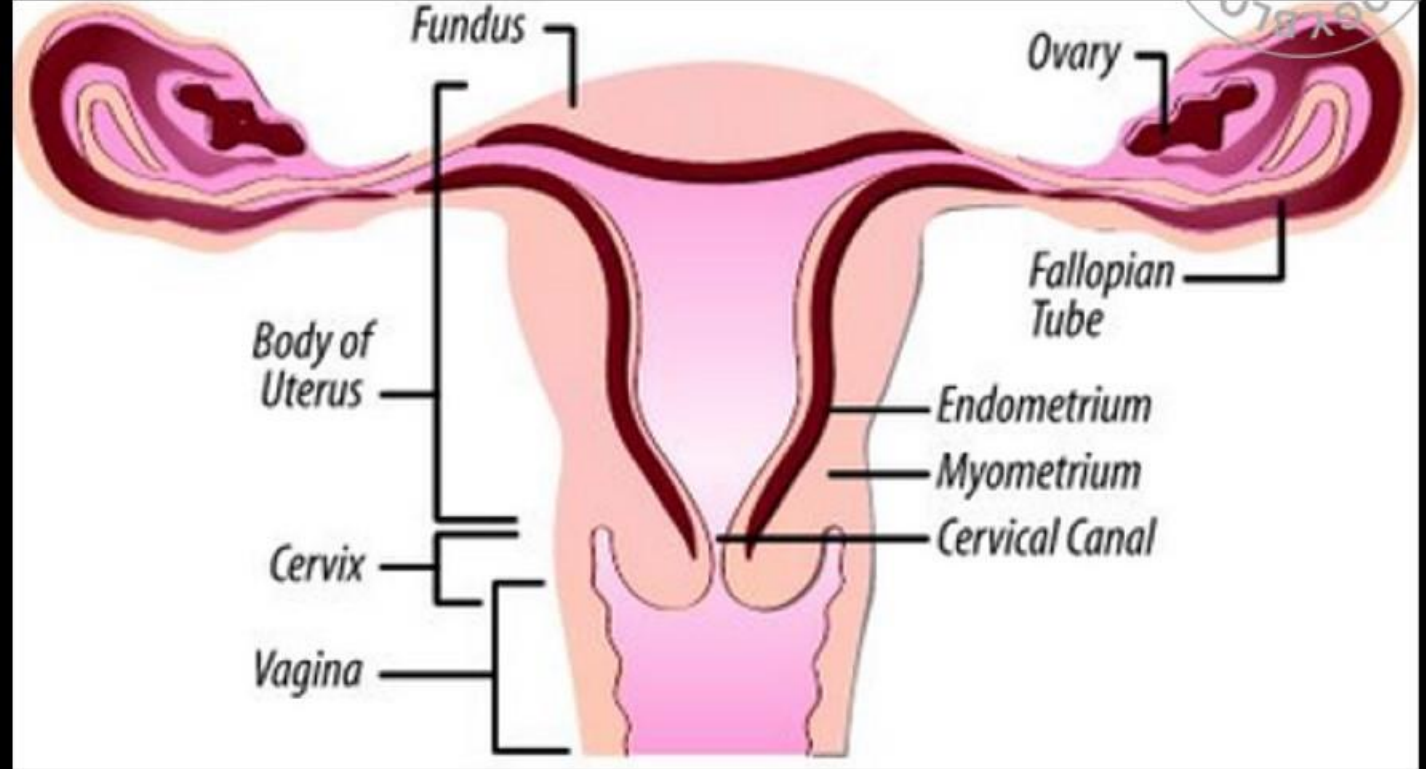




# FERTILIZATION & IMPLANTATION

# FERTILIZATION AND IMPLANTATION



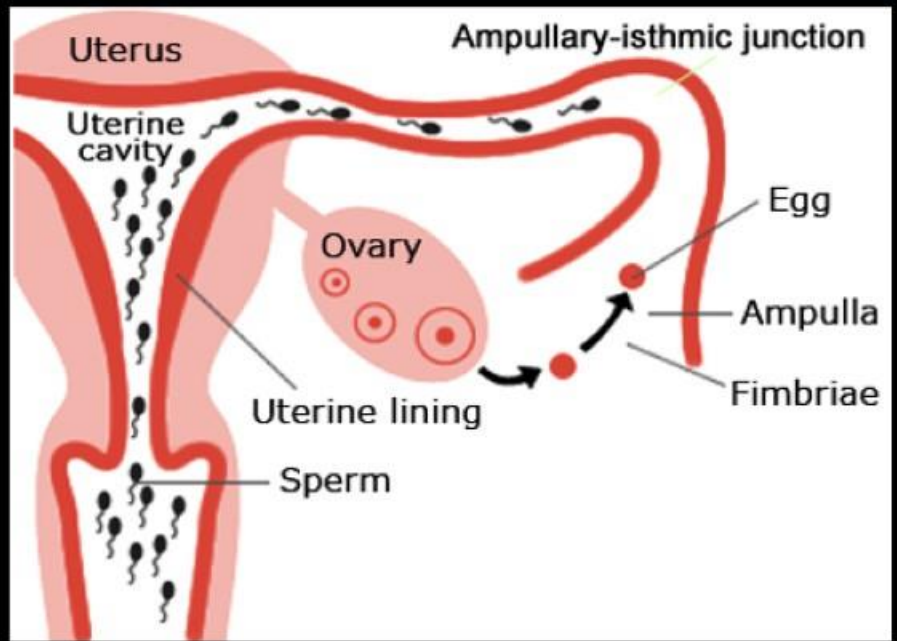
During copulation, semen is released by the penis into the vagina. It is called **insemination**.



# FERTILIZATION AND IMPLANTATION



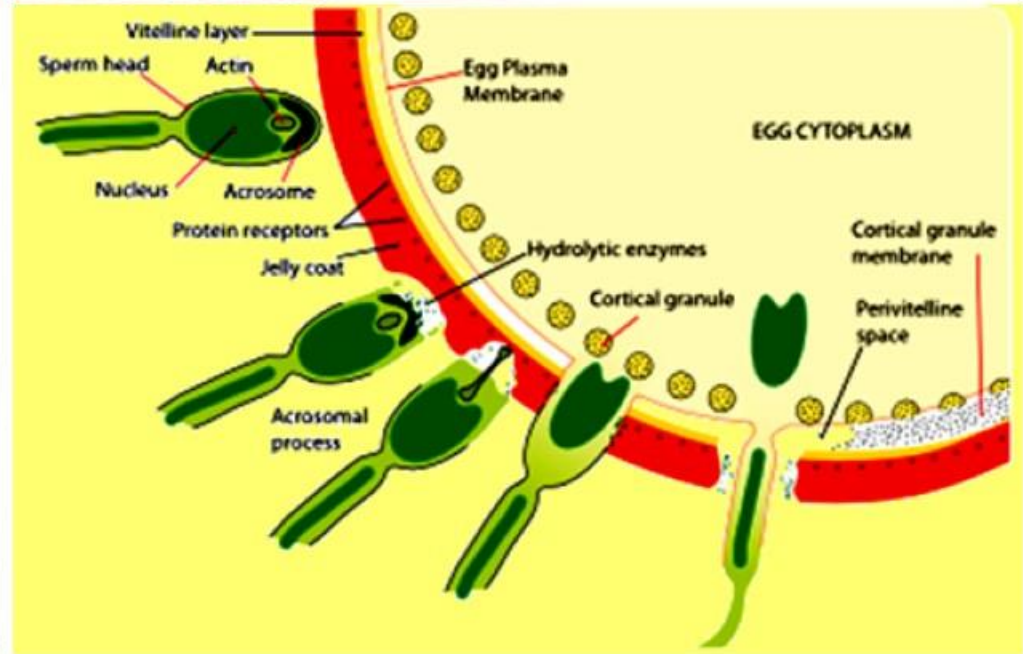
- Fusion of sperm with ovum is called **fertilization**.
- It occurs in **ampullary region** of fallopian tube.





