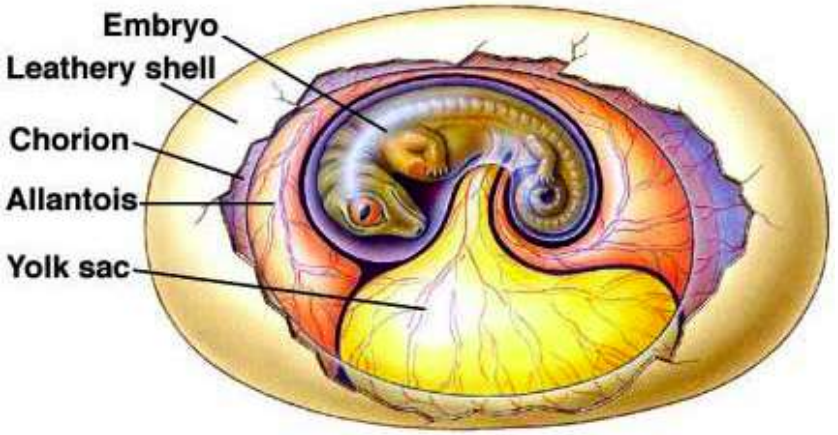
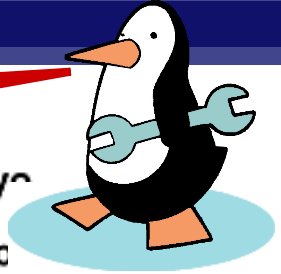
Animal Reproduction & Development

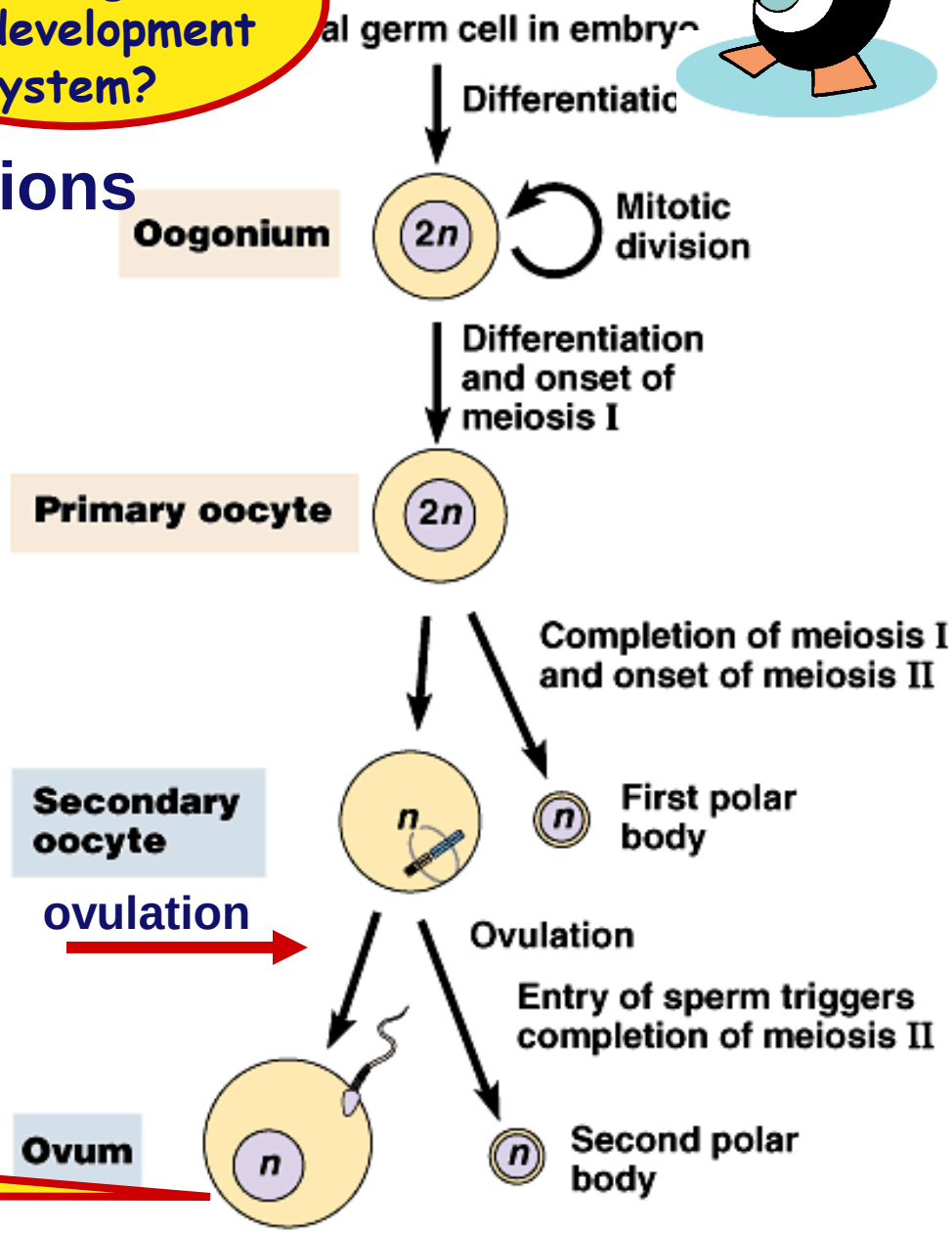


Oogenesis

- Unequal meiotic divisions
  - unequal distribution of cytoplasm
  - 1 egg
  - 2 polar bodies

What is the advantage of this development system?



