of pH, pCO_2, and temperature. It was concluded that the extremely low pCO_2s found in dogfish would make it very difficult to measure maximum CO_2 exchange.

3. Perfusions were set up using a small membrane lung (Peirce) and trying quite a large number of cannulation techniques. O_2 exchange in the lung was measured by means of a small respirometer connected to the gas phase of the lung. It was found that it was almost impossible to set up a non-leaking perfusion preparation principally because of small branches of efferent gill arteries going to the head region. It is felt that it may actually be necessary to isolate gills so that perfusate coming from the gills may be collected more reliably.
4. Methods of deoxygenating sea water supplying gills were investigated, the idea being to measure the exchange of O_2 in gills in reverse direction on the assumption that deoxygenation in the gills would be equivalent to oxygenation since it is believed to be a passive physical process dependent on O_2 pressure differentials. This technique is necessary because no method of satisfactorily deoxygenating blood in an artificial lung is available. It was found that bubbling nitrogen through sea water and use of the enzyme Dee-O did not provide sufficiently low pO_2s in the sea water. It will probably be necessary to boil sea water and have it available in large quantities. It can be brought to the proper temperature for use by utilizing various small volume but efficient heat exchangers that are available and with which we have had experience.

Conclusion: It should be possible to set up a steady state perfusion incorporating an artificial membrane lung to provide oxygenation and gill units to provide deoxygenation. From experiments made with such a setup it should be possible to arrive at some estimate of maximum gill function as it relates to oxygenation.

1962 #33

UNILATERAL FURROWING IN THE EGGS OF *Hydractinia* AND *Echinorachnius*

R. Rappaport and G. W. Conrad,* Union College, Schenectady, N. Y.

The geometrical relations of the cleavage stimulus and activities of the cleavage furrow were studied in the dividing egg of *H. echinata* which has a naturally unilateral furrow and in sand dollar eggs, manipulated to divide unilaterally. Results of preliminary operations upon cleaving *Hydractinia* eggs confirmed those obtained by Yatsu (1912) on Beroë. Experiments also showed that the furrow is not a restricted site of new surface formation. *Hydractinia* divides symmetrically if the distance from the mitotic apparatus to the periphery is equalized by amputating cytoplasm. Flattened *Echinorachnius* eggs divide unilaterally when the mitotic apparatus is mechanically displaced more than one spindle width from the egg center. When these eggs were subjected to the same operations as *Hydractinia*, responses were alike. Superficial differences between cleaving *Hydractinia* and *Echinorachnius* eggs are due to the difference in the geometric relation between mitotic apparatus and cell surface. Since the furrow in both forms can divide an unstimulated area, it appears that the base of the furrow is self-propagating and is the location of the mechanical forces which accomplish division. The geometrical relations between mitotic apparatus and cell periphery strongly suggest that the presumptive furrow region is

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changed by the mitotic stimulus and is not, as proposed by Wolpert ('60), the region of the cell that fails to receive the stimulus.

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TIME RELATIONS OF THE CLEAVAGE STIMULUS IN Echinarachnius parma

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The time relations of the cleavage stimulus were studied by cnetrifugal relocation of the mitotic apparatus at different times in the division cycle and by bringing parts of the surface which would not normally become furrow into the stimulus area. It was found that the position of the furrow is determined 10 minutes before cleavage begins. When the mitotic apparatus is relocated, a secondary furrow appears 10 minutes later, indicating the total time required for stimulus and response. Surface pushed into the stimulus region produces a furrow in about 5 minutes. A single mitotic apparatus can stimulate more than one furrow. Its stimulus activity persists for about 20 minutes.

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CYTOKINETIC INHIBITION BY ULTRAVIOLET RADIATION

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Experiments have been made on cleaving zygotes of Echinarachmus parma, in which one of the gametes was exposed to ultraviolet radiation. In one series of studies the pre-fertilization recovery of indicated unfertilized eggs was shown to occur by a much lesser degree than has been demonstrated for Abacia eggs.

Zygotes in which either the sperm or eggs has been irradiated were placed in sea water containing 1.7 μc. H^3-thymidine/ml. These were exposed to the H^3-thymidine environment in 10 minute pulses beginning with fertilization through the third cleavage. In zygotes in which eggs had been exposed to cause a substantial delay in cleavage, the uptake of H^3-thymidine as determined from radioautographs was not delayed. H^3-thymidine uptake for second cleavage occurs previous to and during the first cleavage.

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