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Bioecology of *Bracon hebetor* Say (Hymenoptera: Braconidae),
an Indigenous Larval Parasitoid of the Coconut Leaf Eating
Caterpillar *Opisina arenosella* Wlk.
(Lepidoptera: Cryptophasidae)*

During a survey on the natural enemy complex of *Opisina arenosella*, cocoons and adults of a braconid parasitoid were collected from Eravipuram, Quilon District, Kerala. Subsequently, this was also collected from *Opisina*-infested gardens at Ponmana and Ayiromthengu (Quilon Dist.), Thottappally (Alleppey Dist.) and Nileswar (Cannanore Dist.). The specimens reared in the laboratory from field collected cocoons were determined as *Bracon hebetor* Say (= *Microbracon hebetor*) Say = *Habrobracon juglandis* Ashmead (Figs. 1 & 2) by Dr. G. Nixon, Commonwealth Institute of Entomology, London.

Biology, parasitic behaviour and intensity of natural parasitism of this parasitoid were studied during 1982 and

1983 and the results are reported in this report.

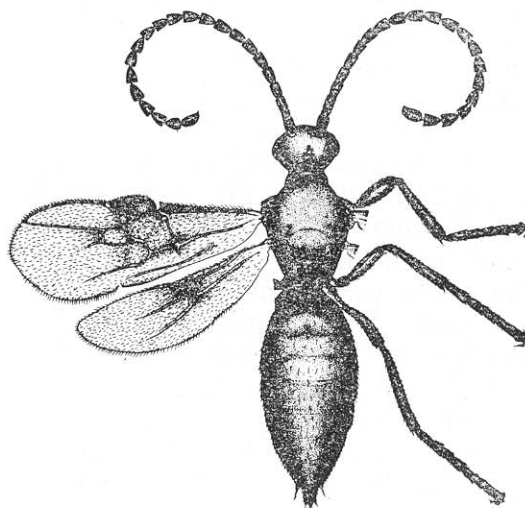


Fig. 1. *B. hebetor* - Male

* Contribution No. 440, Central Plantation Crops Research Institute, Kasaragod

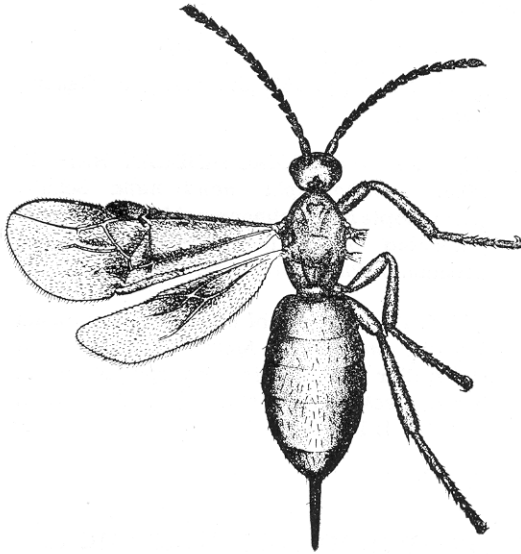


Fig. 2. *B. hebetor* - Female

Culture of *B. hebetor* was maintained on *O. arenosella* caterpillars at normal room temperature (24-33°C) and RH (32-95%). Pairs sorted out from freshly emerged brood were caged in specimen tube (8×2.5cm). Fifth instar caterpillar of *O. arenosella* was provided singly for oviposition and the parasitised larva removed daily from the cage and maintained separately. Observations on oviposition, fecundity, duration of different life stages, moulting, feeding and longevity of adults were recorded at 24 hr intervals. The adult parasitoids were fed with undiluted honey provided as tiny droplets on wax-coated paper strips. Biology of this parasitoid was also studied using caterpillars of *Coreyra cephalonica* Staint. as hosts for comparison of the results.

Fortnightly observations on population of *Opisina* caterpillars were made

from 120 sample palms for assessing the intensity of natural parasitism by *B. hebetor* in the field.

