



Fertilization to Implantation

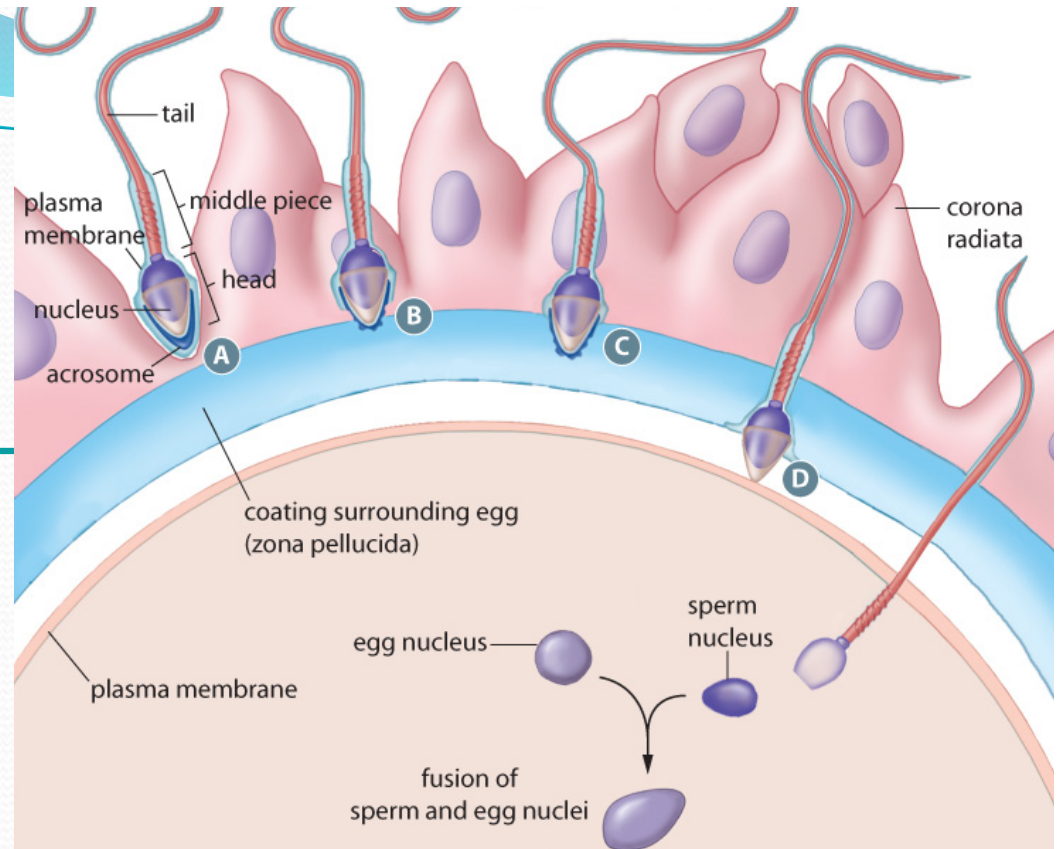
BOOKLET 3

First Stages of Development

Fertilization:

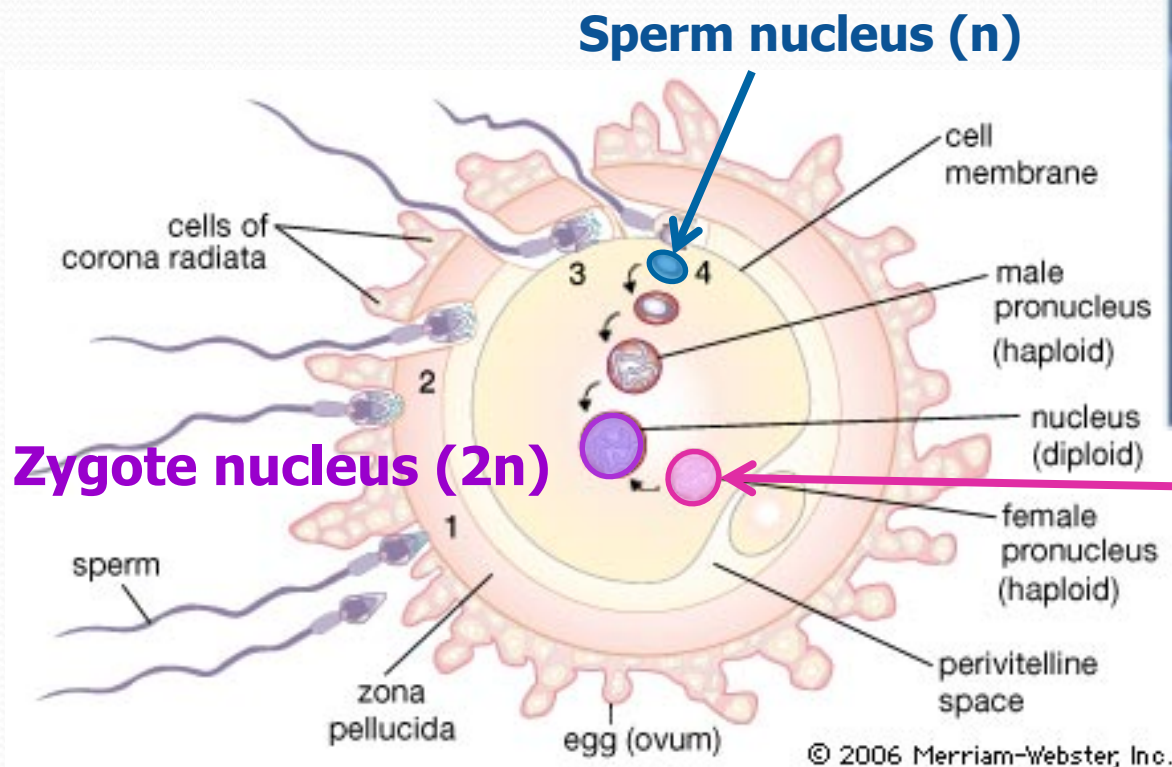
Occurs: in _____
(within 24 h of ovulation)
Only a few dozen of the
best swimmers make it!!

