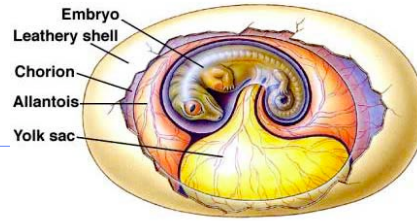


Chapter 46.

Animal Reproduction



Sexual & asexual reproduction

- **Asexual**
 - ◆ production of offspring with genes from one individual
- **Sexual**
 - ◆ formation of gametes & fertilization
 - ◆ genetic recombination & variation



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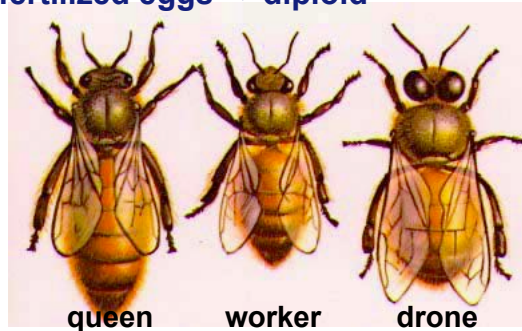
© Bob Schmitt

Parthenogenesis

- **Development of an unfertilized egg**

- ◆ **honey bees**

- **drones = males produced through parthenogenesis → haploid**
- **workers & queens = females produced from fertilized eggs → diploid**



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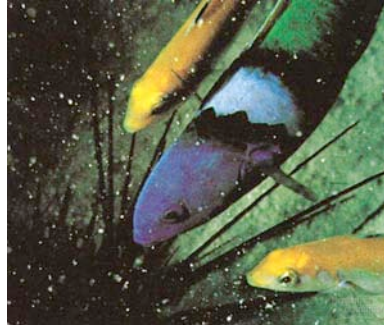
2004-2005

Honey bee eggs hatch regardless of whether they are fertilized. The female bees--queens & workers--develop from fertilized eggs that contain 32 chromosomes. These 32 chromosomes consist of two sets of 16, one set from each parent. Hence female bees are said to be diploid in origin. The males (drones) develop from unfertilized eggs which contain only one set of 16 chromosomes from their mother. Drones are thus haploid in origin. This reproduction by the development of unfertilized eggs is called parthenogenesis.

Drones develop by parthenogenesis from unfertilized eggs that the queen produces by withholding sperm from the eggs laid in large drone cells. Drones lack stings and the structures needed for pollen collection; in the autumn they are ejected by the colony to starve, unless the colony is queenless. New drones are produced in the spring for mating.

Both queens and workers are produced from fertilized eggs. Queen larvae are reared in special peanut-shaped cells and fed more of the pharyngeal gland secretions of the nurse bees (bee milk or royal jelly) than the worker larvae are. The precise mechanism for this caste differentiation is still uncertain. Although workers are similar in appearance and behavior to other female bees, they lack the structures for mating. When no queen is present to inhibit the development of their ovaries, however, workers eventually begin to lay eggs that develop into drones.

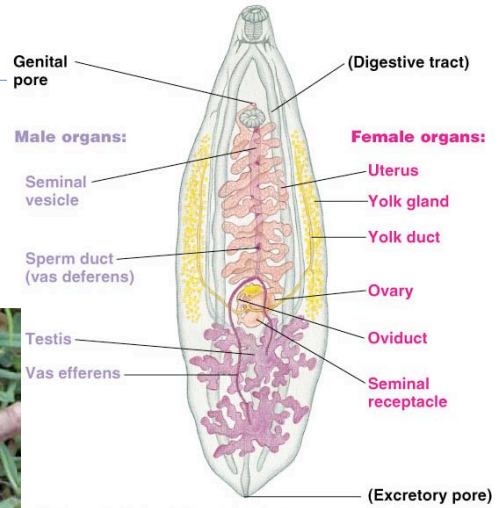
**Different
worlds...**



AP

Hermaphrodites

earth worms mating



flat worm

2004-2005

Fertilization

- **External**
 - ◆ usually aquatic animals
- **Internal**
 - ◆ usually terrestrial animals



