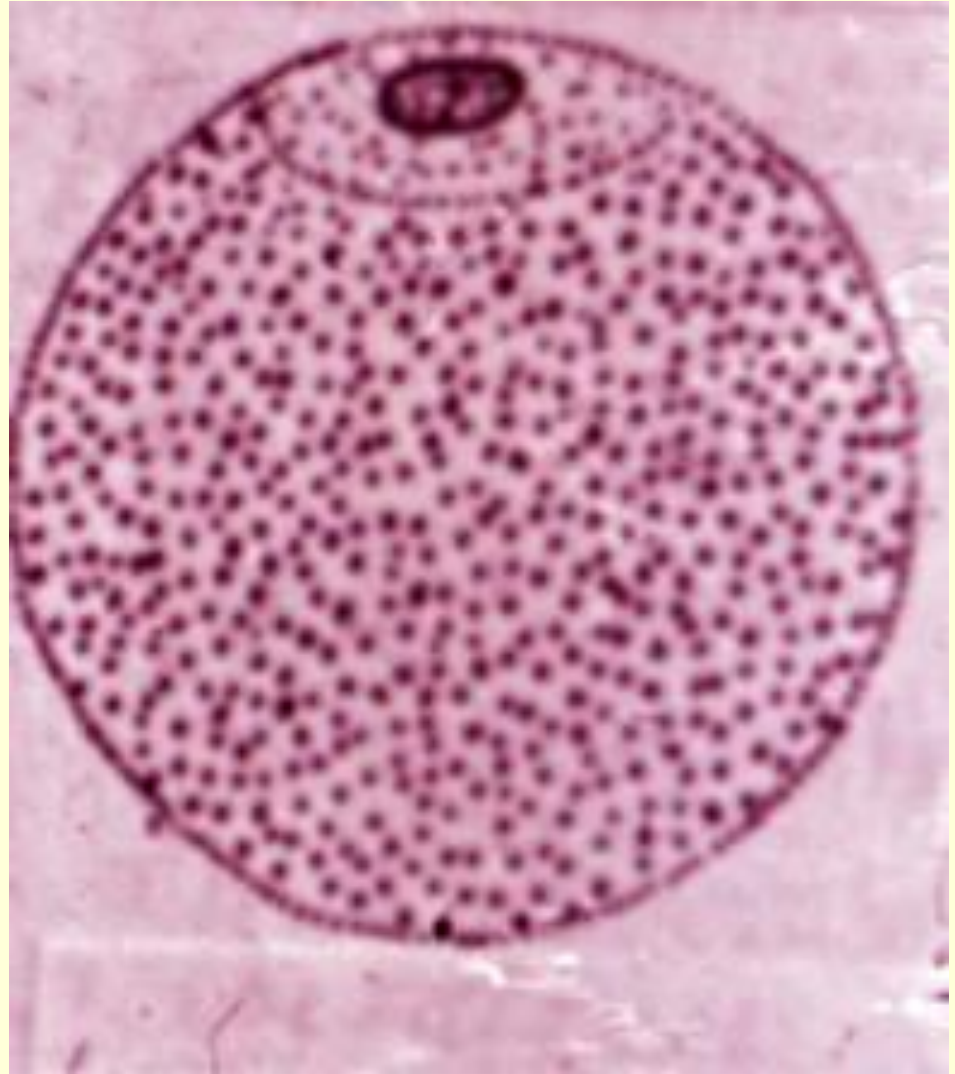
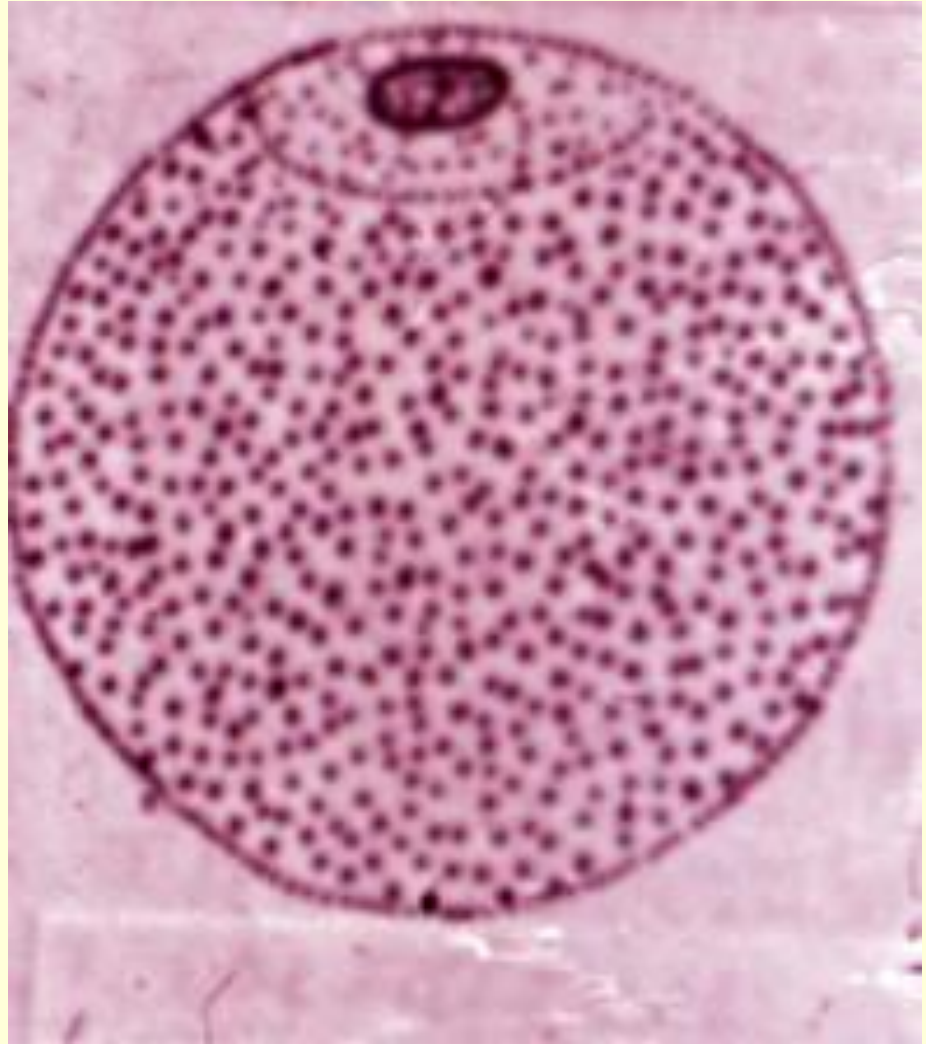


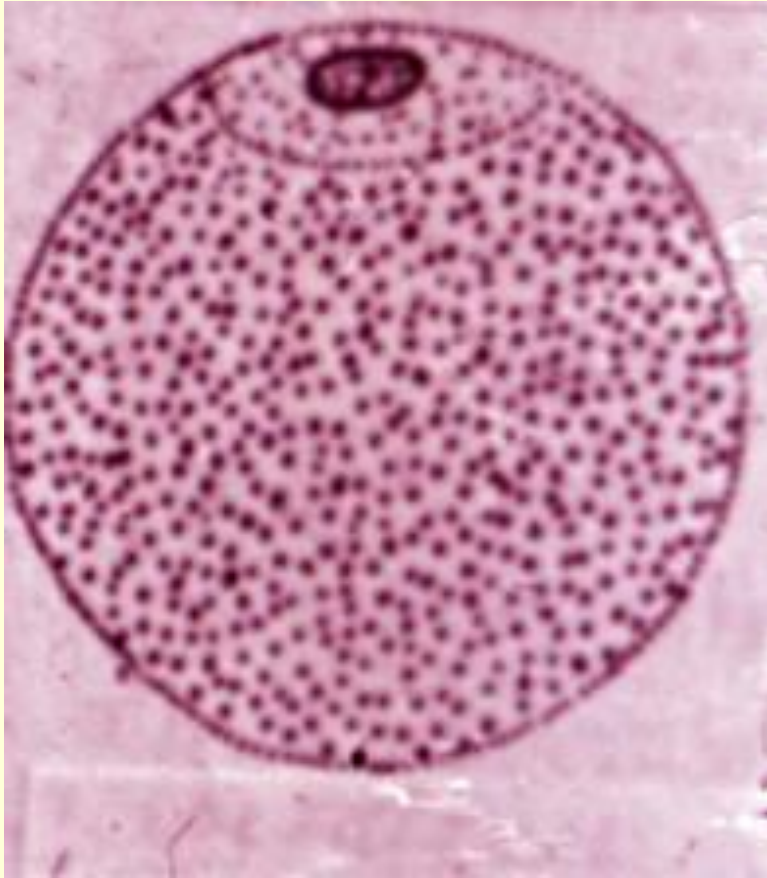
***Subsequent developments  
from zygote in Poultry - 1***

Poultry egg which is polylecithal type consists of egg cell surrounded by a vitelline membrane, egg yolk, cytoplasm and nucleus.