- Sperm reaches egg & uses acrosome to _____
- Sperm travels further eventually reaching the plasma membrane of the ovum.
- One _____, causing cell membrane to depolarize preventing entrance of other sperm.
- _____ ($23+23 = 46$)



Fertilization

- **Gametes** (n) fuse to form a **zygote** ($2n$)
- Zygote = _____



Early Stages of Development

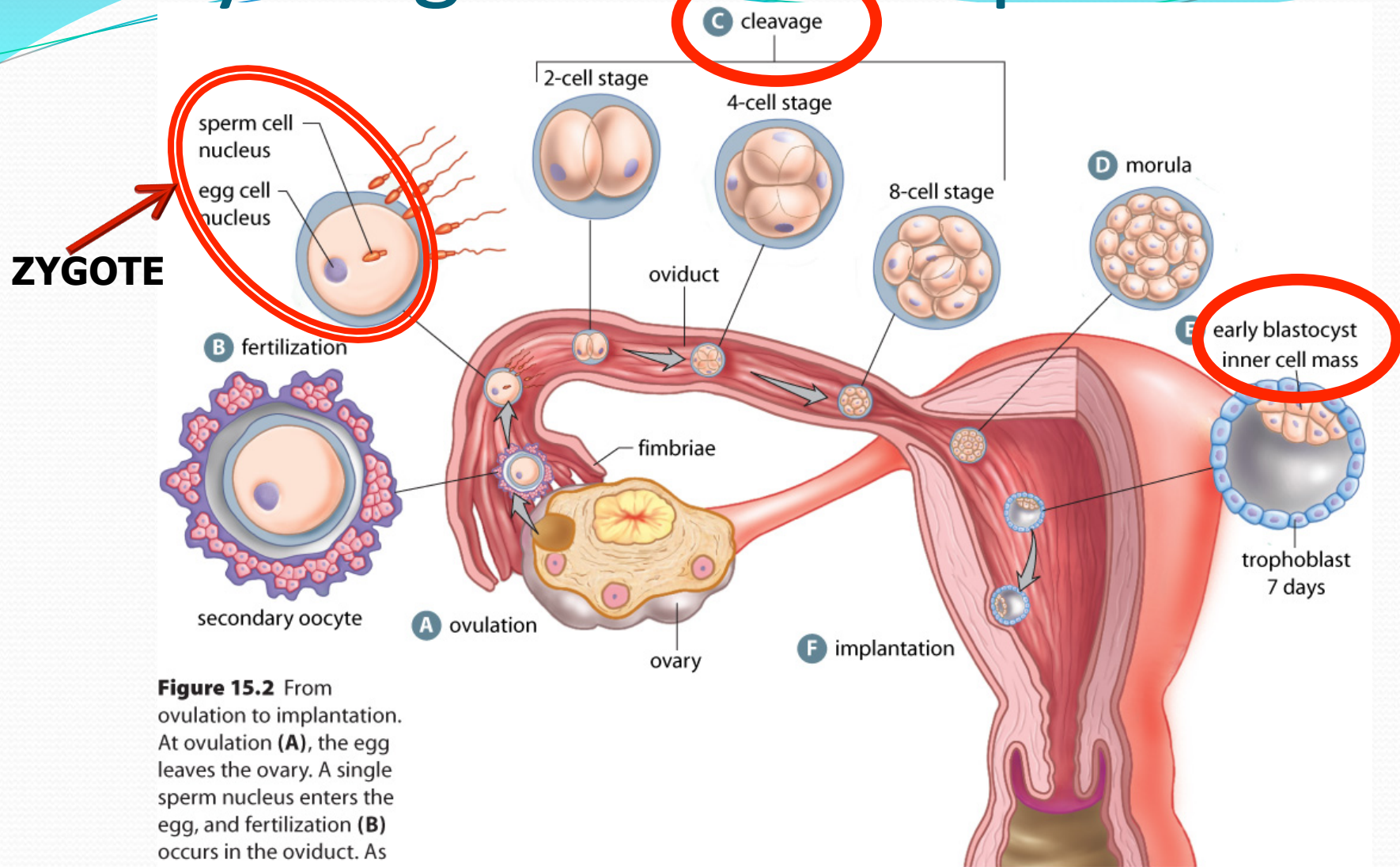


Figure 15.2 From ovulation to implantation. At ovulation (A), the egg leaves the ovary. A single sperm nucleus enters the egg, and fertilization (B) occurs in the oviduct. As the zygote moves along, it undergoes cleavage (C) to produce a morula (D). The blastocyst forms (E) and implants in the lining of the uterus (F).



When can Conception Occur?

- Ova can survive at most for approx. 2 days post ovulation while sperm can survive for up to approx. 5 days given the right environment.

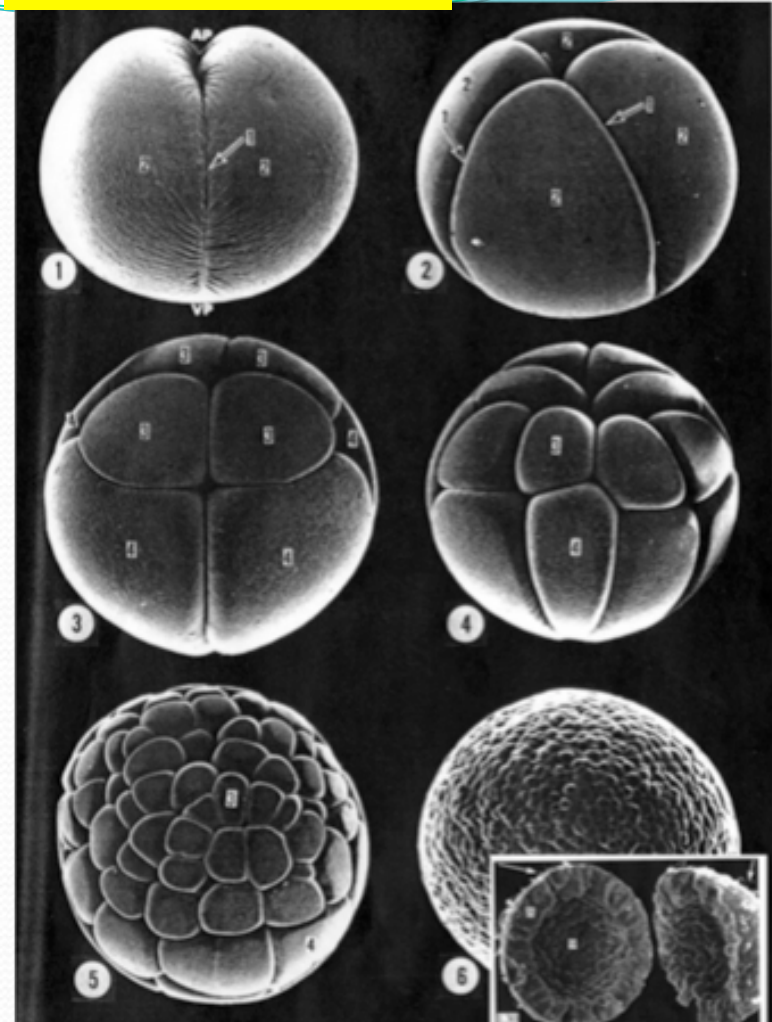


Given a normal menstrual cycle, when could pregnancy occur?

