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### Electron microscopical examination of the junction between the myenteric plexus and the longitudinal muscle of the guinea-pig ileum

G. GABELLA (introduced by H. W. KOSTERLITZ), *Department of Anatomy, University College, London*

Electron microscopical examination of the longitudinal muscle of the guinea-pig ileum confirms previous observations (Paton & Zar, 1968) that this layer is usually devoid of nerve fibres. The problem arises as to how excitatory and inhibitory stimuli can reach the longitudinal muscle cells.

Anatomical evidence shows five different possibilities:

(a) Nerve fibres right at the surface of ganglia in the myenteric plexus show “synaptic” vesicles, frequently forming aggregations under the plasma membrane, which might release the transmitter diffusing towards the longitudinal muscle cells.

(b) Secondary and tertiary strands of the myenteric plexus have vesicle-containing fibres at the surface of the bundle at a short distance from the more internally situated longitudinal muscle cells.

(c) Junctions have been found between muscle cells of the circular muscle layer and muscle cells of the longitudinal muscle layer; these junctions generally have finger-like processes.

(d) There are junctions between smooth muscle cells and the so-called “interstitial cells” (Cajal) which, at other parts of their surface, are connected with nervous structures.

(e) Finger-like processes may protrude from the innermost longitudinal muscle cells and closely approach the external surface of the ganglion.

Quantitative determinations of these various neuromuscular structures are in progress and possible functional implications will be discussed.

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### Measurement and printout of average heart rate using digital techniques

A. K. ARMITAGE, C. A. GRANT, P. N. LEE, C. M. SELLERS and A. WILSON, *Department of Pharmacology, Tobacco Research Council Laboratories, Harrogate*

The equipment to be demonstrated was developed in order to study the effects on heart rate of cigarette and cigar smoking. Frequent, accurate and rapid measurements

of heart rate were required over periods of approximately 1 h. Heart rate is normally measured by direct reading heart rate meters or by calculation from an electrocardiogram. Such methods do not clearly or conveniently show the small changes caused by cigarette smoking. Heart rate, when calculated from the time interval between two consecutive heart beats, can show large variation. If instantaneous heart rate is calculated 10 times from consecutive intervals, the mean value is very close to the average heart rate over the 10 beat period. Such a value of average heart rate can be obtained on a permanent record whenever required. The principle of the method is illustrated in Fig. 1.

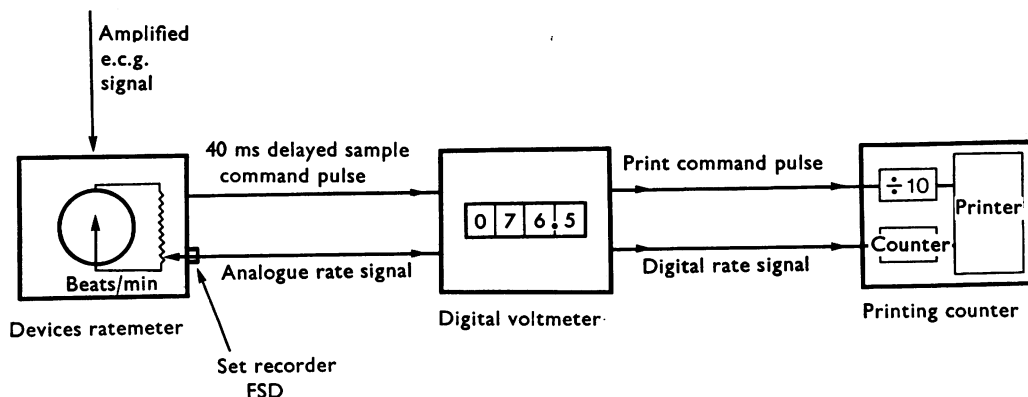


FIG. 1.

The e.c.g. waveform, suitably amplified, is applied to the input of a Devices Instantaneous Ratemeter type 2750. The ratemeter converts the e.c.g. waveform to a meter reading of instantaneous heart rate by measuring the interval between each heart beat. The ratemeter output voltage, being the analogue rate signal, together with a delayed sample command pulse, is connected to a digital voltmeter (DVM), which performs the function of an analogue to digital converter. The voltage displayed on the DVM can be made numerically equal to the heart rate in beats per minute by adjustment of the set recorder FSD. Since a finite period of time is required after each heart beat for the ratemeter to change from one instantaneous value of heart rate to the next, a delay of approximately 40 ms is provided before the digital voltmeter is commanded to sample and measure the instantaneous value of ratemeter voltage. Print command and binary coded decimal outputs are available from the DVM which are connected to the counting circuits of a printing counter unit. If the associated print command pulse following each DVM measurement is applied to a decade counter the printer performs the addition of ten measurements of heart rate before it is commanded to print out the total.

#### The induction of physical dependence to morphine in the rat using a subcutaneously implanted reservoir

P. G. GOODE (introduced by A. B. WILSON), *Department of Pharmacology, Wyeth Institute of Medical Research, Taplow, Buckinghamshire*

The use of morphine-dependent animals for predicting the dependence liability of analgesic drugs in man is now generally accepted. Many workers have produced