fully adapted to salinities below blood levels showed changes characteristic of the fresh water condition (loss of the apical pits in the chloride cells). The dye binding capacity of the mucoid substances of the gills was not affected by changes in environmental salinity.

3) Maternal and extra-embryonic blood vessels in Squalus were prepared for electron microscopic examination in view of their special uterine environment.

## 1962 #10

## HYPOXIA ON DEVELOPING SAND DOLLAR EGGS

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In the course of studies designed to test the permeability of sand dollar eggs to dyes, it became necessary to view simultaneously the successive stages in the development of the fertilized egg. This was accomplished by transferring a large quantity of fertilized eggs to a deep flask of sea water (250 ml), and allowing them to remain at the bottom, undisturbed, for 24-36 hours at the temperature of ambient sea water. At that time, all stages of development could be seen, including the first divisions into two and four cells. That this retarding effect on cell development was attributable to hypoxia was shown in several different ways: 1) The same effect could be produced by bubbling a mixture of 5 per cent oxygen in nitrogen through the sea water surrounding the eggs, 2) it could be prevented either by agitating the flask, by bubbling oxygen through the sea water, or by placing the fertilized eggs in a flat dish instead of at the bottom of a deep flask and, 3) retardation of development did not occur when 5 per cent carbon dioxide was bubbled through the sea water. These results suggest that the metabolic activity of the developing eggs depletes the stagnant water in their vicinity of oxygen, thereby retarding their normal development.

## 1962 #11

FURTHER STUDIES ON THE SOURCE OF AMMONIA EXCRETED BY THE GILLS OF MARINE FISHES

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Previously we showed that the combined 'activities' of glutaminase I and glutamic acid dehydrogenase in gill tissue could more than account for all the measured ammonia excreted branchially by the shorthorn sculpin, <u>Myoxocephalus scorpius</u>. Current investigations, which were undertaken to identify possible precursors of ammonia and to develop techniques for the determination of branchial blood flow rates by application of the "Fick Principle," suggest a modification, however, of a second argument which favored peripheral formation at the gills rather than diffusion of preformed ammonia. This presumed evidence was based on experiments in which the ammonia concentration of afferent gill blood drawn from the heart was compared with what was thought to be efferent gill blood drawn from the tail, and it appeared that the gills extracted only 10 per cent of the blood ammonia. In the current series of experiments, blood