B. hebetor completed its egg to adult emergence period in 8.67 ± 1.52 (range 7-12) days. The egg period was 1.25 ± 0.44 (range 1-2) days. The larval and pupal periods were 3.05 ± 0.68 (range 2-4) and 4.38 ± 1.15 (range 3-7) days, respectively. The egg viability was 79.24% and the larval survival 71.52%. The larva when fully grown, stopped feeding and completed the prepupal period of 18-20hr after which it finally moulted and entered the pupal phase (Fig. 3). Sixtythree per cent of the pupae gave emergence to adults. The male to female ratio was 1:1. Fiftythree per cent of the brood comprised only males, four per cent only females and fortythree per cent mixed population of males and females. Number of parasitoids per brood varied from 1-38, male brood with an average number of 7.24 parasitoids, female brood with 2.83 parasitoids and the mixed brood with 10.46 parasitoids. Adults start feeding 5-10 minutes after emergence.

The parasitoids are sexually mature and soon after emergence they actively search for the mate. Mated females laid fertilised eggs, which gave emergence to male and female progeny and the virgin females to male progeny only, showing an arrhenotokous type of reproduction. The virgin female parasitoids, which emerged in test cages either as females, alone or as the first emerged females, completed the egg to adult period in 9.53 ± 0.13 (range 9-10) with an egg period of 2 ± 0 , larval 2.87 ± 0.27 and pupal 4.67 ± 0.25 days.

