

3-2421

REPORT

OF THE

Proceedings of the Third Entomological Meeting

Held at Pusa on the 3rd to 15th February 1919

In Three Volumes

Edited by

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Imperial Entomologist

VOLUME III



CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1920

Price per complete set of 3 Vols. Rs. 17 As. 8.

The first time I saw this was at Hillgrove (2,000 feet) on the Nilgiris where this wasp was very actively collecting flies of sorts attacking the body of a cow. The flies happened to be species of *Stomoxys*, *Lyperosia*, and *Philæatomyia*—all biting flies.

I again noted this phenomenon at Tanjore in the Plains where the flies were collected from cart bullocks. I was not able in this case to identify the flies. I am sorry I was not able to follow the wasps in both cases to their nests.

I believe this appears to be interesting from a veterinary point of view also.

Mrs. Hutchinson.

Does the reader of this paper know whether the wasps stupefy the flies ?

Mr. Ramakrishna
Ayyar.
Mr. Fletcher.

I am sorry to say that I could not observe this point.

Species of *Bembex* are usually found in sandy places but they are so quick on the wing that it is generally very difficult to observe them. Bingham, in his *Fauna* volume, notes that they prey on Diptera and states that some Indian species do not close their burrows but keep them open and supply their larvæ with fresh food. I am not aware, however, that the species of Diptera so taken have been definitely determined before.

63.—NOTES ON THE LIFE-HISTORY OF *CANTAO OCELLATUS*, TH.

By T. V. RAMAKRISHNA AYYAR, B.A., F.E.S., F.Z.S., *Ag. Government Entomologist, Madras.*

(Plate 142.)

During the months from May to July this gay-coloured Pentatomid is found in numbers on *Trewia nudifolia*, an Euphorbiaceous tree growing abundantly along the banks of the big tanks adjoining the Agricultural College, Coimbatore, South India. Due to the striking colouration and its habit of feeding quite exposed on the tender leaves and succulent fruits of the tree, this bug many a time attracts the attention even of the layman.

So far as I am aware, very little is on record regarding the early stages and habits of this bug although the insect has been known to science for over a hundred years past. According to Dixon this insect is sparingly found in the Borghat (Bombay) in April-May and appears to play an important part in the pollination of the Moon tree (*Macaranga roxburghii*). Green states that in Ceylon this species is found gregariously twenty or thirty together on single branches of trees. Lefroy in his *Indian Insect Life* has a word about the insect's habit of sitting on its eggmass.

EXPLANATION OF PLATE 142.

Cantao ocellatus.

Fig. 1. Branch of *Trewia nudiflora* with bugs on it, natural size.

Fig. 2. Female bug brooding over egg-mass, natural size.

Fig. 3. Eggs, newly-laid (on left) and ready to hatch (on right), magnified. The natural sizes are shown by the smaller figures within the dotted circles.

Fig. 4. Parasite on eggs, magnified.

Fig. 5. Larva, first instar, magnified.

