oil. The relative difficulty with which the interfering factor in the bean oil is extracted from the beans and its increased effectiveness as the starch-oil preparations age suggests that the firmness of the association of the oil with the starch may account for its action.

Various means of overcoming this interference were tried. The method which appears to be most practical from a nutritional point of view involves a preliminary treatment with yeast. After incubating the undissolved starch-oil preparation with yeast and heating the preparation at 100° for 30 minutes the starch treated with bean oil is then digested by pancreatic amylase at about the same rate as untreated starch. This is true for both new and old starch-oil preparations. The yeast employed does not significantly digest the starch nor does the heated yeast hydrolyze maltose. Likewise, a similar treatment of whole navy beans approximately doubles the rate of hydrolysis of the bean starch by pancreatic amylase. In this respect the treated beans compare more favorably with other common starchy foods. Heating the beans in dilute acid followed by neutralization further compensates for the delayed digestion. It is believed that a similar fat-soluble factor occurs in some other foods and preliminary studies indicate that other enzymes are influenced by this substance. It appears to be especially prominent in soybeans.

In view of some of the present nutritional problems and the increased use of soybeans the significance of this factor is being studied in detail.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE PROTECTIVE ACTION OF GLUCOSE IN BOVINE PLASMA AGAINST HEAT COAGULATION[1]

BEILINSSON[2] found that sucrose and glycerol inhibited the heat coagulation of egg albumin. Newton and Brown[3] showed that sucrose and glucose prevented coagulation of plant sap proteins by freezing. The protective action of other sugars against heat coagulation of egg albumin and the nature of the protection have been investigated.[4]

Van Der Scheer and co-workers[5] have studied the changes occurring in horse serum when it is heated to 60° to 65° C. for short intervals. They were able to show the presence of a new component by electrophoretic analysis. The new component was labeled "C." Evidence was presented to show that this component was a colloidal aggregation product resulting from the denaturation of constituents in the serum.

The present study demonstrates the protective action of glucose against the formation of the "C" component in heated bovine plasma by using the moving boundary technique of electrophoretic analysis.[6]

Normal bovine plasma obtained from citrated blood was utilized. One aliquot of the plasma was saturated at room temperature with glucose, stoppered and then heated at 65° C. for one hour in a constant temperature water-bath. At the end of this period of heating, the sample was perfectly clear and no coagulation was evident. The glucose was removed by dialysis against physiological salt solution. A second aliquot was heated in its native form under the same conditions. However, in this case a coagulum formed during the heating period which was later removed by centrifugation. The remaining aliquot was not heated and served as a control. The three samples were then adjusted to a protein concentration of 2 per cent. and dialyzed for 3 days against large volumes of a diethyl barbituric acid—sodium diethyl barbiturate buffer of pH 8.6 and 0.1 ionic strength. Electrophoretic analyses of the samples were then carried out in a manner previously described at 0° C. for 10,000 seconds at a potential gradient of 6 volts.[7]

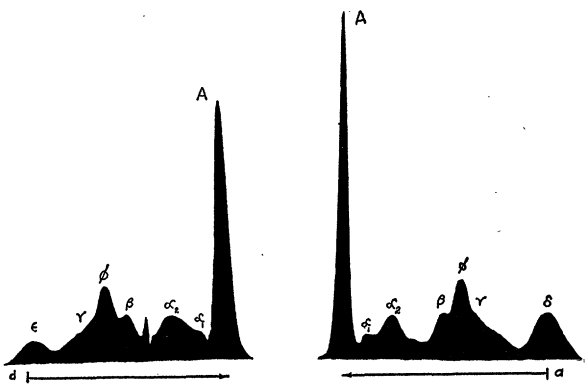

FIG. 1

[1] From the Bacteriology Section of the Michigan Agricultural Experimental Station and the Kedzie Chemical Laboratory, East Lansing, Michigan. Journal article No. 652 from Michigan Agricultural Experiment Station.

[2] A. Beilinsson, *Biochem. Zeits.*, 213: 399, 1929.

[3] R. Newton and W. R. Brown, *Can. Jour. Research*, 5: 87, 1931.

[4] C. D. Ball, C. R. Hardt, R. J. Westfall and W. J. Duddles. In process of publication.

[5] J. Van Der Scheer, R. W. Wyckoff and F. L. Clarke, *Jour. of Immunol.*, 40: 39, 1941.

[6] A. Tiselius, *Trans. Faraday Soc.*, 33: 524, 1937.

[7] C. L. San Clemente and I. F. Huddleson, *Mich. Agr. Exp. Sta. Bul.* 182, p. 3, 1943.

