tinguishable from those of the animal glycogens, whereas the dextrin pattern is entirely different.

The action of malt diastase on corn glycogen has been studied, since Glock[2] has shown that glycogen is hydrolyzed by the diastases at a much slower rate than are the starches. The corn glycogen has been compared with starches, with the erythrodextrin mentioned above and with glycogen from other sources. Table 1 shows the fraction of each polysaccharide hydrolyzed after one hour under identical conditions. The amount of hydrolysis was measured by determination of the reduction of the solution by Hanes method[3] calculated as maltose.

TABLE 1

Polysaccharide	Source	Per cent. hydrolyzed
Glycogen	*Cysticercus fasciolaris*[4]	10
Glycogen	Oyster	15
Glycogen	Yeast	31
Glycogen	Sweet corn	32
Erythrodextrin	Corn starch	50
Starch	Rice	60
Starch	Corn	65

It is evident that the corn glycogen is hydrolyzed at a rate much lower than that of the starches, higher than that of the animal glycogens, but nearly identical with that of yeast glycogen.

PREPARATION

The corn is soaked for a day or two, extracted with water, and the extract boiled and filtered. Two volumes of glacial acetic acid are added,[5] and the precipitated starch either centrifuged or allowed to settle. The acetic acid concentration of the supernatant solution is increased to 75 per cent.,[6] whereupon the glycogen precipitates. The starch should be redissolved and reprecipitated several times to increase the yield of glycogen, but the separations eventually become less efficient, since both starch and glycogen apparently combine with the acid to form more soluble compounds. Purification of the glycogen can be accomplished by the usual methods.

On one occasion 3.9 gm of glycogen were obtained from 30 gm of Golden Bantam sweet corn. The quantity in one or two kinds of field corn investigated was negligible.

SUMMARY

A polysaccharide apparently identical with glycogen has been extracted from sweet corn.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR THE CONTINUOUS RECORDING OF GASTRIC pH IN SITU

A METHOD has been developed for the determination and the continuous recording of gastric pH *in situ*. To obtain accurate results it was found necessary to keep the silver-silver chloride glass electrode isolated from the gastric mucosa. This was accomplished by a glass or bakelite guard or by a small balloon attached above the electrode. The wire from this electrode was shielded and encased in a Levine tube. In order to mix the gastric contents and to obtain samples another Levine tube was bound to that containing the electrode lead in such a way that the tip of this second tube extended a few centimeters beyond the electrode. With the exception of the opening adjacent to the electrode all other openings of this second tube were covered with balloon rubber. Contact with the saline silver-silver chloride reference electrode was made either on the skin or by means of a thread placed in the aspirating Levine tube. The electrode leads were connected through a Beckman pH meter to a recording potentiometer.

In order to insure accurate recording, certain precautions had to be observed. The exact position of the glass electrode in the stomach was determined by fluoroscopic observation. The gastric contents were constantly mixed by a continuous pump which alternately withdrew and reinjected 25–50 cc of gastric contents at 30-second intervals. By these technical refinements the wide variations reported by Eyerly and Breuhaus[1] between the values obtained by the use of the gastric electrode and those determined on the aspirated speci-

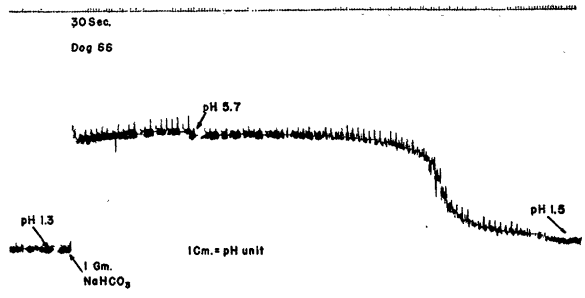

FIG. 1. Changes in gastric pH following administration of 1 gram of sodium bicarbonate in a dog of 17 kilograms, anesthetized with morphine and chloralose.

[2] G. E. Glock, *Biochem. Jour.*, 30: 1386, 1936.
[3] C. S. Hanes, *Biochem. Jour.*, 23: 99, 1929.
[4] The cysticercus glycogen was very kindly furnished by Dr. L. Frank Salisbury, of the Department of Chemistry, Yale University.
[5] *Cf.*, "Methods of Analysis of the Association of Official Agricultural Chemists," Washington, 1935, p. 357.
[6] *Cf.* Bell and Young, *Biochem. Jour.*, 28: 882, 1934.
[1] J. B. Eyerly and H. C. Breuhaus, *Am. Jour. Dig. Diseases*, 6: 187, May, 1939.

men were avoided, and the difference in the two types of pH determinations was maintained within 0.5 unit.

The accompanying Fig. 1 shows the accuracy of the method. The fasting contents of an anesthetized dog were diluted to 100 cc with distilled water and a control recording made. The introduction of 1 gram of sodium bicarbonate in 100 cc of distilled water followed by rinsing through the Levine tube with 50 cc of water caused a prompt increase in the pH value. The peak of this rise is conditioned by the pH of the alkaline solution, whereas the plateau level immediately following is the pH of the alkali and gastric content mixture. The duration of the plateau, shown by the gently sloping curve which is terminated by the sudden drop to a low level, is controlled by the amount of alkali added, the rate of acid secretion and the intermittent emptying of the stomach. The amount of emptying can be calculated if the gastric contents are measured after the pH has returned to the low level. By controlling the variables interesting data may be obtained on the efficacy of antacids and the rate of gastric secretion. Information pertaining to these experiments as well as further details concerning the method will be published elsewhere.

