been observed.

The neuro-vasopressor reflex originated by stimulation of the central end of the vagus is scarcely altered in the dog pretreated with SY-28.

The diphasic hypertension following electric stimulation of the splanchnic nerve, in normal dogs, is dissociated into a monophasic rise and a secondary fall of blood pressure after injection of 1 mg/kg SY-28. No reversal of the initial neuro-vasopressor response of sympathetic origin occurs.

3. *Effects on hypertensive substances*

Intravenous injection of 1 mg/kg SY-28 reverses the vasoconstrictor effects of epinephrine and inhibits its tachycardic action.

Same doses reduce or abolish the vasopressor effect of nicotine, ephedrine and veritol (β-p-oxyphenyl-isopropylmethylamine), but never induce a vasodilator response.

The hypertensive action of acetylcholine, in the atropinized dog, persists after injection of SY-28.

The vasopressor action of levo-arterenol‡ is notably depressed, at a time when neuro-vasopressor effects of sympathetic origin are nearly normal and epinephrine reversed by SY-28.

B./ β-(2-biphenyloxyethyl)-n-butyl-β-chloroethylamine HCl (SY-30).

According to Loew's and our observations, the pharmacological actions of SY-30 and SY-28 are similar, the SY-30 being less active.

Intravenous injection of 5 to 10 mg/kg has no immediate effect on blood pressure and heart rate, whereas intra-arterial injection produces a marked local vasodilatation, often preceded by a slight vasoconstriction. Later on the general blood pressure decreases progressively.

Vasopressor effects of carotid sinus origin are rapidly depressed but not reversed. Similarly, the neuro-vasopressor responses due to stimulation of the splanchnic nerve or other sympathetic nerves, may be diminished, but are never reversed after injection of SY-30.

While epinephrine hypertension is reversed and its tachycardic action completely abolished, the vasopressor activity of ephedrine, nicotine, dl-arterenol, acetylcholine (after atropinization) is weakened or blocked.

Finally, SY-30 paralyzes the cario-accelerator nerves.

Summary. The experiments showed that α - naphtylmethylethyl - β - bromoethylamine (SY-28) and β-(2-biphenyloxyethyl)-n-butyl-β-chloroethylamine (SY-30) are very active adrenolytic agents, with a weak sympathicolytic effect. The present and previous experimental observations once more demonstrate a marked dissociation between the vascular action of epinephrine and the neuro-vascular sympathetic transmission of excitations.

‡ Kindly provided by M. L. Tainter (*Science*, 1948, **107**, 39).

16283 P

Effect of Muscle Work Upon Level of Blood Glucose in the Eviscerated Rat.

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These experiments show that faradic stimulation of the gastrocnemius muscle accelerates the rate of fall of blood glucose in eviscerated and eviscerated-nephrectomized rats.

Methods. Male rats of the Sprague-Dawley strain were fed Friskies Dog Cubes. At a weight of 185 to 205 g, the inferior vena cava was ligated between the liver and kidneys to cause the development of a collateral circulation. Asepsis was preserved. When the animals reached 265 to 310 g they were anesthetized (cyclopal sodium) and eviscer-

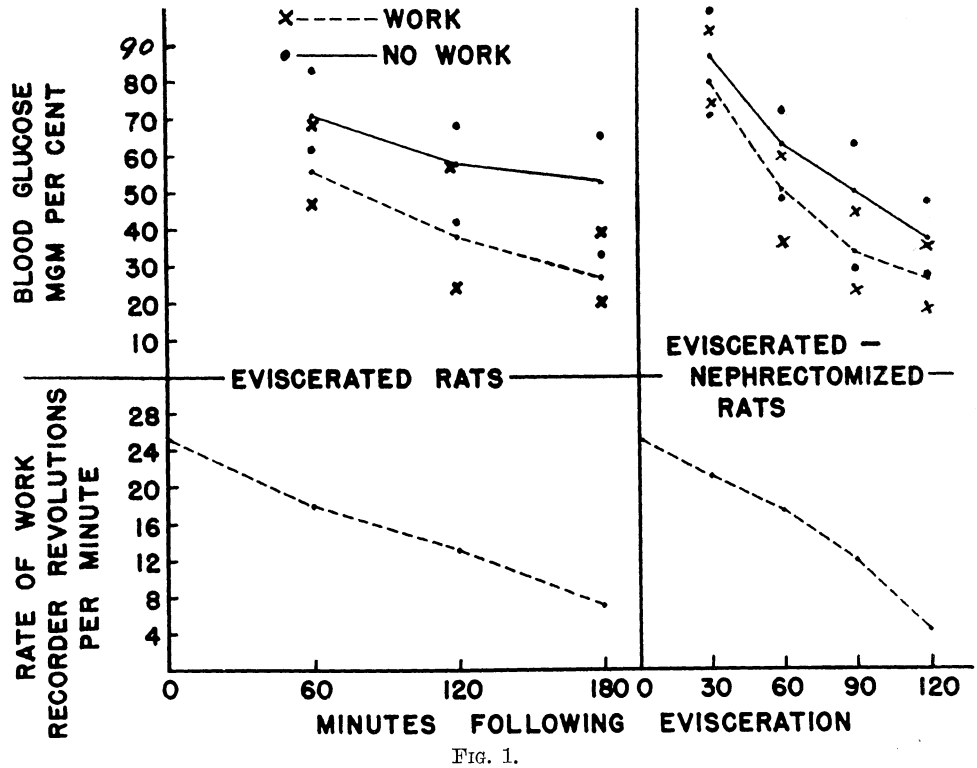

FIG. 1.

