1965 #4

OSMOREGULATION IN Squalus acanthias IN HYPEROSMOTIC ENVIRONMENT

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According to Smith, the dogfish obtains free water to form its hyposmotic urine from the sea by movement of water down a concentration gradient across the gill membrane. The concentration gradient for water is supplied by the addition of urea to the plasma electrolytes, raising the total osmotic concentration of the fish to approximately 50 mosmols above the sea water.

To exercise this hypothesis, dogfish were placed in cooled, aerated tanks containing sea water to which was added marine salt (2 experiments) commercial NaCl (2 experiments), urea (3 experiments) and sucrose (1 experiment) in amounts sufficient to reverse the normal osmotic gradient across the gills. The fish were studied for from 1 to 5 days during which plasma and urine osmolality, sodium and urea concentration were followed. The following preliminary conclusions may be drawn:

(1) Regardless of the substance used to increase the osmotic concentration of the sea water, the dogfish plasma osmolality increased over the course of 3-5 days to exceed that of its environment.

(2) This increase in plasma concentration is effected by an increase in plasma sodium concentration, not by urea.

(3) During the time that the environment is more concentrated than the fish, hyposmotic urine continues to be formed.

(4) As urine osmolality increases, urea forms the principle contributing substance to this increase.

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DYNAMICS OF SULFABROMOPHTHALEIN SECRETION BY THE LIVER OF THE SPINY DOGFISH, Squalus acanthias, WITH SPECIAL REFERENCE TO MEASUREMENT OF HEPATIC BLOOD FLOW

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The comparative physiology of the liver is as yet poorly defined. The large liver of the dogfish is of especial interest (10-12% of body weight, about 30% fat). The following data continue studies begun by us in 1956. Not all analyses were completed when this abstract was written, so the facts and conclusions given below may require reinterpretation.

Studies on dog and man indicate that BSP (sulfabromophthalein) is taken up by the liver by a process of accumulation—or storage—into what may be defined as a constant volume of distribution, and then transferred into the bile by a limited transfer system. At low concentrations, the extraction of BSP from the blood is sufficiently large to permit an estimation of hepatic

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