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Experiments on the Morphogenesis of Regenerating Fins In Fundulus Heteroclitus

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The fins of Fundulus heteroclitus regenerate by the terminal accumulation of undifferentiated cells derived from the connective tissue immediately proximal to the level of amputation. Osteoblasts which normally line the surfaces of the dermal fin rays, also migrate into the blastema where they are responsible for giving rise to the regenerated rays. The latter develop as a result of the initial deposition of bone in intimate association with the epidermal basement membrane.

The complete extirpation of ventral halves of fin rays from amputated fins results in the regeneration of correspondingly deficient structures. When parts of fin rays are removed for short distances behind the level of amputation, ray regeneration proceeds nomally from the more proximal level. Additional fin rays transported to the interradial regions of subsequently amputated fins bring about the formation of corresponding extra rays in the regenerate. When parts of fin rays are extirpated from otherwise intact fins, the missing portions are replaced by distally directed growth from the proximal ray stumps.

Totally denervated fins cannot regenerate after amputation, nor can individual fin rays repair injuries in the absence of nerves. It is concluded, therefore, that ray regenerates are formed only under the influence of osteoblasts derived from pre-existing ray stumps, and that this process is dependent upon the presence of adequate innervation.

Execretion of Sodium Bicarbonate by the Freshwater Catfish (Ameiurus nebulosus)

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It was reported previously (Am. J. Phys. 183:155, 1955) that in contrast to the marine dogfish, a carbonic anhydrase sensitive to inhibition by Diamox® does exist in the kidney of the freshwater catfish. In the latter species, intraperitoneal administration of sodium bicarbonate leads to alkalinization of the urine and increased renal excretion of sodium and bicarbonate; excretion of a sodium bicarbonate load is slow and not effected by the gills. The two species respond similarly with respect to branchial elimination of CO_2 which is partially inhibited by Diamox. Unlike the dogfish, the branchial carbonic anhydrase of the freshwater catfish seems to facilitate the formation of diffusable CO_2 from HCO_3^-, rather than supplying ions for an exchange mechanism.

Excretion of Sodium Bicarbonate and CO_2 by the Fresh-water Catfish, *Ameiurus Nebulosus*

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As recorded previously (Am. J. Physiol. 183:155, 1955), a carbonic anhydrase (C. A.) which is sensitive to inhibition by Diamox is present in the kidney of the fresh-water catfish. Intraperitoneal administration of sodium bicarbonate leads to alkalinization of the urine and renal excretion of sodium and bicarbonate. Sodium bicarbonate is not excreted by the gills. Branchial CO_2 excretion is partially inhibited by Diamox, possibly in consequence of inhibition of C.A. in red cells. The branchial C. A. seems to facilitate the formation of CO_2 from HCO_3^-, rather than to promote an ion exchange mechanism. These results are in contrast to the marine dogfish, *Squalus acanthias*, which has a Diamox sensitive carbonic anhydrase in the gills but not in the kidney; and in which exogenous sodium bicarbonate is entirely excreted by the gills (apparently by an ion exchange mechanism) and does not alkalinize the urine.

The Effect of Chlorothiazide on the Urinary Excretion of Sodium Chloride, and Potassium in the Marine Dogfish, Squalus Acanthias

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Chlorothiazide is a diuretic which in man and the dog inhibits the reabsorption of sodium and chloride, supposedly by an inhibitory effect on carbonic anhydrase, but possibly by a second mechanism as well. The kidney of the marine dogfish contains no carbonic anhydrase sensitive to inhibition by Diamox. Therefore, this kidney was considered suitable for the study of the carbonic anhydrase independent diuretic effect of chlorothiazide. Fifty to 200 mg of the drug were given iv. to 8 dogfish weighing between #10.5 and 7.3 kg, after collection of control urine and blood specimens. The second urine and blood specimens were taken 2½