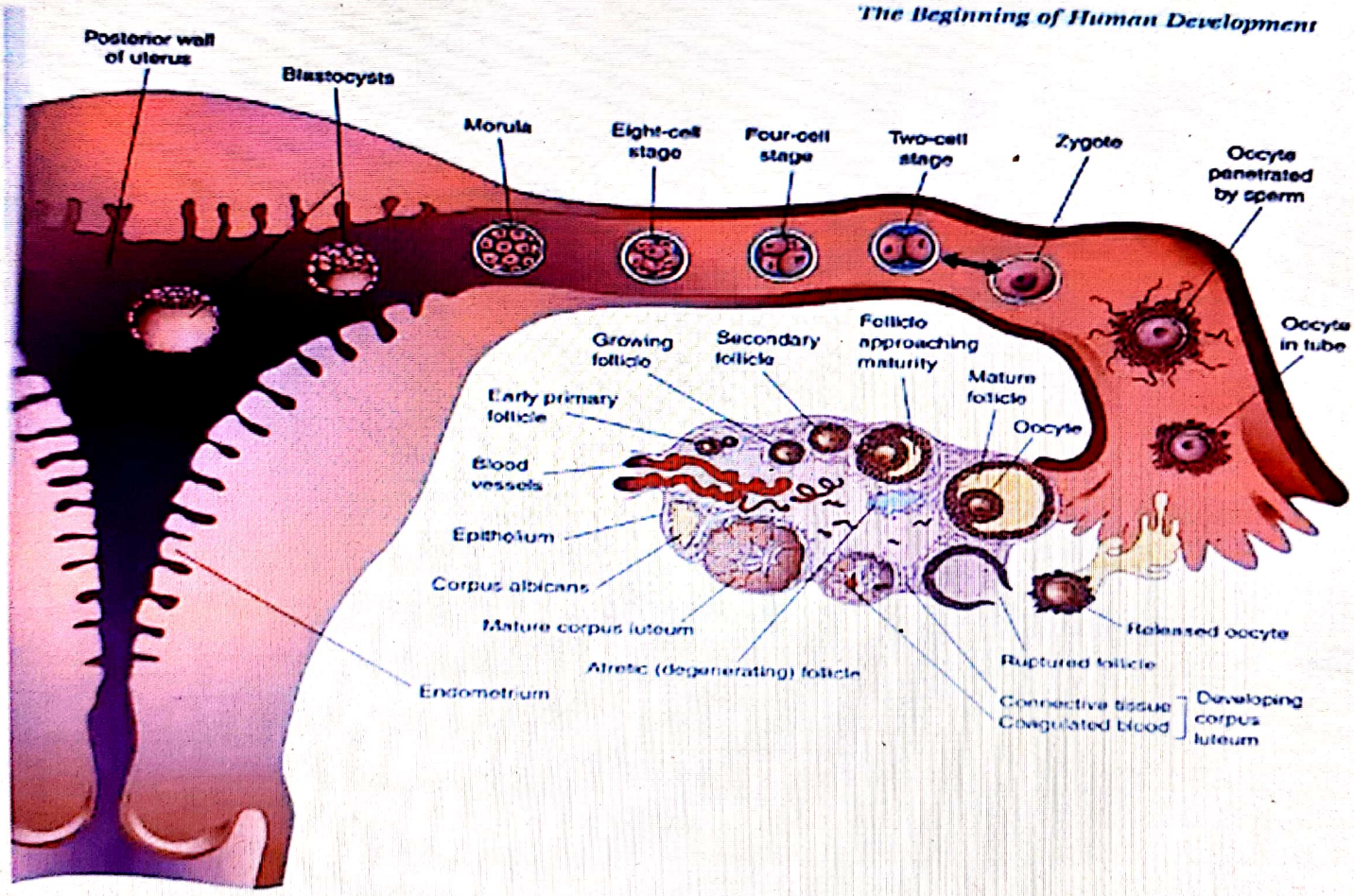
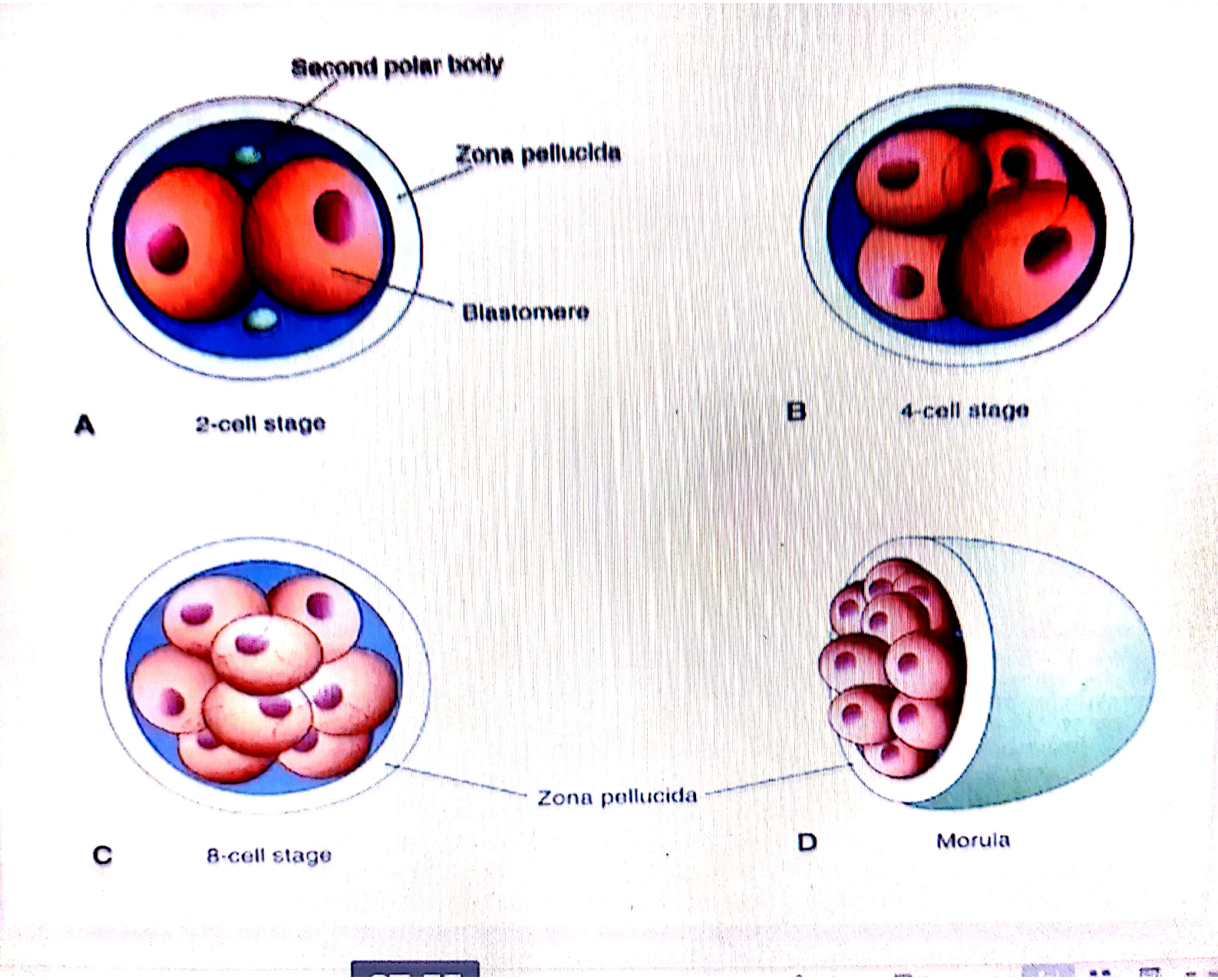
