LETTERS TO THE EDITORS

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Ultra-Violet Irradiation of Tobacco infected with Potato Virus Y and the Availability of Virus to Aphids

SINCE many workers in widely divergent fields are interested in the biological effects of ionizing radiations, new methods of approach to this study may have wider application than is at first realized. This communication reports that ultra-violet irradiation of tobacco infected with potato virus Y can reduce the availability of virus to aphids without causing apparent injury to the plants or greatly reducing the infectivity of sap extracts as measured by starch – iodine lesions.

Leaves of White Burley (*Nicotiana tabacum* L.) tobacco plants showing well-developed symptoms of infection with potato virus Y were irradiated in the dark 15 cm. from a source of ultra-violet light. (The intensity of radiation of 2537 A. on the surface of the leaves was about 2 mW. per sq. cm.) Half of each leaf was either removed or covered during irradiation to serve as an unirradiated control. After irradiation, the plants were placed in daylight under glass for several hours, and then kept under normal glasshouse conditions of illumination. The availability of virus to aphids was tested with fasted wingless adults of *Myzus persicae* (Sulz.), which were transferred in pairs from the source of infection to young healthy tobacco plants for 24 hr.

When aphids spent two minutes on the leaves immediately after irradiation, the pairs out of 70 that transmitted from leaves irradiated zero, two, four and eight minutes were 68, 28, 11 and 1 respectively. Many fewer transmissions resulted when the aphids spent four hours on the leaves ; but the differences in the numbers of transmissions from irradiated and unirradiated leaves were similar to those above. Irradiation of one surface of a leaf did not affect the availability of virus from the other ; nor did irradiation appear to affect the feeding behaviour of the aphids. The irradiated plants continued to grow and looked the same as the controls, and the availability of virus to aphids returned to normal within a few days. For example, after two to four days, as many transmissions were obtained from leaves irradiated two minutes as from the controls, and transmissions from leaves irradiated five minutes equalled that of the controls after five to ten days.

Ultra-violet irradiation of some plant viruses *in vitro* results in a loss of infectivity without any gross changes in their physiochemical properties[1] and, by analogy, virus infectivity is probably destroyed *in vivo* when infected plants are irradiated. Although detailed infectivity tests have not yet been done, the following tests indicate that if ultra-violet destroys infectivity *in vivo*, then only a small part of the total virus in a leaf is so affected during the brief periods of irradiation required nearly completely to reduce the availability of virus to *M. persicae*. Infected leaves were divided along the mid-veins, and one-half of each leaf was irradiated for five minutes, the other half serving as an untreated control. The pairs of aphids out of 20 that transmitted virus after two minutes on these leaves were zero for the irradiated

and 18 for the controls. Sap expressed from each group of half-leaves and diluted with an equal volume of phosphate buffer at pH 7 was inoculated on opposite half-leaves of tobacco. Sap from the irradiated leaves produced as many starch – iodine lesions[2] as that from the controls in one experiment ; when repeated, however, slightly fewer lesions were produced by sap from the irradiated leaves, the difference being less than 10 per cent.

M. persicae becomes infective with potato virus Y during feeding punctures when the stylets are inserted into the epidermis of infected plants, and transmission rarely, if ever, occurs after the stylets have penetrated into deeper tissues[3]. Therefore, it is only necessary to postulate inactivation of potato virus Y in the epidermis of the irradiated tobacco leaves to account for the results reported here.

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[2] Holmes, F. O., *Cont. Boyce Thompson Inst.*, 3, 163 (1931).

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Protein Synthesis and Genetics

THE recent exchange of views in *Nature* regarding the biosynthesis of proteins prompts some comments from a geneticist. Campbell and Work[1] take note of "the two main streams of thought on protein synthesis : one derived from the study of isolated enzyme systems and suggesting a stepwise coupling of many small peptide units ; the other based on the study of genetic inheritance of protein specificity and preferring synthesis on templates, each template being specific for a single protein structure and probably identifiable with a gene". While not rejecting the latter view (one gene – one protein), they point to some of the difficulties with which it is confronted, and further suggest the possibility that a synthesis of the two ideas will be found to fit the facts. Dounce[2], on the other hand, elaborates and defends a nucleic acid template hypothesis, and suggests that such a hypothesis is consistent with the existence of both plasma genes and nuclear genes. Quite independently, immunogenetic and biochemical studies of controllable genetic material have yielded results suggesting a synthesis of these views.

In *Drosophila melanogaster*, genic interaction has been demonstrated in the determination of antigenic specificity, a finding difficult to reconcile with the one gene – one protein hypothesis. In one series of isogenic stocks, interaction between at least three non-allelic loci is responsible for the presence or absence of a particular antigenic component. Two of these loci have been identified (ruby and vermilion), and have morphological as well as antigenic effects[3]. In another series of isogenic stocks, interaction between alleles results in a distinctive antigenic component in heterozygotes. The interaction involves the wild and mutant alleles at the loci