Pl. conc. μg/ml	Sea water conc. Δ μg/ml	Elapsed time (min)	Clearance ml Pl/hr	% dose lost per hr
Dogfish		Sulfadiazine		
1040	0.5	20	3.0	1
400	0.35	15	6.5	1
Dogfish		p-Aminobenzoic acid		
168	0.65	60	8	1/2
112	0.90	60	16	1/2
104	0.12	45	3	<1/2
Dogfish		Antipyrine		
69	0.8	15	139	5
88	0.7	30	48	2
104	2.2	45	85	2
Sculpin		Antipyrine		
400±	4.5	30		11
400±	4.0	30		10
400±	4.3	30		11
Lobster		Antipyrine		
132	3.5	30		14
80	4.0	30		24
308	1.0	22		6

10% of the dose per hour of antipyrine was excreted by the sculpin and between 6 and 24% per hour of antipyrine by the lobster.

These results suggest that the gills of these three animals are relatively impermeable to a substance as lipoid soluble as antipyrine.

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CLEAVAGE OF SAND DOLLAR EGGS WITH CONSTRAINED SURFACES

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In dividing echinoderm eggs new surface is produced by stretching the old. Normally the pattern of stretching is predictable, the greatest amount taking place at the poles of the cell and the least in the furrow. This specific pattern has been invoked as an intrinsic part of several hypothetical cell division mechanisms. An experimental analysis of the relation between cleavage and the normal stretch pattern was, however, lacking. The purpose of this investigation was to determine whether cleavage could occur in cells whose surface had been manipulated to dis-

rupt the pattern of new surface formation. Rinsing fertilized sand dollar, Echinarachnius parma, eggs in calcium and magnesium free sea water and also in acidulated calcium free sea water makes the surface sticky. Their adhesion to glass and plastic surfaces is so strong that they cannot be separated without tearing the cell. By fastening cells to flat or concave or cylindrical surfaces different regions and proportions of the surface were constrained immediately after the furrow's first appearance. Cells divided despite bilateral constraint and distortion of the polar and subpolar surfaces. However circumferential constraint near and parallel to the cleavage plane stopped division even when only one side was affected. Constraint of large portions of the egg surface does not interfere with cleavage as long as an area on either side of the furrow is left free. Cleavage does not require the normal pattern of new surface formation. It seems likely that normal regional differences in surface stretching are due to the operation of physical forces originating outside the region.

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CHANGES IN THE ULTRAVIOLET LD_{50} DURING THE CLEAVAGE CYCLE IN ZYGOTES OF Echinarachnius parma

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Resistance to ultraviolet, using survival as the criterion, was studied in zygotes of E. parma during the first cleavage cycle. The purpose was to compare such a survival curve with the previously reported curves for sensitivity of cell division delay. (Rustad, Photochem. and Photobiol. 3:529, 1964).

Fertilized eggs were subjected to a series of dose levels of heterochromatic ultraviolet (UV) irradiation at various times during the first cleavage cycle. The source of UV was a Hanovia high pressure mercury arc with an interposed Vicor filter which eliminated wavelengths below 260 mu. The criterion for survival was the ability of the zygotes to gastrulate successfully. The dose level needed to obtain 50% non-gastrulation was noted as the LD_{50}.

The LD_{50} at ten minutes post-fertilization is 2.1×10^2 ergs/mm^2; this increases to 1.26×10^4 ergs/mm^2 by the time of first cleavage. The increase in the LD_{50} is exponential during the first hour post-fertilization at 16° C. At this point a short plateau (8.4×10^3 ergs/mm^2) of 20 min appears. After this 20 min the LD_{50} again increases to reach the maximum at 90 min post-fertilization. It remains constant during the process of cleavage. Thus it requires sixty times the energy for an LD_{50} just before cleavage as is needed immediately post-fertilization. The significance of the plateau between 60 and 80 min post-fertilization is not clear, but it is interesting to note that it begins at the same point as insensitivity to UV with regard to cleavage delay. The big contrast is that cleavage delay insensitivity remains constant until cleavage begins, whereas, the LD_{50} shows another increase.

Photoreactivation illumination (PR) will increase survival of zygotes at each LD_{50} during the cell cycle. When the irradiation is applied during the first 15 min post-fertilization the PR must be given during the immediately following period before fusion of the sperm and egg pronuclei. The damaging lesion becomes non-reversible after the completed fusion of the pronuclei.