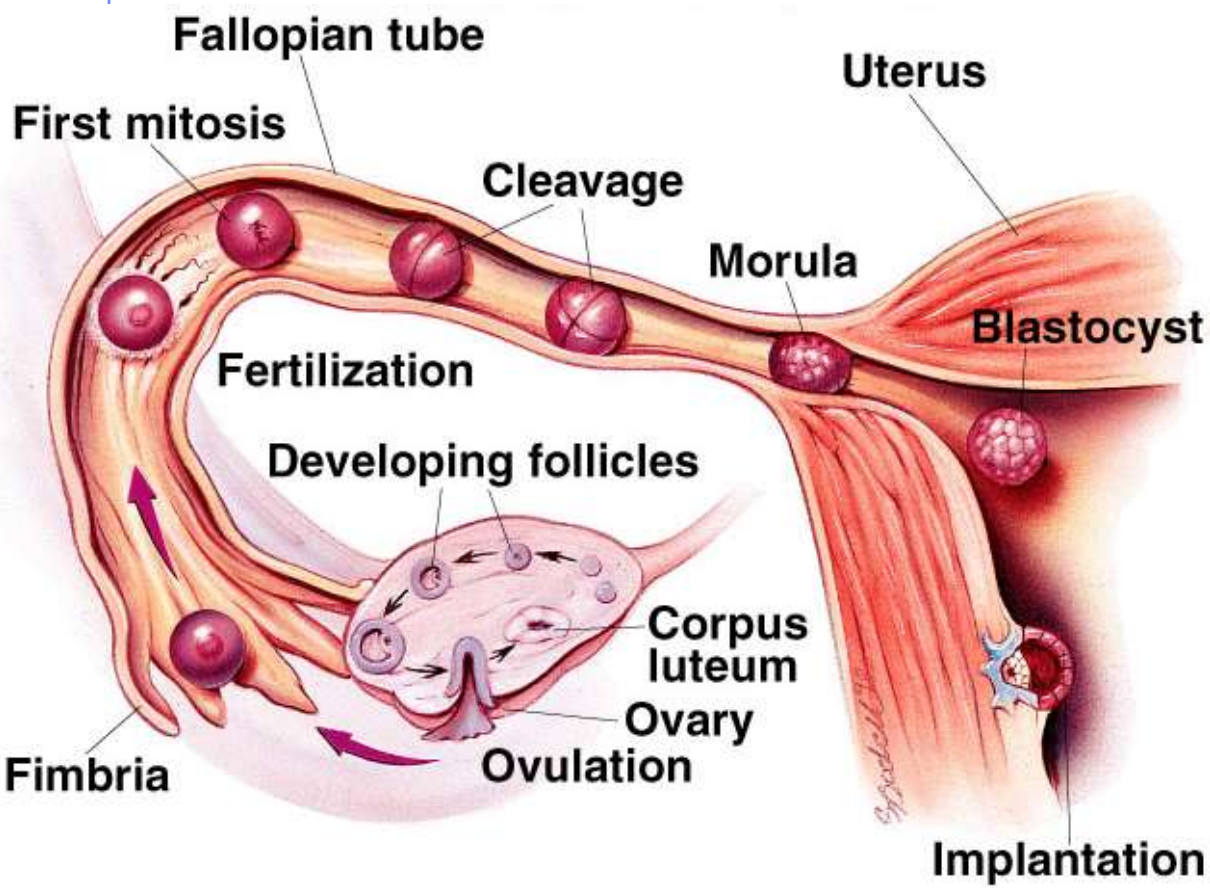


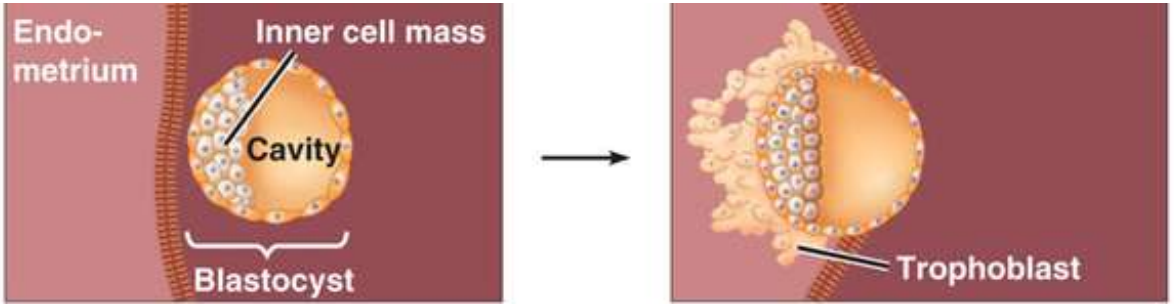
Meiosis 1 completed during egg maturation

Meiosis 2 completed triggered by fertilization

Put all your egg in one basket!

