

dorsal and the ventral lips. It is, however, also possible that the tail-mesoderm forms a continuous girdle around the equator of the egg as in the urodeles but that the portions in the dorsal and ventral lips are so attenuated as to be unable to assert their normal developmental traits. In either case the conclusion must remain that tail-potencies are largely concentrated in two bilaterally located regions of the mesoderm.

Conclusions. 1. In the early gastrula of the anuran *Hyla regilla* the inductor of the neural plate is localized approximately in the dorsal lip region of the mesodermal band, that is, it extends about 45° on either side of the dorsal mid-line. 2. The tail-forming potencies are localized in the lateral and ventro-lateral regions of the mesoderm, with the higher percentage of tails developing from the ventro-lateral regions after implantation. The dorsal and the ventral lip mesoderm do not form tails after implantation. 3. The present results show that the anuran *Hyla* has distinct differences in the localization of certain developmental capacities as compared to the eggs of urodeles. Both the neural inductor and the tail mesoderm have a more limited meridional extent in *Hyla*.

10160

Effect of Fat on Rate of Availability of Orally Ingested Carbohydrate.

HERBERT POLLACK AND HENRY DOLGER.

From the Diabetic Clinic and from the Laboratories of the Mount Sinai Hospital, New York City.

In a recent publication¹ it was shown that the ingestion of rapidly available carbohydrates by diabetic patients using protamine zinc insulin, resulted in rapid rises and precipitous drops in blood sugar concentration. Such marked fluctuations in blood sugar concentration are no doubt responsible for many of the difficulties encountered in the clinical management of diabetes with protamine zinc insulin. A solution of this problem presents itself in the well-known property of fats in delaying gastro-intestinal activity. To test this hypothesis, 25 patients were given a standard amount of carbohydrate with and without fat. The banana was chosen because

¹ Pollack, H., and Dolger, H., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 577.

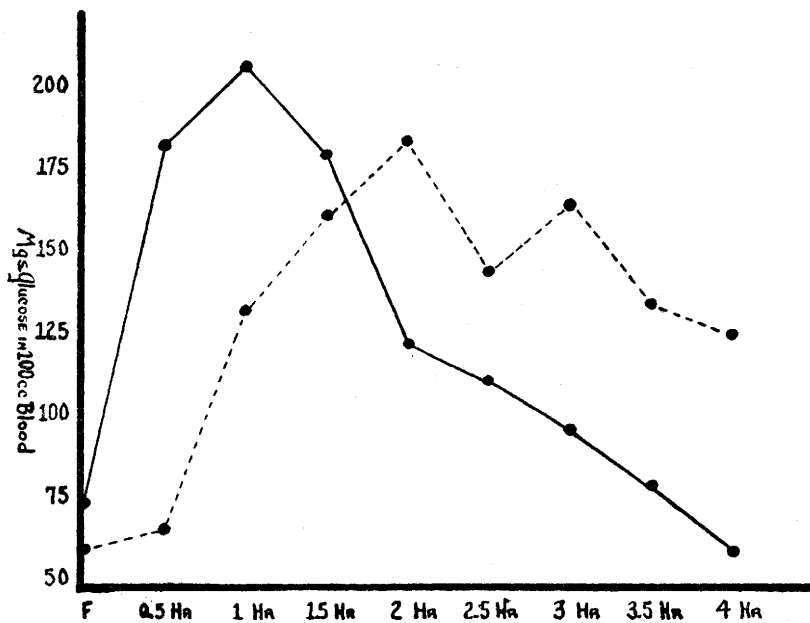


FIG. 1.
 Curve after banana and cream
 Curve after straight banana

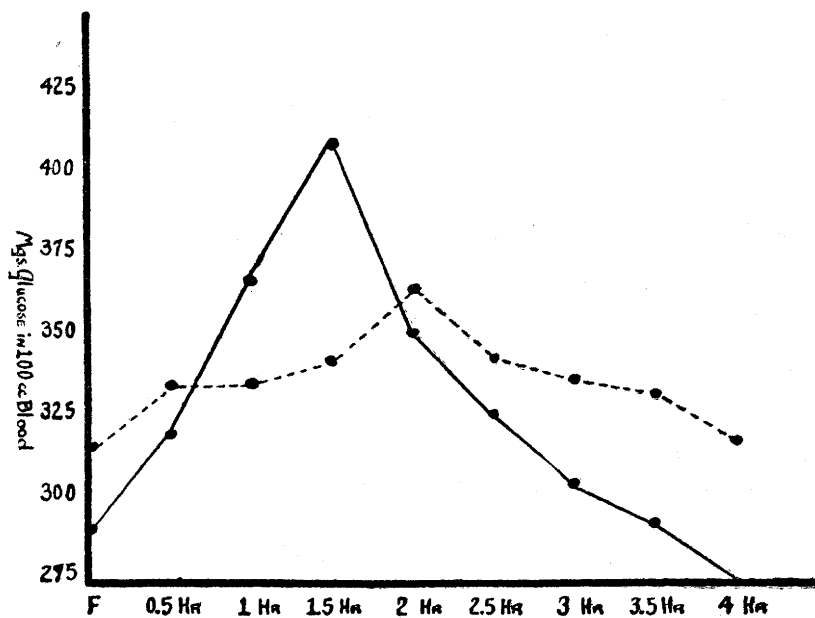


FIG. 2.
 Curve after banana and cream
 Curve after straight banana

of its universal availability, standard composition, palatability, and ability to be combined with cream.

