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BIOLOGY OF *BRACHYMERIA NEPHANTIDIS* GAHAN AND BRACHYMERIA *LASUS* (WALKER) (HYMENOPTERA : CHALCIDIDAE)

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Brachymeria nephantidis Gahan is one of the important pupal parasites of *Nephantis serinopa* Meyrick, the black-headed caterpillar pest of coconut in Kerala. Similarly *B. lasus* walker is also parasitic on various crop pests like *Phytometra (Plusia) peponis, Sylepta derogata, Earias vitella* (— *E. fabia*) etc. Jayaratnam (1941), Rao *et al.* (1948) and Dharmaraju (1963) briefly studied the biology of *B. nephantidis.* But the larval biology of these parasites is not clearly known. The biology of *B. nephantidis* and *B. lasus* was studied in detail.

Meterials and Methods

Multiplication of the parasites in the laboratory was done by supplying mated females with fresh host pupae. The oviposited pupae were kept in separate tubes. The various stages of development, the egg, larvae and pupae were observed by dissecting the host pupae at fixed intervals. The stages of the larvae were determined by measuring the size of the mandibles and spiracles using an eyepiece micrometer.

Results and Discussion

1. *Brachymeria nephantidis* Gahan

The whitish translucent eggs (Fig. 1) are inserted one at a time into the host pupa. These lie freely in the body fluid of the host. The incubation period varies from 18—28 hours according to the season. About 1—2 hours before hatching, the embryo starts its wriggling movements and the larva then makes a hole at the cephalic region of the egg by means of its mouthparts and slowly wriggles out. The pale white first instar larva lives freely, feeding on the contents of the host pupa. The duration of the first instar varies from 23 to 33 hours, second instar 6 to 12 hours, third 9 to 17 hours, fourth 15 to 22 hours and the final instar (Fig. 2) 30 to 50 hours. During moulting the head is freed at first from the larval exuvium and slowly the other parts of the body are also freed by wriggling forward.

Prior to pupation, the fifth instar larva stops feeding and is usually found with its head end directed towards the tail region of the host pupa. The larva soon reverses its direction and finally casts its meconium and becomes a prepupa.

Only one parasite ever completes its development in a host pupa. If more than one egg is laid, all of them may hatch into larvae but they, then, compete with one another for the available food and the one that wins survives. In most cases the competitors are eliminated during the first instar itself.

The prepupa, after shedding its larval skin, slowly transforms into the pupa which is at first creamy-white in colour. Within a day the colour becomes light golden yellow. In 2 to 3 days colour changes to brown and then to black. The pupa is usually found in the thoracic region of the host. The pupa! period lasts for 5 to 17 days.

The emergence of the parasite from the pupal stage starts with the up and down movement of the tarsi inside the pupal case. Then the pupal case breaks open and the covering of the abdominal region is pushed back by the legs. Simultaneously the abdomen is retracted forwards. Finally the pupal exuvium from the head region is also got rid of with the help of the legs and the whole process of primary emergence takes about 23 to 33 hours.

After the primary emergence the insect remains quiescent for about 5 to 10 hours inside the host pupa. The insect then becomes active and at first a tiny hole is formed on the pupal case which is made bigger and bigger by biting away small bits of it. The head and forelegs come out through the opening and the other parts of the body are drawn out by pushing the pupal case backwards with the forelegs. In the case of *Nephantis serinopa* and *Sylepta derogata,* used as host material, the emergence holes are located at the anterior region of the pupa while in pupae of *Phytometra (Plusia) peponis* the holes are usually found at the middle region or at the tail region.

The total developmental period varies according to the climatic conditions and sex differences. During summer the males take 10 to 13 days for development and the females 11 to 14 days whereas during rainy season the males take 12 to 17 days and females 13 to 18 days. The total length of developmental period on various hosts was almost the same.

2. *Brachymeria lasus* (Walker)

The whitish, translucent eggs of *B. lasus* hatch in about 20 to 31 hours. The process of hatching is same as that in *B. nephantidis.* The first instar larval period is 21 to 31 hours, second instar period 17 to 28 hours, third instar 20 to 31 hours. fourth instar 22 to 33 hours and the fifth instar period is 24 to 72 hours. The prepupai period is about 20 to 48 hours and the pupal period varies from 96 to 144 hours, depending on the weather. T, e process of emergence from the pupa is more or less similar in both *B. nephantidis* and *B. lasus.* The developmental period in the case of males and females ranges from 10 to 16 and 11 to 18 days respectively (Narendran and Joseph, 1976).

The incubation period of the *egg* was usually completed in 2 to 3 days in all species of chalcididae (Clausen, 1940). But in *B. nephantidis* and *B. lasus* the incubation period was definitely lesser than 2 days and in some cases, lesser than even a day. Compared to *B. intermedia* and *B. compasilurae* the larval period is somewhat low in *B. nephantidis* i. e. 4 to 5 days whereas it is 9 to 11 days for the other species (Dowden, 1935). The pupal period of *B. nephantidis* and *B. lasus* is rather short—4 to 8 days—while it goes upto 10 to 12 days in *B. fonscolombei* (Roberts, 1933) and 7 to 20 days in *B. tachardiae* (Haroon Khan and Verma, 1946). However the pupal period of *B. excarinata* is only 4 to 7 days (Cherian and Basheer, 1938). As reported by Jayaratnam (1941), in *B. nephantidis*, the pupal period lasts for 10 days while it is 7 to 10 days according to Rao *et al.* (1948) The variations in climatic conditions under which the observations were made, may account for these higher values in the pupal period obtained by Jayaratnam and Rao.

