

Cleavage process in sea-urchin

Here the cleavage is rapid and initially consisting of only 2 phases of the cell cycle- *the DNA synthesis (S) phase and mitosis (M phase)*.

Type of egg:

The eggs of sea-urchins are oligolecithal.

Site of cleavage:

During the entire period of cleavage the embryo is enclosed in the fertilization membrane and the outer surface of the blastomeres are closely associated with the hyaline layer (formed as a result of emptying of the contents of the cortical granules into the previtelline space during fertilization).

Territories of cleaving sea urchin embryo:

The cleaving sea urchin embryo is divided into 5 territories, each of which is derived from a specific segregated set of founder cells and is characterized by unique pattern of gene expression and individual cell lineages. The territories are—

(1) prospective oral ectoderm, (2) prospective aboral ectoderm, (3) prospective skeletogenic mesoderm, (4) the vegetal plate and (5) the small micromeres (**Cameron and Davidson, 1991**).

Progressive steps involved:

1st and 2 nd cleavage	Follow meridional cleavage
3 rd cleavage	Equatorial cleavage, producing an 8 cell embryo with blastomeres of almost equal size.
4 th cleavage (Formation of micromeres dependent on the cytoplasm of vegetal pole.)	<p>i. 3 distinct types of blastomeres produced.</p> <p>ii. The 4 blastomeres of the animal tier undergoes a <i>meridional cleavage</i>, resulting in a single animal tier of 8 cells called mesomeres.</p> <p>iii. The 4 vegetal blastomeres divide asymmetrically, forming a tier of 4 large <i>macromeres</i> and below that 4 small <i>micromeres</i>.</p>
7 th and 8 th cleavage	The central cavity (<i>blastocoel</i>) becomes well established (blastula phase).
10 th cleavage	The blastomeres form motile cilia which penetrate the hyaline layer and extend into the previtelline space.

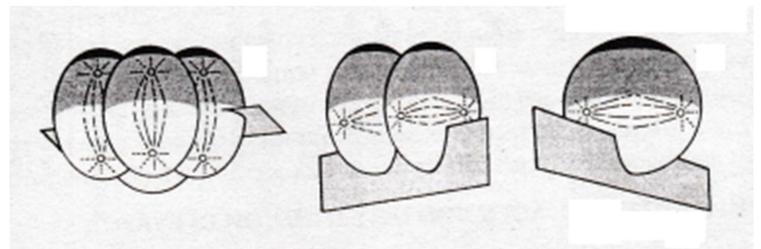


Figure: Cleavage in the sea urchin embryo. In (A-C) the plane of the next cleavage division is indicated.

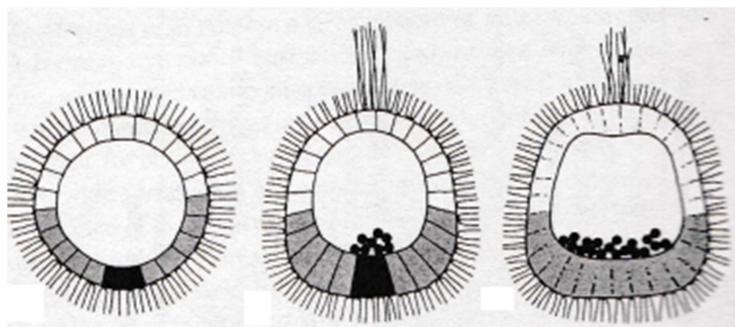


Figure: Sections through blastulae. The black circles in I and J are primary mesenchymal cells