

Biology and rearing requirements of an anthocorid predator, *Blaptostethus pallescens* Poppius (Heteroptera: Anthocoridae)

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ABSTRACT: Biology and feeding potential of an anthocorid predator, *Blaptostethus pallescens* Poppius were studied on the eggs of alternate host, *Corcyra cephalonica* (Stainton). Approximately 100 UV irradiated *C. cephalonica* eggs are required for rearing one nymph throughout its nymphal period of about 16 days (4-11 eggs per day) and 630 eggs for an adult throughout its longevity (3-19 eggs per day). Adult females had a greater feeding potential (943 eggs per adult) in comparison to males (381 eggs per adult). Utilising 9cc of *C. cephalonica* eggs, 1000 *B. pallescens* could be produced. The lab-reared adults had a very high longevity (38-78 days) and fecundity (110-203 nymphs/female), indicating the suitability of *C. cephalonica* eggs for mass production.

KEY WORDS: Biology, *Blaptostethus pallescens*, *Corcyra cephalonica*, feeding potential, rearing

Blaptostethus pallescens Poppius (Heteroptera: Anthocoridae) was originally described as *Blaptostethus piceus* Fieber var. *pallescens* Poppius from Celebes. It has been assessed as a potential anthocorid predator of pests in the maize ecosystem in Egypt (Tawfik and El-Sherif, 1969; Tawfik and El-Husseini, 1971; Tawfik *et al.*, 1974). The information available on the genus *Blaptostethus* in India is scanty. The only records available are that of *Blaptostethus kumbi* Rajasekara collected from sugarcane fields in Mysore (Rajasekhara, 1973); *B. pallescens* from Tamil Nadu and Bombay (Muraleedharan, 1977) and Bangalore (Jalali and Singh, 2002). *B. pallescens* has also been recorded from Madagascar (Muraleedharan, 1977) and from grain warehouses in Egypt, where mites were common (Tawfik and El-Husseini, 1971). Preliminary investigations revealed that this predator could be a potential

biocontrol agent for the management of *Rhopalosiphum maidis* (Fitch) in maize and also of primary and secondary storage grain pests. Attempts were made to mass multiply this predator in the laboratory and to study its biology and feeding potential. The objective of this work was to meet the predator requirement for large-scale releases of *B. pallescens* by developing an inexpensive and simple mass rearing system. Hence, the need was felt to study the biology and feeding potential of the predator. This paper details a method developed to multiply *B. pallescens* on *Corcyra cephalonica* (Stainton) as alternate laboratory host.

MATERIALS AND METHODS

The basic units of multiplication were PEARLPET® plastic containers (500ml capacity). The containers were provided with strands of cotton

at the base. UV-irradiated *Corcyra cephalonica* eggs were placed on pieces of bean pods using a moist soft brush. In each container, 10 pieces of bean pods were placed with *C. cephalonica* eggs. Pollen was sprinkled on cotton. A swab of cotton soaked in water was stuck to the wall of the container. One container could hold 30 adults. The eggs were laid in the bean pods, inserted into the tissue with only the operculum of the eggs visible. After 24 hours, the pods with the eggs were removed and placed in small, round, ventilated plastic containers (diam 6.5 cm and height 2.5 cm). When the nymphs hatched, they were shifted to PEARLPET® jars provided with *C. cephalonica* eggs on bean pods. Feeding was provided on alternate days till adults emerged. The freshly emerged adults were shifted to the jars with bean pods for oviposition.

In order to study the feeding potential of nymphs, ten sets of ventilated containers, described above, were arranged with one newly hatched nymph in each container. UV-irradiated *C. cephalonica* eggs (15 eggs) were placed on a piece of bean pod and kept inside each container. After every 24-hour period, the eggs were examined for feeding damage and another set of UV-irradiated eggs was provided. This was continued till adults formed. The feeding potential of the adult male and female was also studied. The method followed was the same as that followed for nymphs. The adults were provided UV-irradiated *C. cephalonica* eggs @ 20 eggs per adult per day till mortality.

RESULTS AND DISCUSSION

Diagnostic Characters

Body length: 2.60-2.95 mm. Head, pronotum, scutellum and cuneus area of hemelytra dark brown, membrane of hemelytra grey. Underside uniformly dark brown, slightly lighter than dorsal side; legs lighter, yellowish brown. Antenna with first two segments stout, segments III and IV slender and filiform (Fig.1b), with several setae longer than width of segment. Pronotum with three pairs of long bristles, first dorsal and on collar region, second lateral, just below anterior margin and third

posterolateral (Fig.1a). Scutellum with a prominent median depression or dent. Abdomen broader in female, posterior segments asymmetrical in male, last segment with a bunch of setae (Fig.1d) and with elongate setae visible on dorsal side in both sexes. Fore femora with 5-6 strong, peg-like teeth on distal side; fore tibiae with a lateral row of teeth almost throughout their length (Fig. 1c). Mid- and hind tibiae with irregular spines on surface, more in distal half. Female with two copulatory tubes (Fig.1e).

