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Observations on the Function of the Pylorus as Revealed by Duodenal Regurgitation.

C. B. WRIGHT AND GRACE MEDES.

From the Medical Service of the University Hospital, Minneapolis.

The recent attention given to Boldyreff's theory[1, 2, 3] of the automatic regulation of the acidity of the stomach through duodenal regurgitation, has opened up an important line of clinical investigation. Two methods of determining regurgitation are being employed, the presence of bile in the stomach, and the estimation of the total chlorides of the stomach content as compared with the free or total acid.

We have investigated the presence of trypsin and bile in the fasting stomach, as well as their disappearance and reappearance in the stomach in the presence of water and dilute acid and alkali.

Nine examinations were made on cases as follows:

5 total achylia, giving no acid on fractional meals or after injection of histamine (pernicious anemia).

1 normal.

1 low duodenal obstruction from retroperitoneal growth.

1 duodenal ulcer.

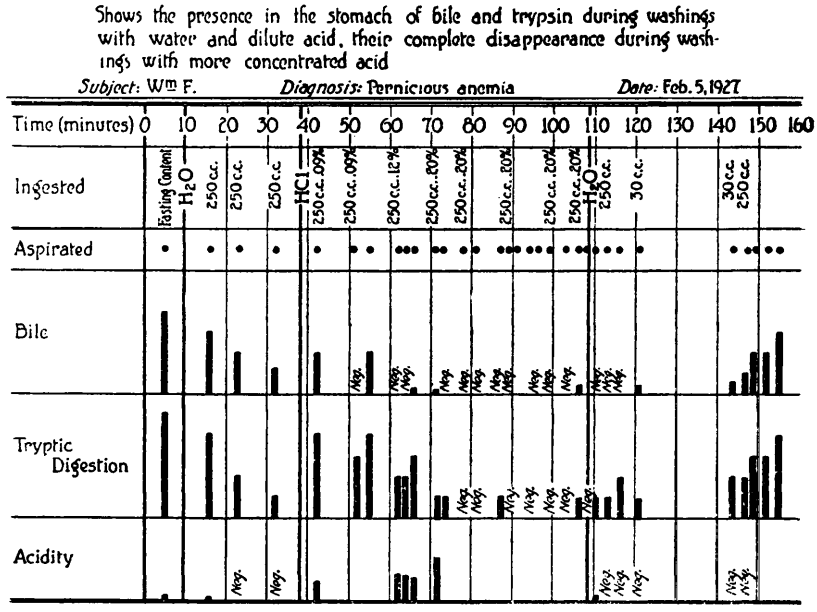
1 pyloric resection by the Polya method.

In carrying out the experiments, the contents of the fasting stomach were removed through a Rehfuss tube with the olive located in the lower part of the stomach. The stomach was then washed at 3 to 5 minute intervals with small amounts of water or of the reagent selected, and samples immediately withdrawn; or the reagent was allowed to remain in the stomach and portions fractioned out at 5 to 10 minute intervals.

In testing for the presence of trypsin, the stomach content was centrifuged or filtered if opaque, the clear fluid was then shaken

with permutit to remove ammonia and a solution of purified egg albumin added to each. The mixture was then brought to a pH of 8.5 (just alkaline to phenolphthalein) and allowed to incubate 48 hours at 37°, when amino acids were tested for by Folin's method.

In cases of achylia we found trypsin almost continually present when the stomach was washed with water, 1 per cent Na_2CO_3 or HCl (less than 0.05*N*). With more concentrated acid trypsin usually disappeared. The presence of bile was more variable. Though this was a constant finding in achylia, in other types of cases less uniformity of result was obtained.



This shows a typical experiment in a case of achylia. Bile and trypsin were both present during washing with water and 0.09 per cent HCl. During washing with 0.2 per cent HCl it disappeared completely and reappeared only intermittently and in minute amounts. Water was then introduced, whereupon trypsin reappeared at once. Later on, bile also reappeared.

From this, as well as others of our experiments it was shown definitely that bile and trypsin appear independently of each other, trypsin occurring with greater frequency. Bile only rarely appeared in the absence of trypsin. This point we consider of importance, since Baird, Campbell and Hern,[4] in discussing the neutralizing ef-

fect in the stomach of the pancreatic juice have concluded the absence of pancreatic juice in the stomach from the absence of bile. The anatomic explanation of our findings is suggested by a study of the anatomy of the pancreatic ducts by Baldwin,[5] showing a patent and probably functioning accessory duct in 77 per cent of cases studied and a separate opening of the pancreatic and bile ducts in 25 per cent of the cases.

Whether the disappearance of trypsin and bile after washing the stomach with acid is due to the closure of the pylorus or to a closing effect of the separate ducts from the liver and the pancreas we are not prepared to state. We wish to emphasize that wherever the closing mechanism is located, the effect in the pernicious anemia cases is a prolonged closure, lasting from 30 to 40 minutes. In a case of healed duodenal ulcer the closing effect was much more marked, more than an hour and a half elapsing before signs of duodenal regurgitation occurred after the introduction of acid into the stomach.

This is a preliminary report.

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[1] Boldyreff, W., *Zntrlblt. f. inn. Med.*, 1908, vi.

[2] Boldyreff, W., *Ergebnesse d. Physiol.*, 1911, xi, 121.

[3] Boldyreff, W., *Quart. J. Exp. Physiol.*, 1915, viii, 1.

[4] Baird, M. McC., Campbell, J. M. H., and Hern, J. R. B., *Guy's Hosp. Rep.*, 1924, lxxiv, 23.

[5] Baldwin, W. M., *Anat. Rec.*, 1911, v, No. 5.

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The Prenatal Growth of the Human Thymus.

RICHARD E. SCAMMON.

From the Department of Anatomy, University of Minnesota.

The weight of the human thymus in the fetal period is characterized by great variability. Therefore a large number of observations are necessary to demonstrate even the approximate course of prenatal growth of this organ.

The ponderal growth of the thymus, with respect to body-weight, has been studied in a series of 1043 weighings of the organ from human fetuses under 4000 grams in total (dead) body weight. In no instances were observations made on fetuses living over 48 hours.