- The yolk is concentrated in one region of the egg, called the vegetative pole. The part of the egg that is devoid of yolk is called the animal pole.



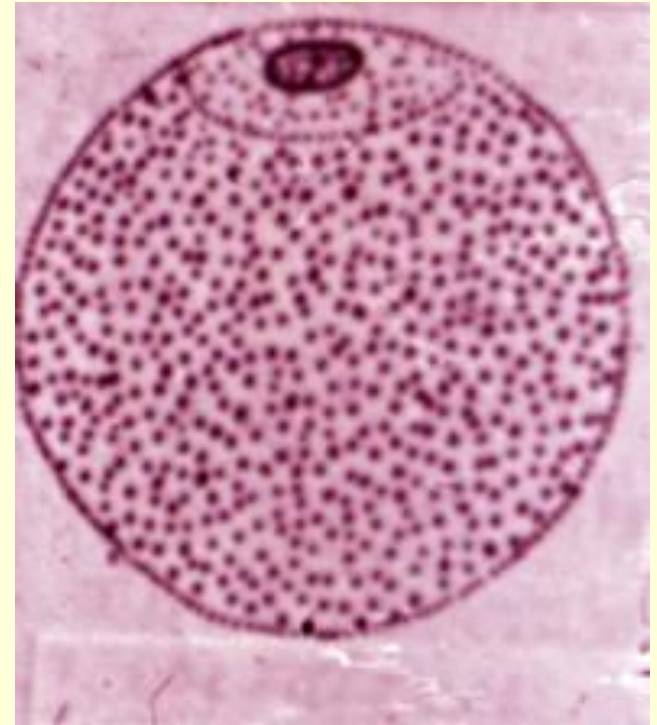


- There is a transversely striped thin layer (**zona radiata**) outside of vitelline membrane of this cell. Zona radiata surrounds by the **membrana granulosa** layer. This transverse lines are cytoplasmic projections of the follicle epithelial cells in the membrana granulosa.

- The **embryology of the poultry** is the development of the poultry inside of the egg.

- Construction of egg yolk until ovulation is completed.
- Mature egg cell is discarded without zona radiata into oviduct.

- Cytoplasm of the egg cell is very small and located in the animal pole with the nucleus. The yolk are accumulated at the vegetative pole, whereas at the animal pole the cytoplasm is devoid of yolk.

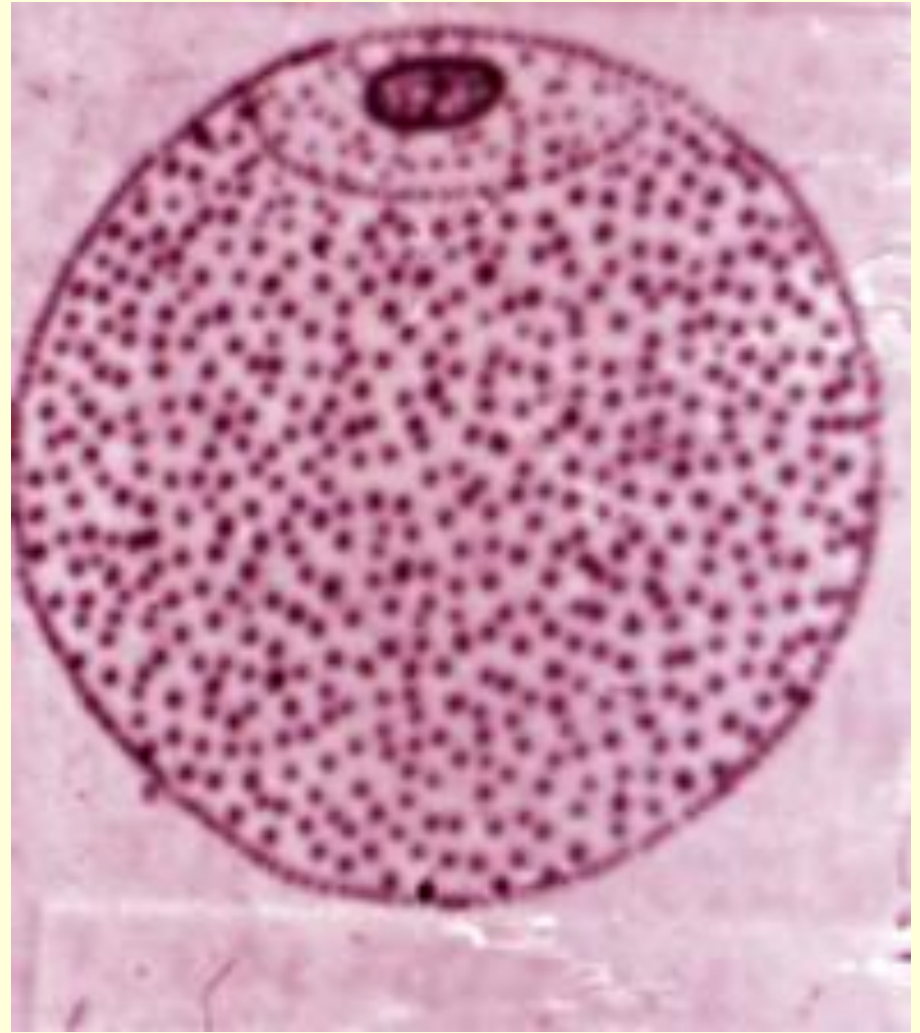


- Polylecithal eggs undergo partial cleavage, where yolk is not incorporated in the cells during cell division. This is not only true for chickens, but also for fishes.





- In consequence of it, cleavage and germ development only at the animal pole proceeds, within the range of small area. This manner of cleavage is partial discoidal.

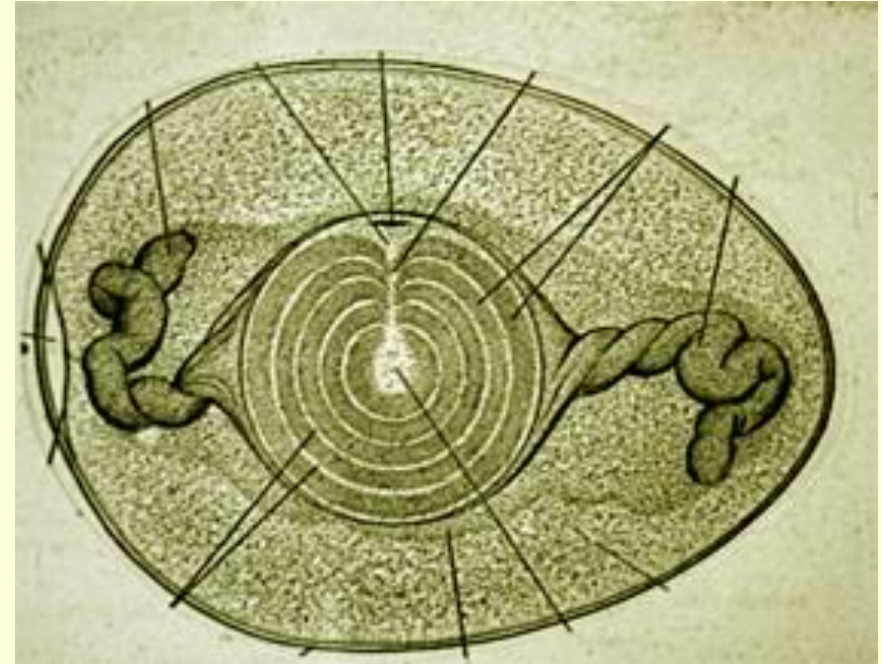


- The site of cleavage is confined to a disc-shaped area at the animal pole.
- The embryonic development occurs in this **blastodisc**.