The effect of work upon the level of blood glucose in eviscerated and eviscerated-nephrectomized rats. Averages and range. Ten pairs of rats were used in each experiment.

ated by the method of Ingle and Griffith.[1]

In Exp. 2 the kidneys were removed at the time of evisceration. Immediately following the operation the animals were prepared for the stimulation of the gastrocnemius muscle to lift 100 g 3 times per second, according to the procedure of Ingle.[2] The animals were closely matched into pairs on the basis of body weight. One animal of each pair was subjected to work, and the second was kept without the weighting or stimulation of the muscle. Glucose was determined on tail blood by the method of Miller and Van Slyke.[3]

Experiments and Results. Ten pairs of rats were used in Exp. 1. One rat of each pair was subjected to stimulation of the gastrocnemius muscle for 180 minutes. Samples of blood were taken from each animal at the end of 60, 120 and 180 minutes following evisceration.

Ten pairs of eviscerated-nephrectomized rats were used in Exp. 2. One rat of each pair was subjected to the stimulation of muscle for 120 minutes. Samples of blood were taken 30, 60, 90 and 120 minutes following evisceration.

The data are summarized in Fig. 1. The rates of work and levels of blood glucose decreased more rapidly in the eviscerated-nephrectomized rats than in the eviscerated rats. In both series of animals the fall in blood glucose was accelerated by the stimulation of muscle. All of the "work" series developed convulsions and fatal hypoglycemia before convulsions were shown by any of the "no work" series.

Comment. The effect of nephrectomy in hastening the onset of hypoglycemia in the rat was previously known.[4] Although the

[1] Ingle, D. J., and Griffith, J. Q., Chapter 16, *The Rat in Laboratory Investigation*, J. B. Lippincott Co., Philadelphia, 1942.

[2] Ingle, D. J., *Endocrinology*, 1944, **34**, 191.

[3] Miller, B. F., and Van Slyke, D. D., *J. Biol. Chem.*, 1936, **114**, 583.

eviscerated rat lacks a pancreas and its hormone, insulin, it is capable of utilizing some glucose, as is readily shown when the organs responsible for the endogenous formation of glucose, *i.e.*, the liver and kidneys, are absent. The rate at which such animal removes glucose from the blood is further accelerated by muscular work. We propose to study the effect of muscle work upon the glucose load which the eviscerated rat can tolerate in the presence and absence of insulin.

Summary. In eviscerated and in eviscerated-nephrectomized rats stimulation of the gastrocnemius muscle accelerates the fall of blood glucose and shortens the time of survival.

4 Reinecke, R. M., *Am. J. Physiol.*, 1942, **136**, 167.

16284 P

Enhancing Effect of Mg^{++} on Clotting Activity of Ca^{++}

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Recent studies[1] on the activating effect of metallic salts on the hemolytic function of complement led to the conclusion that free bivalent cations were essential to the process and that the importance of Mg^{++} was more decisive than Ca^{++} or other cations studied.

In previous publications we have reported experiments indicating a close correlation between cephalin and Ca^{++} and their role in the coagulative and complementary activities of blood plasma or serum.[2-4] Moreover, in the clotting process the action of ionized calcium salts has been shown to be highly specific in that salts of even closely related elements, strontium and barium, had relatively little effect.

It seemed of importance therefore to determine whether magnesium, although inactive alone, might enhance the coagulative activity of calcium for plasma or serum.

The technic used in these experiments was similar to that described previously[3] except for the use of guinea pig plasma instead of rabbit plasma. Two preparations were employed: a 0.1% cell-free oxalated plasma for determining the direct coagulating effect of Ca^{++} or other ions and a more strongly oxalated and diluted plasma, the dioxalated plasma of Bordet and Delange[5] which is more resistant to clotting by direct recalcification and provides a satisfactory reagent for the detection of "thrombin" activity.

Oxalated plasma was obtained by bleeding from the carotid artery over paraffined surfaces into 1% sodium oxalate containing 0.5% NaCl, 1 part to 9 parts of blood, and removal of cells and platelets by centrifugation at 2°-6°C.

Dioxalated plasma was prepared by mixing 1 volume of cell-free oxalated plasma with 4 volumes of 0.2% sodium oxalate containing 0.85%NaCl.

The solutions of $MgCl_2$ and $CaCl_2$ were prepared by diluting molar solutions with 0.85% saline.

The cephalin was a 0.01% solution of phosphatidyl serine in 0.85% saline.

In the experiments of Fig. 1, 0.1 ml amounts of the molar concentrations of $CaCl_2$ or $MgCl_2$ indicated were used, the volume was made up to 0.6 ml with saline and 0.1 ml of

1 Mayer, M. M., Osler, A. G., Bier, O. G., and Heidelberger, M., *J. Exp. Med.*, 1946, **84**, 535.

2 Wadsworth, Augustus, Maltaner, Frank, and Maltaner, Elizabeth, *J. Immunol.*, 1936, **30**, 417.

3 Wadsworth, Augustus, Maltaner, Frank, and Maltaner, Elizabeth, *J. Immunol.*, 1937, **33**, 297.

4 Wadsworth, Augustus, Maltaner, Frank, and Maltaner, Elizabeth, *Am. J. Physiol.*, 1937, **119**, 80.

5 Bordet, J., and Delange, L., *Ann. de l'Institut Pasteur*, 1912, **26**, 657.