

Ram Balak Mahto
Guest faculty
Zoology department
v.s.j college Rajnagar Madhubani
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INFLUENCE OF YOLK ON CLEAVAGE

Yolk is needed for embryonic development. However the fertilized egg has to undergo all stages of development and result in a suitable 'young form' initiating next generation.

Somehow with all the influences of yolk the developmental procedures are so adapted and modified that a well formed embryo will result. The initial influence of yolk is felt during the process of cleavage. The amount of the yolk and its distribution affect the process of cleavage.

Accordingly several cleavage patterns have been recognized.

1. Total or holoblastic cleavage - In this type the cleavage furrow bisects the entire egg. Such a cleavage may be either equal or unequal.

(a) Equal holoblastic cleavage - In microlecithal and isolecithal eggs, cleavage leads to the formation of blastomeres of equal size. Eg: Amphioxus and placental mammals.

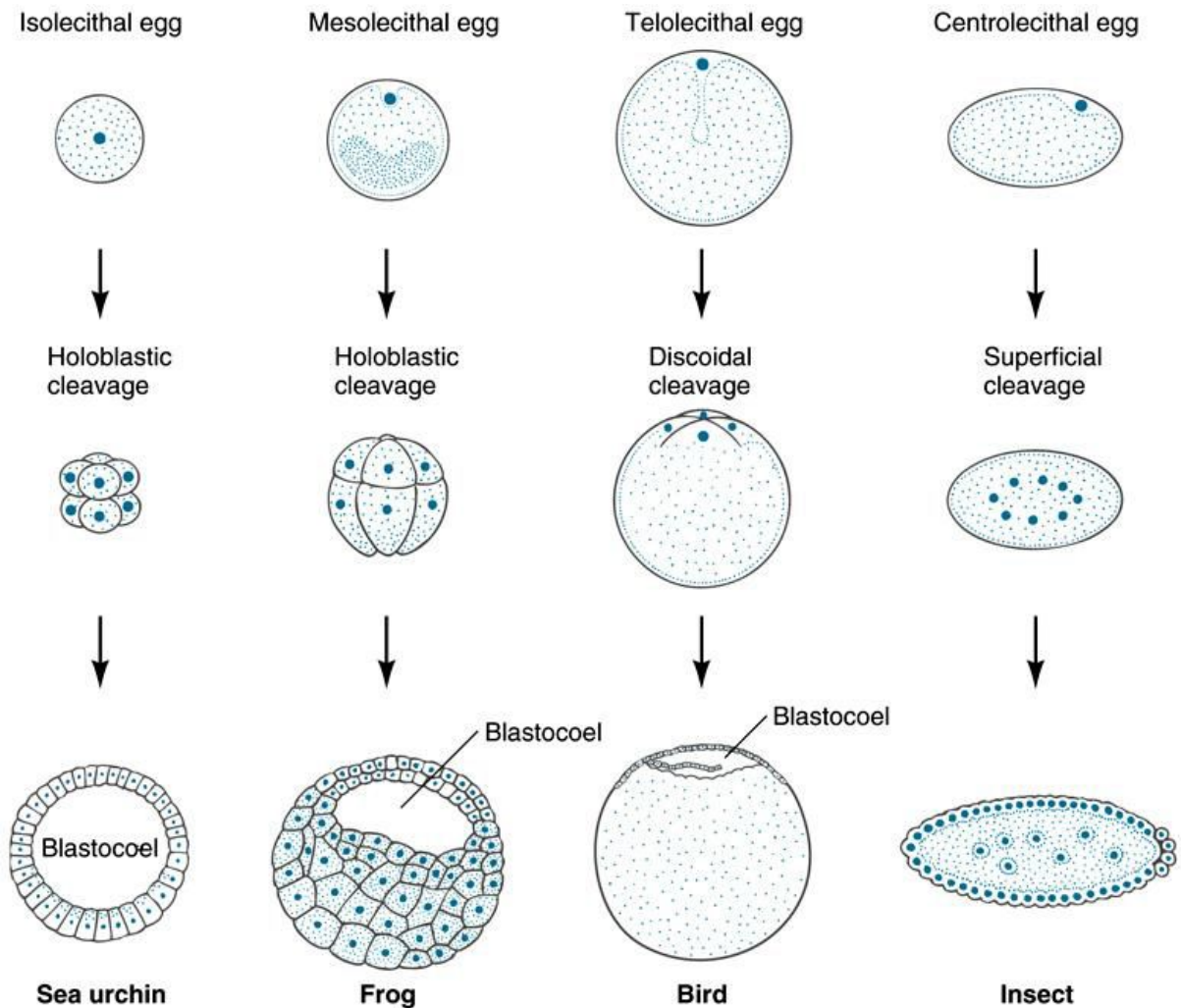
(b) Unequal holoblastic cleavage - In mesolecithal and telolecithal eggs, cleavage leads to the formation of blastomeres of unequal size. Among the blastomeres there are many small sized micromeres and a few large sized macromeres.

2. Meroblastic cleavage - In this type the cleavage furrows are restricted to the active cytoplasm

found either in the animal pole (macrolecithal egg) or superficially surrounding the egg (centrolecithal egg). Meroblastic cleavage may be of two types.

(a) Discoidal cleavage - Since the macrolecithal eggs contain plenty of yolk, the cytoplasm is restricted to the narrow region in the animal pole. Hence cleavage furrows can be formed only in the disc-like animal pole region. Such a cleavage is called discoidal meroblastic cleavage. Eg: birds and reptiles.

(b) Superficial cleavage - In centrolecithal eggs, the cleavage is restricted to the peripheral cytoplasm of the egg. Eg: insects.



Typical cleavage patterns of isolecithal, mesolecithal, telolecithal and centrolecithal eggs

Laws of cleavage

Apparently there are several cleavage patterns. However, all cleavages follow a common procedure.

The cleavages are governed by certain basic principles or laws.

1. Sach's laws - These laws were proposed by Sach in 1877.

- i) Cells tend to divide into equal daughter cells
- ii) Each new division plane tends to intersect the preceding plane at right angles.

2. Balfour's law (Balfour 1885) - "The speed or rate of cleavage in any region of egg is inversely proportional to the amount of yolk it contains".