are handled similarly by the renal tubules of this elasmobranch. It was difficult to determine the manner in which urea is handled by the kidneys of Potamotrygon because of the inability to collect urine samples uncontaminated with cloacal contents in these small fishes (ca 100g) with no urinary bladder. Glomerular filtration rates estimated from inulin clearances average 8.3 ml/kg x hr as determined in four clearance periods in two freshwater rays. These values are 10-15 times those found in small marine skates Raja erinacea and significantly higher than glomerular filtration rates observed in Squalus. In contrast to marine elasmobranchs in which 85-90% of the urea filtered at the glomerulus is reabsorbed by the renal tubules, a renal clearance study done on a single Potamotrygon indicated that only about 50% of the filtered urea is reabsorbed by the renal tubules of this fish. Thus, acclimatization of this elasmobranch to freshwater environment is accompanied both by increased glomerular filtration rate and decreased tubular reabsorption of urea, both factors leading to elevated rates of renal excretion of the compound. These studies indicate that the low level of urea in Potamotrygon is due to both increased rate of excretion and decreased rate of biosynthesis of the compound.

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1970 #14

INVESTIGATIONS OF LIVER RESPIRATION IN DOGFISH (Squalus acanthias) AND LITTLE SKATE (Raja erinacea)

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Previous studies (Physiol. Zool. 42:231-47, 1969) have shown that in the skate, Raja erinacea norepinephrine is twice as effective as epinephrine in elevating blood glucose levels but has little effect in the dogfish, Squalus acanthias. The present investigation was initiated as a pilot study to investigate the effect of norepinephrine and other substances on respiration in whole homogenates of elasmobranch liver. Routinely, 700 or 350 mg of tissue were homogenized in a 3 ml chilled medium of sterilized seawater or modified Elasmobranch Ringers (no glucose component). Both media proved equally successful. Respiration was determined using a YSI model oxygen electrode in test runs of 15 minute duration at 15, 17, 19 and 25°C, and recorded in μl O_2 consumed ml homogenate/minute. In one series of experiments respiration was studied on 100 mg slices of skate liver.

Rise in temperature from 15°C to 25°C in 700 mg of dogfish homogenate produced a slight rise in respiration from an average of 0.062 to 0.083 μl O_2/ml/min, but a threefold rise in the skate from an average 0.094 to 0.312 μl O_2/ml/min. This species differential is probably due in part to the higher fat content of the dogfish liver preparations. However, as nitrogen determinations were not made, species comparisons remain obscure. Determinations were eventually made on 350 mg of skate tissue at 25°C so as to achieve oxygen consumption ranges closer to those for 700 mg of Squalus liver.

The results of metabolic substances and mammalian hormone preparations on homogenate respiration are described below. During each trial an experimental sample was run simultaneously with that of a control. Recordings from the experimental and control electrode were alternated at approximately two minute intervals.

1. Glucose and Lactate. In both species the addition of 10 μg of anhydrous glucose or lactate produced slight but significant rises in respiration of homogenates. However, amounts of glucose above 50 μg were inhibitory indicating the presence of a Crabtree effect.

2. Norepinephrine. Homogenates receiving 10-95 μg of norepinephrine-bitartrate (Sigma) showed a significant rise in respiratory rate over controls from 0.13 ± .007 to 0.189 ± 0.011 μl O_2/ml/min in Raja. In the dogfish norepinephrine had, if anything, a slight depressant effect.

3. Glucagon. 5 μg glucagon (Lilly) produced the largest responses recorded in both Raja and Squalus, with respiratory rates nearly doubled over those of controls.

4. 100 mg tissue slices of skate liver exhibited higher rates of oxygen consumption than 350 mg of homogenate at 25° C.

The above experiments indicate that liver homogenates and slices in a simplified Ringer's medium may be used to determine endogenous respiration rates in elasmobranchs. Endocrine secretions known to influence carbohydrate metabolism such as glucagon and norepinephrine have a positive effect on liver respiration in the skate. That norepinephrine had little or no effect on dogfish preparations tends to confirm earlier work on the effect of catecholamines on blood sugar levels. In future investigations it is suggested that liver slices may prove a more effective means of studying respiration rates than homogenates.

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1970 #15

DISTRIBUTION OF ^{14}C-DDT IN THE LOBSTER

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Many studies have been conducted where assays for levels of DDT are reported only in terms of the whole body of fresh water or marine species. It was felt that it would be much more informative to study the organ distribution of this important pesticide after administration of ^{14}C-DDT. Lobsters weighing about 500 g were procured from local lobstermen. Animals received 0.1 mg/kg of ^{14}C-DDT (Amersham/Searle, ring labeled) in 50% ethanol by injection into the pericardial sinus. After various times indicated in Table 1, the lobsters were dissected, and organs were prepared for subsequent assay for total ^{14}C (DDT plus metabolites) by the combustion technique. The chemical nature of the radioactivity is currently under investigation by use of combination gas chromatographic-mass spectro-photometric methods. The results in Table 1 show that DDT is rapidly removed from the plasma while there is a striking, persistent increase in the amount of radioactivity found in the liver (hepatopancreas). Preliminary results showed that this organ was about 60% fat, and this may explain the selective localization of the very lipid-soluble DDT. Most other organs, i.e., green gland, stomach, male gonads, brain, gills, claw muscle, and tail muscle, while decreasing in the amount of ^{14}C by the 7th day, always contained greater amounts of radioactivity than did plasma. The levels in lobster intestine remained rather constant for 7 days. The high initial levels in heart are undoubtedly related to the mode of administration. It was noted that egg masses contained more of the radioactive material than