visualized after the interpleural injection was the substernal glands, less than one hour after injection.

The animals were not injured by the interpleural injection of thorium dioxide. Those first injected several months ago are in apparent good health.

These experiments demonstrate that a colloidal substance, such as thorium dioxide, when injected as reported, is first absorbed by the substernal glands, by the lymph nodes and vessels of the thorax and by the lymph nodes and vessels beneath the diaphragm. It is believed that substances other than colloidal in character, such as organisms, if injected into the pleura in a similar manner will be absorbed by the lymphatic system in the same way.

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Excretion of Phenol Red by the Aglomerular Kidney.*

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The fact that the aglomerular kidney can excrete phenol red was first reported by Marshall and Grafflin[1] for the goosefish, and by Marshall[2] for the toadfish. Marshall and Grafflin[3] have described the excretion of phenol red by the aglomerular kidney following the intramuscular injection of varying doses, and the relation between the amount excreted and the urine volume. Their experiments were conducted on summer toadfish. The excretion of the dye was determined for a period of 5 hours. Averaging their figures gives the following results on

a. Effect of varying the amount of phenol red administered:

mg. Phenol Red per kg. body wt.	% excreted 5 hr.	mg. excreted 5 hr.
5	17.5	0.9
50	3.8	1.9
100	1.6	1.6

b. Effect of variations in urine flow:

*This work was made possible by a grant from the Graduate School Research Fund of the University of Minnesota.

[1] Marshall, E. K., Jr., and Grafflin, A. L., *Johns Hop. Hosp. Bull.*, 1928, **43**, 205.

[2] Marshall, E. K., Jr., *Am. J. Physiol.*, 1930, **94**, 1.

[3] Marshall, E. K., Jr., and Grafflin, A. L., *J. Cell. and Comp. Physiol.*, 1932, **1**, 161.

mg. Phenol Red administered per fish 200-400 gm.	Urine flow per kg. per 24 hr.	% excreted 5 hr.	mg. excreted 5 hr.
1.8	1.1	20.7	0.37
1.8	2.6	23.3	0.41
1.8	15.8	21.9	0.39

Thus, when the injected dose of phenol red was increased 10 times, the mg. excretion was only doubled, and with a further doubling of the dose the excretion remained practically constant. In the second group of experiments, when the urine flow increased 160% the phenol red excretion increased only 12% and lastly with a further increase in urine flow of 600% the phenol red excretion remained practically constant. This proves that for the aglomerular kidney the secretion of phenol red is neither proportional to blood concentration nor dependent upon urine flow.

Marshall[4] has also shown in the toadfish, that from a blood concentration of 0.6 mg. % of phenol red, the urine produced may contain as much as 250 times this concentration; whereas from a blood concentration of 19 mg. %, the phenol red concentration in the urine only reaches a figure 14 times that in the blood. This shows that with increasing the blood concentration the efficiency of the kidney is decreased.

As the dosage employed by Marshall and Grafflin was much higher than that used in the human, it was thought worthwhile to study the excretion of phenol red by the toadfish using doses comparable to the arbitrarily accepted 6 mg. dose for the human. This paper reports these experiments. As the urine flows of toadfish in this laboratory have been found to be low and extremely constant, the effects of varying urine outputs were not included. The results obtained following the intramuscular injection of varying quantities of phenol red completely confirm the findings of Marshall and Grafflin.[3]

The toadfish used in this study can, perhaps, best be called winter fish. They were shipped from Baltimore in October and November. In the laboratory, they were contained in aquaria filled with half strength artificial sea water (240 millimols NaCl per liter). The formula for the preparation of the sea water was obtained from McClendon, Gault and Mulholland.[5] The fish lived extremely well in the laboratory; none died. They were fed once per week on either fresh oysters from the shell, or canned oysters.

[4] Marshall, E. K., Jr., *Am. J. Physiol.*, 1931, **99**, 77.

[5] McClendon, J. F., Gault, C. C., and Mulholland, S., Publication No. 251 of Carnegie Institution, Washington, 1917, 21.

The experimental procedure was to remove the fish from the aquarium with a net, weigh, tie off the urinary papilla, inject the phenol red intramuscularly dissolved in 0.4 to 0.6 cc. of water and then return the fish to the aquarium. The fish were out of water, for these steps, for only 2 to 3 minutes. Two hours later, the fish were again removed from the aquarium, sacrificed, and the urine removed from the bladder with a hypodermic syringe. In addition, the bladder was always washed out twice with small volumes of distilled water. The dye in the urine was then determined with a micro Duboscq colorimeter.

