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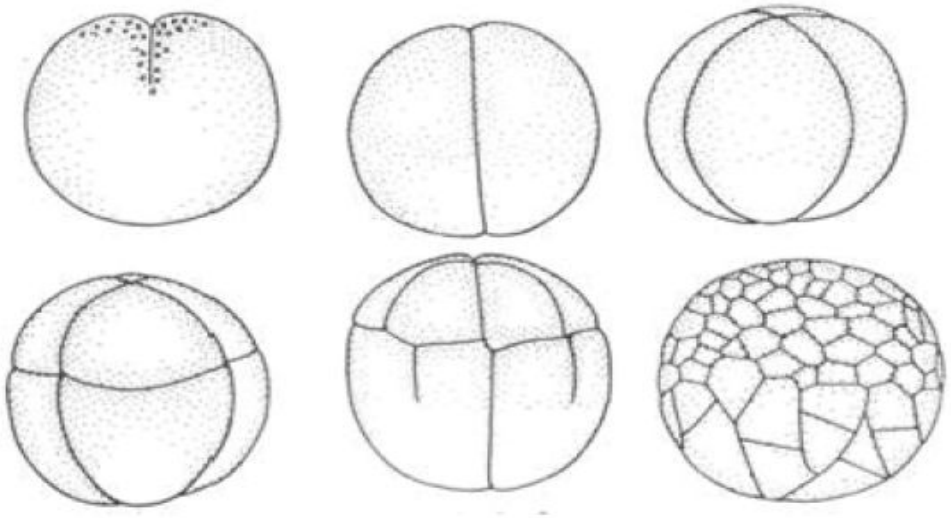
Cleavage and Blastulation in frog

Cleavage

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. In frog's egg the cleavage is **holoblastic** and **unequal**.

The cleavage occurs as follows.

1. The first cleavage plane is **meridional**. Initially, a furrow appears at the animal pole. It gradually extends towards the vegetal pole of the egg. It cuts the egg through its median animal-vegetal polar axis and results in two equal sized blastomeres.



Cleavage in frog's egg

2. The second cleavage furrow is again **meridional**. It bisects the first cleavage furrow at right angles. It is a holoblastic cleavage affecting both the blastomeres of the first cleavage. It results in the formation of four blastomeres.

3. In the next stage a **latitudinal/horizontal** furrow is formed above the equator nearer to the animal pole. Such a furrow is due to the influence of yolk concentration in the vegetal pole. The latitudinal furrow uniformly affects all the blastomeres. It results in the formation of eight blastomeres. Four of them remaining in the vegetal pole are large. They are named as **macromeres**. Another four blastomeres remain in the vegetal pole. They are named as **micromeres**. The micromeres are smaller in size than the macromeres.

The fourth set of cleavage planes are **meridional** and double in nature. They are unequal. They divide yolkless micromeres more rapidly than yolk-rich macromeres. These cleavages result in the production of 16 blastomeres.

5. The fifth cleavage is latitudinal /horizontal and double, dividing the micromeres as well as macromeres so that four tiers of blastomeres are formed.

6. As a result of further cleavages, a ball of several small blastomeres results. A closer observation reveals that, while the blastomeres above the equator are small and remain as micromeres, the blastomeres of the vegetal pole remain progressively larger. The larger blastomeres are called the macromeres.

Initially the continued division of blastomeres forms a ball like structure which is solid. It is called the **morula** stage, as this has superficial resemblance to a mulberry fruit. Very soon however the morula stage gives rise to a stage called the blastula which is a hollow ball like structure.

Blastulation

At the end of cleavage the solid ball of cells give rise to blastula which consists of number blastomeres. The characteristic features of the blastula stage are the presence of a well defined cavity called the **blastocoel**. This is the beginning of the primary body cavity. The process of the formation of blastula is called **blastulation**. The blastula of frog is called amphiblastian as the cavity is confined to only the animal pole. The vegetal pole however is composed of a solid mass of non pigmented yolky cells.

In the thirty two cell stage, the blastula consists of a single layer of cells and is called the early blastula. The pigmented cells (micromeres) are found in the anterior half while the yolky

megameres are present in the posterior half. As has been already pointed out, the blastocoel lies entirely in the anterior half. The blastula of frog is hollow and has a very well developed blastocoel. It is said to be a **coeloblastula**. As segmentation proceeds, the number of cells in the blastula increase; so also the blastocoel. The floor of the blastocoel is flat while its top portion is arched. The roof is made up of three to four layers of pigmented micromeres while the floor is formed by yolky megameres. Between the micromeres and the megameres and along the equator is found a group of cells which are intermediate in size (between megameres and micromeres). These cells constitute the germ ring. The germ ring is formed in the region of the grey crescen.