We are greatly indebted to Dr. N. R. Trenner for valuable suggestions as well as the construction of the glass electrodes and to Mr. L. Fernandez, who assisted during the earlier part of the experiments.

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CHROMOSOMES FROM LEAVES

A MODIFICATION of Warmke's[1] method for making root-tip smears has been found by the writer to be effective for studying chromosomes in the leaves of certain plants: place young leaves in Carnoy's solution (3 parts chloroform, 2 parts absolute alcohol and 1 part glacial acetic acid) for five or more minutes; transfer momentarily to a solution of equal parts of 95 per cent. alcohol and concentrated hydrochloric acid; put the leaves back into Carnoy's, and, after several minutes, smear in iron aceto-carmine.

By this method the chromosomes of a number of genera have been investigated: *Smilax* L. (Liliaceae), *Sedum* L. (Crassulaceae), *Cercis* L. (Leguminosae), *Punica* L. (Punicaceae), *Sanicula* L. (Umbelliferae), *Pyxidanthera* Michx., *Diapensia* L., *Shortia* Torr. and Gray, *Schizocodon* Sieb. and Zucc., and *Galax* L. (Diapensiaceae), *Chimaphila* Pursh (Ericaceae), and *Plantago* L. (Plantaginaceae). Metaphase drawings of two species are shown here for purposes of illustration: Fig. 1, *Sedum pusillum* Michx., from Stone Mountain

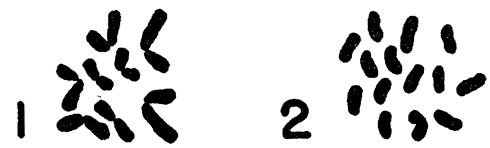

FIG. 1. *Sedum pusillum* Michx., $2n = 8$, *ca.* 3800 ×.
FIG. 2. *Cercis canadensis* L., $2n = 14$, *ca.* 4500 ×.

in Georgia, with 8 somatic chromosomes, the lowest number known for the extremely varied family; and Fig. 2, *Cercis canadensis* L., four trees on the grounds of the College of William and Mary, with 14 somatic chromosomes. Senn[2] reported a $2n$-number of 12, n-number of 6, for this species; his drawing of meiotic chromosomes suggests an interpretation of two bivalents in contact to be a single bivalent; his somatic number (not figured) was determined from an anther-wall division. The only other investigated species of *Cercis* has 14 and 7 chromosomes, respectively.[3]

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[1] H. E. Warmke, *Stain Technology*, 10: 101–103, 1935.

[2] H. A. Senn, *Bibliogr. Genetica*, 12: 175–336, 1938.

[3] R. Corti, *Nuovo Giorn. Bot. Ital.*, N. S., 37: 679–680, 1930.

BOOKS RECEIVED

DE BROGLIE, LOUIS. *Matter and Light; the New Physics.* Pp. 300. Norton. $3.50.

FLEMING, J. A., Editor. *Terrestrial Magnetism and Electricity.* Vol. VIII, *Physics of the Earth.* Pp. xii + 794. Illustrated. McGraw-Hill. $8.00.

FRASER, CHELSEA. *Heroes of the Air.* Pp. xl + 846. Illustrated. Crowell. $2.50.

FURNAS, C. C. *The Storehouse of Civilization.* Pp. xx + 562. Illustrated. Teachers College, Columbia University. $3.25.

GASSER, HERBERT S. and others. *Symposium on the Synapse.* (Reprinted from the *Journal of Neurophysiology.*) Pp. 361–474. 25 figures. Charles C Thomas.

GRAHAM, HARVEY. *The Story of Surgery.* Pp. xv + 425. 23 plates. Doubleday, Doran. $3.75.

HAUSMANN, ERICH. *Physics.* Second edition. Pp. vi + 756. 469 figures. Van Nostrand. $4.00.

HIBBEN, JAMES H. *The Raman Effect and its Chemical Applications.* Pp. 544. Reinhold. $11.00.

HUDDLESON, I. FOREST and others. *Brucellosis in Man and Animals.* Pp. xvii + 339. 40 figures. Commonwealth Fund, New York. $3.50.

MACDOUGALL, F. H. *Thermodynamics and Chemistry.* Third edition. Pp. ix + 491. Wiley. $5.00.

ROBBINS, WILLIAM J. and HAROLD W. RICKETT. *Botany; a Text-book for College and University Students.* Third edition. Pp. vii + 658. 440 figures. Van Nostrand. $3.75.

ROUSH, G. A. *Strategic Mineral Supplies.* Pp. xvii + 485. McGraw-Hill. $5.00.

SZEGÖ, GABOR. *Orthogonal Polynomials.* Vol. XXIII, American Mathematical Society Colloquium Publications. Pp. ix + 401. The Society, New York.

Treatment in General Practice; the Management of Some Major Medical Disorders. A symposium. Vol. I, pp. x + 259. Vol. II, pp. xii + 436. Little, Brown. $7.50.