

# ON THE BIOLOGY OF *CALLEIDA SPLENDIDULA* (F) (COLEOPTERA : CARABIDAE), A PREDATOR OF THE COCONUT LEAF EATING CATERPILLAR, *OPISINA* *ARENOSELLA* WLK.

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## ABSTRACT

A method for rearing the carabid predator, *Calleida splendidula* (F) in the laboratory is described. Short descriptions of the adult and immature stages of the beetle and feeding potential of the predator on *Opisina arenosella* WLK. caterpillars are also furnished. The adult beetle, on an average, consumed one fully grown caterpillar of *O. arenosella* in every three days. Eleven to thirteen second instar caterpillars of *O. arenosella* were consumed by each grub during the entire grub phase. The adult beetle lived for 6 to 14 months in laboratory cages. A comparison between *C. splendidula* and *Parena nigrolineata* (CHAUDOIR) also is furnished.

(Key words: Method of rearing: Biology: *Calleida splendidula*)

## INTRODUCTION

The carabid beetle, *Calleida splendidula* (F.) (= *Parena laticincta* BATES.) was recorded as a predator of the coconut leaf eating caterpillar *Opisina arenosella* WLK. (= *Nephanthis serinopa* MEYRICK) by RAO (1924) from Mangalore, Karnataka. GARDNER (1927) described the larvae of *C. splendidula* and reported that this is predacious on *Pyrausta machaeralis* WALKER and *Hyblaea puera* CRAMER. ANDREWS (1933) reported that in addition to the above two preys, *C. splendidula* is predacious on *Nephoter yx rhodobasalis* HAMPSON and *Pyrausta coclesalis* WALKER.

It is evident from the de-

scriptions of the adult beetle and the immature stages that the studies made on the carabid beetle *Parena laticincta* by DAVID *et al.* (1975) and GANESWARA RAO *et al.* (1978) related to *Parena nigrolineata* (CHAUDOIR). As such, only very scanty information is available on the biology and feeding potential of *C. splendidula* on *O. arenosella* caterpillars. Earlier attempts to rear this predator in the laboratory were also unsuccessful. MOHAMED *et al.* (1982) reported that the adult beetles did not oviposit in the laboratory. Taking into consideration the size of adult beetles, the eggs of *Calleida splendidula* and *Parena nigrolineata* are very small and, as such, it would be rather difficult to locate them in the larval galleries of

the pest. As with *P. nigrolineata*, it is easy to breed this predator also in the laboratory. It is now possible to liberate the laboratory reared adults of *C. splendidula* for biological suppression of *O. arenosella*. In this paper, we furnish a simple technique for rearing it in the laboratory and a short account on the biology and feeding potential of the predator on *O. arenosella* caterpillars.

## MATERIALS AND METHODS

### Method of rearing :

Initial breeding material of the predator was obtained from single female of *C. splendidula* collected from the field. It laid 114 eggs in three months' time and from this

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a stock culture of 94 adults could be built up. These adults commenced laying eggs in four months after emergence. Up to 15 adult beetles were caged in a glass bottle of size 17.5 cm x 7.5 cm, in which coconut leaf bits infested by *O. arenosella* caterpillars were provided. The bottle was covered with a piece of mull cloth tightened with rubber bands. The beetles laid eggs on the leaf bits near the larval galleries of *Opisina*, partly covering them with frass materials from the larval galleries or faecal pellets of the caterpillar. The beetles also oviposited on the cloth piece and/ or in the glass bottle itself, when leaf bits were not provided. The eggs are laid singly without gluing and they can be easily detached with a camel hair brush and stored in glass vials for hatching. Adequate moisture was provided by keeping small rolls of moistened cotton wool in the cage. The eggs are removed from the rearing cage every day. This is necessary since the adults of *Calleida splendidula* feed on their own eggs.

On hatching, each grub is transferred to a glass vial, 8 cm x 2.5 cm, and three to four second instar caterpillars of *O. arenosella* are provided as food. One or two caterpillars are partially crushed and provided for the newly hatched predator grubs, so as to enable them to feed on the same immediately. When the glass vial becomes dirty, the predator grub is transferred to a similar clean, dry vial. The grub pupates in the glass vial itself under normal room temperature and relative humidity.

