

species of *Pleurotropis* at Cawnpore, therefore, is the first record for Northern India.

While most of the species of *Pleurotropis* have been known to parasitise phytophagous larvae of Coleoptera, Lepidoptera, Diptera and Hymenoptera in various parts of the world several of them have been recorded also as secondary or hyper and even tertiary parasites.^{2,3,4} It appears that at least one species, *P. parvulus* Ferr., has been successfully employed in the biological control of pests—in Fiji against *Promecotheca reichei* Baly and in New Guinea against *P. papuana* Csiki, both coconut leaf miners (see *Rev. App. Ent.*, A, 1940, 28 (2), 50-51; 28 (5), 230, and previous connected references).

In view of the fact that the species of *Pleurotropis* have a wide range of hosts and appear to flourish under fairly cold and humid conditions, there is some promise of their being useful against *Epilachna* beetles, damaging brinjal and other cultivated plants in the hills of the United Provinces and other areas.

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THE MODE OF ACTION OF ACETYLCHOLINE ON UNSTRIATED MUSCLE

SINGH^{1,2,3,4} has suggested that one of the ways in which drugs act is by sensitising the muscle to ions in the solution, the mechanism of this sensitisation being an increase in permeability. This view is supported by the fact, that sometimes unstriated muscle,⁵ and striated muscle,⁶ do not relax on the withdrawal of the stimulant; the contraction, therefore, must have been caused by some substance, other than the original stimulant.⁷

Action of acetylcholine.—Acetylcholine produces either twitches or tonic contraction in frog muscle. Twitches are produced by small concentrations (1 in 10⁵), or at higher temperatures (30° C.). Tonic contractions are produced by large concentrations or at lower temperatures. If acetylcholine produces twitches, then in the presence of subliminal concentrations of substances that usually produce tonic contraction, such as potassium, nitrate, iodide, thiocyanate, it may produce tonic contraction.

The above tonic contraction may be due either to acetylcholine or the contracture-producing substance, one making the muscle sensitive to the other. That it can be due to acetylcholine is shown by the fact that the muscle relaxes on withdrawal of the drug, though the relaxation may be slow showing that the other substance may also be involved. That it can be due to the other substance, is shown by the fact that the muscle does not relax on with-

drawal of acetylcholine, but does so on withdrawal of the contracture-producing substance. Thus if the concentration of potassium in the saline is raised to a value just sufficient to cause a small contraction and acetylcholine added, then, instead of twitches a tonic contraction results. On withdrawal of acetylcholine the muscle does not relax, but does so on withdrawal of potassium (Fig. 1).

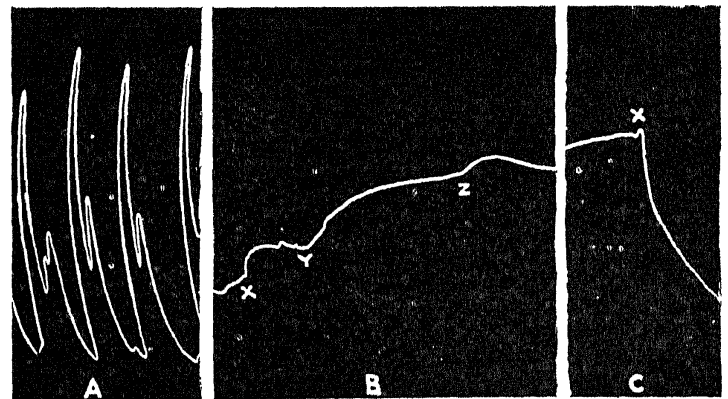


FIG. 1. Frog stomach muscle.

- A. Contraction with acetylcholine in saline.
B. Same in the presence of excess of potassium (0.016008 M); potassium added at X, acetylcholine added at Y and withdrawn at Z; no relaxation.
C. Potassium withdrawn at X; note relaxation.

Action of other substances.—In *Mytilus* muscle, similar results are produced if it is immersed in a barium-rich solution just insufficient to cause a contraction. Contraction will now occur if adrenaline or acetylcholine are added, or if electric current is passed, or the muscle is given a sudden stretch or release; this contraction will subside on withdrawal of barium. This shows that electric current, drugs and sudden stretch or release produce some similar effect. This effect is probably responsible for slow relaxation when the muscle is stimulated by contracture-producing substances.

Discussion.—The presence of a substance around the muscle fibres is not sufficient to produce excitation. According to current views, acetylcholine would produce depolarisation of the membrane and so increase the permeability. This would result in entrance of potassium ions into the muscle fibres, so that for excitation, movement of ions appears necessary, as electric current would also produce a movement of ions; this might produce an increase in the concentration of ions in an outer zone.³

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