

A METHOD FOR RECORDING PERISTALSIS IN ISOLATED INTESTINE

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A method is described for studying peristalsis in isolated pieces of guinea-pig ileum. Records are obtained of longitudinal contractions, intraluminal pressure and volume of fluid expelled.

In the method for recording peristaltic activity recently described by Bülbiring and Lin (1958), the two ends of the isolated piece of intestine were held rigidly and no record was obtained of longitudinal contractions. In the method described here the intestine is suspended isotonicly and any commercially obtainable isolated organ bath can be used.

Fig. 2 shows the experimental arrangement. A loop of guinea-pig ileum is suspended in an isolated organ bath (50 ml.). The oral end is tied to the short end of a J tube (internal diameter 4 mm.). The caudal end is tied to an inverted U tube which is fitted with a valve made from flat drainage tubing ("Pauls" tubing obtainable from Philip Harris, Ltd., Birmingham, 3). The inverted U tube is suspended from a lever which is suitably counterweighted and carries a frontal writing point. The long limb of the J tube is used as a water manometer, transferring the pressure changes in the intestinal lumen by air transmission to a float recorder.

The float is made from a thin-walled bacteriological test tube with the mouth turned in (see inset of Fig. 2). This, and the use of a 1 mm. capillary inlet tube, prevents the two surfaces approaching each other, thus the float does not touch the inlet tube.

Tyrodé solution from a Marriotte bottle enters the lumen of the intestine through a thin Portex tube (1.7 mm. internal diameter) into which is inserted a fine polyethylene tube (0.5 mm. internal diameter) to make intraluminal injections with a minimum of dead space. The concentric inner tube reduces the lumen of the outer tube to capillary dimensions, thereby increasing the resistance to the flow of solution, so that the rate of inflow, at a given pressure head, is reduced.

The outer Portex tube is pushed over one end of a small glass T piece; the inner tube passes right through and emerges at the opposite end. A seal is effected between the fine inner tube and the glass by using a small specially moulded P.V.C. thimble. The thimble is prepared by dipping a hot steel former into a P.V.C. "latex" (I.C.I. Welvic Paste Type PA/2, see I.C.I. Handbook "Welvic Paste"). The diameters of the former have to be 20% less than the diameter of the tubes which the thimble has to fit.

An electromagnetic vibrator (Fig. 1) is fixed to the vertical rod from which the levers are suspended in order to minimize artifacts due to friction between writing levers and the drum. It is important to note the soft iron pole faces, which are cemented to the magnet with Araldite to prevent rapid deterioration of the permanent magnet.

Fig. 3 is a diagram of the volume recorder developed from that described by Streeten and Vaughan Williams (1951). The fluid is collected

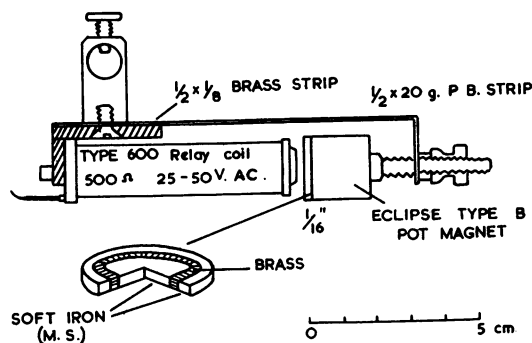


FIG. 1.—Electromagnetic vibrator.