AP Biology

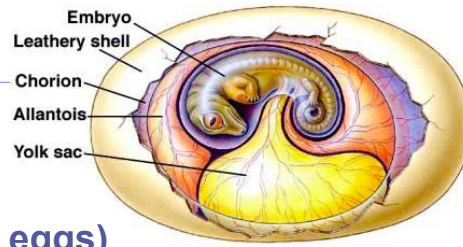
Development

■ External

- ◆ in water (eggs)
- ◆ on land (amniotic eggs)
- ◆ oviparous: lay eggs
- ◆ ovoviparous: live births from eggs
 - sharks & some snakes

■ Internal

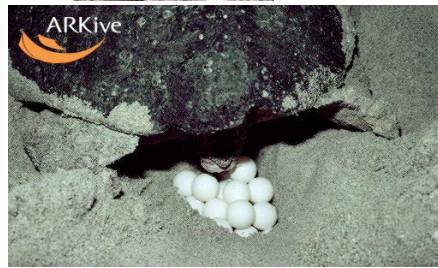
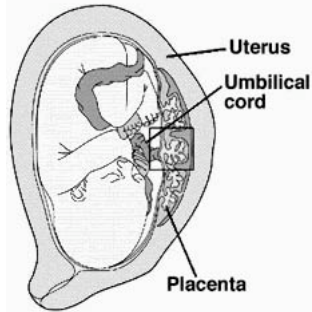
- ◆ placenta
- ◆ viviparous:
live placental birth



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Adaptive advantages?

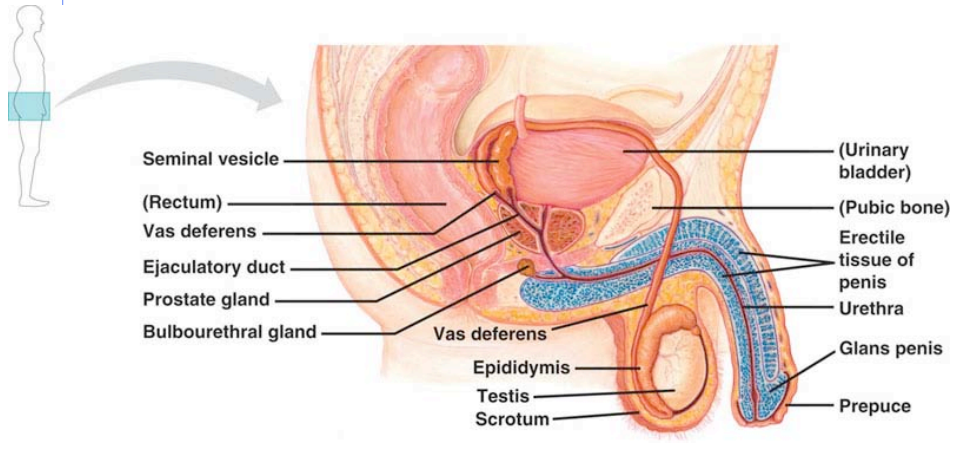
- What is the adaptive value of each type of sexual reproduction
 - ◆ number of eggs?
 - ◆ level of parental of care
 - ◆ habitat?



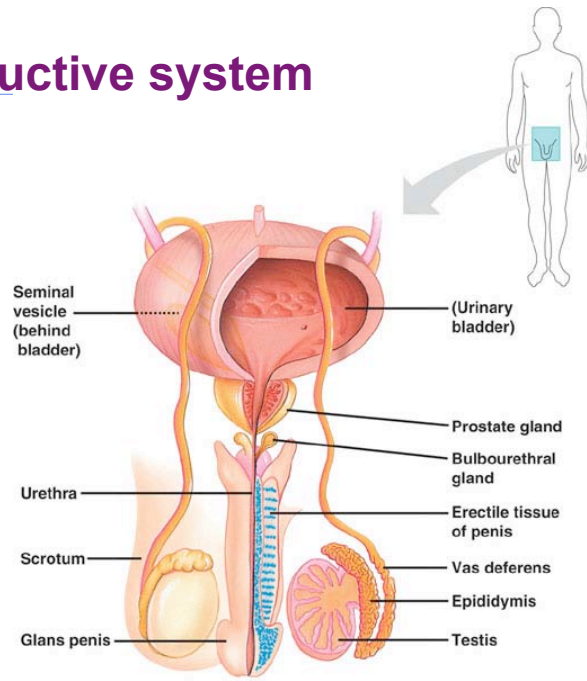
Human reproduction

Male reproductive system

◆ over 100 million per day!