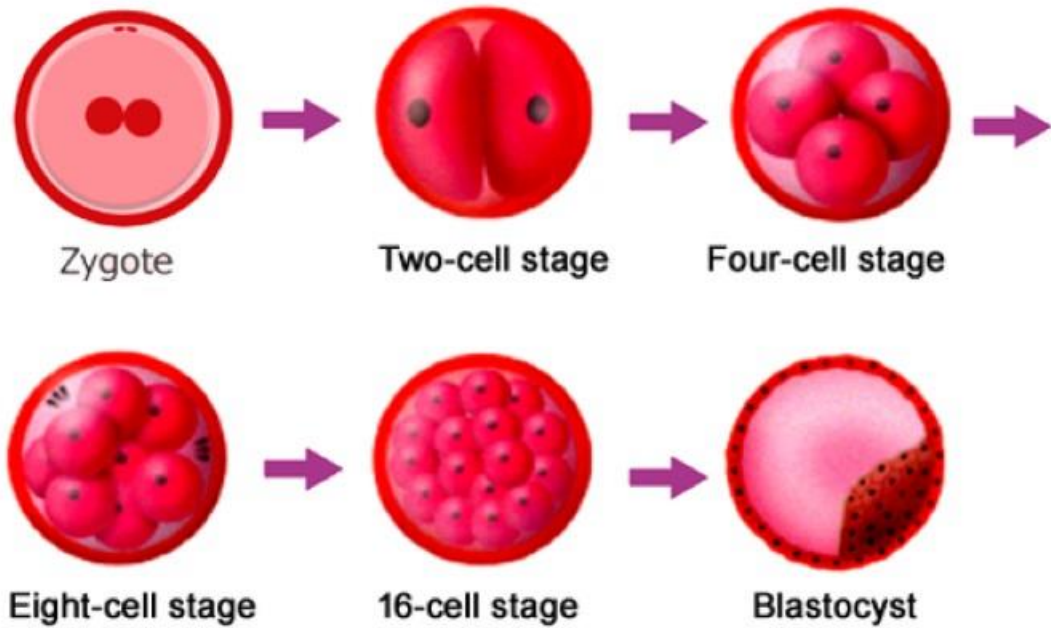
# FERTILIZATION AND IMPLANTATION

- Fertilization happens only if ovum & sperms are transported simultaneously. So all copulations do not lead to fertilization & pregnancy.
- A sperm contacts with **zona pellucida**. It induces changes in the membrane that block the entry of additional sperms.
- The secretions of the **acrosome** help sperm to enter the egg cytoplasm via zona pellucida and plasma membrane. This causes second meiotic division of the secondary oocyte to form an **ovum (ootid)** and **second polar body**.
- The haploid nuclei of the sperm and ovum fuse together to form a **diploid zygote**.

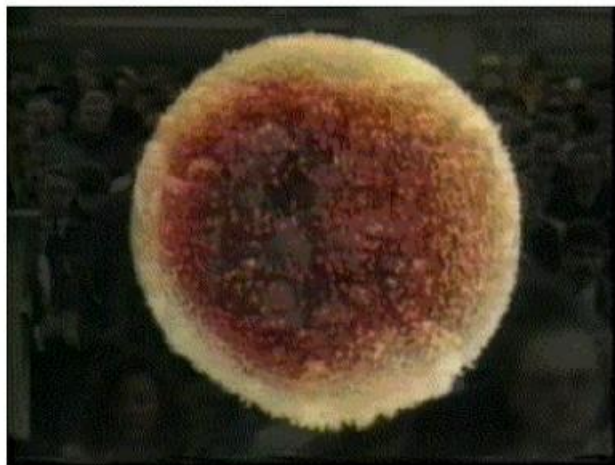




# FERTILIZATION AND IMPLANTATION

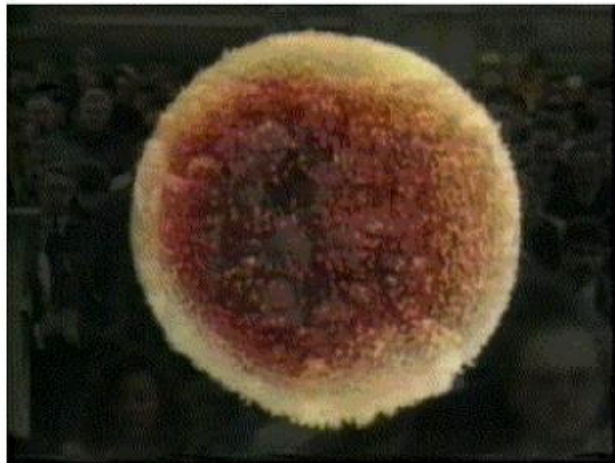
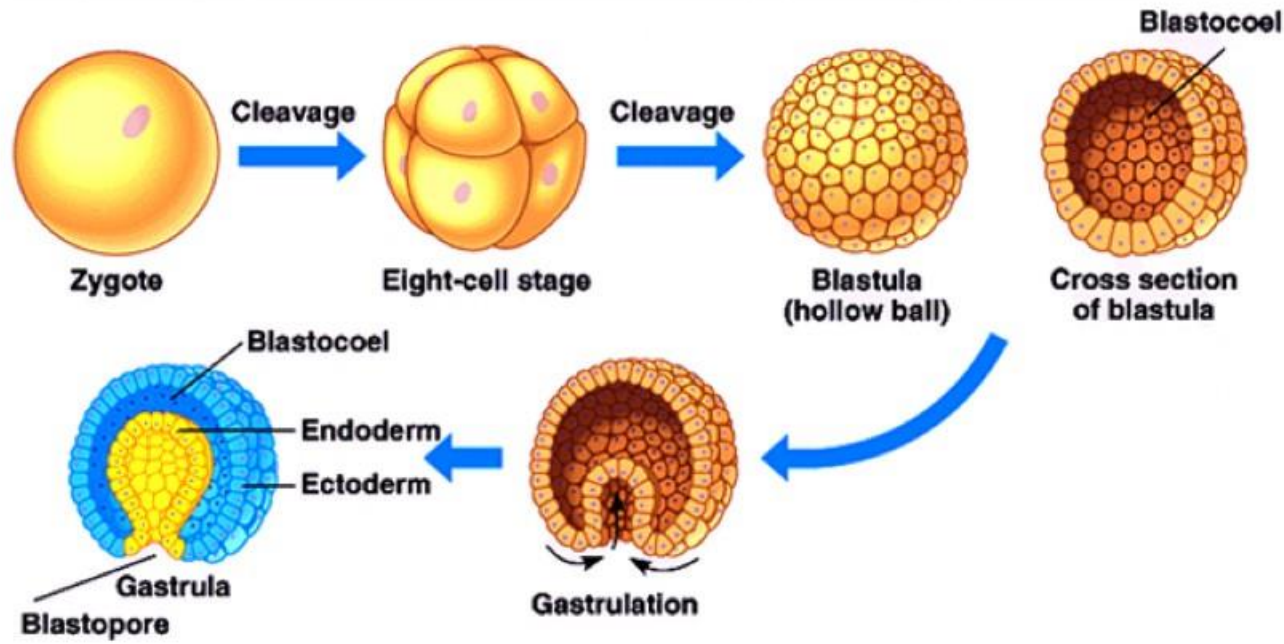


