THE RELATION BETWEEN INITIAL EQUATORIAL CELL DIAMETER AND CLEAVAGE CONSTRICTION RATE

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The reduction in equatorial diameter which comprises cytokinesis reflects the shortening of a circumferential band of contractile material, known as the contractile ring, which is contiguous to the cell surface. Since the cross-sectional area of the contractile ring remains constant, reduction in volume of ring material must occur *pari passu*. It is tempting to link the disappearance of ring material with force production and such linkage could imply that the force produced is a function of the rate at which the contractile ring diminishes. Previously published measurements revealed that the forces exerted by the furrows at first and second cleavages of sand dollar eggs are the same. However, the rates at which constriction takes place at first and second division are unequal, the first being significantly faster than the second in 2 species of echinoderms. In order to determine whether the rate differences were due to differences in division mechanisms or to simple geometrical differences, uncleaved sand dollar (*Echinarachnisus parma*) eggs were altered so that their diameters approximated that of one of the first 2 blastomeres before second cleavage, and the constriction rates were compared. The alteration was accomplished before fertilization, either by fragmenting eggs, or by extruding them into cylindrical form by expulsion through a pipette nozzle into a sperm suspension. In the latter eggs, cylindrical form was molded and maintained by the fertilization membrane. The results were as follows:

	Initial Diameter	Rate of Constriction (μm/min)
First cleavage (normal)	151.3 μm, s.d. 7.03	9.9, s.d. 2.18
Second cleavage (normal)	107.5 μm, s.d. 5.20	6.7, s.d. 1.209
Fragments (spherical)	103.6 μm, s.d. 12.4	6.44, s.d. 1.27
Cylindrical whole eggs	115.5 μm	6.44

Results indicate that the first cleavage is inherently like that of the second, and the actual rate is related to initial equatorial diameter and thus to some geometrically related factor. It is simplest to propose that the rate is affected by the resistance of surface forces, which would be greater in smaller cells. This investigation was supported by National Science Foundation Grant PCM 74-18380A02 to R. Rappaport.

ION MOVEMENTS IN THE DOGFISH RECTAL GLAND - EVIDENCE FOR THE INDEPENDENT UPTAKE OF SODIUM AND CHLORIDE

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It has been shown that at least part of the mechanism of cyclic AMP (cAMP) stimulation of secretion in the dogfish rectal gland involves an increase in the number of ouabain-binding sites in the tissue (Shuttleworth and Thompson, J. exp. Zool. 206:297-302, 1978 and this bulletin). The existence of an additional part of the mechanism involving modifications of the uptake of ions at the baso-lateral membranes is suggested by two facts: (1) In slices of *Scyliorhinus* rectal gland, cAMP increases ouabain-sensitive oxygen consumption to an extent ten times greater than its effect on the number of ouabain-binding sites (Shuttleworth and Thompson, J. comp. Physiol. - in press). This indicates that some