Zygote (2n)

Cell Cleavage

- Zygote undergoes
(*cleavage*) to form
ball of cells called
 (16-32 cells by day 5)
- Morula develops into
 (day 7)



Morula (2n)

**Blastocyst
(2n)**

Blastocyst

inner cell mass

Chorion

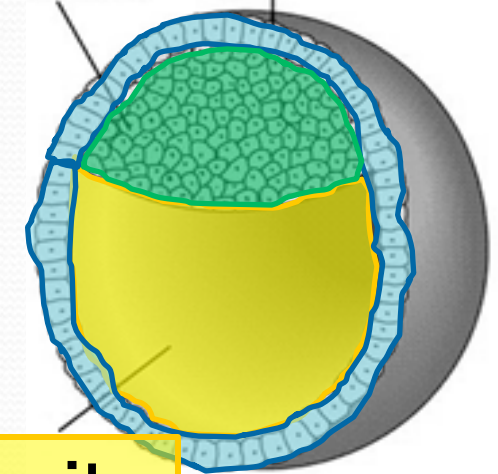
a cavity (space) opens up in the morula

☐ Chorion (trophoblast): _____

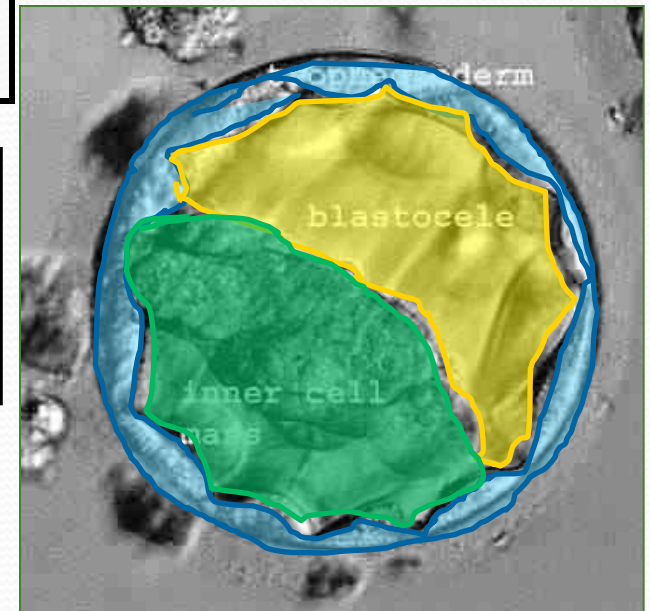
☐ _____

☒ Chorion forms _____

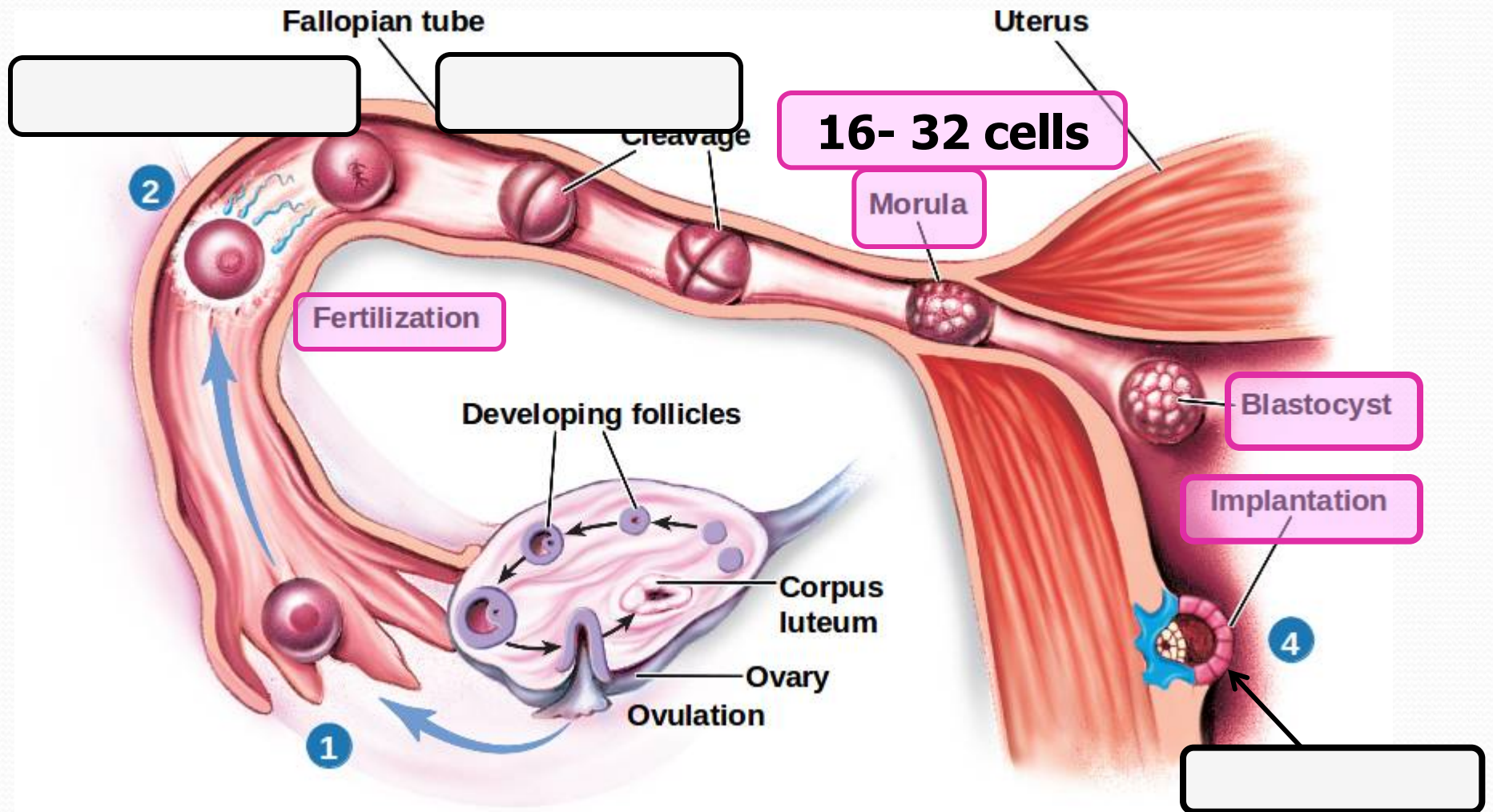
☐ inner cell mass: will _____



cavity



From Ovulation to Implantation



From Ovulation to Implantation

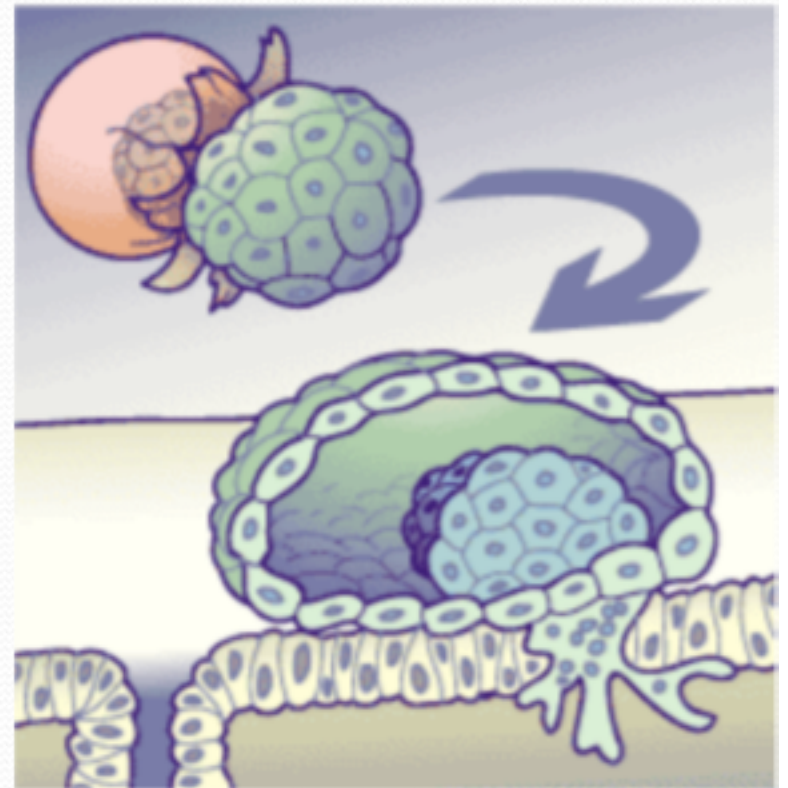
- **Day 1:** First Cleavage – cell _____
- **Day 4:** 16 – 32 cell stage. Ball of cells is called a _____
- **Day 5:** the cells of the morula begin to move around to form an _____ of cells. The outer layer of flattened cells (chorion) are important for **implantation in the uterine lining.**
- **Day 7:** The two layers of cells arrange themselves around a hollow fluid filled cavity called the blastocoel, the actual cell mass is called a _____

From Ovulation to Implantation

Day 8: Implantation

1. The blastocyst, by means of villi and enzymes secreted by the **chorion** (the membrane that forms around it), **implants** itself in the endometrium thus resulting in **pregnancy (gestation)**.

