The ratio between the direct and reflected light with gray background 2 was just sufficient to cause about half of the fish to pale. Regardless of the intensity of light from above, a similar number always paled with this paper below since the same ratio existed.

If the fish assumed the shade of the background below because of the ratio of direct light to reflected light entering the eye, then fish should pale on gray 3 when its brightness is increased by illumination from below, and a ratio is established which is known to induce paling of the body. To test this hypothesis, a mazda lamp, inside frosted, was turned on under gray 3 while the source of illumination from above was eliminated. When the brightness of this paper was 1 foot-lambert, the fish immediately paled. With added illumination from above so that the ratio was 50:4, an intermediate shade was quickly assumed.

Fish, therefore, paled as long as the ratio of direct to reflected light was 50:10. Fish failed to pale on a brightly lighted gray background below because this background did not reflect enough light in comparison to the light coming from above. The shade assumed by the fish depends upon a ratio between the direct and reflected light because illumination of one region of the eye inhibits melanophoric response caused by illumination of the other region of the eye.

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THE EXCRETION OF CREATINE IN THE DOGFISH, *SQUALUS ACANTHIAS*

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The essential differences in the metabolism of creatine and creatinine in mammalian as opposed to submammalian forms have been known for many years. In mammalian forms the end product is excreted chiefly as creatinine, while in forms below the mammals creatine is the predominant excretory product. However, exogenous creatine administered to mammalian forms is in part excreted as creatine. In line with this metabolic difference between mammals and lower forms, it has been shown in previous communications (Am. J. Physiol.,

109, pp. 532-541; 542-549, 1934; Ann. Rep. Tortugas Lab., Carnegie Inst. Wash., 1935-36, pp. 90-91) that in dog and man the excretion of exogenous creatine may be adequately accounted for on the basis of a mechanism of filtration and perhaps reabsorption, while in the marine teleost, *Epinephilus morio,* in addition to the glomerular route, a tubular secretory mechanism must be invoked to account for the large amount of creatine appearing in the urine. A further study was undertaken of the mechanism of excretion of creatine in the dogfish, *Squalus acanthias.*

Simultaneous clearances of inulin and creatine were determined in 22 normal dogfish and in 4 after phlorizin, following the intravenous or intramuscular administration of creatine and inulin. The clearance of creatine at all plasma levels was found to be higher than the simultaneously determined glomerular (inulin) clearance. Below a plasma level of creatine of 10 mgm. per 100 cc. the creatine clearance is some 6 times the glomerular clearance while at plasma levels above 150 mgm. creatine per 100 cc. it drops off to 1.5 times the glomerular clearance. Thus at all plasma levels tubular secretion of creatine accounts for a considerable fraction of the creatine excreted. Calculation of the amount of creatine secreted by the tubule indicates that at low plasma levels there is some diminution in tubular secretory ability while at moderate plasma concentrations a secretory maximum of 50 to 60 mgm. per kgm. body weight per day is reached which is not exceeded though the plasma level be increased many fold. The secretory ability of the tubule for creatine is not influenced specifically by doses of phlorizin which are sufficient to paralyze the ability of the tubule to reabsorb glucose. The above evidence for a highly developed tubular secretory mechanism for creatine correlates with the known fact that a considerable fraction of total nitrogenous excretion in the dogfish is in the form of creatine.

THE EXCRETION OF PHOSPHATE IN THE DOGFISH, *SQUALUS ACANTHIAS*

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The excretion of inorganic phosphate in the dogfish was examined with two objects in view: to determine whether or not endogenous and exogenous phosphate are secreted by the tubules, and to what extent the pH of the urine is controlled by selective secretion of acid phosphate. Unfortunately the nature of the problem is such that, with the methods at our disposal, neither question can be answered definitely. We be-