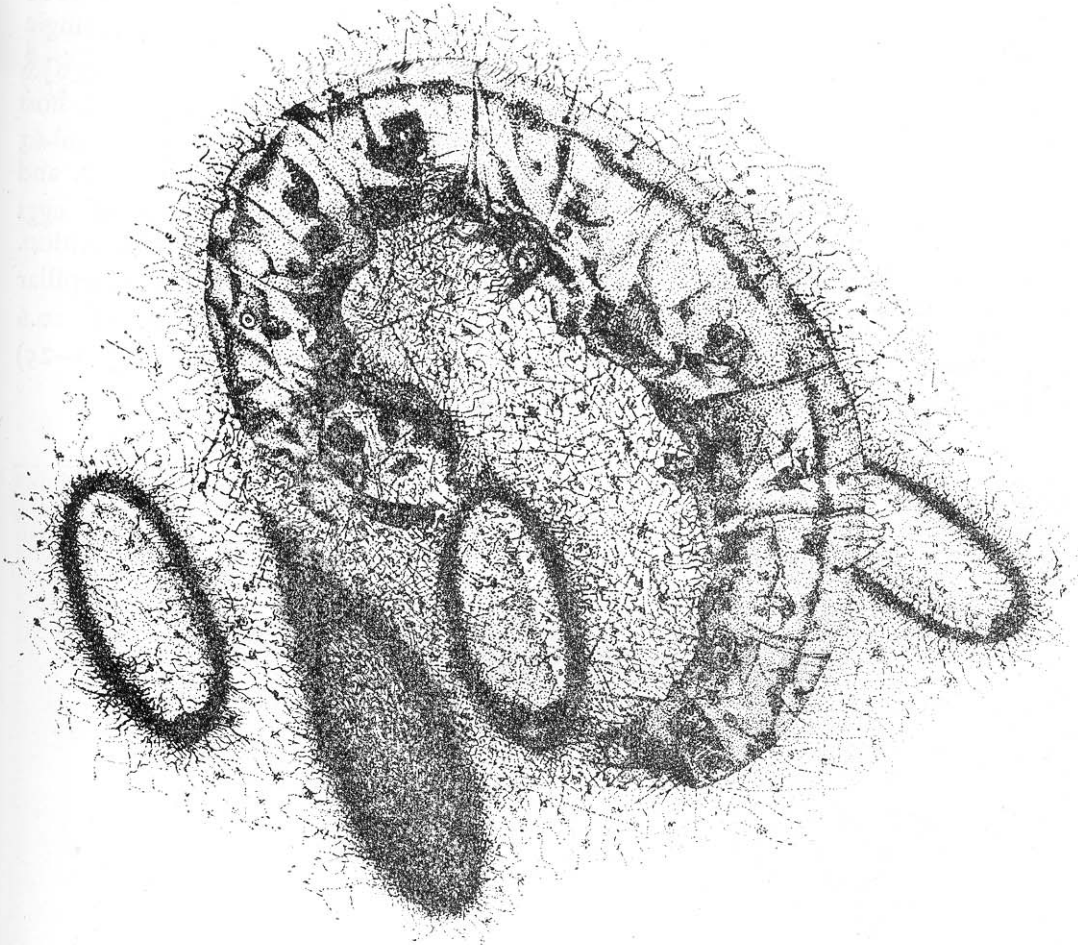


Fig. 3. *B. hebetor* - Pupae

These females were short-lived, longevity was only 17 days. Fecundity was on an average 82 eggs within an oviposition period of 8 days and gave emergence to 87.4% adult males only (out of the 151 eggs observed 132 males alone emerged).

The females started laying eggs 2-5 days after emergence. Eggs are laid on partially paralysed host caterpillars

(Fig. 4), which remained either exposed or concealed in galleries. Three to four stings by the female parasitoid render the host paralysed in 3 to 18 hr and the paralysed larva, left without any eggs laid lived for 3-5 days and then died. No recovery was noted. A single parasitoid paralysed 14-32 (average 22.60 ± 7.18) fifth instar *Opisina* caterpillars during its life span of 20-63 days. At times, the early prepupal caterpillars

were also paralysed and eggs laid. Female parasitoids fed on host's haemolymph, but no such feeding was observed by the males. When fresh hosts are provided daily, the longevity of the female parasitoid was prolonged to 63 days and the oviposition period to 55 days. Hagstrum and Smitle (1977) also observed that the survival and fecundity of the female *B. hebetor*, a parasite on *Ephestia cautella*. Walk. were directly related to the frequency of host finding.

Eggs are laid singly or in groups of two to eight on the hosts body. A single female laid on an average 229.1 ± 67.8 eggs (range 142-345) on 14-32 host caterpillars during its life span of 20-63 days, the daily range being 2-27, and laid the maximum number of eggs during the first ten days of oviposition. On an average, a single host caterpillar supported the development of 10.6 (range 1-29) eggs and 8.4 (range 1-25) larvae of the parasitoid.

