marked flow of saliva. The extract was injected intravenously into dogs under barbital-ether anesthesia in which Wharton's duct had been cannulated. Quantities of extract sufficient to lower the blood pressure from 60 to 80 mm. of Hg were injected without any evidence of increased flow from the cannula. In each case stimulation of the chorda tympani nerve gave a marked response.

The second method was a study of the effect of the application of 0.4% HCl to the tongue of a dog in which one submaxillary gland had been denervated. A fistula of Wharton's duct was prepared in each of 2 dogs. After recovery from the operation, the dogs were placed in the stocks daily, and 0.4% HCl was applied to the tongue. A copious flow of saliva resulted. Three weeks after the first operation, the chorda tympani and cervical sympathetic nerves were sectioned, and the daily applications of acid to the tongue resumed on the second day after the operation. The nerve section caused an immediate cessation of the flow of saliva from the fistula, and in no case was there any effect produced by the acid.

Although the results reported were obtained in only 4 acute experiments and 2 fistula dogs, they are so consistently negative that we feel them adequate to support the conclusion that there is no hormone mechanism for salivary secretion in the dog.

4670

Attempts to Visualize the Gall-Bladder of the Rabbit with Tetraiodophenolphthalein.

H. C. LUETH AND A. C. IVY.

From the Department of Physiology and Pharmacology, Northwestern University Medical School.

In previous work[1] we were unsuccessful in attempts to record a gall-bladder contraction in the rabbit on the injection of cholecystokinin. It was reasonable to suppose by analogy from Graham's and Cole's[2] work, that we would be able to study the problem roentgenologically, after the administration of sodium tetraiodophenolphthalein. Graham, Cole and Copher[3] report that they have visualized the gall-bladders of rabbits after the subcutaneous injection of

[1] Lueth, H. C., Ivy, A. C., and Kloster, G., *Am. J. Physiol.*, 1929-30, xci, 329.

[2] Graham, E. A., Cole, W. H., Copher, G. H., *J. Am. Med. Assn.*, 1925, lxxxiv, 15.

[3] Copher, G. H., *J. Am. Med. Assn.*, 1925, lxxxiv, 1563.

sodium tetrabromphenolphthalein, but add that these shadows were faint and inconsistent.

We hoped to get more consistent results using intravenous injections of tetraiodophenolphthalein. Because of our early failure in 4 rabbits to get shadows with the usual doses of 0.2 gm. per kilo, we increased the amount. Four rabbits were given 0.3 gm. per kilo, one of which showed toxic symptoms. One of 2 rabbits given 0.4 gm. died in 4 hours. Twenty-four rabbits were given the usual dose of 0.2 gm. per kilo, which proved fatal in 2 cases. This is in accord with Whitaker and Milliken,[4] who studied the toxicity of tetraiodophenolphthalein and tetrabromphenolphthalein, finding that 0.24 gm. is the largest single non-toxic dose for rabbits. Because of the possibility of missing the time of maximum concentration, which in dog and man is after 14 hours, the dye was given to fasting animals, and pictures taken every 2 hours until 40 hours after the injections. We were uniformly unable to obtain shadows of the rabbit's gall-bladder. As control experiments we injected the same dye, in the same dose (0.2 gm. per kilo) in dogs and sharply defined shadows were obtained.

Because of this lack of concentration of the dye in the rabbit, we took specific gravity determinations. We found the rabbit's gall-bladder bile to have a specific gravity of approximately 1.048, which is within the lower range of the specific gravity of gall-bladder bile of man and dog.

In one experiment in which the animal was killed by the injection of 0.4 gm. per kilo no shadow of the gall-bladder was discernible. On the death of the animal, 10 minutes later, a picture of the excised liver and gall-bladder was made. In this picture the gall-bladder was visualized but its shadow was no more dense than the more dense portions of the liver. This may be the reason why the rabbit's gall-bladder does not visualize, since it is so completely surrounded by the lobes of the liver.

[4] Whitaker, L. R., and Milliken, G., *Surg. Gynec. Obst.*, 1925, xl, 17.