

resulted in such a high mortality that they could not be used in these studies.

Graph 1 depicts the results obtained in these persistence studies on thevetin as compared with a previously established curve for ouabain.<sup>9</sup> We were astounded by the relative evanescence of the thevetin action, finding practically no persistence of effect in the pigeon after 3 hours. Similar experiments on 8 cats (employing an initial dose of 75% of the average M.L.D.) showed about 15% of its effectiveness remaining after 24 hours. This figure approaches the limit of error for this method of bioassay. These experiments upon pigeons and cats indicate that thevetin is one of the most rapidly eliminated (physiologically) digitaloids yet described.

## 9105 P

### Ureteral Pain as Determined by Faradic Stimulation in Man.

NELSE F. OCKERBLAD AND HJALMAR E. CARLSON. (Introduced by C. J. Weber.)

*From the Department of Urology, University of Kansas School of Medicine, Kansas City, Kansas.*

In studying the ureteral contractions by the electrical method as described by Paladini,<sup>1</sup> it occurred to us that the localization of ureteral pain could be studied by applying a stimulus to the electrode and having the patient describe the area in which the pain was felt. Experiments of this kind have been extensively done on the pleura, pericardium and peritoneum by Capps<sup>2</sup> and more recently by Boyden and Rigler<sup>3</sup> on the gastrointestinal tract.

Since the electrodes used in the contraction studies were not quite suitable for pain distribution studies, a special electrode with a single metal contact at the tip was manufactured for this purpose by the American Cystoscope Makers, Inc. A Harvard inductorium was used for the source of current with 6 volts on the primary circuit. The inactive electrode was applied to the chest.

The patient was cystoscoped, the ureteral catheter electrode was introduced into the ureter and stimulation was made at various

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<sup>1</sup> Paladini, A., *Arch. ital. di urologia*, 1934, **11**, 211.

<sup>2</sup> Capps, J. A., *An Experimental and Clinical Study of Pain in the Pleura, Pericardium and Peritoneum*, Macmillan Company, New York, 1932.

<sup>3</sup> Boyden, E. A., and Rigler, L., *J. Clin. Invest.*, 1934, **13**, 833.

levels up the ureter. The distance between stimulation points was 5 cm., since it was felt that too frequent stimulation led to indefinite and inaccurate interpretation. After the conclusion of the experiment pyeloureterograms were taken to exclude pathology in the urinary tract.

The results obtained in 8 patients so studied may be briefly summarized as follows:

In the lower one to 2 cm. of the ureter, the pain was referred suprapubically, being almost in the midline and extending upward about 4 cm. Pain into the perineum occurred in some cases but was not constant. Five centimeters from the ureteral orifice the pain was higher and somewhat lateral to the midline. The pain was always below the iliac crest and somewhat medial to McBurney's point. In many cases the patient complained of pain in the inside or outside of the thigh or inside of the leg at this level. In others, pain in the leg was only noticed at somewhat higher levels. From 10 to 20 cm. the pain was referred in practically the same abdominal areas as the lower levels but pain on the inside of the leg often extending to the toes was the rule. At the 25 cm. level the patient complained of pain over the anterior portion of the iliac crest and anterior iliac spines which was also present at the 26 and 27 cm. level. When the interior of the kidney was stimulated the pain was always referred to the back. In one case with a left chronic hydro-nephrosis and hydroureter no pain response could be elicited, which is in accord with clinical experience in these cases.

### 9106 P

#### Excitant Action of Morphine on the Long-surviving Decorticated Cat.\*

W. E. HAMBOURGER.†

*From the Department of Pharmacology and Toxicology, Yale University, New Haven, Connecticut.*

Morphine is known to be excitatory to several species of animals. The cat especially gives a violent maniacal response. As the first step in an analysis of this excitant action, the effect of morphine has

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† Department of Pharmacology, Western Reserve University, Cleveland, Ohio.