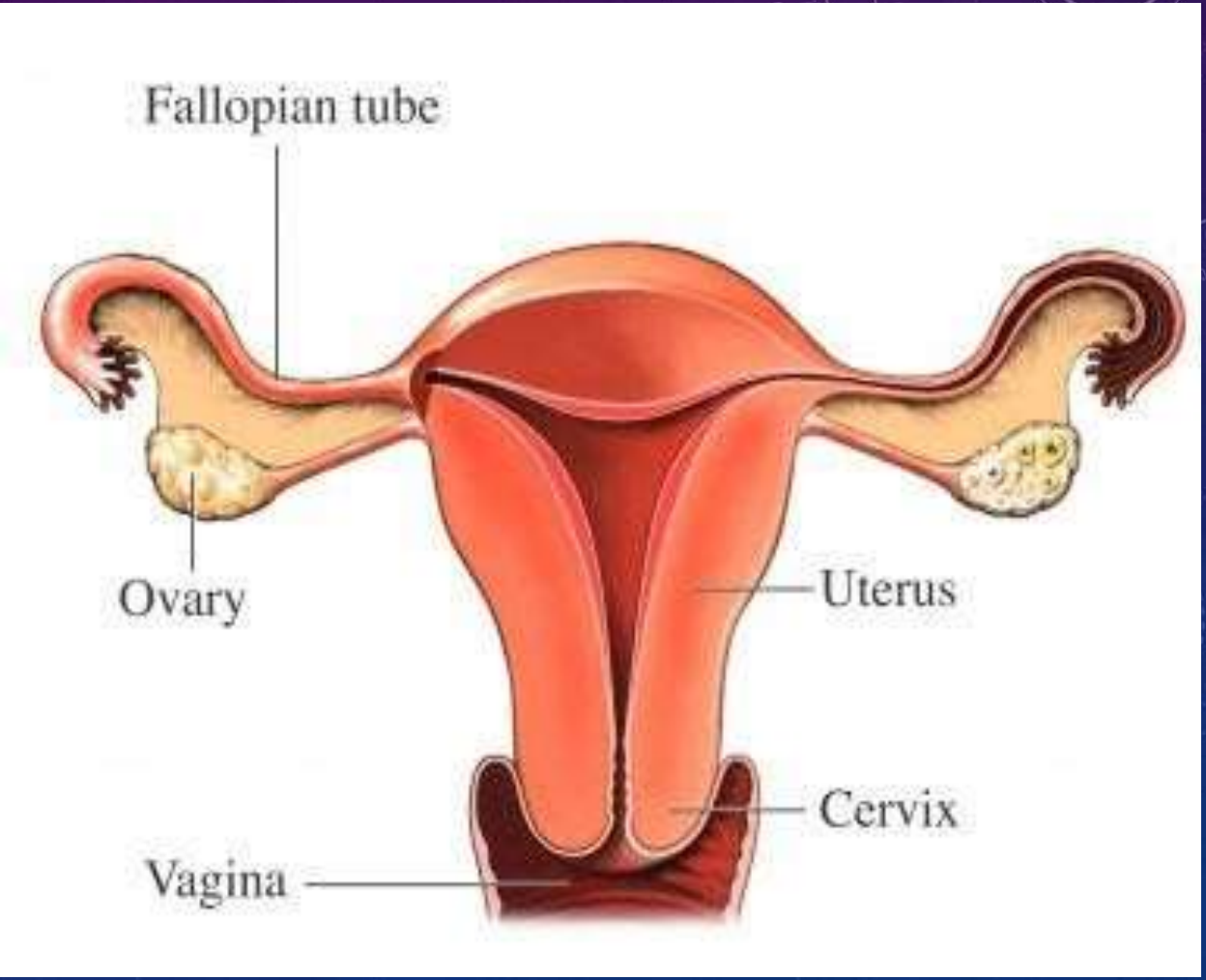
EMBRYOLOGY and oral histology

Senior lecturer
Dr sura talal kadhim
Department of prosthodontics technology

Lab 1

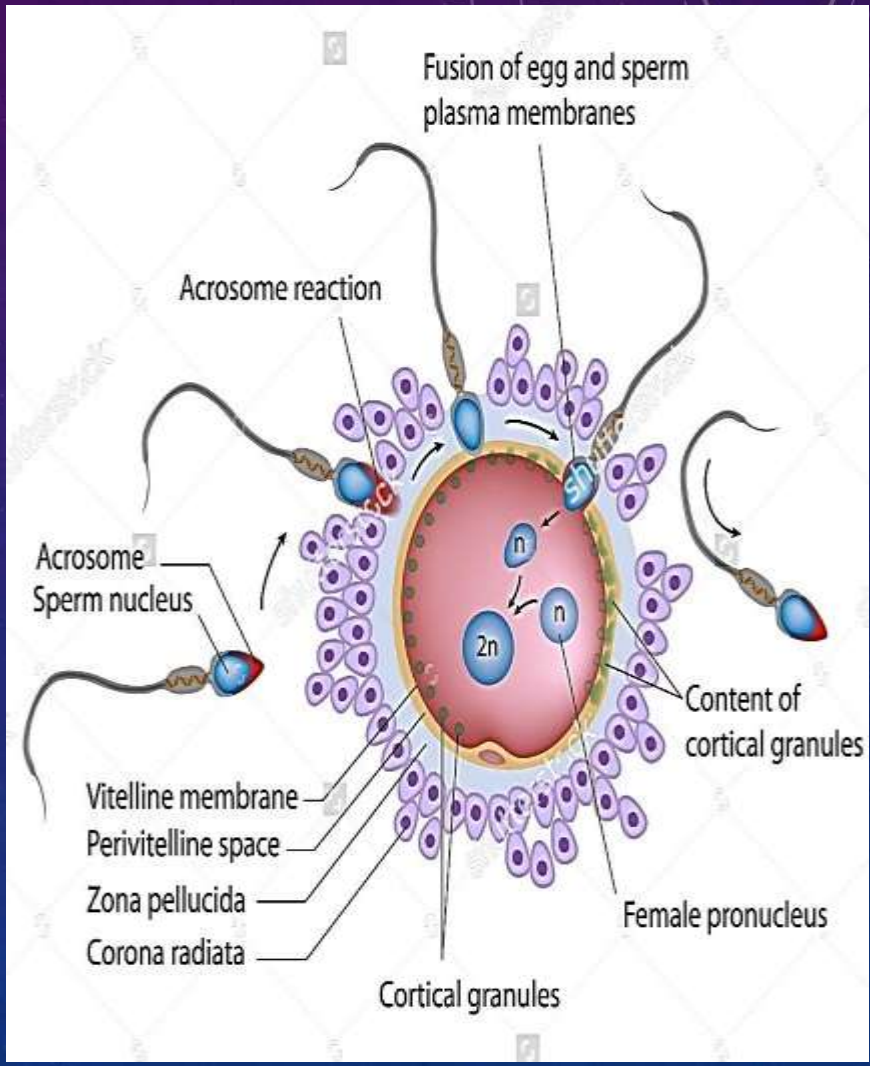
Embryogenesis is the process of initiation and development of an embryo from a zygote that occurs through a sequence of cell division, enlargement and differentiation.



Phases of fertilization

Phase I: Penetration of the corona radiate

- 200-300 million spermatozoa deposited in genital tract
- 300-500 reach fertilization site.
- Only one of them fertilizes egg

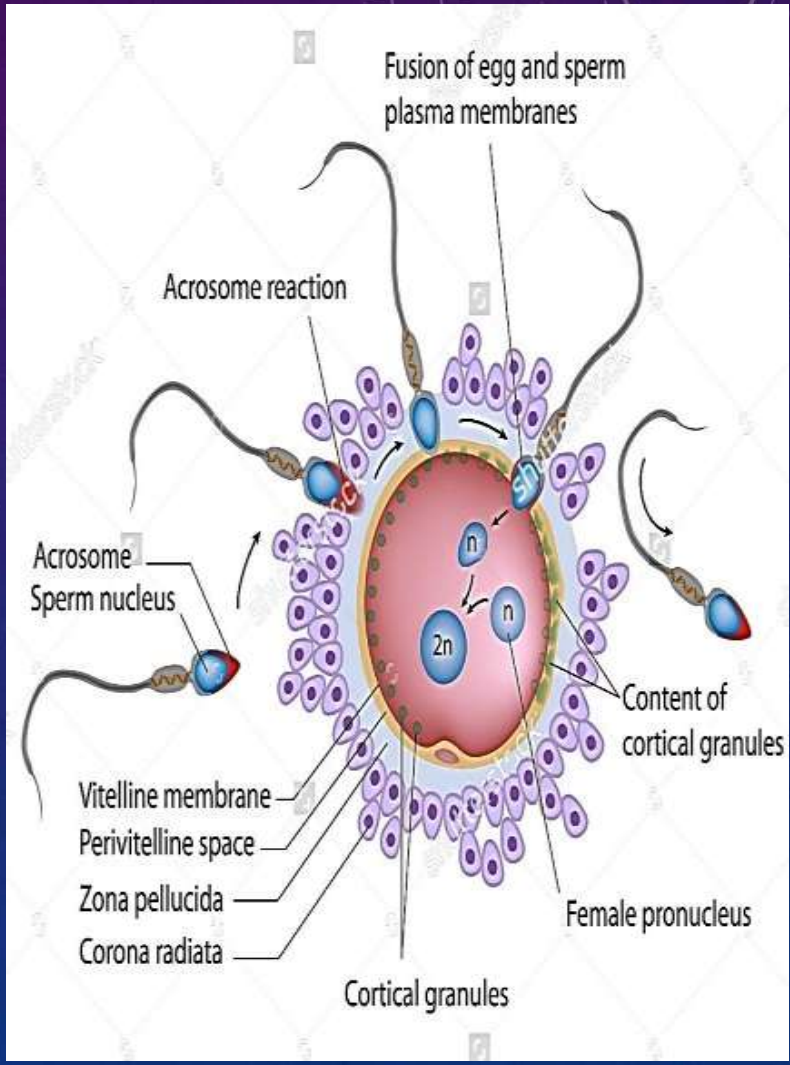


Phase II: Penetration of the zona pellucida

-The zona is a glycoprotein shell surrounding the egg that facilitates and maintains sperm binding

