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Entomologist



Trinidad & Tobago

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DEPARTMENT OF AGRICULTURE.

3rd March, 1913.

SPECIAL CIRCULAR No. 5.

FROGHOPPERS.

J. C. KERSHAW.

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THE NYMPH OF "TOMASPIS VARIA," F.

On experimenting with carbon bisulphide as an insecticide for Frog-hopper nymphs I found, as Professor Carmody had concluded, that it was not effectual with them under field conditions when protected by their spittle, though very efficient when the nymphs are just hatched or shifting their quarters to a fresh rootlet. On closely examining the nymph the cause of failure of the bisulphide was apparent. The tergal plates and pleura of the abdomen are greatly produced and bent around the underside of the abdomen till the opposing ends touch one another. Thus is formed—for the whole length of the abdomen—on the underside of the nymph a large air-chamber or reservoir. The spiracles or stigmata open into the upper part of this chamber; so that although the whole chamber and spiracles are of course integumentary and external, nothing can be seen of them by viewing the nymph on the exterior, unless the ends of the plates closing the chamber are turned up. Apparently the whole sternal surface has been invaginated, and has thus drawn inwards the pleural region with the spiracles: and pulled around the ends of the tergal plates, as shown in the diagrammatic transverse section of a nymph feeding on rootlet, protected by its spittle. A=diagrammatic transverse section of an adult *Tomaspis*, where the sternal and tergal plates with the pleura and spiracles have returned to a normal position, and there is consequently no air-chamber. B=transverse section of the abdomen of an adult *Acrid* sp., where the abdominal plates and spiracles are in the positions usual in insects generally, and these positions are approximately the same in their nymphs.

The nymph as a rule hermetically seals itself on the rootlet with the spittle, but is able to breathe by drawing on the air supply in its air chamber. Thus fumes of insecticides with difficulty penetrate to the breathing apparatus of the insect whilst in its covering of spittle. The spume is probably not true mucin, since it does not wholly dissolve in water; but a mucinoid.* It is produced chiefly by the anterior portion of the malpighian tubes, and if this part of a nymphal tube is placed in alcohol, the contained mucinoid shrinks and coagulates and can be dissected out as a very pale yellowish, stringy substance. If this coagulated material is then placed in water it quickly swells and becomes viscid, pale bluish, translucent and just as capable of being drawn out into viscid threads as the untreated material fresh from the tubes. The alcohol and water treatment continued several times leaves the mucinoid apparently unaltered. The rectum also, of course, contains this substance. The secreted spittle is a very stubborn material with most reagents, though it consists merely of air bubbles coated with an exceedingly thin film of mucinoid, but in this there are also great numbers of crystals; those of calcium oxalate are most numerous: leucine spherules and urates are also present: Collens found potash (carbonate?). In fact every substance excreted from the anus of the nymph is found in the spittle, but it is the mucinoid substance which accounts for this retaining its form more or less when dry.

The air-chamber is, no doubt, primarily for the purpose of preventing the spiracles from becoming clogged by the glutinous spittle, but the

