Acetolysis of Carrageen Mucilage

IN a series of papers published between 1921 and 1929, Haas and his collaborators[1] showed that in the mucilage of carrageen moss (*Chondrus crispus*) there are two main constituents one of which can be extracted from the seaweed by cold water, the other only by hot water. They further showed that both constituents are ethereal sulphates of polymeric carbohydrates, occurring chiefly in the form of their calcium salts; but all their attempts to isolate the polymeric carbohydrates by hydrolysis led only to the production of simple hexoses. Galactose and fructose were easily recognized by them among the products of hydrolysis.

We have now acetylated the mucilage by treatment with acetic acid and acetic anhydride under the catalytic action of sulphur dioxide and chlorine, and on removal of the acetyl groups from the product we have obtained two polymeric carbohydrates each containing about 0·1 per cent of ash and giving analyses which agree well with the formula $(C_6H_{10}O_5)_n$. One of these bodies is soluble only in hot water and gives with iodine a wine-red colour similar to that given by glycogen, while the other is soluble in cold water and gives no characteristic colour with iodine. After hydrolysis neither compound gives glucosazone nor does either give the Seliwanoff reaction for fructose; the latter reaction is, however, given by the alcoholic liquid from which the polymeric carbohydrates have separated on deacetylation. From both polymers the characteristic α-methylphenylhydrazone of galactose was prepared and both gave mucic acid on oxidation with nitric acid.

Both polymeric carbohydrates appear to be galactans. In physical properties they resemble the body isolated by Hassid[2] from *Irideæ Laminarioides* more than that obtained by Percival and Sym[3] from agar.

Further investigation of these products is in progress, and detailed results will be published elsewhere.

T. DILLON.
P. O'COLLA.

Chemical Department,
University College,
Galway.
March 30.

[1] Haas and Hill, *Ann. App. Biol.*, **7**, 352 (1921); Haas, *Biochem. J.*, **15**, 469 (1921); Russell-Wells, *Biochem. J.*, **16**, 578 (1922); Haas and Russell-Wells, *Biochem. J.*, **23**, 425 (1929).
[2] Hassid, *J. Amer. Chem. Soc.*, **57**, 2046 (1935).
[3] Percival and Sym, NATURE, **137**, 997 (1936).

Points from Foregoing Letters

A NEW formula connecting tensile strength with latent heat of melting and Poisson's elastic constant has been developed by R. Fürth and found to be in good agreement with experiment.

Electron diffraction studies show, according to S. Yamaguchi, that when potassium and sodium are exposed to air they are attacked within five minutes by carbon dioxide, but lithium and calcium are not attacked. Oxygen and moisture in the air attack all four metals.

W. Krasny-Ergen describes a suggested apparatus for the separation of uranium 235.

L. G. Stoodley has shown how measurements of the signal strengths of ultra-short waves reflected at grazing incidence at a diffuse boundary in the troposphere may be used to calculate the reflection coefficient for longer waves at vertical incidence. The results are in agreement with the experimental values of Appleton and Piddington.

Records of the rhythmical impedance changes undergone by an unfertilized trout egg are submitted by Lord Rothschild. From resistance and capacitance changes in an equivalent circuit, it is found that resistance and capacitative components plotted against time give curves which are in phase every other cycle and approximately sinusoidal.

J. Weiss states that the fluorescence of conjugated ring systems is essentially due to the presence of the 'mobile' electrons, which are also responsible for the chemical behaviour of these substances. The structures of some related hydrocarbon-peroxides and of graphitic oxide are deduced, and a possible mechanism for the action of carcinogenic hydrocarbons is suggested.

E. F. Yang finds that when sodium phytate is present in excess, calcium is not precipitated as the phytate but remains in solution in an un-ionized form which is not precipitated by addition of oxalate or phosphate. D. C. Harrison and Sir Edward Mellanby find that this non-precipitation of calcium as phytate does not hold for oatmeal extracts. Their experiments indicate that the rickets-producing action of cereals is due to phytic acid, which interferes with calcium absorption from the intestine. They suggest that the cereal phytic acid may exert a rachitogenic action partly by precipitating calcium in the intestine and partly by rendering the calcium un-ionized and thus impeding its absorption.

The application of œstrogens by C. W. Emmens and R. J. Ludford to tissue cultures of vagina and uterus failed to induce either proliferation or cornification of the epithelial cells. Hence it is concluded that the characteristic histological changes following œstrogenic stimulation *in vivo* are not the result of a direct action of the hormones on the epithelial cells.

S. Ochoa finds that oxidation of pyruvic acid in brain preparations, in the presence of phosphate, adenylic acid, and hexosemonophosphate, is accompanied by conversion of the monoester into hexosediphosphate with an equivalent uptake of inorganic phosphorus. This 'coupling' explains why both inorganic phosphate and adenylic acid are necessary for the oxidation of pyruvate in brain.

I. Doniach and J. C. Mottram report that human red corpuscles were sensitized to light with 3 : 4-benzpyrene. The hydrocarbon was active down to a dilution of 1 in 10 million. Washing red corpuscles which had been suspended in benzpyrene colloid did not rid them of their sensitivity to light. The photodynamic reaction was enhanced both by prolonged contact in the dark of the corpuscles with the benzpyrene and by raising the temperature at which contact was made.

By acetolysis of carrageen mucilage, T. Dillon and P. O'Colla have obtained two polymeric carbohydrates, one soluble in cold water and the other soluble in hot water and giving a characteristic colour with iodine. Both appear to be galactans.