recording changes in volume in the lower limb during spinal root stimulation, and found *vasoconstrictor* fibers to the lower extremity emerging in T11-L2 (inclusive) and to a lesser extent in L3. Oughterson, Harvey and Richter[5] indicate by recording the temperature changes in the lower limb of dogs after interrupting the vasomotor pathways by transection of the spinal cord, that vasoconstrictor fibers to the lower extremity may emerge below L6. Derom[6] would limit the vasomotor fibers to the first 3 lumbar nerves in the dog, on the grounds that section of the rami communicantes of these roots abolishes all vasomotor reflexes in the lower extremity.

The existence of B as well as C waves, amongst the responses that were shown to be autonomic by their disappearance after nicotine, is of considerable interest. The presence of B fibers in the sympathetic outflow to the limb has not hitherto been clearly indicated, though Erlanger[7] speaks of some "inconstant results" in cats and dogs. Such fibers imply the possibility of control over effectors differing in function and distinct from those supplied by fibers of the C group. The number of B and C fibers contributed by each root would then determine the possible extent of its control over the various types of sympathetic response.

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A Difference in Effect of Distilled Water and of Isotonic Solutions in Intestine on Pancreatic Secretion.

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The fact that water in the intestine stimulates the external secretory function of the pancreas was first demonstrated by Damaskin in Pavlov's laboratory[1, 2] and later by Babkin[3, 4] and Bylina.[5] In the

[5] Oughterson, A. W., Harvey, S. C., and Richter, H. G., *J. Clin. Invest.*, 1932, **11**, 1065.

[6] Derom, E., *Mém. de l'Acad. Roy. de Méd. de Belg.*, 1938, **25**, 1.

[7] Erlanger, J., in Erlanger, J., and Gasser, H. S., *Electrical Signs of Nervous Activity*, Philadelphia, University of Pennsylvania Press, 1937, p. 67.

[1] Pavlov, I. P., *Die Arbeit der Verdauungsdrüsen*, Weisbaden, 1898.

[2] Pavlov, I. P., *The Work of the Digestive Glands*, London, 1910, p. 144.

[3] Babkin, B. P., *Arch. d. Sci. Biol.*, 1904, **11**, No. 3 (Reference from Babkin[4]).

[4] Babkin, B. P., *Die aüssere Sekretion der Verdauungsdrüsen*, Berlin, 1914.

[5] Bylina, A. S., *Prakt. Arzt*, (russ) 1911, No. 44-49 (Reference from Babkin[4]).

course of an investigation of the effects on pancreatic secretion of various organic buffer mixtures in the intestine (results to be published elsewhere), we found that many neutral, isotonic, watery solutions were ineffective. The reason for this apparent conflict in results provides the material for the present report.

The dogs used in these experiments were provided with gastric and duodenal fistulas fitted with large cannulas (5/8" lumen). The duo-

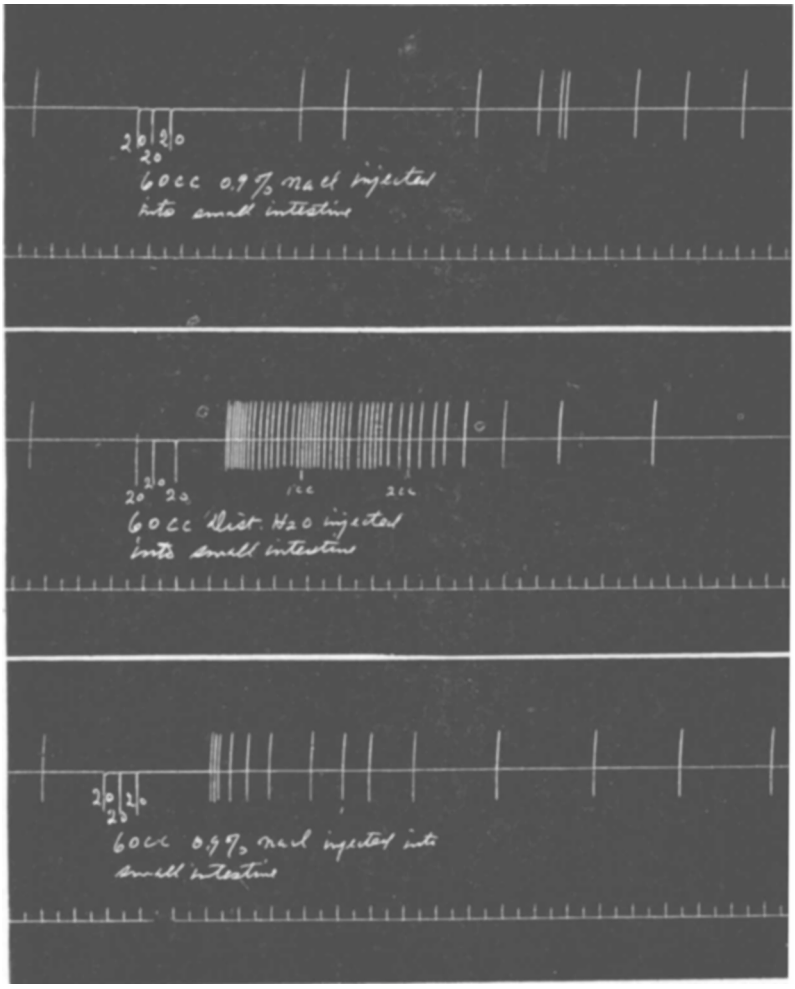

FIG. 1.

Effect of injecting 60 cc of distilled water (middle record) into the intestine compared with the effect of an equal amount of 0.9% NaCl solution (upper and lower records) given 25 min before and 25 min after the water. A drop recorder was used which delivered 17 drops per cc. Time is in 30 sec intervals.

denal fistula was placed opposite the point of entrance of the main pancreatic duct into the duodenum. The pancreatic juice was collected by means of a funnel shaped rubber cup, which was held against the duodenal wall surrounding the papilla by means of a suitable spring device. Further details of the method will be given in the report referred to above.

Water and various solutions were either injected into the upper small intestine in 20, 40, or 60 cc amounts through a tube passed via the duodenal cannula or perfused through the intestinal lumen by means of a pump delivering approximately 15 cc per minute.

Distilled water injected into or perfused through the intestine caused a brief but rapid flow of pancreatic juice. Various isotonic solutions, *e.g.,* 0.9% NaCl and 5% glucose had no such effect, except when given after an injection of distilled water, when a doubtfully positive result was frequently observed (Fig. 1).

Evidently the pancreatic secretagogue action of water is in some way related to hypotonicity and is not exhibited by the water present in isotonic solutions. This fact has an important bearing on the interpretation of experimental data obtained with watery solutions. Instead of concluding, as at present, that a substance in solution is inert if it has the same effect on the pancreas as an equal amount of pure water, we must regard it as an active stimulus if it is effective in isotonic solution.

These observations do not necessarily apply to water or solutions that have passed through the stomach where they may become mixed with HCl or, possibly, other pancreatic secretagogues.

Conclusion. Although pure water in the intestine causes pancreatic secretion, isotonic solutions of inert substances in water do not.