

## A Note on the Biology of *Anastatus tenuipes* an Oothecal Parasitoid of Brown Banded Cockroach *Supella longipalpa*

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*Anastatus tenuipes* Bolivar (Hymenoptera:Eupelmidae), a dimorphic parasitic wasp was found to parasitize the oothecae of the brown banded cockroach, *Supella longipalpa* Fabricius, (Dictyoptera:Blattellidae) in nature. Ananthasubramanian and Ananthakrishnan (1961) described the biology of an undetermined species of *Anastatus* from *S.supplicatum* Serville (= *longipalpa*). Later extensive studies were carried out on some of the species such as *A.uma* Boucek (Uma Narasimham and Sankaran, 1982), and *A.floridanus* Roth & Willis (Flock, 1941). However, very little is known about the biology of *A.tenuipes* in the brown banded cockroach which is a mechanical vector of many pathogenic organisms affecting man (Roth and Willis, 1957).

To obtain a regular supply of parasitoids for study, oothecae of *S.longipalpa* were collected periodically from human dwellings in Villanur situated 10 km away from Pondicherry and held in containers for emergence of either parasitoids or host nymphs. The parasitoids were propagated by providing oothecae of *S.longipalpa* and maintained in a temperature - controlled room ( $28 \pm 2^{\circ}$  C).

Investigations were carried out on the mode of parasitisation by exposing to the host oothecae. The duration of immatures and emergence pattern, mating, feeding behaviour and fecundity of the adult parasitoids were carried out. The number of hosts parasitised by a single female was determined by subjecting known number of host oothecae in different ratios viz., 1:1, 1:2, 1:3, 1:4, and 1:5. The impact of parasitoid density on parasitism was also studied in the following ratio i.e., 1:1, 1:2, 1:3, 1:4, and 1:5 of host:parasitoid. The parasitoid which emerged from the oothecae were sent to the International Institute of Entomology, London, for identification.

The parasitoid was identified as *A.tenuipes*. The freshly emerged male and female parasitoids measured  $2.9 \pm 0.75$  mm (range = 2.7-3.2 mm) and  $4.06 \pm 0.21$  mm (range 3.8-4.5 mm) respectively. Males were uniformly black in colour whereas, females were brown. On emergence, both males and females were sexually mature. Mating was completed within 8-15 sec., (mean =  $10.6 \pm 2.4$  sec). Females started oviposition in 24-48 h of emergence. The duration of oviposition

Table 1. Effect of parasitoid density on parasitism

Parasitoid : host ratio	No. of Progeny produced	Developmental duration (days)	Sex ratio
	Mean $\pm$ S.E.	Mean $\pm$ S.E.	M : F
1 : 1	10.75 $\pm$ 2.59 (7 - 14)	27.40 $\pm$ 3.32 (21-30)	1 : 4
2 : 1	13.50 $\pm$ 2.69 (9 - 16)	37.41 $\pm$ 4.13 (30 - 41)	1 : 1
3 : 1	21.21 $\pm$ 3.12 (19 - 27)	-	-
4 : 1	27.20 $\pm$ 1.60 (25 - 29)	-	-
5 : 1	30.40 $\pm$ 3.87 (25 - 37)	-	-

Figures in parentheses represent range ; D = Larvae found dead in the oothecae.

varied from 32-67 mts. (mean =  $44.7 \pm 18.37$ ) and a female deposited all her eggs in a single ootheca. The number of eggs laid in an ootheca varied from 8-16 (mean =  $12.27 \pm 3.69$ ). More than one female oviposited in a single ootheca. The incubation period varied from 36-48 hrs., (mean = 41.08), whereas, the duration of larvae and pupae lasted for 12-18 days (mean =  $15.87 \pm 2.03$ ) and 8-10 days (mean =  $9.5 \pm 0.64$ ) respectively. The total number of progenies emerged from a parasitised ootheca ranged from 8-16 (mean =  $14 \pm 4$ ). The sex ratio males to females of progeny that emerged from an ootheca was found to be 1:4. The parasitoid caused 100% mortality of embryos inside the ootheca. The longevity of the parasitoid (N=25) was studied. The starved males and females lived for 2-3 days (mean =  $2.25 \pm 0.43$ ) and 5-7 days (mean =  $5.5 \pm 0.5$ ) respectively. Honey-fed males and females lived for 2-3 days (mean =  $2.5 \pm 0.5$ ) and 5-8 days (mean =  $6.3 \pm 0.8$ ) respectively, when deprived of host. In the presence of host oothecae, females survived for 9-15 days (mean =  $12.5 \pm 2.29$ ), while no change was observed in the longevity of males. Studies on the effect of host density on parasitism revealed that the parasitoids parasitised and laid all the eggs in only one host. Nymphs of *S.longipalpa* emerged from the remaining oothecae. This suggests that this gregarious parasitoid deposits all her eggs only in a single host ootheca in her life. Experiment on the effect of parasitoid density on parasitism showed that all the parasitoids were found to attack the single host ootheca. The mean number of progeny produced by a female in 1:1 and 2:1 ratio was  $10.75 \pm 2.59$  (range = 7-14) and  $13.50 \pm 2.69$  (range 9-16). From the remaining sets, though the parasitoids laid eggs, no progeny emerged. When these oothecae were dissected and examined, dead larvae of parasitoids were seen, suggesting the elimination of supernumeraries due to

starvation in the later stage of larval development. The developmental duration and number of parasitoid progenies per host were influenced by superparasitism (Table 1). Immature duration increased with increase in parasitoid density. The sex ratio changed in favour of males with the increase in parasitoid density.

When the parasitoid was offered the oothecae of *Periplaneta americana* (L), *Blattella germanica* (L) and *Neostylopyga rhombifolia* (Stoll) along with *S.longipalpa*, it oviposited only in the ootheca of *S.longipalpa* which suggests its host specificity.

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KEY WORDS : *Anastatus tenuipes*, *Supella longipalpa*, oothecal parasitoid

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