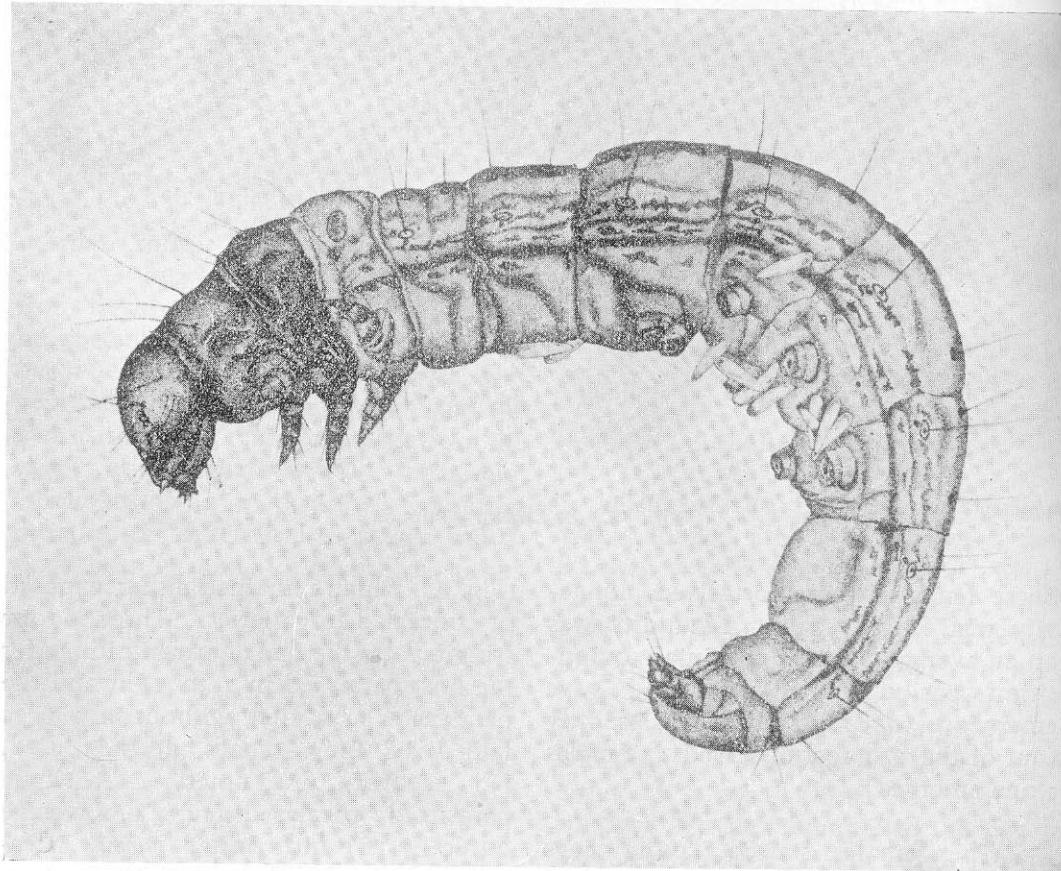


Fig. 4. *B. hebetor* - Eggs laid on *O. arenosella* caterpillar

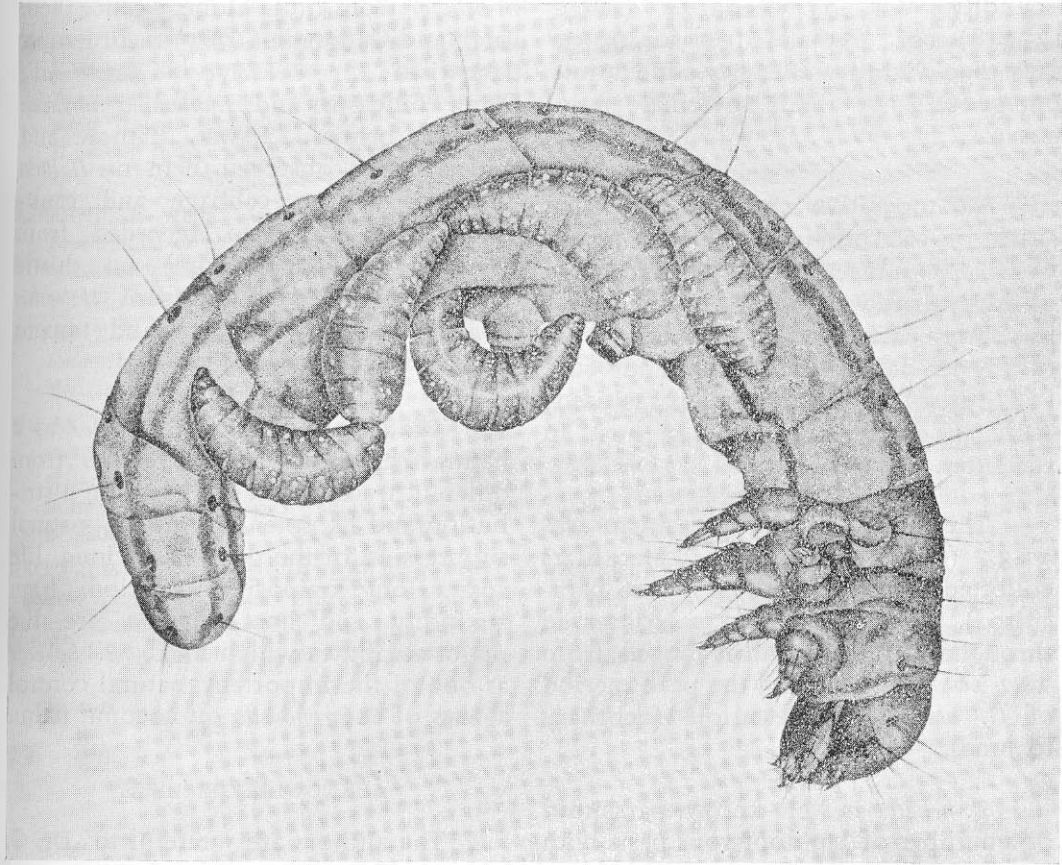


Fig. 5. *B. hebetor* - Larvae developing on *O. arenosella* caterpillar

The average preoviposition period was 3.0 ± 1.15 (range 2-5), oviposition period 37.7 ± 14.54 (range 22-55) and postoviposition period 4.4 ± 2.32 (range 1-8) days. The egg laying females caged singly and provided daily with fresh hosts had a comparatively long lifespan of 45.17 ± 14.76 (range 20-63) days, as against the normal female longevity of 8.94 ± 1.88 (range 6-13) and male longevity of 9.03 ± 1.84 (range 6-13) days, when caged in groups and fed with honey alone.

B. hebetor parasitised second to fifth instar caterpillars of *Opisina* (Fig. 5). However, the second and third instar hosts produced only male progeny. Fourth and fifth instar caterpillars were the ideal stages for mass multiplication of the parasitoid as they produced progeny of both the sexes.

The parasitoid completed its egg to adult period on *C. cephalonica* caterpillars in 8.60 ± 0.13 (range 7-10) days. Oviposition period lasted only 13.13 ± 1.54 (range 5-22) days. The mean

fecundity was 71.73 ± 11.84 (range 13-148) eggs. Females lived for 24-53 days. Egg viability was 92% and adult emergence 81%. Male to female ratio was 5:1.

A comparative study of the parasitism on caterpillars of *O. arenosella* and *C. cephalonica* revealed that the percentage of parasitism was 65.9 (29 out of 44 hosts were parasitised) with an egg laying of 3.9 per host in the former and 52.3 (23 out of 44 hosts were parasitised) with an egg laying of 2.6 per host in the latter.