Fertilization

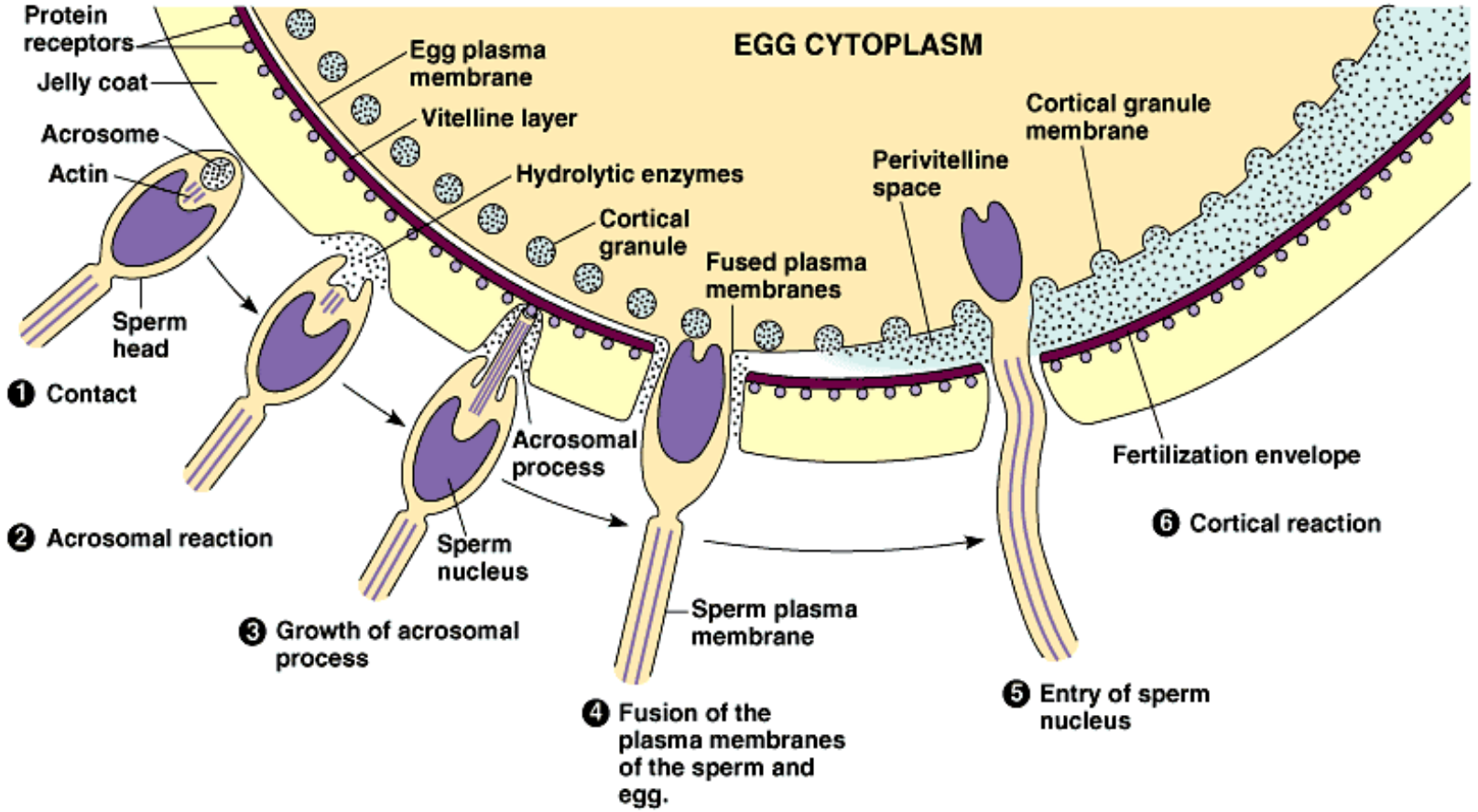




- fertilization
- cleavage
- gastrulation
- neurulation
- organogenesis

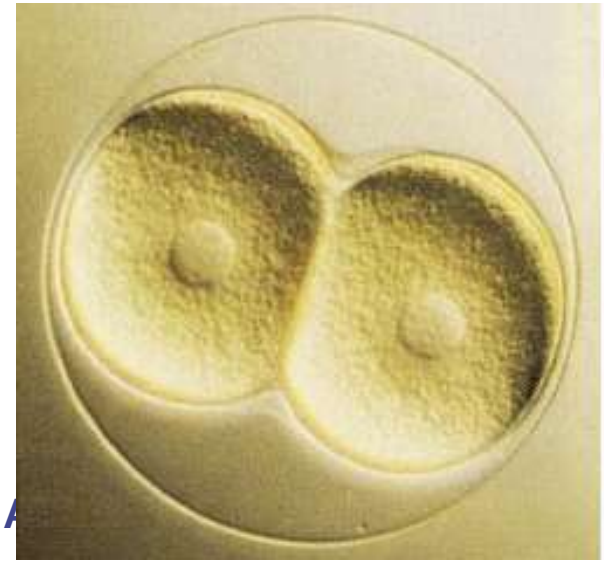
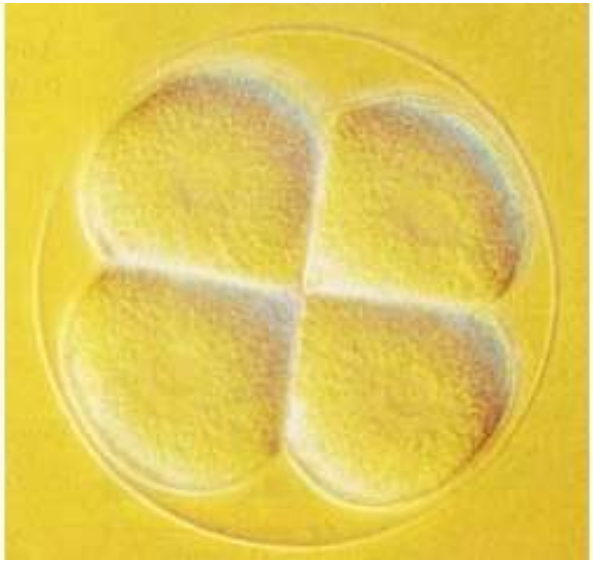
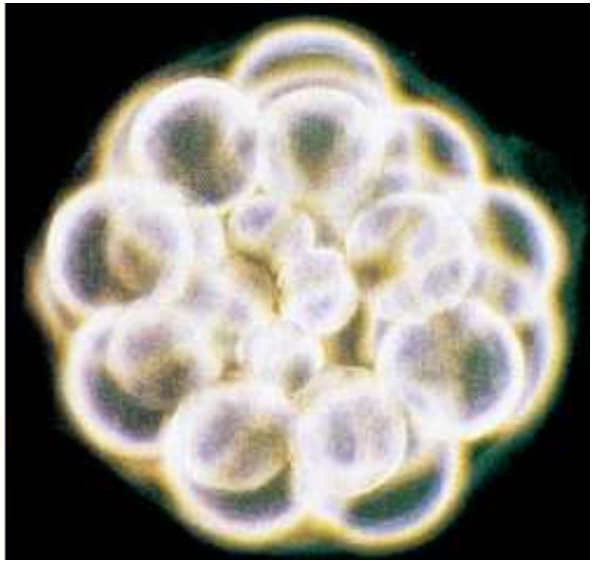
Fertilization

- Joining of sperm & egg
  - sperm head (nucleus) enters egg



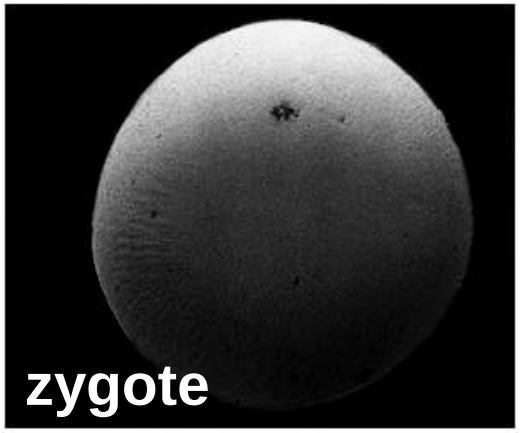
Cleavage

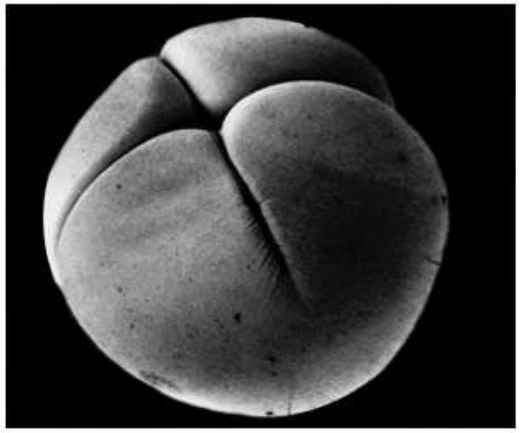
- **Repeated mitotic divisions of zygote**
  - **1st step to becoming multicellular**
  - **unequal divisions establishes body plan**
    - **different cells receive different portions of egg cytoplasm & therefore different regulatory signals**

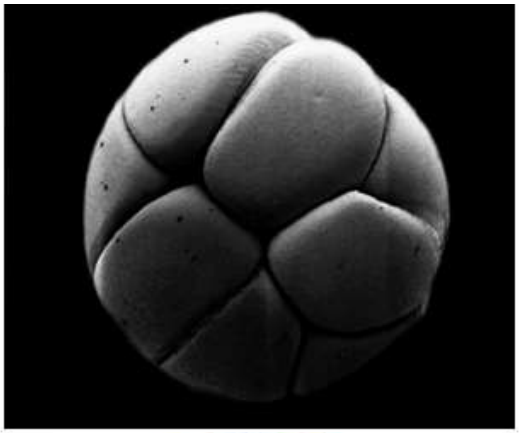




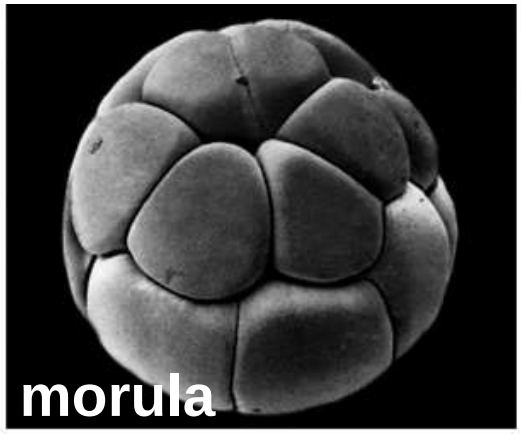
Cleavage

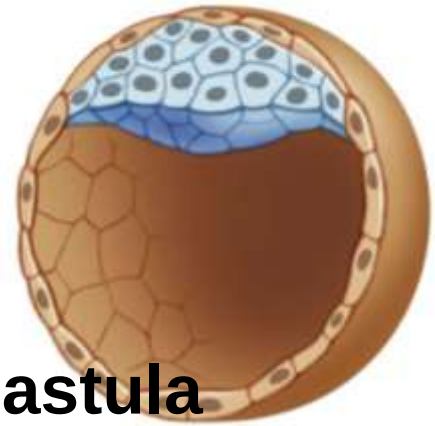
- zygote → morula → blastula
  - establishes future development