Fig. 1 shows the electrophoretic pattern obtained from the normal unheated plasma. Fig. 2 was obtained from the sample that was heated for one hour at 65° C. in the absence of glucose. A decrease in the areas of all the visible constituents as compared with the normal plasma in Fig. 1 is evident. The

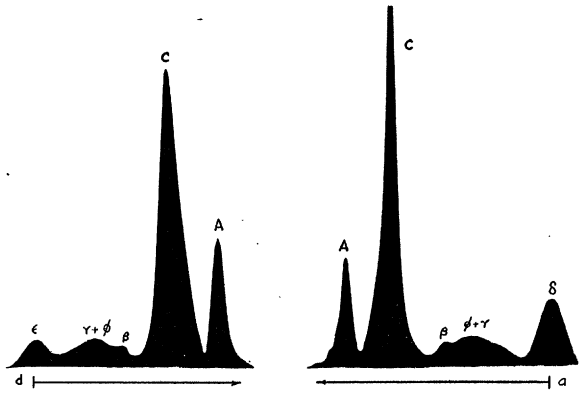

FIG. 2

"C" component appears in the region of the alpha globulins, and its concentration is such that the peak on the ascending side extends beyond the plate. Fig. 3 shows the effect of heating the plasma in the presence of saturated glucose. The pattern does not show the "C" component after this condition of heating. However, the fibrinogen, beta and gamma globulin areas have decreased while a small new peak (x) is observed in the descending pattern next to the alpha-2 globulin.

The sharp peaks (y) near the beta globulin patterns may have originated from normal constituents in the plasma whose properties have been changed by the heating process or they may represent lipide disturbances.

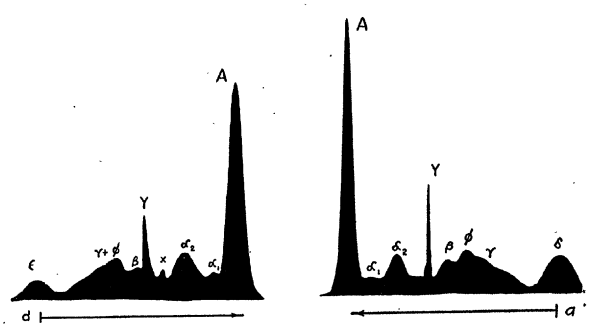

FIG. 3

In Table 1 are set forth the calculated mobilities of the components of the different samples. There is close agreement between values for all plasma samples. No significant differences in mobilities have been observed between normal plasma and plasma heated at 65° C. in the presence of saturated glucose.

TABLE 1

Sample description	Mobilities u × 10⁻⁵									
	A	α^1	α^2	C	x	y	β	φ	γ	φ+γ
Normal plasma	6.78	6.04	5.35				3.53	2.75	2.48	
Plasma and glucose heated at 65° C	6.55	5.82	4.81		4.16	3.60	3.31	2.62	2.11	
Plasma heated at 65° C	6.86			5.08			3.39			2.34

It is believed that the protective action of glucose against the heat coagulation of plasma proteins may be of considerable significance in studies pertaining to proteins. Further investigations of this nature are in progress and will be reported on at a later date.

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BOOKS RECEIVED

BLOOR, W. R. *Biochemistry of the Fatty Acids and Their Compounds, the Lipids.* Pp. xi + 387. Reinhold Publishing Corporation. $6.00.

Carnegie Institution of Washington Publication 555. Biological Results of the Last Cruise of the Carnegie. Illustrated. Pp. v + 92. $1.00, paper cover; $1.50, cloth binding.

CLANCEY, VERNON J. *Chemistry and the Aeroplane.* Illustrated. Pp. vi + 176. The Ronald Press Company. $2.25.

CONKLIN, EDWIN GRANT. *Man: Real and Ideal.* Pp. xvii + 247. Charles Scribner's Sons. $2.50.

GRAHAM, HERBERT W. *Studies in the Morphology, Taxonomy and Ecology of the Peridiniales.* Publication No. 642. Illustrated. Pp. vii + 129. Carnegie Institution of Washington. $1.50, paper cover; $2.00, cloth binding.

HECTOR, L. GRANT, HERBERT S. LEIN and CLIFFORD E. SCOUTEN. *Electronic Physics.* Pp. viii + 355. Illustrated. Blakiston Company. $3.75.

HUMPHREYS, W. J. *Fogs, Clouds and Aviation.* Illustrated. Pp. xii + 200. Williams and Wilkins Co. $3.00.

JACOBS, WOODROW C. and KATHERINE B. CLARKE. *Meteorological Results of Cruise VII of the Carnegie, 1928–1929.* Publication No. 544. Illustrated. Pp. iv + 168. Carnegie Institution of Washington. $1.50, paper cover; $2.00, cloth binding.

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THOMSON, ANDREW. *Upper-Wind Observations and Results Obtained on Cruise VII of the Carnegie.* Publication No. 547. Illustrated. Pp. vii + 93. $0.75, paper cover; $1.00, cloth binding.

WEEKS, ARTHUR W. and H. GRAY FUNKHOUSER. *Plane Trigonometry.* Illustrated. Pp. viii + 193. D. Van Nostrand Co. $1.75.