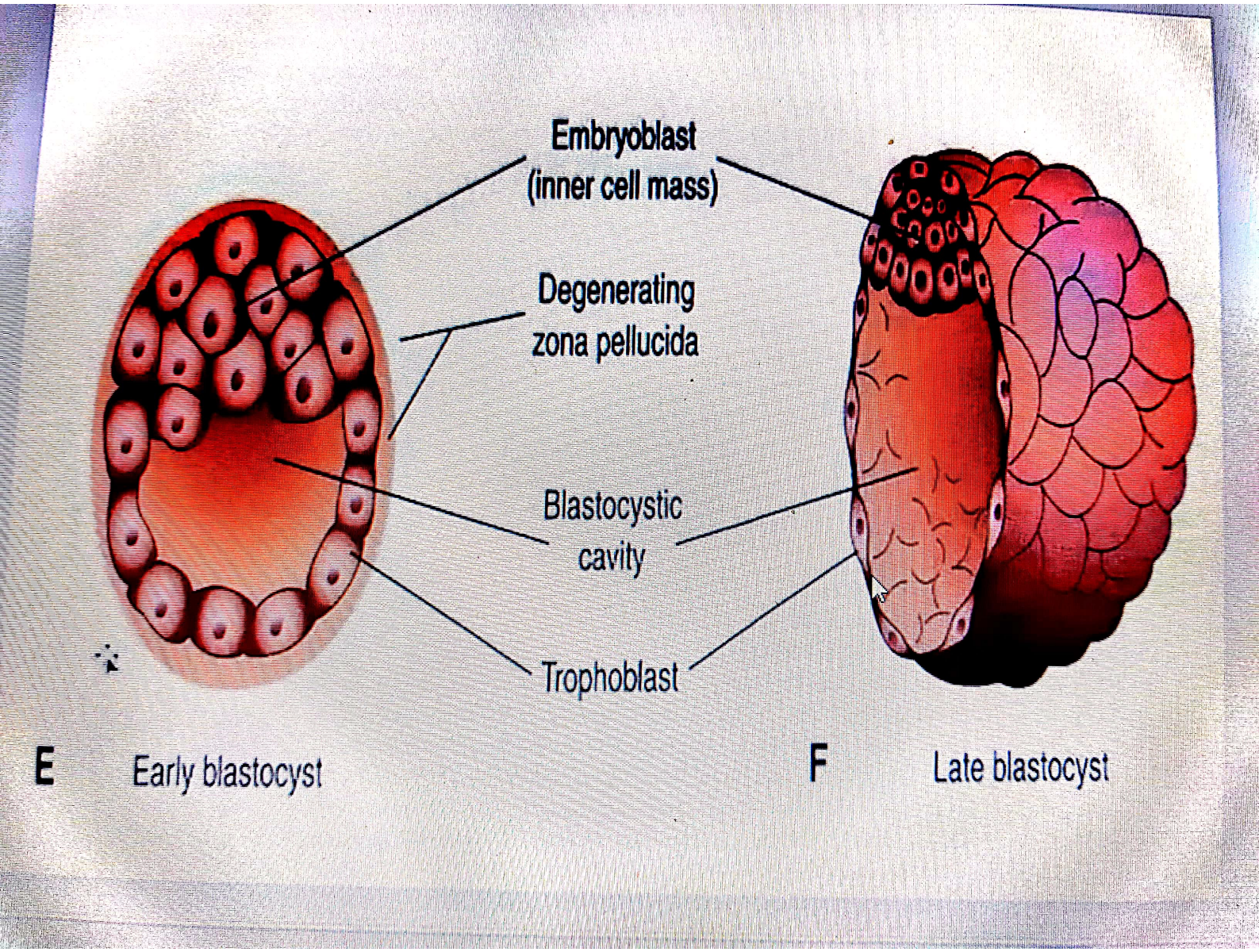