The mean natural parasitism was 31.3% (out of 2417 *Opisina* caterpillars collected from the field, 757 were parasitised). Parasitism was observed throughout the year and it ranged from 26.2 to 26.7% during the peak period of *O. arenosella* infestation (February to June).

B. hebetor is well-known parasitoid of a number of lepidopterous pests both in the field and in storage. The parasitoid was first recorded on *C. cephalonica* infesting stored grains in south India (Krishna Ayyar, 1934) and *Coreyra* larvae were used as hosts for mass culturing *B. hebetor* in the laboratory (Negi, Venkataraman and Chatterjee, 1944). Appanna (1953) recorded its use in the biocontrol of insect pests of sesamum, lab-lab etc. Puttarudriah and Channa Basavanna (1957) listed twentyone hosts of

B. hebetor from India alone. Since then, Patel and Gangrade (1965) recorded its parasitism on *Dichocrocis punctiferalis* Guen. on castor and *Eublemma olivacea* Wlk. on brinjal. Rawat, Rathore and Saxena, 1968 observed them on *Hellula undalis* Fabr. on cabbage and cauliflower. It was also recorded from *Ostrinia kasmirica* (Moore) on thistle (Achan et al., 1970) and from *Heliothis armigera* (Hb.) on gram and tomato (Gulab Singh et al., 1983).

The occurrence of *B. hebetor* as a natural parasitoid of *O. arenosella* from different tracts indicates its wide distribution and its potential in the natural suppression of the pest. The long life span, long oviposition period, high fecundity and host finding are the major attributes which make *B. hebetor* as one of the important natural control agents of *O. arenosella* on coconut palm.

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