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BIONOMICS OF *SERINETHA AUGUR* FABR. AND ITS ASSOCIATION WITH *DYSDERCUS CINGULATUS* FABR., THE RED COTTON BUG

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Serinetha augur F. (Plate Ia) (Family Coreidae) is a brightly coloured bug and is quite often met in company with *S. abdominalis* Fabr. and the red cotton bug *Dysdercus cingulatus* F. on cotton (Lefroy, 1909).

The Coreid bugs, in general, are plant sap-suckers and are found associated with a wide range of plants from grasses to trees in cultivated fields as well as forests. Scanty information is available about the food plants and economic importance of these bugs in India. However, *Leptocoriza varicornis* F. is a pest of rice and millet (Imms, 1951) and *Amblypelta cocophaga* China, attacks coconut fruits, and their premature falling off is attributed to the injury and swellings caused by the feeding of these bugs (Phillips, 1940, 1941).

According to Lefroy (1909) both *S. abdominalis* and *S. augur* are not known to feed upon cotton seeds and are, therefore, harmless. Hoffman (1933) records *S. augur* occurring in large numbers on *Trewia* and on *Cardiospermum halicacabum* (Family Sapindaceae) in Coimbatore and Canton (China) respectively, but does not consider it a pest as the feeding habits are not known. Chatterjee (1915, 1936) states that oil from the seeds of *kusum* has a positive chemotropic influence on both the young and adults of this species but he also does not mention the feeding habits. This bug has been commonly found on fallen, dry as well as fresh fruits and also occasionally on leaves and ripening fruits (Plate II) of *kusum* trees. Since *kusum* (*Schleichera oleosa*) (Family Sapindaceae) is one of the important major hosts of lac insects and the lac produced on this host is of the best quality, the biological studies and economic status of this bug were undertaken at Hesal near Ranchi in June, 1953. Sometimes these bugs occur in clusters of 50-100 between naturally formed shelters of leaves. They also feed occasionally on the leaves and stems of *Lantana* and some other weeds growing under or in the vicinity of *kusum*.

Breeding technique—Rearing was carried out in ordinary glass battery jars (6" x 4") with perforated paper or brass lids as covers. The bugs and nymphs were provided with fruits or seeds of *kusum* or 3% sugar solution for feeding purposes. Occasionally they were also fed upon the leaves and twigs of *kusum* which were kept in a container filled with water.

The bugs and nymphs died in large numbers in the winter season due to cold and therefore, it was found necessary to provide dry leaves inside cages for shelter against cold.

Distribution—*Serinetha augur* F. is distributed in Assam, Bombay, Madras, Ceylon, Upper Tenasserim, West Yunan, the Malayan Peninsula and Hainan (Distant, 1909); Pusa, Poona (Fletcher, 1921); China (Hoffman, 1933); Dehra Dun, Kalsi, United Provinces; Aiyur, Dankanikota, Jamalagiri, Kottur, Fraserpet (Chatterjee, 1936). Some examples from Calcutta, Bangalore, Travancore, Chatrapur, Lucknow, Nani Tal, Asansol, Nandidurg (South India) and Lower Burma are also present in the collection of the Zoological Survey of India.

Life history—Brief notes on the laboratory rearing and biological observations in the field are presented below.

The female bugs lay eggs indiscriminately in confinement. The eggs are usually laid either singly or in clusters, in batches of 2 or more, and as many as 16 eggs have been counted in one batch. The maximum number of eggs laid by a female was 203 in its life of 114 days (Table I). An egg (Plate Ib) measures 1.84 mm. in length and 1.2 mm. at its greatest width. The egg is glued to the substratum by means of a short pedicel. On the upper side is an operculum which has small pores ranging in number from 14 to 22, probably micropylar in function. A small area with a similar number of pores is also visible on the anterolateral side of the egg. Its function is not known. When the egg hatches the operculum or lid is pushed off and separated and the nymph emerges with its ventral side upwards. The egg period ranges from 6—9 days in the summer months and 16-19 days during November-December.

