The tubes were stored at 3-5°C., and were examined for lysis at intervals of 7 to 9 days, at which time the tubes were shaken to assure thorough mixing. Lysis was measured roughly by the intensity and amount of coloration of the supernatant fluid.

The findings of 2 independent trials are summarized in Table I. These tests, although not giving identical results, agreed so closely that they are grouped together. Only those solutions with which favorable *results* were obtained in preserving the cells are given in the table. The other solutions not included gave in general less successful preservation of the pigeon and dove cells, and to some extent of the chicken cells. The addition to these various solutions of ¼ or ½% gelatine was of no aid in preventing lysis.

It is readily apparent in the table that chicken cells are much more easily preserved in dextrose solutions than those of either pigeon or dove, both as to length of time and in the range of dilutions possible. Furthermore, there is some indication that, in many of the dilutions given, dove cells were preserved longer than pigeon cells. The exception, in the solution containing 34 cc. of distilled water plus 5.4% dextrose, was observed in each of the separate trials. All these cells, however, were fairly well preserved in any one of the following combinations: (a) 100 cc. of Locke's solution plus 32 or 34 cc. of distilled water, (b) to which was added equal parts of either 4.2% or 5.4% of dextrose solution.

The agglutinability of the suspended cells with specific antisera was tried at the 6th week in the first test, and at the 8th week in the second. In all cases, the stored cells agglutinated at the same end dilution of the antisera as did fresh cells of each species. Whether or not each of the many antigens present in these cells[2, 3] will be fully expressed in like manner after standing is yet to be determined.

9183 P

Hyperglycemia Due to Impaired Hepatic Glycogenesis.

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It has been recognized that there is a difference in many respects between the severe type of diabetes mellitus occurring in the child

2 Irwin, M. R., and Cole, L. J., *J. Exp. Zool.*, 1936, **73**, 85; 1936, **73**, 309.

3 Todd, Chas., *Proc. Royal Soc. (B)*, 1930, **106**, 20; 1931, **107**, 197.

and the mild type of glycosuria found in obese, middle aged people. An explanation defining this difference on a metabolic basis has not been presented. The following experiments indicate that in obese, middle-aged patients with glycosuria there is no deficiency in the oxidation of glucose. There is, however, a disturbance in the mechanism which removes glucose from the blood stream and deposits it as glycogen.

Normal controls were fed a diet containing 200 gm. of carbohydrate, 80 gm. of protein and approximately maintenance calories for 3 days. They then entered the respiration chamber.[1] The next morning they were instructed to arise, void, and imbibe 100 gm. of glucose in solution. Immediately after the glucose had been ingested a continuous 4-hour period of indirect calorimetry by the open circuit method[1] was obtained. The subjects disposed of 40 to 50 gm. of the ingested glucose by oxidation during this 4-hour period. The urine contained no glucose. Since the blood sugar of normal individuals under these circumstances has returned to the fasting level in 3 hours or less, it is evident that 50 to 60 gm. of the ingested glucose was disposed of by the deposition of glycogen in the liver (and possibly to some extent in the muscles).

Using the same technic, 5 obese patients with glycosuria, who came to the clinic to be treated for diabetes mellitus were found to oxidize normal amounts of glucose. The urine contained from 4 to 17.5 gm. of glucose in the 4-hour period. The glucose tolerance curves of these patients performed a few days before the studies in the respiration chamber were definitely diabetic in type. A typical example follows: Fasting, 161 mg./100 cc.; 1 hour, 300 mg.; 2 hours, 202 mg.; 3 hours, 178 mg.; 4 hours, 158 mg. All showed significant glycosuria during the test.

Eight patients of this type, all having glycosuria and diabetic types of glucose tolerance curves were placed upon submaintenance diets. No attempt was made to control the glycosuria other than the somewhat restricted carbohydrate necessitated by the limitation of calories. Glucose tolerance curves during the period of weight reduction exhibited a gradual return to the normal which was attained in all cases when a normal weight was reached. At this weight all are aglycosuric on normal diets and show no disturbance in carbohydrate metabolism by any test.

Since these patients when obese were able to dispose of a normal amount of glucose by oxidation but nevertheless became hypergly-

[1] Newburgh, L. H., Johnston, M. W., Wiley, F. H., Sheldon, J. M., and Murrill, W. A., *J. Nutrition*, 1937, **13**, 193.

cemic when given 100 gm. of glucose, it is clear that they were unable to lay down glucose as glycogen at the normal rate. This delay accounts for the excess of glucose in the blood and the consequent glycosuria. Surgical removal of 50% of the dog's liver causes a similar delay in clearing the blood of extra glucose.[2]

Therefore, it appears to be true that hyperglycemia and diabetic glucose tolerance curves simulating milder forms of true diabetes mellitus may be produced by disturbances within the liver which are associated with obesity. Since the term diabetes mellitus implies a diminished capacity for oxidizing glucose, such patients as those described above do not belong under this heading even though they conform to the diagnostic criteria for diabetes as ordinarily interpreted. Their abnormal utilization of carbohydrate was corrected by simple reduction of weight to normal.

9184

Chemospecific Flocculation of Sterols by Anti-Sterol-Sera.

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Some years ago, one of us reported experiments concerning the antigenic qualities of cholesterol and derivatives of cholesterol, using the method of complement-fixation.[1, 2] Flocculation tests, which were not published, confirmed the results with complement-fixation. In the meantime, Hahn and Hazado[3] reported experiments on a flocculation of cholesterol by cholesterol antisera. Since the demonstration of a specific and sensitive flocculation of cholesterol by the serum of animals injected with cholesterol (and a protein *"schlepper"*) furnishes a new and valuable argument for the haptenic quality of sterols, our own data are now given.

The great sensitivity of sterol sols toward salts may be obviated by adding 2 volumes of water to the serum-dilutions. The specific

2 Coller, F. A., and Troost, F. L., *Ann. Surg.*, 1929, **90**, 781-793.

* c/o Lederle Laboratories, Inc., Pearl River, N. Y.

1 Weil, A. J., and Besser, F., *Klin. Wschr.*, 1931, page 1941.

2 Weil, A. J., and Besser, F., *Z. Immunforschg.*, 1932, **76**, 76.

3 Hahn, F., and Hazado, W., *ibid.*, 1936, **88**, 16.