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CLEAVAGE AND TYPES

The process of cleavage remains one of the earliest mechanical activities in the conversion of a single celled egg into a multicellular embryo. It is initiated by the sperm during fertilization. However in parthenogenetic eggs cleavage can commence without the influence of fertilization. The process of cleavage or cellulation happens through repeated mitotic divisions. These divisions result in cells called blastomeres. In later stages of development the blastomeres occupy different regions and differentiate into several types of body cells.

The first cleavage of frog's egg was observed by Swammerdam in 1738. The entire process of cleavage in frog's egg was studied by Prevost and Dumas in 1824. With the development of microscopes cleavages and further stages were observed in the eggs of sea urchin, star fishes, amphioxus and hen's eggs. From all these studies it has become clear that all divisions in cleavage are mitotic. The mitotic process is very rapid. In the eggs of sea urchin division of the blastomeres can be observed every 30 minutes. As the cleavage progresses the resultant daughter cells, namely the blastomeres get reduced in size. During cleavage there is no growth in the blastomeres. The total size and volume of the embryo remains the same. The cleavages result in a compact mass of blastomeres called morula. It gets transformed into blastula. While the wall of the blastula is called the blastoderm, the central cavity is called the blastocoel. The planes of cleavage an egg can be divided from different planes during cleavage. Depending on the position of the cleavage furrow the planes of cleavage are named.

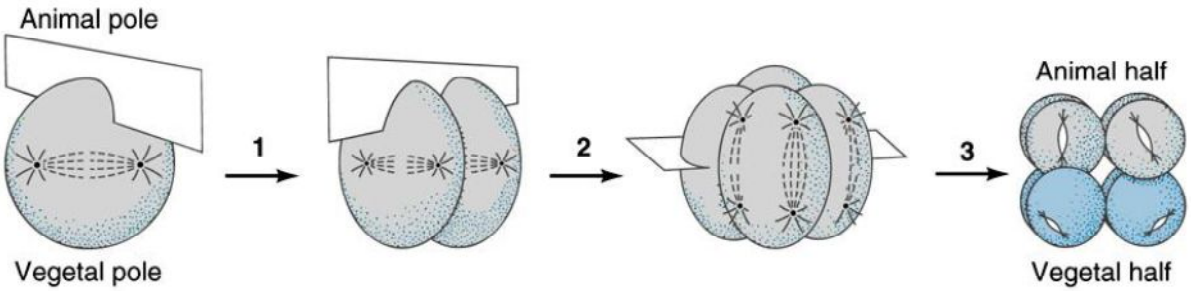
1. Meridional plane: The plane of cleavage lies on the animal vegetal axis. It bisects both the poles of the egg. Thus the egg is divided into two equal halves.

Meridional cleavage

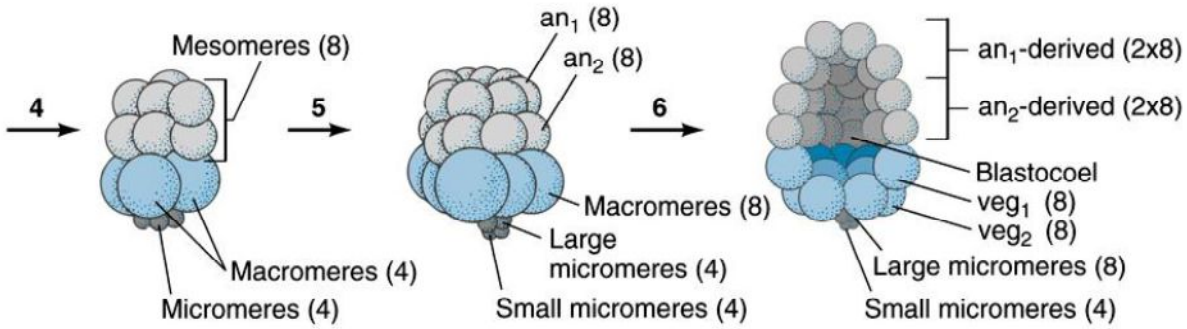
2 Blastocoel formation Vertical plane: The cleavage furrows may lie on either side of the meridional plane. The furrows pass from animal to vegetal pole. The cleaved cells may be unequal in size.

3. Equatorial plane: This cleavage plane bisects the egg at right angles to the main axis. It lies on the equatorial plane. It divides the egg into two halves.

4. Latitudinal plane: It is similar to the equatorial plane, but it lies on either side of the equator. It is also called as transverse or horizontal cleavage.



Meridional cleavage



Blastocoel formation

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