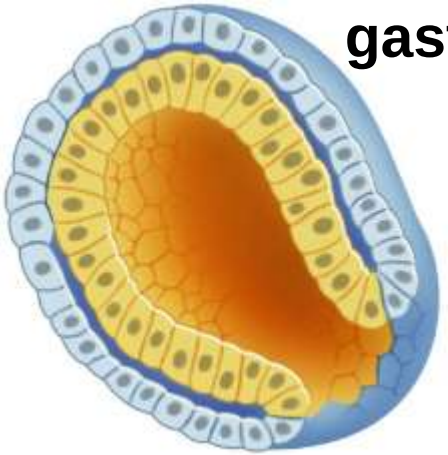






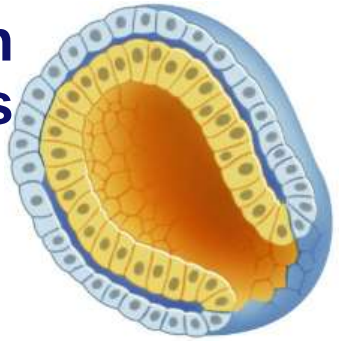




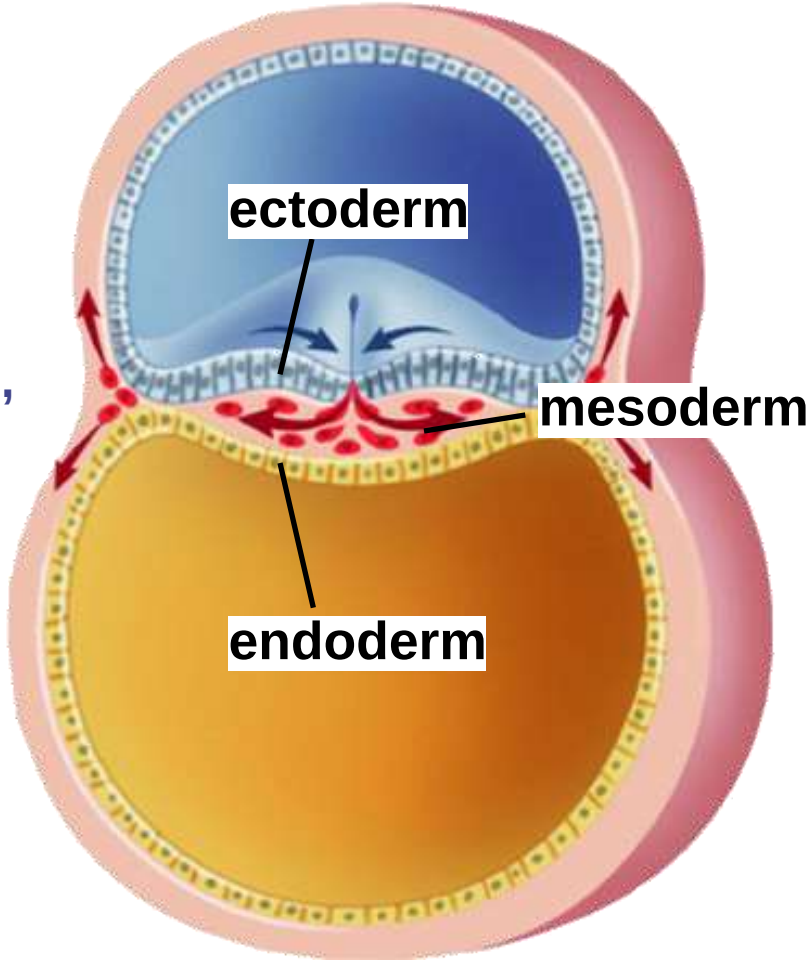


Gastrulation

gastrulation in primitive chordates



- **Establish 3 cell layers**
  - **ectoderm**
    - outer body tissues
      - skin, nails, teeth
      - nerves, eyes, lining of mouth
  - **mesoderm**
    - middle tissues
      - blood & lymph, bone & notochord, muscle
      - excretory & reproductive systems
  - **endoderm**
    - inner lining
      - digestive system
      - lining of respiratory, excretory & reproductive systems



protostome vs. deuterostome

Testing…

All of the following correctly describe the fate of the embryonic layers of a vertebrate EXCEPT

A. **neural tube and epidermis develop from ectoderm**
B. **linings of digestive organs and lungs develop from endoderm**
C. **notochord and kidneys develop from endoderm**
D. **skeletal muscles and heart develop from mesoderm**
E. **reproductive organs and blood vessels develop from mesoderm**

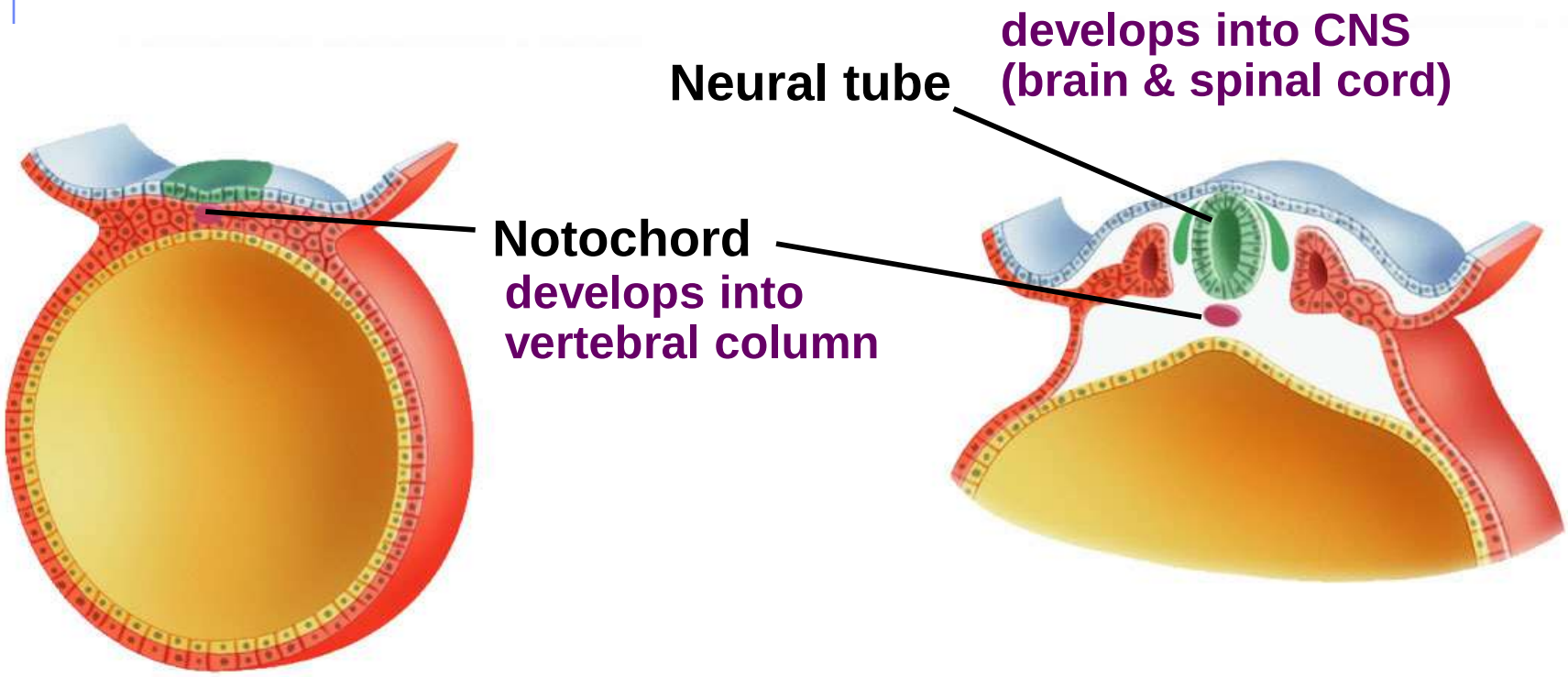
Testing…

In a study of the development of frogs, groups of cells in the germ layers of several embryos in the early gastrula stage were stained with five different dyes that do not harm living tissue. After organogenesis (organ formation), the location of the dyes was noted, as shown in the table below.