## **EGG YOLK**

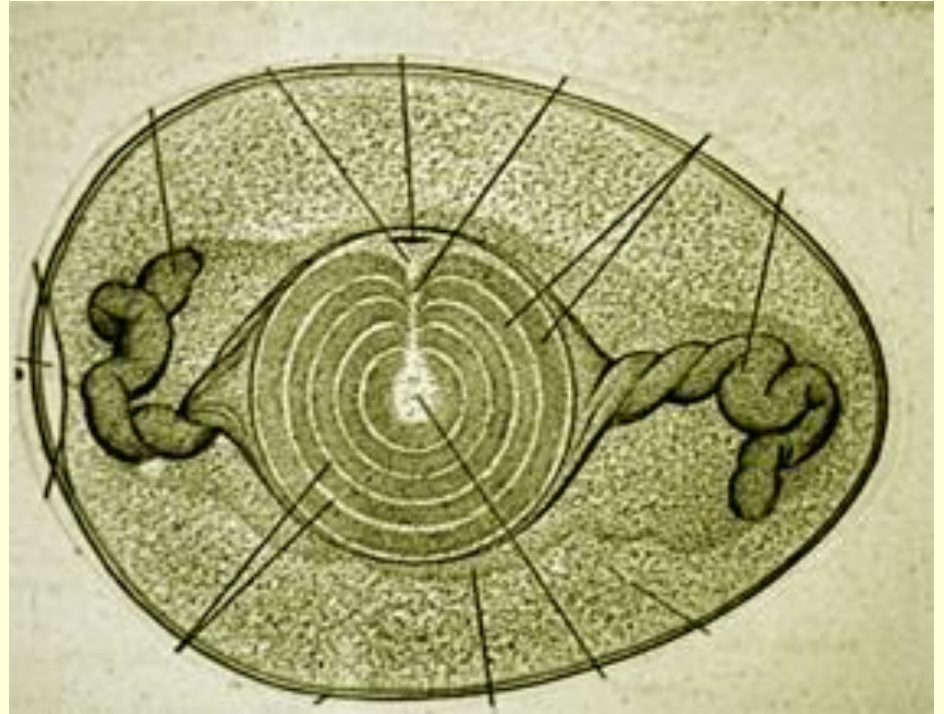
Egg yolk is formed of white and yellow vitellus rings. White vitellus that contains nucleus and cytoplasm is called **Pander's nucleus.**

- Egg white (albumin), which is darker in the interior surrounding the egg cell, while the outer part is more fluid situation.
- Egg white and chalaza consisting of egg white are made in the next region from infundibulum of oviduct.



- Oviduct is one. The first part of the oviduct is the **infundibulum**.
- The next section of the oviduct is the **magnum**.
- The third section of the oviduct is the **isthmus**.

- The next section of the oviduct is the **shell gland** (or uterus). In this section, the shell forms on the egg. The shell largely is made of calcium carbonate. **The egg shell is porous and it serves respiration.**



- The last part of the oviduct is the **vagina**. The vagina does not really play a part in egg formation but is important in the laying of the egg. The vagina is made of muscle that helps push the egg out of the hen's body.

- The thick albumin is made in this channel, firstly. While the egg cell pass through the spiral-shaped of the channel, the chalaza is formed.
- Liquid albumin and the double membrane (internal and external membranes) are added in the lower parts of oviduct.
- In the region corresponding to the large pole of the egg has a air space between double membrane.



- **Egg yolks can be double in some eggs. This situation arise from two egg cells discarded during ovulation.**
- **Both they constitute double yolk eggs wrapped in the same cloth passing oviduct. Even though these eggs are fertilized. Normally improvement is not seen. Because air and nutrients in the egg but it is enough for the development of a chick.**



In some eggs can be seen on the red spots on egg yolk.  
What is this spot, how it occurs?

- They are blood droplets falling on the yolk membrane and leak from capillaries exploding in ovary during ovulation.
- When blood droplets cover with albumin, it remains in the egg.

- In general, white-feathered chickens lay white eggs, and brown-feathered chickens lay brown eggs.

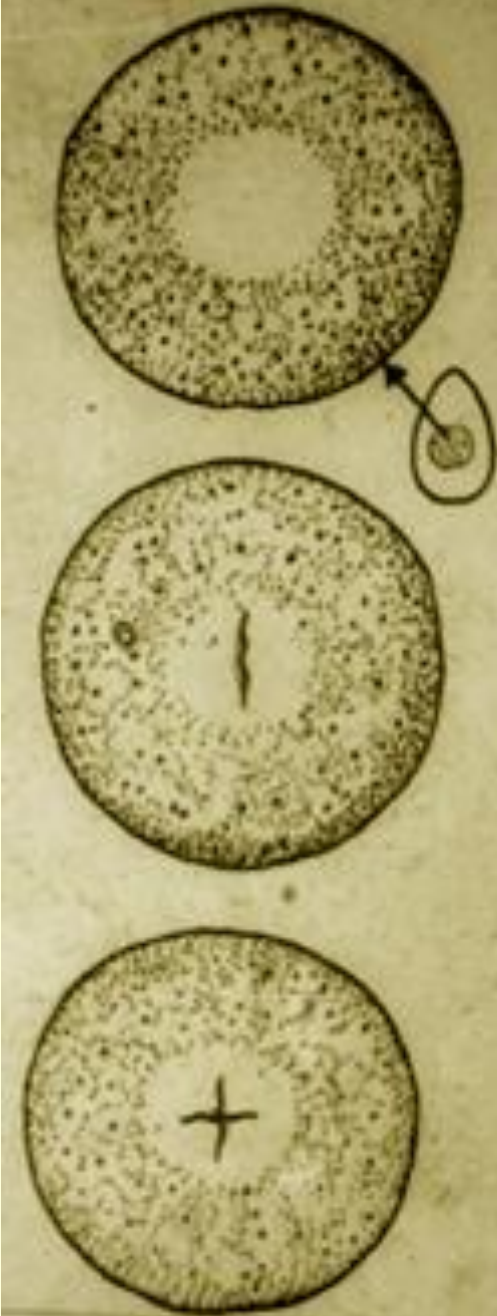


- The egg cell is thrown into the oviduct with ovulation and it is fertilized here.
- Unlike other animals, few sperm can enter into egg cell in poultry  
(Polyspermy)

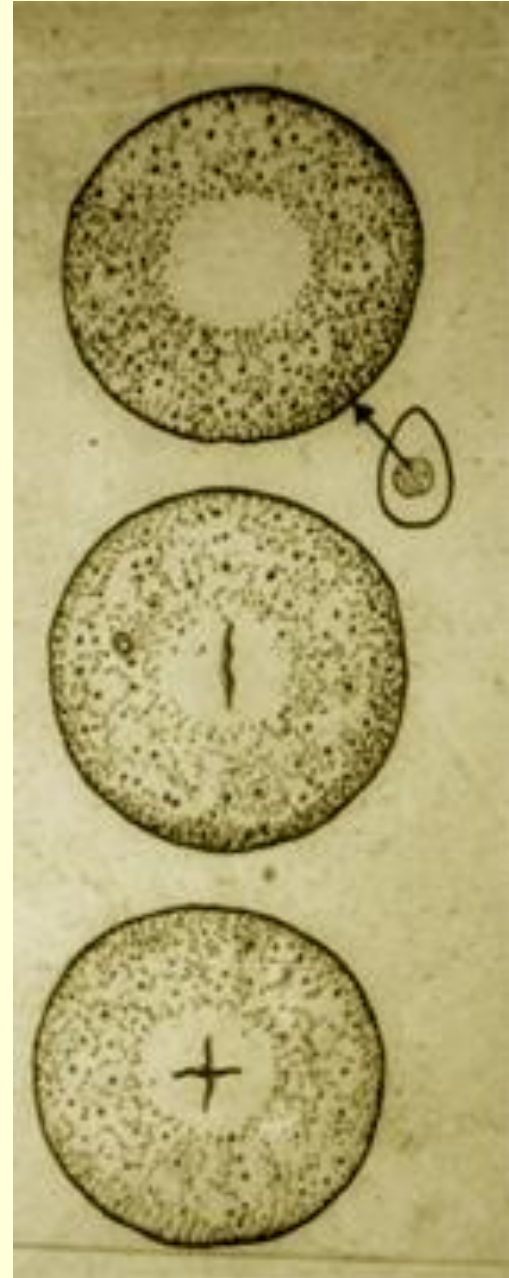
- But, pronucleus of one of them fuse with pronucleus of the egg cell (karyogamy).
- Other spermium shows no improvement and degenerate and disappear during the divisions of the zygote.