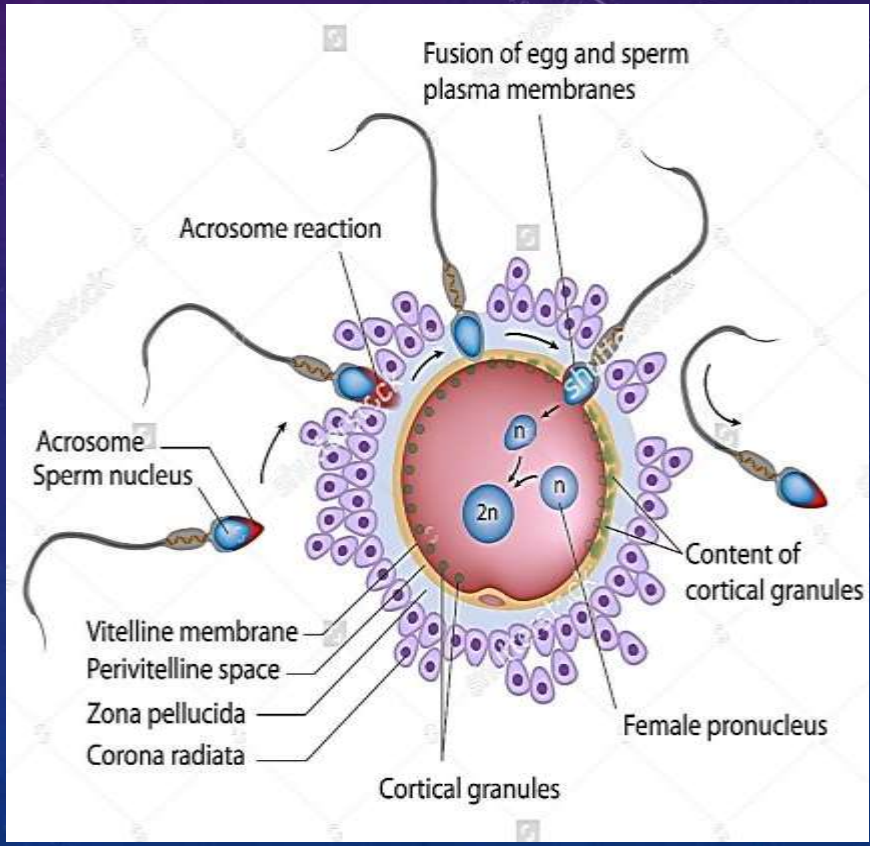
-Induces the ***acrosome reaction***.

-Release of acrosomal enzymes (acrosin) allows sperm to penetrate the zona in contact with the oocyte



PhaseIII: Fusion of oocyte and sperm cell membrane

-After adhesion, the plasma membranes of the sperm and egg fuse.

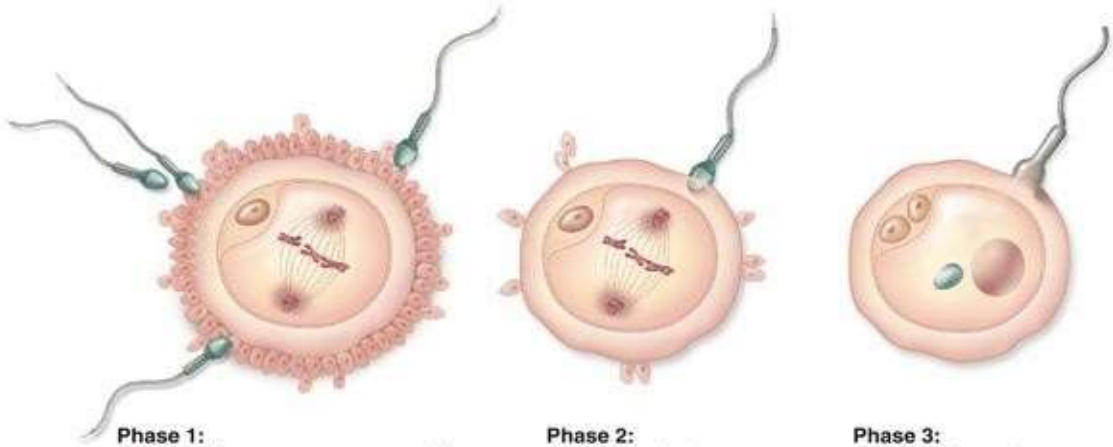


FERTILIZATION

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(a) Sperm cell

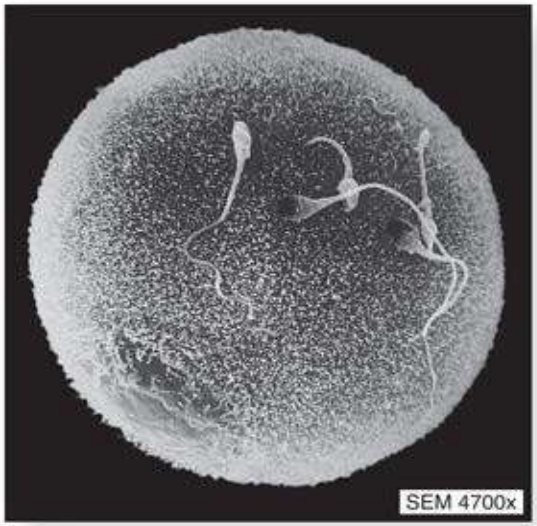


Phase 1:
Sperm undergoes acrosome reaction and penetrates corona radiata

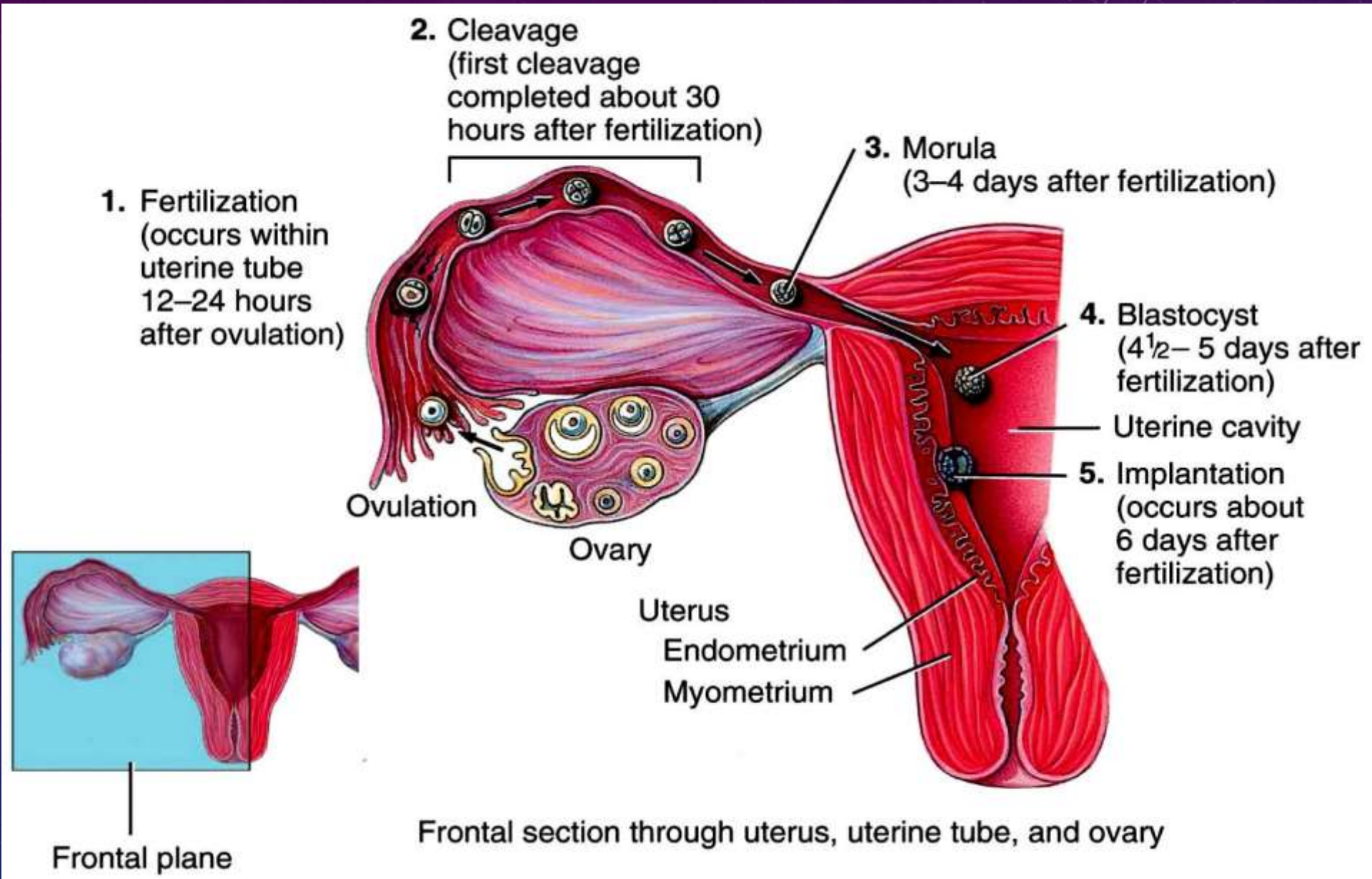
Phase 2:
Sperm penetrates zona pellucida

