

- (3) The isolated perfused gland can be used to study various pharmacological and hormonal effects on electrolyte secretion in the absence of complicating diverse physiologic change in the intact animal.

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#### ULTRASTRUCTURE OF MARINE CALCIFICATION\*

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The technique of x-ray diffraction was applied to the study of marine calcification. It was shown that the mineralized spine of the sea urchin was composed of a single crystal of the calcium carbonate mineral calcite. Similar studies on the plates of the sand dollar test showed them to be single crystals of calcite. Studies are now in progress to see if the earliest development of the sea urchin spine is as a single or multiple crystal system. A similar study is planned on the sand dollar calcification history.

In collaboration with Drs. David Karnofsky and Charles Young an x-ray diffraction study is being run on the development of calcite crystals in the embryo of the sand dollar. Preliminary results have shown that both large crystals (no doubt the trigonal spicules reported in the literature) and smaller crystals can exist in the early pluteus stage. Further experiments are under way to determine the earliest stage of mineral development.

X-ray diffraction studies on the operculum bone of the pollock and cod show that this tissue contains the typical poorly crystallized bone apatite (i.e., the calcium phosphate mineral of bone) as seen in other bones. Earlier work by these investigators showed the mineral of carp operculum to be non-crystalline, or amorphous. (Care was taken with the present work to study a freshly excised bone which was kept moist with Fish Ringer's Solution while under study. This was done to avoid crystallization of a possible amorphous phase.) Additional x-ray studies of freshly excized, lyophilized dogfish vertebrae showed this tissue to contain bone apatite as in teleost fish.

It is planned to continue this project concentrating on the earliest stages of hard tissue development.

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#### DRUG METABOLISM BY VARIOUS MARINE ANIMALS

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Very little is known concerning the metabolism of foreign compounds by marine animals. In the studies to be described it was our purpose to investigate further the hypothesis of Dr. Brodie that fish lack the capacity to metabolize foreign compounds. These metabolic transformations usually convert the substrate to a more readily excreted less lipid soluble derivative.

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