- Cleavage begins 30 hours after fertilization



- ***Definition:***
- **It is the process by which the Blastocyst penetrates the superficial (Compact) layer of the endometrium of the uterus.**
- ***Site:***
- The normal site of implantation is the posterior wall of uterus near the fundus (fundo-posterior area)
- ***Time:*** It begins about the 6th day, after fertilization.
- It is completed by the 11th or 12th day.
- *The cells of the blastocyst differentiate into:*
- *An -Outer layer- the wall, called trophoblast.*
- *An -Inner cells -called inner cell mass -(embryoblast)*



- ***Mechanism:***
- **The Morula reaches the uterine cavity by the 4th day after fertilization, & remains free for one to two days in the cavity.**
- **Fluid passes from uterine cavity to the Morula through the zona pellucida.**
- **Now the Morula is called Blastocyst, its cavity is called blastocystic cavity (blastocele), its cells divided into Embryoblast & Trophoblast.**
- Blastocyst begins implantation by the 6th day, (*20th day of a 28 day menstrual cycle*).
- Trophoblast cells penetrate the epithelium of the endometrium (what are the characteristics of the uterine mucosa at the time of implantation?).
- Penetration results from proteolytic enzymes (e.g.. COX-2) produced by trophoblast.

- ***The embryoblast*** **projects into the blastocystic cavity, while the trophoblast forms the wall of the blastocyst.**
- **By the 5th day** the zona pellucida degenerates & disappears, to allow the blastocyst to increase in size and adhere and penetrate the endometrium.

By 6th day the blastocyst adheres to the endometrium

- **By 7th day**, *Trophoblast* differentiated into 2 layers:

Cytotrophblast, inner layer, *mitotically active*.

Syncytiotrophoblast (outer multinucleated mass, with *indistinct* cell boundary.

By 8th day the blastocyst is superficially embedded in the compact layer of the endometrium.

- **Blood-filled Lacunae appear in the <u>Syncytiotrophoblast</u>**

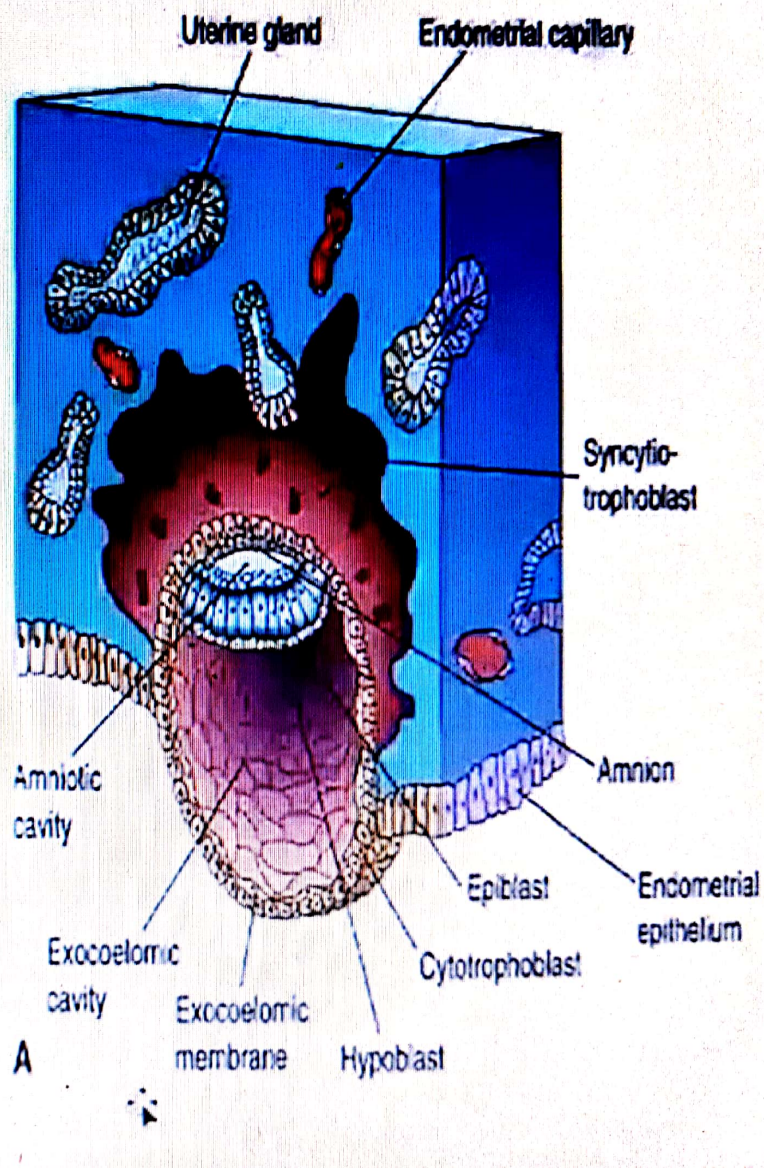
which communicate forming a network of lacunae by the day 10th and 11th

