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A Physiologic Consideration of the Sphincter of the Ductus Choledochus.

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The presence of a sphincteric mechanism at the duodenal end of the common bile duct, in relation to the functioning of the biliary tract, has never been conclusively proved. More recently, in the light of newer studies upon the physiology of the gall bladder, it has been questioned. The muscle tone of the duodenum, together with the peristaltic waves of the gastro-intestinal tract have again been ascribed as essential factors in the flow of bile.

To determine whether or not there was a localized mechanism at the duodenal end of the common duct capable, upon stimulation, of stopping the flow of bile, the following series of experiments were performed. Under ether anesthesia, the biliary tract of a dog was exposed and a cannula inserted into the common duct with the point directed towards the duodenum; and the lower intra-mural portion of the duct was carefully dissected away as closely as possible from the wall of the duodenum. All tissue as nearly as could be determined with the naked eye, not of the duct itself, was carefully teased away. The cannula was then connected to a pressure bottle containing Ringer's solution, kept at a constant body temperature; while the intra-mural portion of the duct was carefully placed upon the points of an electrode. In this position Ringer's solution was allowed to pass through the duct and records were made, by both the drop and the pressure method, of the rate of flow of the fluid through the duct before, during, and after stimulation. A brief electrical stimulation applied to a restricted region of the intra-mural portion caused a stoppage of the flow of the fluid through the duct, at pressures greater than the recorded pressure produced by the secretion of the liver, or the contraction of the gall bladder. Following the period of stimulation, there is an interval of a few seconds before the fluid again passes through the duct, and several seconds before the normal rate is restored. A similar stimulation of any other extra-mural portion of the duct had no appreciable effect upon the flow of fluid through it. Similar studies upon the guinea pig, wherein the common duct opens directly into the duodenum, reveals

the existence of a strong sphincteric mechanism at the lower end of the choledochus, wholly apart from the gastro-intestinal tract.

This is a preliminary report.

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The Application of Certain Statistical Criteria to the Problem of Seedling Mortality.

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The practically important problem of obtaining an adequate crop stand on the agricultural field must depend for its solution on the detailed investigation of a number of factors, physical, chemical, physiological and pathological. While the end purpose of such investigations may be in part practical, they have their bearing upon a number of general biological questions, for example that of the existence of a selective death rate.[1] In suggesting the applicability of certain statistical methods, which, as far as I am aware, have not heretofore been applied to these problems, I have in mind the probability that they will be useful in other investigations involving the problem of mortality.

Problem 1. A criterion of the deviation from a random distribution of an observed distribution of number of seedlings produced.

Let s be the number of seeds planted, g be the number of seeds germinating or surviving to a given stage, f the number of seeds failing to germinate or dying at an early stage, in a large number, N, of small experiments. Then if p be the probability of development of the seed into a seedling, and q be the probability of its failing to develop or of its dying before any given period

$$p = \frac{\Sigma(g)}{sN} = \frac{\overline{g}}{s}, \quad q = \frac{\Sigma(f)}{sN} = \frac{\overline{f}}{s} = 1-p,$$

where Σ denotes summation throughout the number, N, of experimental plantings and the bars denote means of g and f.

If the frequency distribution of the number of germinations per experiment (*c. g.*, per hill) were determined solely by chance it should should be given by $N(p+q)^s$. The agreement of the theoretical and empirical distributions may be tested by Pearson's χ^2 criterion,[2] using Elderton's[3] table for testing goodness of fit.

Application of this criterion to large series of germination records