Phase 3:
Sperm and oocyte plasma membranes fuse

(b) Three phases of fertilization



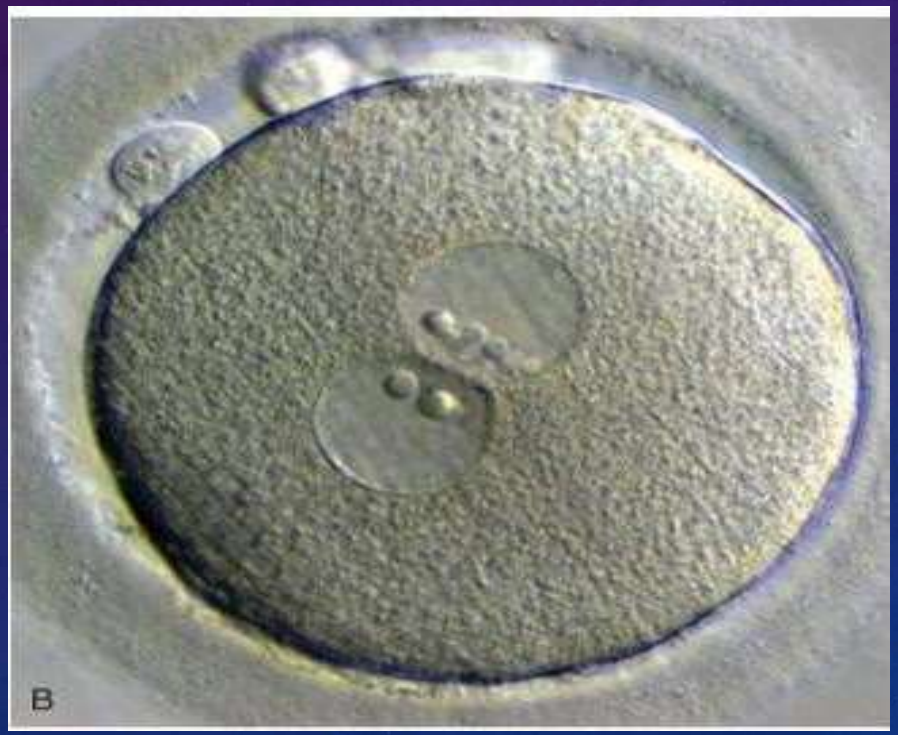
(c) Phase 1 of fertilization



Frontal section through uterus, uterine tube, and ovary

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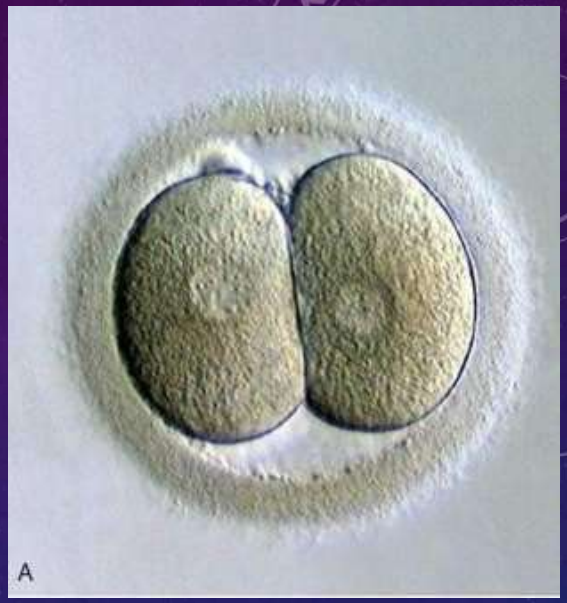
Fertilized egg (zygote)



Fertilized egg
2 polar bodies
2 pronuclei

Day 1
0.1 mm

2 CELL STAGE



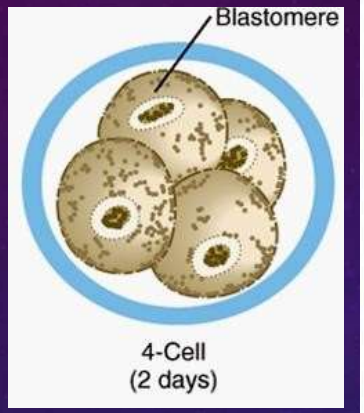
Individual cells = blastomeres

Cells become <u>smaller</u>

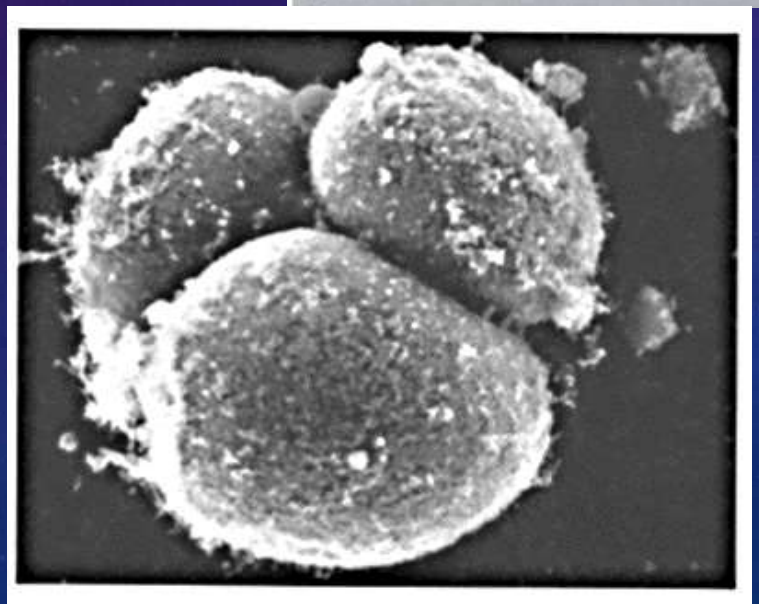
Blastomeres are equivalent .