Male reproductive system

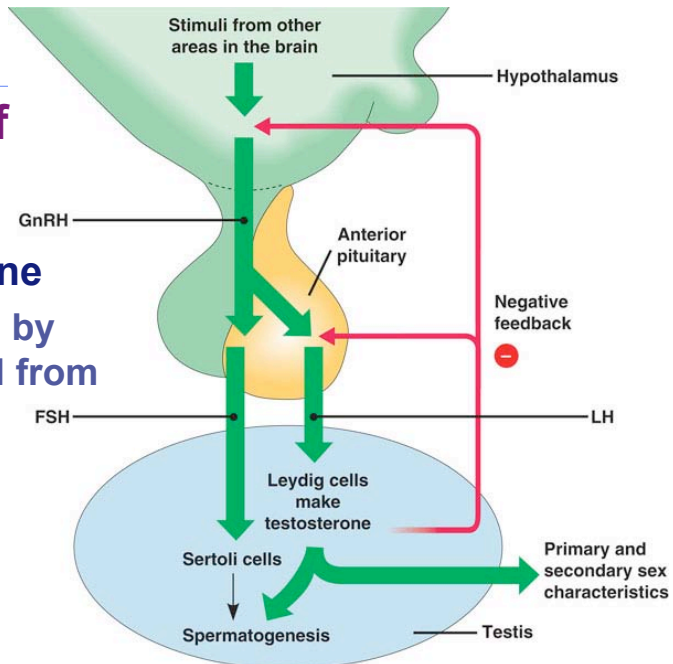


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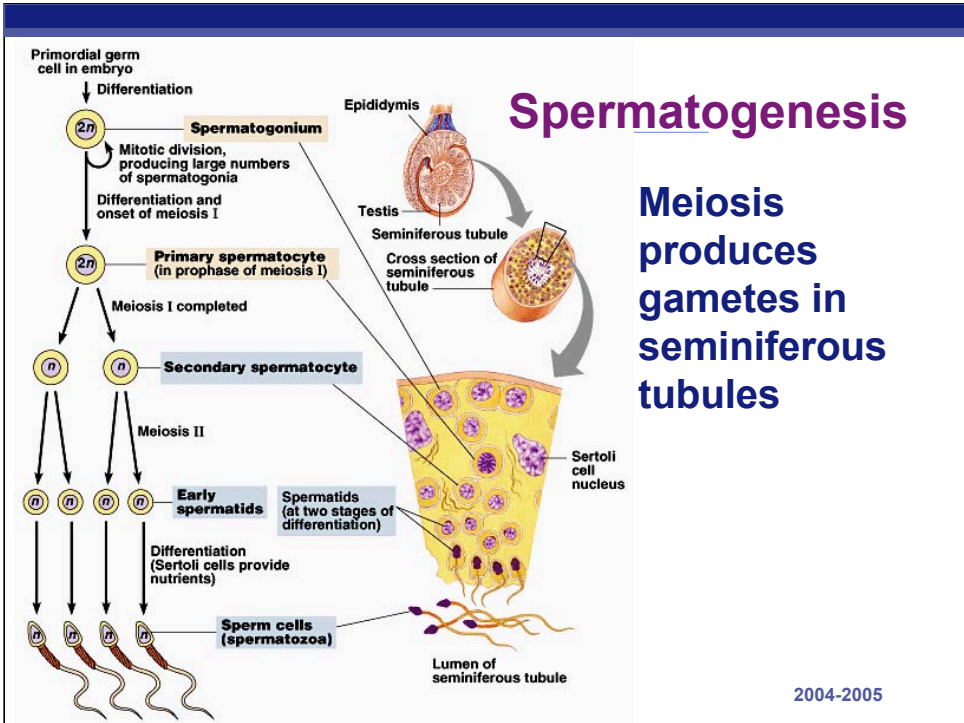
Hormone control of testes

