

Blastula formation in Frog

Definition:

As cleavage proceeds the adhesion of blastomeres to one another. Continued cleavage resulted in formations of smaller and smaller blastomeres since there is no growth between the cell-divisions. Cells at the vegetal pole are larger than those at the animal pole. Inside this spherical mass of cells, a fluid filled cavity-*the blastocoels*, develops in the animal region and the embryo is then known as **blastula**.

Some important general features of blastula:

- (1) Formation of blastula results from cell divisions and cell polarization and in some cases from the movement of water and ions into the *blastocoels*.
- (2) Right from the beginning of cleavage the blastomeres become progressively joined closed together by several types of intercellular junctions (tight junctions, gap junctions etc). At the blastula stage these junctions seal off the interior of the embryo from the outside.
- (3) Continuous cleavage results the formation of a hollow sphere cells-*the blastula*.

Blastula in frog:

- (1) When the embryo has completed the cleavage cycle that takes it from the 64 cell morula to 128 stage, the **blastula**.
- (2) Duration: Until successive cleavage cycles have increased the cell number between 10000 and 15000 blastomeres. At this time the massive morphogenetic movements characterizing **gastrulation**, begins.
- (3) Important regions: The blastula can be conveniently sub-divided in 3 main regions—
 - a) A region around the animal pole, roughly including the cells forming the roof of the blastocoels. These cells correspond roughly to the future ectodermal germ layer.
 - b) A region around the vegetal pole including the large cells in the interior which constitute the yolk mass. These are the future endodermal cells.
 - c) A marginal ring of cells in the subequatorial region of the embryo including the region of the **grey crescent** cells of this zone normally form the embryonic mesoderm.
- (4) Arrangement of cells:
 - a) With very uneven thickness.
 - b) The blastoderm is no longer a simple columnar epithelium but is 2 or more cell thick.
 - c) The cells in the interior are rather loosely connected to one another, but at the external surface of the blastula the cells adhere to one another very firmly.
5. Pigmentation: The pigments remain as before, more or less restricted to the upper hemisphere of the embryo. Only a slight intermingling of cytoplasm seems to be produced by the cleavage furrows cutting through the substance of the egg.
6. Special feature of **blastocoel** (according to **Nieuwkoop**-He discovered the basis of mesodermal induction)
One of the functions of the blastocoels may be to restrict the interaction between future endodermal and ectodermal cells to the marginal ring surrounding the edges of the blastocoels. Mesoderm forms (in amphibian blastula) in an equatorial ring between the prospective ectoderm and endoderm. Cells of the animal hemisphere above the blastocoels normally form **ectoderm**.

Experimental evidence to proof :

1. **Nieuwkoop** (1973) performed recombination experiments in which a sheet of cells from the animal hemisphere above the blastocoels was directly apposed (place something side by side with or close to something else) to the yolk mass from the vegetal hemisphere.