## RESULTS AND DISCUSSION

### Adults :

Immediately on emergence,

the adult of *C. splendidula* is light brown with a reddish tinge colouration. The metallic blue green lustre begins to show up on the outer margins of the elytra eight hours after the emergence.

The adult of *C. splendidula* is smaller than *P. nigrolineata*. The former is about 8mm long with 3.5 mm long antennae. The adult of *P. nigrolineata* is 1 cm long with broader head and thorax, but with shorter and stouter antennae. *C. splendidula* laid, on an average, 32 - 47 eggs per month.

### Egg :

Spherical, light creamy, shiny, much bigger than that of *P. nigrolineata*. Chorion smooth, opaque and leathery. Eggs are laid freely, without any gluing, and partially covered with the gallery frass material or faecal pellets of the caterpillar.

### Grub:

The grubs of *C. splendidula* are black with a prominent reddish brown head, while those of *P. nigrolineata* are brownish.

The first instar grub 3.8 to 4 mm long, with a flat, prominent reddish brown head, antennae short and four - segmented; body black,

tapering towards the caudal end; anal cerci long with a black proximal, white middle and black distal portions, the last joint of the anal cerci possesses three hairs; last abdominal segment tubular, with hairs all over the body; legs black, tarsal spines two, short.

The first instar grub is highly mobile and cannibalistic. Larval mortality is quite common if adequate number of prey (partially crushed caterpillars) is not provided in the rearing cages).

The mature grub is black, 2.15 cm long and 2 mm wide; head reddish brown, prominent; antennae 4 - jointed; 1.7 mm long; body 13 - segmented; first thoracic segment is the longest (1 mm), the last abdominal segment is tubular, anal cerci five - jointed; 2 mm long, third, fourth and the proximal end of the fifth segment white, remaining portions black, the fifth segment bears three hairs.

### Pupa :

Creamy, when freshly formed; slowly turns brown, 0.57 mm long, 2.2 mm wide, head beset with black hairs. Dorsal side of abdominal segments bears sensory hairs arising in groups as also singly.

Life history	Range (days)	Average (days)
Egg period	4 - 8	6
Grub Phase	13 - 18	15.76
Pupal Period	4 - 7	5.6
Total duration from egg to adult stages	25 - 30	26.88

Feeding potential of *C. splendidula* :

There are three instars in the

grub phase of *C. splendidula*. Details of the duration of each instar and the feeding potential of the grubs are as follows:-

Instar	Duration (days)	Average (days)	Feeding potential (II instar <i>O. arenosella</i> caterpillars)
I	3 - 5	3.52	3 - 4 caterpillars
II	3 - 5	3.88	3 - 4 "
III	5 - 10	7.8	4 - 7 "

On an average, eleven to thirteen second instar caterpillars of *O. arenosella* were preyed by each grub of *C. splendidula* during its entire grub phase in the laboratory.

The adult beetle, on an average feeds on one fully grown caterpillar of *O. arenosella* in every three days. The beetles lived for 6 to 14 months in laboratory cages.

Comparison between *C. splendidula* and *P. nigrolineata* :

1. *P. nigrolineata* females glue their eggs, while *C. splendidula* lays eggs freely without gluing. Both the species cover their eggs with the frass material from the silken galleries of

*O. arenosella*. The eggs of *Calleida* are larger and spherical, whereas those of *P. nigrolineata* are oval.

2. Hatching of eggs is adversely affected or hatching delayed if excessive moisture is not provided in glass vials in which the eggs of *P. nigrolineata* are maintained. The egg period of *P. nigrolineata* went to a maximum of 14 days. Eggs of *Calleida* also hatch under normal relative humidity.

3. The feeding period of the grub of *P. nigrolineata* is shorter (about 10 days), while it was 13 - 15 days in the case of *C. splendidula*.

4. The prepupal period is long in *P. nigrolineata*.

5. *P. nigrolineata* pupates in moist soil, while *C. splendidula* pupates in the leaf itself or in the glass vial in the laboratory.