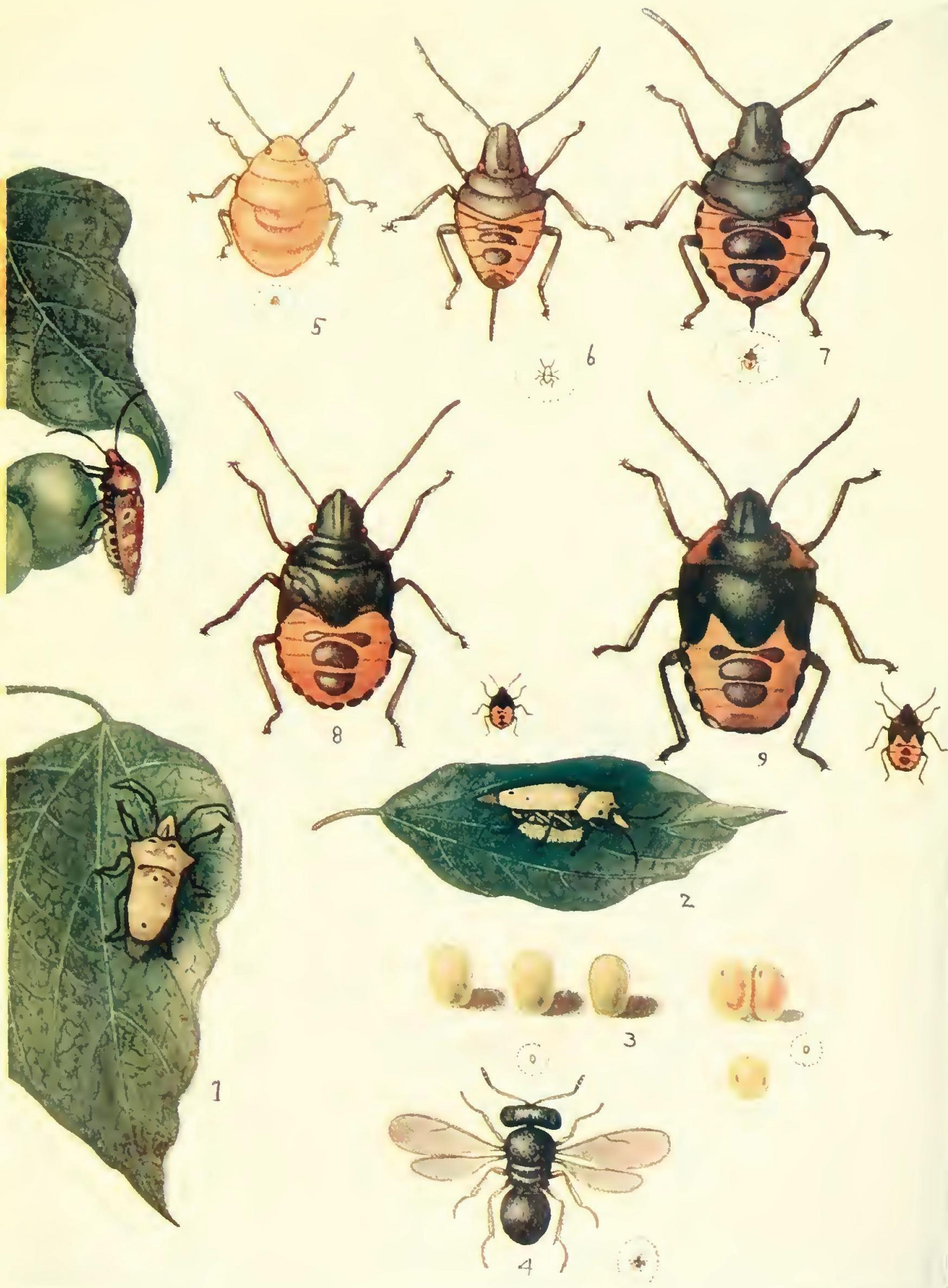
Fig. 6. Larva, second instar, magnified.

Fig. 7. Larva, third instar, magnified.

Fig. 8. Larva, fourth instar, magnified.

Fig. 9. Larva, fifth instar, magnified.

(In figures 4—9 the natural sizes are shown in the smaller figures alongside each of the magnified illustrations.)



CANTAO OCELLATUS.

The following notes form a summary of the observations I have been able to make on the life-history and habits of this insect in South India.

Distribution. I have noted this insect in Coimbatore, the Mysore uplands, the Bababudins and on the Western Ghats, commonly in summer. Besides *Trewia* I have found this insect occasionally breeding on *Kigelia pinnata* in company with another conspicuous bug, *Catacanthus incarnatus*, Dr., in the Western ghats and on the Mysore uplands.

Life-history. As is usual with most bugs, the method of coupling is in opposition. The sexes remain united for a long time—even as long as 36 hours sometimes—and numerous couples are seen in May-June, which appears to be the breeding season.