2. The _____, a **hormone** which stimulates the _____ and estrogen for the first 3 months.

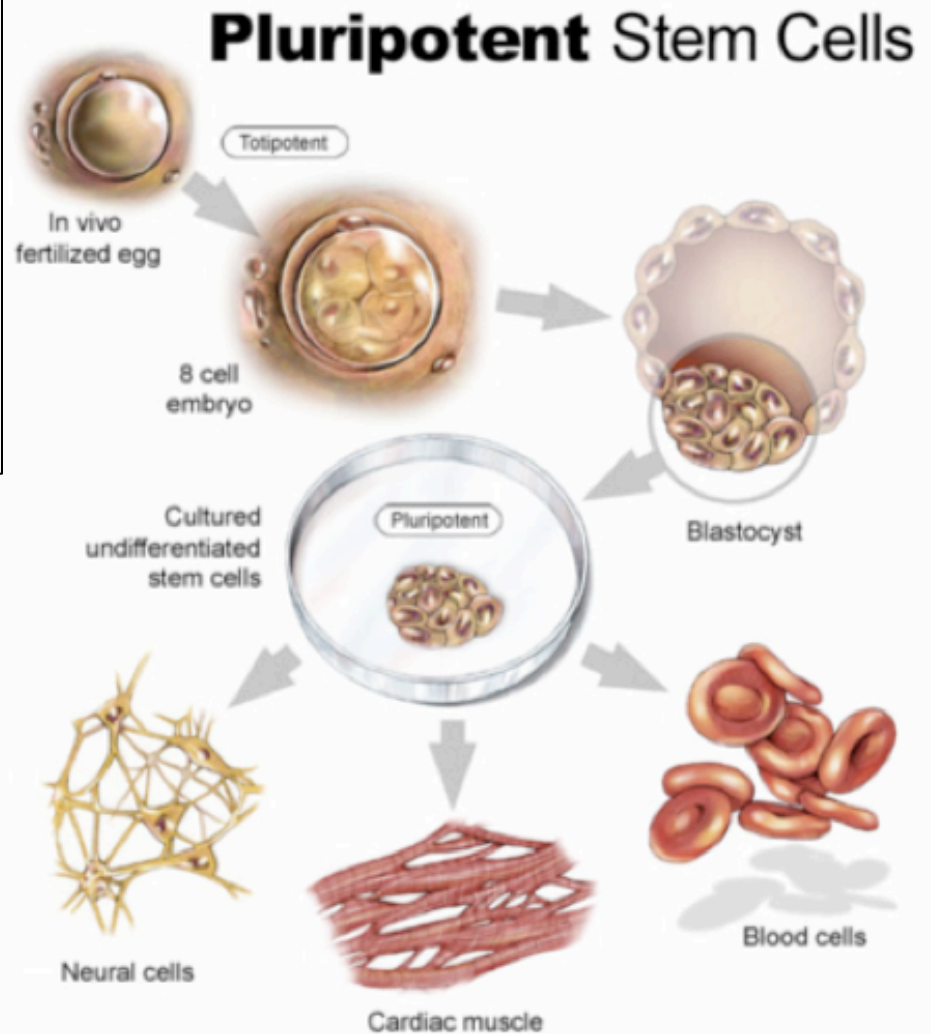


STEM CELLS

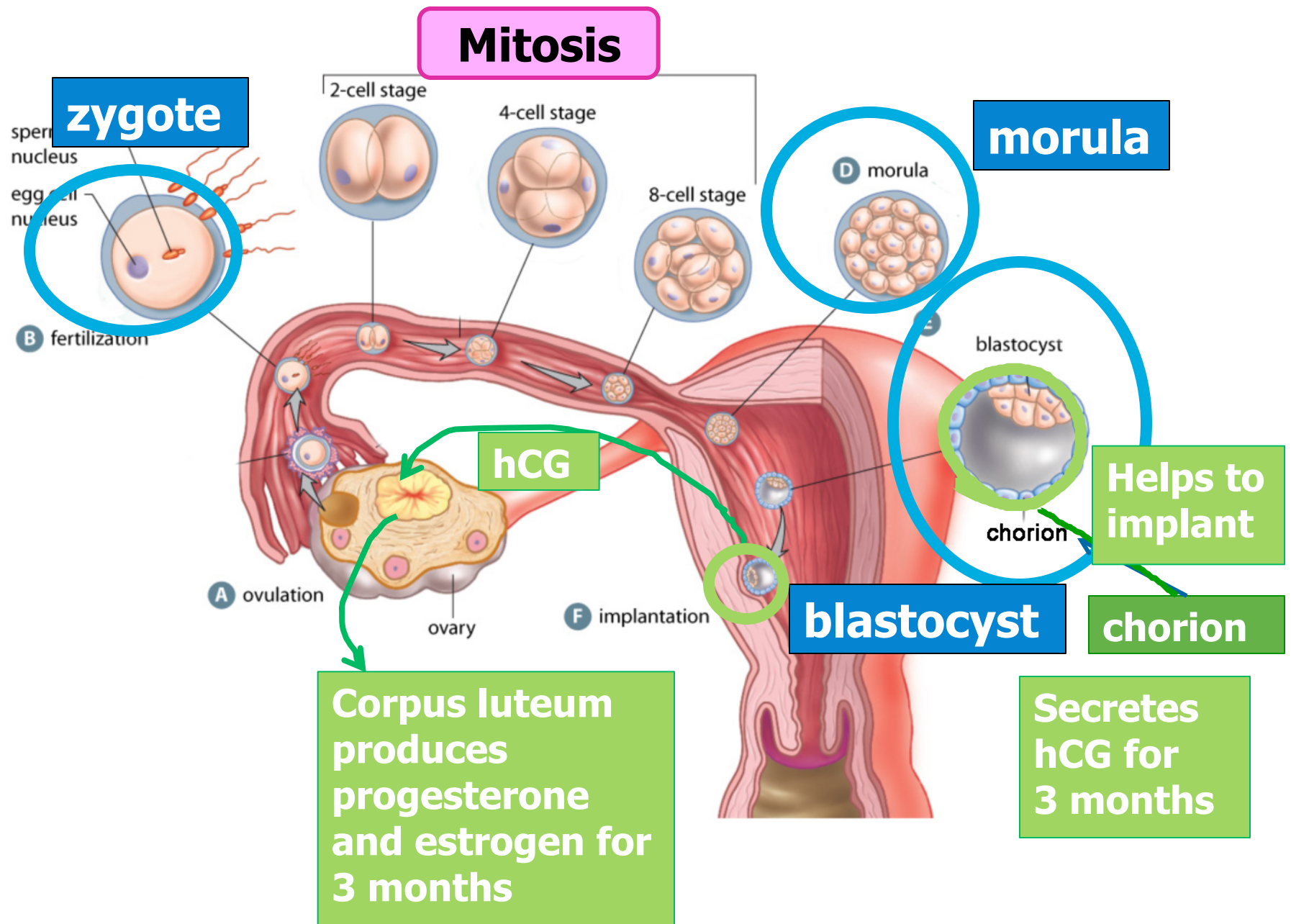
Stem cells from the blastocyst are
...can
develop into any cell in
the body and can be used
for **stem cell research.**

First Spinal Cord
Stem Cell Surgery (3 min)

A stem cell Story (15 min)