- Zygote undergoes mitotic division (**cleavage**) starts as it moves through the isthmus towards the uterus and forms 2, 4, 8, 16 daughter cells called **blastomeres**.
- The embryo with 8-16 blastomeres is called a **morula**.
- Morula continues to divide and transforms into **blastocyst**.



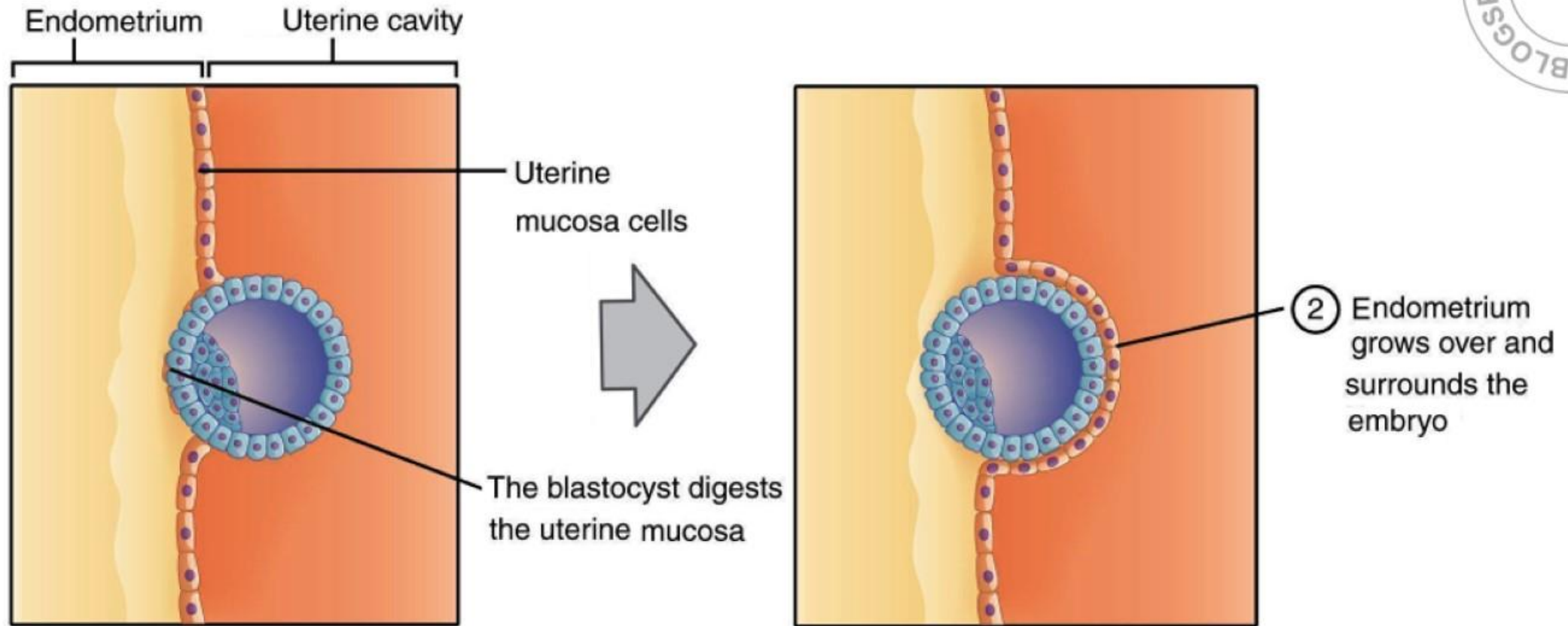


# FERTILIZATION AND IMPLANTATION



- In blastocyst, the blastomeres are arranged into an outer layer (**trophoblast**) and an **inner cell mass** attached to trophoblast.
- The trophoblast layer gives nourishment to inner cell mass. Also it gets attached to endometrium.
- The inner cell mass gets differentiated to **3 germ layers (outer ectoderm, middle mesoderm & inner endoderm)**. This 3-layered structure (**gastrula**) forms the embryo.

