ulation was more frequently associated with the third group of experiments, in which granulosa luteinization (pseudolutein bodies) or atresin effects predominated. We may then conclude that the thyroid-stimulating hormone, while in many cases associated with theca luteinization or atresin effects, is distinct from the hormone producing these ovarian effects. This conclusion is in agreement with views previously expressed by us.[3]

Summary. 1. When the anterior pituitary glands of cattle are kept *in vitro* in cane sugar solutions or in glycerin, luteinization processes in theca and granulosa predominate; but if the glands are left in the solution for only one hour atresin effects may still be noticeable. Thyroid hypertrophy is found in the majority of cases. 2. When, instead of cane sugar or glycerin, solutions of urea are used, formation of mature follicles is induced by the glands thus treated in more than one-third of the cases. In another third the action of the urea was so strong that all the ovarian hormones were eliminated. In the majority of these animals also the thyroid hormone had been lost, but in some cases the formation of mature follicles was associated with thyroid hypertrophy. In somewhat less than one-third of the cases formation of pseudolutein bodies, with or without other luteinization processes, and in a few cases atresin effects were observable. 3. While thus glycerin and cane sugar solutions make possible the production of luteinizing effects by the implanted glands, after application of urea solutions only maturation processes are produced, or luteinization effects mainly of the granulosa, or in still other cases all the hormones are eliminated.

9189 P

Relationship Between Blood Amylase and Urinary Amylase in Man.

S. H. GRAY AND MICHAEL SOMOGYI.

From the Laboratory, Jewish Hospital, St. Louis.

Somogyi[1] has shown that the amylase content in the blood is rather constant for the individual, while the variations from individual to individual are considerable. The study of the amylase content of the urine, however, reveals great irregularity in the same individual at various periods of the day, without any apparent regu-

[3] Loeb, Leo, Saxton, John, and Hayward, S. J., *Endocrin.*, 1936, **20**, 511.

[1] Somogyi, Michael, PROC. SOC. EXP. BIOL. AND MED., 1934, **32**, 538.

larity in the variations. The analytical methods used were those described by Somogyi.[1, 2, 3] We found it very important to take into consideration the optimum pH (6.8-7.4) and the optimum salt concentration (0.25-0.4% NaCl).

In healthy human beings the concentration of the enzyme in the urine is greater than in the blood, the ratio of urine amylase to blood amylase being usually between 2:1 and 6:1. These fluctuations in ratio occur in the same person, often in the course of a single day. Great as these variations are, we find that on the whole there is a parallelism between the blood and urinary amylase concentrations; *i. e.,* high blood amylase usually goes with a high urinary amylase, and low blood amylase with a low urinary amylase.

In pancreatic injury, as acute pancreatitis, obstruction of pancreatic ducts or trauma of the gland, there is a tremendous increase in both amylases, but without a shift in the relative concentrations. Since the urinary amylase remains high for a period of about 24 hours longer than the blood amylase, it may be preferable to determine the urinary amylase for the diagnosis of acute pancreatitis.

In conditions where the blood amylase is low, as in severe toxemias of pregnancy, pneumonia, liver abscess, many cases of cholecystitis, obstructive jaundice and diabetes,[1] the urinary amylase is proportionately low. Both occasionally may be zero. Thus, although in these conditions there are extremes of amylase concentration, the ratios between the urine and blood remain the same as in healthy human beings.

On the other hand, there are conditions in which the ratio is markedly reduced to such a degree that the blood amylase concentration exceeds the urinary amylase concentration, giving a ratio of less than one. The blood amylase in such conditions may be subnormal, normal, or definitely above normal. If moderate elevations in blood amylase occur, it is necessary to determine urinary amylase in order to differentiate between kidney retention and pancreatic disturbance as the causative factor.

Reversal of the urinary amylase/blood amylase ratio was observed mainly in kidney disturbances. Our series, as yet small, includes cases of acute and chronic glomerulonephritis, amyloid nephrosis and lipoid nephrosis.

We have attempted to study the amylase excretion in cases of scarlet fever, a disease where acute nephritis is most frequently

2 Somogyi, Michael, PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 1126.

3 Somogyi, Michael. Both methods in detail will be published in the near future.

found as a complication. We wished to obtain the blood-urinary amylase ratios before nephritis set in, so that we could study the progressive change in the ratios from the incipiency of the kidney lesion. During the period of this study none of these cases developed acute nephritis. Yet, in 26 of the 35 scarlet fever patients there was a reversal of the ratio, suggesting that scarlet fever is usually accompanied by kidney damage of a degree insufficient to be observed clinically. At the same time, 18 cases of diphtheria and measles were studied; of these only 4 showed a ratio slightly below one.

Work is in progress to evaluate the amylase clearance as a possible kidney function test.

9190 P

Effect of Liver Extract on Thyroid Glands of Mice and Guinea Pigs.

EDWARD L. BURNS AND V. SUNTZEFF. (Introduced by Leo Loeb.)
From the Department of Pathology, Washington University School of Medicine St. Louis, Mo.

During experiments to test the effect of prolonged administration of liver extract on the blood-forming organs, attention was drawn to the thyroid gland by the hyperactivity and excitability of the animals so treated.

The thyroid glands of 20 mice, injected daily with from 0.1 to 0.5 cc. of concentrated liver extract* for from 14 to 480 days, showed changes after 6 or 7 weeks of injection which progressed slowly but steadily as long as the injections were continued. These alterations consisted of: (1) Localized degeneration of several epithelial cells in some of the acini. (2) A general lowering of the height of the alveolar epithelium, associated with an increase in the amount of colloid contained in the acini. (3) Rupture of acini due either to pressure of an increased content of colloid inside the acinus or to isolated degeneration of the alveolar cells. (4) Accumulation of colloid material in the inter-acinar spaces, causing additional injury as well as compression, distortion, and separation of the acini. (5) A gradual increase in the amount of fibrous tissue in the stroma of the thyroid gland.

* Solution Liver Extract, Concentrated, very generously supplied by Eli Lilly and Co.