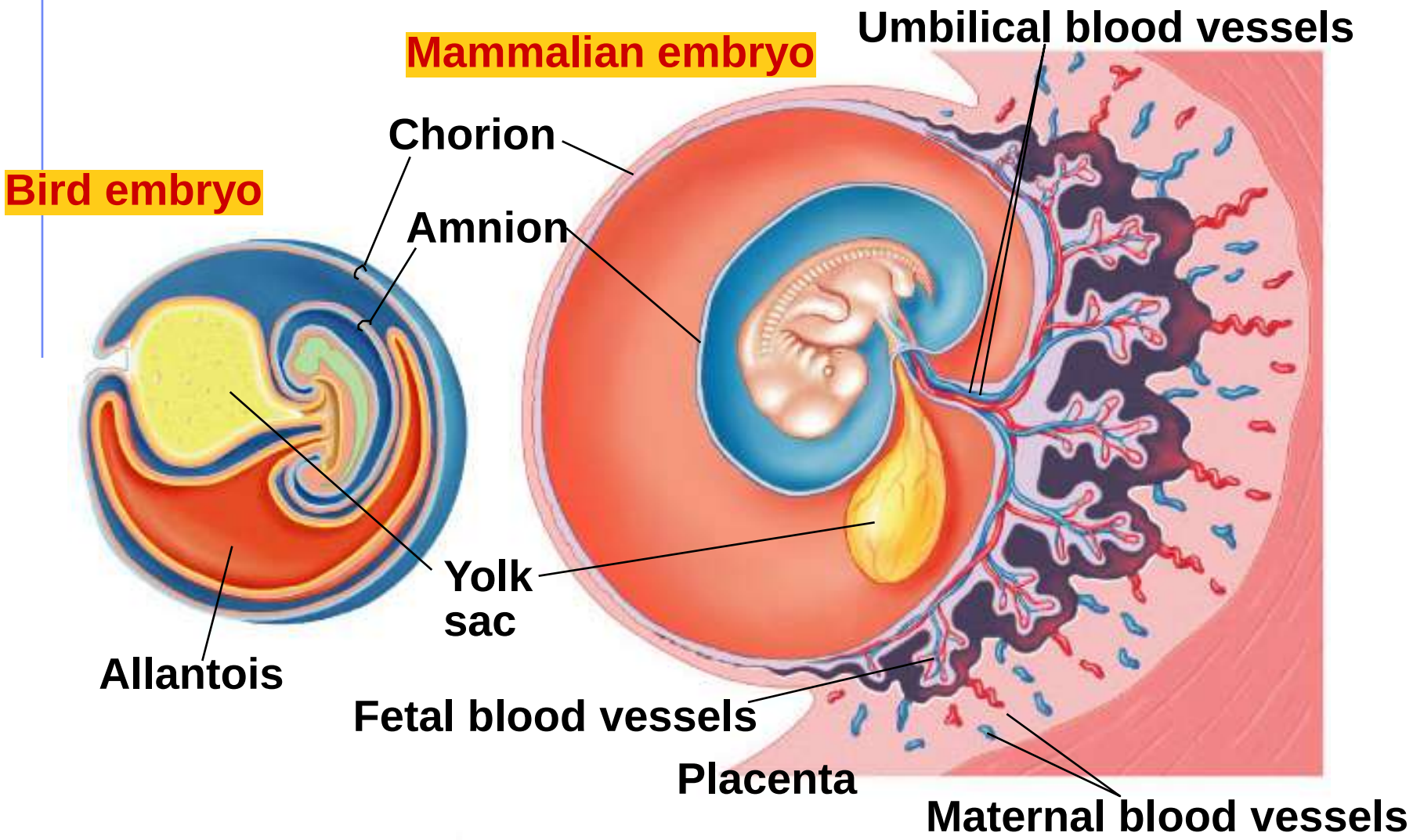
Tissue	Stain
Brain	Red
Notochord	Yellow
Liver	Green
Lens of the eye	Blue
Lining of the digestive tract	Purple