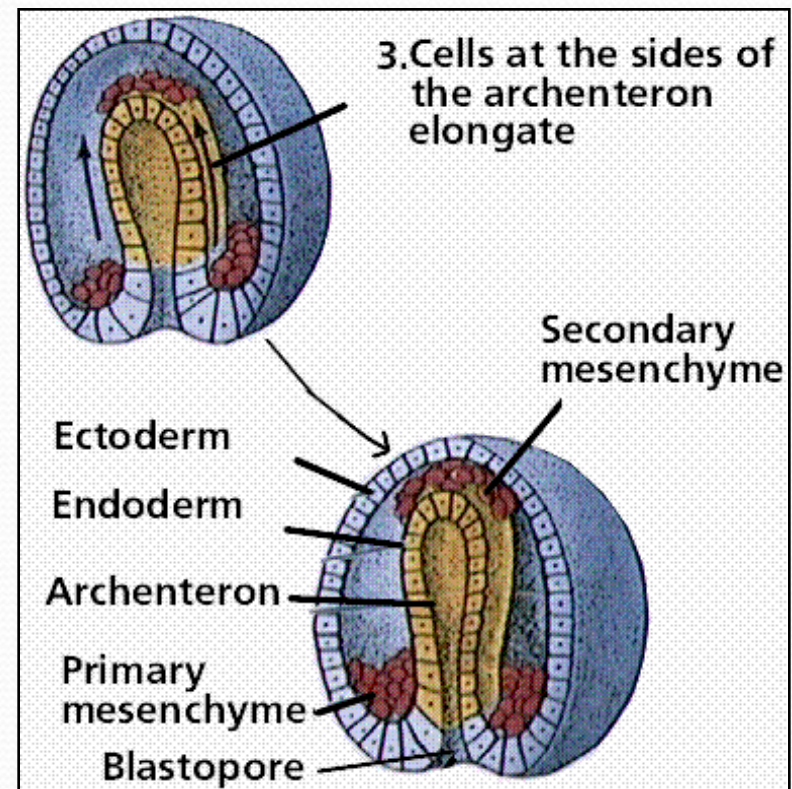
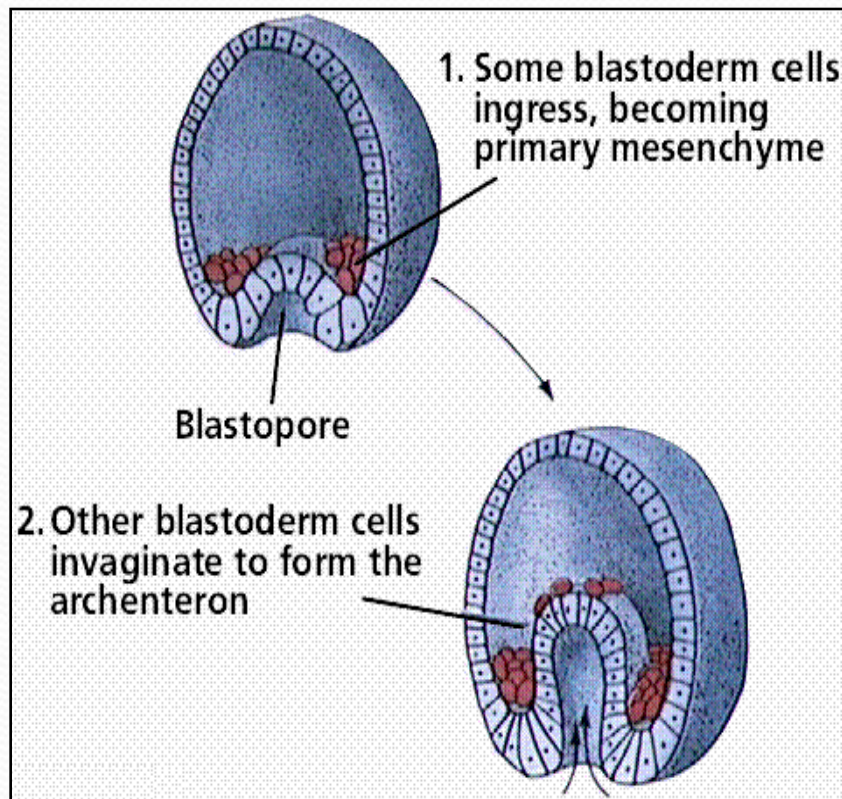


REVIEW THE STEPS:



Gastrulation (~Day 7)

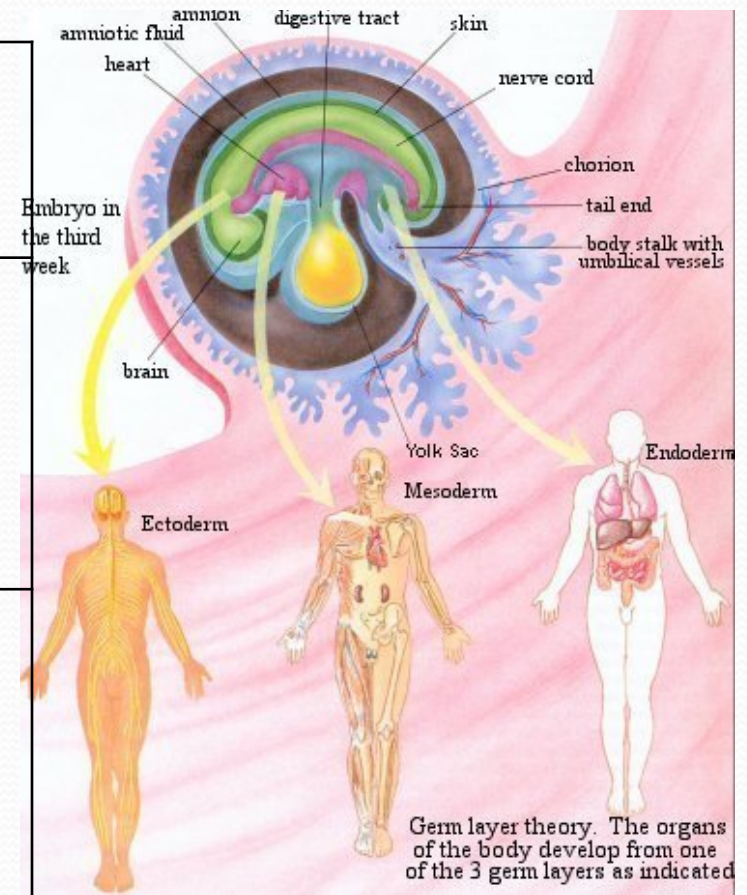
- **Gastrulation** is the process in which the **inner cell mass of blastula** _____ (embryonic tissues)
– the (_____, _____, _____)
- embryo now called _____.



Gastrulation (~Day 7)

Cells begin to differentiate (change) to form specific organ systems!

Ectoderm	- _____ - _____
Mesoderm	- S _____ - M _____ - G _____ (reproductive structures) <u>So Many Gonads</u>
Endoderm	- R _____ - D _____ - E _____ <u>R.E.D.</u>

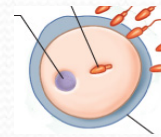


Bozeman 6:50- 8:59

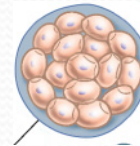
How to remember the stages?

Zebras **M**ake **B**etter **G**uacamole **E**very **F**riday

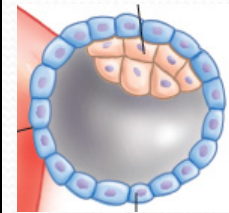
Zygote – Day 0 (**S**perm + **e**gg)



Morula – Day 4 (**16 – 32** cells)



Blastocyst – Day 6 ****Implantation** Outer layer (chorion) helps the implantation process, secretes hCG and forms placenta



How to remember the stages con't...

