The Accumulation of p-Aminohippurate and Chlorphenol Red In Slices of Dogfish Kidney

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Incubation of thin slices of Dogfish kidney with varying concentrations of chlorphenol red in a suitable oxygenated medium for 20 minutes at 25° C. did not produce any luminal concentration of the dye. Thus, these preparations behave qualitatively like slices of mammalian kidney cortex *in vitro* and, unlike teased preparations of teleost and amphibian kidneys, lack an active cell to lumen transport process. Chlorphenol red, over a range of 0.000033 to 0.002 M, was accumulated by slices at a rate proportional to concentration (0.18 to 7.1 micromoles/gm./20 min.) without inhibition of respiration. *p*-Aminohippurate, over the same concentration range was accumulated at the rate of 0.17 to 2.9 micromoles/gm/20 min. The accumulation of PAH from a 0.00033 M solution was markedly inhibited by chlorphenol red at 1/10th or more of that molarity. Contrarywise, the accumulation of chlorphenol red from a 0.00017 M solution was not inhibited by PAH until the latter was 10X more concentrated.

Electron Microscopy of Saline Secretion

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Normal and treated dogfish, *Squalus*, were used for continuing studies on the fine-structure of the rectal salt-gland. Variant fixation procedures were used, and the material was embedded in epoxy resin. Previous work on the nasal salt-gland of sea gulls revealed that the cytoplasm of the principal cells is deeply cleft into leaflets by basal infoldings of the cell membrane. In contrast, the cells of the rectal salt gland of elasmobranchs show marked lateral infoldings of cell borders and the presence of a complex series of vesicular elements. Vacuoles arise at the cell borders and other vacuoles fuse with the lumen of the tubule.

A variety of other organisms was prepared for exploratory examination of salt secreting mechanisms.

Urea and Ammonia Excretion in the Frog

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A study was undertaken of urea and ammonia excretion by the skin and kidney of local (*R. clamitans*) and bull (*R. catesbiana*) frogs. Unpublished studies by Homer W. Smith had shown that ammonia in addi-

tion to urea was present in excretions from both organs, but the possibility remained that the ammonia was a decomposition product and was not excreted as such. Accordingly, objectives of the present work were to determine: (1) the quantity of ammonia excreted by the adult frog skin, (2) the relative amount of nitrogen excreted by the skin and kidney, and (3) the factors influencing the mode of nitrogen excretion.

Retention catheters were inserted in the cloaca and the frogs were placed in small vessels containing water buffered at pH 7. Excretions from the kidneys and skin were then analyzed separately for ammonia and urea. Repeated experiments in the presence of high concentrations of streptomycin, penicillin G, and achromycin showed that ammonia was still present in the excretions from both organs. The division of excretion between skin and kidney varied widely, but in all cases both organs excreted significant amounts of nitrogen; the ammonia nitrogen from each organ was in most cases between 0 and 20 per cent of the total.

The data were marked by wide variations in the mode of excretion, however, and it was not determined which of the many variables such as diet, temperature, presence or absence of bath water, sex or species of frog were responsible for this variation. The presence or absence of bath water did not appear to be an important variable in this respect.

Preliminary experiments were performed on the relative rate of excretion of urea and thiourea by the skin and kidney. Again, both organs were important in excreting exogenous loads of these compounds and, by comparison with in vitro data, simple diffusion seemed adequate to explain loss through the skin. Permeability of the skin to thiourea was approximately 50 per cent greater than to urea.

Transpleural Exchange Rates in the Frog

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Three types of experiments were performed on 24 adult bullfrogs (Rana Catesbiana): 1) the display of the blood vessels on the surface of the lung; this procedure involved the in-situ injection of 10 ml of saturated calcium chloride into the beating heart, filling of the lungs with saturated sodium bicarbonate, fixation of the fluid-containing lungs in formalin and clearing of the lungs in a one per cent solution of potassium hydroxide containing Alizarin Red S, 2) introduction of the test solution by tracheal catheter into one lung of the pithed, live frog followed by removal of the lung ("dead lung") for immersion in an isosmotic frog Ringer's solution and 3) expression of one lung through a slit in the thorax of a pithed frog followed by introduction of the test solution by tracheal catheter into the exposed lung and immersion of the in-situ lung ("live lung") in an isosmotic solution. The injection method served to illustrate the fine vascular pattern of the surface of the lung by precipitating calcium in the vessels and staining the precipitate with Alizarin Red. The behavior of the