Neurulation

- Formation of notochord & neural tube
  - develop into nervous system

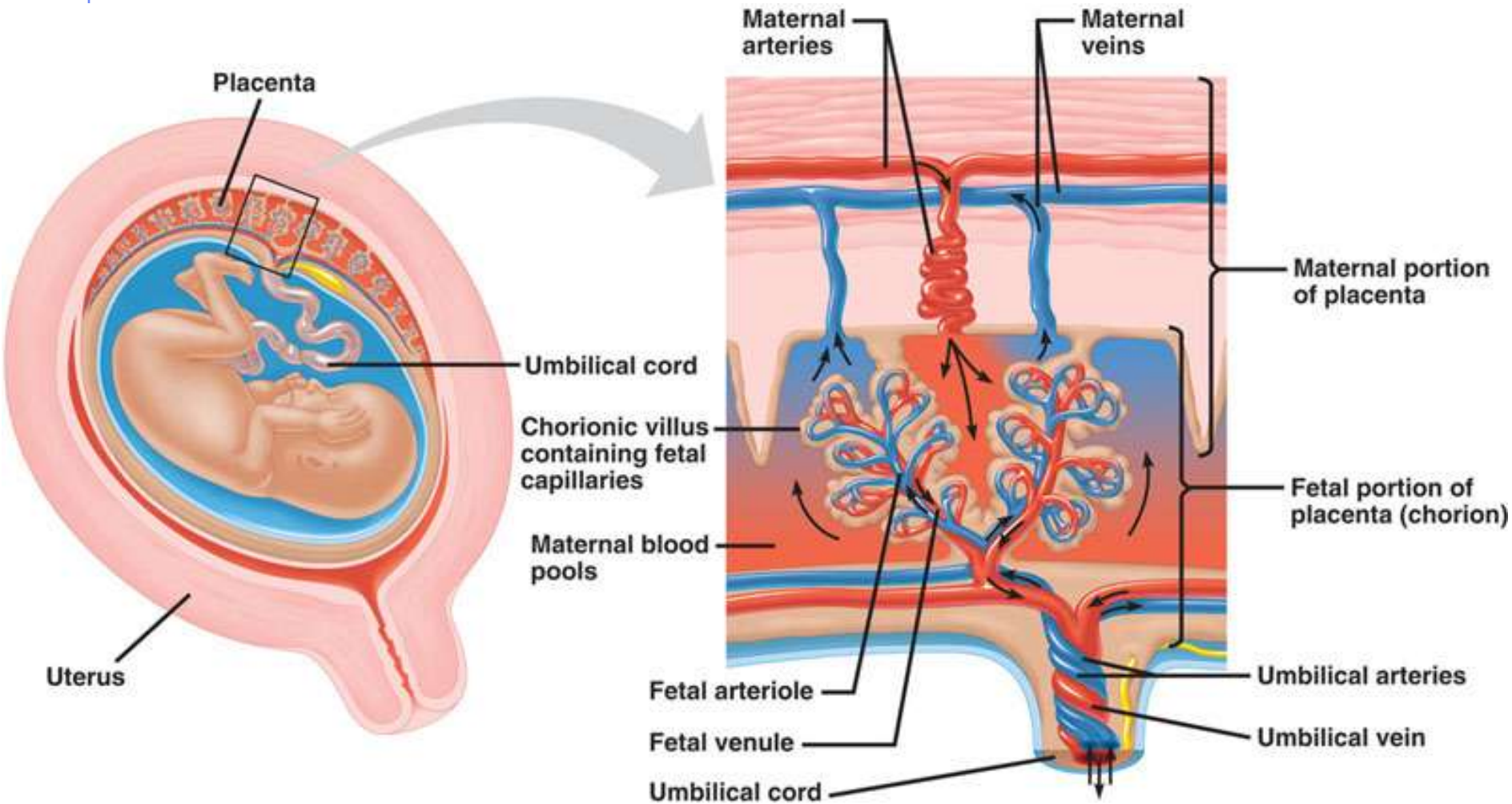


Organogenesis



Placenta

- Materials exchange across membranes



Human fetal development

4 weeks

7 weeks

Human fetal development

Human fetal development

Human fetal development

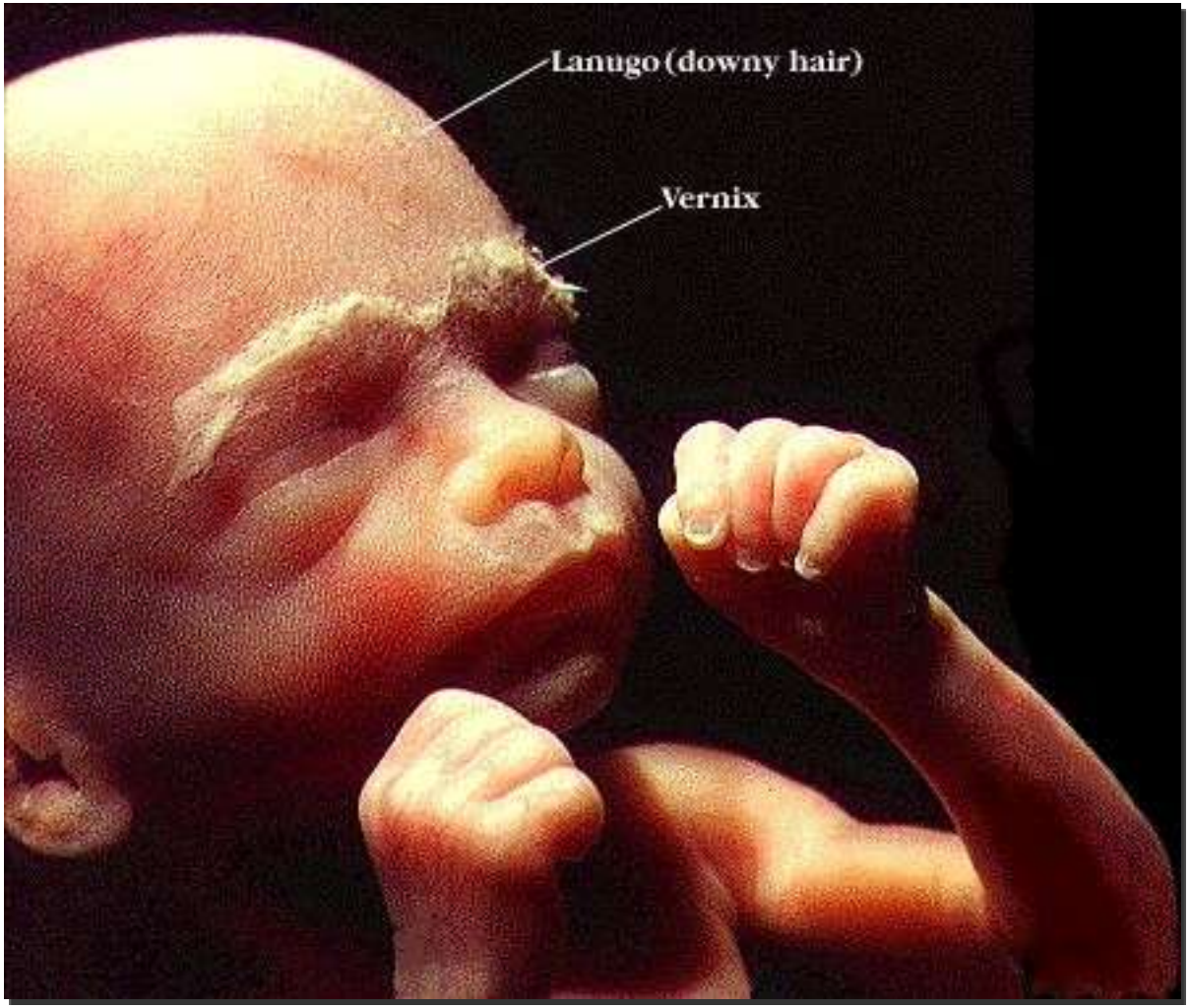
- The fetus just spends much of the 2nd & 3rd trimesters just growing
  - …and doing various flip-turns & kicks inside amniotic fluid

- Week 20

Human fetal development

- 24 weeks (6 months; 2nd trimester)