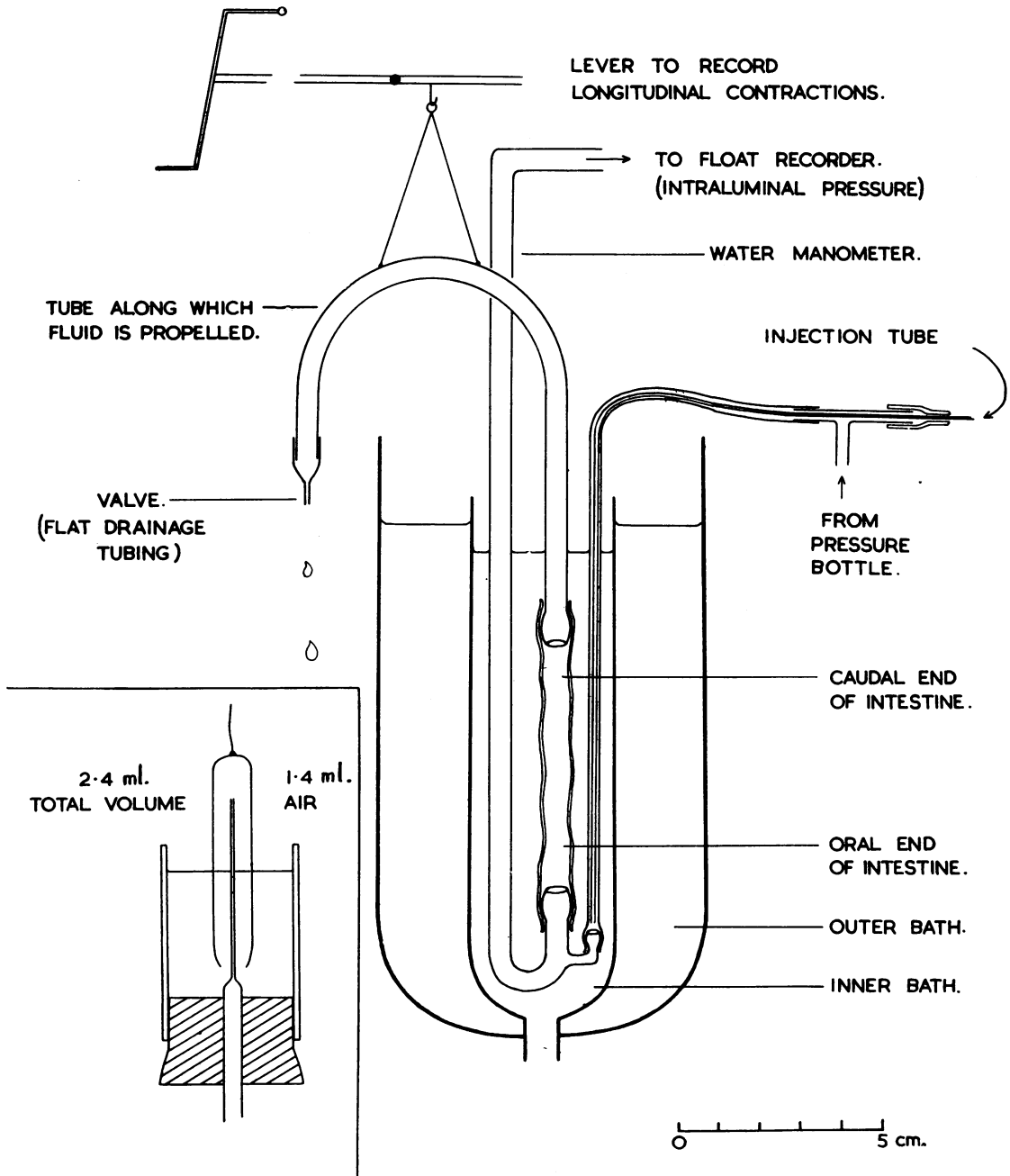


FIG. 2.—General arrangements of apparatus. For description see text.

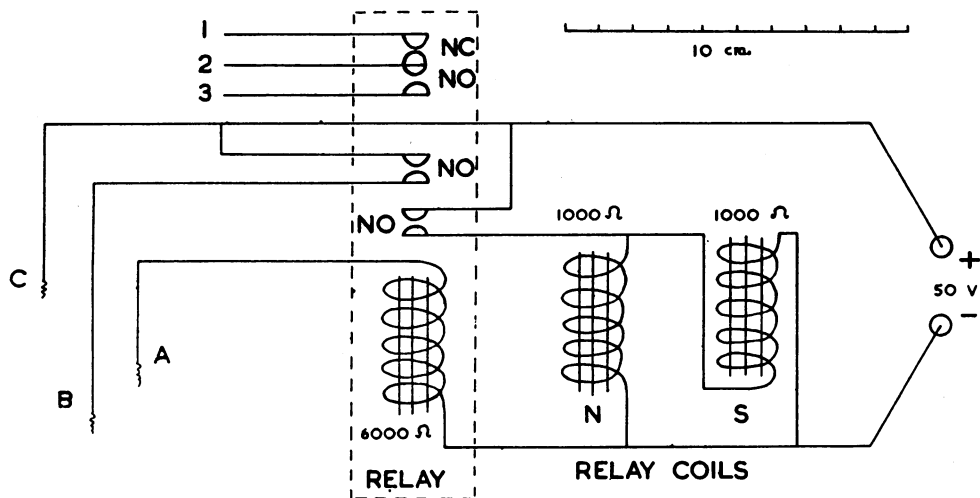
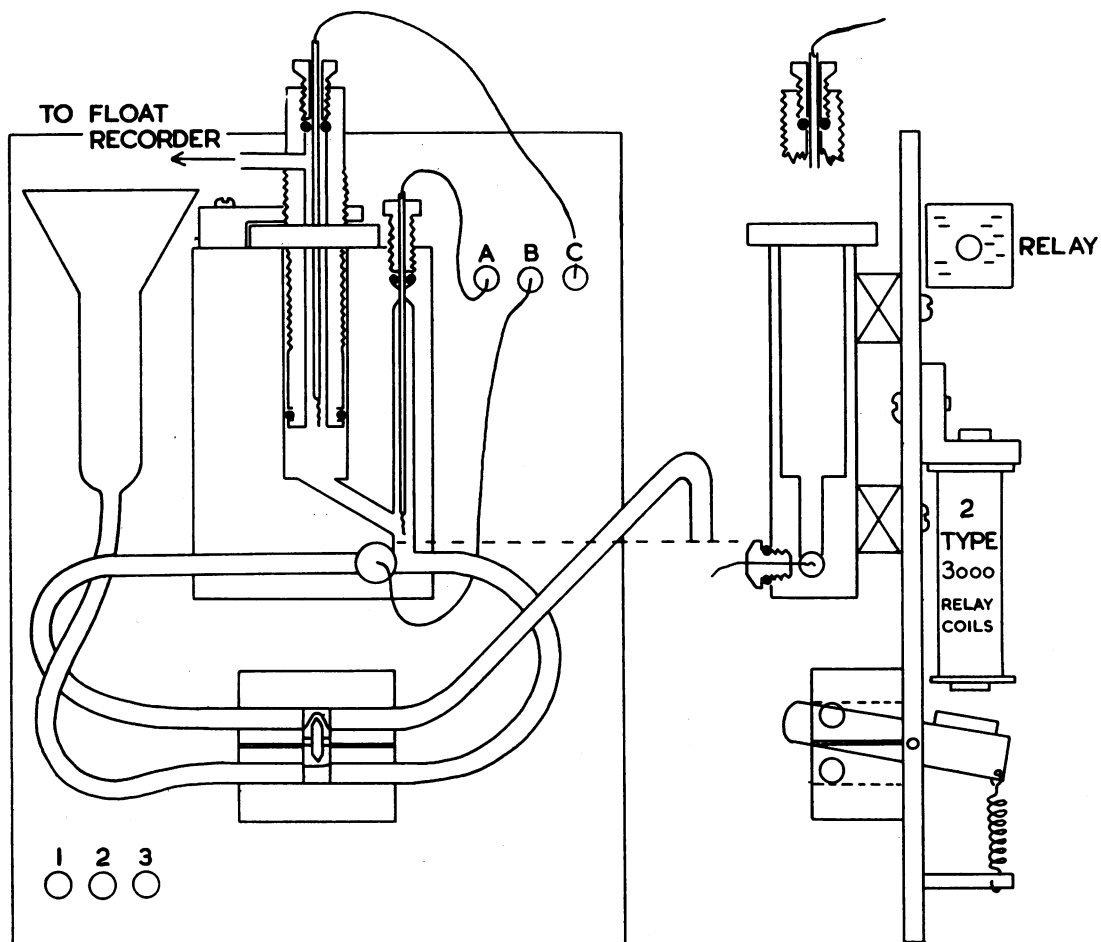


