

XII. *Notice of a tube-making Homopterous insect from Ceylon.* By Prof. J. O. WESTWOOD, M.A., F.L.S., Honorary Pres. Ent. Soc. London, &c.

[Read August 4th, 1886.]

PLATE VIII.

AMONGST the various secretions emitted by different species of insects, such as wax, silk, gums, the oily matter of the *Meloë* and ladybird, &c., none has attracted more general attention than the white frothy material observed upon almost all kinds of plants in the spring and early summer, known by the common name of "cuckoo-spit," each patch of which is caused by, and forms the residence of, the immature states of a small homopterous insect, *Aphrophora spumaria*. From the very careful observations and experiments of DeGeer (Mem., iii., p. 168, *et seq.*), it is clear that the true nature of this secretion was first made known by Poupert in the Memoires of the Academy of Paris in 1705, and that it is no other than the fluid excrement of the larva of this insect, consisting of the juices of the plant on which it subsisted, and which, being discharged, with very little alteration in its nature, drop by drop from the anus of the insect, forms an accumulated moistened mass which keeps the body of the insect in a moist condition until it is ready to assume the perfect state. Other instances of the employment of the excrement as a covering of the body of the larvæ occur in the *Hispidæ* amongst beetles, whilst the fluid emitted by the bombardier-beetles is so volatile that immediately on coming into contact with the air it explodes. I have now to describe another curious secretion emitted by an insect closely allied to *Aphrophora*, serving the same purpose as the cuckoo-spit.

In the course of the autumn of 1885 I received by parcel-post from Ceylon (forwarded by my excellent correspondent, Staniforth Green, Esq., of Colombo) a

small box containing specimens of a small homopterous insect allied to the genus *Aphrophora*, the economy of which is remarkable. "The larva," my correspondent remarks, "resides in a tube, which is fixed on a twig or leaf-stalk of the Suriya tulip tree (*Adansonia digitata*, L.), on the end of the branches. The perfect insect, no doubt, deposits its eggs in the same way that *Aphrophora spumaria* lays hers, but I have not yet noticed the growth of the tube. I had one under observation for about a week, and could, with the aid of a lens, see the movements of the larva inside. Its position in the tube was head downwards, and it seemed to be continually working its anus against and round about the inside of the tube near its orifice. At intervals a clear water-like fluid was discharged from its anus, which would escape from the tube drop by drop. I allowed some of this to fall upon a clear slip of glass, but it did not seem to congeal. It gradually dried on the glass, leaving but a slight mark on its surface. I see in your 'Modern Classification of Insects,' ii., p. 433, that a species of *Aphrophora* is found upon trees in Madagascar, the larva of which emits a considerable quantity of clear water, especially in the middle of the day, when the heat is the greatest. Can this be the same insect? [No.] Here in Ceylon the water seems to drop from the tube day and night, for I have seen it dropping before sunrise. Our insect has a life of some weeks in the larval state, and never shows itself outside of its tube until it is ready to assume its perfect state. The change occurs early in the morning, generally between six and seven o'clock, shortly after sunrise. First of all a quantity of little bubbles appear in the form of a knob at the mouth of the tube. Then the pupa comes out tail first, and takes up a position on the top of the tube [transversely, like the letter T], and in the middle of the bubbles. In about ten minutes it completely extricates itself from its old skin, and the curved horn on its thorax seems to uncurl. Some of the specimens I have sent you show this. Please see if there are any males among them. If not, it is possible that they may not reside in tubes. I noticed a few the other morning resting on a twig, the female above and the male below; the latter was considerably smaller, and of darker colour. On being slightly disturbed they leaped away. They appear to be very scarce, seldom

showing themselves. I have been resident here for more than thirty years, and, until I noticed these tubes lately, I had only met with two specimens."

"P.S., 19th August.—Yesterday morning I discovered some newly-hatched larvæ of the *Aphrophora* on the tip of a small tulip tree. They could not have been long out of the egg, little tiny creatures of an orange colour, and in the midst of a spot of froth. I could see them moving about in it. I find that the tube is beginning to be formed. I am now convinced that it is commenced and finished by the little creature itself while in the larval state; the walls of the tube were commencing to rise, enclosing a space of sufficient size to contain the larva in a perpendicular position, but it must be a close fit by the time they are ready to assume the perfect state. At present they are in a horizontal position, and must by working about form the foundation of their cells as the froth becomes congealed. There are five or six of these young larvæ close together on the tip of a twig which is sending out leaves. One tiny larva is moving about with no froth about it, and with quite a dry skin. You will notice that the cases have a ringed appearance; this is probably caused by the semicircular motion of the anus of the larvæ, which is crushed against the interior of the tube sometimes above and sometimes below. I do not believe that the insect does any injury to the tree, or even to the branch it feeds on."