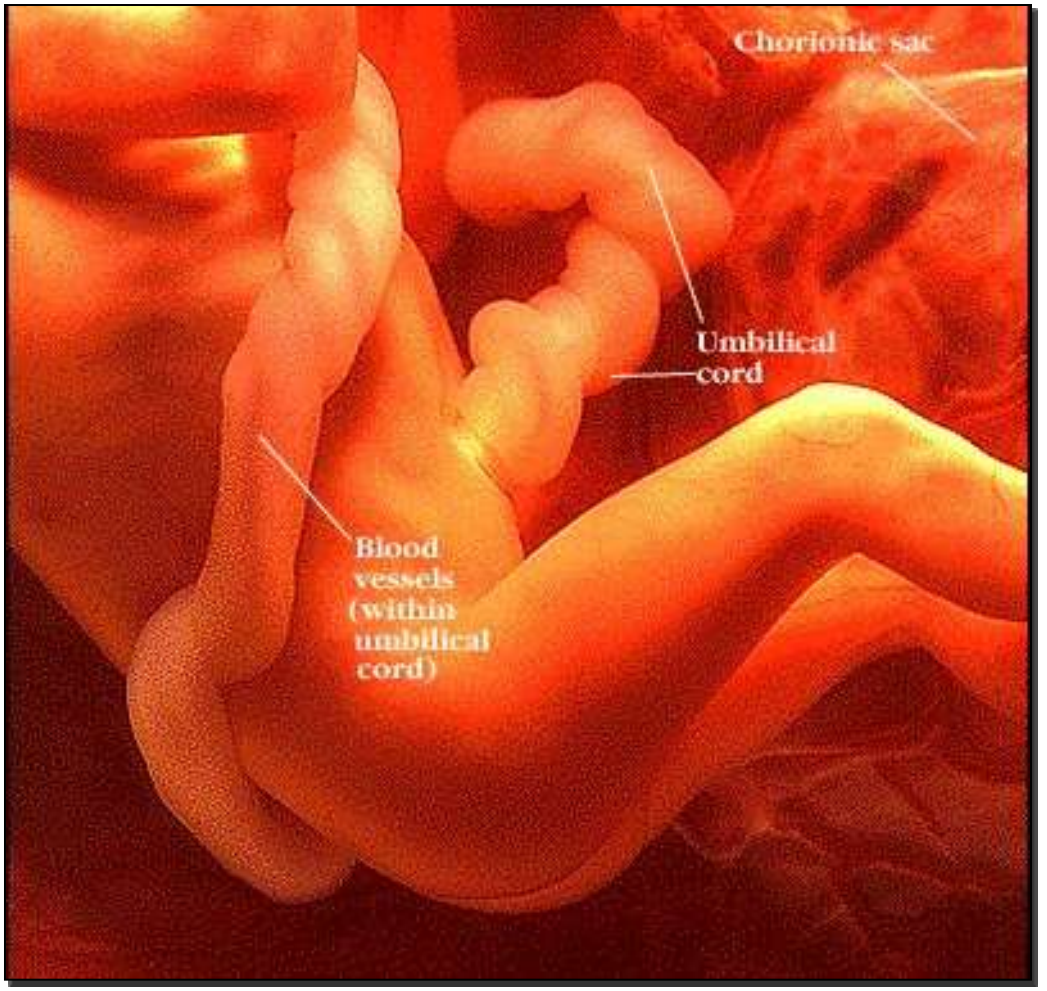
fetus is covered with fine, downy hair called lanugo. Its skin is protected by a waxy material called vernix



Human fetal development

- 30 weeks (7.5 months)