- The end of early development is similar in all organisms, but the pattern of early mitotic divisions can differ.
- One factor that influences the pattern of mitosis is the amount of yolk present.

- After the zygote formed divisions that are different from the amphioxus.
- In polylecithal eggs with meroblastic cleavage, such as that of the poultry, only the protoplasm of the egg i.e., the blastodisc, is divided, and the cleavage planes don't segment the yolk.

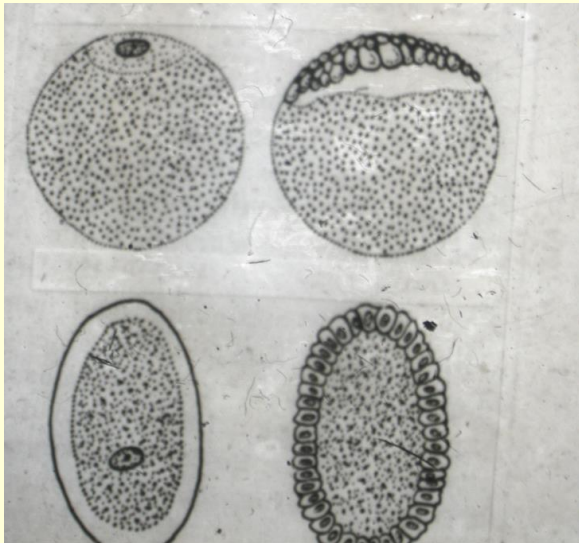


- The first cleavage begins with furrow in a disc-shaped field where is found cytoplasm and nucleus.



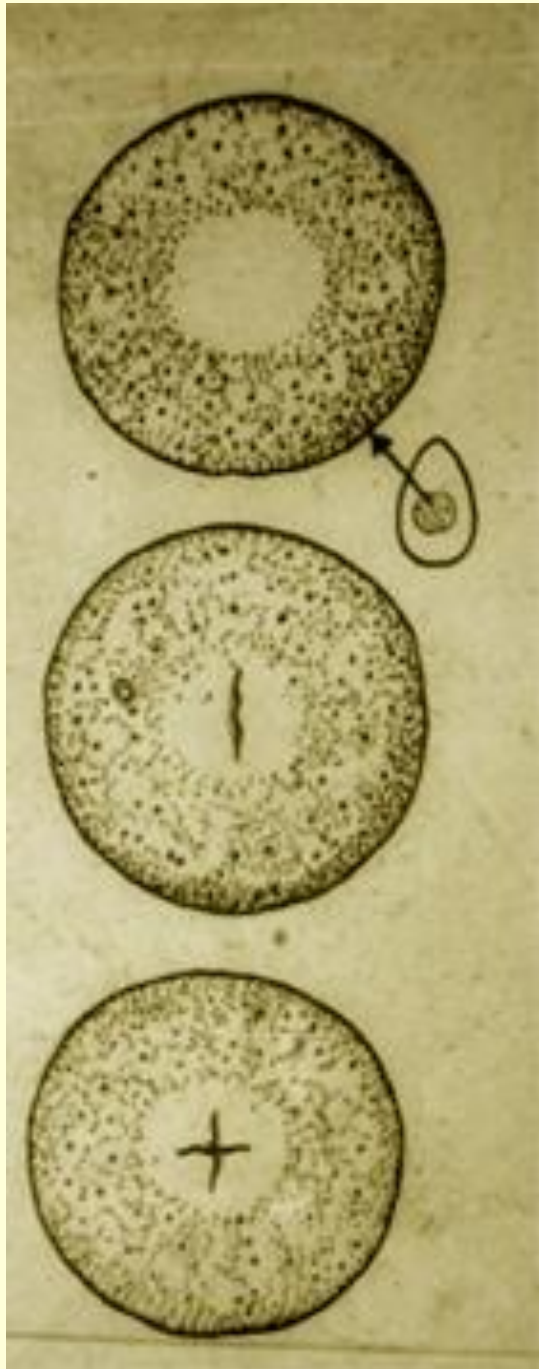


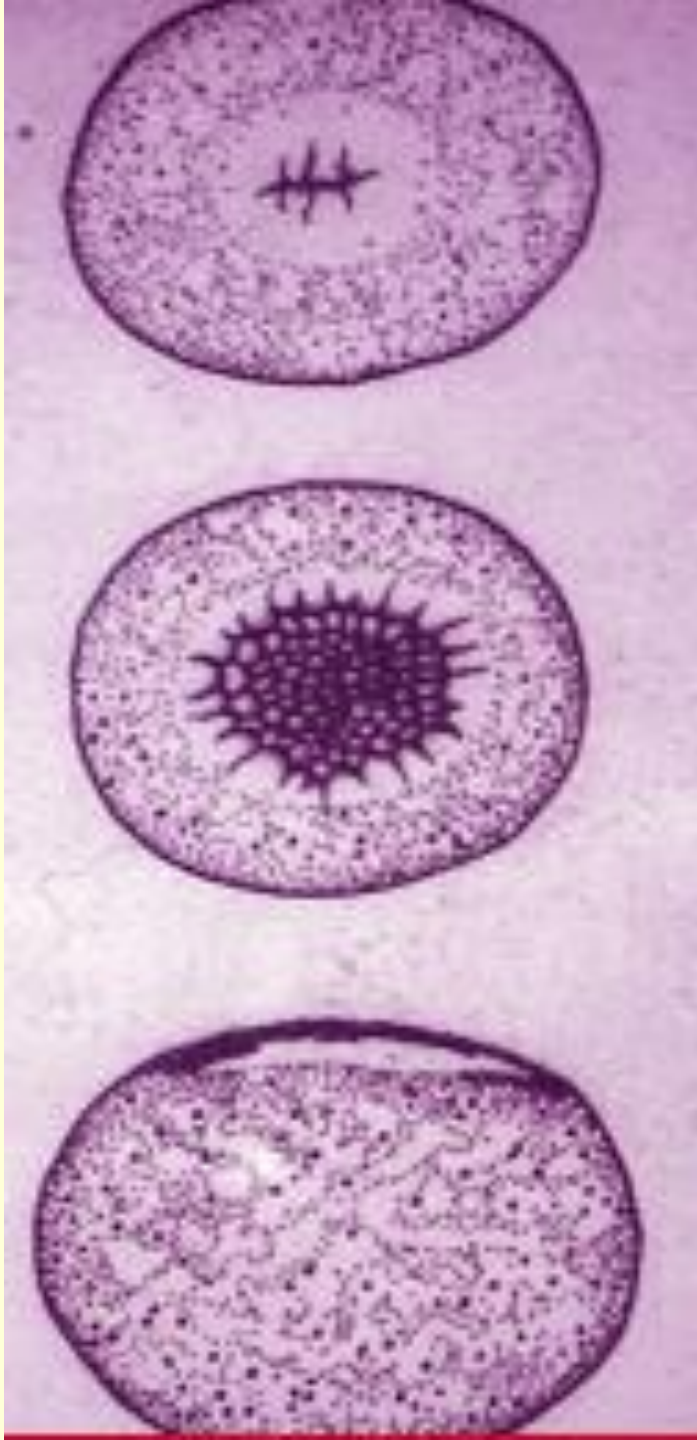
- This cleavage furrow can be considered as the first meridional division. As a result of this cleavage furrow, disc-shaped field is divided into incomplete of two halves.