Egg. Egg-laying does not occur soon after the sexes separate but it generally takes place from two to four days afterwards; at any rate, this was the case in captivity. The eggs are generally laid on the lower surface of tender leaves, though they are also found at times deposited on fruit clusters. In captivity the act of egg-laying was never noticed during the day time. The eggs are laid in groups, the number in each group varying from 10 to as many as 150. The eggs in each group are closely packed together in parallel rows and each of them is cemented to the plant surface. In shape each egg is cylindrical and attached to the plant surface by one of the poles of the cylinder; the height of the egg is 1.5 mm. while each measures 0.875 mm. across transversely. The egg surface is smooth and, unlike that of many other Pentatomids, there is no separately marked lid or sculptured operculum provided; but the region of the egg cap can be made out as a transparent shining circular area on the top pole of the egg. In colour the just-laid egg-cluster is glistening yellow-white; especially the upper pole through which the future larva emerges is very glossy; this colour gradually changes to a deep orange as the hatching time approaches. At this latter stage the pink eyes of the future nymph are seen through the transparent egg-shell as two bright spots.

This insect is one of the few and interesting examples of insects exhibiting what may be called 'parental care.' The mother-bug sits on the eggmass and continues to do so from the time the eggs are deposited until after they hatch out into young ones. In some cases I have observed the mother remain in the same position some time even after all the young larvæ have moved away from beneath her body. All this time the parent insect does not take any food and while in this posture the slightest disturbance makes it vibrate the antennæ in a characteristic manner as though in defence, and bring its body closer to that side of the eggmass

where the disturbance is felt. The egg mass in some cases is fairly big and the parent is not able to cover the whole mass while it sits over it. In one case where I got a group of eggs collected from a tree with the mother mounting guard over them, I observed that, while those eggs well covered by the parent's body retained their normal colour, those at the edge and away from the mother's reach developed a dark tinge and eventually in about two days minute black wasps* emerged from the eggs instead of bug larvæ. Evidently the parent resting on the egg-mass serves to some extent as a preventive against the eggs getting parasitized.† A similar case of parental care is described in the Transactions of the Entomological Society for 1904 by Dodd in the case of another Pentatomid, *Tectocoris lincola*, var. *banksi*, Don.

In from five to seven days the eggs hatch; all the young ones do not emerge together. An interval of several hours intervenes between the hatching out of the first nymph and the opening of the last few eggs of a group.

First instar. Length 1.5 mm. The tiny larva has at this stage a roughly oval shape with the upper surface convex from above. The antennæ and limbs are comparatively well developed; the distal joint of the antenna is slightly swollen. The rostrum extends almost to the tip of the abdomen along the ventral side. The general colour is orange; eyes bright scarlet; antennæ, rostrum and legs transparent brown. In about half an hour after emergence the colour of the limbs, thorax and the dorsal region of the abdomen changes to a paler hue. Two fairly distinct and one faint dark patches appear on the abdomen. All the larvæ coming out of one egg-batch remain feeding gregariously on the fruit or the leaf surface for a pretty long time—in some cases even up to the second or third moult. During the first stage the creature is quite helpless, the slightest external disturbance often affecting it very much.

Second instar. Length 3 mm. Head, antennæ, legs, rostrum, connexival spots and transverse bands across abdomen get a shiny bluish brown colour. The head and thorax get a metallic greenish tinge, the abdomen becomes pinkish; the antennal joints are pinkish proximally, connexivum bluish black. Three transverse patches of blue black colour are found across the abdomen dorsally; of these two one is dumb-bell-shaped. The general shape of the body becomes changed due to a tendency on the part of the anterior portion of the body to be drawn forward.

* This parasite appears to be same as *Telenomus indi*, Girault, found on Pentatomid eggs.

† This fact has also been mentioned by Fletcher in his *South Indian Insects*, page 34, figure 17.

The rostrum now extends slightly beyond the abdomen and can be seen from above; the distal joint of the antenna is slightly swollen.

At this stage also the larvæ are gregarious and not very active; but they often manage to remain together hidden either under a leaf or on the unexposed surface of a fruit.

