LETTERS TO THE EDITORS

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A Fruit-setting Hormone from Apple Seeds

In the apple, fruit size and shape are known to be closely correlated with the number and position of the fertile seeds, an observation which suggests that the developing seed may be the source of a hormone which initiates and controls the growth of the fruit. Experimental evidence supporting this has recently been obtained for the apple variety Crawley Beauty, from the young seeds of which it has been found possible to prepare extracts which are active in stimulating the development of unfertilized tomato ovaries.

Active extracts can be obtained from both fresh and dried material by the simple expedient of boiling the seeds in water (25 ml. per gm. dry wt.) in an open beaker for 15 minutes, which serves not only to extract the hormone and concentrate the extract, but also at the same time inactivates oxidizing enzymes. After separation from the plant material, the resulting liquor is cooled at 5° C. for 24 hours, filtered, and the filtrate tested directly by placing one drop on the ovary of an emasculated tomato flower. Alternatively, the active principle can be removed from the filtrate by shaking with ether, evaporating to dryness, and taking up the residue with water or lanolin. If the extract is active, the tomato ovaries show visible swelling within four or five days, and eventually develop into seedless fruits of excellent size and quality.

Using the above extraction procedure, active extracts were prepared from seeds taken from young fruits collected at various stages from three to ten weeks after petal fall, but no fructigenic activity could be detected in seeds taken from fruits which were older than this. This disappearance of activity corresponded closely with the cessation of the rapid growth of the seed, the disappearance of an unidentified compound (believed to be a glucoside) from the seed, and the occurrence of the so-called 'June drop', which in this variety occurs in the latter half of July. Further work is in progress to establish more precisely the relationship between these phenomena and to investigate the role of this hormone in the processes of fruit-set and development of the apple and other tree fruits.

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Underground Spread of Potato Virus X

Although potato virus X is the most widely distributed of the potato viruses, there is considerable uncertainty about its method of transmission. No insect has been found to act as a vector, and the only way in which it is known to spread is by contact between healthy and infected plants. This was first demonstrated by Loughnane and Murphy[1,2], who concluded that it resulted solely from leaf contact, and that there was no danger of spread occurring below ground. Experiments at Rothamsted have confirmed that spread occurs only when plants are in contact, and that leaf contact alone is sufficient; but the results also suggest that root contact is equally important.

In potatoes, the rate of spread is slow; in no year during the course of these experiments have more than 1 in 10 of the healthy plants in contact with infected ones become infected. In field experiments it has been noticed that tubers from plants adjacent to infected ones were sometimes infected even when the haulms had not reacted when tested for virus X at the end of the season. One explanation for this would be that infection occurred through foliage late in the season, and that the virus passed to the tubers without becoming systemically established in the haulms. It seemed, however, equally probable that spread was occurring underground, and glasshouse experiments were made to test this possibility.

Various experiments have been carried out in which healthy and infected potato tubers were planted in the same pots, in half of which screens of 'Cellophane' were erected to prevent foliage contact. There was too little spread for any definite conclusions to be reached, but again there was a suggestion of spread without leaf contact. In one experiment, for example, there was no sign of spread from tests made from the haulms at the end of the season in either the screened or unscreened pots, but subsequent tests on the harvested tubers showed that spread had occurred in one of the screened pots.

Tomato is much more susceptible than potato to infection by virus X, and spread is much more rapid. Parallel experiments with this plant have shown that spread occurs equally well whether there is root contact only, or both root and leaf contact between infected and healthy plants. The virus strain used produced a bright yellow interveinal mottle in the tomato. Plants were set out in pairs in large pots, individual 'Cellophane' screens were erected in half the pots, and the plants were allowed to grow to 5–6 in. in height before one of them was inoculated with the virus. Tests made eight weeks later showed that 7–9 of the uninoculated plants in the unscreened pots had become infected, and 5–9 in the screened pots.

In an experiment with a different type of screen which provided a continuous barrier between the infected and healthy plants in 9 of the 18 pots, spread of virus occurred to all 9 of the uninoculated plants (root contact only) and to 7–9 of the unscreened pots. All the control tomato plants in the same glasshouse, not in contact with infected plants, remained healthy. There is no evidence to show whether the underground spread is caused by mechanical transfer of virus between roots in contact or by some other mechanism.

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[1] Loughnane, J. B., and Murphy, P. A., *Nature*, **141**, 120 (1938).
[2] Loughnane, J. B., and Murphy, P. A., *Sci. Proc. Roy. Dublin Soc.*, n.s., **22**, 1 (1938).

Ultra-Violet Absorption in Living and Dead Cells

An ultra-violet microscope having an achromatic objective designed by Brumberg and Gershgorin[1] (with an aperture of 0·5) has been used for photographing living tissue cultures. The latter were grown by the hanging drop method on a quartz cover-glass. The source of light used was a high-pressure quartz