consisting entirely of illuminating gas. This was a carburetted water gas with an illuminant content of 10.2 per cent. After exposure the gas was removed by a stream of air passed into the flask until no more odor was detected. Exposures were made for 5, 7, 8, and 10 minutes. Within less than an hour later severe injury could be detected in all cases. The leaves became a pale whitish green, indicating chlorophyll decomposition, the surface became slightly concave (in contrast with the normal slightly convex appearance), and numerous drops of liquid were exuded on the upper epidermis, most numerous about one-third the distance from the node to the tip. Later the roots separated from the plants. All plants after the 10-minute exposure were killed, and but few survived after a 5-minute exposure.

It is suggested that Spirodela may be used in a technique for detecting the presence of illuminating gas in soils, where high concentrations are often present as the result of leaks in gas mains. TRUE has described a technique for this purpose, using the sweet pea. It is doubtful whether Spirodela is as sensitive to traces of illuminating gas or ethylene as those plants studied by CROCKER and his coworkers.—ALBERT SÆGER, Cornell University, Ithaca, New York

OCCURRENCE OF DULCITOL IN IRIDEAE LAMINARIOIDES (RHODOPHYCEAE)

In studying the nature of the cell wall constituents of Irideae laminarioides, which grows abundantly on the rocks of the Pacific Coast, at Moss Beach, California, the investigation was primarily concerned with a polysaccharide, galactan, which consists chiefly of galactose units. The writer was also interested in determining whether or not the metabolism of this plant is based on a sugar such as glucose or sucrose, as in the higher plants, or on a carbohydrate other than these.

Material was collected at four different times of the year, on May 12, June 20, August 28, and October 27 of 1932. The plants were extracted with alcohol and analyzed for reducing and total sugars. All of the samples failed to give a reducing value with Fehling’s solution either before or after hydrolysis. On concentrating the alcoholic extract, however, a thick syrup was obtained.

Since the presence of mannitol in brown algae was reported by KYLIN in 1913–1915, and more recently by HAAS and HILL, it seemed likely that this syrup might contain the alcohol. Its isolation was therefore

attempted. The plants were boiled for 15 minutes in 95 per cent. alcohol immediately after collection, then dried in a vacuum oven at 40° C. One hundred and fifty grams of the dry tissue were ground up and sieved. The ground material was then extracted in a large Soxhlet with 80 per cent. alcohol, and this extract was combined with the alcoholic portion in which the plants had been boiled immediately after collection. The combined solution was treated with lead acetate, the excess of lead removed with 2 per cent. H₂SO₄, and the lead sulphate filtered off. The filtered solution was then treated according to the method of HAAS and HILL (4) for preparation of mannitol, but no crystalline form of this alcohol could be obtained from the syrup. A portion of the syrup was placed in the vacuum oven and concentrated at 80° C. for 12 hours, the syrup then being weighed and its specific rotation observed. The substance showed no rotatory power; also, the addition of borax (1) to this solution did not increase its rotation. This fact furnished additional proof of the absence of mannitol.

Since the Irideae laminarioioides contained a considerable amount of galactan, it was suspected that the sugar alcohol of galactan, dulcitol, might be present. The syrup was extracted again in a Soxhlet with absolute alcohol, the extract clarified with charcoal, concentrated to a syrup, and allowed to stand for about a week with occasional stirring. White crystals began to separate. After recrystallization of these crystals and examination, the following was observed: the specific rotation of this substance, [α]₀ = 0; melting point 185°; oxidation with nitric acid yielded mucic acid. These facts constitute conclusive proof that this substance isolated from Irideae laminarioioides was dulcitol.

HAAS and HILL (2, 3) have recently reported the occurrence of dulcitol and sorbitol in a red alga, Brostrychia scorpioides. On examination of eight other species of Rhodophyceae, however, they found no evidence of the presence of either dulcitol or sorbitol.

The isolation of dulcitol from Irideae laminarioioides, therefore, confirms the occurrence of dulcitol in red algae found by HAAS and HILL.

The polysaccharide galactan isolated from Irideae laminarioioides is precipitated out from 95 per cent. alcohol and is obtained in the form of threads. It absorbs many times its own weight of water and forms a colloidal solution. It gives no reducing value, but after hydrolysis with 2 per cent. sulphuric acid it strongly reduces Fehling’s solution. Upon oxidation with nitric acid it yields mucic acid. This polysaccharide is being investigated at the present time.

It is conceivable that a possible equilibrium exists between the polysaccharide, galactan, and the sugar alcohol, dulcitol. This may be analogous in the carbohydrate metabolism of the plant to the equilibrium that exists.
between starch and glucose in higher plants. This suggestion supports the idea that the metabolic process of some of the algae may depend upon carbohydrates other than glucose or sucrose. In the case of *Irideae laminarioides* this is probably dulcitol.—W. Z. Hassid, *University of California, Berkeley, Calif.*

**LITERATURE CITED**


**MOVEMENT OF ORGANIC MATERIALS IN PLANTS: A CORRECTION**

In a recent note upon the mechanism of translocation, the writers criticized the use made by Crafts of the Poiseuille expression for uniform, non-turbulent, viscous flow in a capillary of known dimensions. To this criticism in all its general aspects we still adhere, especially in so far as it refers to the inapplicability of the formula in question to a "flow" which is clearly not uniform, and also to the comparison made between the whole phloem wall substance and the pores in the sieve plates as possible avenues for translocation. The basis of the latter criticism is that Crafts by treating the whole phloem wall substance as a single, circular capillary, derived pressures which can have no possible relation to the actual pressures involved in the production of a flow of the desired dimensions in the phloem wall. These are unjustifiably compared with pressures calculated to refer to flow through the pores in the sieve plates.

In the attempt to pursue Crafts' own method and insert a dimension (one half the mean wall thickness) which, on the assumption of flow