- **Syncytiotrophoblast**

erodes the endothelial lining of maternal capillaries which known as sinusoids.

Now blood of maternal capillaries reaches the lacunae so,

<u>Uteroplacental circulation</u> is established by 11th or 12th day.



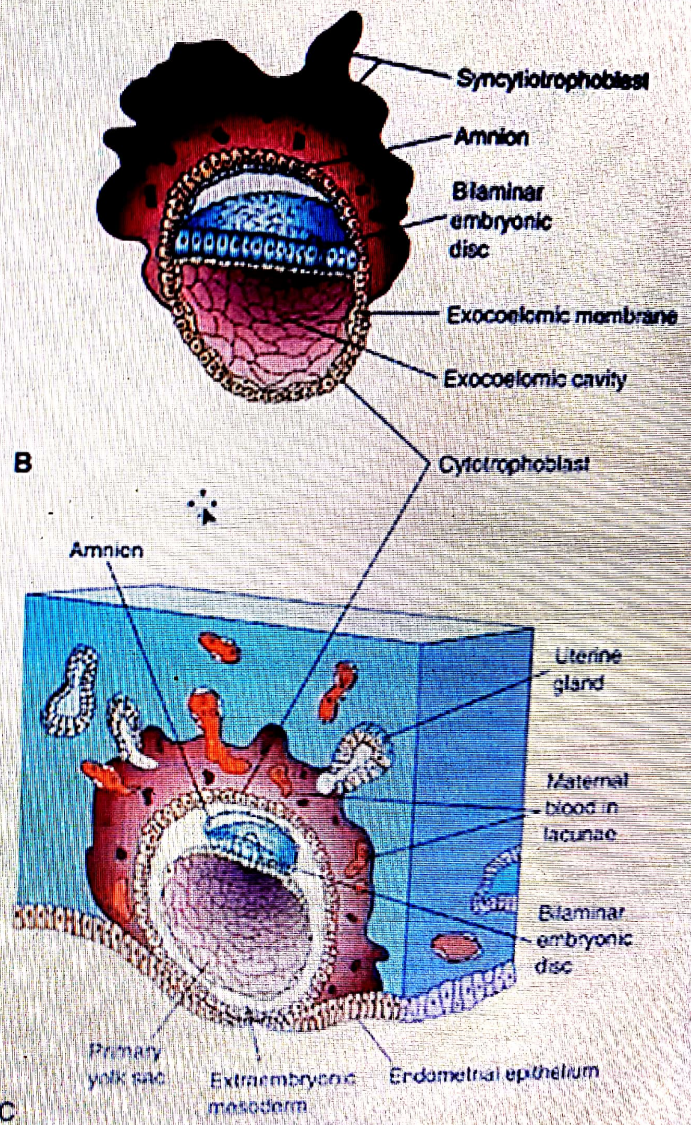
Endometrial cells undergo **apoptosis** (programmed cell death) to facilitates invasion of endometrium by the Syncytiotrophoblast.

Syncytiotrophoblast engulf these degenerating cells for nutrition of the embryo.

Implantation can be detected by:

1- Ultasonography.

2- hCG (human chorionic gonadotrophin which is secreted by the Syncytiotrophoblast) by the end of 2nd week



- **By the tenth day** conceptus is completely embedded in the endometrium.
- For about 2 days the site of penetration shows a defect in the endometrium.
- A fibrinous coagulum of blood closes this defect till the endometrial epithelium creeps over the closing plug by the 12^{th} day to cover the defect.