The second moult takes place after four days.

Third instar. Length 5 mm. At this stage the posterior end of the thorax shows a tendency to become pointed backwards to form the future scutellum. Soon after the second moult the larva has a uniform pinkish colour and the rostrum has a whitish tinge. After an hour or more the ground-colour now becomes changed to a reddish ochre and the metallic spots at the connexivum appear clearly. The rostrum reaches beyond the abdomen. The scutellum appears pointed posteriorly at the median line. The larvæ still feed gregariously but in hiding. In another four days the third moult occurs.

Fourth instar. Length 8 mm. At this stage the rostrum is slightly shorter and just reaches the tip of the abdomen. Head, thorax, legs and rostrum metallic blue; abdomen above and below reddish ochraceous with two transverse and one dumb-bell-shaped patches of dark brown on the dorsal surface of the abdomen. The head is drawn forwards and the three regions in it are clear; the rudiments of the wings appear on each side of the body as blunt processes of a metallic hue. The scutellum is found gradually moving backwards over the abdomen. The larvæ at this stage begin to separate and remain feeding hiding under leaves. In another four days the next stage is assumed after another moult.

Fifth instar. Length 12 mm. The rostrum at present reaches only the third abdominal segment. The wing-pads and scutellum are distinct and have moved backwards well over the abdomen. The latter is bluntly pointed behind and reaches the first dumb-bell-shaped transverse band on the abdomen; the wing-pads extend a little beyond. The prothoracic spines now appear and though small are distinct, sharp and pointed backwards. In colour the antennæ and rostrum are dark, the region of the legs from coxa to tibia reddish; the tibiæ and tarsi of a shining metallic green colour. Head, thorax and scutellum shining metallic green. The lateral margins of the prothorax orange. The metallic bands on the abdomen are broader and prominent. The abdomen below gets a darker tinge especially at the midventral region.

In a week's time the last moult takes place and the adult condition is assumed. The following table of rearing in captivity show the approxi-

mate period occupied by each stage in the development of the insect in two cases.

No.	Eggs laid on	Hatched 1st stage	2nd stage	3rd stage	4th stage	5th stage	Adult	TOTAL
1	14th May	19th May	23rd May	27th May	31st May	4th June	12th June	28 days.
2	20th May	24th May	29th May	2nd June	5th June	9th June	16th June	27 days.

Thus the adult condition is reached in about a month's time from the date of egg-laying.

The sexes.—There is a good deal of individual variation in the adults, nor can males and females be easily distinguished by any definite colour markings. The male is generally smaller in size and has, so far as I have observed, a more pronounced colouration. In a number of specimens of the adults examined I found that the bluish-black spots on the ventral side of the abdomen are generally more in number in the females than in the males.

One very interesting thing about this bug is that it is an annual visitor to the locality, coming about May and disappearing in July. For the rest of the year I have never found a single specimen anywhere in the vicinity of the College. And the season between May-June is the shooting and fruiting season of the food plant *Trewia*.

64.—NOTES ON THE LIFE-HISTORY OF *POLYPTYCHUS DENTATUS*.

By T. V. RAMAKRISHNA AYYAR, B.A., F.E.S., F.Z.S., *Acting Government Entomologist, Madras.*

(Plate 143.)

Rothschild and Jordan in their classical memoir on the Sphingidæ of the World record only two species of the genus *Polyptychus* as found in India, the rest of the species, about thirty in number, being recorded as African. Of the two *P. dentatus* is the subject of this paper. Although there are two or three previous references to this insect, whatever is on record regarding the earlier stages of this insect is very meagre and imperfect. Hearsey has devoted a couple of lines to the larva of this insect as found at Barrackpur and he calls it *Smerinthus denticulatus* in the *Proceedings of the Entomological Society* (1864) Vol. III, p. 100. Forsayeth in his paper on the Lepidoptera of Mhow in the *Transactions of the Entomological Society* for 1884, p. 395, refers to this insect and gives a very brief and meagre description of a fairly well-grown larva. These