The full-sized larva-tubes are about half an inch long and about a line in diameter. They are about the thickness of writing-paper, of a dirty whitish colour, with the surface finely transversely wrinkled. The basal portion is dilated and curved so as partially to clasp the twig on which it is fixed, as shown in the accompanying sketches. In this manner the bottom of the tube is closed, and, as the insect resides in it with the head downwards, I do not understand how it can obtain nourishment from the plant through its delicate rostrum, unless it occasionally emerges from its abode, which, of course, is stationary. During the past spring I have noticed that our common English cuckoo-spit insect remains stationary on a plant for several weeks.

The immature insect differs from the imago in the usual manner, having the wings only visible in a rudimental

condition in the pupa state, in which, as will be seen in figure, the only appearance of the large curved dorsal horn is seen in a very small dorsal protuberance in the middle of the hind part of the thorax.

The perfect insect proves to be a species of Burmeister's curious genus *Macharota* (Handb. d. Ent., 2 Bd. pp. 127, 128), intermediate between the *Cercopides* and the *Centroti* and *Membracides*.

Of Burmeister's type of *M. ensifera*, brought by Chammisso from the Island of Luzon, the chief of the Philippines, I fortunately made a sketch in the Berlin Museum more than fifty years ago, and was thereby enabled to identify the species also brought from the Philippine Islands by the late Mr. H. Cuming (Proc. Zool. Soc., Nov. 14th, 1837, p. 130).

The Ceylon insect agrees with the type in size and general appearance, but the head is more pointed in front and is concolorous, whereas it is black in *M. ensifera*, which latter is destitute of the very minute dark dots with which the Ceylon species is marked both on the body and also on the fore wings. The specimens of the latter (preserved, however, in spirits) are uniformly pale luteous-coloured, whilst in the Philippine insect the prothorax is marked with five slender brown longitudinal vittæ, and the sides of the middle segments of the abdomen are black.

The following characters will serve to distinguish the Ceylonese species:—

MACHAROTA GUTTIGERA. — Pallide luteo-fulva, guttis minutis nigricantibus, vix distinctis, remote sparsis, notata, præsertim in marginibus tegminum et in venis insidentibus; fronte capitis magis conico, concolori. Long. corp. circ. lin. 3. Expans. tegminum circ. lin. 6. Habitat, Ceylon. Dom. S. Green detecta et mihi benevole transmissa.

EXPLANATION OF PLATE VIII.

FIGS. 1, 2, 3.—The tube of the larva of *Macharota guttigera*, seen in different positions; magnified.

„ 4, 5.—Basal portion of the tube, showing the manner in which it is made to clasp the twig on which it is affixed.

- FIG. 6.—The pupa, taken out of the tube.
 „ 7.—The perfect insect (natural size).
 „ 8.—Front of head of imago, showing the rudimental ocelli
 in two impressed spaces of the hind part of the vertex.
 „ 9.—Side view of the head, showing the antennæ inserted
 close to the anterior margin of the eyes.
 „ 10.—One of the antennæ.
 „ 11.—The dorsal thoracic horn.
 „ 12.—Fore wing or tegmen.
 „ 13.—Hind wing.
 „ 14.—Hind leg.
 „ 15.—Under side of the abdomen of the male imago.

PS.—Whilst this memoir was in preparation there appeared in an American entomological periodical the following notice of a very similar discovery, in New Holland, of a case-making species:—“At the meeting of the Linnean Society of New South Wales on the 26th November, 1884, a paper was read by F. Ratte, M.E., on the larvæ and larva-cases of some Australian *Aphrophoridae*, in which the larval state of some small species of *Rhyngota*, closely allied to the genus *Aphrophora*, and probably belonging to the genus *Ptyelus*, is described. The description of the larva-cases and of some of the larvæ discloses a feature probably new to the science of Entomology. These cases, unlike those of insects generally, are true shells, containing at least three-fourths of carbonate of lime, and resembling in shape some fossil and recent *Serpulæ*, some being conical, others serpuliform or helicoidal. The conical shells are fixed on the branches of some species of *Eucalyptus*, the mouth turned upwards, the larva being placed in it with the head downwards. It introduces its suctorial apparatus into the bark of the stems, sucking the sap of the tree, and emits from time to time, by its anus, drops of clear water. This property of emitting clear water is possessed by all the family.”—‘*Psyche*,’ vol. iv., p. 288, June, 1885.