Determined matter	Analysis of the fruits floating on : Dist. water	2% NaCl	4% NaCl	6% NaCl	8% NaCl	10% NaCl	Fruits sunk in 10% NaCl
Dry matter	24·45	27·15	29·16	30·22	32·45	34·55	39·40
Red. sugars	6·14	6·22	6·11	5·93	6·09	6·35	6·27
Sucrose	5·03	7·22	8·84	9·47	12·40	15·81	17·75
Total sugars	11·17	13·44	14·95	15·40	18·49	33·16	24·02

tents. This was done by putting the whole fruit population in a big vessel containing distilled water and then collecting all the fruits that floated as one batch ; the sunken fruits were afterwards put in aqueous solutions containing 2, 4, 6, 8 and 10 per cent pure sodium chloride, and in each case the floating fruits were collected, washed with distilled water and finally analysed (after excluding the seeds), together with the last batch which sank in the 10 per cent sodium chloride solution.

The accompanying table shows the dry matter as well as the sugar content of each batch calculated in terms of grams per 100 gm. fresh weight of the fruits.

It appears clear from the table that although the population of the date fruits was collected from the same tree and at the same time, yet the fruits varied enormously in their dry-weights, the essential variation being in their sugar contents, especially the sucrose fraction. The fruits that floated on distilled water showed smallest dry-weight and also smallest sucrose content, while the samples that sank in 10 per cent sodium chloride solution showed largest dry-weight and also the highest sucrose content. It is interesting to note that the hexose content of all fruit batches fluctuated but little.

The above-mentioned experiment may, therefore, serve as basis for successfully preparing homogeneous date samples, thus minimizing the sampling error and reducing the number of replicates to be analysed under different experimental conditions.

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Imino-Acids in *Santalum* Leaves

Attention has been directed by Giri, Gopalkrishnan, Radhakrishnan and Vaidyanathan[1] to the high content of free hydroxyproline in the leaves of *Santalum album* L., and of free proline in the leaves of various species of *Citrus*. Their observations are of interest, as these imino-acids have previously been reported only as minor constituents of the soluble nitrogenous compounds of plant tissues, though they occur regularly as constituents of plant proteins. Hydroxyproline in particular has rarely been detected as a component of the soluble nitrogen in plant tissues.

Extracts of leaves from two Australian species of *Santalum* have now been examined by paper chromatography. With *S. obtusifolium*, the most prominent reactions with ninhydrin and isatin were given by proline, hydroxyproline (confirmed by the specific test of Jepson and Smith[2]) and glutamine ; with *S. murrayanum* proline gave by far the most prominent spot, but hydroxyproline was also present. There are thus several species in which proline accumulates to comparatively high concentrations, which is not entirely surprising in view of its known[3,4] relationship in various organisms to glutamate, the central metabolic position of which is generally acknowledged.

Other 'unusual' amino-acids known to accumulate in individual species include arginine in seedlings of various conifers, especially *Abies pectinata*[4,5], and citrulline in roots and root nodules of *Alnus glutinosa* and *A. incana*[6]. The range of plant material examined for amino-acids is still very limited, and the detection of other 'unusual' amino-acids by simple survey experiments may be anticipated. Such plants, as suggested by Giri *et al.*[1], may well provide useful sources of compounds not readily accessible to synthesis.

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[1] Giri, K. V., Gopalkrishnan, K. S., Radhakrishnan, A. N., and Vaidyanathan, C. S., *Nature*, 170, 579 (1952).
[2] Jepson, J. B., and Smith, I., *Nature*, 172, 1100 (1953).
[3] Fincham, J. R. S., *Biochem. J.*, 52, 313 (1953).
[4] Vogel, H. J., and Davis, B. D., *J. Amer. Chem. Soc.*, 74, 109 (1952).
[5] Schulze, E., *Z. physiol. Chem.*, 22, 435 (1896–97).
[6] Virtanen, A. I., and Miettinen, J. K., *Nature*, 170, 283 (1952).

Effects of Trace Metals, Oxygen and Light on the Glucose–Glycine Browning Reaction

The reaction of amino-acids and sugars to form brown-coloured products (Maillard reaction) has attracted the attention of many investigators[1]. Although such variables as the type of sugar and of amino-acid, concentration of reactants, *p*H, temperature, and catalytic effects of buffers have been recognized and controlled in model experiments, results of different workers are still difficult to reconcile.

In recent studies we have found that, under some conditions, the rate of development of colour in glucose–glycine solutions is strongly influenced by trace amounts of manganese or of iron, by oxygen and by light. In a typical experiment illustrating the manganese effect, an aqueous solution containing 0·448 *M* D-glucose, 0·458 *M* glycine, 0·0105 *M* disodium hydrogen phosphate, 0·0053 *M* potassium dihydrogen phosphate, and 0·4 p.p.m. manganese (as manganese chloride) was allowed to react in the dark at 50° in sealed glass tubes with air in the head-space. The amount of colour measured at different time-intervals was 17–24 per cent less than in controls without manganese (Table 1). In the presence of 2 p.p.m. of manganese there was a 30–40 per cent decrease in the amount of colour formation. (The remarkable sensitivity of the reaction to manganese is illustrated by preliminary experiments carried out

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