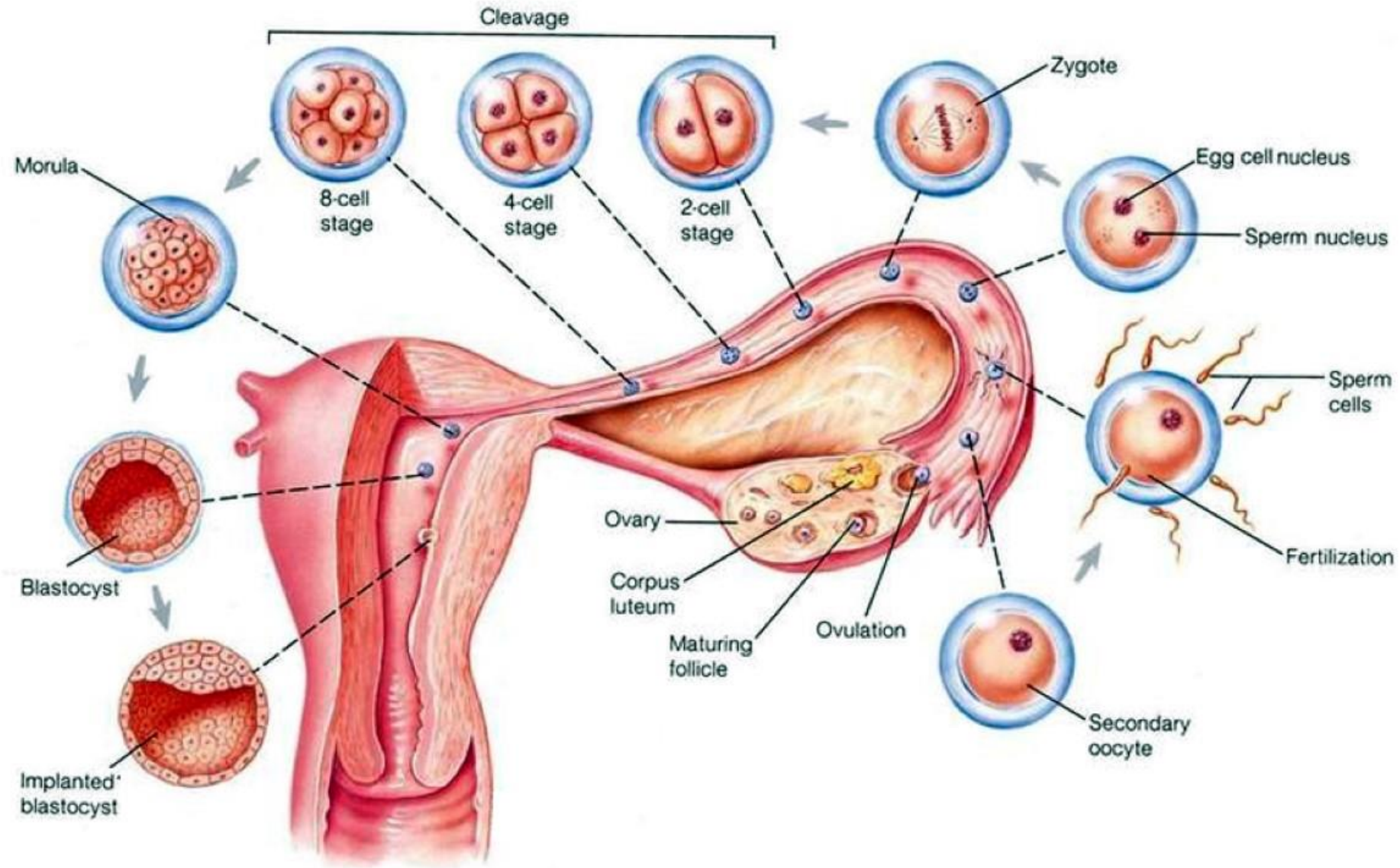
# FERTILIZATION AND IMPLANTATION



- After attachment, uterine cells divide rapidly and cover the blastocyst.
- As a result, the blastocyst becomes embedded in the endometrium. This is called **implantation**.



# FERTILIZATION AND IMPLANTATION: AT A GLANCE



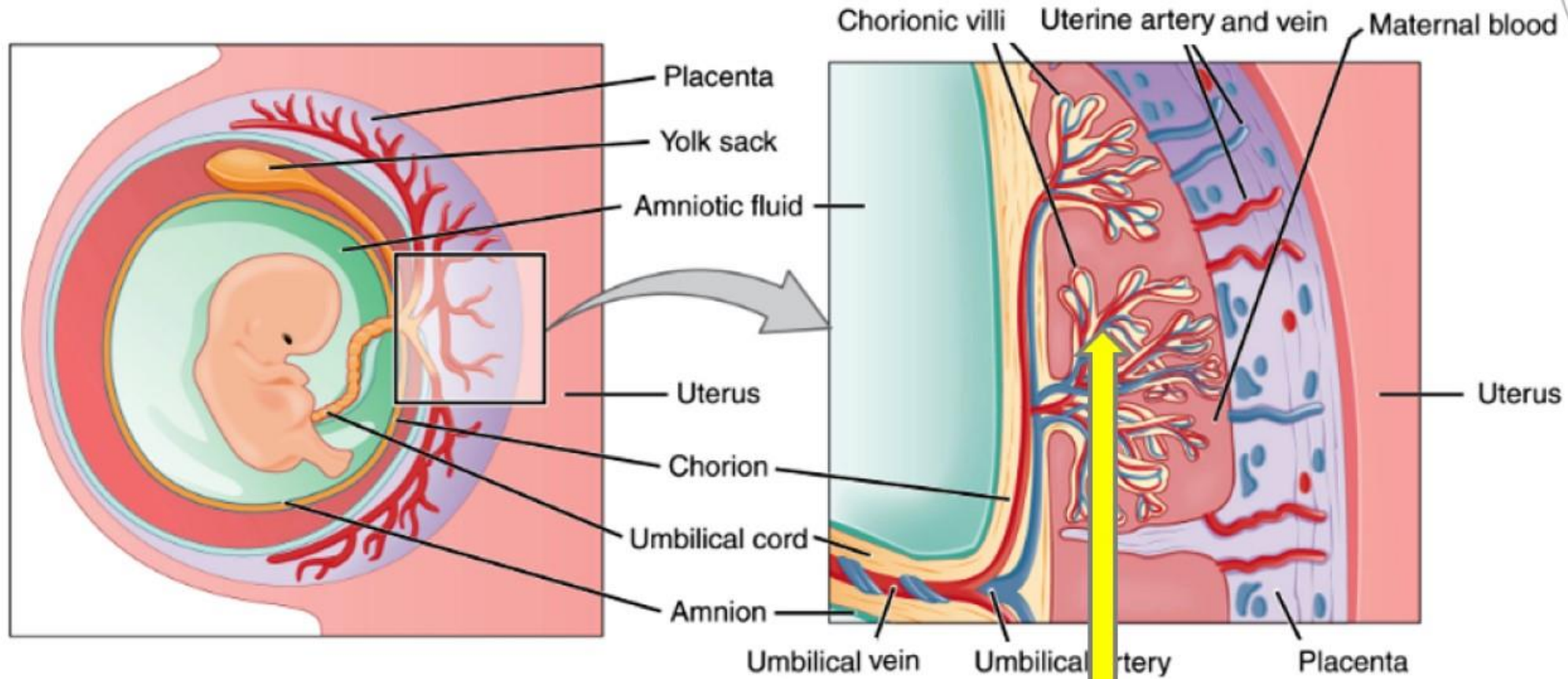




# ***PREGNANCY AND EMBRYONIC DEVELOPMENT***

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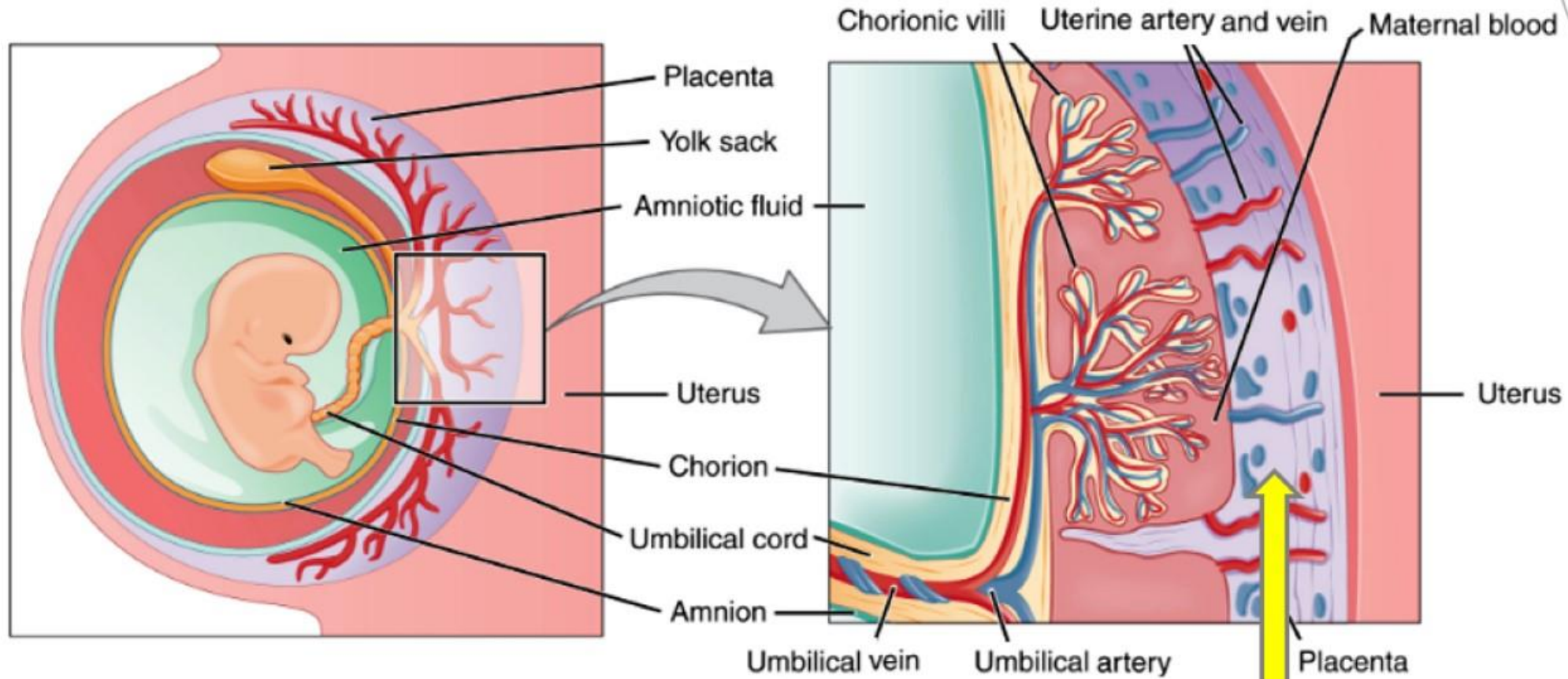
# PREGNANCY AND EMBRYONIC DEVELOPMENT