side view

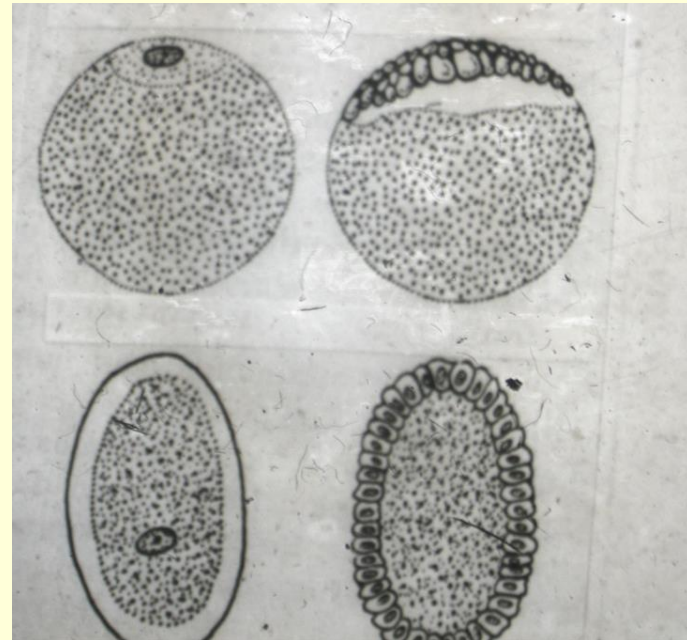
- *The second meridional division occurs as being vertical to the first and embryonic field is divided incomplete into 4 parts.*





- Subsequent cleavage becomes in the inside of the disk and the surface in parallel. This is only the third cleavage direction and therefore takes the HORIZONTAL DIVISION name.
- Morula occurs with later divisions. These cells are adherent to the egg yolk.

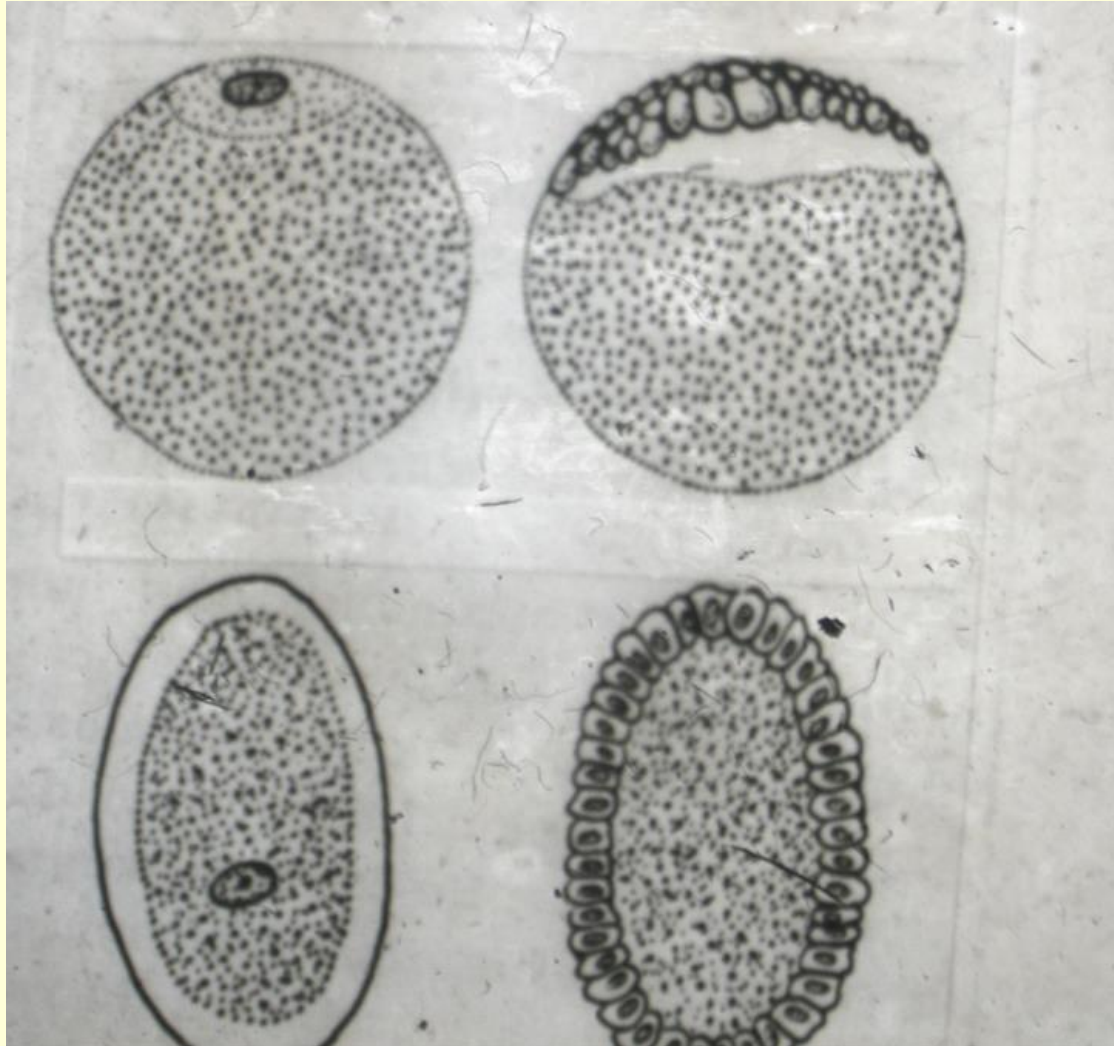
- After a short time, yolk material starts to melt with enzymes to release the cells on the bottom surface of morula and a cavity is formed (morula gap).



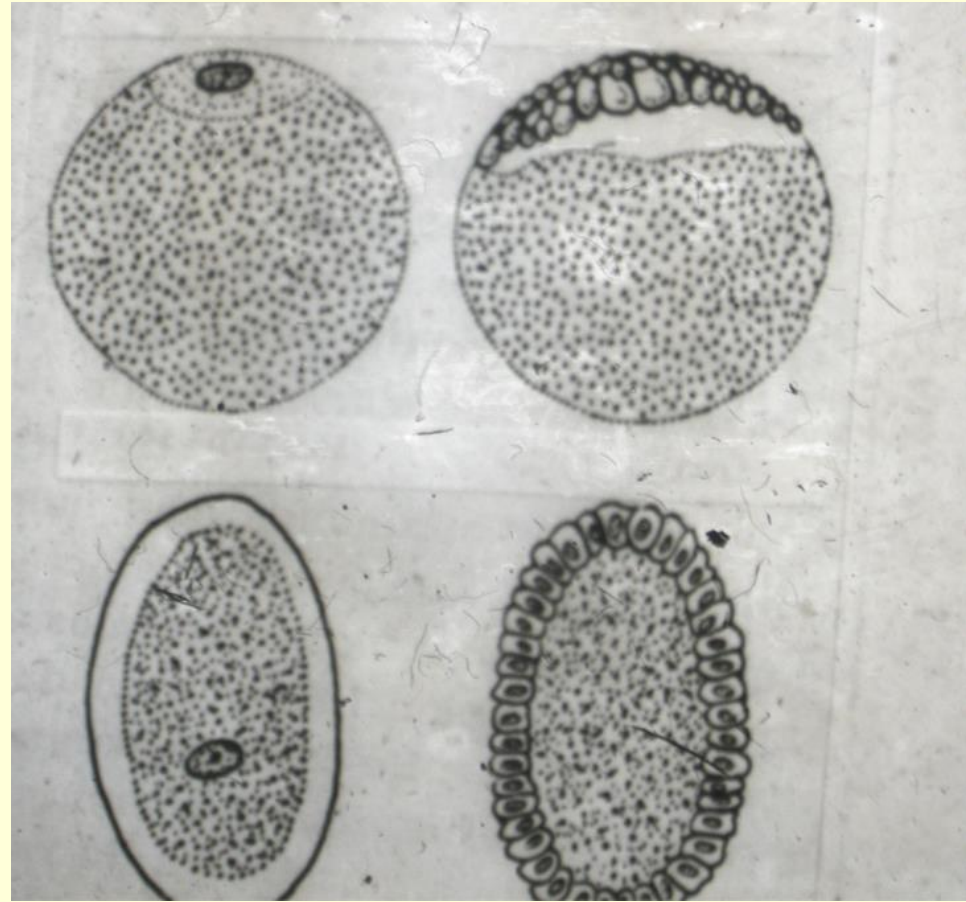
- Morula cavity becomes wider in a short time and occurs blastocoel, and it formed disc-shaped blastula.
- This is called discoblastula.