Nymphs—The nymph passes through five instars before it becomes an adult. The first stage nymphs are quite hardy and can live without food for 5-8 days and some of them even moult and enter into the second instar. No difficulty was felt in breeding the earlier stages but a huge mortality occurred in the older stages and rearing was difficult. Only a few nymphs could be successfully reared to the adult stage, either from the laboratory bred or from field collected stock. Hoffman (1933) met with the same difficulty in rearing the coried bug *Mictis serina* Dallas and reported that not a single individual could be carried through from egg to adult stage.

The rearing data indicate that considerable variation occurs in the nymphal period and total life cycle. Some nymphs which hatched in July reached the adult stage in 31 to 44 days, while others of the same batch of eggs did not become adults although they lived for 74 to 85 days. However, one of the nymphs which hatched in September took 146 days to become an adult.

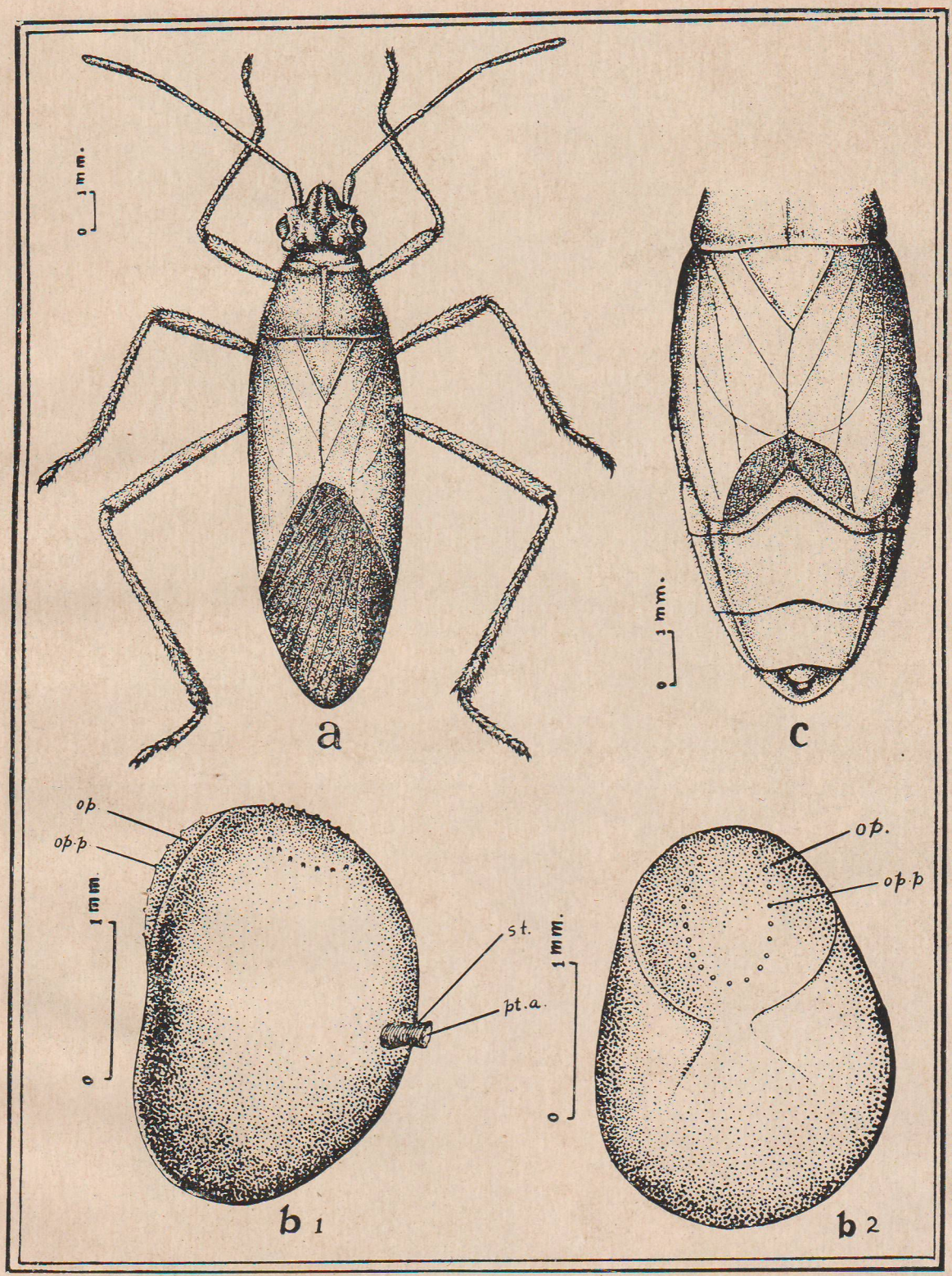
Adult—Unmated adults lived from 18 to 46 days during the months of August to October, but amongst those allowed to mate average longevity was 44 days for males and 76 for the females, maximum being 104 days.