Biological parameters

Utilising the standardized rearing technique, *B. pallescens* could be reared successfully and continuously. The biological parameters are indicated in Table 1. The newly hatched nymphs when fed on UV-irradiated eggs of *C. cephalonica*, developed normally with five nymphal instars and became adults in about 16.3 days. Tawfik and El-Husseini (1971) attempted to rear this predator on lepidopteran larvae, aphids and mites and reported that the nymphs were unable to moult when the food was restricted to aphids or plant sap. When fed on aphids or lepidopterous larvae, they identified five nymphal instars; the durations of each instar from 1st to fifth being 2-6, 2-3, 2-3, 2-4 and 4-6 days, respectively. This is comparable with the durations of the five nymphal instars observed in our study (Table 1).

In the present investigation, mean longevity of adult male and female was 42.4 and 58.2 days, respectively. Tawfik and El-Husseini (1971) reported on a male and female longevity of 17.7 and 24.4 days, respectively when the anthocorid was reared on lepidopteran larvae. They also reported that the fecundity of the anthocorid was 78 eggs on lepidopteran larvae, 13.2 on aphids and 5.7 on mites. However, in our studies a high mean progeny production (based on nymphal count) was recorded (143 per female). The female: male ratio was 1.2:1 in our studies and in the studies conducted by Tawfik and El-Husseini (1971) on other hosts. The high longevity and progeny production recorded on UV-irradiated *C. cephalonica* eggs, is a clear indication of its suitability for mass rearing *B. pallescens*.

Table 1. Biological parameters of *B. pallescens*

Biological parameters	Mean±SD	Range
Incubation period (in days)	4.5±0.22	3-5
Nymphal period (in days)	16.3±0.62	14-16
1 st instar	3.6±0.68	2-6
2 nd instar	2.2±0.20	2-3
3 rd instar	2.2±0.37	2-3
4 th instar	2.4±0.40	2-4
5 th instar	6.0±0.55	4-7
Total developmental period (in days)	19.9±0.40	17-23
Longevity male (in days)	42.4±5.82	38-68
Longevity female (in days)	58.2±5.06	44-78
Progeny production (nymphs/female)	143±30.05	110-203
Per cent female progeny	57.8±1.60	55-61

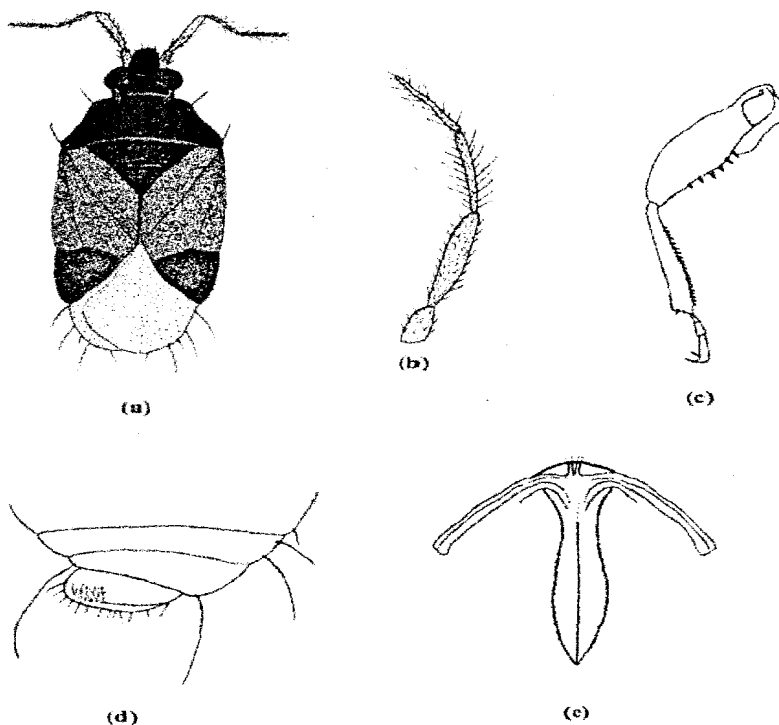


Fig.1a-e: *Blaptostethus pallescens*. a. Adult, dorsal aspect, b. antenna

The feeding potential of this anthocorid was studied (Figs. 2A and B). During the nymphal period, the freshly hatched nymphs preferred to feed on plant sap on the first two to three days. From the 3rd or 4th day, they started feeding on host eggs. Feeding generally ranged between 4 and 11 eggs

per day. However, occasionally a higher peak of 13 eggs per day was observed. Feeding potential was observed to be higher between day 8 and day 14 of the nymphal period. Total feeding was 83 to 114 eggs per male nymph and 94 to 130 per female nymph.