Cell community on the blastocoel is named blastoderm, also. Blastocoel is found between yolk sac and blastoderm layer.



- Blastoderm is fused with yolk sac only at peripheral portion.



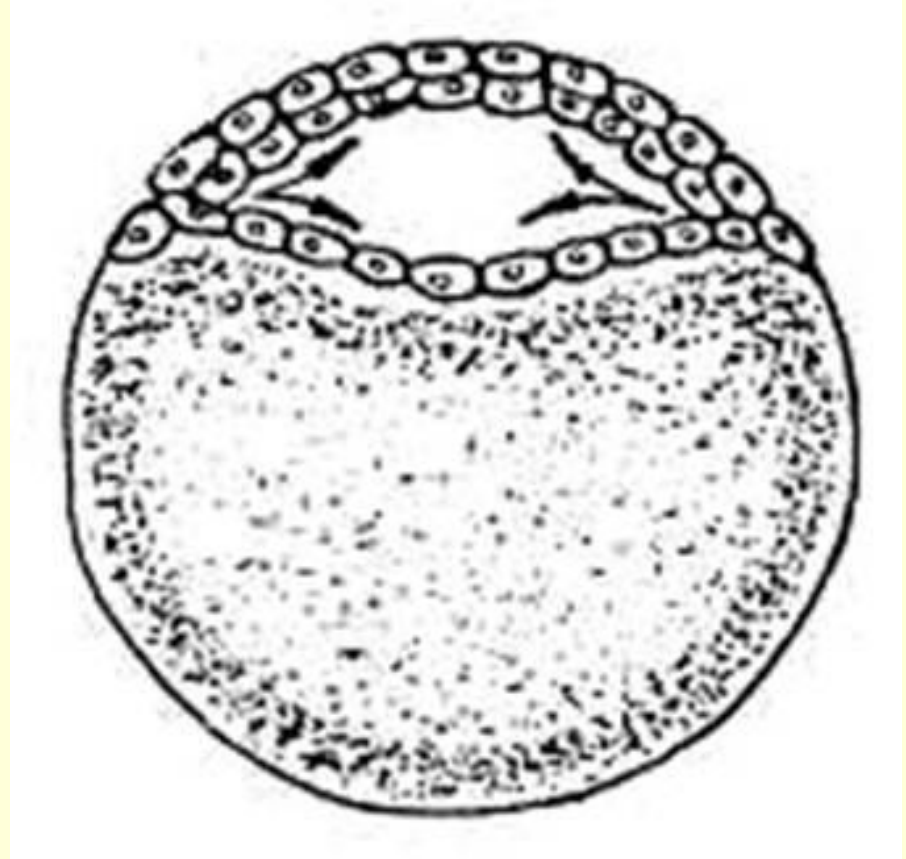
4-6 hours avian embryo

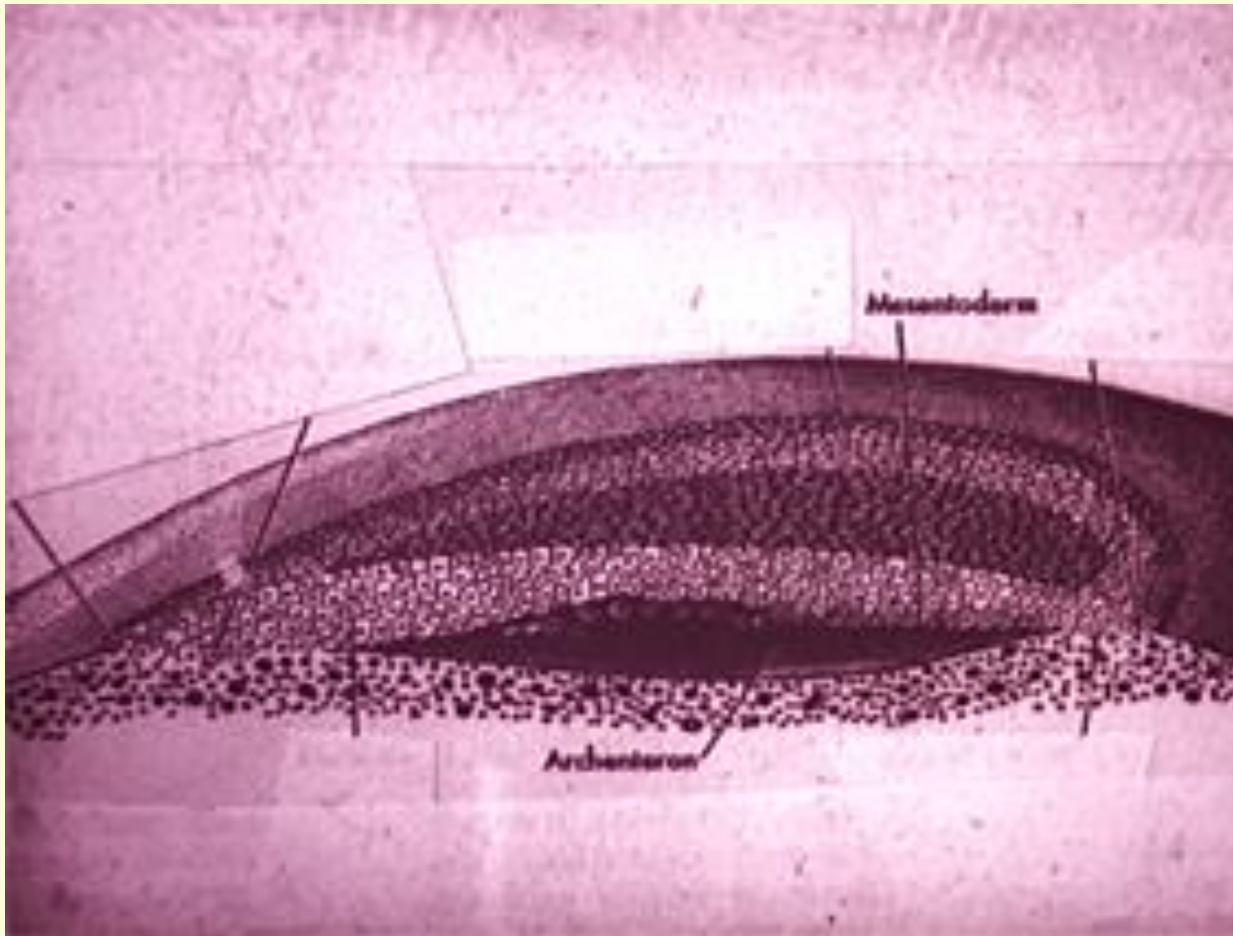
When viewed from above the egg at this stage, central part of disc-shaped blastoderm layer which coincided on blastocoel is transparent (area pellucida). The edge portion is seen dark (area opaca).





