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**BIOLOGY OF SCYMNUS NUBILUS MULS. (COCCINELLIDAE:
COLEOPTERA) AN INSECT PREDATOR**

Scymnus nubilus Muls. is known as a predator of aphids, aleurodids mealy bugs and mites (Lefroy, 1909; Misra, 1920; Fletcher 1932; Kapur, 1940, 1942; Puttarudraih, 1947; Puttarudraiah and Channabasavanna, 1953). In Kerala it has been observed as an efficient predator of *Pentalonia nigronervosa* Goq, the banana aphid, the vector of bunchy top virus. As very little information is available on the biology of this predator, it was studied in detail, the findings of which are presented in this paper.

Biological observations

Mating And oviposition. Mating commenced on the fourth or fifth day of adult emergence. Pairs of beetles confined in tubes were seen to mate repeatedly even after the females had started egg laying. Egg laying commenced on the sixth day of emergence. Eggs were laid singly under the moults of aphids or under dead aphids. One female beetle laid 4 to 14 eggs a day, the average being 9.6. Egg laying continued for more than a month.

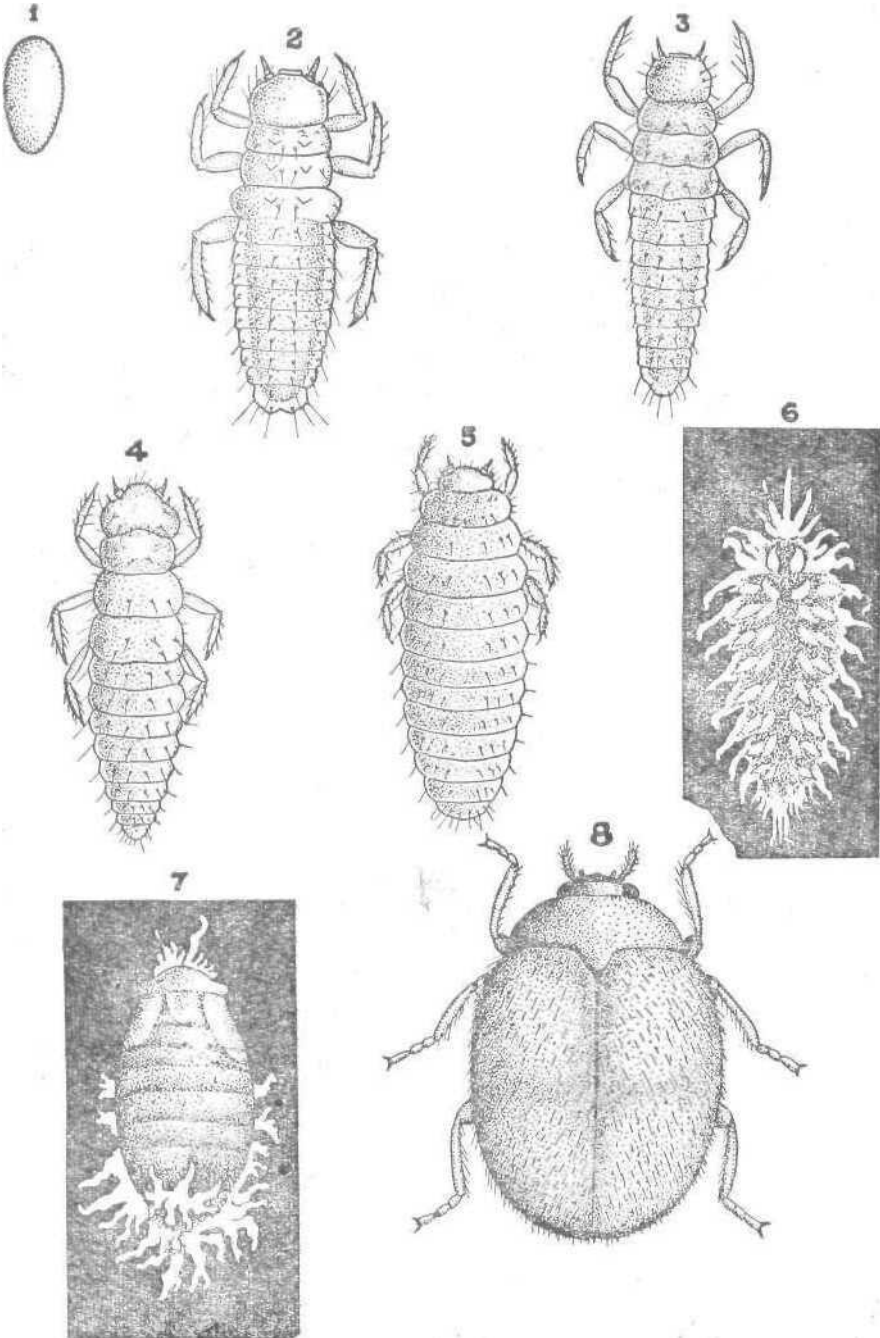
Egg. (Fig. 1) Oval, measuring 0.4 to 0.5 mm. long and 0.25 mm. broad; when just laid, light yellow in colour with shining surface; turned light yellowish brown later; chorion smooth, tender and membranous. Incubation period varied from 3 to 4 days.

Larva. The larva has four instars. Newly hatched grub (Fig. 2) yellowish brown, elongated; sub-depressed, tapering posteriorly and measuring 0.7 mm. long and 0.2 mm. broad across the thorax. White waxy warts develop around setae dorsally on the thoracic and abdominal segments in 3 to 4 hours. Duration of the first instar grub was two days in August-September.

The second (Fig 3) and third (Fig. 4) instar grubs measured 1.2 and 1.6 mm. in length and 0.22 and 0.29 mm. in head width respectively; both moulted in 1-2 days

Full grown (fourth instar) grub: (Fig. 5 and 6 without and with warts) 2.5 to 3 mm. long with a head width 0.42 mm. and dark brown in colour. Body fusiform with the abdominal segments 3-5 broadest; measuring 1.1 mm. white waxy warts, stout and pointed, completely covering the body. Duration of fourth instar varied from 4 to 6 days and that of full larval stage 8 to 11 days.

LIFE STAGES OF SCYMNUS NUBILUS



Feeding habits of grubs The grub feeds on the aphid by biting a puncture on its body and sucking up the body juice. Younger stages of the grub attack aphids which are even bigger than them. The per day consumption of aphids by the grub varied from 2 to 14 in its different instars. The number of aphids consumed per day by a grub was highest (average 11.4) during the 5th to 7th day after hatching of the larva. That was during the early fourth stadium. Then there was a sudden reduction in the number of aphids eaten and on the last two days of the fourth larval stadium, the grub did not feed at all. During the whole larval period a grub consumed 50 to 63 aphids, the average being 57.8.

Pupa (Fig. 7) The full grown grub attached itself to the plant by its posterior end and pupated in a day or two. Pupa oval, measuring 2.1 mm. in length and 1.4 mm. in width and pale reddish brown in colour. Pupal period varied from 4 to 7 days in the laboratory.

Adult. (Fig. 8) On emergence, the beetle was golden brown which subsequently, turned to reddish brown with a black tinge. It was an active flier moving on plants swiftly. Unlike the nymph, the adult, bit, chewed and swallowed the bodies of the aphids. A beetle fed on 6 to 11 aphids a day the average being 8.4.

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