has been found to be similar to that of Biloxi soybean.

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A NEW POLYSACCHARIDE FROM BLACK SPRUCE (PICEA MARIANA)

WHEN native lignin is isolated from black spruce (*Picea mariana*) with aqueous alcohol and the alcohol is distilled off under reduced pressure, a mixture of native lignin and resins separates from the remaining aqueous solution.[1] On saturating the aqueous filtrate with sodium sulfate, a polysaccharide separates as a flocculent precipitate which, after centrifuging and washing with 80 per cent. alcohol, then with absolute alcohol, and finally with ether and petroleum ether, is obtained as a light powder. After purification by prolonged electrodialysis and repeated precipitations by dropping a concentrated aqueous solution into absolute methanol, the polysaccharide is obtained as a white, nonhygroscopic powder in a yield of about 0.1–0.2 per cent. of the wood. It does not reduce Fehling solution before hydrolysis with hot dilute hydrochloric acid, but does so very strongly after this treatment. In spite of lengthy electrodialysis, it still contains 0.7 per cent. ash (determined as sulfate). It is very soluble in water, forming a slightly turbid solution similar to starch solutions. Its aqueous solution shows a slight levorotation which, after hydrolysis, changes to a strong dextrorotation. A hydrolysis curve, obtained by boiling the polysaccharide with 2 per cent. sulfuric acid, shows that a maximum reducing power of about 95 per cent. sugar (calculated as glucose) is reached after 6 hours. The presence of 0.7 per cent. MeO and a slight residue left after hydrolysis indicate that a small amount of lignin is still present which is difficult to remove because of the colloidal properties of the polysaccharide. On distillation with 12 per cent. hydrochloric acid, the polysaccharide gives 3.3 per cent. carbon dioxide, which corresponds to 13.2 per cent. uronic acid. When the polysaccharide is acetylated by heating it with a mixture of pyridine and acetic anhydride, a gelatinous suspension is formed from which an acetylated product is obtained which is insoluble in water and the common organic solvents.

A biochemical analysis[2] of the hydrolyzed polysaccharide by the method of Wise and Appling[3] shows the presence of 72.6 per cent. galactose, corresponding to 65.3 per cent. galactan. The polysaccharide also contains 13.1 per cent. arabinose (determined by the method of Wise and Peterson[4]) corresponding to 11.5 per cent. araban; glucose, mannose and xylose are absent. The presence of uronic acid, the levorotation and the insolubility of the acetylated derivative differentiate the polysaccharide from the arabogalactans isolated from certain larch species.[5,6] As the acetate of arabogalactan is soluble in organic solvents,[5] it is improbable that the polysaccharide is a mixture of arabogalactan and polyuronic acid because, in this case, the acetate should be at least partially soluble in organic solvents.

From the above analysis, it seems that the 3 components—galactose, arabinose and uronic acid—are present in the polysaccharide in a 4:1:1 molecular ratio.

A closer chemical investigation of this polysaccharide is in progress and the results will be reported at an early date.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE WATER MANOMETER FOR RECORDING INTESTINAL ACTIVITY[1]

EXPERIMENTS on intestinal activity *in situ* often fail because of unsatisfactory recording equipment. This tends to discourage performance of such experiments in student laboratories. This note describes a simple device for recording intestinal motility which has the advantage of economy, ease of construction and maintenance, and which may be readily adjusted to give a wide range of initial force distending the intestine. Furthermore, by the use of a lever, considerable amplification of changes in the manometer level may be obtained readily.

[1] F. E. Brauns, *Am. Chem. Soc.*, 61: 2120, 1939.

[1] Aided by a grant from the Fluid Research Fund of the Yale University School of Medicine.

[2] The author is indebted to Dr. P. Cundy, of the Analytical Department and Mr. J. F. McCoy, of the Bacteriological Department of the Institute, for carrying out the analyses.

[3] L. E. Wise and J. W. Appling, *Ind. Eng. Chem., Anal. Ed.*, 16: 28, 1944; 17: 182, 1945.

[4] L. E. Wise and F. C. Peterson, *Ind. Eng. Chem.*, 22: 362, 1930.

[5] F. C. Peterson, A. J. Barry, H. Ukauf and L. E. Wise, *Am. Chem. Soc.*, 62: 2361, 1940; and preceding papers.

[6] E. V. White, *Am. Chem. Soc.*, 64: 2838, 1942; and preceding papers.

