mean whole body intracellular pH measured 6.97 pH units. Intracellular pH in the dogfish is not significantly different from that found in man and in the dog. The pH gradient between extra- and intracellular water averages 0.44 pH units indicating that the H^+ concentrations of intracellular water is 2.7 times as large as that of extracellular water.

This work was supported by a research grant (H-5059) from The National Heart Institute of the National Institutes of Health, Public Health Service.

Extracellular Volume (Sucrose Space) In The Dogfish

Eugene D. Robin, Gerald P. Rodnan and Margaret H. Andrus
University of Pittsburgh Medical School

The extracellular fluid volume (E.C.F.) is not completely defined conceptually. It is now generally accepted that the volumes of distribution of sucrose and inulin more closely approximate E.C.F. than the volumes of distribution of other test substances. These substances appear to be appropriate both because they are biologically inert and because, in general, they do not penetrate cell membranes. To our knowledge, no previous measurements of E.C.F. in the dogfish have been made. Investigation of the metabolism of sucrose reveal that a relative plateau of plasma sucrose concentration is reached four hours after the intra-vascular administration of 0.50 gms. of sucrose. This plateau is based on the fact that no excretion occurs across the gills, and, urinary excretion, although present, is quite small. For practical purposes, urinary excretion may be disregarded and E.C.F. calculated as follows:

$$\text{E.C.F. (liters of plasma water)} = \frac{\text{Total sucrose injected}}{\text{Plasma sucrose concentration} \times 0.93 \quad (\text{time} = 4 \text{ hrs.})}$$

Measurements of the E.C.F. in 17 dogfish averaged 0.65 ± 0.51 L. which amounted to $20 \pm 3.5\%$ of total body weight.

This work was supported by a research grant (H-5059) from The National Heart Institute of the National Institutes of Health, Public Health Service.

Total Body Water (T.B.W.) and Intracellular Body Water In The Dogfish

Eugene D. Robin, Gerald P. Rodnan and Margaret H. Andrus
University of Pittsburgh Medical School

Textbooks generally state that total body water (T.B.W.) in fish is equal to 80% of total body weight. This statement oversimplifies the results of the data on which it is based. There is good evidence to indicate that T.B.W. varies from species to species and from individual to in-

dividual. Most measurements have been based on direct weights before and after drying. Such studies have lead to estimates by different workers of total body water in the dogfish ranging from 46% to 80%. No studies have been performed using the dilution of appropriate substances which distribute themselves through body water to approximate total body water. There has been no simultaneous measurements of T.B.W. and E.C.F. to approximate intracellular fluid volume (I.C.F.). The substance N-acetyl 4-aminoantipyrine (NAAP) has been shown to distribute itself in tissue in proportion to the water and to be negligibly bound to plasma proteins. It has therefore been used for measurements of T.B.W. in dog and man. In the dogfish following the intravascular injection of 0.50 gms. of NAAP, a relative plateau of plasma concentration is reached in four hours. This plateau is based on the fact that no excretion takes place across the gills and urinary excretion, although present, is quite small and may be ignored from the practical standpoint. Simultaneous measurements of the four-hour sucrose space permit the calculation of I.C.F. as follows:

$$\text{T.B.W.} = \frac{\text{NAAP injected}}{\text{Plasma NAAP concentration x 0.93 (time 4 hrs.)}}$$

I.C.F. = T.B.W. - E. C. F. (sucrose space)

These measurements were performed in 16 dogfish. T.B.W. averaged 2.28±0.98 L. which amounted to 66.1±2% of body weight. I.C.F. averaged 1.46±0.72 L. which amounted to 44±5.5% of body weight.

This work was supported by a research grant (H-5059) from The National Heart Institute of the National Institutes of Health, Public Health Service

Nitrogen Metabolism In The Tunicate, Halicynthia Pyriformis

Gerald P. Rodnan, Eugene D. Robin, and Margaret H. Andrus
University of Pittsburgh Medical School

Tunicates occupy a key position in evolution. The larval form is free swimming and has a definite notochord. The adult form is sessile and without a well-defined central nervous system. It seemed of interest to investigate the pattern of nitrogen metabolism in this animal. "Plasma" was obtained by bronchial puncture through the outflow siphon and measurements of plasma NH_4^+-NH_3, uric acid and urea nitrogen were performed in approximately 20 adults. Mean value for NH_4^+-NH_3 was 183±32 uM/L; plasma uric acid averaged 0.66±0.58 mg.%; blood urea levels were operationally 0 mg%.

Partition of nitrogen excretion was performed as follows: an indwelling polyethylene catheter was placed in the outflow siphon. The organism clamped the orifice tight and quantitative collections of efflux fluid could be performed. Infusions of desired composition could be administered by a similar catheter placed in the inflow siphon. Analysis of outflow fluid revealed the presence of significant quantities of ammonical