



Figure 3: Electron photomicrograph of ependymoma cells. Note the pleomorphic nature of the nuclei, the prominent nucleoli, margination of chromatin and the vacuolated nature of the cytoplasm.

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CLEAVAGE FURROW ESTABLISHMENT IN MECHANICALLY DISTURBED SAND DOLLAR EGGS

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In cleaving eggs the division mechanism is established at the cell surface as a consequence of the presence of the mitotic apparatus. Communication between surface and mitotic apparatus is assumed; little is known concerning its nature. The fact that the morphological manifestation of the mechanism is restricted to a band 10 microns wide strongly suggests considerable specificity. Two general mechanisms have been suggested: free diffusion and alternatively a mechanism comparable to propagation associated with the linear elements of the mitotic apparatus. The purpose of this investigation was to interfere mechanically with the process in order to learn more of its nature. Experiments were accomplished on *Echinarachnius parma* by micromanipulation. The interference was begun before furrow establishment and continued until the furrow appeared.

Normal furrows appeared in the equatorial surface following continuous massage with the tip of a rounded needle. With each stroke the contents of the cell between the mitotic apparatus and the surface were shifted as well as the asters. In other experiments the mitotic apparatus and the equatorial cytoplasm were shifted without altering the appearance or timing of the cleavage furrow. Low frequency vibration was imposed in the equatorial surface by inserting a needle and tapping the manipulators 60-100 times per minute. Despite the shifting of the entire cell contents with each vibration, division was normal. Higher frequency vibrations were administered with an ordinary

doorbell buzzer mounted on the manipulator. By controlling the amplitude and flexibility of the needle, cytoplasmic flow along the needle could be induced. Astral fibers extending to the underside of the equatorial surface remained intact and division was normal.

These experiments demonstrate a hitherto unsuspected durability of the stimulus mechanism and of the linear elements of the mitotic apparatus. Furrow establishment apparently can occur under circumstances that would discourage maintenance of sharply defined diffusion gradients.

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SOME CHARACTERISTICS OF ION TRANSPORT PROCESSES IN THE URINARY BLADDER OF THE WINTER FLOUNDER *Pseudopleuronectes americanus*

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The *in vitro* preparation of the distal expansion of the fused archinephric ducts (urinary bladder) of the winter flounder *Pseudopleuronectes americanus* has been shown to transport Na, Cl, and water from the mucosal to the serosal fluid (Renfro, J.L., Bull. MDIBL 12, 81, 1972). These processes were found to be ouabain sensitive at a concentration of 10^{-4} M. The present study is a continuation of our effort to characterize the role of the urinary bladder in teleost salt and water balance.

The maintenance of the live animals, removal and maintenance of the urinary bladder, and the sac-type preparation used in a portion of these studies has been described previously (Renfro, *op. cit.*). An additional method involving continuous perfusion of the isolated bladder was employed to maintain a constant transepithelial electrical potential difference (P.D.). PE 200 tubing was inserted into each end of the tube-like bladder and fastened with silk suture. This preparation was then suspended in a 10 ml polystyrene tube and sealed at the bottom end. Perfusion fluid was delivered by gravity feed at a regulated flow rate. The incubation medium was Forster's saline (J. Cell Comp. Physiol., 51, 259-1958) modified by omission of the biphosphate-bicarbonate buffer system and substitution of 3 mM Imidazole (pH = 7.8). The external bath volume was exactly 4 ml of aerated solution maintained at a constant temperature of 10°C. Unidirectional fluxes were performed sequentially rather than simultaneously with ^{22}Na and ^{36}Cl . The external bath was renewed frequently to avoid back diffusion of isotope.

P.D. was determined with double junction Ag-AgCl₂ reference electrodes (Orion Corp.) as previously described (Renfro, *op. cit.*). Voltage clamping electrodes were Ag-AgCl₂ wires connected to the mucosal and serosal fluids by PE 60 tubing filled with three percent agar-3M KCl. The voltage supply was a Bioelectrics NF-1 amplifier.

Unidirectional fluxes across perfused bladders in open-circuited conditions with identical solutions on the two sides showed that movement of Na⁺ and Cl⁻ from the bath (serosa) to the lumen (mucosa) of the bladder was about one-sixth of the reverse flux (Table 1).

The range of potentials among bladders was -0.9 to + 22.6 mV with reference to the mucosal side; however the P.D. was constant for each individual bladder.

Unidirectional fluxes of Na⁺ and Cl⁻ in short-circuited conditions with the same solution inside