs are identical. Each leg bears a long and stout coxa, narrow and curved trochanter, a femur and a tibia which are subequal in length (fig. 8). The coxa bears six outer and three inner setae of unequal size.

The free end of the coxa gives a fulcrum joint to the trochanter which is rectangular in form. The broader margin bears two inner and two outer setae of equal size. The distal end of trochanter is concave which receives the femur. The latter becomes narrow at the distal end. There are three outer and three inner setae present on the femur. The tibia is articulated at the free end of the femur and becomes gradually taper. It has six outer and three inner setae. There are about 15 tenent hairs present near the tip of the tibia (fig. 9). A deep toothed claw is present at the free end of the tibia. The claw is rather triangular at the

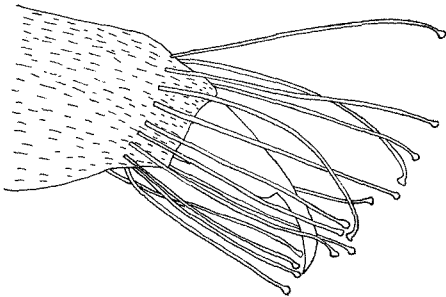


Fig. 9. Tip of tibia ($\times 550$)

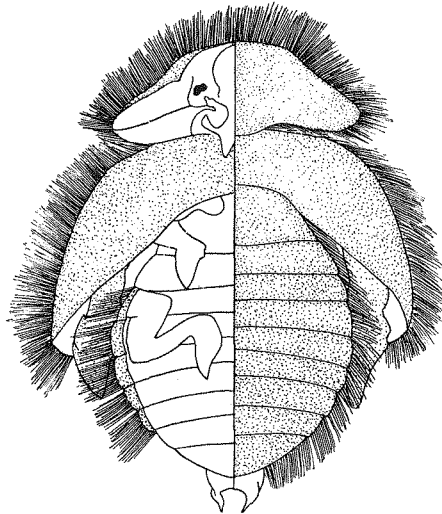


Fig. 10. Ventral and dorsal views of pupa ($\times 25$)

base and bends narrowly to form a sharp point distally. The relative lengths of the segments of the legs are: coxa, 0.17 mm; trochanter, 0.06 mm; femur, 0.19 mm and tibia, 0.20 mm.

Abdomen: The abdominal terga from first to eight segments possess four lightly chitinised tubercles. The tubercles are placed in a transverse row in each segment. These segments are adorned by long pectinate setae of varying length and minute spicules. The dorsal tubercles are large and bear seven setae and a spicule. The setae on the subdorsal tubercles are five in number. A few setae do not have tubercles and the skin in that area is piceous. Three setae are located on the lateral angles of each tergum. The spiracles are placed in the antero-lateral angles having no setae in the areas. The intersegmental membrane between the first and second abdominal terga possesses a pair of longitudinal opening of repugnatorial glands. On each side the pleuron has a tubercle bearing five to seven setae, intermingled with many spicules. The sterna have four similar tubercles as on the terga but they are very small. The setae on the sternum are comparatively few and smaller. The ventral tubercles bear six to eight setae and

the subventrals have only five. The ninth segment is chitinised in the posterior half bearing numerous long setae on the tergum. The lateral setae appear in groups of three on each side and the ventrals are much smaller. The spicules are also present. The tenth segment forms an eversible sucker with several setae at the terminal end.

Pupa

The dorsum is of dark brown colour and is covered with numerous long setae and spicules throughout the body (fig. 10). The body is without larval exuviae which is pushed down at the anal suckers and the tergal sclerites are hard. It is about 1.8 mm long and the greatest width at the first abdominal segment is 1.0 mm. The head is directed caudad and the pronotum is large. The elytron spreads out as soon as the pupa is put in alcohol and extends upto the second abdominal segment. The wings are thin, membranous and extend upto the fifth abdominal segment. The sternum is pale in colour and devoid of setae and spicules. Rudiments of eyes, mouth parts and legs are visible in older pupa. The body is attached anteriorly to the substratum by the oral rudiments and posteriorly by the anal suckers. Such pupae produce normal adults.

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Summary

A detailed morphological study of the immature stages of *Stethorus gilvifrons* Mulsant is presented. The illustrations include external distinguishing features of the egg, fourth instar larva and the pupa.

Zusammenfassung

Es wird eine eingehende morphologische Untersuchung der frühen Entwicklungsstadien von *Stethorus gilvifrons* Mulsant gegeben. Die Abbildungen umfassen äußerliche Unterscheidungsmerkmale des Eies, des vierten Larvenstadiums und der Puppe.

Резюме

Предлагается подробное морфологическое исследование незрелых степеней развития *Stethorus gilvifrons* Mulsant. Рисунки показывают внешние отличительные признаки яйца, четвёртой личиночной фазы и куколки.

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