4 CELL; SECOND CLEAVAGE

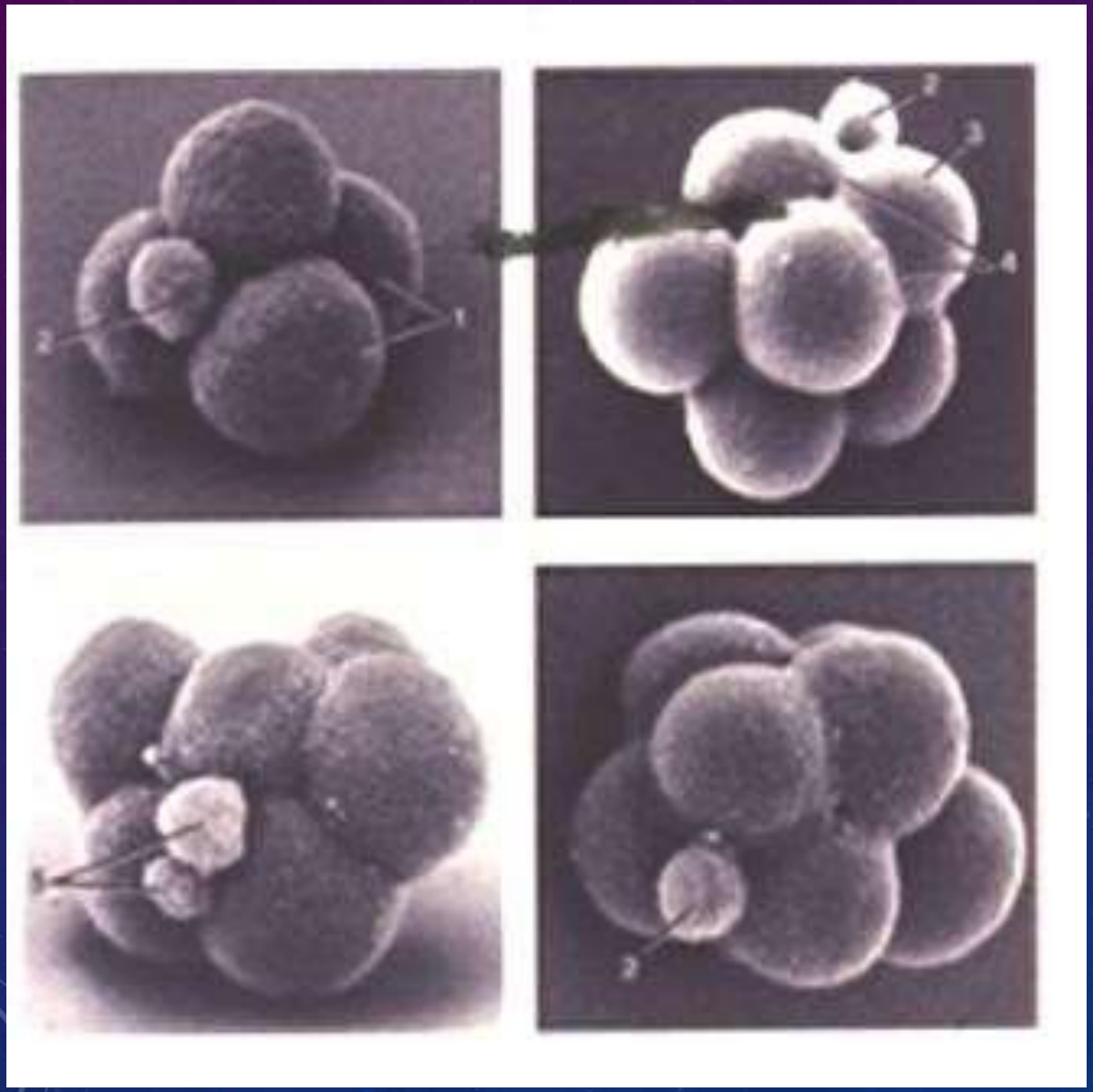






4 equivalent blastomeres

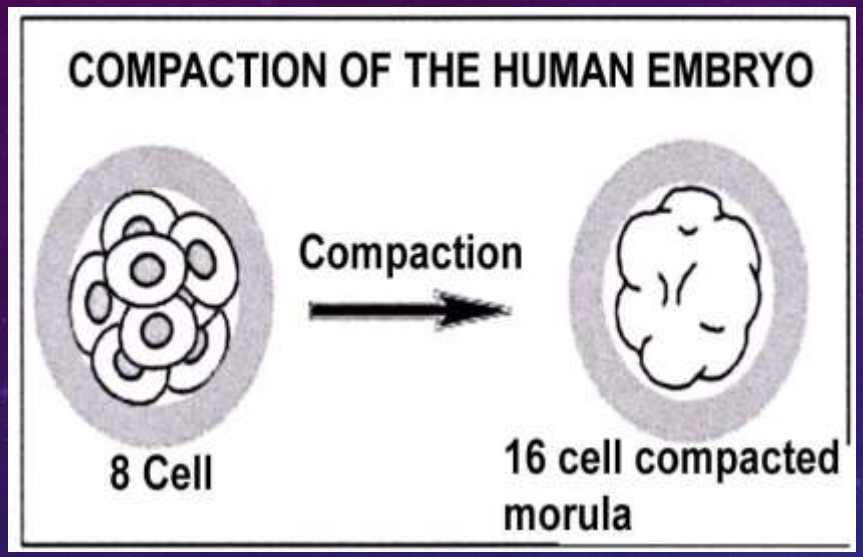
Still in zona pellucida



8 CELL; THIRD CLEAVAGE

BLASTOMERES STILL EQUIVALENT

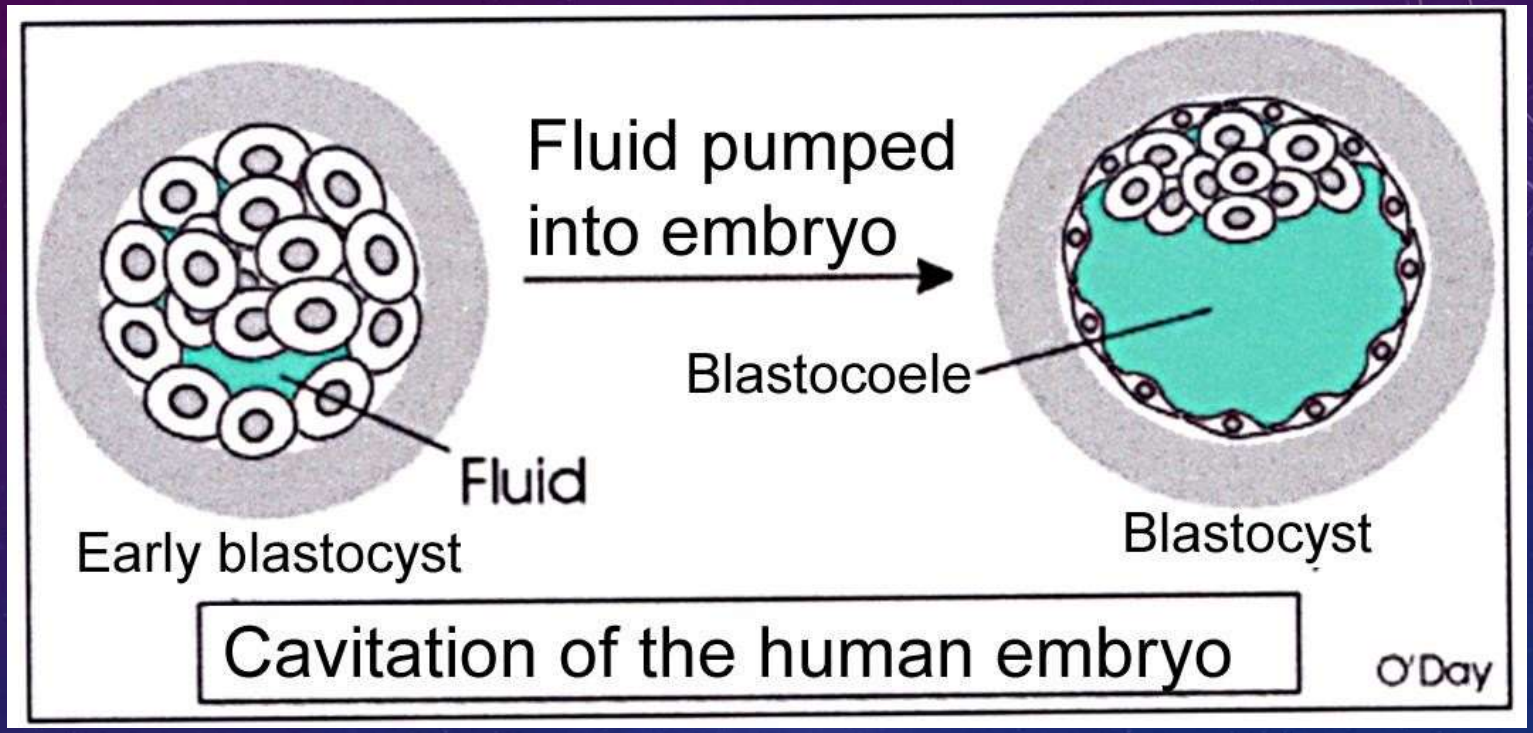
AFTER 8-CELL STAGE:
FIRST DIFFERENTIATION OF EMBRYONIC LINEAGES





Caused by increased cell-cell adhesion

FORMATION OF THE BLASTOCYST

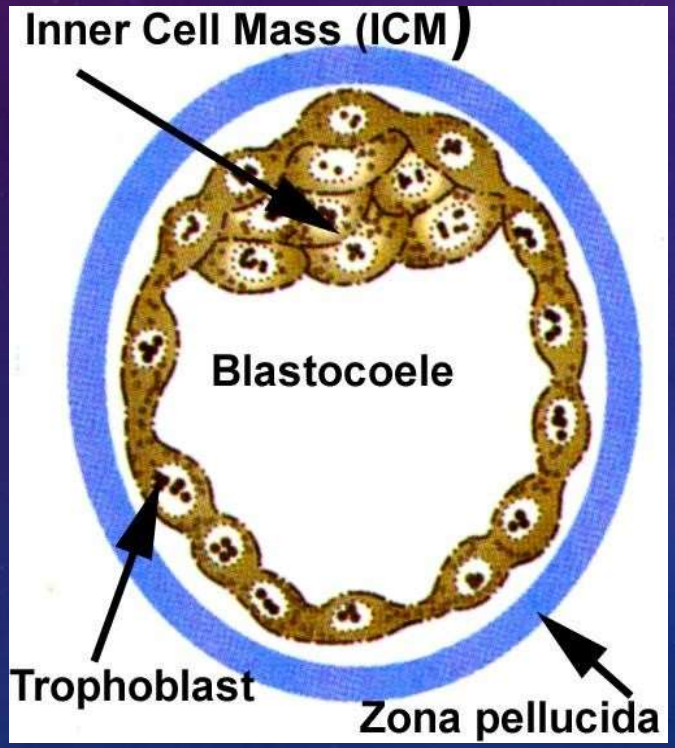


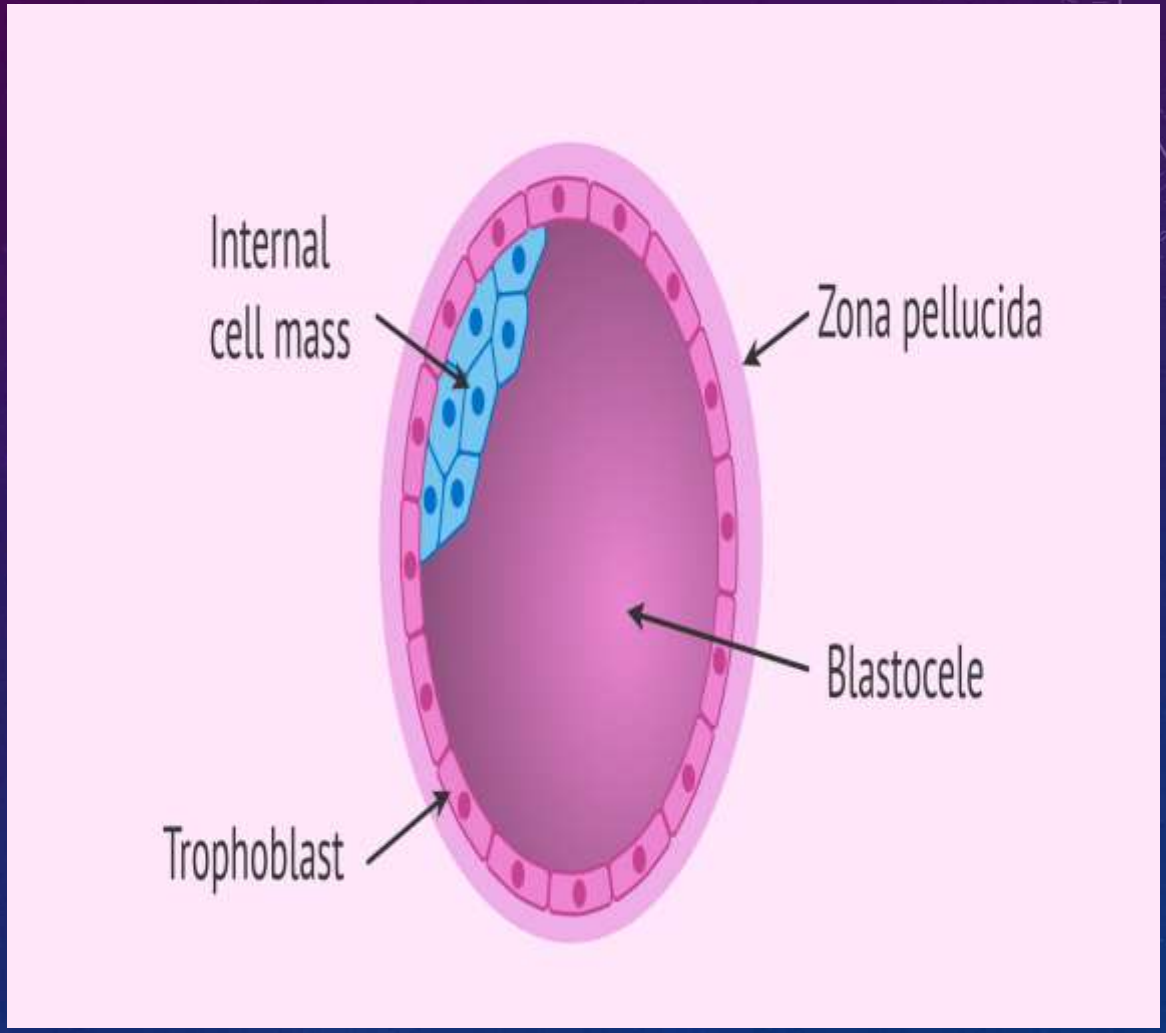
Cells that are forced to the outside of the morula are destined to become **trophoblast**--cells that will form **placenta**

The **inner cells** will form the embryo proper and are called the **inner cell mass** (ICM).