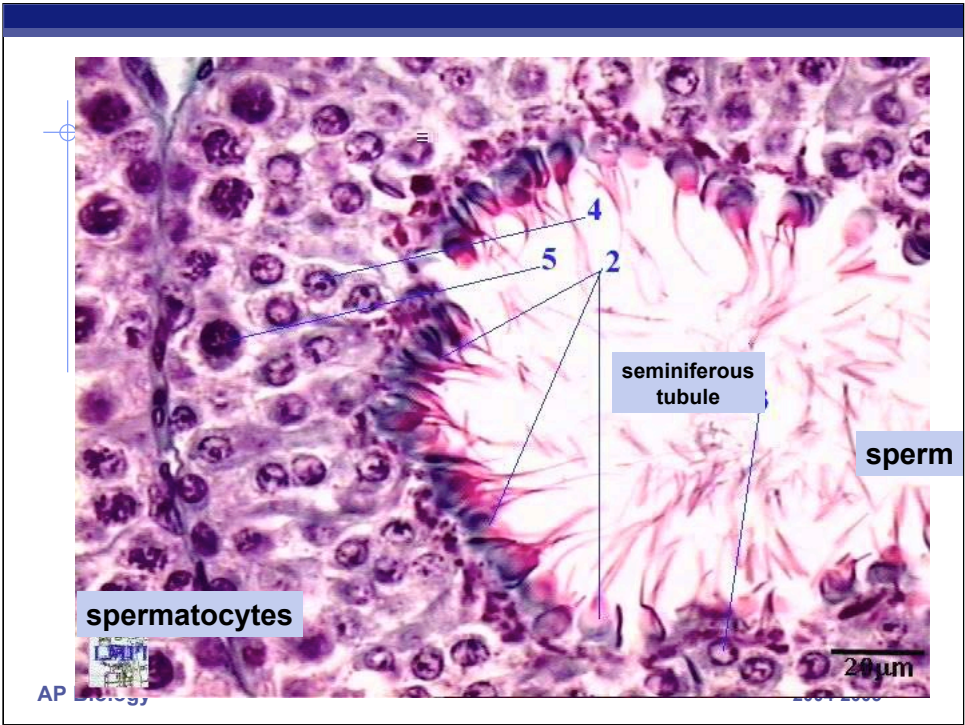
Testosterone

- ◆ regulated by FSH & LH from pituitary

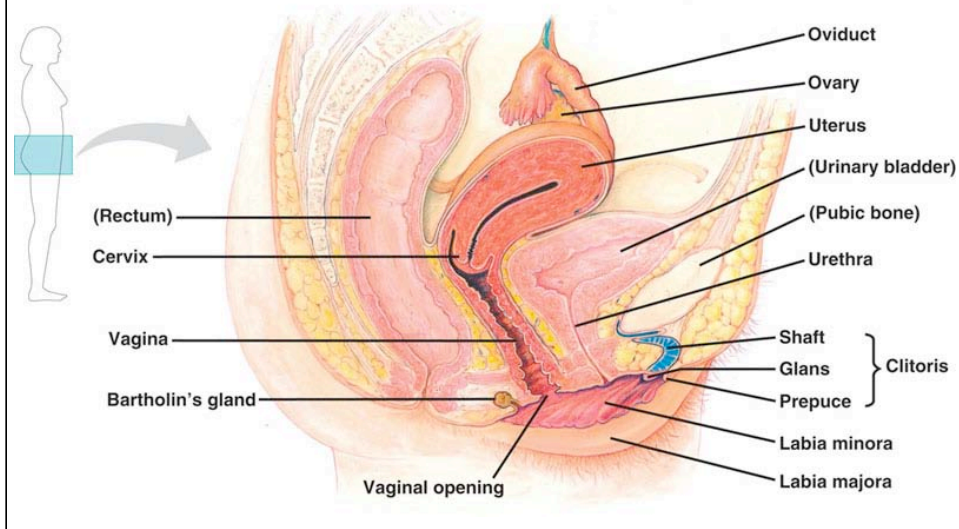


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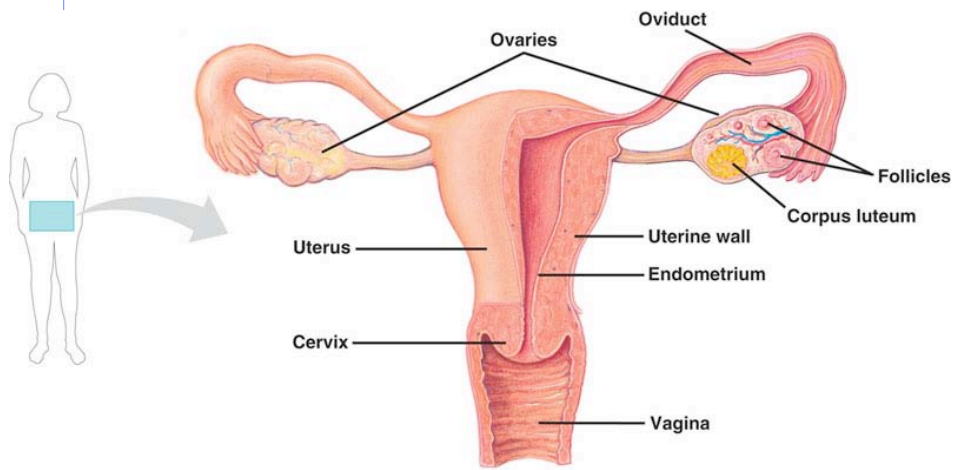




Female reproductive system



Female reproductive system



AP Biology

2004-2005

Sex hormones: female

- **Estrogen**
 - ◆ ovaries
 - ◆ stimulates uterine lining growth
 - ◆ 2° female sex characteristics
 - ◆ regulated by FSH & LH from pituitary
- **Progesterone**
 - ◆ ovaries
 - ◆ stimulates uterine lining growth
 - ◆ regulated by FSH & LH from pituitary

Hormone regulation of female cycle

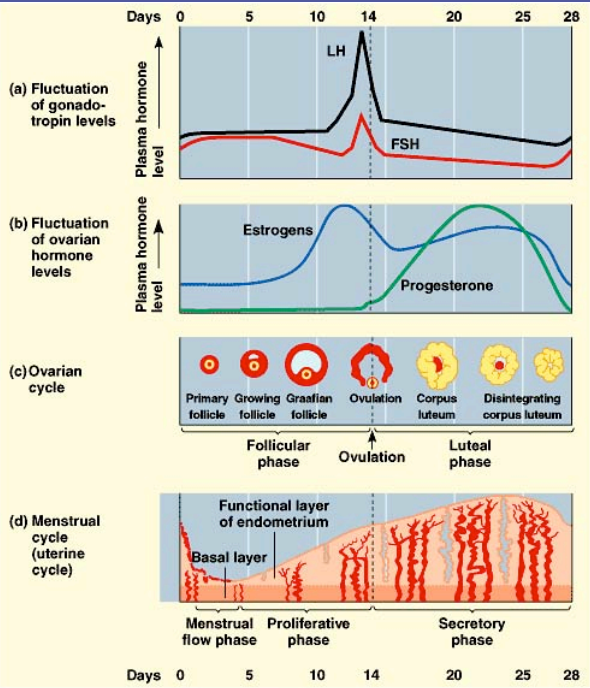
What happens in:

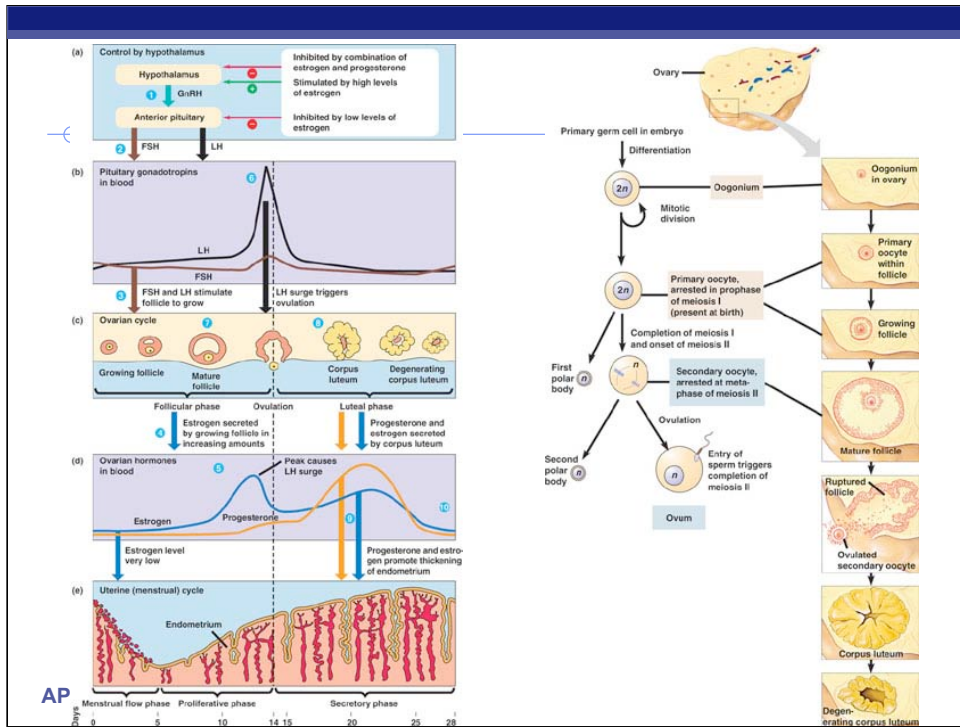
- pituitary gland
- ovary
- uterus

Menopause

- 46-54
- ovaries lose response to FSH & LH

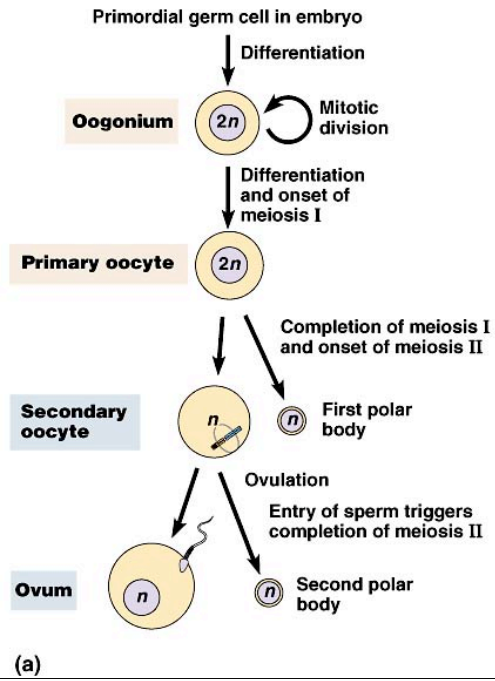
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Oogenesis

