and renal succinoxidase activity (90 μl $0_2$/100 mg DNA/min) are 9 to 10 times greater than in the latter. Comparative data from various species show that there is a significant correlation ($P<.01$) between TmPAH and renal succinoxidase activity in the goosefish, frog, dog, cat and rat.

## The Morphogenesis of Regenerating Scales In Fundulus Heteroclitus

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The cycloid scales of teleost fishes are capable of regenerating *in situ* soon after their removal. Since they are acellular structures, their replacement is accomplished by the calcification of the intercellular matrix in the vicinity of the dermal scleroblasts left behind after the scale has been plucked. Although scales can be successfully transplanted in the integumentary "pockets" from which they were removed, where they will resume growth, their implantation in other regions of the body is followed by resorption. Scales transplanted to fins or to intraocular sites were invariably eroded, presumably due to the paucity of scale-forming cells.

In other experiments, the ability to repair defects inflicted on scales was investigated. Various regions of scales were removed and the remaining parts were placed into the scale pocket to determine, after a suitable length of time, if the missing parts would be regenerated. If the anterior (proximal) region of a scale was removed by transverse bisection or by cutting a notch in the scale, regeneration of the removed parts occurred. Similarly, longitudinal bisection of the scale resulted in the replacement of the absent part adjacent to the residual half of the scale. Conversely, when posterior (distal) parts of the scale were removed, regeneration seldom occurred. It is concluded that the restoration of lost parts of scales, like that of entirely removed scales, depends upon the presence of scleroblasts capable of mediating calcification. The failure of scale regeneration in the more posterior regions, where the skin adheres to the removed scale, is apparently attributed to the absence of residual scleroblasts in such areas.

## Site of Urine Acidification in the Dogfish

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The ventral surface of the kidneys of unanesthetized dogfish (Squalus acanthias) was visualized microscopically and micropuncture of individual tubules performed. An aqueous solution of phenol red was injected with a micropipette into renal tubules to determine the site of the acidification of

the urine. Multiple injections in various types of tubules were performed and in all instances, save one, the dye turned yellow indicating an acid reaction. It was not possible to subsequently macerate the kidney and isolate the injected tubule in order to definitely localize the site of puncture. Nevertheless, the majority of the punctures can be assumed to have been in the proximal tubule, for this is readily identified in vivo by its large diameter. These results confirm the earlier findings of Kempton (This Journal page 34, 1940)

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## The Electrolyte Metabolism of the Swimbladder and Gastric Mucosa

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In 1922, J. S. Haldane proposed that gas was secreted into the swimbladder as a result of acidfication of the blood bathing the gas gland epithelium. The resultant changes of pH, $P_{02}$ and PCO2 were thought to be sequestered from the general circulation by counter-current exchange in the "rete mirable". Even though this has been the only credible explanation for gas secretion, no evidence had been provided either *in vitro* or *in vivo*. The isolated gas gland epithelium of the pollack was found to selectively secrete hydrogen ion into the solution bathing its serosal surface. This paves the way for identifying the acid secreted and clarifying the enigmatic role of carbonic anhydrase. ("The Teleostean Swimbladder", Nature, in press.)

In recent years considerable emphasis has been placed upon the association between the transepithelial electrical potential difference and the secretion of acid by the gastric mucosa. The isolated gastric mucosa of elasmobranchs, dogfish and skate, was found to secrete acid but without generating a significant potential difference. The marine and freshwater teleostean (pollack, tomcod, longhorn sculpin, winter flounder, eel and catfish) gastric mucosae generated a potential difference of more than 15 mV and is thus similar to the amphibian and mammalian stomach. The elasmobranch and teleostean gastric mucosae are histologically similar. ("The Electrophysiology of the Elasmobranch Stomach", submitted to Science, December, 1958.)

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