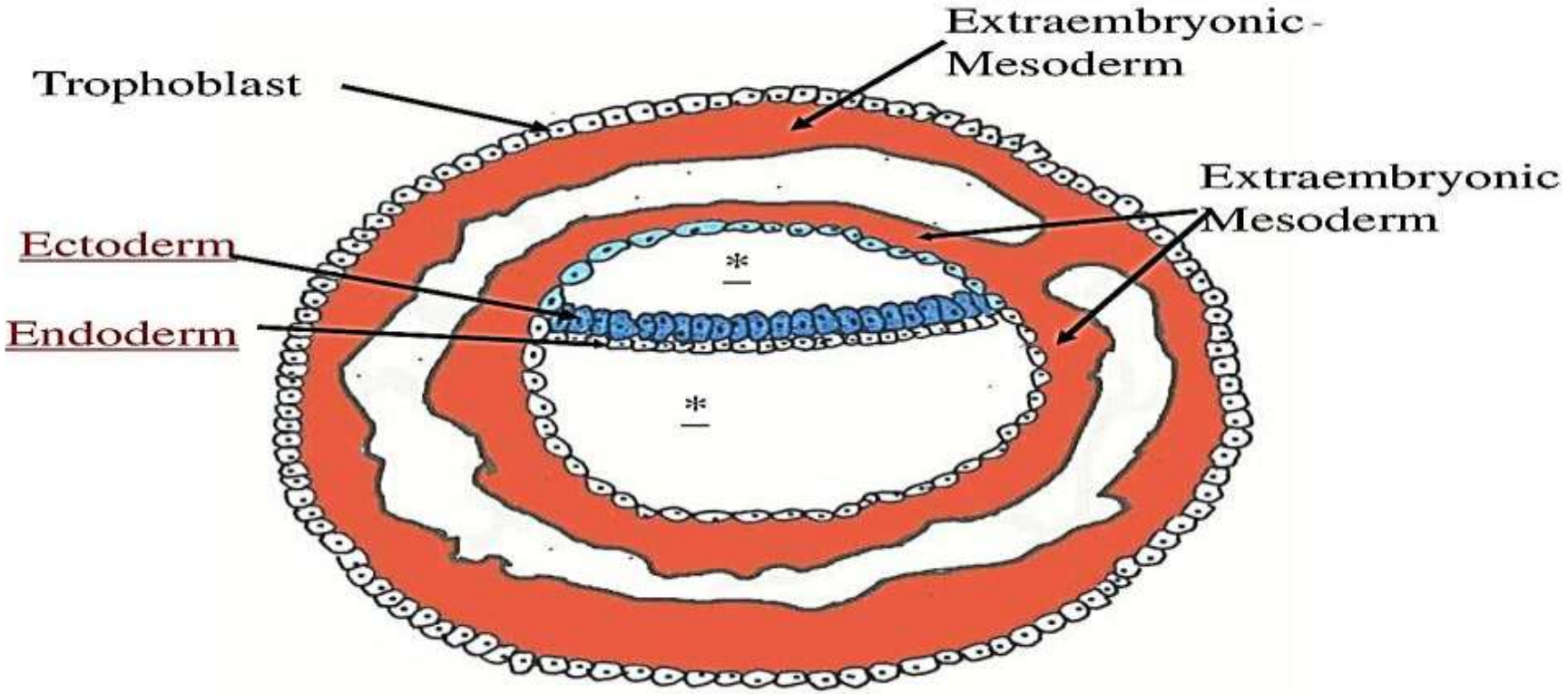
- Zygote → Morula →

❖ Blastocyst
Trophoblast
Embryoblast




Internal
cell mass
Zona pellucida
Blastocele
Trophoblast

Second week of development

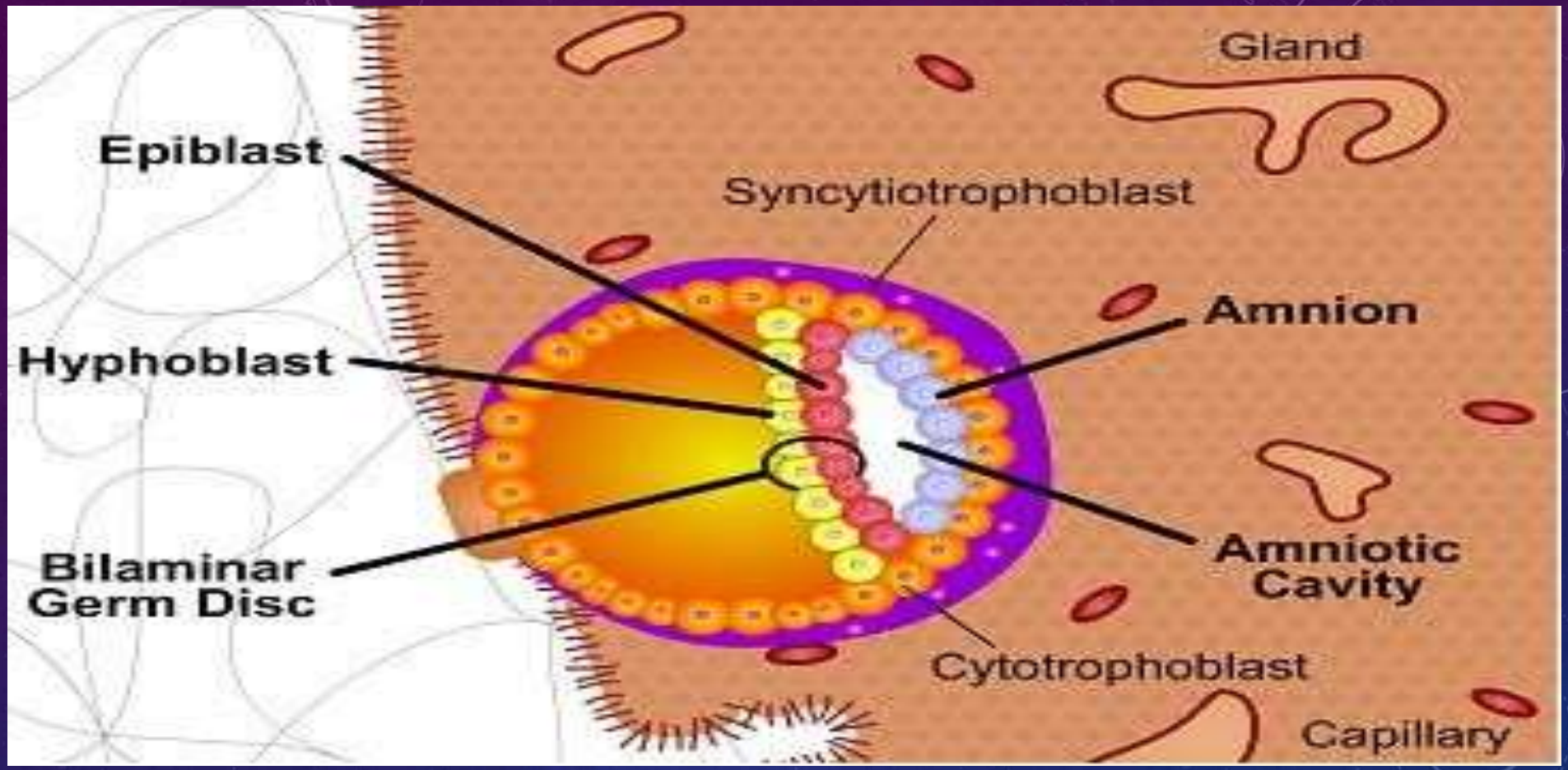


***the amnion cavity and yolk sac*

2nd week of development: The week of two

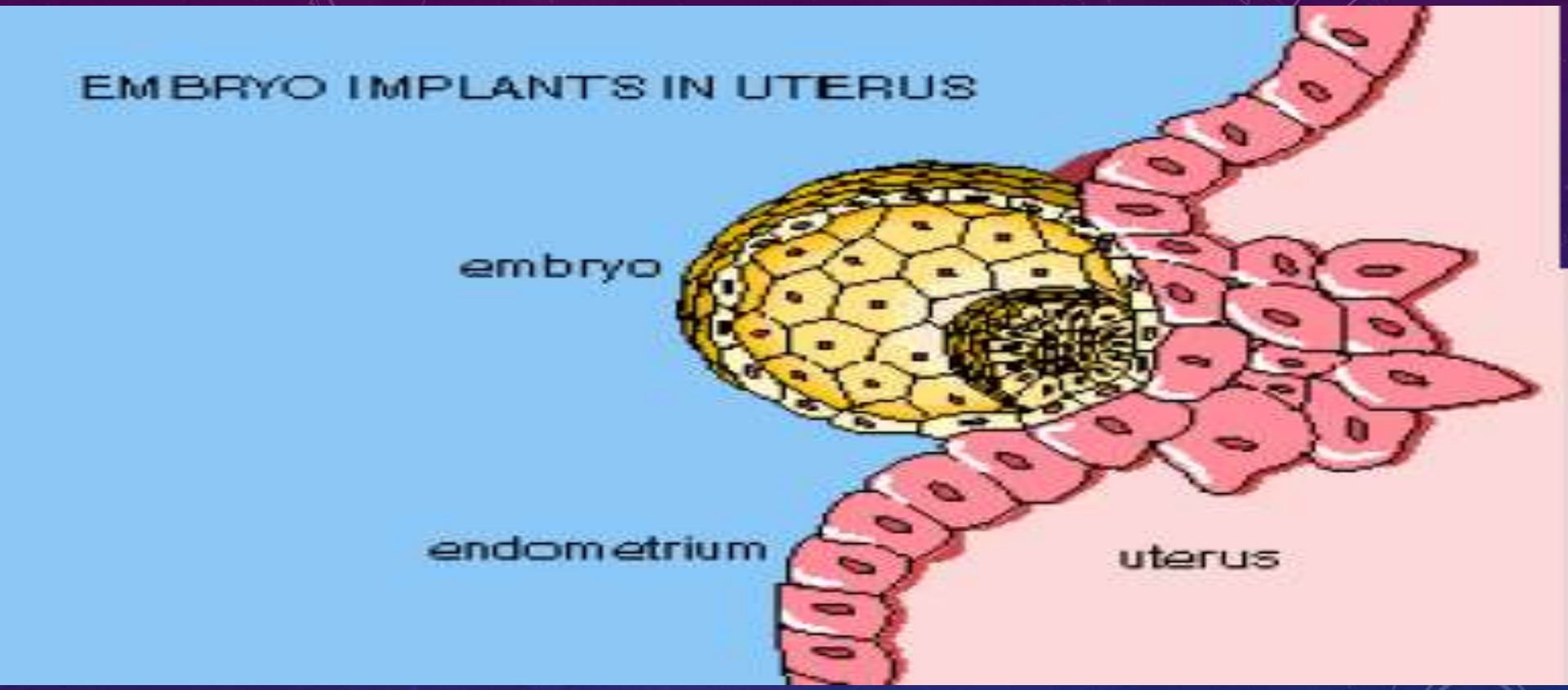
WHY?

- Embryoblast ↗ hypoblast
  ↘ epiblast