- After implantation, finger-like projections (**chorionic villi**) appear on trophoblast.
- They are surrounded by uterine tissue and maternal blood.

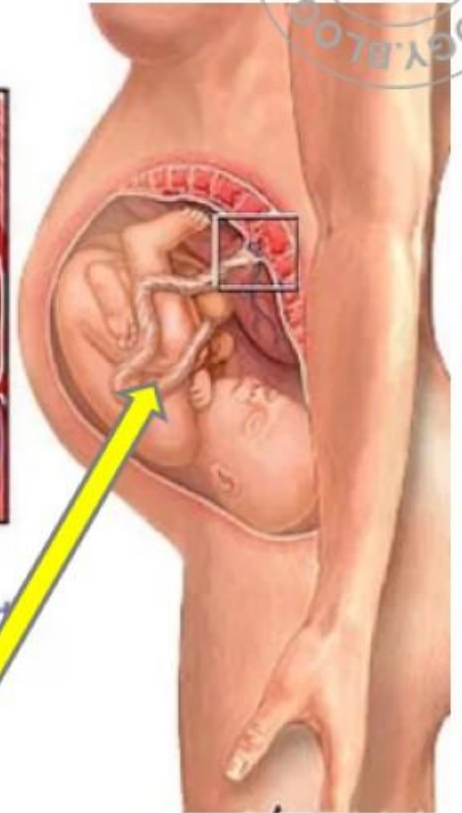
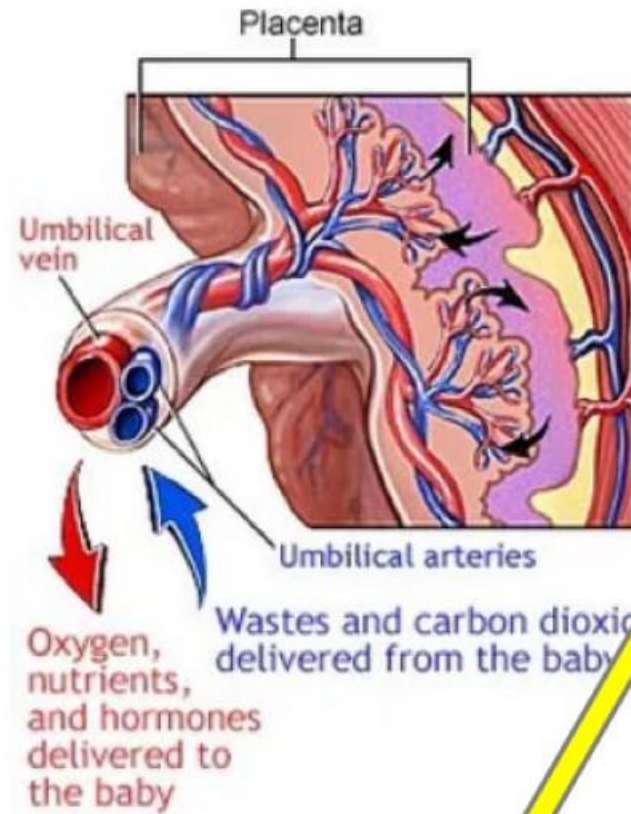


# PREGNANCY AND EMBRYONIC DEVELOPMENT



- The chorionic villi & uterine tissue are interdigitated to form **placenta**.
- Placenta is a structural and functional unit b/w embryo (foetus) & maternal body.