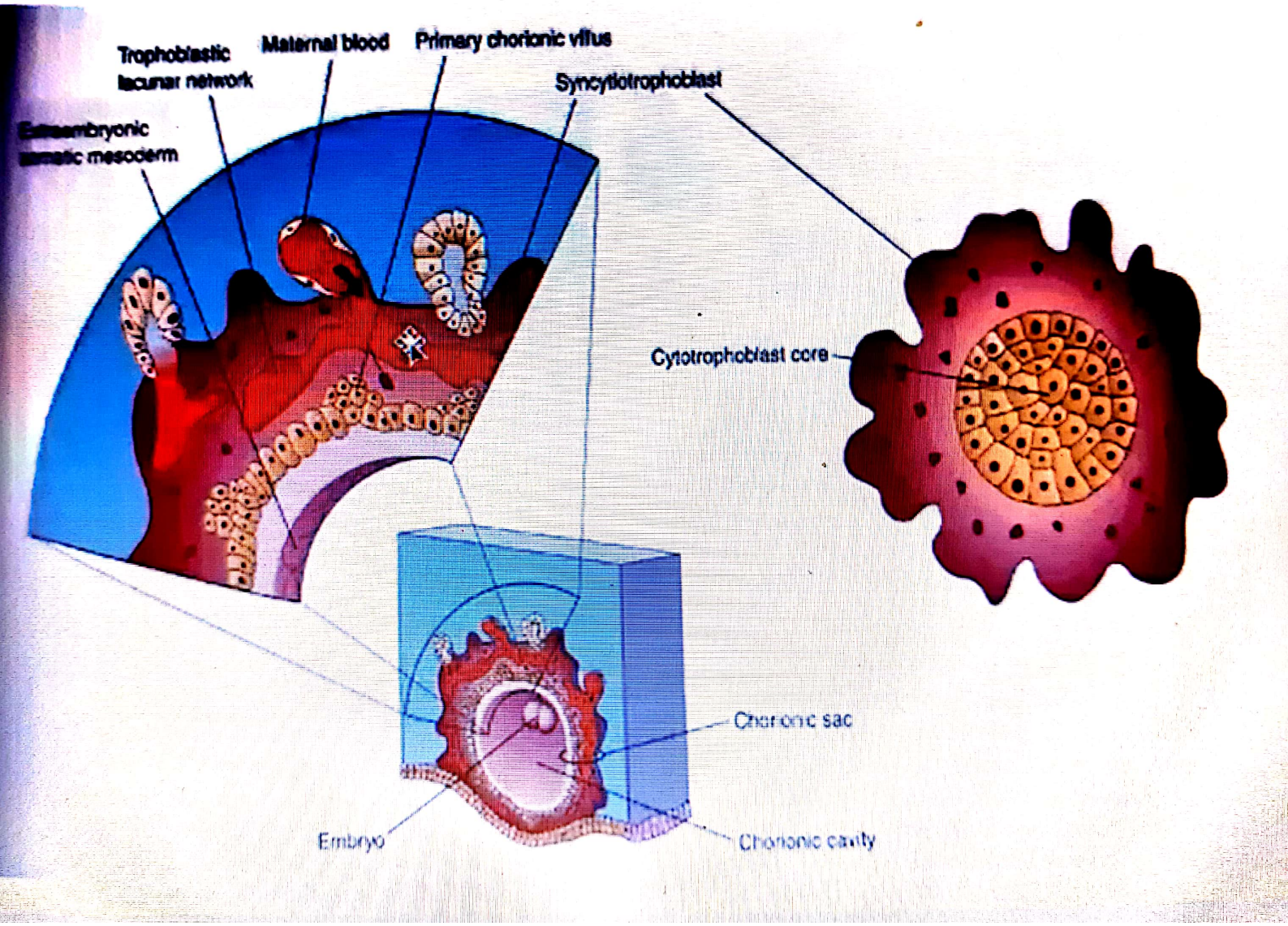
- ***Formation of embryonic disc***
- **Embryoblast cells arranged into 2 layers:**

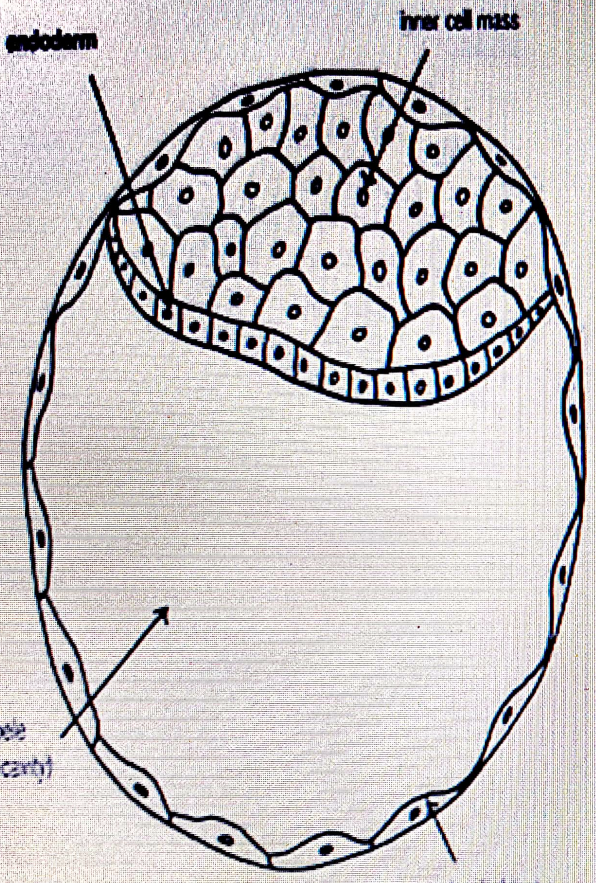
- **1- High columnar cells towards the amnion, called Ectoderm, *(Epiblast)*.**
- **2- Low- cuboidal cells towards the blastocystic cavity called Endoderm, *(Hypoblast)*.**
- Now it is called bilaminar embryonic disc.

