

have shown that clay properties are most strongly developed in the most siliceous clays. Hall and Russell, many years ago, attempted to correlate soil fertility with the composition of the clay fraction. It is evident, therefore, that students of the soil are likely to obtain results of the highest importance, both for the natural study of the soil and for the elucidation of problems of soil fertility, by giving attention to the composition of the clay fraction, particularly in its vertical variation in the soil profile.

G. W. ROBINSON.

University College of North Wales,  
Bangor, May 21.

#### Insects and Potato Virus Diseases.

It has long been a matter for conjecture as to what insect or insects are responsible in Great Britain for the dissemination of the 'virus' diseases affecting the potato plant. Experiments carried out by myself over a period of years show beyond doubt that, out of the normal insect potato fauna, one particular insect is a most efficient vehicle for the transmission of the serious disease known as 'leaf-roll.'

The insect in question is a small aphid, *Myzus persicae* Sulz., and it attacks both the plant in the field and the sprouts of the tuber in the store. Under certain conditions I have been able to infect with fair regularity between ninety and one hundred per cent of the experimental plants with leaf-roll by means of this aphid. Further, I have proved, under glass-house conditions, that healthy potatoes, on the sprouts of which *Myzus persicae* carrying the virus of leaf-roll has been feeding, will produce plants so badly 'rolled' within two months of the date of the first infection, as to give little or no crop. In the glass-house a number of known healthy potato tubers, with sprouts thus infected at the beginning of March, produced plants in an advanced stage of leaf-roll by the end of April.

It will thus be understood how it is possible for 'seed' potatoes, stored in a healthy condition, to give rise to a negligible crop in the ensuing season. Attempts to induce nine other species of insects which normally inhabit the potato plant to transmit the virus of leaf-roll under varying conditions have so far proved abortive. It is, however, unwise to deduce from these negative results that such insects are unable to transmit leaf-roll under any conditions. Suffice it to say that as yet they have not done so under conditions which gave positive results with *Myzus persicae*.

As regards the disease known as 'mosaic,' the transmitting power of *Myzus persicae* appears to be much less, and the percentage of experimental infections has been small. However, in experimenting with the virus of potato mosaic on another Solanaceous host, some curious facts relating to the behaviour of this virus have come to light. By infecting tobacco plants with the virus obtained from mosaic-affected 'Arran Victory' foliage by means of leaf mutilation inoculation, a very characteristic disease known as 'ringspot' is produced in the tobacco. The chief symptom of this is the formation of clearly defined whitish concentric rings, each having a central spot (Fig. 1).

On transferring this virus by needle inoculation back to healthy potatoes, a mosaic-like disease is produced in which the symptoms of the original mosaic are intensified and its infective nature very greatly increased. Its symptoms consist of a very characteristic and strongly marked mottling of the leaves, which later may become crinkled at the edges, accompanied by large numbers of small necrotic

spots. It is, in fact, very similar to the potato virus disease known as 'crinkle,' with the exception that true crinkle is very much less infectious, so far as my experience goes. This altered virus can be passed by needle inoculation from potato to potato and from tobacco to tobacco or from one to the other with the utmost regularity, the symptoms developing in the former in eight to eleven days according to the temperature, and after a somewhat longer period in the latter.

It is now possible to induce the aphid *Myzus persicae* to disseminate this virus to potatoes where

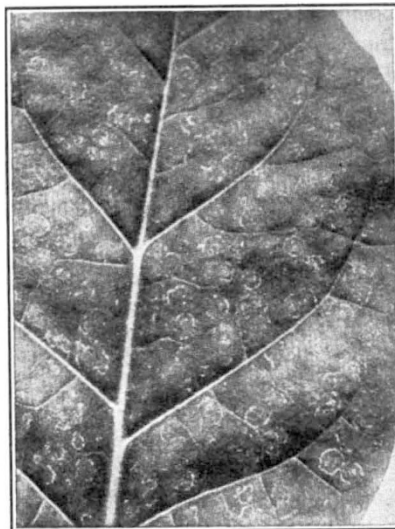


FIG. 1.—'Ringspot' on tobacco caused by inoculations with potato mosaic.

it would not do so before its passage through the tobacco, and successful transmissions have been performed in periods ranging from 14 to 24 days. This transformed or 'ringspot' mosaic in potato has not, however, adapted itself to dissemination by the aphid proportionately to its greatly increased infectivity to the plant, and aphid infection is still a matter of uncertainty. Inoculations into healthy tobacco plants with the juice of healthy potatoes or with viruses other than mosaic, have up to the present failed to produce ringspot, but when mosaic has been a component part of a virus complex ringspot has developed.

KENNETH M. SMITH.

School of Agriculture,  
Cambridge.

#### The Excitation of the D Lines by the Green Sodium Band.

IN a recent paper (*Phys. Rev.*, May 1928) Prof. Wood and the present writer have discussed the conditions under which it is possible to excite the D line fluorescence in sodium vapour by light which is free from wave-lengths absorbed by the atom. A band in the green at 5200 Å., 50 Å. in width, was found to produce a maximum D line fluorescence when a foreign gas at a few millimetres pressure was mixed with the fluorescing vapour. The presence of a foreign gas seemed essential for the production of the D lines in this way, and the most obvious explanation seemed to be that the excited molecule collided with a foreign gas molecule and dissociated into one normal and one excited atom. But the dissociation potential as calculated by Pringsheim (*Zeit. f. Phys.*, 44, 651; 1927) and Loomis (*Phys. Rev.*, 31, 323; 1928) from