- Cavities ↗ amniotic cavity
  ↘ primitive yolk sac
- Trophoblast ↗ cytotrophoblast
  ↘ syncytiotrophoblast



Defination of bilaminar disc

- These two layers are sandwiched between two cavities i.e. primitive York sac and amniotic cavity.

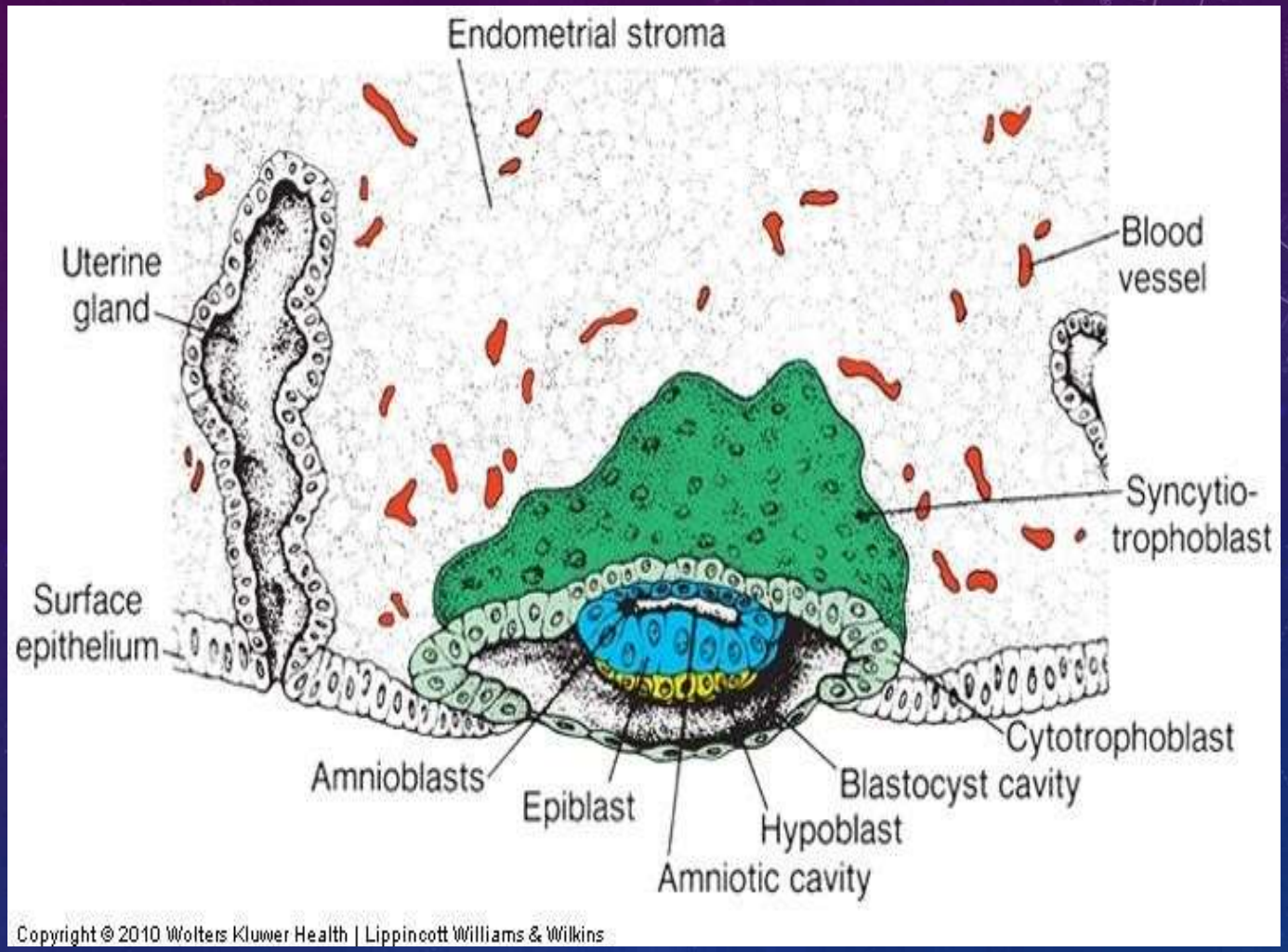


Inner cell mass divides into epiblast and hypoblast:

Epiblast contributes to forming the overlying amniotic membrane and amniotic cavity