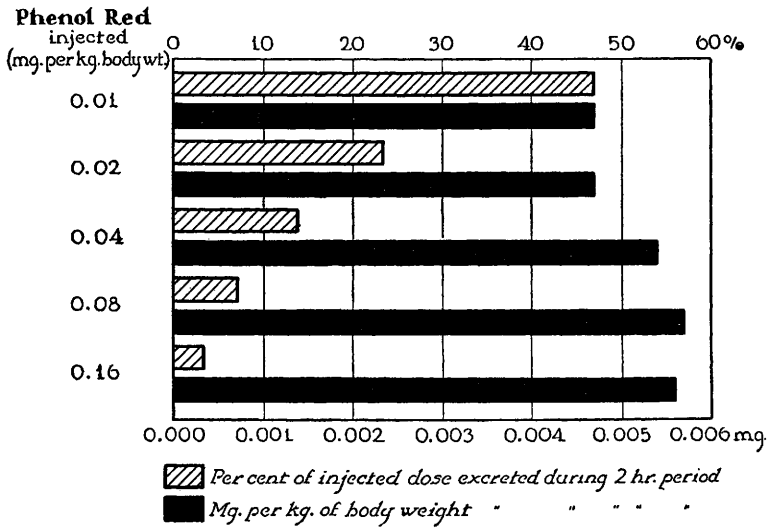

FIG. 1.
Excretion of Phenol Red by Aglomerular Kidney of the Toadfish.

Fig. 1 shows graphically the average % excretion and the average mg. per kg. of body weight excretion of phenol red for the 5 doses administered; namely, 0.01, 0.02, 0.04, 0.08, and 0.16 mg. per kg. Each time the injected amount of phenol red is doubled the % excretion is cut almost in half. On the other hand, the excretion in mg. per kg. of body weight remains constant or possibly tends to increase very slightly over the 5 dosages studied. Assuming uniform absorption of the dye from all injections, these results indicate that the secretion of phenol red by the aglomerular kidney is not dependent upon the blood concentration, and therefore does not agree with the ordinary concepts of filtration or diffusion.

Summary. When phenol red is injected intramuscularly into toadfish in doses of 0.01, 0.02, 0.04, 0.08 and 0.16 mg. per kg. of body weight, the % elimination from these doses is 47, 23.5,

13.9, 7.3 and 3.5, respectively. Based on body weight of the fish, this elimination amounts to 0.0047, 0.0047, 0.0054, 0.0057 and 0.0056 mg. per kg. Through this series, increasing the injected dose up to 16 times, increases the mg. per kg. elimination by not more than one-fifth. In other words the excretion remains practically constant.

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Modification of Skin Sensitivity to Neoarsphenamin in Rabbits Treated with Potassium Iodide and Bromide.

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It has been demonstrated[1, 2, 3] that a nonspecific positive luetin reaction can be produced in the human subject and animals by the administration of potassium iodide. The object of the present study was to ascertain whether or not potassium iodide and bromide are capable of exerting a similar influence on the skin hypersensitiveness to neoarsphenamin in rabbits.

This work included 2 experiments, involving 76 adult male albino rabbits. Twenty-four of these animals which had been inoculated with *Treponema pallidum* from 5 to 8 months previously, were distributed in both experiments and were all in the latent stage of the infection at the time of the experiments. The neoarsphenamin solution was prepared and the rabbits were shaved according to the methods described previously.[4] The brand of neoarsphenamin used was that prepared by Hoechst Company, Germany, and the ampoules employed were always from the same batch. The rabbits were sensitized and tested with 0.2 cc. of freshly prepared 0.15% neoarsphenamin in normal salt solution. The right flank of the animal was used for the sensitizing injection and the left for the testing injections, all being intradermal. The hyper-

[1] Sherrick, J. W., *J. Am. Med. Assn.*, 1915, **65**, 404.

[2] Kolmer, J. A., Matsunami, T., and Broadwell, S., Jr., *J. Am. Med. Assn.*, 1916, **67**, 718.

[3] Kolmer, J. A., Immerman, S. L., Matsunami, T., and Montgomery, C. M., *J. Lab. and Clin. Med.*, 1917, **2**, 401.

[4] Mu, J. W., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 781.