

STEBBING ON EARLY SEX DIFFERENTIATION BETWEEN LARVAE OF LAC INSECTS AND ON THE INDIAN WAX-INSECT

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INTRODUCTION

E.P. Stebbing was Entomologist at the Imperial Forest Research Institute, Dehra Dun, India, and the author of a *Manual of Forest Zoology for India* [1], published in 1908. He illustrates, on plate LXXI, which is simultaneously indicated as Fig. 313, the crawling stage larvae of the lac insect, both as male Fig. 1 here and female, seen dorsally as also side-ways. Further he illustrates the antennae of the two larvae showing the difference between the male and female. Fig. 2 here is a slightly enlarged picture taken from Stebbing which clearly shows the early difference as supposed to exist between the sexes. Moreover Stebbing also wrote a monograph on lac [2], which again was published in 1908, next edition appearing in 1910. Now in this edition there are no illustrations of the male and female larval insects nor of their antennae offered in the *Text Book of Forest Zoology*. Following Stebbing, A.D. Imms succeeded him as the Entomologist. Along with N.C. Chatterjee he published a monograph on lac [3], in 1915, wherein the antenna of the crawling larva is given in Fig. 11. It is stated (on p. 15) that, "the antennae are 6-jointed", while it is 7-jointed according to Stebbing, as in Fig. 2 here of the female larva, and 14-jointed in the male. Remembering the claim of Stebbing, Imms and Chatterjee write (on p. 7) that, "in the newly hatched larvae the sexes are indistinguishable by any external characters". This disposes off Stebbing's claim to differentiate lac larvae by their antennae.

Stebbing also gives the dorsal views of male and female crawling larvae but there is hardly any noticeable difference and no where in the text there is anything like a description of the figures he illustrates. Moreover, he also shows the larvae sideways. His figure of male larva is reproduced as Fig. 1 here; there are some 15 body segments. Now the crawling larva, while it is some 10 days old, secretes a dorsal wax-shield and this is constituted of 11 plates, each being secreted by the dorsal surface of the body segment beneath. Thus there are 11 visible body segments and not 15 as illustrated by Stebbing. Imms and Chatterjee depict, as

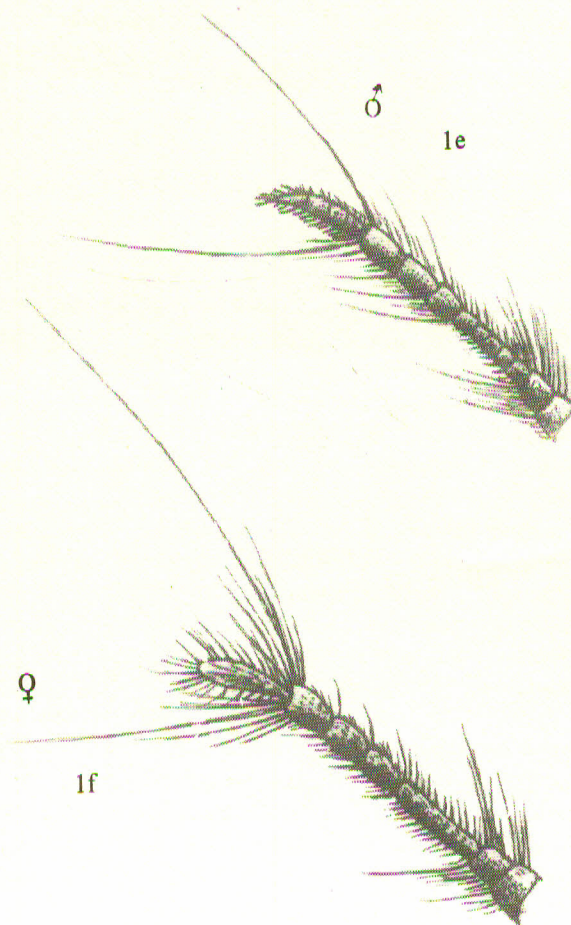


Fig. 1 Stebbing's crawling stage male larva of lac insect seen side-warp: note the proboscis.

Fig. 7, Pl. 2, the crawling larva seen dorsally and they show 12 body segments which clearly contradicts what Stebbing has illustrated. Imms and Chatterjee further show, in fig. 8, Pl. 2, the ventral view of the crawling larva. The head lies between the first pair of legs and the proboscis starts a little posteriorly. The proboscis is long enough to form a loop. When inserted into the plant it is long enough to reach the phloem tissue of the stem as I was able to observe

