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RECTAL GLAND FLUID-PLASMA RATIOS OF INULIN AND POTASSIUM IN THE SPINY DOGFISH

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Natural rectal gland fluid contains no positive blank with the inulin method of Schreiner. With plasma levels of 15 - 17 mg %, only immeasurable traces of inulin appear in rectal gland fluid.

The ability of the rectal gland to concentrate potassium has not been studied critically. Dr. Helen Cserr analyzed two species of Squalus acanthias and found rectal gland fluid-plasma levels of 6.7/3.3 and 8.5/3.9 mMoles/1. These data together with the analyses of Burger and Hess, Science, 131:670, 1960, indicate a concentration of potassium in rectal gland fluid of the same approximate percentage as sodium. These data indicate that further experimental analysis is worthwhile.

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FURTHER STUDIES ON EXTERNAL SODIUM FLUXES IN THE DOGFISH, Squalus acanthias

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Continuing the studies begun by Burger and Tosteson (Comp. Biochem. Physiol., in press, 1966) on the uptake of sodium by the head end of the spiny dogfish, work was done in the following areas: (1) a disappearance from plasma curve of injected Na^{22}, as a basis for quantitative calculations; (2) more data on uptake of Na^{22} by the head end of the fish; (3) efflux of injected Na^{22} by the head end; (4) uptake of injected Na^{22} by the skin alone, using a sea water bath containing Na^{22} in a plastic bag, ligated anteriorly behind the pectoral fins, and posteriorly before the cloaca. A rapid stream of running sea water was directed posteriorly, and there was no possibility that the head (gills and oral surface) were contaminated by leakage; (5) the effect on Na^{22} uptake by the head in a bath containing ouabain (1 m mole/1). In all bath experiments, the tail of the fish was placed in a plastic bag, ligated anteriorly of the cloaca, to avoid contamination of the bath by urine, rectal gland fluid, or feces. All bath experiments were performed at 9-10° C. Other methodology was that described by Burger and Tosteson above. Counting of Na^{22} was done with a Geiger tube on dried planchetted volumes.

The data secured is too voluminous for the present limitations of space, and will be presented as abstract summaries in the numerical order of the experiments given above.

1) A Na^{22} disappearance from plasma curve was obtained over a 9-hour period. It could be approximated by the sum of three exponential processes having time constants of 5 min, 1.43 hours, and 48 hours. Using this plasma disappearance curve and applying the superposition formula for linear systems, the assumption that the Na^{22} uptake from the sea water was constant gave an excellent fit between the calculated uptake curve and the observed appearance of Na^{22} in the plasma after it was placed in the sea water around the head.