therefore, in the Mount Lamington area, while not at all surprising to mycologists, is an interesting example of the invasion of an unusual ecological niche.

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Occurrence of Putrescine in Potassium-deficient Barley

The identification of primary effects of potassium in plant cells has proved to be one of the most elusive problems in mineral nutrition. Many widespread physiological disturbances accompanying potassium deficiency are well known, especially in the fields of nitrogen and carbohydrate metabolism; but the immediate causes of the characteristic (yet variable) leaf symptoms and the premature death of foliage have been almost entirely a matter for speculation. This communication is intended to direct attention to the fact that in barley, at least, putrescine is produced and accumulated under certain conditions of potassium deficiency, and that some of the observed symptoms may well be directly attributable to its presence.

A qualitative investigation, by means of paper chromatography, into the free ninhydrin-reacting compounds in barley leaves (F. J. Richards and E. Berner, in the press) revealed the frequent occurrence there of an unidentified basic substance. It was found in more than trace amounts only in potassium-deficient plants, and only in such of those as had not been supplied with either sodium or rubidium. Any of these alkali metals appeared to suppress its accumulation. Where it did occur it was present from an early age, increasing in quantity as the external symptoms of deficiency became acute.

In order to isolate and identify the substance, a large quantity of potassium-deficient barley was grown in 1951. Green laminæ, moribund leaves and stems from this material all contained the compound; indeed, on chromatograms from the moribund leaves it provided the most intense of all the ninhydrin spots. The substance was first isolated from the other ninhydrin-reacting compounds present in 75 per cent alcoholic extracts by elution on columns of 'Permutit' special sulphonated polystyrene resin; after passing hydrochloric acid and ammonium hydroxide through the charged columns the substance was removed by means of 0·2 *M* ammonium carbonate. The eluate was partially evaporated to remove the ammonia, acidified with hydrochloric acid and evaporated to dryness. The residue was then steam-distilled from a soda solution, acidified and evaporated nearly to dryness; a little ethanol was added and the substance thrown down with acetone. It was finally re-distilled and re-precipitated.

The isolated substance was indistinguishable from putrescine, whether in the form of hydrochloride, platinichloride or picrate; chromatographically, too, it behaved exactly like putrescine. The identification was confirmed by the production of identical X-ray powder photographs from the isolated substance and from putrescine hydrochloride; thanks are due to the Pedology Department of Rothamsted Experimental Station for taking these photographs.

The concentration of putrescine in the moribund potassium-deficient leaves is quite high, the yield indicating that the content of the free base must have been at least 0·15–0·2 per cent dry weight. No estimate of the content in green leaves has yet been made, but is, of course, lower than this.

Preliminary work involving feeding putrescine through the partially cut leaves of high-potassium plants has revealed toxic effects which bear close resemblances to some of the symptoms found in potassium-deficient barley. Chlorophyll disappears in patches and death soon follows. This may occur even on tillers remote from the one receiving the putrescine directly, distal parts of the leaves then being especially affected. The toxic symptoms induced by the free base, however, differ somewhat from those developed when the hydrochloride is supplied.

It is hoped that experiments in progress may throw some light on the origin of the amine (ornithine would seem to be the most likely precursor, but is not normally detectable in barley leaf extracts), and whether or not it is also produced, but metabolized immediately, in the presence of alkali metals.

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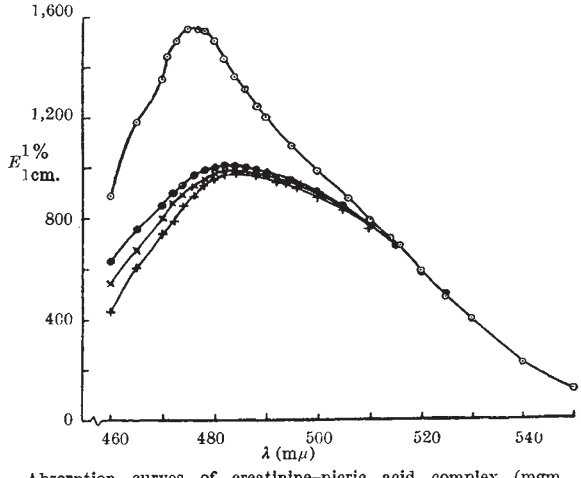
Determination of Creatinine

Creatinine is commonly determined in biological fluids by various modifications of the Jaffe reaction. The method is recognized as being non-specific and must be applied with caution unless there is a large excess of creatinine present over interfering substances. The specificity of the method has been greatly improved by Miller and Dubos[1].

Peters[2] has pointed out that a significant deviation from Beer's law becomes apparent at concentrations of creatinine greater than 5 mgm. per cent. This may be due to the bicolorimetric nature of the determination; the orange-red colour being a mixture of the red of the coloured creatinine complex and the yellow of unchanged picric acid. So far as is known, it has not been made clear that anomalies may also occur at low concentrations of creatinine.

As the accompanying graph shows, it has been found that if the absorption spectrum of the creatinine



Absorption curves of creatinine–picric acid complex (mgm. creatinine per cent). ○—○—, 0·0125; ●—●—, 0·025; ×—×—, 0·05; +—+—, 0·1