

of the glycolytic mechanism as a whole, however, does not satisfactorily explain the fluoride effect, inasmuch as iodoacetate, which produces the opposite effect to fluoride on ovulation, also inhibits glycolysis³. Oxalate, which is without significant effect on ovulation, may also inhibit glycolysis under certain conditions, but is without effect on living yeast, presumably because of its failure to penetrate⁴.

We have been obliged to discontinue these experiments temporarily owing to the advent of the season of spontaneous ovulation in our frogs.

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K. M. WILBUR.
M. K. MCPHAIL.

Depts. of Physiology and Pharmacology,
Dalhousie University,
Halifax, N.S.
May 22.

¹ McPhail, M. K., and Wilbur, K. M., *J. Pharmacol. and Exp. Therap.*, **78**, 304 (1943).

² Chambers, R., Cold Spring Harbor Sympos., **8**, 144 (1940).

³ See chapter by Cohen, P. P., "Respiratory Enzymes" (Minneapolis, 1939).

⁴ Runnström, J., and Hemberg, T., *Naturwiss.*, **25**, 74 (1937).

Treatment of Blackwater Fever

HÆMOLYTIC substances were demonstrated in the peripheral blood of three patients. They appear a few minutes before an attack of hæmoglobinæmia and are rapidly removed from the serum by the red blood cells. The hæmolytic properties of the serum can be preserved if the red blood cells are rapidly removed by centrifuging¹.

The hæmolytic process is accentuated by quinine (1 in 300), pamaquine (1 in 1,000) and mepacrine (1 in 500) and antagonized by antivenine (1 in 300); antivenine also antagonizes the action of drugs.

The clinical use of antivenine has been attended with complete success. 200 ml. initially, followed by 10 ml. at intervals of four hours, completely cut short an attack of blackwater fever in thirty-six cases, in which the mortality ordinarily would have been 25-50 per cent. Furthermore, in three cases, the administration of mepacrine in full doses together with antivenine cured the blackwater fever together with the causative malignant malaria.

INDER SINGH.
INDERJIT SINGH.

Brigade Laboratory,
Allahabad.

¹ Singh, I., and Singh, I., *Ind. Med. Gaz.* (in the Press).

Structure of Cellulose

IN a recent communication¹, Peirce has put forward considerations on the structure of cellulose based on a pyranose ring in which the five carbon atoms are nearly co-planar and there is a right angle between the bonds of the ring oxygen. We should like to say that to invoke such a configuration is unnecessary and unjustified by the evidence. To be sure, a flat or flattish ring was long current in the X-ray literature on cellulose², but it was never easy to see the real need for it, and latterly Meyer and Misch³ have stated that the X-ray intensities support the 'armchair' ring equally well and have gone over to that form.

Contrary to what Peirce suggests, the *trans*-, or armchair, form of the Sachse strainless ring does give the observed fibre period of cellulose very closely (10.3, Å. as compared with 10.3₀ Å.), if one takes 1.54 Å. for the length of the C-C bond and 1.42 Å. for the C-O bond, with the tetrahedral angle for the carbon inter-bond angle and 110° for the oxygen inter-bond angle⁴. Our own immediate interest in the matter arises from an X-ray study of the structure of alginic acid and its relation to that of cellulose and its derivatives. To reproduce quite accurately the characteristic dimensional features of these two different chain configurations (and probably of pectin also), we have not yet found any necessity either for going outside such concepts of sugar chemistry as have been built up particularly by Haworth, Hirst and their collaborators, or for departing seriously from accepted bond-lengths and angles derived from simpler compounds; and full-scale models, also, that we have constructed of regenerated cellulose are satisfactory in these respects.

In support of his proposals, Peirce cites the earlier work of Cox and his collaborators: their later work, however, goes far to establish the strainless armchair ring. Cox and Jeffrey on glucosamine hydrobromide⁵, for example, go almost all the way; but perhaps the most convincing evidence is found in an X-ray investigation by Cox and Brown⁶ of the crystal structure of β-methyl xyloside. Here a three-dimensional Patterson synthesis reveals only three vectors of length approximately 1.5 Å., and there is only one form of the xyloside molecule that is compatible with such a result, namely, the strainless armchair. The same shape of molecule provides also what appears to be a unique explanation of the observed intensities of reflexion from the (304) and (402) planes.

W. T. ASTBURY.
M. M. DAVIES.

Textile Physics Laboratory,
University of Leeds.
June 7.

¹ Peirce, F. T., *Nature*, **153**, 536 (1944).

² For example, Meyer and Mark, "Der Aufbau der hochpolymeren organischen Naturstoffe" (1930).

³ Meyer, K. H., and Misch, L., *Helv. Chem. Acta*, **20**, 232 (1937).

⁴ Pauling, "The Nature of the Chemical Bond" (1939).

⁵ Cox, E. G., and Jeffrey, G. A., *Nature*, **143**, 894 (1939).

⁶ Brown, C. J., Ph.D. thesis, University of Birmingham (1939).

It is not stated whether the new structure for cellulose proposed by Dr. F. T. Peirce¹ is in better agreement with the X-ray intensities than those previously put forward; but as some justification for it is sought in the earlier work of the Birmingham school, the following observations may be relevant. These observations are of a somewhat general character as the records of my unpublished work are not at present at hand.

At the time the paper² quoted by Peirce was written, X-ray technique was insufficiently advanced for detailed analyses of individual saccharides to be made, and the views advanced as to the conformation of the pyranose ring were based on a general survey of a large number of compounds. In the light of more recent work, it seems probable that as the molecular arrangement in polyhydroxy compounds is determined largely by the distribution of OH groups, whereas that in methylated sugars depends chiefly on general molecular shape, deductions from a survey covering both types are not so con-