The first point of these experiments is the extension of the effects of hypophysectomy upon experimental diabetes to another species.

The second point is the prolongation of life of depancreatized cats, a species in which this operation alone is so uniformly and rapidly fatal. These control animals developed severe acidosis and ketosis about 48-72 hours after removal of the pancreas. In both of the doubly operated animals, so far as our observations go at present, neither acidosis nor ketosis was a prominent feature. The other characteristics of diabetes—glycosuria, polyuria and marked loss of weight, were present in varying degree.

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A Note on the Relationship of Pellagra to Pernicious Anemia.

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Pellagra and pernicious anemia are now regarded as special types of deficiency diseases. They have in common such clinical manifestations as achylia gastrica, glossitis, peripheral neuritis, and central nervous system changes. Goldberger and his associates[1, 2] believe that pellagra is caused solely by a diminished intake of some specific food substance ("vitamin G"). Rolph,[3] Turner,[4] and others have described cases developing secondary to lesions of the gastrointestinal tract. While it has likewise been suggested that in certain instances the lack of some substance in the diet may cause pernicious anemia, it usually follows the lack of the essential secretion ("intrinsic factor") in the gastric juice which changes food into an antianemic substance.[5] A short time ago Spies and Payne[6] produced remissions in 2 patients with pernicious anemia, by giving an incubated mixture of beef muscle and achylic gastric juice from acute

[1] Goldberger, J., and Wheeler, G., Bull. 120, Hygienic Laboratory, Washington, 1930, 120.

[2] Goldberger, J., Wheeler, G., Lillie, R. D., and Rogers, L. M., *U. S. Public Health Report*, 1926, **41**, 297.

[3] Rolph, F. W., *Canad. M. A. J.*, 1916, **6**, 323.

[4] Turner, R. H., *Am. J. Trop. Med.*, 1929, **9**, 192.

[5] Castle, W. B., Health, C. W., Strauss, M. B., *Am. J. Med. Sci.*, 1931, **182**, 741.

[6] Spies, T. D., and Payne, W., *J. Clinical Invest.*, 1933, **12**, 229.

pellagrins. This observation indicated that the "intrinsic factor" was present in gastric secretions from pellagrins in an amount adequate to form the antianemic substance. They suggested in this study that the usual pellagrin apparently develops his disease as a result of inadequate food ingestion, whereas the usual pernicious anemia patient developed the anemia from the failure of his gastric juice to make an antianemic substance from food.

Since pernicious anemia and pellagra are both related to diet and its subsequent assimilation by the body, there have been recent attempts to recognize more specifically those substances in food which are important in the pathogenesis of the 2 diseases. Strauss and Castle[7, 8] have found that the substance in food ("extrinsic factor") concerned with the development of pernicious anemia is associated with so-called "vitamin G" which other workers have considered as the "antipellagric vitamin". Wills[9] has observed that this vitamin is not identical with the substance curing tropical macrocytic anemia, and was unable to obtain a satisfactory hemopoietic response from the vitamin B complex (including vitamin G).

In view of the close relationship between pellagra and pernicious anemia, and the known fact that under certain conditions yeast has been curative for both, we have studied the relative efficacy of autoclaved brewer's yeast* in the 2 diseases during the past 3 years.

Five cases of classical Addisonian pernicious anemia and 30 cases of characteristic pellagra were selected. Patients with pernicious anemia were given ordinary hospital diets without liver, kidney or pancreas. After a preliminary period of observation, each of 3 cases was given daily an incubated mixture of 150 cc. of normal human gastric juice and 50 gm. of autoclaved brewer's yeast. (This yeast was autoclaved by the Harris Laboratories and shipped in sealed 5 lb. tins). The 2 other patients with pernicious anemia were given the same amount of yeast after it had been incubated with pepsin and trypsin instead of human gastric juice. The course of the anemia in the 5 cases was followed by daily determinations of red blood cells, hemoglobin, and reticulocytes but no significant change occurred during the 10 days which they received the incubated materials. Each patient with pernicious anemia responded promptly to the administration of intramuscular liver extract which was given immediately following the experimental period.

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7 Strauss, M. B., and Castle, W. B., *New Eng. J. Med.*, 1932, **207**, 55.

8 Strauss, M. B., and Castle, W. B., *Lancet*, 1932, **2**, 111.

9 Wills, L., *Lancet*, 1933, **1**, 1286.

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The pellagrins were given a diet low in pellagra-preventive substances throughout the course of the experiment and autoclaved yeast from the same tin which contained the dry powder given to the pernicious anemia patients was administered to each pellagrin in daily quantities of 50 to 100 gm. All signs and symptoms of pellagra promptly disappeared under controlled conditions, indicating that the yeast contained a chemical substance which could be utilized by the pellagrous patient. On the other hand, the failure of a hemopoietic response to the incubated mixture of yeast and gastric juice in those patients with pernicious anemia suggests that either an antianemic substance was not formed in adequate amounts to remit the disease under the condition of this experiment, or, if formed, the antianemic factor was not utilized by the patient. The digestion of the same preparation of yeast by means of pepsin and trypsin likewise produced no substance which remitted the patient.

Strauss and Castle[7, 8] produced a hemopoietic response in pernicious anemia patients by giving them an incubated mixture of normal gastric juice and *Vegex*, a preparation of autolyzed yeast and "flavoring materials". On theoretical grounds it seems likely that the process of autolysis of yeast which *Vegex* undergoes might cause many physical and chemical changes in the yeast cells which might not be produced by autoclaving under steam pressure for long periods of time as was done with the brand of yeast we used. (Lassen and Lassen[10] have just published some observations showing that yeast mixed with human gastric juice does not produce a hemopoietic response in pernicious anemia patients.) It is conceivable that the autoclaving process may firmly bind potent substances so that they cannot be utilized and that autolysis may break down the yeast cells and liberate active substances. The quantitative relationship between the amounts of gastric juice and any available precursor of the antianemic substance ("extrinsic factor") may have been insufficient to produce a satisfactory hemopoietic response in the anemia patients during 10 days and for that reason, our observations should not be interpreted as demonstrating that the autoclaved brewer's yeast does not contain a substance which under certain circumstances might be activated and changed into an antianemic factor. The pellagrins, on the other hand, did utilize the same preparation of yeast for the cure of this disease. The present study suggests that the chemical substance in yeast, utilized by the pellagrin to remit his disease, is not the same as the precursor of the antianemic factor found in food ("extrinsic factor").

[10] Lassen, H. C. A., and Lassen, H. K., *Am. J. Med. Sci.*, 1934, **188**, 461.