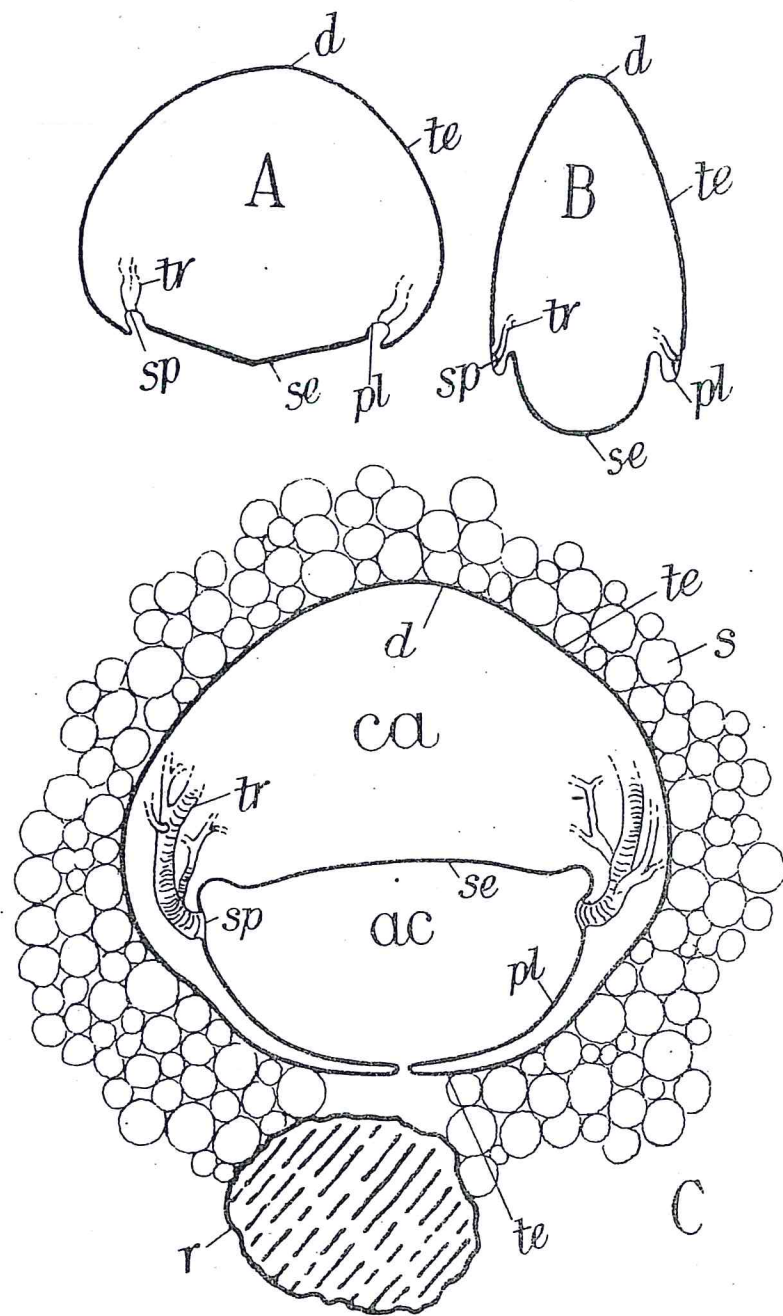
*Otherwise it responds correctly to the usual reagents for mucin; it tends to granulate with subacetate of lead and stains deeply with methylene blue.

amount of air contained in the chamber is sufficient to last the nymph for some considerable time. I think, however, that from time to time the nymph breaks through the covering of spittle—generally with one of the fore-legs—and thus admits a fresh supply of air. The use of the legs as a sort of plasterer's trowel is common with certain Hemiptera, e.g. *Sycanus* sp. (Annales de Société Entom. de Belgique, tome LIII, p. 241, 1909.) In this case the colleterial secretion for covering its eggs is shifted from the genital orifice by the tarsus of the hindleg to that of the midleg, and thence to the foreleg, and by the tarsus of the latter applied to the batch of eggs. The nymphs of *Tomaspis* use their legs in like manner to spread around the spittle from the anus, although the anal style and indeed the whole abdomen is extremely mobile; but the tarsi carry the spittle where the anal style is unable to reach.

Carbon bisulphide is rapidly fatal to a nymph on a grass-stem in a test-tube, even when surrounded by its spittle, if the cotton plug is wet with the chemical. But a very large quantity would have to be applied under the conditions found in the canefields, so that the expense would be prohibitive.

2nd March, 1913.

J. C. K.



Reference to Figures.

A=Transverse section of abdomen of adult *Tomaspis*.

B= " " " " *Acridid* sp.

C= " " " " nymph *Tomaspis*.

ac=air chamber. ca=cavity of abdomen. d=dorsal part of abdomen.

pl=pleurum. r=rootlet. s=spittle. se=sternite.

sp=spiracle. te=tergite. tr=trachea.

FROGHOPPER NOTES.

THE Frog hopper is, in my opinion, indigenous to Trinidad chiefly for the following reasons:—

1. There are at least four species of the genus (*Tomaspis*) in the island.
2. It prefers various native grasses as foodplants to cane.
3. It has at least two egg parasites, and the nymphs are killed off to some extent by the larvæ of native Hover-flies (*Syrphidæ*.)
4. There are very commonly one or two large parasitic worms in the abdominal cavity amongst the viscera of the adult Frog-hopper, and these worms also occur in other Homoptera here.



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FROGHOPPERS.

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