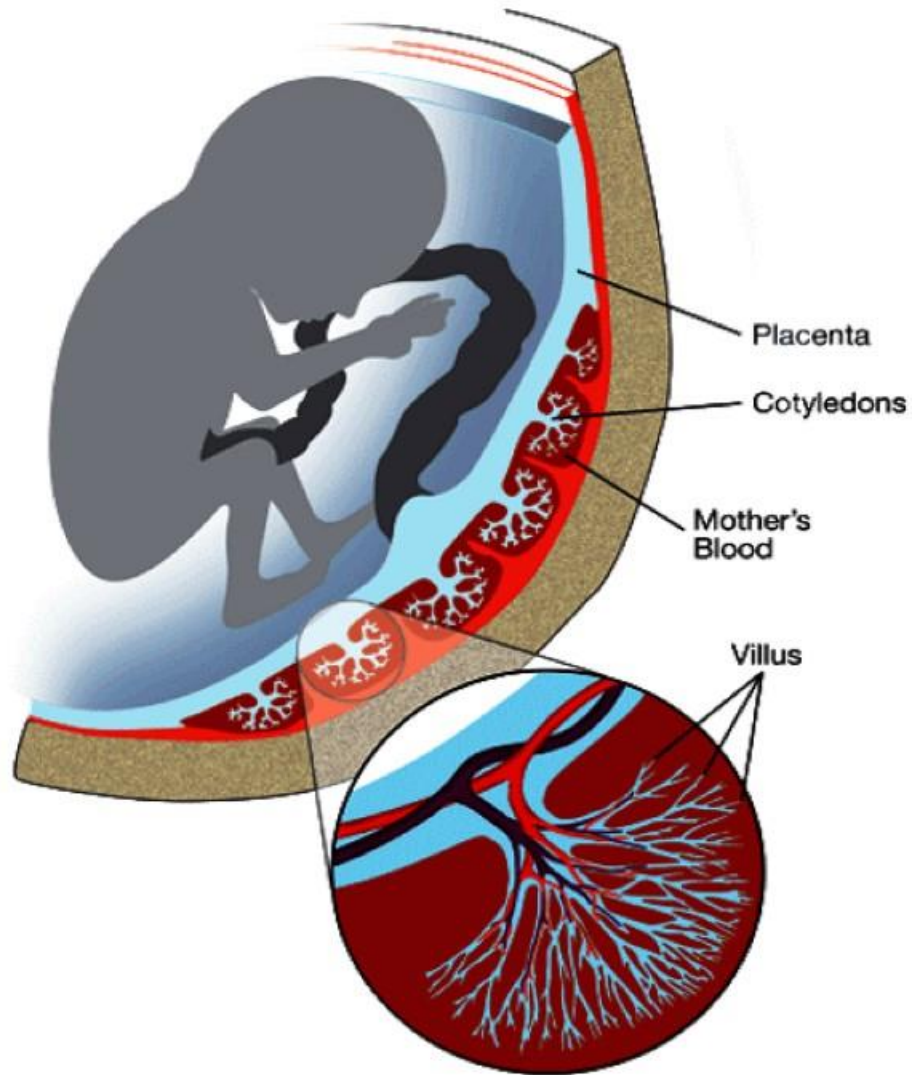
# PREGNANCY AND EMBRYONIC DEVELOPMENT



- Placenta is connected to the embryo by an **umbilical cord**. It transports substances to and from the embryo.



# PREGNANCY AND EMBRYONIC DEVELOPMENT



## Functions of placenta

1. Acts as **barrier** between the foetus & mother.
2. Supply **O<sub>2</sub>, nutrients** etc. from mother to foetus.
3. Remove **CO<sub>2</sub> & excretory wastes** from foetus.
4. Acts as an **endocrine gland**. It secretes **Human chorionic gonadotropin (hCG), human placental lactogen (hPL), oestrogens, progesterone & relaxin**.

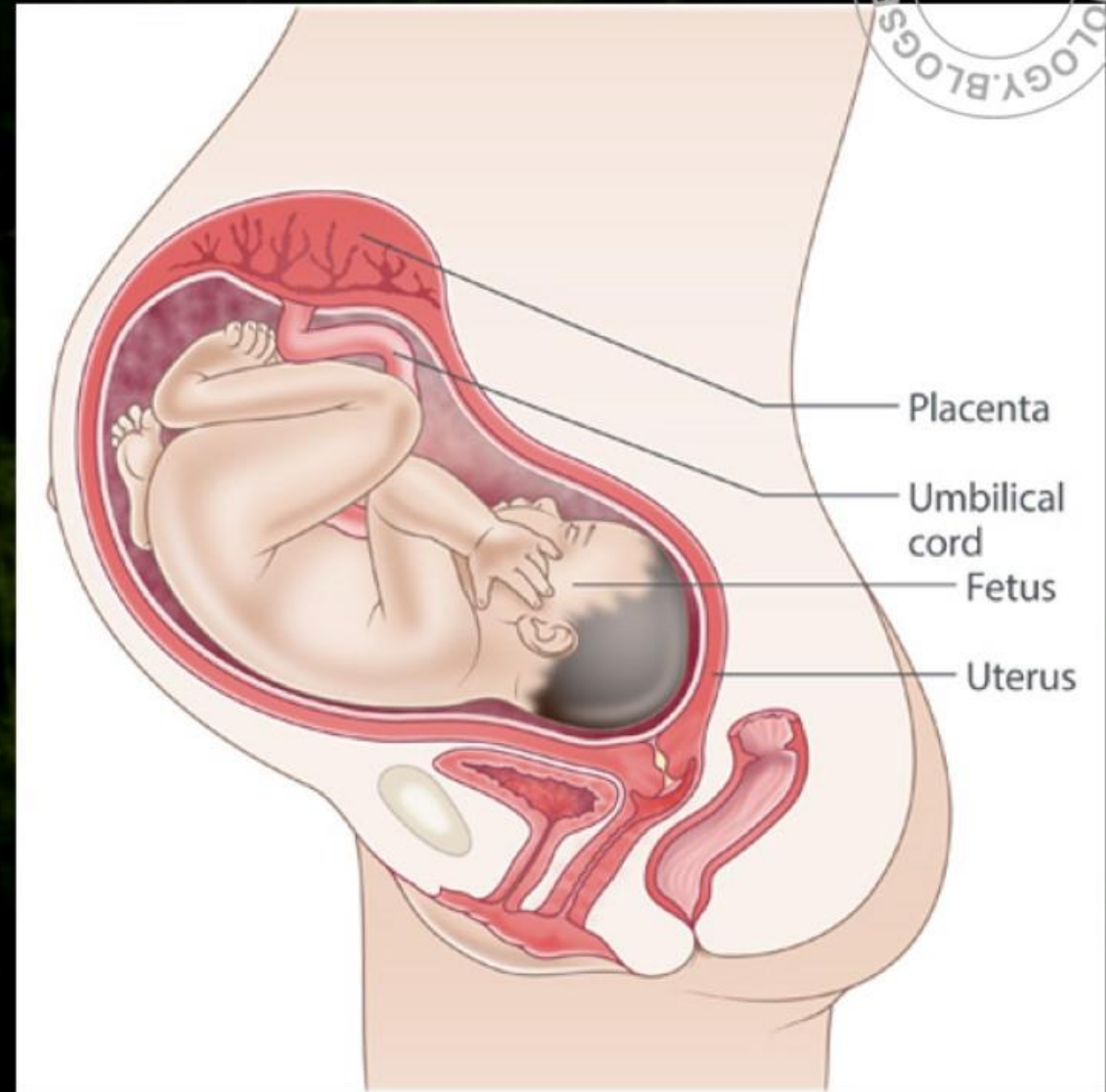
**Relaxin is also secreted by ovary.**



# PREGNANCY AND EMBRYONIC DEVELOPMENT



- During pregnancy, **estrogens, progesterones, cortisol, prolactin, thyroxine** etc. are also increased in maternal blood.
- They support the fetal growth, metabolic changes in the mother and maintain pregnancy.