The patients chosen for this experiment were severe diabetics maintained with protamine zinc insulin exclusively. The tests were carried out in the post-absorptive state, and 24 hours after the last injection of protamine zinc insulin. Blood sugars were determined by the Somogyi modification of the Schaffer-Hartmann method at ½ hourly intervals for 4 hours. Each patient received 220 g of banana alone for the preliminary studies, and after 10 days the same amount of banana with 4 ounces of 30% cream.

Within certain variations all patients responded in the same way. Three representative curves were chosen for illustration to show the results and the variations. There are 2 major advantages of the fat-carbohydrate mixture over the carbohydrate alone. The first is the delay in the time of maximum absorption for from 1 to 2 hours. The second is the elimination of the precipitous drop in blood sugar concentration seen with carbohydrate alone.

The advantages of these fat-carbohydrate mixtures when protamine zinc insulin is being used are quite obvious. The activity of the protamine zinc insulin is not manifested for several hours after its injection, hence the importance of delaying the post-

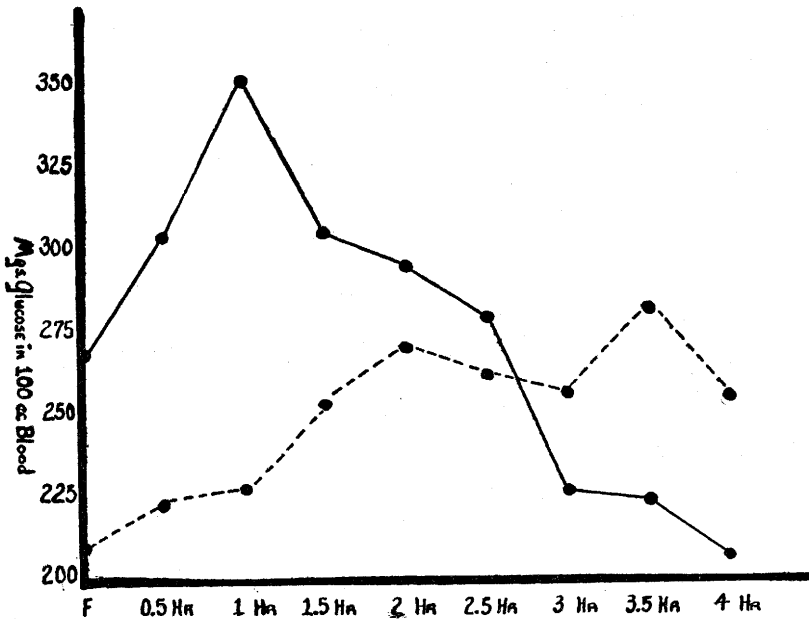


FIG. 3.
 Curve after banana and cream
 Curve after straight banana

prandial rise in blood sugar. This delay may allow the absorptive period to come within the range of insulin activity of the current injection.

The sustained absorption seen with the fat mixtures tends to prevent the disturbing post-hyperglycemic hypoglycemias previously described.

10161

Protein as a Source of Carbohydrate for Patients Using Protamine Zinc Insulin.

HERBERT POLLACK AND HENRY DOLGER.

From the Diabetic Clinic and from the Laboratories of the Mount Sinai Hospital, New York City.

The introduction of protamine zinc insulin for the management of diabetes gave rise to several difficulties. Some of these, with suggested solutions, have been discussed in previous papers.^{1, 2, 3} In addition, the prolonged action of protamine zinc insulin during the whole 24-hour period led to severe nocturnal hypoglycemic episodes. The recommendation by Conn and Newburgh⁴ of high protein diets for the treatment of spontaneous hypoglycemia can be applied in principle to this problem. It is well known that about 50% of protein is available to the body as carbohydrate. It is also known that the gastric-emptying time with a meat meal may be prolonged to 3 or more hours. The time of small intestinal digestion, absorption, transportation to the liver, deamination, and synthesis of glucose further delays this availability.

To test this hypothesis, 40 diabetic patients were given 400 g of lean chopped beef, lightly broiled. This test meal was given 24 hours after the last dose of insulin (protamine zinc insulin) on a fasting stomach. Blood sugars were taken at one-half hourly intervals for a period of 4 hours, as previously described. Control experiments consisted in blood sugar determinations on the same patients under similar conditions, but without any food.

The results were uniform in all patients. There is a slow but definite rise in blood sugar concentration throughout the whole experi-

¹ Pollack, H., and Lande, H., *N. Y. State J. Med.*, 1938, **38**, 1.

² Pollack, H., *J. Mt. Sinai Hosp.*, **4**, 437.

³ Pollack, H., and Dolger, H., *PROC. SOC. EXP. BIOL. AND MED.*, 1938, **38**, 577.

⁴ Conn, J. W., and Newburgh, L. H., *J. Clin. Invest.*, 1936, **15**, 665.