6. Under identical conditions of temperature and relative humidity in the A. C. room, *P. nigrolineata* took 31 days to complete the egg to adult stages (22 - 7 - 1984 to 22 - 8 - 1984 : egg period - 6 days, larval and prepupal period - 19 days and pupal period - 6 days), while *C. splendidula* completed its life cycle in 26 days (22 - 7 - 1984 to 17 - 8 - 1984 : egg period - 6 days, grub phase - 15 days and pupal period - 5 days).

7. Both the species have three larval instars.

8. Compared to their size the adults of both the species are poor feeders.

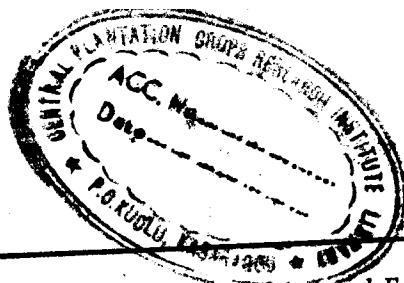
9. Population of *P. nigrolineata* is more in the field than that of *C. splendidula*.

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#### References

- Andrews, H. E. (1933) On the types of the Oriental Carabidae described by V. de Motchulasky. *Trans. Roy. Ent. Soc. London* 81 : 4
- David, B. V., A. V. N. Paul, S. Palaniswamy & T. R. Subramanian (1975) Life history and feeding potential of the predatory beetle, *Parena laticincta* Bates. On *Nephantis serinopa* Meyr. *Science & Culture*. 41 (3) : 135.
- Ganeshwararao, A., P. R. M. Rao, K. Laxminarayana & P. S. Rao (1978) Preliminary observations on the biology of *Parena laticincta* Bates (Coleoptera : Carabidae) a predator of *Nephantis Serinopa* Meyrick. *Indian Cocon. J.* 9: 2 - 5.



- Gardner, J. C. M. (1927) Descriptions of three Indian beetle larvae (Carabidae: Coleoptera) *Ind. For. Res., Ent. Series*, 13: 65.
- Mohamed, U. V. K., U. C. Abdulrahiman & O. K. Remadevi (1982) Notes on two carabid (Carabidae: Coleoptera) predators of *Nephantis Serinopa* Meyrick (Xylorictides: Lepidoptera) from Kerala. *Entomol*, 7 (3): 341-343.
- Pillai, G. B. & S. Keshava Bhat (1987) Biology and feeding potential of *Parena nigrolineata* (Chaudoir) (Coleoptera: Carabidae); a predator of the Coconut caterpillar, *Opisina arenosella* WLK. *Indian Cocon. J.*, 17 (12): 6-10.
- Rao, Y. R. (1924) An outbreak of *Nephantis serinopa* at Mangalore in 1922. *Rept. Proc. V. Ent. Meeting, Pusa* : 92 - 98.

## COCONUT TYPES OF GOA

Three main types of coconut are cultivated in Goa. In the southern portion of the territory is grown the type called Benaulim while two types called Calangute and Nadora are cultivated in the northern parts of the State.

### *Benaulim*

This type belongs to the Tall variety and starts bearing at the age of 6 to 8 years after planting. The nuts are small in size. The husk is fairly thin. Two shades of colour occur-green and reddish green. The green type is a heavy bearer and is predominant though the other type is also a heavy bearer. Benaulim is reported to have wider adaptability as far as soil requirements are concerned. The oil content of the kernel is fairly low. This type derives its name from the village of Benaulim where it is extensively cultivated. This is also known as Banavalli type.

### *Calangute and Nadora*

Both these types are met with in the northern parts of Goa. They also derive their names from the villages called Calangute and Nadora where they are mainly cultivated. They reach the bearing stage only by 10 to 15 years after planting. They seem to be more adapted to coastal and riverside areas. The nuts of these types are bigger in size; hence fewer nuts are obtained from a bunch. The kernel has greater oil content than that of the Benaulim type nut. They are reported to have a comparatively shorter life span than the Benaulim type.

These types are to be seen mainly in certain areas around the villages from which they got their names.