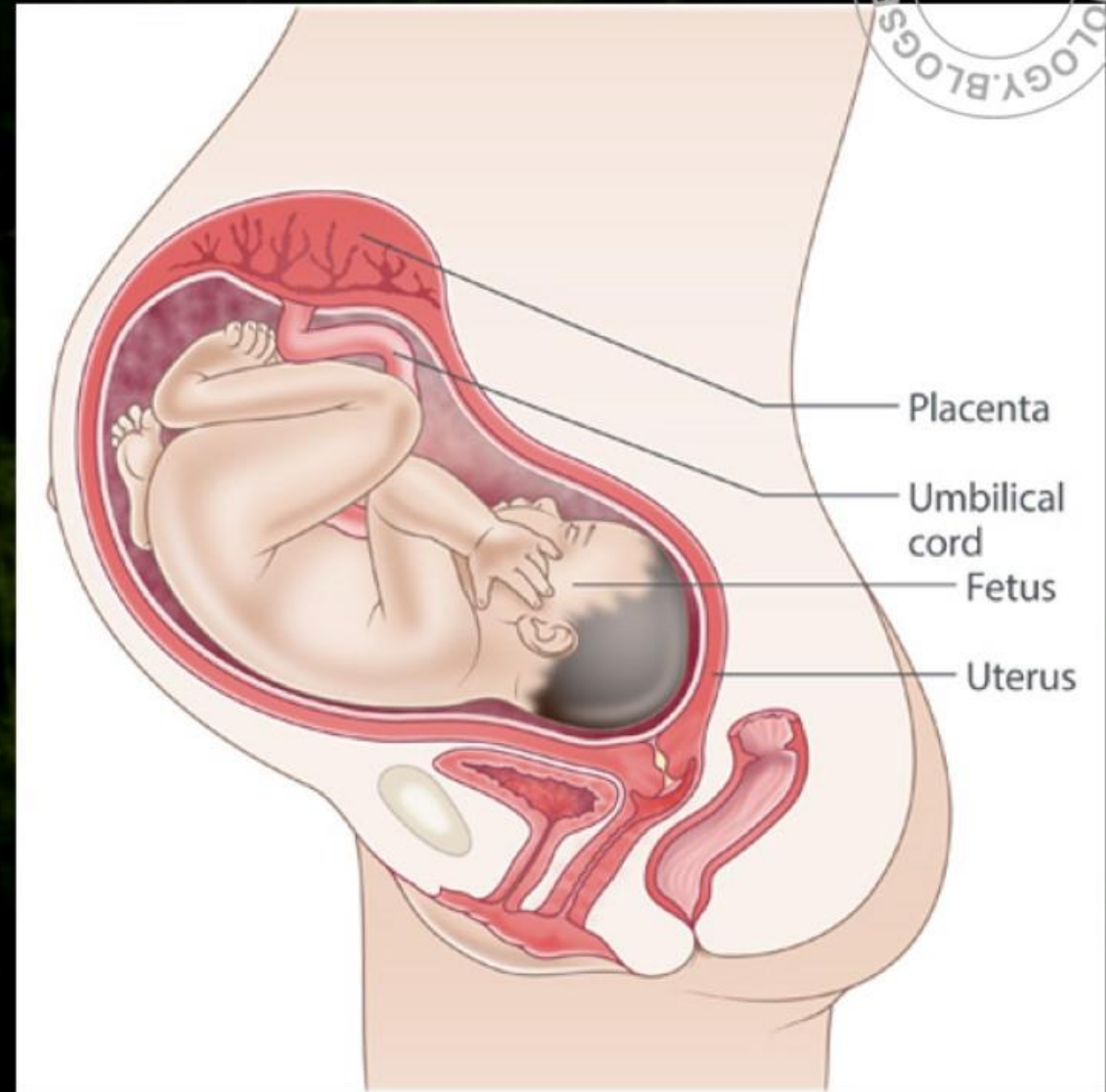




# PREGNANCY AND EMBRYONIC DEVELOPMENT



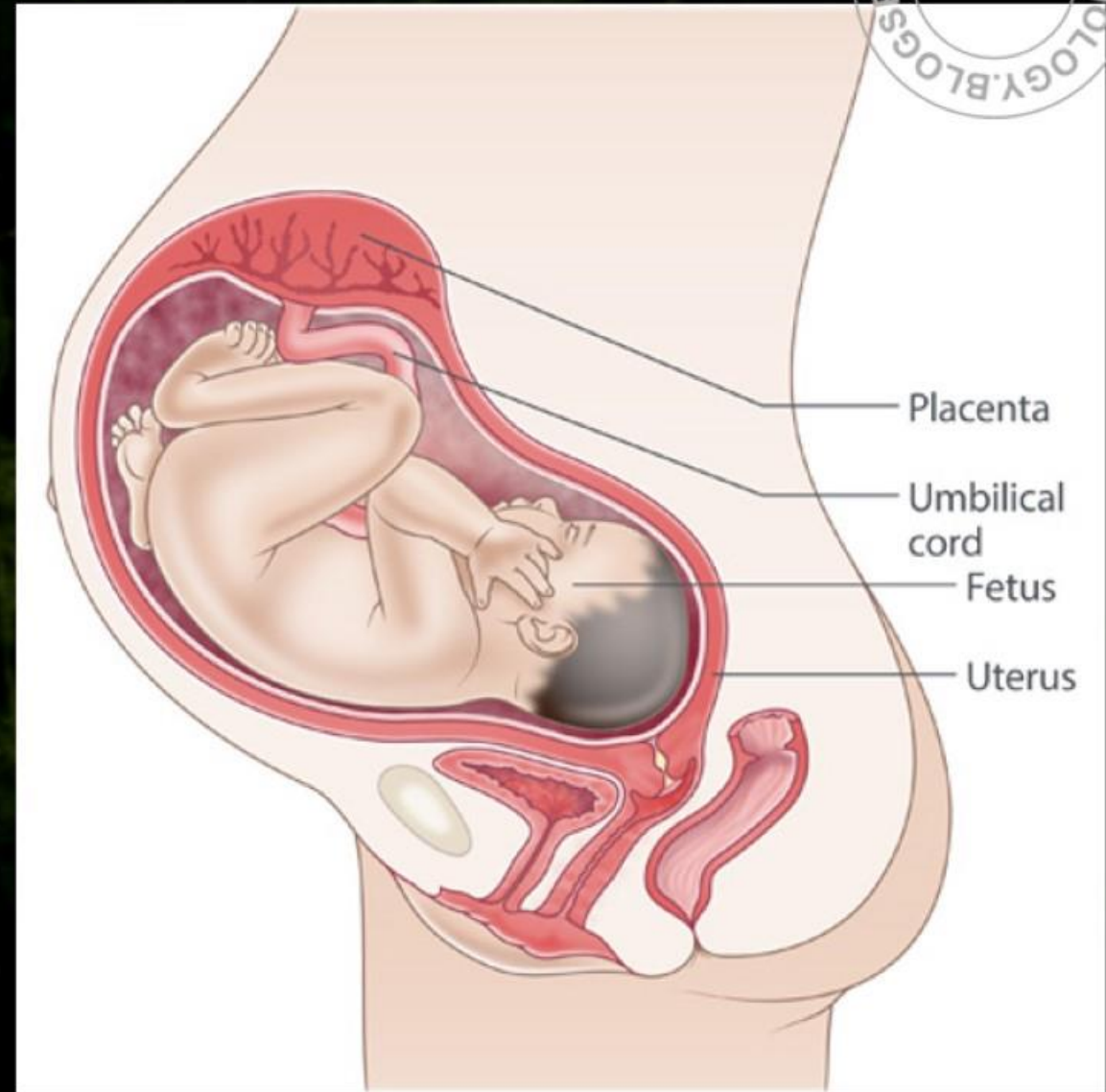
- The germ layers give rise to all tissues (organs).
- The stem cells in inner cell mass have the potency to give rise to all the tissues and organs.



# PREGNANCY AND EMBRYONIC DEVELOPMENT



- Human pregnancy (**gestation period**) lasts 9 months.
- For cats: 2 months.  
Dogs: 2 months.  
Elephants: 21 months.





# PREGNANCY AND EMBRYONIC DEVELOPMENT



## Changes in embryo during pregnancy

- **After one month:** Heart is formed.
- **End of second month:** Limbs and digits are developed.
- **End of 12 weeks (first trimester):** Major organs (limbs, external genital organs etc.) are well developed.
- **During 5<sup>th</sup> month:** First movement of foetus and appearance of hair on the head.
- **End of 24 weeks (second trimester):** Body is covered with fine hair, eyelids separate and eyelashes are formed.
- **End of 9 months:** Ready for delivery.