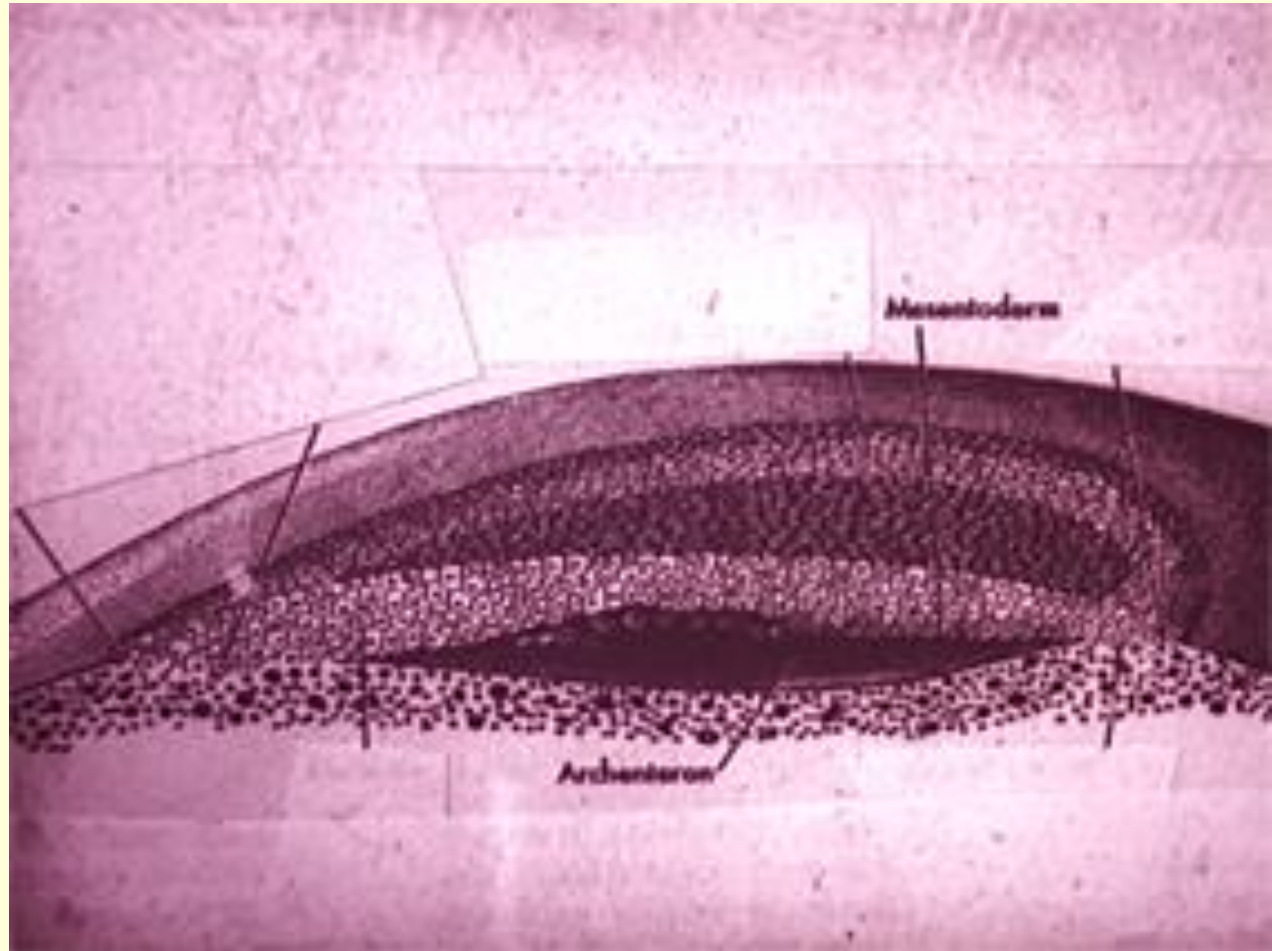
- Blastoderm cells in the area pellucida show an overgrowth. The resulting new cells migrate toward the blastocoel and thus, a layer is formed.



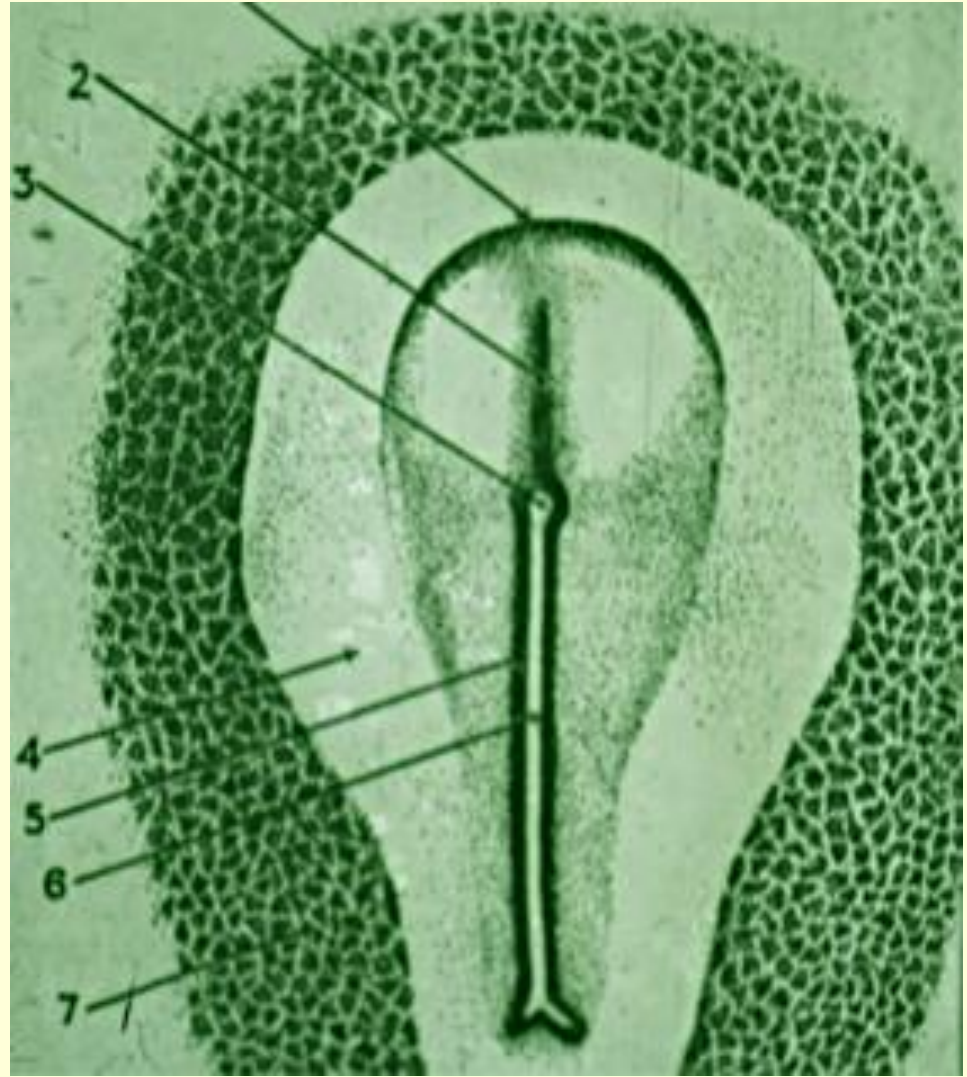


- This layer which is cover over the blastocoel is endoderm. Blastoderm cells on the endoderm make the ectoderm. The occurrence of the endoderm is called POLYINVAGINATION.