FIG. 3.—Volume recorder. For description see text.

in the funnel and passes into the measuring chamber through an electromagnetic "tap." On entering, the fluid first makes contact with electrode B, then with A, and finally with C. At this stage the "tap" is energized and cuts off the flow, storing any subsequent inflow in the funnel. At the same time it releases the measured volume between A and C; this escapes through the outlet tube, the mouth of which should be just below the level of A. As soon as the fluid falls below A the cycle starts again. The electrodes are made of platinum. No disturbance due to polarization is encountered and the apparatus is reliable provided it is kept clean. The volume to be measured (that between A and C) can be adjusted by moving the piston carrying C. This volume can be recorded by air transmission, using a float recorder of somewhat larger volume than that shown in Fig. 2. Alternatively the terminals 1 and 2 or 2 and 3 can be used to operate electrical devices.

A typical tracing obtained with this method is shown in Fig. 4. The upper record (L) shows the longitudinal contractions. The middle record (P) shows the intraluminal pressure which rises slowly until the peristaltic contraction occurs and empties the lumen. The lower record (V) shows the volume of fluid expelled.

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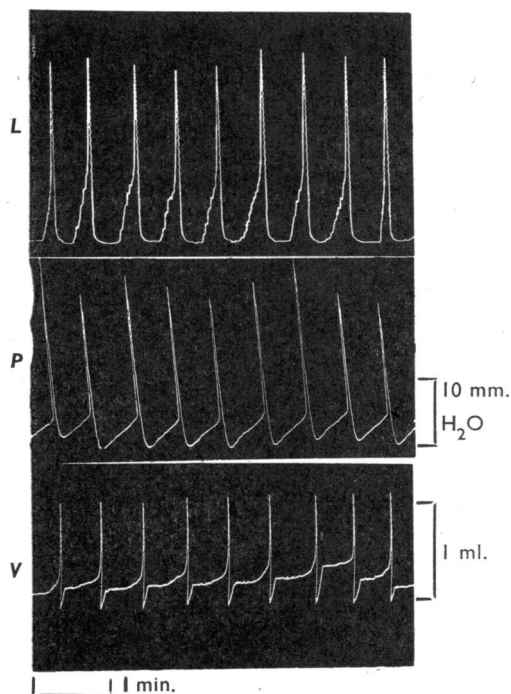


FIG. 4.—Records made from guinea-pig ileum with the apparatus described in the text. L, contractions of the longitudinal muscle; P, intraluminal pressure; V, volume of fluid expelled.

REFERENCES

- Bülbring, E., and Lin, R. C. Y. (1958). *J. Physiol.*, **140**, 381.
 Streeten, D. H. P., and Vaughan Williams, E. M. (1951). *Ibid.*, **112**, 1.