LETTERS TO THE EDITORS

The Editors do not hold themselves responsible for opinions expressed by their correspondents. No notice is taken of anonymous communications

Motility of Insect Tracheoles

THE tracheoles supplying the epidermis in *Rhodnius* are simple or branched tubes, 200–350 μ in length, tapering gradually from a diameter of 0·7–0·8 μ to end blindly at about 0·2 μ. Each is laid down within a single cell, the nucleus of which lies at about one-third of the way along the tube. Once laid down, the tracheoles persist unchanged throughout the life of the insect: they do not shed their cuticular linings at moulting, nor are they converted into tracheæ (cf. Keister[1] on the late stages of *Sciara*).

The tracheoles are by no means inert structures. If a region of the epidermis is deprived of its tracheal supply, and particularly if an organ with a high rate of oxygen consumption is implanted, the tracheoles from the adjacent regions migrate towards the oxygen-deficient zone. Movements up to 1 mm. have been observed. The tips of the tracheoles appear to be attracted to sites of low oxygen tension: little effect is produced by a simple incision in the integument if this is exposed to air; but the tips move actively towards a cut exposed to zero oxygen tension (using pyrogallol). The tracheæ may be widely displaced by the traction exerted upon them by the actively moving tracheoles.

It is this migration of tracheoles which provides for the immediate tracheal supply of implanted organs. Afterwards, the low oxygen tension induces an exceedingly active outgrowth of new tracheæ and tracheoles which are filled with air and become functional when moulting takes place.

If the insect is reared in reduced concentrations of oxygen, there is an increase in the numbers of large tracheæ developed. This is particularly evident in the wing lobes. The general pattern of wing venation is not affected by this altered tracheal arrangement, although minor changes may occur. These observations will be published in full elsewhere.

V. B. WIGGLESWORTH

Agricultural Research Council
Unit of Insect Physiology,
Department of Zoology,
Downing Street,
Cambridge.

[1] Keister, M. L., *J. Morph.*, **83**, 373 (1948).

Observations on *Lebistes reticulatus*

A COMMERCIAL population of *Lebistes reticulatus* was observed for two years and the three following observations were made.

(1) *Exciting action of an extract of domestic flies.* It is known that in its natural habitat *Lebistes* destroys a great many small insects, especially mosquitoes and mosquito larvæ. During the two years we kept this species in an aquarium the fishes were fed on meat and a commercial fish food only.

One day a freshly killed domestic fly was introduced into the aquarium and floated on the surface; the fishes became very excited after a short but clear refractory period. They swam to and fro below the fly and tried to pull it below water and consume it. The following day another fly which had been covered with shellac was introduced into the aquarium, but the reaction was very weak. Visual stimuli therefore appear to play a very small part in this excitation reaction. A few days later some droplets of a colourless extract of about a hundred flies were added to the aquarium water and an intensive reaction followed. It is therefore probable that a water-soluble substance diffused from the fly into the water and is responsible for the reaction observed. Extracts of locusts and caterpillars of *Sphinx convolvuli* and *Mylabris* gave a weak reaction and that of *Dorylus* and *Coprinus* was negative. It therefore seems probable that the exciting factor is fairly specific for the insect concerned. This excitation-provoking substance apparently represents a new group of substances which may be added to the alarm-, smell- and taste-substances examined and described by von Frisch[1].

(2) *Sex-reversion after infectious decimation.* A *Saprolegnia* infection suddenly appeared in the aquarium when it was over-populated, and within three days 70 per cent of the fish had died. The remaining fishes consisted of eighty-six sexually mature females and seven sexually mature males. Within twenty days after the epidemic there were forty-one females which were changing into males, the gonopodia and male colour patterns being almost fully developed. It was noticeable that only the medium-sized sexually mature females showed this change. The small and large sexually mature females were unaffected (see table).

Size (mm.)	No. of males	No. of females	No. of intersexes
19	—	2	—
20	1	1	—
21	—	4	—
22	3	2	—
23	3	2	4
24	—	10	10
25	—	3	7
26	—	2	11
27	—	2	3
28	—	2	2
29	—	3	3
30	—	4	1
31	—	2	—
32	—	1	—
33	—	2	—
34	—	3	—
Totals	7	45	41

The sudden change in sex, twenty days after the epidemic, suggests the probability that the toxins excreted by this pathogenic fungus were responsible for the sex reversion. The question that now arises is: Is the sex reversion a specific reaction to *Saprolegnia* toxins, or may it also occur after poisoning by other toxic agents when they remain active for the same period and with the same intensity?

Other aquaria containing fish of the same population also showed sex reversion, but in a much slighter degree.

(3) *Black mutant with abnormal hydrostatic system.* The same population repeatedly produced a few fish which were characterized by black pigmentation and a reduced swimming capacity. They do not swim horizontally, but with the body at an angle of about 30° with the horizontal, the head being in the highest position. The tail moves very quickly and this gives the impression that they have difficulty in swimming upward because of a hydrostatic defect. In fact, these fishes usually remain just above the bottom