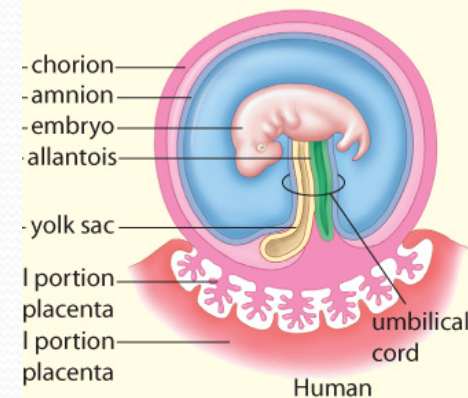
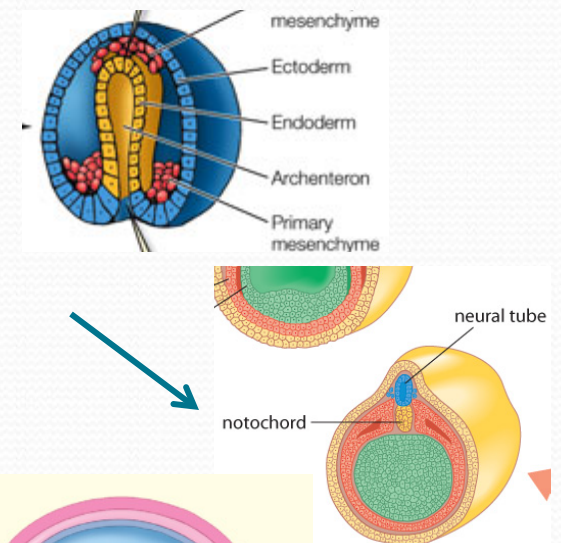
Zebras Make Better Guacamole Every Friday

Gastrula – Day 7 - 3 germ layers – ectoderm, mesoderm, endoderm.

Neurulation – formation of neural tube which will form CNS.

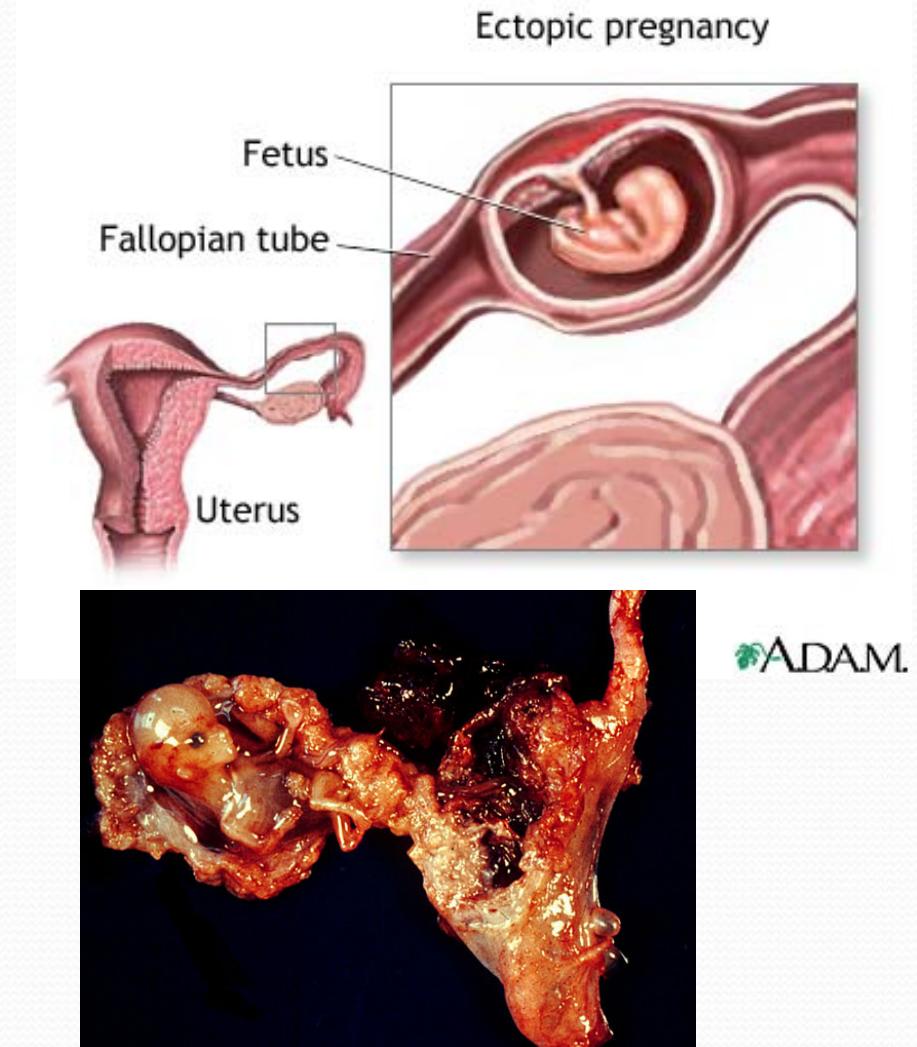
Embryo – Day 10 - chorion starts to form the placenta

Fetus – week 8 – called fetus because all major organ systems have started to develop



Ectopic Pregnancy: Faulty Implantation

- In an ectopic pregnancy, a fertilized egg has implanted _____, usually in the _____.
- **Severe bleeding** and possible death of the mother can result from this type of pregnancy