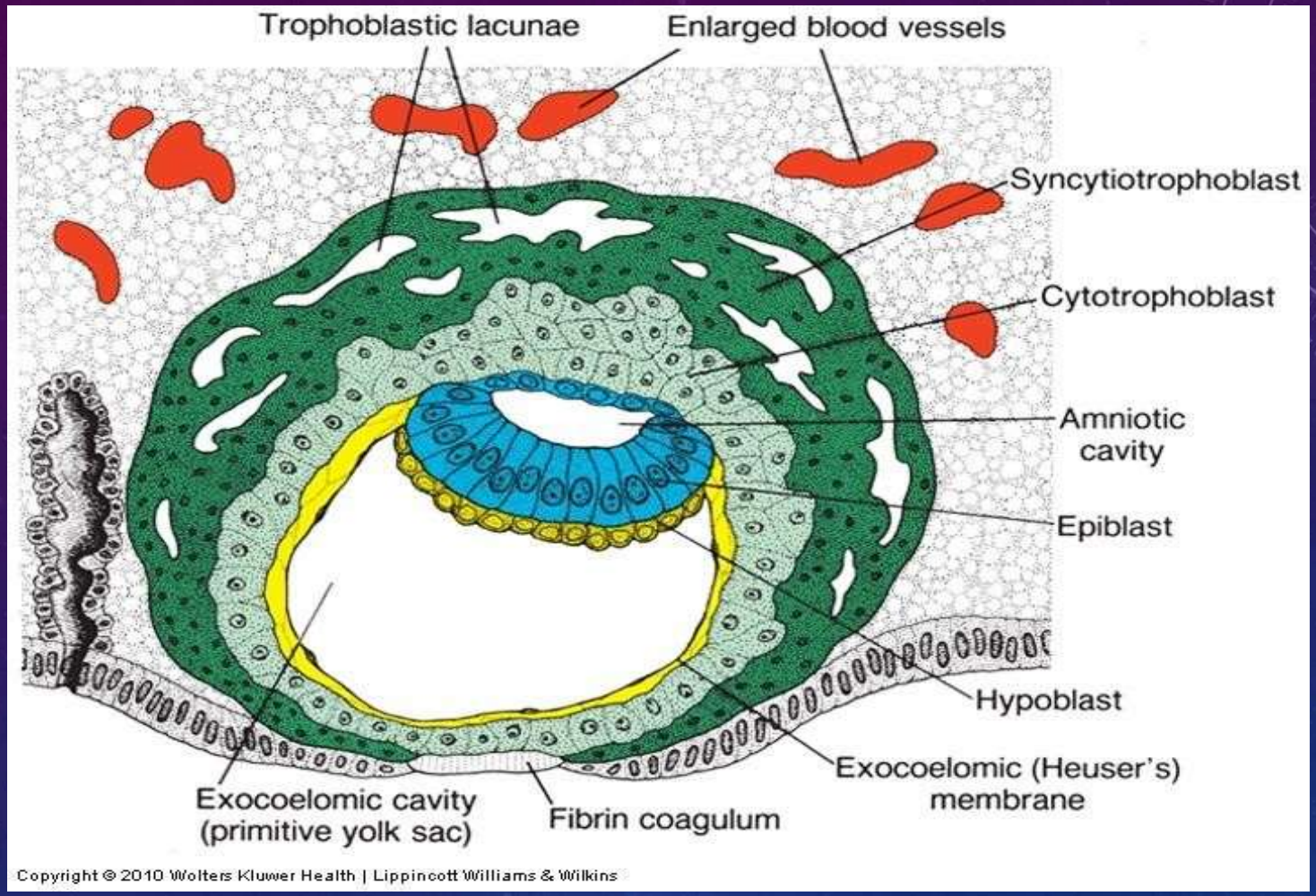
Hypoblast contributes to forming the underlying yolk sac

Implantation and placentation (day 8)



8 day human blastocyst, partially embedded in the endometrial stroma.

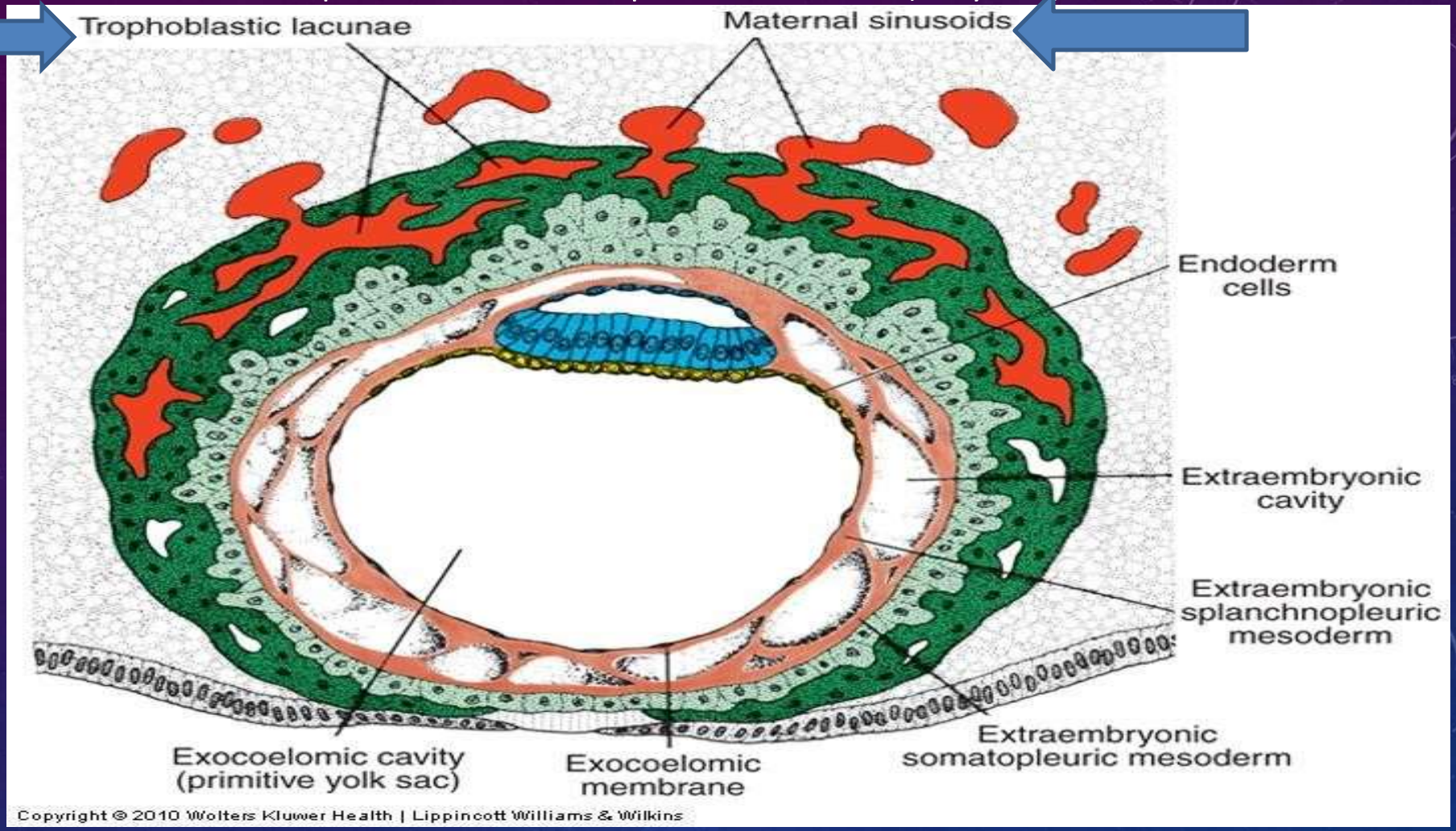
Implantation and placentation (day 9)



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A 9-day human blastocyst. The syncytiotrophoblast shows a large number of lacunae.

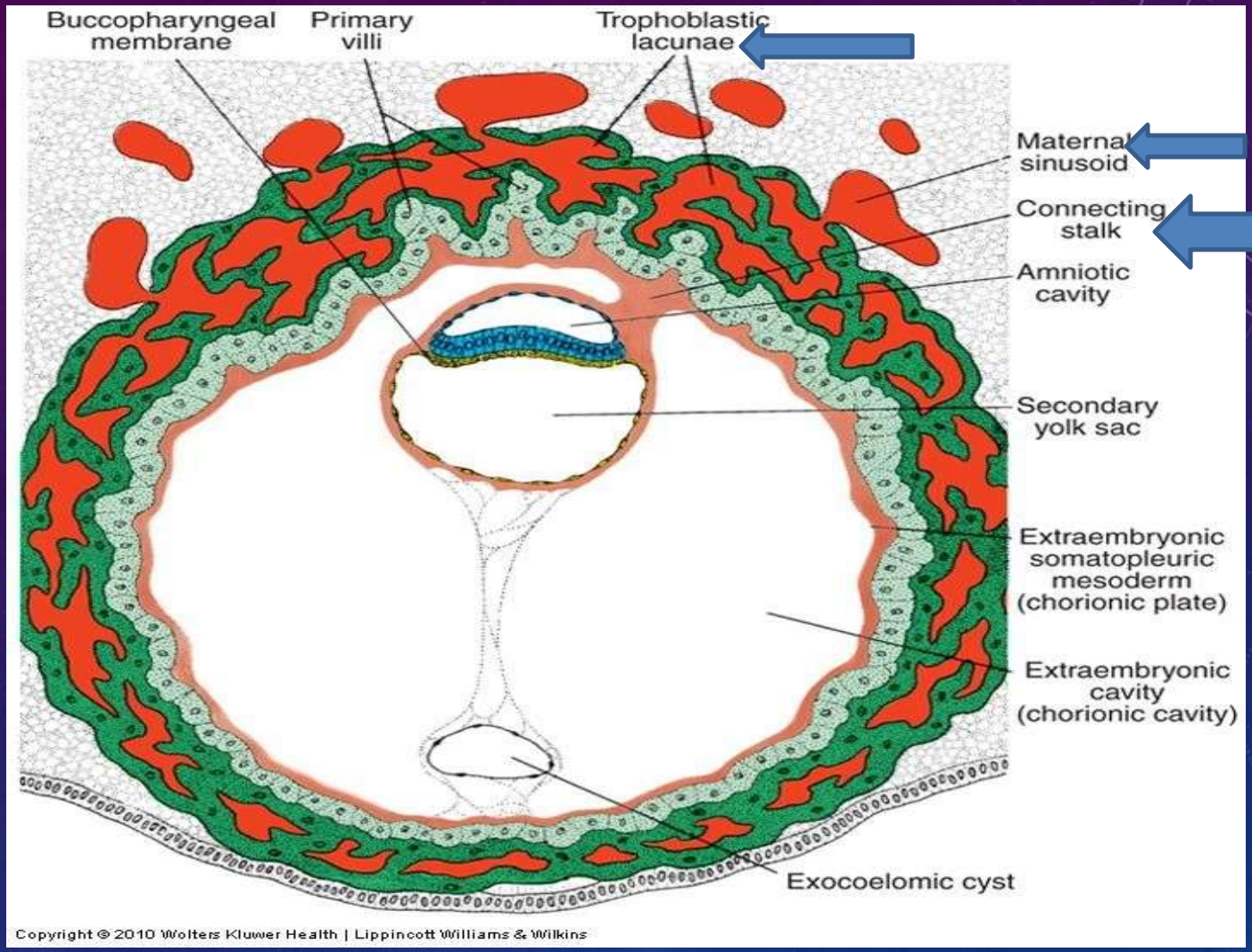
Implantation and placentation (day 12)