- Formation of amniotic cavity.

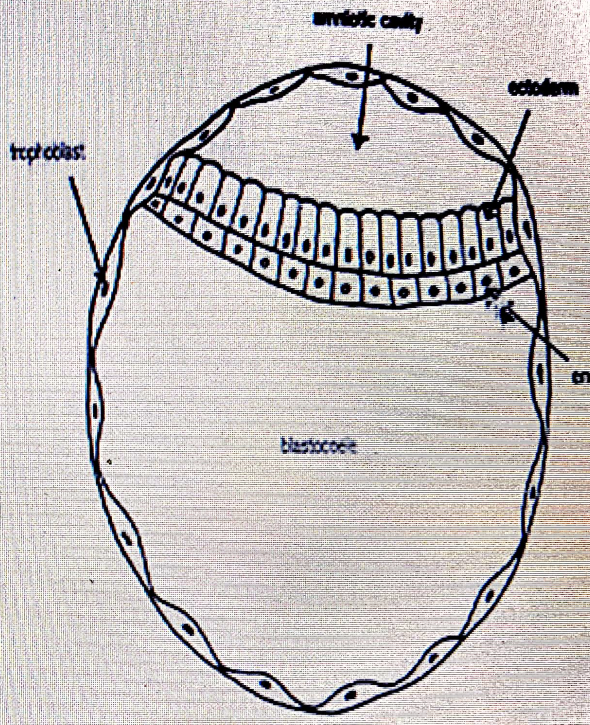
- A space appears between the ectoderm and the trophoblast. Its floor is formed by the ectoderm while its roof is formed by a layer of flat cells called amniogenic cells which secretes the amniotic fluid.

Primary chorionic Villi

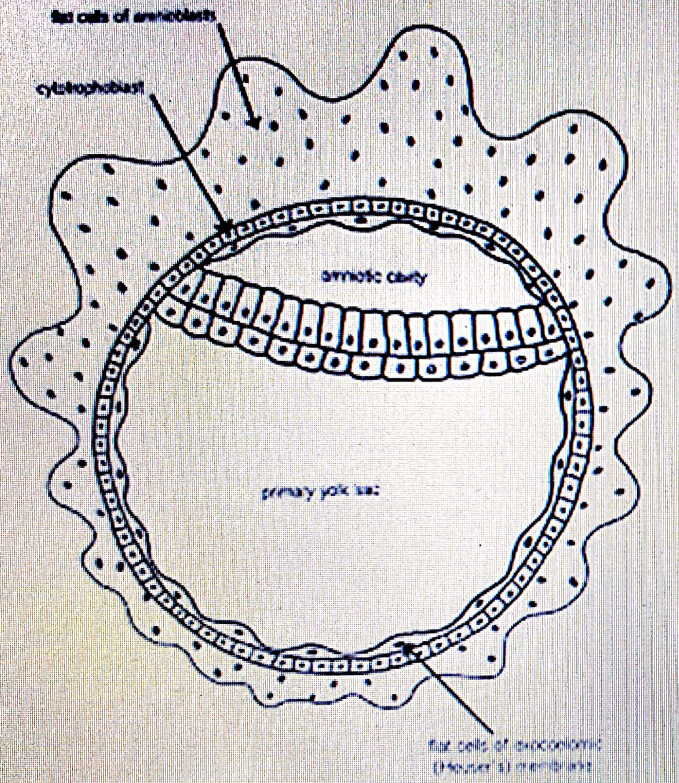


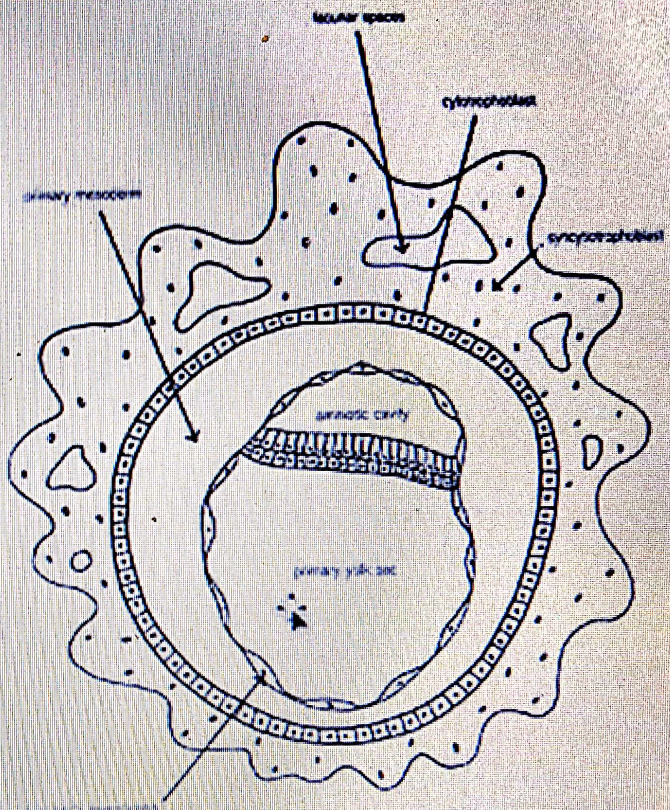


(Fig. 55): Changes in the blastocyst, formation of the endoderm.