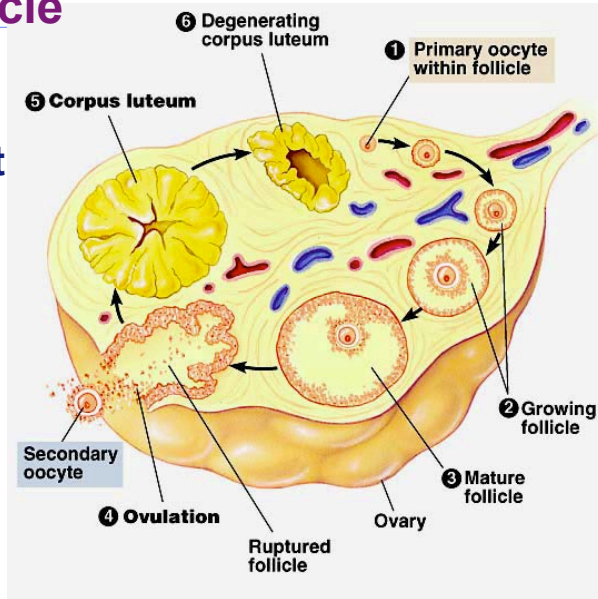
state of egg
when fertilized



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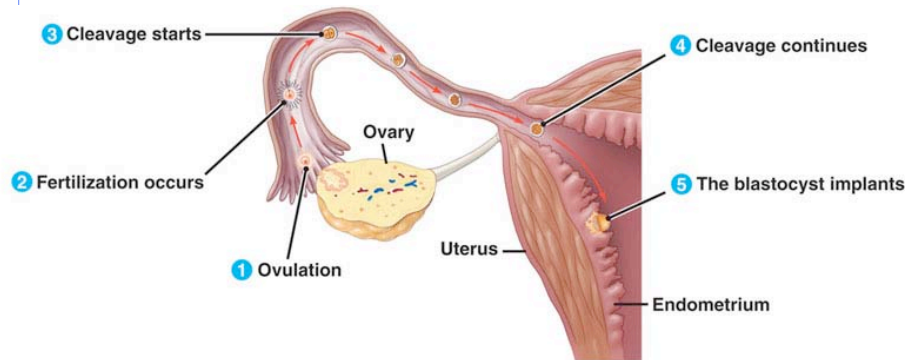
Ovarian cycle

