

Gastrulation

I. Generalities

It corresponds to the second phase of embryonic development. It is a set of cellular and tissue movements (known as morphogenetic movements) leading to a rearrangement of blastomeres to obtain two embryonic tissues (in the case of diploblastic species) or three embryonic tissues (in the case of triploblastic species).

- **Ectoderm** (ectoblast): superficial layer
- **Mesoderm** (mesoblast): middle layer
- **Endoderm** (endoblast): internal layer

The embryonic tissues give rise to the tissues and organs of the embryo.

Gastrulation is characterized by the appearance of a digestive cavity (called the **archenteron**).

II. Gastrulation modalities:

Gastrulation is highly variable across the animal kingdom. It occurs according to several modalities:

- *EMBOLY (Invagination).
- *EPIBOLY (Recovery Overgrowth= *recouvrement*).
- *DELAMINATION (splitting of the cell layer and separation).
- *IMMIGRATION (cells migrate individually).
- ***polar proliferation**

• Gastrulation by emboly (= by invagination):

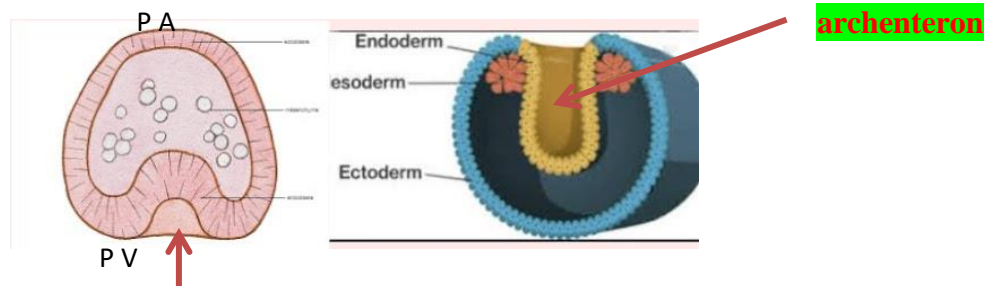
This form of gastrulation involves :

- Eggs that are poor in yolk { **especially at the vegetative pole** }
- Eggs that undergo radial holoblastic segmentation

The sea urchin is the most studied species for this type of gastrulation.

	Alécithe	Oligolécithe	Hétérolécithe
Segmentation Holoblastique	X	X	X
Segmentation radiaire	NO	X	X
Gastrulation par embolie		X	

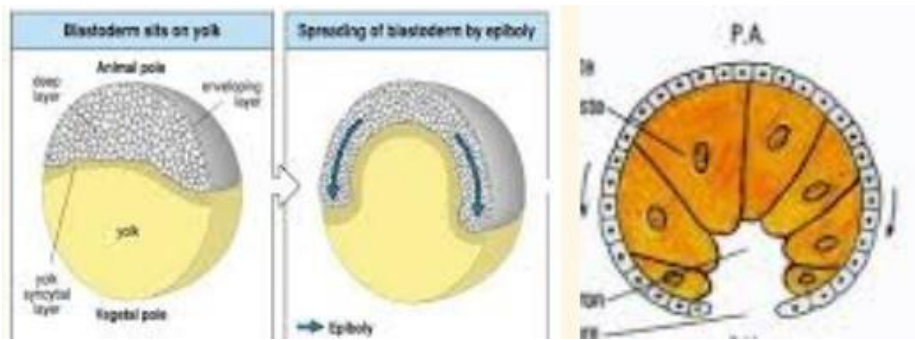
Emboly = invagination = folding or penetration of a cell sheet into the blastocoel.



• Gastrulation by epiboly: This form of gastrulation concerns :

- * Eggs that have the blastomeres of the vegetative pole too voluminous in yolk.
- * Eggs which have a reduced blastocoel = irregular blastocoel.
→Heterolectic eggs.

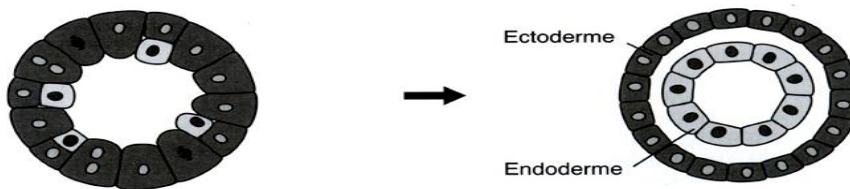
Epiboly corresponds to a movement of covering one tissue by another. In general, micromeres cover macromeres.



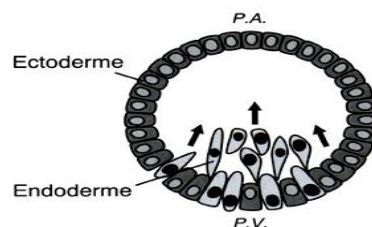
- **Gastrulation by immigration:** cells actively migrate into the blastocoel, become free and then arrange themselves to form the internal layers.
- **Gastrulation by delamination:** it consists of a splitting of a cell layer into two more or less parallel layers, which then form two different layers. The inner layer (=endoblastic layer) surrounds an archenteron.
- **Gastrulation by polar proliferation:** this type characterizes birds. It consists of the multiplication of cells at one of the poles of the Blastodisque. The daughter cells resulting from this localized proliferation form internal tissues.

Note: Gastrulation is characterized by complex morphogenetic movements, and the above types of cellular movements can all occur together, or only some of them, in a variable way depending on the species.

Délamination



Immigration



Prolifération polaire

