

Research Articles

OBSERVATIONS ON *ERIBORUS TROCHANTERATUS*  
(MORLEY) (HYMENOPTERA : ICHNEUMONIDAE),  
A LARVAL PARASITOID OF *OPISINA*  
*ARENOSELLA* WLK.

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ABSTRACT

The populations of *Eriborus trochanteratus* (Morley) occurring in India and Sri Lanka, are morphologically identical, but belong to two biotypes. A method to rear the Sri Lankan biotype of *E. trochanteratus* using *Opisina arenosella* Wlk. as host in the laboratory was developed. Additional information on the mating behaviour, oviposition and life history of the parasitoid on *O. arenosella* and *Corcyra cephalonica* caterpillars was collected. Attempts on field colonisation of the laboratory reared parasitoids in *Opisina* infested coconut gardens in the West Coast of Kerala resulted in establishment and recovery. However, hyperparasitism by the chalcidid *Brachymeria nephantidis* Gahan was observed in a few cocoons of *E. trochanteratus* collected from the release site. The possible reasons for the slow build up of population of *E. trochanteratus* in the field are also discussed.

INTRODUCTION

*Eriborus trochanteratus* (Morley) (Hymenoptera : Ichneumonidae) is a well-known complementary parasitoid of the coconut caterpillar *Opisina arenosella* Wlk. (= *Nephantis serinopa* Meyrick) in Sri Lanka. The parasitoid was reported by Ayyar and Margabandhu (1934) from *Dichocrocis punctiferalis* Guen. in Tamil Nadu. It is also a useful parasitoid of the potato tuber moth, *Phthorimaea operculella* (Zeller), in Karnataka (Rao and Nair, 1967). Rao and Nair (1967) recorded it on *P. operculella* as *Nythobia* sp. and Nair and Rao (1972) studied its biology under the name *Diadegma surendrai* Gupta.

The Indian and Sri Lankan populations of *E. trochanteratus* are morphologically identical, but belong to two biotypes as they multiply in entirely different host insects and habitats. In India, it parasitises *D. punctiferalis* on castor, cardamom and other Zingiberaceous host plants and *P. operculella* on potato, and in Sri Lanka in *O. arenosella* on coconut (Ayyar and Margabandhu, 1934; Rao and Nair, 1967; Perera, 1977). Eventhough *O. arenosella* is a serious pest of the coconut in different tracts of Tamil Nadu and Karnataka in India, where *E. trochanteratus* also occurs, it has not been observed as a parasitoid of *O. arenosella* so far.

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Stock of the Sri Lankan biotype of *E. trochanteratus* was introduced by the Tamil Nadu Agricultural University, Coimbatore into India and, a culture of it was obtained by us for laboratory multiplication and trials in the Biocontrol Laboratory at the CPCRI, Regional Station, Kayangulam. Perera (1977) studied its biology and evolved a technique for mass rearing in Sri Lanka. Additional information collected on the mating behaviour and biology of the parasitoid, and the results of attempts on its field colonisation in Kerala are discussed in this paper.

#### Methods of breeding

A day after mating, 5-6 female parasitoids are kept in a 17 × 7 cm glass jar the mouth of which is covered with muslin cloth fastened with rubber bands. After removing the cloth cover the jar is inverted and placed on a wooden table. *O. arenosella* caterpillars removed from their silken galleries are placed inside the jar one by one. The parasitoids immediately oviposit. The silken thread and other dirt are cleared frequently from the table. About 30 parasitised caterpillars are then placed inside another jar containing cleaned 12 cm long coconut leaf bits. They feed on the leaf tissues and form silken galleries. The parasitoid larvae spin cocoons within the cocoons of the host caterpillars.

Caterpillars of *Corcyra cephalonica* were also used for multiplication of *E. trochanteratus* in the laboratory.

A few parasitised *Opisina* larvae were allowed to develop inside clean glass vials to study the behaviour of the

immature stages of the parasitoid. In glass vials the parasitoid larvae spun cocoon and was therefore, possible to observe clearly the development of the larvae and pupae.

#### Mating behaviour

Males are polygamous, sexually vigorous and become active within an hour of emergence. Females are polyandrous and become sexually mature soon after emergence.

On recognition of the female, the male parasitoid lashes the antennae and vibrates the wings in excitement, advances towards the female bending the tip of the abdomen slightly, mounts and thrusts its aedeagus into the genital pore. The male remains motionless during mating, which lasts for 2-4 minutes. Perera (1977) observed that the mating lasted for 7-15 minutes. When several males are present in the glass jar three or four of them try to mate with a female at a time. Generally, the females try to avoid repeated matings. Nair and Rao (1972) in the Indian biotype and Perera (1977) in the Sri Lankan biotype noted casualties among the females by repeated or continuous matings.

