would be relatively simple. Several workers[2,3] have attained complete separation of adenine and guanine; but, so far, we have failed to avoid marked overlapping when four purines are present.

The presence of four purines in grassland plants is of interest and, so far as is known, has not been reported previously. It seems likely that they exist in the free state, although enzymic breakdown of nucleosides, etc., during extraction of the plant juice cannot be ruled out.

It might be mentioned that when herbage juice is passed through a Zeo-Karb 215 column at least two substances absorbing ultra-violet light at 260 mμ pass rapidly through. Paper chromatography suggests these include the pyrimidines, thymine and uracil.

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Some Effects of Mosaic Virus on Nitrogen and Phosphorus Metabolism in Tobacco Plants

Experiments to determine the effects of infection with tobacco mosaic virus (Johnson's No. 1) on the nitrogen and phosphorus metabolism of tobacco leaves were made with a hundred plants grown in sand culture. Fifty plants when at the 8-leaf stage were infected artificially with pure virus. Groups of these and of the corresponding control plants were harvested 17, 27 and 40 days after infection.

Analyses of the leaves (from which midribs were excised) revealed that the concentrations of protein nitrogen and protein phosphorus (expressed as gm. per 100 gm. dry matter) were higher in leaves of infected plants than in those of the healthy control plants. The growth-rate of infected plants was lower than that of healthy controls, and this offset the higher concentration of protein nitrogen, with the result that the total protein nitrogen per plant was slightly lower in infected plants.

The concentration of protein phosphorus was higher in infected than in healthy plants throughout the forty-day growing period. In the healthy plants it decreased by 40 per cent during the period of observation, whereas in infected plants it remained constant. The total amount of protein phosphorus increased from 2·6 to 9·3 mgm. per plant in both healthy and infected plants after seventeen days; but thereafter the amount in the healthy plants remained sensibly constant while the total increased to 11 mgm. in the infected plants.

The virus content of homogenates of infected leaves as determined by the primary lesion method, described by Best[1], using a solution of known virus content[2] as reference standard, revealed that the virus formed an increasingly large proportion of the total protein of older leaves as infection proceeded, but constituted a roughly constant proportion of the protein of younger leaves.

The nitrogen–phosphorus ratio of the protein in the healthy leaves fell from 112 to 69 in forty days, whereas that of infected leaves fell to 54. This kind of difference would be expected because the virus nucleoprotein itself has a nitrogen–phosphorus ratio of 32. If we assume that the whole of the difference in the nitrogen–phosphorus ratio between healthy and infected plants is due to the presence of virus in the latter, we can calculate the weight of virus present. Values calculated in this way were in most cases higher than those obtained by the infectivity method. In young leaves only about one-quarter of the calculated 'total virus' was infective. In older mature leaves the proportion of infective virus was higher; but it decreased with duration of infection. The calculated total virus per plant continued to increase linearly with time throughout the growth period, whereas infective virus reached an apparent maximum after twenty-seven days. Our conclusions are consistent with those published by Bawden and Pirie[3].

The difference between amounts of 'total' and infective virus could be explained as being partly due to some infective virus having become inactive (older leaves), and partly to the presence of a non-infective pre-virus stage (young leaves).

All the above relates to plants grown with adequate nutrients. In a parallel series of plants grown under the same conditions but with nitrogen at a level which limited growth, the dry weight after seventeen days was 80 per cent, and after forty days 56 per cent, of that of the plants which had received adequate nitrogen. Although the plants with adequate nitrogen yielded a higher dry weight than the plants receiving inadequate nitrogen by a factor of 1·8, the amount of infective virus per plant was greater by a factor of 12 at the first harvest and 8 at the last harvest. On a concentration basis (gm. virus per 100 gm. dry matter) the factor was 11 and 5 respectively on the whole plant. When top and bottom leaves were analysed separately, the difference between the two nitrogen treatments was much greater in the bottom leaves than in the top leaves, the factors being 19 and 5 respectively. It would appear that when nitrogen is a limiting factor, the production of normal plant proteins is affected less than the production of virus.

A full account of this work will be published elsewhere.

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Conversion of Plant Nitrogen to Microbial Nitrogen in the Rumen of the Sheep

Plant protein in the fodder of ruminants does not arrive unaltered at the abomasum where peptic digestion takes place; there can be no doubt that at least a part of it is degraded, and later resynthesized to microbial protein by the enormous numbers of bacteria and other micro-organisms in the rumen. From time to time attempts have been made, usually on a basis of insufficient data, to calculate the extent of this conversion, and the estimates have varied from almost negligible proportions to 100 per