matter may not be so simple and may well lead to diffraction anomalies in the image.

Bruce is too severe in his criticism of reflexion fringes. I have shown in connexion with reflexion Fabry–Perot fringes[6,7] that the critical factor affecting visibility is not the reflectivity but the absorption of the front film. Although the quality of reproduction in the note by Bruce makes it difficult to form a reliable judgment, it appears to me that his silver films have too big an absorption. With correct attention to this detail, it is possible to secure very sharp reflexion fringes of high contrast (see illustration of page 149 of ref. 3), and they can be, and have been, used quite well for oscillation experiments (see ref. 4).

The second communication[2], by Bruce, Macinante and Kelly, describes the use of a stroboscopic method with multiple-beam interference fringes for studying oscillations. The authors are obviously not aware of the fact that in April 1949 I gave an account[8,9] of the way Mr. Bardsley and I have for some time been successfully using stroboscope methods in combination with interferometric studies on oscillating crystals. As I have already pointed out, the stroboscopic method we use not only permits larger amplitude measurements to be made, but also, and much more important, reveals relative phases[4b].

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Decomposition of Radioactive Octamethylpyrophosphoramide in Living Plants

Gardiner and Kilby have described[1,2] the synthesis of the systemic insecticide *bis*(*bis*-dimethylaminophosphonous) anhydride (octamethylpyrophosphoramide) in radioactive form (with phosphorus-32) and its application to the study of its uptake by living plants[3]. We also have experimented along these lines, but have extended our investigations to the study of the chemical fate of the substance, using for this purpose activities of about 400 μC./gm. to obtain the necessary sensitivity in analysis. Preparative details will be published elsewhere.

In vitro, acid hydrolysis of the phosphoramide occurs at a rate determined by $k = 3{\cdot}6 \times 10^{-3}$ [H$^+$] min.$^{-1}$ at 25° C., and alkaline hydrolysis by $k = 4{\cdot}7 \times 10^{-3}$ [OH$^-$] min.$^{-1}$ at 100° C. Only powerful oxidizing agents and halogens react more rapidly. Water itself does not react at a measurable rate. Thus in the *p*H range of plant tissues, 4·5–7·0, the half-life *in vitro* would be more than eight years.

We find, however, that only about 10 per cent of the toxic compound originally absorbed by plants in vigorous growth is present unchanged four weeks after spraying. Up to a further 50 per cent is present as decomposition products. The rate of decomposition is considerably dependent on state of growth and is particularly slow in winter-dormant plants, facts which are consistent with the decline in insecticidal activity already established[3]. The contrast with the stability in non-living solutions indicates that some enzymic process is responsible for the decomposition in plants.

The water-miscible amide in dilute solution at 25° C. partitions 7 : 1 in favour of chloroform from water and 23 : 1 from *N* aqueous sodium hydroxide. All products of inanimate hydrolysis carry a hydroxyl group on the phosphorus atom and are therefore retained by aqueous alkali, and we have found no evidence of any metabolite soluble in chloroform but having a different partition ratio with water. To estimate the toxic material, therefore, plant samples are macerated with water, filtered and the aqueous extract, containing most of the activity, made alkaline and extracted with chloroform. The radioactivity of aqueous and chloroform layers is measured in an annulus-type Geiger–Müller tube. With a small correction for incomplete extraction, the chloroform count gives the amount of unchanged compound. Further partition experiments show no evidence of any other chloroform-soluble compound.

The decomposition products are mostly precipitated by calcium salts in alkaline solution. Some light is thrown on the mechanism of decomposition in the plant by following the fate of hexamethylorthophosphoramide. This has similar physical properties to the pyro-compound, but is not hydrolysed by alkalis, as this is a property of the P—O—P bonding. We find that the living plant decomposes the ortho-amide as rapidly as the pyro-. When an aqueous extract normal in sodium hydroxide is partitioned exhaustively with chloroform, little of the decomposition products are in this case not extractable, most appearing as a compound with partition coefficient (chloroform/*N* aqueous sodium hydroxide) of 1·2 as against 17·0 for the ortho-amide. Hydrolysis of the P—N links must give POH groups, products containing which on partition go solely into *N* sodium hydroxide. The initial site of attack by the enzymes is therefore not the P—N link but either the N—C or C—H links. Substitution of carbon by hydrogen or hydrogen by hydroxyl decreases the partition in favour of chloroform. The absence from the pyro-amide products of any substance extractable by chloroform from alkali may result from instability of the P—O—P links during the action on the N—C—H system.

It is therefore probable that the mechanism of decomposition is wholly different from that of inanimate hydrolysis. Attack on the N—C—H system is not surprising in view of the known abundance of methylamines in plants, whereas the unusual N—P link is much less likely to find an enzyme designed to attack it.

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