(Fig. 56): Changes in the blastocyst, formation of the ectoderm and amniotic cavity.

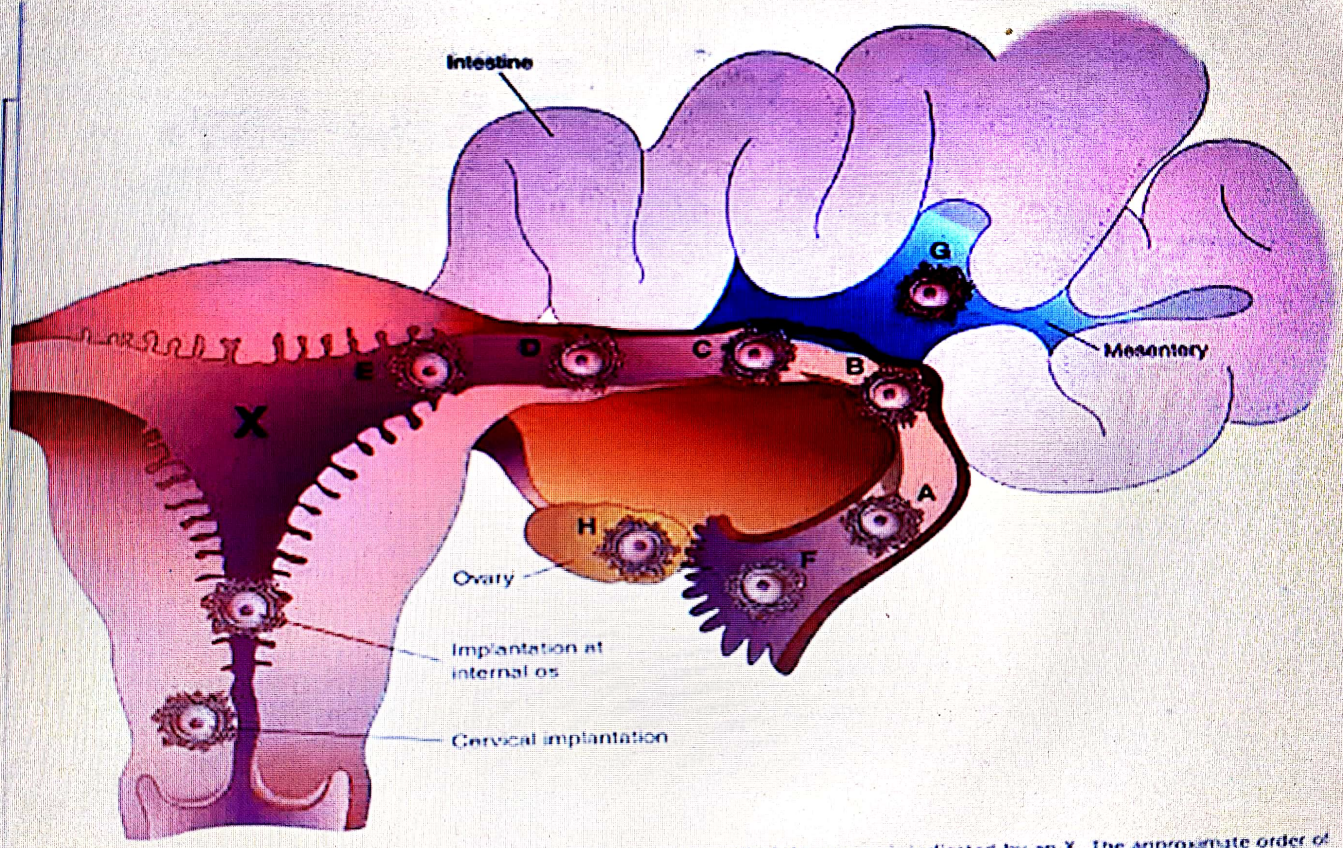




(Fig. 67): Showing changes in the blastocyst, formation of amniotic cavity and primary yolk sac. Note also the differentiation of trophoblast into cytotrophoblast and syncytiotrophoblast

