caused a run-out of that previously accumulated at 18°C. 2, 4-Dinitrophenol, 2 x 10^{-4} molar, inhibited the uptake of the dye. Competition with another organic acid, p-aminohippurate (PAH), was demonstrated. Further, addition of 5 x 10^{-3} molar PAH to a tissue which already had concentrated chlorphenol red resulted in run-out of the luminal dye. This competition indicates that this process is stereospecific. Inhibition of dye uptake was complete when the medium was K-free, and was partial when Mg^{++} or Ca^{++} were omitted.

Phenol red was concentrated in the same manner as chlorphenol red. Bromphenol blue, on the other hand, was taken up by both the cells and, to a lesser extent, the lumen; this seemed independent of the metabolic activity of the tissue, since chilling to 2°C did not alter the uptake of the dye. Thus, the isolated choroid plexus of the dogfish behaved similarly to the isolated proximal tubule of the flounder kidney as described by Forster and, therefore, only the tubule and the choroid plexus have been shown to possess this activity.

Observations on the Formation of Blastoderm Cells in (Marinogammarus)

R. Rappaport and P. J. Donovan
Union College

In many Crustacea, blastoderm cells are formed when the nucleus and cytoplasm immediately surrounding it dissociate from a vesicle of yolk which varies in size and shape according to species. Since the activity resembles cytokinesis but is not accompanied by karyokinesis it is of unique interest. Gammarid embryos are favorable material for the study of this process. Embryos in early stages of blastoderm formation were dissected and the cells spread upon on the coverslip floor of an observation chamber in filtered, pasteurized sea water. Observations were made at 400X with an inverted microscope.

Before separation, there are marked changes in the surface contour. Constrictions and indentations may appear to traverse the length of the cell. Analysis of photographs however, reveals that lateral movements of the furrows are illusory and that the cytoplasm is, in fact, shifting from one side of the furrow to the other. Final separation from the yolk is accomplished after the presumptive blastoderm cytoplasm is sequestered at one end of the cell. Granules in the blastodermic cytoplasm move away from the future site of the cleavage furrow and droplets, apparently lipid, in the yolk become more compact. The beginning of separation is indicated by the intrusion of a furrow between the two types of cytoplasm. Constriction of the furrow appears to be a piecemeal process. In some cells, opposite sides of the furrow alternately intrude and regress. Small depressions which deepened and shallowed also appeared and coalescence of several such depressions perceptibly deepened the furrow. The furrow may either resemble that of the echinoderm egg or it may take the form of a

long neck. The latter may be due to cell locomotion.

Before final separation, part of the blastomeric cytoplasm may become constricted delimiting and apical sphere. The sphere is usually resorbed by the blastoderm cell and its significance is unknown.

Supported in part by Grant from National Institutes of Health.

Cleavage of Echinorachnius Eggs Under Constant Physical Load

R. Rappaport
Union College

In order to learn more of the physical forces which accomplish cytokinesis, glass weights were attached to fertilized eggs and the subsequent first division studied. Eggs were physically divested of jelly and vitelline membrane and made adhesive by immersion in sea water acidulated to pH 3.7 - 4.0 with 0.1 M HCl. They were then pipetted onto the upper, horizontal surface of a submerged glass platform mounted on trunions. Glass beads approximately 150 micra in diameter (Minnesota Mining and Manufacturing Co.) were sprinkled over the cells and the chamber then flushed with ten volumes of calcium free sea water (pH approximately 8) to which sodium citrate had been added. When the table was inverted, the cells supported the weight of the glass beads. Observations and photographs were made through a horizontal miscroscope.

When cells were loaded about 30 minutes before the time of division, they were stretched to four to six times their normal diameter and the cleavage plane was at right angles to the direction of stress. No difference in cleavage time of loaded and unloaded cells was apparent. When loading was delayed until some cells showed signs of furrowing, the cleavage plane appeared at any angle to the direction of stress including parallel. Only cells which began cleavage under the load were studied. Division of loaded cells was not necessarily accompanied by elongation. When the cell surface was marked with carbon particles, it could be seen that cleavage could occur in the absence of the shifting of the surface toward the furrow which occurs in the unloaded cell. Further, marks situated at the base of the beginning furrow remained there as it deepened.

This research was supportd by a grant from the National Science Foundation.