The bugs bring their abdominal extremities together and mate end to end. The female being bigger in size than the male drags the latter about while mating is in progress. The pairs copulate several times in a day and in some cases they continue to do so for several days before egg laying starts. Copulation also occurs in between the egg laying periods.

Dimorphism is also seen in the bugs during November to January when their forewings become quite short and do not extend up to the tip of the abdomen. The distal black membranous spot in dimorphic forms is very much truncated or quite often absent (Plate Ic). The population of such form is about 0.16 per cent.

Some coreids have been reported as predators on certain caterpillars and beetle grubs. Lefroy (1909) reported that R. M. Dixon observed one *Serinetha augur* F. feeding on another but he does not mention the stage of these two. Hoffman (1933) kept several adults confined together in a tin ointment box but they did not exhibit cannibalism. However, it has been observed that both adults and nymphs predate freely on eggs, particularly the freshly laid ones. The older nymphs attack the younger ones especially soon after their hatching and similarly the adults attack and feed on nymphs as well as on adults which have just moulted. No cannibalism was noticed in mature bugs. They also feed collectively or individually on dying and dead nymphs and adults. Mehra and Purkayastha (1957) have observed similar feeding habits on dying or dead adults and nymphs of *Tessaratoma javanica* Thunb. Successful breeding of nymphs to adult stage was achieved when fed exclusively on the egg and the nymphal period was completed in 49 days.

PLATE I.