#### Oviposition

The mated female begins to oviposit a few hours after emergence, if suitable hosts are offered. The progeny of such oviposition will invariably be males. Host caterpillars are, therefore, to be offered about 24 hr. of mating to get progeny of both the sexes.

*O. arenosella* caterpillars are introduced into the inverted glass jar with a

brush by slightly tilting the jar kept on the table. The female, vibrating its wings, advances towards the host and oviposits with a quick, sharp thrust of the ovipositor. In small glass vials the parasitoid experienced difficulty in ovipositing in the naked *O. arenosella* caterpillars (Perera, 1977); but in a more spacious container it oviposited in naked caterpillars briskly one after another without any difficulty.

#### Life history

The minimum period to complete the development of immature stages of the parasitoid in *O. arenosella* is 15 days. Incubation period ranges from 24–32 hr. at a temperature range of 22–30°C and relative humidity range of 45–80%, larval period 5–8 days, prepupal stage in the cocoon 2–3 days and the pupal period 6–8 days. Adult emergence generally takes place from the 15th day onwards after parasitisation. However, during the period of high temperature viz., April–May, the emergence of the parasitoid commences one day earlier. In the case of parasitoids reared on *O. arenosella* caterpillars the emergence of adults is completed within 3–5 days of commencement of emergence from a lot. However, when *Corcyra cephalonica* caterpillars are used as hosts the emergence of adults is spread out to a period of nearly two weeks. The life cycle also ranges from 14–28 days in the case of parasitoid reared on *C. cephalonica*. Longevity of female parasitoids, when fed with honey is 2–15 days and most of them die within a week.

Egg and larva are as described by Nair and Rao (1972). The anterior end

of the parasitoid larva lies towards the anterior end of the host. When it stops feeding it makes an opening in the thoracic region and crawls out. The larva spins a cylindrical cocoon close to the dead host, within the silken cocoon spun by its host prior to its death. The cocoon of *E. trochanteratus* consists of two layers, an outer thin dirty white, loosely spun, transparent and papery layer and an inner thick, strong, compact, smooth and waterproof black layer. The spinning of outer layer is completed in two hours and then strengthened. The inner layer is spun in about 1–1.5 days. The colour of the cocoon changes into light brown subsequently and then becomes dark brown. A ring (about 1.5 mm) appears in the centre of the cocoon. The cocoon spun by *E. trochanteratus* in *O. arenosella* is 7–8 mm long and 2–2.5 mm wide, and much bigger than that of the Indian biotype studied by Nair and Rao (1972). The pupa, at frequent intervals, rolls several times at a stretch, in the cocoon. When it does not roll it is found to tap at the cocoon with its mouth parts many a time.

#### Problems in rearing *E. trochanteratus*

Generally, male progeny outnumbered the female. Excessive production of male progeny during December–January period makes difficult to rear the parasitoid in the laboratory. Infection by the fungus *Aspergillus* sp. kills the parasitised caterpillars during the rainy season. This is more, when *O. arenosella* caterpillars are used as hosts, due to the accumulation of excessive moisture in coconut leaf bits in the parasite rearing glass jars. During

rainy season infection by the entomogenous bacterium *Serratia marcescens* is observed in *O. arenosella* caterpillars collected from the field. When such caterpillars are used as hosts for rearing *E. trochanteratus* the female parasitoids get the infection through their ovipositors and die subsequently.

#### Field colonisation of *E. trochanteratus* and recovery

One thousand and forty-nine adult parasitoids (651 females and 398 males) were released at regular intervals in a coconut garden heavily infested by *O. arenosella* in the coastal belt of Thottappally, Alleppey district, Kerala, during 1979-1980. Fifteen parasitoid cocoons were recovered from the palms in the release site indicating the establishment of *E. trochanteratus* in the field. However, *Brachymeria nephantidis* Gahan (Chalcididae), a primary pupal parasitoid of *O. arenosella*, emerged from three parasite cocoons collected from the field, indicating hyperparasitism.

The rate of multiplication of the parasitoid and its population build-up in the field were rather slow. The major handicap for this parasitoid in the field appears to be its difficulty to get easy access to the host caterpillars.

*O. arenosella* caterpillars move fast up and down within the larval galleries when the parasitoid thrusts its ovipositor in its efforts to locate the host. If it fails to locate any host, it repeats the search. As such, it takes considerable time for successful oviposition in the field. *E. trochanteratus* is a dominant species of parasitoid only in certain tracts of Sri Lanka (Perera, 1977). Laboratory studies carried out by us also have indicated that when multiple parasitism occurs with the tachinid parasitoid *Spoggosia bezziana* (Baranoff), *E. trochanteratus* is always suppressed. This could perhaps to be the reason why *E. trochanteratus* remains as a complementary species of parasitoid of *O. arenosella* in Sri Lanka.

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