As may be seen from the diagram (Fig. 1), the device is composed of parts already available in the laboratory. It is essentially a water manometer, the entire system from intestinal balloon to manometer float being filled with water. The manometer consists of an inverted Kimble retempered glass culture tube (No. 45070), 15 by 150 mm (or similar tube of uniform bore with or without the side arm indicated). This size has been found suitable for use in cats. In

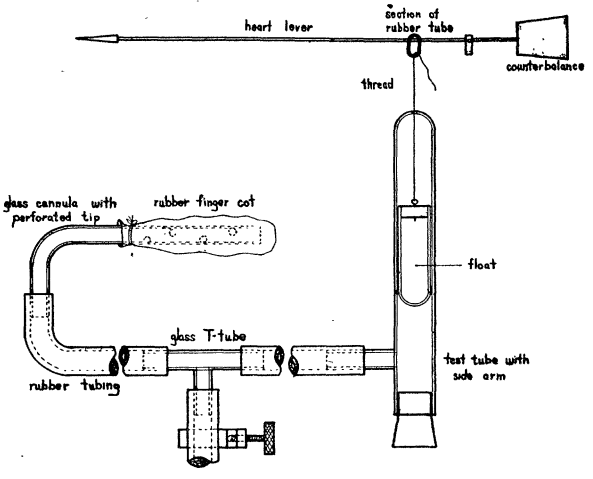

FIG. 1.

the bottom of the tube a pin hole is blown centrally through which a silk thread may pass freely. A manometer float is made either of a hypodermic syringe piston or of a Kahn tube, the size being selected by trial and error to fit so snugly that only a thin film of water separates the float from the manometer wall. Such close fitting insures accurate float reproduction of water level changes. The top of the float is closed with a rubber stopper about 5 mm thick to the center of which is attached a silk thread. The other end of the thread, after passing through the hole in the inverted tube, pierces the wall of a narrow section of rubber tubing which is also pierced by the writing arm of a Harvard heart lever. This latter arrangement makes possible quick adjustment of amplification of the water column height without the necessity of moving the lever relative to the recording surface, and without the use of clamps on the lever or knots in the thread. The recording lever is suitably counterweighted with a small rubber stopper. The intestinal balloon is of the conventional finger-cot variety, throughout the length of which runs a glass tube with several perforations. The perforations allow collapse of the balloon on one side or the end of the tube without interfering with transmission of pressure changes to the manometer. The system is preliminarily filled with water and after the balloon has been placed *in situ* the level of the float is adjusted by a syringe via the side arm of the T-tube.

We have found this device very easy to maintain and to adjust for operation. It is obvious that alignment of the manometer with the recording surface is not critical, and with the use of the gravity-type heart-lever little or no attention is required during the course of an experiment. With the dimensions described, excursion of several centimeters of the writing point per cc volume change is easily achieved. The inherent frictional inertia of the manometer is not a serious drawback to its use for the relatively slow changes in activity seen in the stomach and intestine. The device should prove useful for recording changes in volume of kidney and spleen.

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USE OF A DOUBLE-NOZZLED SPRAY APPARATUS FOR THE APPLICATION OF DDT OR OILS

DURING studies of methods of applying DDT (1-trichloro-2,2-bis(p-chlorophenyl)ethane), a deposit superior in quantity and quality was obtained by combining the water and DDT solution after they leave the spray nozzle. This was done by combining a spray of each from a pair of nozzles converging at an angle of approximately 35 degrees. A DDT solution was sprayed from a small atomizer into a water spray coming from a suction type paint sprayer. The droplets of the two sprays mixed by collision about 2 to 4 cm away from the nozzles.

When the DDT solutions were prepared with water-miscible solvents such as acetone, dioxane or alcohol, the insecticide was deposited as "nascent precipitates," some liquid and some solid. The DDT was precipitated when the droplets of the organic solution mixed with the droplets of water, and was immediately deposited on the sprayed surface.

Deposits on glass were found to consist of small particles well distributed over the surface, and it was possible to vary the type of the particle by varying the DDT concentration or the solvent. Oranges and apples were also successfully sprayed by this method.

Solutions of DDT in solvents other than those miscible with water were also successfully dispersed in this apparatus. Microscopic examination of the sprayed droplets showed that liquids, such as mineral oil, were dispersed in the water phase very much as if the oil had been emulsified, but in such an unstable condition that the oil deposited on the glass or fruit surface, leaving the water to drain off. The instability of the oil-in-water dispersion makes it possible to build a heavy deposit of oil on the surface