Early development of frog (Cleavage in frog)

~ *Pritha Mondal , Asstt. Prof. in Zoology Dept.*

The egg of the frog is mesolecithal and moderately telolecithal with a much larger quantity of yolk than is found in the egg of *Amphioxus* . The pattern of cleavage , therefore , in frog is although holoblastic , but of unequal type (Except the first two cleavages)and is also radially symmetrical . The period of cleavage in frog , like most amphibians , is rapid , usually being completed within 24 hours.

Cleavage Pattern

The **first cleavage plane** is meridional in frog . It begins at the animal pole and slowly extends down towards the vegetal pole . The **second plane of cleavage** is also meridional and is at right angle to the first . The second cleavage starts while the first cleavage furrow is still cleaving the yolky cytoplasm at the vegetal region . The **third cleavage plane** is latitudinal and somewhat above the equator towards the animal pole due to the concentration of yolk at the vegetal pole .It divides the frog embryo into four small blastomeres at the animal pole , called **micromeres** and four large yolk laden blastomeres at the vegetal pole called **macromeres** .The fourth set of cleavages are oriented in a meridional direction . They divide the yolk poor micromeres more rapidly than the yolk rich macromeres .

The synchronization of cleavage of the various blastomeres of the embryo is lost at this point . The micromeres divide faster than the macromeres . This gives rise to many small , heavily pigmented micromeres at the animal pole , and the macromeres at the vegetal pole are larger and fewer in number.

The frog embryo containing 16 to 64 cells is commonly called a **morula** , due to its similarity with that of a mulberry . At the 128 cell stage cleavage gets completed and the embryo is called a **blastula .**

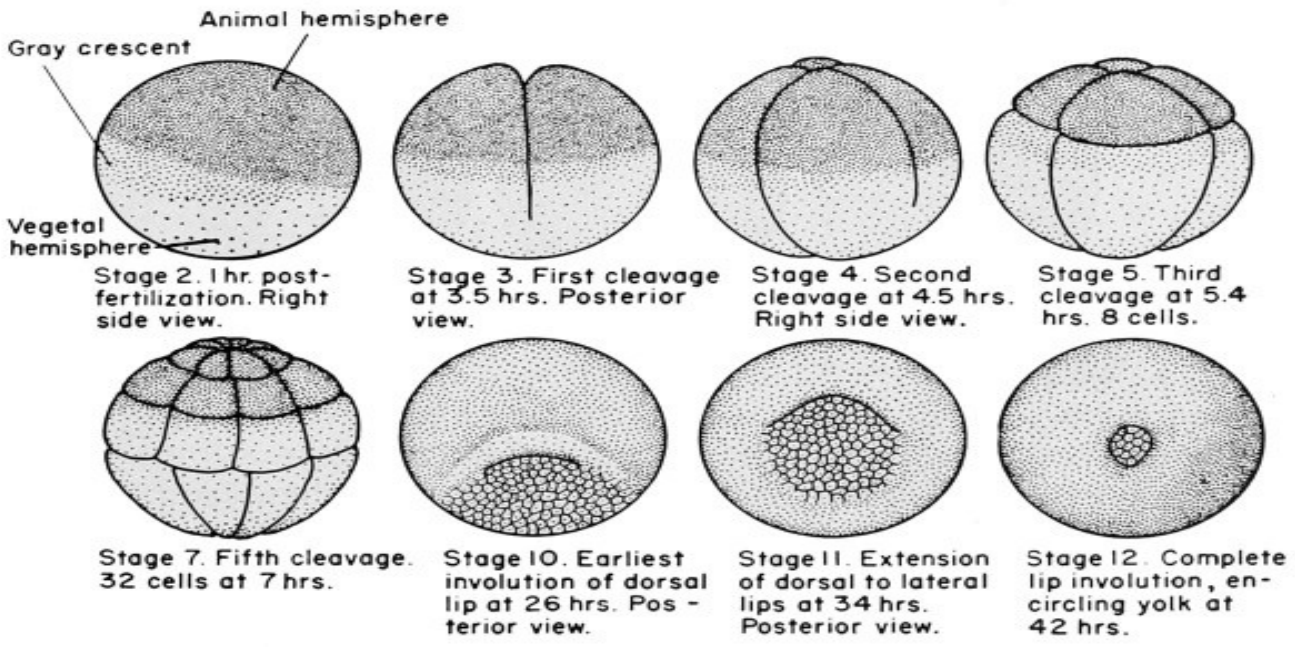

Fig. no. -1 : Cleavage in Frog.

Formation of blastula

The formation of blastocoels has been traced back to the very first cleavage furrow. The first cleavage furrow in *Xenopus laevis* , widens in the animal hemisphere and creates a small intercellular cavity. This cavity expands during subsequent cleavages . With the rapid multiplication of the micromeres at the animal pole , this blastocoelic cavity is formed towards the animal pole . The maintenance and accumulation of fluid in the blastocoel may be due to the pumping of $Na^+$from the blastomeres . The wall of the blastula acts as a semipermeable membrane . Water enters into the blasocoel and maintains the ionic balance, thus causing the blastocoel to expand . During 128 cell stage , the formation of the blastocoels gets completed and the embryo is considered a blastula.

The blastocoelic cavity is somewhat bi-convex . Its root being formed of two celled layer of micromeres , at the animal pole , while its sides and floor comprise of multilayered macromeres . The blastocoel probably serves two functions in frog embryo ; 1) it permits cell migration during gatrulation and 2) it prevents the cells beneath it to interact prematurely with the cells above it .

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Ref. Book *: Introduction to General Zoology, Vol-1, Chaki-Kundu-Sarkar.*