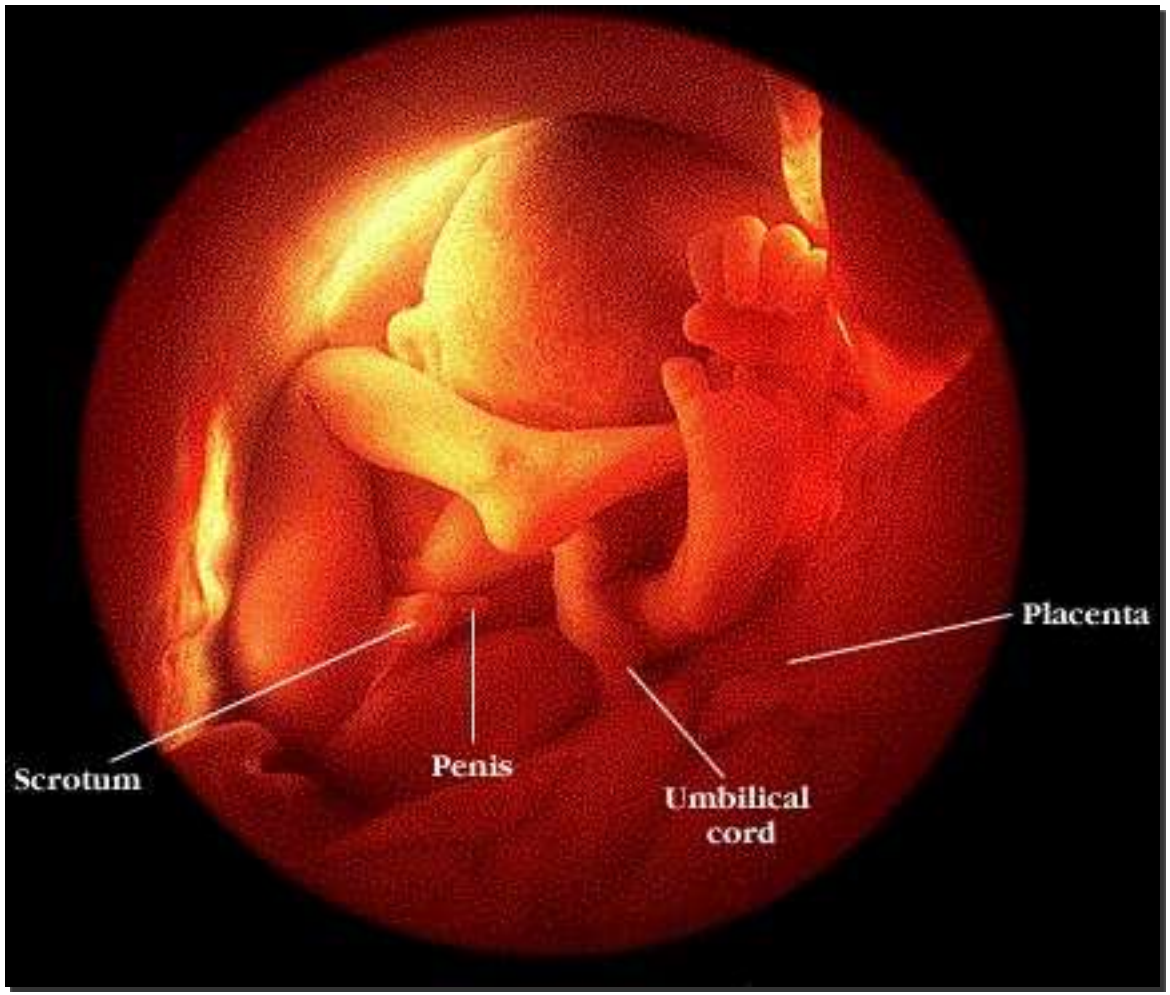
umbilical cord



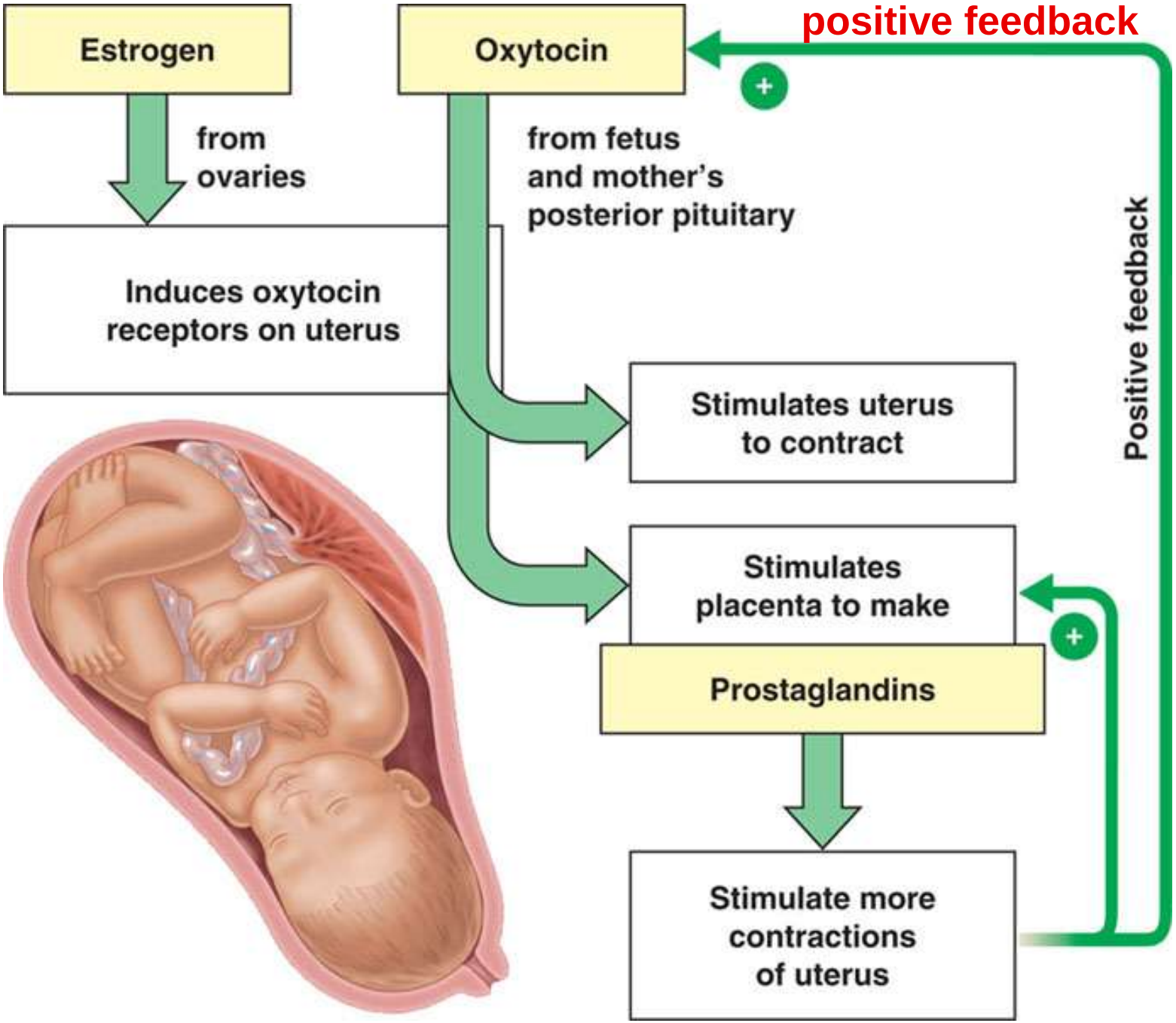
Getting crowded in there!!

- 32 weeks (8 months)

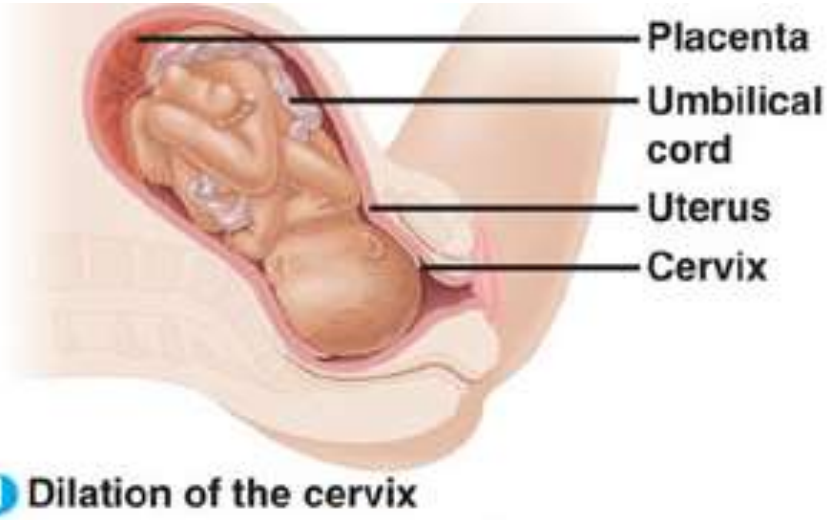
The fetus sleeps 90-95% of the day & sometimes experiences REM sleep, an indication of dreaming



Birth

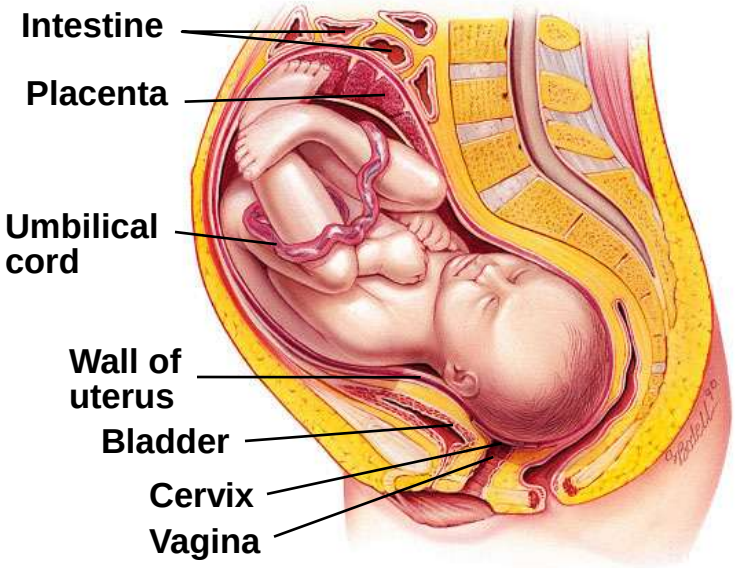

positive feedback
Estrogen
Oxytocin
+
from ovaries
from fetus and mother's posterior pituitary
Induces oxytocin receptors on uterus
Stimulates uterus to contract
Positive feedback
Stimulates placenta to make
+
Prostaglandins
Stimulate more contractions of uterus

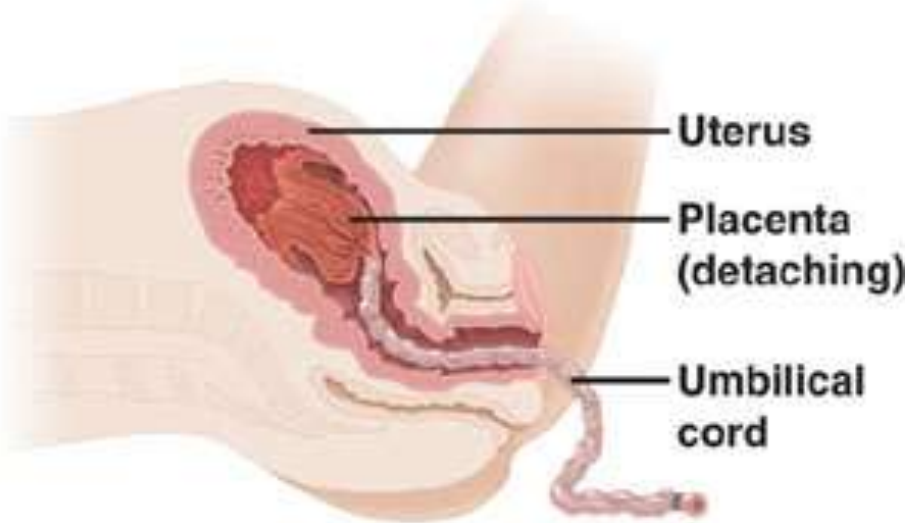
Birth (36 weeks)



1 Dilation of the cervix

2 Expulsion: delivery of the infant





3 Delivery of the placenta

The end of the journey!