Other possible uses of dehydrated antigen which are being studied include: 1. Its use for preparing test fluids for the rapid and test-tube methods of agglutination testing, chiefly for standardizing the bacterial concentration and as a method of preservation over long periods of time. 2. Its use as a product for diagnosing Bang's disease by means of allergy.

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Localized Pain Accompanying Faradic Excitation of the Stomach and Duodenum.

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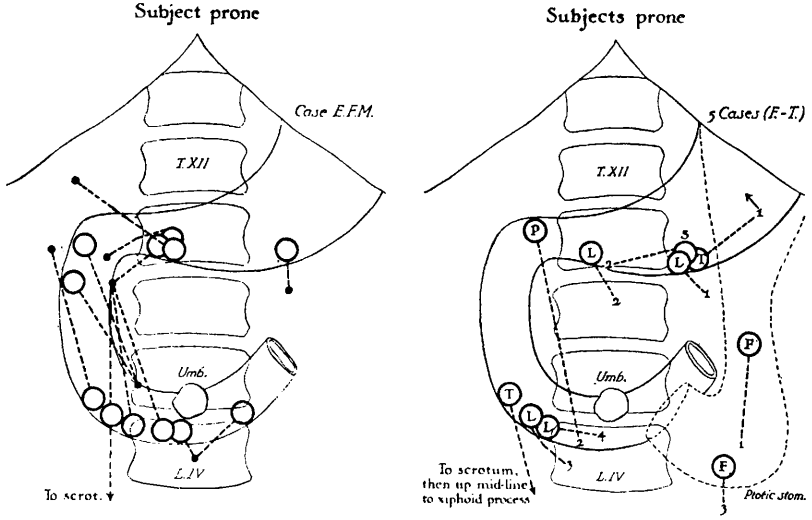
The following observations, hitherto unreported, were made during the course of experiments designed to test the reaction of the human gall bladder to faradic stimulation of the gastro-intestinal tract.[1]

Eleven medical students cooperated in this undertaking, several of them submitting to repeated experimentation. The device selected for stimulating the gut tract was a standard Rehfuss tube enclosing a copper wire soldered to the metal olive at the end of the tube. The other electrode consisted of a moist pad fastened to the arm of the subject. Through this circuit was sent an induction current that was almost intolerable when tested by the lips, but which was not unbearable when applied to the gut, causing sensations varying from barely perceptible, gnawing sensations, to heartburn and sharp colicky pain. With the aid of fluoroscope and barium meal, it was ascertained that when the olive was pushed against the wall of the stomach the current caused ring contraction of the gut and then increased peristalsis distal to that point. In each case the duration of the current was 10 seconds.

Figure 1 (left) records observations made upon one student on 4 different days. The circles indicate varying positions of the electrode in the gut (as determined by X-rays); the dots the site of the pain area on the abdominal wall. With the subject prone, excitation of the mid-pyloric stomach was localized at the lower middle or left epigastric regions; of the pyloric antrum, at the lower

[1] Boyden, E. A., *Anat. Rec.*, 1933, **55** (Suppl.), 8.



middle or right epigastrium; of the pars superior (duod.) at the right umbilical or right supra-umbilical region; of the pars descendens at the right lower epigastric, the right umbilical, or the right scrotal region; of the pars inferior (duod.) at the mid-line just below the umbilicus.

Figure 1 (right side) records scattered observations on 5 other students. Case F (1-3) shows that in marked ptosis of the stomach, pain may be localized as low as the left umbilical zone. Similarly, other experiments have shown that when the subject is shifted from a prone to a side position or to his back, the site of pain frequently shifts with change in posture. Usually the pain is accompanied by varying degrees of abdominal rigidity.

Interpretation of these findings—namely as to whether the pain is entirely visceral, or is partly of anterior-peritoneal origin (according to the views of Morley[2]), or is referred, or is a combination of one or more of these—is being deferred, pending nerve-blocking experiments with novocaine.

[2] Morley, John, Abdominal Pain, Edinburgh, 1931.