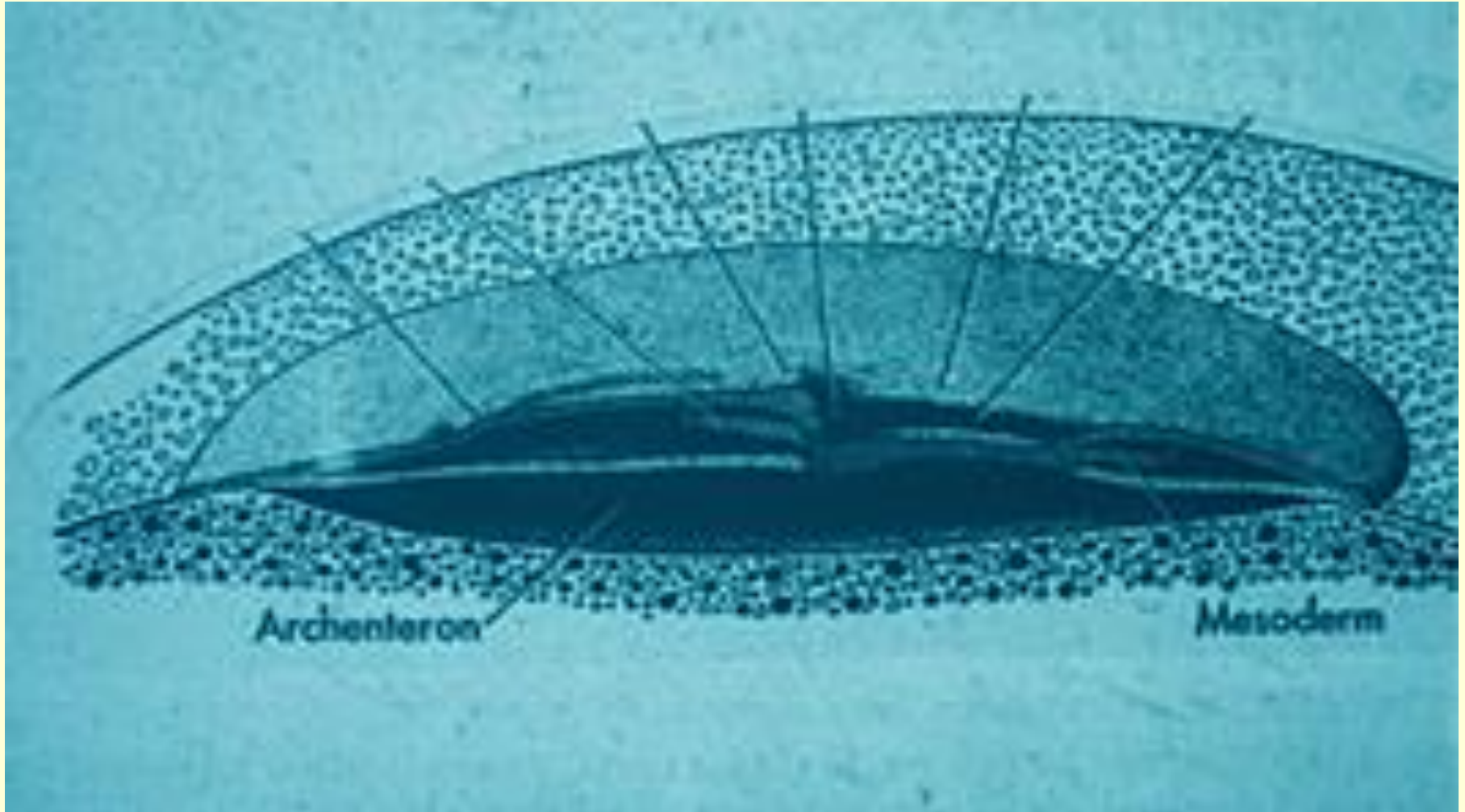
- ***After the endoderm is formed, the blastocoel part between endoderm and vitellus (yolk sac) is named archenteron (first intestinal channel).***
- Because gastrulation is not seen in poultry, gastrocoel is not formed, either.
- After endoderm occur, the disc-shaped area where develops embryo is called discus embriyonalis.



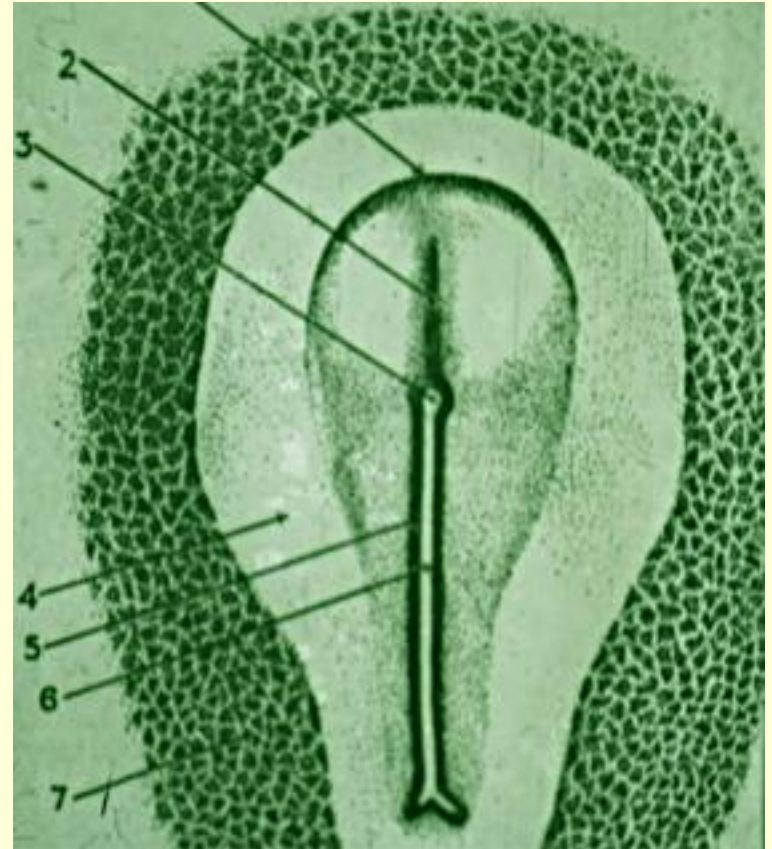
- While development progresses, a groove (sulcus primitivus) appears in caudal edge (in ectoderm) of the disc.
- This groove extending in the cranial direction ends in a cavity in the central part of the disc. This cavity is named Fossa primitivus.



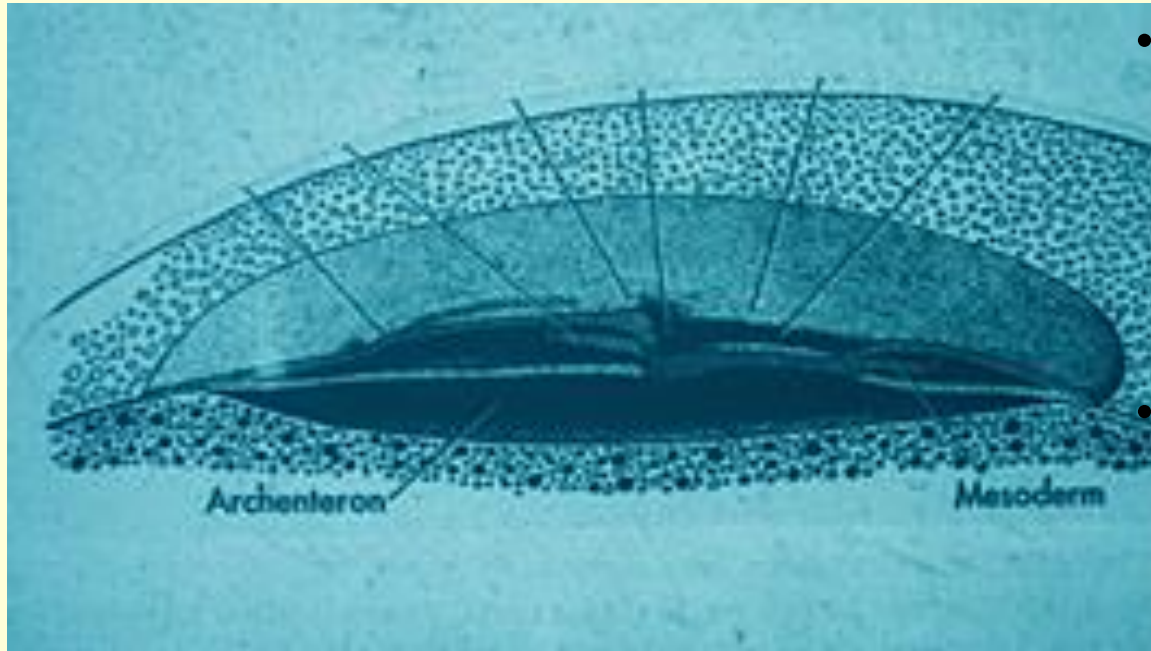
- A node occur with cell proliferation (ectodermal) in the front half of fossa primitivus. This is called nodus primitivus.



- Then, in the cranial direction at the front portion of nodus primitivus occur a second groove. This groove is sulcus neuralis which is the origin of nervous system.



# Chorda dorsalis and mesoderm formation.



- Later, ectoderm cells in the base of sulcus primitivus and at Hensen nodus proliferate and constitute a cell community towards the endoderm.
- This indifferent cell community is called **MESECTODERM**. This will constitute mesoderm and chorda dorsalis, then.

## 22 hours avian embryo



- Indifferent cell community, after creating the chorda dorsalis and mesoderm, sulcus primitivus, fossa and nodus primitivus are seen a decline in primitivus and they are gradually lost.
- Mesoderm initially invisible in the head region of embryo. There are only ectoderm and endoderm, here.



- *Canalis nöroentericus*:
- **The channel formed between the neural field with gastrocoel in amphioxus, formed in the front wall of the fossa primitivus in poultry.**

**This channel allows the feeding of the neural field for a short time. It disappear during decline of sulcus primitivus and fossa primitivus.**