Stages of development in ovary

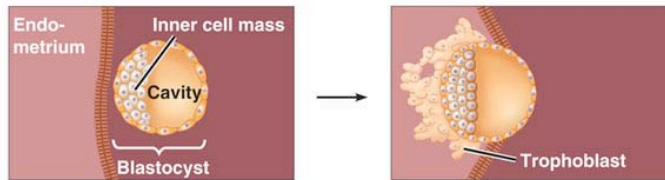


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Fertilization

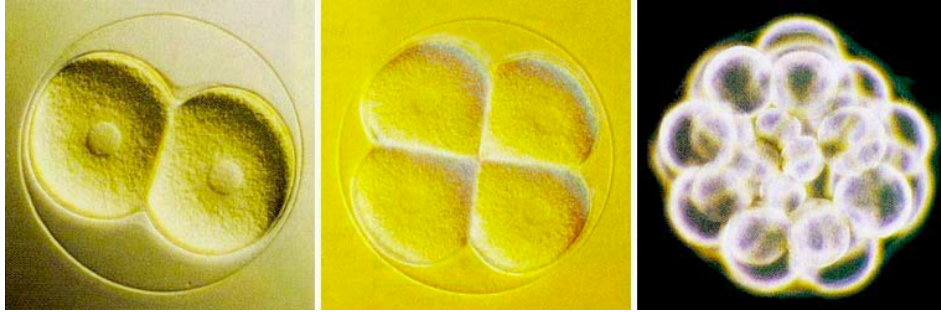


(a) From ovulation to implantation



(b) Implantation of blastocyst

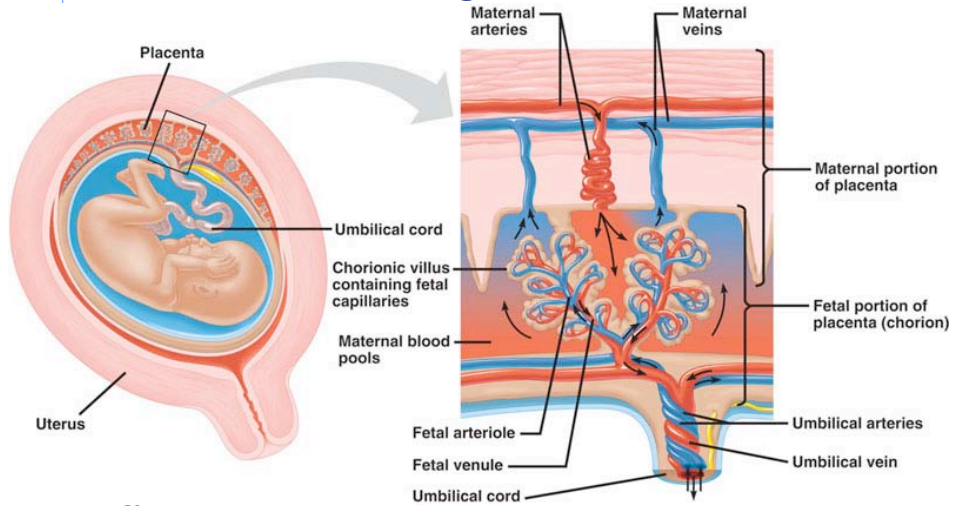
Early development



blastocyst

Placenta

Materials exchange across membranes

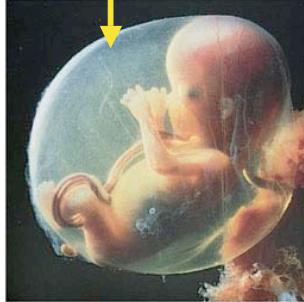


Fetal development

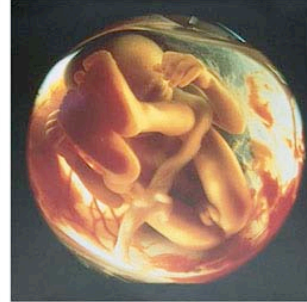
amniotic sac



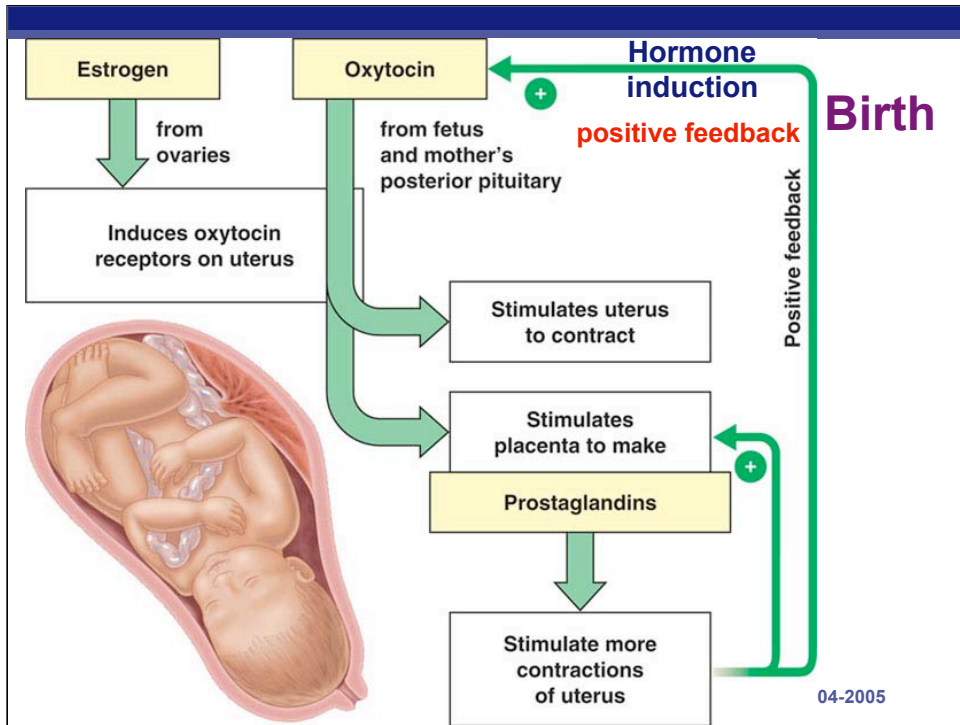