# **PARTURITION & LACTATION**



# PARTURITION AND LACTATION

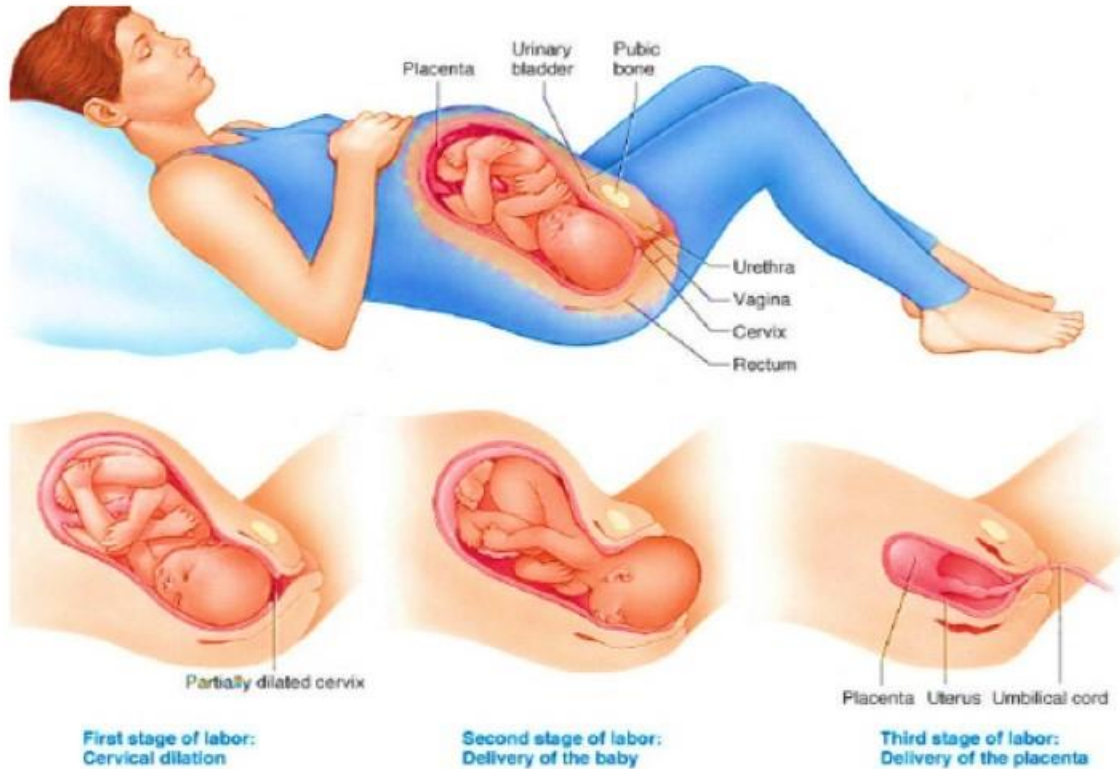


## Parturition (labour)

- Process of giving birth to young ones.
- It is induced by **neuroendocrine mechanism**.
- The signals from the foetus and placenta induce mild uterine contractions (**fetal ejection reflex**). This causes the release of **oxytocin** from maternal pituitary.

# PARTURITION AND LACTATION

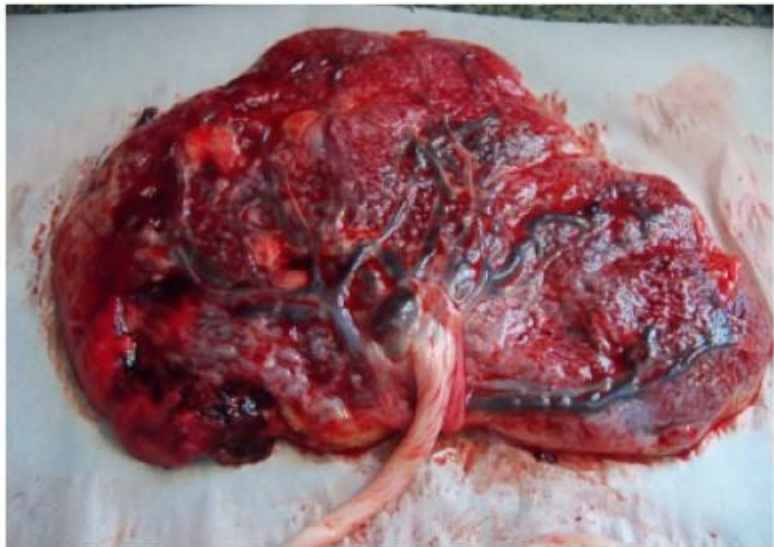
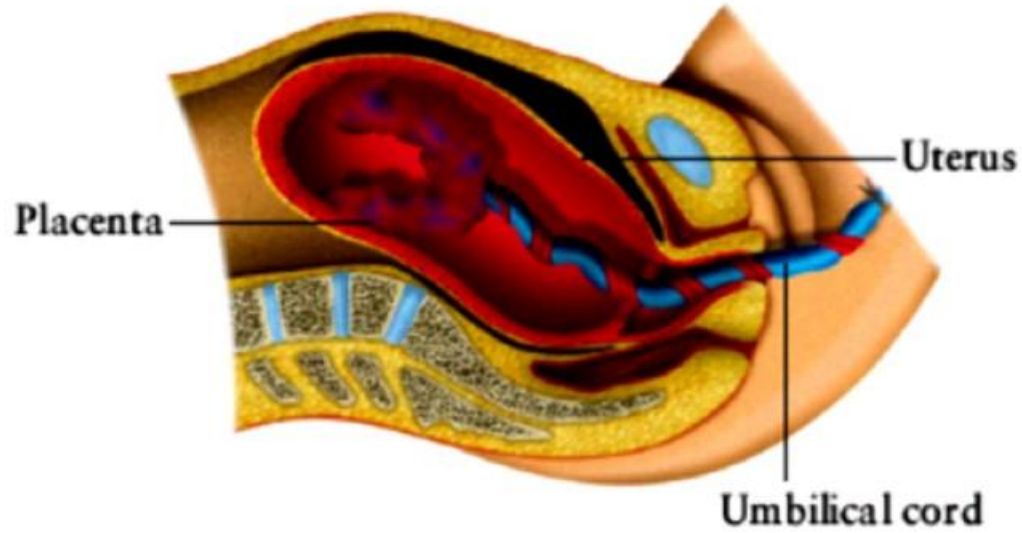
## Parturition (labour)



- **Oxytocin causes stronger uterine muscle contractions which in turn stimulate further secretion of oxytocin.**
- **This process is continued leading to expulsion of the baby out of the uterus through the birth canal.**



# PARTURITION AND LACTATION



- After parturition, the umbilical cord is cut off.
- The placenta & remnants of umbilical cord are expelled from the maternal body after parturition. It is called **“after birth”**.

# PARTURITION AND LACTATION



- The mammary glands produce milk towards the end of pregnancy. It is called **lactation**.
- The yellowish milk produced during the initial few days of lactation is called **colostrum**. It contains several antibodies essential to develop resistance for the new born babies.