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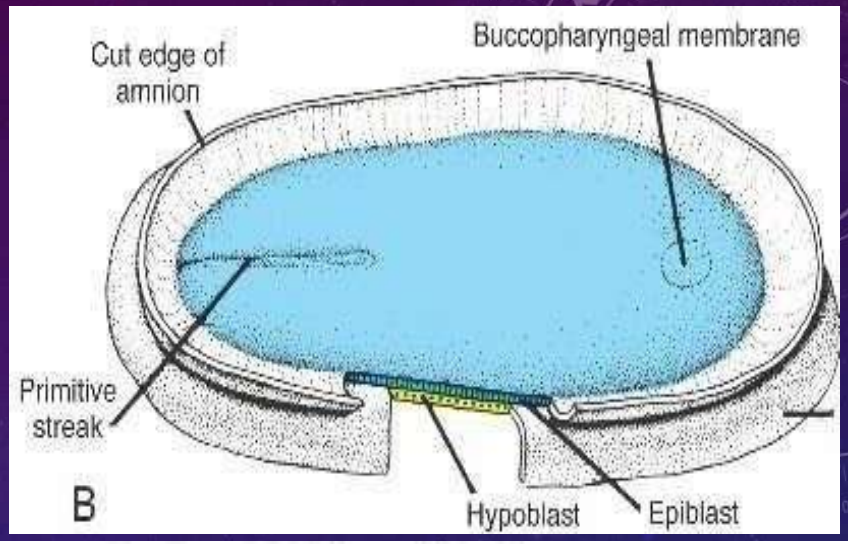
Human blastocyst of approximately 12 days. The trophoblastic lacunae at the embryonic pole are in open connection with maternal sinusoids in the endometrial stroma

Implantation and placentation (day 13)

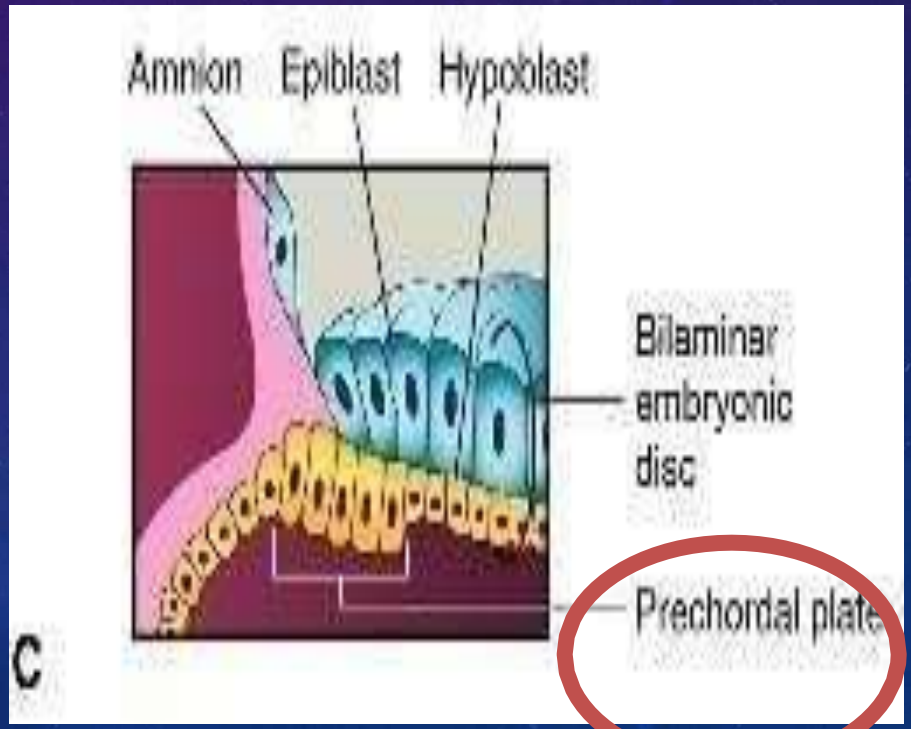


A 13-day human blastocyst. Trophoblastic lacunae and the uteroplacental circulation has begun

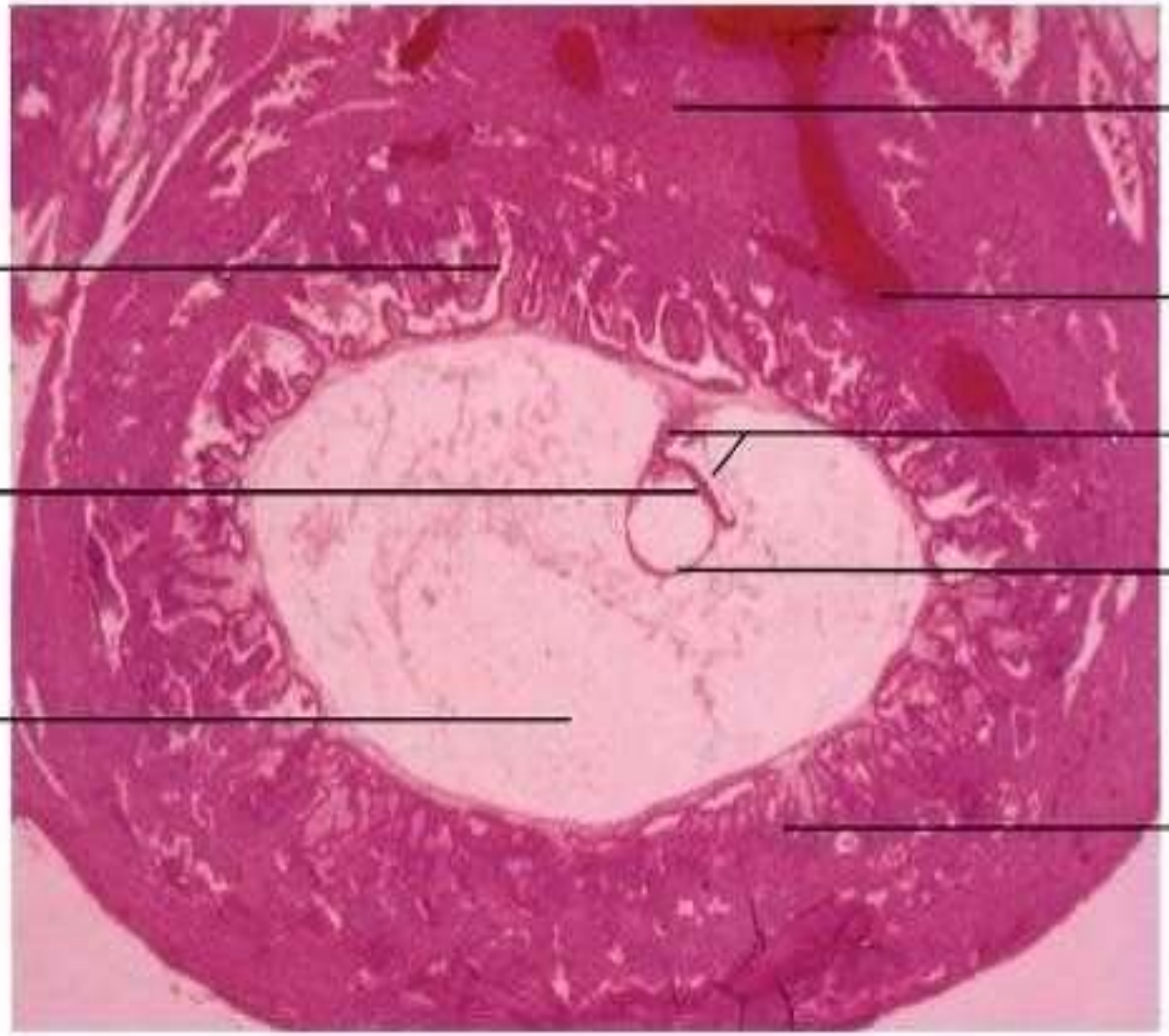
By day 14 the embryo has the form of aflat, bilaminar disc, ovoid in shape.



In alocalized area of the hypoblast, the cels become more columnar and form a thickened circle area, the **prechordal plate (future mouth)** .



At the end of the second week:



Mudoogo Edgar


Thank you