(a) 5 weeks. Limb buds, eyes, the heart, the liver, and rudiments of all other organs have started to develop in the embryo, which is only about 1 cm long.



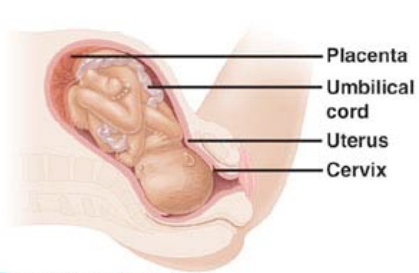
(b) 14 weeks. Growth and development of the offspring, now called a fetus, continue during the second trimester. This fetus is about 6 cm long.



(c) 20 weeks. By the end of the second trimester (at 24 weeks), the fetus grows to about 30 cm in length.



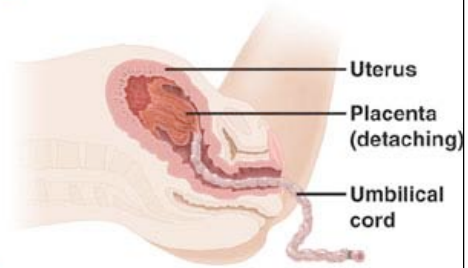
Birth



1 Dilation of the cervix



2 Expulsion: delivery of the infant



3 Delivery of the placenta

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