Roberts (1933) noted that the total developmental period *B. fonscolombei* fluctuated with the change of seasons from one host species to another. He found that *B. fonscolombei* took 21.5 days at 86-90°F and 55 days at 56-60°F. Haroon Khan and Verma (1946) observed that *B. tachardiae* had an 11 day developmental period in June; thereafter it increased with the fall in temperature. In November—December when the temperature was very low, it was completed in over 42 days. In *B. nephantidis* also the total developmental period was only 10 to 14 days during summer and during the rainy season the developmental period was prolonged to 12 to 17 days.

Summary

The detailed biology of *Brachymeria nephantidis* and *Brachymeria lasus*, two important, pupal parasites of the black headed caterpillar of coconut *Nephantis serinopa* has been studied and the results are reported in this paper.

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സംഗ്രഹം

തെങ്ങോലയ്ക്ക ചില കാലങ്ങളിൽ വമ്പിച്ച കേടുണ്ടാക്കുന്ന തെങ്ങോലപ്പുഴുവിന്റെ സമാധി **(pupa)** കളെ ഫലപ്രദമായി നിയന്ത്രിക്കാൻ കെൽപ്പുള്ള 'ബ്രാക്കിമീറിയ നെഫാൻറിടീസ്', 'ബ്രാക്കിമീറിയ ലാസസ്' എന്നീ എതിർ പ്രാണികളുടെ ജീവചരിത്രം വിശദമായി പഠിച്ചു അവയുടെ ജീവിത ദശകളെ പൂർണ്ണമായി ഈ ലേഖനത്തിൽ വിവരിച്ചിരിക്കുന്നു.

Fig 1. Egg of A *nephantidis*

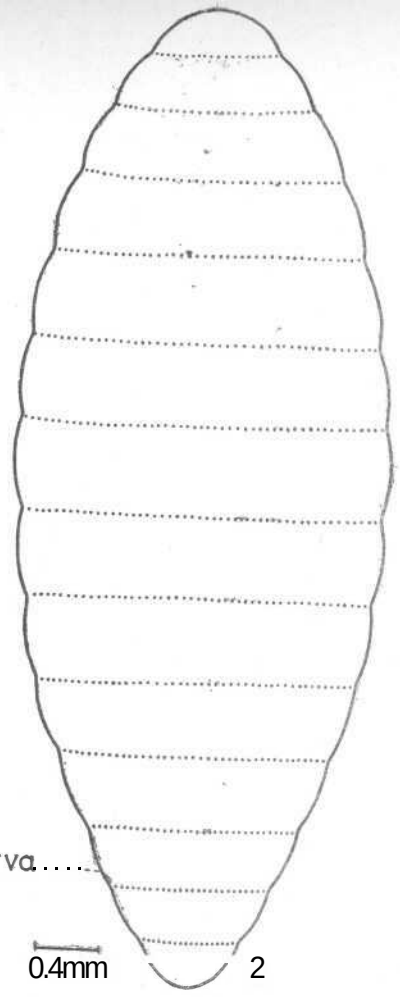

Fig 2. Fifth instar larva of *B nephantidis*

Fig.3.

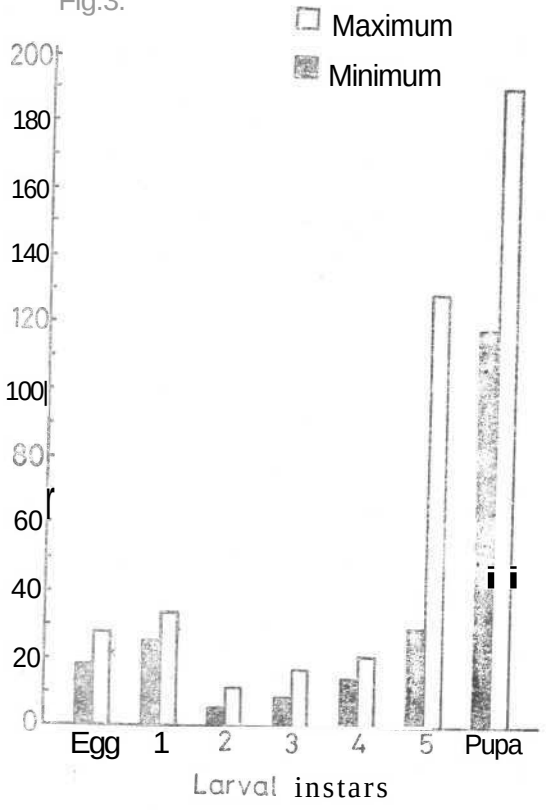

Fig 3. Developmental period in hours of the various larval instars of *B. nephantidis*

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