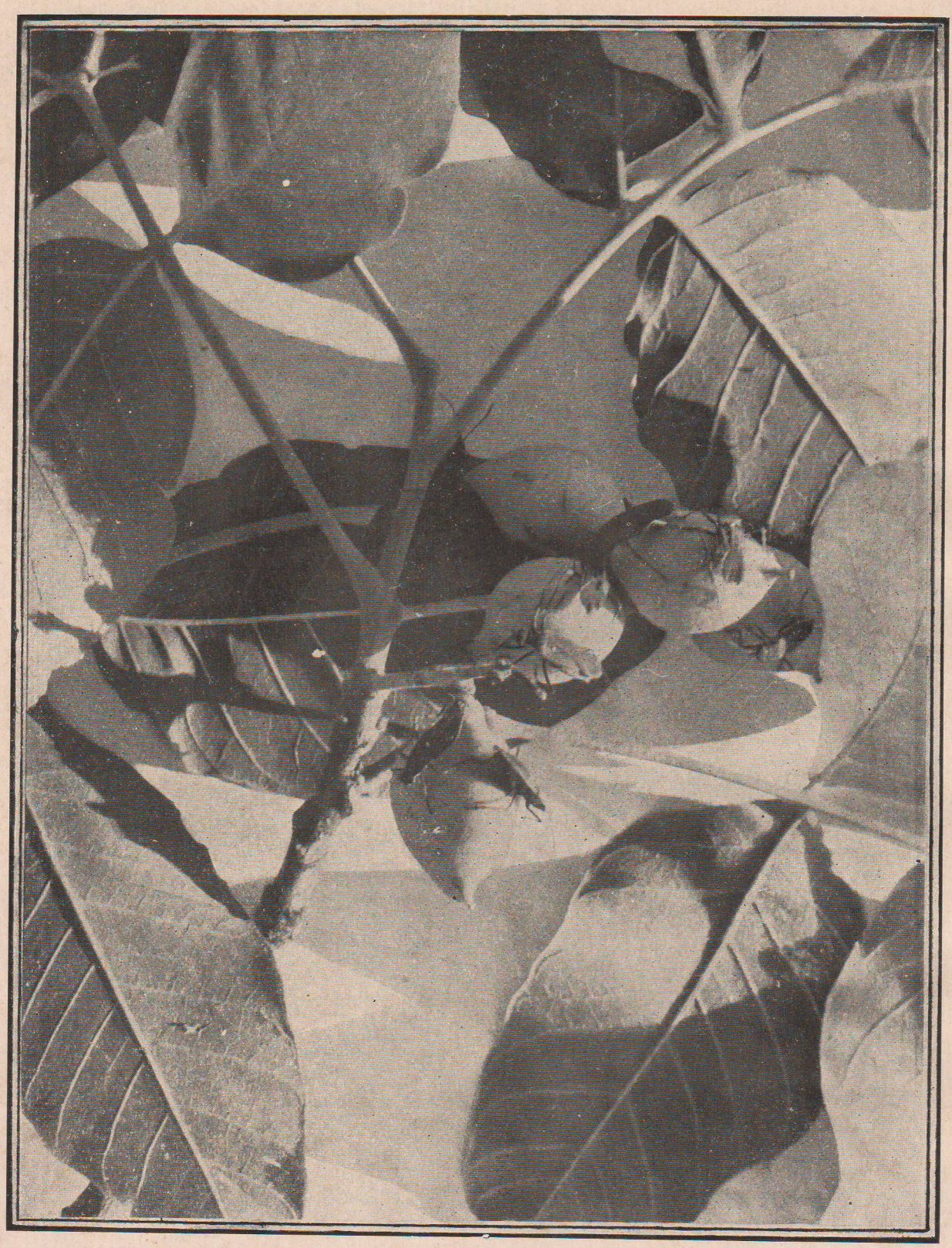


EXPLANATION OF PLATE

a Adult Bug.
b 1.---Lateral view of the Egg } op --operculum, st., egg stalk., pt.a. point of attachment
b 2.---Dorsal view of the Egg } of the egg., op.p. operculum porce.
c ---Abdomen of the Hemiwinged Adult.

(Courtesy *Indian Forester*)

PLATE II.



Bugs Feeding on Ripening Fruits on Kusum Tree

(Courtesy *Indian Forester*)

Nature of injury and economic importance—The bug thrusts its proboscis into the seed through the hard shell several times at a place so as to make a small hole for feeding on the oily contents of the seed. As many as 40 to 50 bugs and nymphs have been observed clinging to a single seed for feeding. These puncture marks are clearly visible if seen with a lens.

To test the viability of such seeds 100 seeds injured by bugs were sown in the nursery bed along with 100 seeds free from such damage. The percentage of germination was 2 in the former case as compared to 50 in the latter. Thus it was clearly established that the bug injury affects the germination of seeds. It is also likely that a similar type of damage is done to cotton seeds as well on which its feeding has been reported.

Dysdercus cingulatus Fabr. (Family Pyrrhocoridae)—The nymphs and adults of this common red cotton bug were found along with *Serinetha augur* on *kusum* fruits in December, 1953. The adults were also found on *arhar* (*Cajanus cajan*) leaves. Three nymphs were fed on *kusum* fruits and one developed into adult, one died and the third escaped. Four adults collected from the field were fed on *kusum* fruits and they lived for 45—76 days.

TABLE I.—*Oviposition records of Serinetha augur* Fabr. *per pair*

Serial number of pairs caged	Copulation date	Commencement of egg laying	Preoviposition period (days)	Egg laying period (days)	Actual number of days eggs laid	Total number of eggs laid	Average No. of eggs per female per day of egg laying	Post oviposition period (days)
1	12 6 53	13 6 53	1	114	33	203	6	2
2	24 6 53	3 7 53	9	119	25	124	5	Nil
3	16 6 53	17 6 53	1	80	18	81	4.5	Nil
4	24 6 53	1 7 53	7	62	14	84	6	30
5	24 6 53	30 6 53	6	58	14	187	13·3	11
	Average	...	4.8	86.6	20·8	135.8	6.9	8.6

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