minant groups. Some cross reactions were often encountered between compounds like alpha carboxy-amyl kerateine and alpha carboxy-n-butyl kerateine. A striking specificity was exhibited in the case of 2 compounds with benzene rings in their side chains. Benzyl kerateine was easily differentiated from compounds containing aliphatic side chains as "determinants."

These results compare favorably with those obtained by Landsteiner and van der Scheer[6] in their studies on antigens containing azo-components with aliphatic side chains.

With the exception of the azo-method introduced by Landsteiner the possibility of the introduction of determinant groups into proteins has been limited.

It has been generally assumed that the various methods employed affected the benzene ring, tyrosine being regarded as playing a major rôle in the determination of the specificity of proteins. The observations of Hopkins and Wormall,[7] in which the reaction of the free amino groups of proteins with phenyl-iso-cyanates was used to introduce new determinant groups, indicated that a protein may be altered immunologically by a process not affecting the benzene ring.

From the studies presented here it is therefore also evident that substitution of the –SH group of kerateines by simple chemical compounds influences the serological behavior as well as the chemical characteristics of these derived proteins.

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Influence of Balloon Distention of Duodeno-Jejunal Loops on Volume of Combined Digestive Secretions.*

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In the course of certain studies which were designed to disclose whether acute intestinal obstruction is associated with the production of an increased flow of the digestive secretions, Swindt and

[6] Landsteiner, K., and van der Scheer, J., *J. Exp. Med.*, 1934, **59**, 751.

[7] Hopkins, S. J., and Wormall, A., *Biochem. J.*, 1933, **27**, 740.

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Montgomery[1] observed that in isolated duodeno-jejunal loop strangulation obstruction the secretion of the combined digestive juices (gastric, pancreatic, biliary, and duodenal) is distinctly depressed. Careful analysis of the secretion curve showed that the depression occurred promptly and lasted for a period of from 12 to 24 hours, after which the secretion gradually returned toward normal and then decreased again as the animal became moribund. The early fall in secretion was often associated with nausea and vomiting and the appearance of mild symptoms of depression.

In addition we had observed in a single successful experiment of closed loop obstruction, performed on an animal with a denervated isolated loop after the "normal" fasting level of combined digestive secretions had been obtained, that no significant decrease in the secretion occurred until the animal was moribund, and that the animal showed no evidence of depression until shortly before death.

Since these findings were contrary to the general belief that acute strangulation obstruction produces a hypersecretion of the digestive juices[2] and since the alteration in secretion was associated with symptoms which Herrin and Meek[3] have attributed to nervous influences, we devised the following experiments to determine whether distention of a loop of bowel in the absence of the accumulation of "toxic" fluid within the loop would produce alterations in secretion similar to those observed in the experiments on closed, isolated loop strangulation.

Dogs were prepared with a 12- to 14-inch Thiry-Vella duodeno-jejunal fistula, the duodenum having been divided about 5-6 cm below the lower pancreatic duct. Dragstedt type cannulæ were then placed in the duodenum and jejunum proximally and distally, respectively, to the points of division of these structures for the purpose of collecting and replacing the combined digestive secretions. The loss of fluids by the kidneys and the lungs was made good by the daily intravenous or subcutaneous administration of from 1,000 to 1,500 cc of normal salt or Ringer's solution. In one series of 7 animals the nerves to the loop were not touched; in a second series of 4 animals the loop was denervated by severing all connections with the body except the blood supply. After normal fasting levels of secretion appeared to have been established a sausage-shaped balloon with a capacity of from 200 to 300 cc was

[1] Swindt, Joseph M., and Montgomery, M. Laurence, PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 915.

[2] Wangensteen, Owen H., *The Therapeutic Problem in Bowel Obstructions*, Springfield, Ill., C. C. Thomas, 1937, p. 6.

[3] Herrin, Raymond C., and Meek, Walter J., *Arch. Int. Med.*, 1933, **51**, 152.

introduced into the distal end of the isolated loop and partially distended with 30 cc of water. Several hours later an additional 15 to 20 cc of water was placed in the balloon. These maneuvers were designed to simulate the trapping of fluid in obstructed loops. Then, in order to simulate a further gradual distention, water was introduced into the balloon at the rate of from 6 to 8 cc per hour, until the balloon contained a total of from 200 to 250 cc of water. The amount of distention used was based on the observation that the prerupture capacity of isolated closed loops of similar length and situation was about 200 cc.