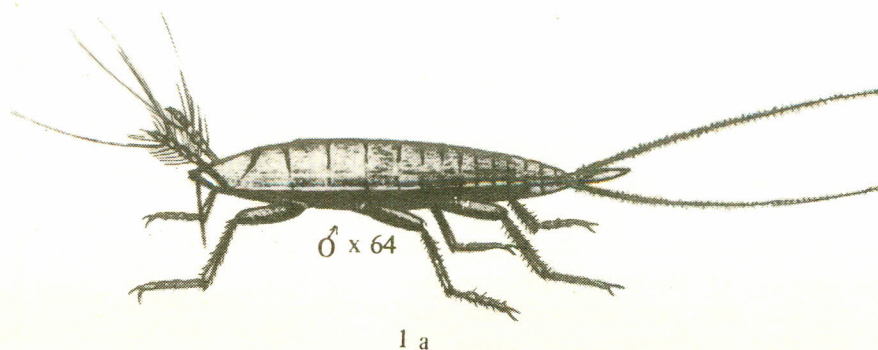
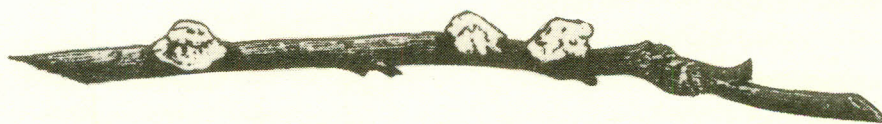


Fig. 2. Antennae of crawling stage larvae, male and female.



312. Scales of *Ceroplastes ceriferus* (white insects wax).

Fig. 3. Stebbing's *Ceroplastes ceriferus*.

incross sections of twigs infected with lac. On the contrary Stebbing, in Fig. 1 here, places the proboscis at the extreme anterior end as a short beak. Then the hind legs are not so far behind. Altogether Fig. 2 is the result of as much imagination as of observation and fully justifies Imms and Chatterjee remarking, on p. 2, that, "Stebbing's work is not free from errors".

Finally Stebbing, on Pl. 2, figs. 5 and 5-a, gives the "dorsal and side view of Tachind, two-winged fly, *Mascicera* sp. possibly parasitic on the larvae of the parasitic moth, *Eublemma amabilis*". The two wings however show the typical venation of a chalcid fly unlike any diptera. I (5) have shown already that the insect is the chalcid parasite of the lac insect itself and would probably be *Tachardia-phagus tachardiae*. How, the four wings could be reduced to two and the antennae further trimmed to qualify a dipterous insect reveals a definite intention to modify what was actually observed. It may be remarked that the problem of sex differentiation in the larval stage claimed by Stebbing and not confirmed by Imms and Chatterjee forms the subject of a thesis of mine [5] showing this to be possible.

Stebbing has also "published some observations on the Indian Wax-insect, *Ceroplastes ceriferus*. Now there is another species in India allied to the above. It has been named by me as *Ceroplastes Vayssierei* Mand. This is the smaller species with the main host *Dedonia viscosa* in Bangalore (India) and as such has a much larger distribution. I also found it in Hyderabad (India), on the Karonda plant. Fig. 3 here, is taken from Stebbing [1], as his fig. 312, and represents this smaller species. It was new and

as such not recognised by him. *Ceroplastes ceriferus* is much larger and in Bangalore its common host is *Ficus Mysorensis*, and reported by me earlier [6]. It can be said that the secreted wax assumes a conical shape only with *C. Vayssierei*. We may now consider what Stebbing has to say. In his book on Forest Zoology [1] he writes, on p. 166, that, "the insect known as the white wax insect, *Ceroplastes ceriferus*, is an inhabitant of Central and Southern India. It secretes little conical masses of a sweet white waxy substance around it, fig. 312, (Fig. 3) and it is to be found that times fairly numerous upon pipal (*Ficus religiosa*) and other trees. These white masses are sought for eagerly by jungle tribes, especially children and eaten with relish.... This wax was tried for candle purposes before the days of Kerosine and it was hoped that it would be able to rival the Chinese form, but it was found to burn with a smoky flame". On p. 167 he finally writes, "*Ceroplastes ceriferus*, its only use at present is as an article of food amongst the villages".

Not all scale insects secrete a sweet honey dew attracting ants. The pseudo-lac insects *Tachardina lobata* and *T. silvestri* are such and also the two wax insects, *C. ceriferus* and *C. Vayssierei* which do not attract ants. Had the wax itself been sweet no ant would have left the same for the children of hill tribes to feast upon. Wax is one substance which is undigestible and by no means sweet. To speak of "sweet wax" would be a myth rather than a scientific discovery. Altogether Stebbing's information on lac and on wax insects is the one source to my knowledge which is most unique of its kind.

CONCLUSION

Stebbing illustrates the crawling lac insect with 15 segments when these should be 11. The antennae of male and female larvae are illustrated to show a morphological difference. These figures have no reality while Imms and Chatterjee depict 6-joints in the larval antennae. The proboscis of the lac larva starts from the ventral side between the first pair of legs. Stebbing places it at the extreme anterior end as a short beak. Moreover, the illustrations are not described in the text. The figures are "illustrations to order" rather than records from actual observations. With regard to *Ceroplastes ceriferus* its wax is supposed to be like sugar candy appealing to children of forest tribes. No is digestible much less sweet and Stebbing's account of it sounds a myth rather than reality.

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