In the returns issued by the Department of Agriculture for Scotland[2], there are fourteen potato varieties which flower sparingly or not at all. Four of these, Arran Crest, Epicure, Ninetyfold and King Edward, are necrotic to virus *X* when infected artificially through graft unions, and field crops are invariably free from infection. The remaining ten varieties, Duke of York, Eclipse, Sharpe's Express, Witchhill, Great Scot, Royal Kidney, Arran Banner, Arran Chief, Arran Consul and Rhoderick Dhu are non-necrotic, and analyses of samples drawn from commercial stocks have shown that virus *X* is of common occurrence within them. Of the free-flowering varieties in commerce, none is necrotic to virus *X* and none is *X*-free. It would seem, therefore, that the absence of virus *X* in commercial stocks is more closely related to the necrotic reaction than to the absence of flowers.

In support of this view, there is the observation that the necrotic disease is rarely, if ever, seen in the field, a fact which receives partial explanation on the grounds that as the necrosis is lethal, perpetuation of diseased plants vegetatively is eliminated. There is also experimental evidence derived from artificial methods of infection to suggest that entry of the virus into varieties to which it is lethal does not take place readily through means of infection other than a graft union.

The possibility of a species of thrips acting as a vector of virus is in no way invalidated by this criticism of the locus of entry.

The position with regard to virus *A*, of which *Myzus persicæ* is the vector[3], is very similar to that of virus *X*. Of the forty-six varieties listed in the agricultural returns[2], seventeen are necrotic to virus *A* and are free from the virus under natural conditions. Ten of these varieties seldom produce flowers and seven are free-flowering. Of the twenty-nine non-necrotic varieties, three non-flowering and five flowering varieties are usually found to be infected with virus *A*, whilst the virus is not uncommon, either alone or in combination with other viruses in the remaining twenty-one varieties. It seems clear, therefore, that the factor determining the presence or absence of virus *A* is the reaction of the variety to the virus and not the presence or absence of flowers.

Evidence with regard to non-necrotic aphis-borne viruses has been obtained from a series of controlled field-trials in which free-flowering varieties were kept disbudded throughout their growing period. Twenty plants of each of eight varieties were interplanted with leaf-roll infector plants. After one season of exposure, 46 per cent of the flowering controls and 49 per cent of the disbudded plants had contracted infection. At the end of a second season the infected plants had increased to 68 per cent of the flowering controls and 75 per cent of the disbudded plants. It would seem, therefore, that the presence of flowers *per se* has little effect on dissemination of potato virus diseases.

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[1] Smith, K. M., "A Text-Book of Plant Viruses", p. 343 (1937).
[2] *Scot. J. Agric.*, **20**, 92–93 (1937).
[3] Loughnane, J. B., NATURE, **131**, 838 (1933).

Mechanism of Polyploidy through Colchicine

THE action of colchicine on plant nuclei has been studied in stamen hairs of *Tradescantia reflexa*. Ovaries with attached filaments from which the pollen sacks had been removed were submerged in a salt sugar solution in which checks will survive more than 48 hours. Colchicine in concentrations ranging from $2 \times 10^{-4}\,M.$ to $6 \times 10^{-2}\,M.$ inhibits spindle formation and thus prevents anaphase. The drug slows down, but does not inhibit, the normal chromatin changes. Thus the split metaphase chromosomes commence to shorten and swell. Chromonemata become visible within them. Gradually they assume interphase structure. Meanwhile, chromosomes may have assumed various positions within the cell. Single chromosomes or groups of few chromosomes may have separated from the main group. The reconstruction of the amphidiploid colchicine nucleus thus at first leads to an irregular contour, which is gradually lost; micronuclei may be formed.

In summary, colchicine specifically inhibits anaphase, so that polyploid nuclei originate through reconstruction of an interphase nucleus from metaphase chromosomes, wherever plant cells divide under the influence of the drug.

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Rotational Analysis of the Visible O_2^+ Bands

THE visible O_2^+ bands obtained by a heavy discharge through helium containing a small amount of oxygen have been photographed in the second order of a 21-ft. grating.

Examination of the bands, λ 5632 (1, 0), λ 6026 (0, 0) and λ 6419 (0, 1), shows that each consists of four components containing in all thirty-nine branches. The alternate lines in each branch are missing and the structure agrees with the $^4\Sigma_g^- \rightarrow {}^4\Pi_u$ transition predicted for these bands by Mulliken[1]. The missing lines at the origin show that the $^4\Pi$ level is inverted. The Λ-type doubling is greater in the $^4\Pi_{-1/2}$ than in the $^4\Pi_{1/2}$ state, increasing with J in each case, and is very small in the $^4\Pi_{3/2}$ and $^4\Pi_{5/2}$ states.

The fine structure of the $^4\Sigma$ level agrees with Budó's[2] theory. The F_1 level is blended with F_4 and F_2 with F_3, while F_1 and F_2 are separated by a constant interval from which $\varepsilon = 0{\cdot}146$ and $\gamma \sim 0$. The effect of this structure is to reduce the total number of branches to be expected for the transition from 48 to 40.

Preliminary values of the molecular constants obtained from the analysis are as follows:

$A = -46{\cdot}9$ cm.$^{-1}$, $B_e' = 1{\cdot}292$ cm.$^{-1}$, $\alpha_e' = 0{\cdot}027$ cm.$^{-1}$, $D_e' = -6 \times 10^{-6}$ cm.$^{-1}$, $r_e' = 1{\cdot}274 \times 10^{-8}$ cm., $B_e'' = 1{\cdot}108$ cm.$^{-1}$, $\alpha_e'' = 0{\cdot}018$ cm.$^{-1}$, $D_e'' = -5 \times 10^{-6}$ cm.$^{-1}$, $r_e'' = 1{\cdot}346 \times 10^{-8}$ cm.

A complete account of the analysis of these and of the (2, 0) band will be published shortly.

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[1] Mulliken, *Rev. Mod. Phys.*, **4**, 51 (1932).
[2] Budó, *Z. Phys.*, **105**, 73 (1937).