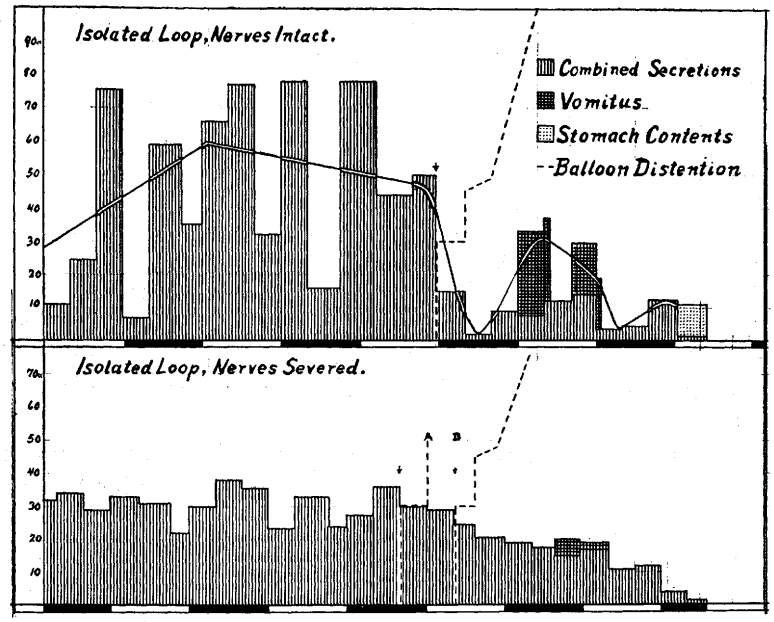

FIG. 1.
Secretion Curves.

Chart represents individual experiments in each classification, and is characteristic of the general trend.

The combined secretion is charted on the basis of cc per hour. The arrows show the points at which the balloon was introduced into the Thiry-Vella loop. In the experiment from which the lower graph was taken the balloon slipped out of the loop between points A and B and had to be replaced. The dotted lines show the rate at which the balloon was distended, using the same scale as that for the secretion. Solid lines represent noon to midnight. Non-solid lines midnight to noon.

Representative results are shown in Fig. 1. It will be observed that in the animal possessing an intact nerve supply to the loop of bowel mild distention of the balloon caused an early, marked suppression of the secretion similar to that observed in closed isolated

loop strangulation. In the animals in which the loop had been denervated the early suppression did not occur.

Conclusions. (1) Distention of an isolated loop of bowel to the point of strangulation, when caused either by the spontaneous accumulation of fluids therein, or by the distending of an indwelling balloon, produces an early temporary suppression of the combined digestive secretions. (2) The suppression of secretion does not occur when the loop has been denervated. (3) The similarity of the changes produced by balloon distention with those seen in spontaneous loop distention would seem to argue against the hypothesis that strangulation intestinal obstruction is associated with hypersecretion of the digestive juices.

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Nature of the Action of Testosterone on Genital Tract of the Immature Female Rat.*

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Opening of the vagina and estrus in the immature rat with the use of various androgens has been reported by Butenandt and Kudzus.[1] Deanesley and Parkes[2] noted, in addition, that testosterone and other androgens produced not only vaginal opening but also uterine enlargement in the ovariectomized as well as in the intact immature rat. This suggested, therefore, a direct action upon the uterus and vagina. Nelson and Merckel[3] described the uterine reaction of adult rats to androgens and found enlargement after the administration of testosterone, androstenedione, cis-androstenedione and dehydroandrosterone; the latter producing the response even in the absence of the pituitary. McKeown and Zuckerman[4]

* We are indebted to Dr. Joseph C. Aub for valuable suggestions in the preparation of the paper and to Dr. Shields Warren for reviewing the histological sections.

1 Butenandt, A., and Kudzus, H., *Hoppe-Seyler's Z.*, 1935, **237**, 75.

2 Deanesley, R., and Parkes, A. S., *Brit. Med. J.*, 1936, **1**, 527.

3 Nelson, W. O., and Merckel, C. G., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 825.

4 McKeown, T., and Zuckerman, S., *Proc. Roy. Soc. B.*, 1937, **124**, 362.