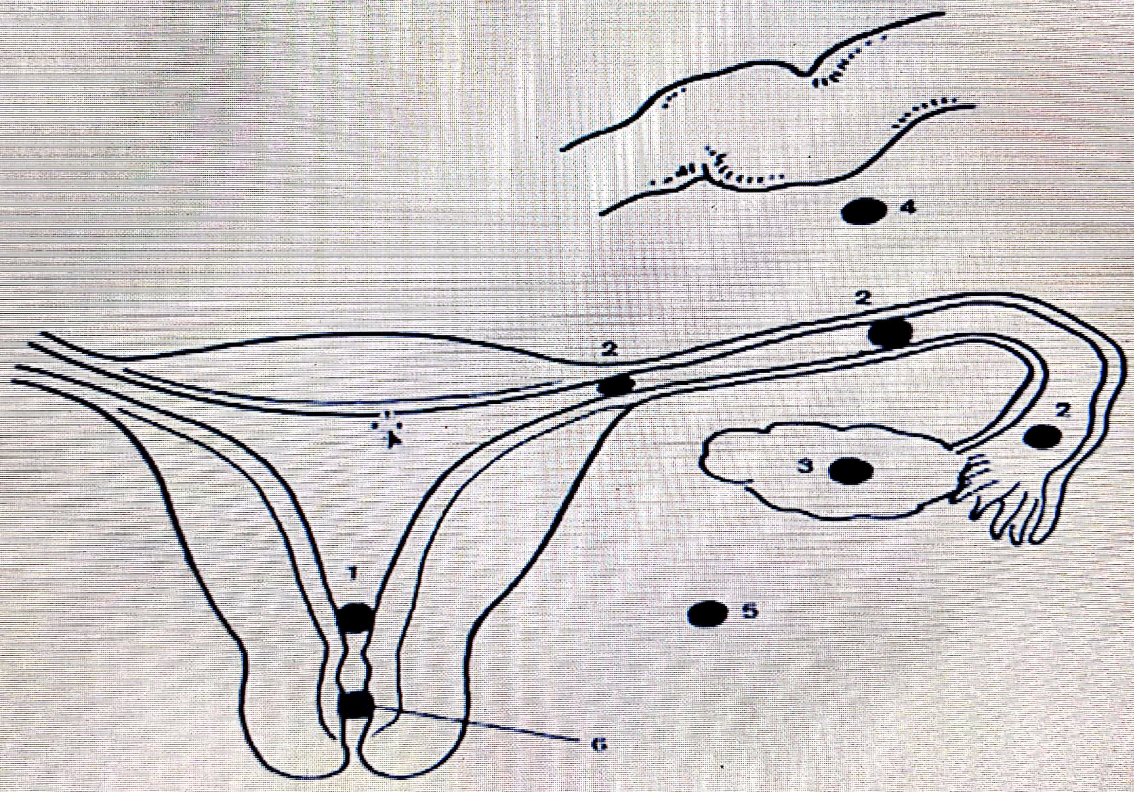
Fig. 68: Changes in the blastocyst, formation of large cavities in the primary mesoderm

Ectopic Implantation (Pregnancy)

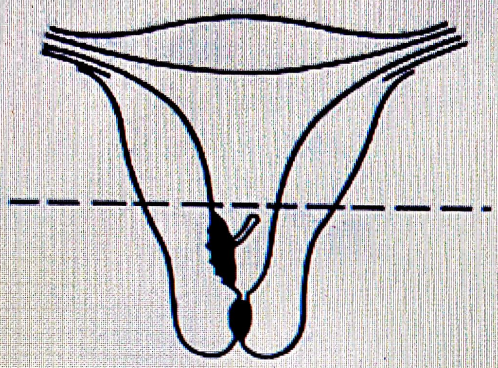


I–III, Implantation sites of blastocysts. The usual site in the posterior wall of the uterus is indicated by an X. The approximate order of frequency of ectopic implantations is indicated alphabetically (*A*, most common, *H*, least common). *A* to *F*, Tubal pregnancies. *G*, Abdominal pregnancy. *H*, Ovarian pregnancy. Tubal pregnancies are the most common type of ectopic pregnancy. Although appropriately included with uterine implantation sites, a cervical pregnancy is often considered to be an ectopic pregnancy.

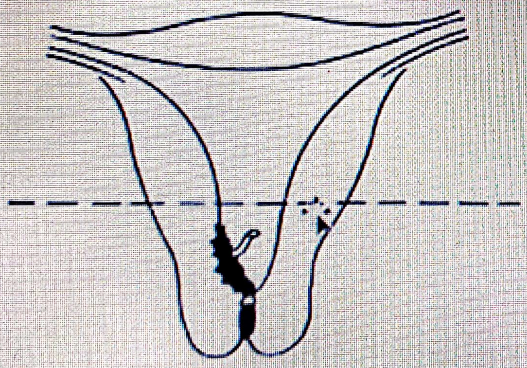
- **Ectopic Pregnancy:**
- **1- Placenta Previa. 2- Tubal. 3- Ovarian. 4- Abdominal. 5- Pelvic. 6- Cervical.**



Types Of Placenta Praevia



(Fig. 52): Placenta praevia lateralis



(Fig. 53): Placenta praevia marginalis

- **Ectopic Pregnancy**
- It means implantation outside the uterus.
- 95 to 97% of ectopic pregnancies occurs in the uterine tube.
- Most are in the ampulla & isthmus.
- **Placenta previa:**
- Implantation occurs in the lower uterine segment.