phate. Plasma phosphate was about 1.6 mg %. Exogenous inorganic phosphate which raised blood level to about 8 mg %, resulted in phosphate appearing in the urine. Urinary phosphate disappeared before plasma phosphate fell to control levels. Like glucose then, the nephridia totally retain phosphate at normal levels, but permit it to spill over into the urine at higher levels. Since phosphate can disappear from the blood without urinary excretion, it seems likely that the carapace which contains phosphate serves as a dynamic reservoir.

Analyses made by Dr. Alvin Rieck for trimethylamine oxide, showed substantially more of this substance in the urine than in the blood, but not enough to account for the total urinary NPN.

The Mechanism of Acidification of Dogfish Urine and the Effects of 6063 Injections on the Blood and Urine of Fishes*

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Several years ago, it was reported (W. W. Smith) that the urinary pH in both dogfish and sculpin is fixed at about 5.7 and cannot be changed by the intravenous administration of a variety of substances. It was suggested that the fixity of the urinary pH might be related to the fact that in marine fish the urine contains large quantities of magnesium which precipitate as $Mg(OH_2)$, $Mg(NH_4)PO_4$, or $MgHPO_43H_2O$ if the urinary pH exceeds 6.0. The mechanism of acidification was, by a process of exclusion, related to exchange of H ions for cations as previously hypothesized (H. W. Smith, 1937). Support for this mechanism was subsequently adduced by others in mammals, using either sulfanilamide, or the sulfonamide derivative "Diamox" (6063) to inhibit the carbonic anhydrase involved in the hydrogen ion exchange mechanism.

Studies were conducted during the summers of 1952-1954 on acidification mechanisms of the urine of marine dogfish (*Squalus acanthias*), sculpin (*Myoxocephalus scorpius*), and fresh water catfish (*Ameirus nebulosus*), and on the effects of "Diamox" on blood and plasma composition.

In the dogfish and catfish, urine was collected from a rubber balloon attached to an indwelling urinary catheter. In the sculpin, the urinary papilla was ligated and urine was collected by direct puncture of the bladder. Whereas each dogfish and catfish served as its own control, separate groups of sculpins were used for control and experimental periods.

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All blood and urine samples were drawn anaerobically. All test substances were injected intravenously or intramuscularly.

The following anaylses were performed: pH, total CO_2, urea, chloride, sodium, potassium, freezing point depression, phosphate, inulin, ammonia, and titratable acidity.

The pH of dogfish urine was unaffected by the injection of: sodium bicarbonate, alkaline phosphate, sodium phosphate, creatinine, p-aminohippuric acid, maleate, mercuhydrin, BAL, sodium fluoride, iodoacetic acid, beryllium sulfate, dinitrophenol, and potassium chloride. Variations in titatable acidity were directly related to variations in phosphate excretion.

In the dogfish and sculpin, the intravenous administration of "Diamox" failed to alter the composition of the urine with respect to CO_2, bicarbonate, sodium, potassium or volume. This lack of response to "Diamox" contrasted sharply with that elicited in the catfish, which responded as does the mammal: an increase in urine flow, an alkalinization of the urine, and an increased excretion of bicarbonate, sodium and potassium. Both catfish and dogfish manifested a decrease in blood pH.

Despite the lack of renal response to a challange with bicarbonate, the level of bicarbonate in the dogfish serum was not appreciably altered by the intravenous administration of the maximum tolerated doses.. However, the combination of bicarbonate and "Diamox" resulted in a sustained rise in serum bicarbonate and pH.

The results of these experiments indicate that the acidification of dogfish and sculpin urine is independent of a "Diamox-sensitive" carbonic anhydrase system. They also suggest that there exists an extra-renal site which is susceptible to the action of "Diamox".

Studies on the Regulation of Bicarbonate Concentration in the Coelomic Fluid of the Sea Urchin*

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Many years ago it was noted (H. W. Smith) that the coelomic fluid of the sea urchin (*Strongylocentrotus*) had a bicarbonate concentration of approximately 4 millimoles/liter as compared with a bicarbonate concentration of 1.8 millimoles/liter in the surrounding sea.

Experiments were carried out in an effort to determine whether an active mechanism of acid-base balance was operating in maintaining this difference.

Coelomic fluid, drawn in anaerobic syringes, was obtained by

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