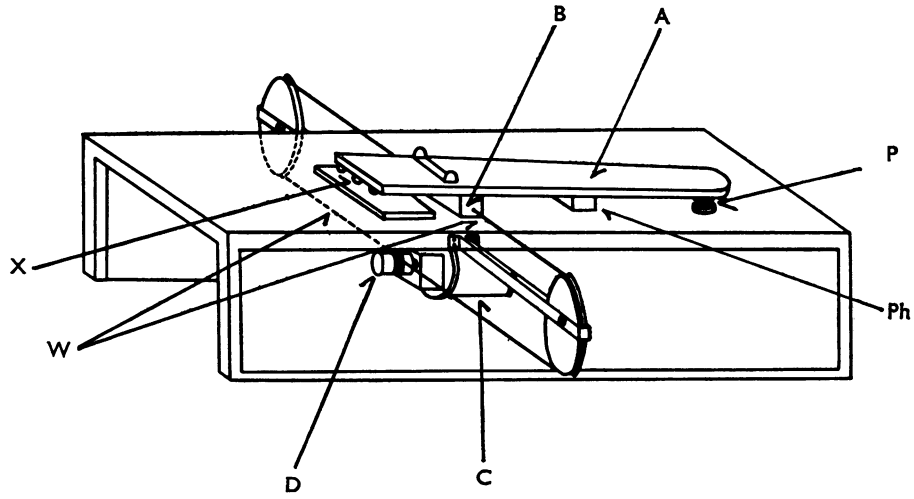

FIG. 1. Diagrammatic representation of apparatus for measuring passive resistance to movement of the forearm in man.

Air bearings can be used instead of ball bearings.

I thank Mr. B. Nichols, Mr. S. Smith and Mr. A. H. Weston for their technical assistance.

Stress-induced oral and gastric ulcers in rats

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The " stress " of a period of physical restraint is a well established means of producing gastric ulcers in rodents (Brodie, 1968). The mode of production of these ulcers is generally considered to be similar to that of stress-induced gastric ulcers in the human. A similar relationship between certain oral lesions and psychological stress in the human has also been suggested. Random examination of the oral cavity of rats subjected to 24 hr of physical restraint showed that oral ulcers as well as gastric ulcers were being produced, thus prompting a detailed study of this phenomenon.

Male and female Wistar rats were subjected to 24 hr of physical restraint by enclosure in plaster of Paris bandages, a successful technique first demonstrated by Martindale, Somers & Wilson (1960). At the end of this period the rats were killed with ether, their stomachs removed, washed with warm water and inflated with formol saline. Gastric ulcers were then detected by macroscopic examination of the stomachs under transmitted light.

Oral ulcers were detected as follows: After the animals were killed, the head was removed and immersed in formol saline solution for 48 hr with the jaws gagged open. The tongue, soft palate and lower lip were then removed and examined for ulcers by macroscopic examination, but in this case application of 2% fluorescein solution was necessary in order to render the ulcers easily visible.

Gastric ulcers were found only in the glandular portion of the stomach; no rumen ulcers were observed. Oral ulcers, on the other hand, were found on the tongue, palate and lower lip to significantly different extents. There were no signi-

ficant differences between the incidence of ulcers occurring in male and female animals under both experimental and control conditions for either type of ulcer.

It is suggested that the restraint-stress technique of producing oral and gastric ulcers might prove useful as an evaluative measure of the " anti-ulcer " activity of drugs against both types of ulcer.

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REFERENCES

BRODIE, D. A. (1968). Experimental peptic ulcer. *Gastroenterology*, **55**, 125–134.

MARTINDALE, K., SOMERS, G. F. & WILSON, C. W. M. (1960). The effect of thalidomide in experimental gastric ulceration. *J. Pharm. Pharmac.*, **12**, 153T–158T.

Electroanaesthesia as a pharmacological technique

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Recent progress in electroanaesthesia has been reviewed by Smith, Tatsuno & Zouhar (1967). This technique has now been investigated with a view to using it in pharmacological experiments. A diagram of the apparatus is shown in Fig. 1. It will deliver a mixed direct and pulsed current. The direct current (d.c.) generator was based upon the circuit described by Smith, Goodwin, Fowler, Smith & Volpitto (1961). Pulses were generated from a transistorized variable multi-vibrator which was capable of delivering rectangular pulses with a frequency range between 30 and 20,000 pulses/sec. Pulse width could be varied independently of frequency. At a frequency of 100 pulses/sec, pulse width could be varied between 1 and 9 msec. The oscilloscope was calibrated from the output of a sine/square wave oscillator. The amplified output from the oscillator could also be used as an alternative source of alternating (sine or square wave) current.

The most critical parameters for electroanaesthesia are the two currents passing through the animal. Since this current cannot be determined until the voltage is

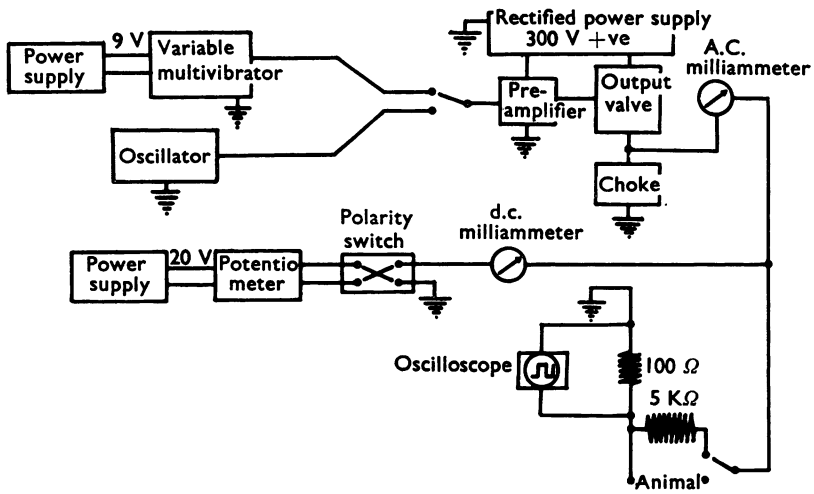

FIG. 1. Diagram of the electroanaesthesia apparatus. It consists of two components, a direct current generator and a pulsed current generator. The mixed direct and pulsed output is used for inducing and maintaining anaesthesia.