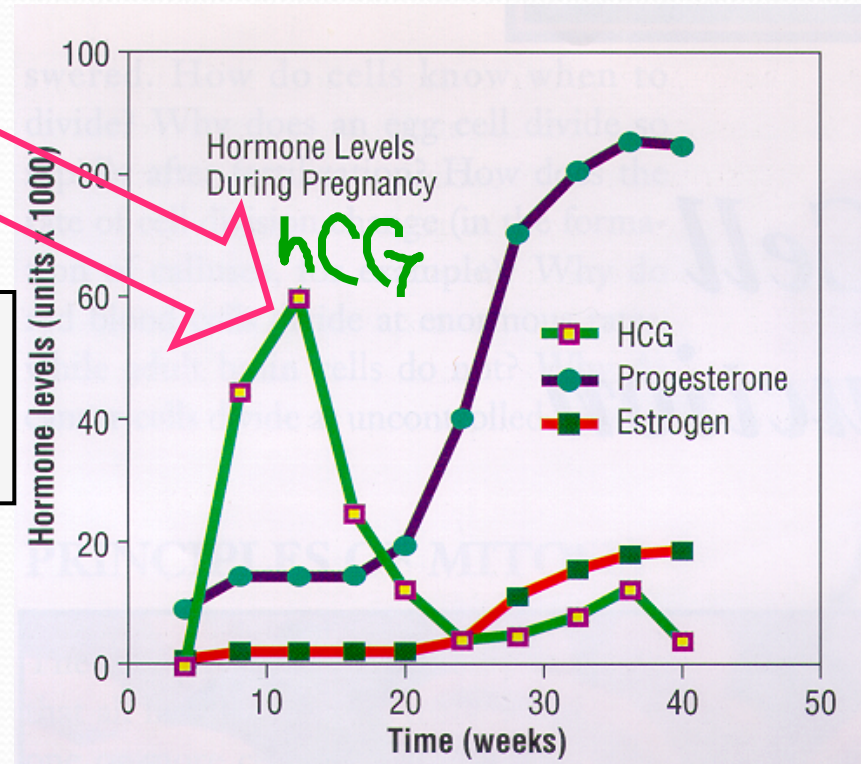
Pregnancy Tests

Outer layer of the blastocyst (the **chorion**) starts to secrete **hCG** when it _____ on ~day 7. This causes morning sickness & is the hormone measured in a pregnancy test!

Pregnancy test: tests for the _____ in the urine (sometimes the blood).

Remember hCG: _____ – keeps corpus luteum secreting **progesterone** & **estrogen** for 3 months!!

Later on, the placenta secretes sufficient estrogen and progesterone



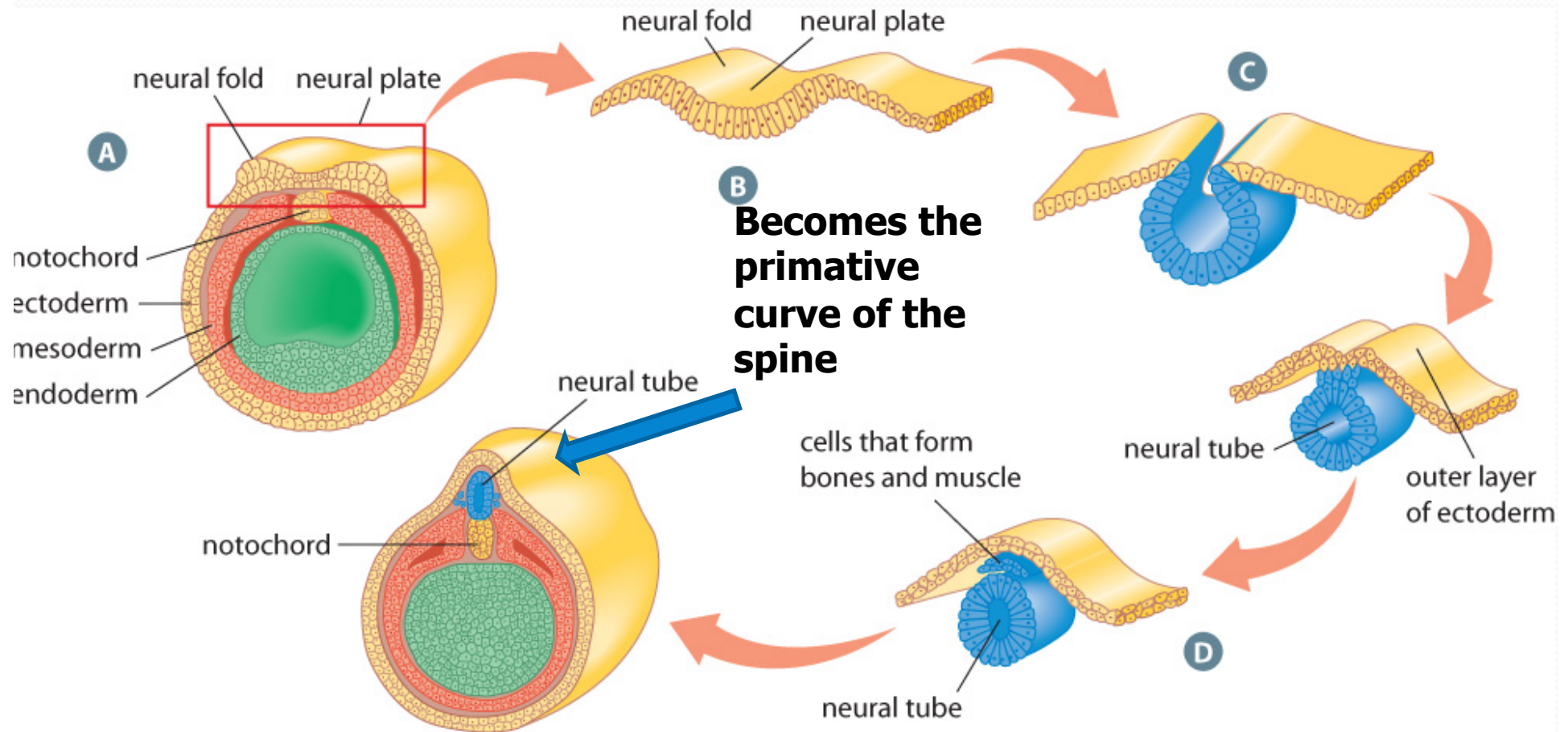
How can a miscarriage occur?

- For first 3 months **progesterone** comes from mother
- Fetus starts making it's own after **3 months**
- If mom stops progesterone and fetus does not start...
 - **Miscarriage** occurs



Neurulation: formation of neural tube →
develops into _____

Happens during the _____



Practice:

State the layer (ecto, meso, endo) that the part originates from
(check pg 532)

1. Lungs _____
2. Eye _____
3. Skin _____
4. Heart _____
5. Stomach _____
6. Brain _____
7. Testes _____
8. Small Intestine _____
9. Teeth _____
10. Spinal cord _____

11. Hair _____
12. Muscles _____
13. Pancreas _____
14. Hypothalamus _____
15. Thyroid gland _____
16. Large intestine _____
17. Bones _____
18. Finger nails _____
19. Ovaries _____