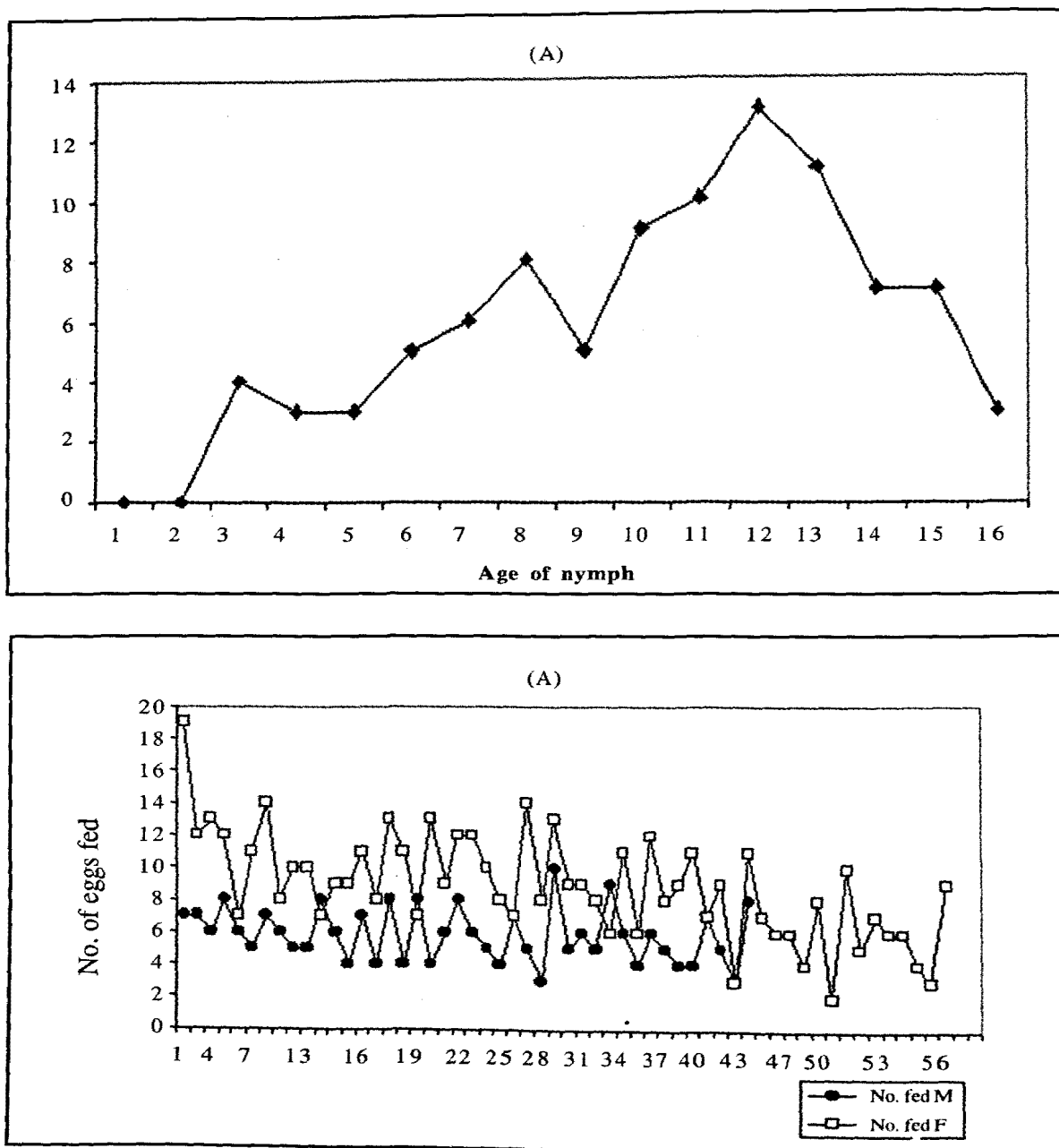


Fig. 2. Feeding potential of *Blaptostethus pallescens*
(A) nymph (B) Adult: Male (M) and Female (F)

In the case of the adults, the female had a higher feeding potential in comparison to the male. The adult male fed on 3 - 10 eggs per day, however, during some days feeding was lesser, *i.e.* 2 eggs per day. The adult female fed on about 4 - 13 eggs per day. The fresh adult female had a higher feeding potential of about 19 eggs per day. Total feeding per adult male ranged 165-742 eggs and per adult female 503-1552 eggs. Based on the feeding potential, it was calculated that 9cc of *C. cephalonica* eggs would be required for rearing 1000 *B. pallescens*. An average of 200 individuals could be produced per month per rearing container.

Preliminary investigations revealed that this anthocorid could also feed on the nymphs and adults of maize aphid, *Rhopalosiphum maidis*. *B. pallescens* nymph could feed on approximately 99.5 aphid nymphs and one adult anthocorid on 120 aphid nymphs. This experiment indicated that this predator can be intensively cultured, without encountering problems of cannibalism and excessive handling; thus making it amenable to commercial production.

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