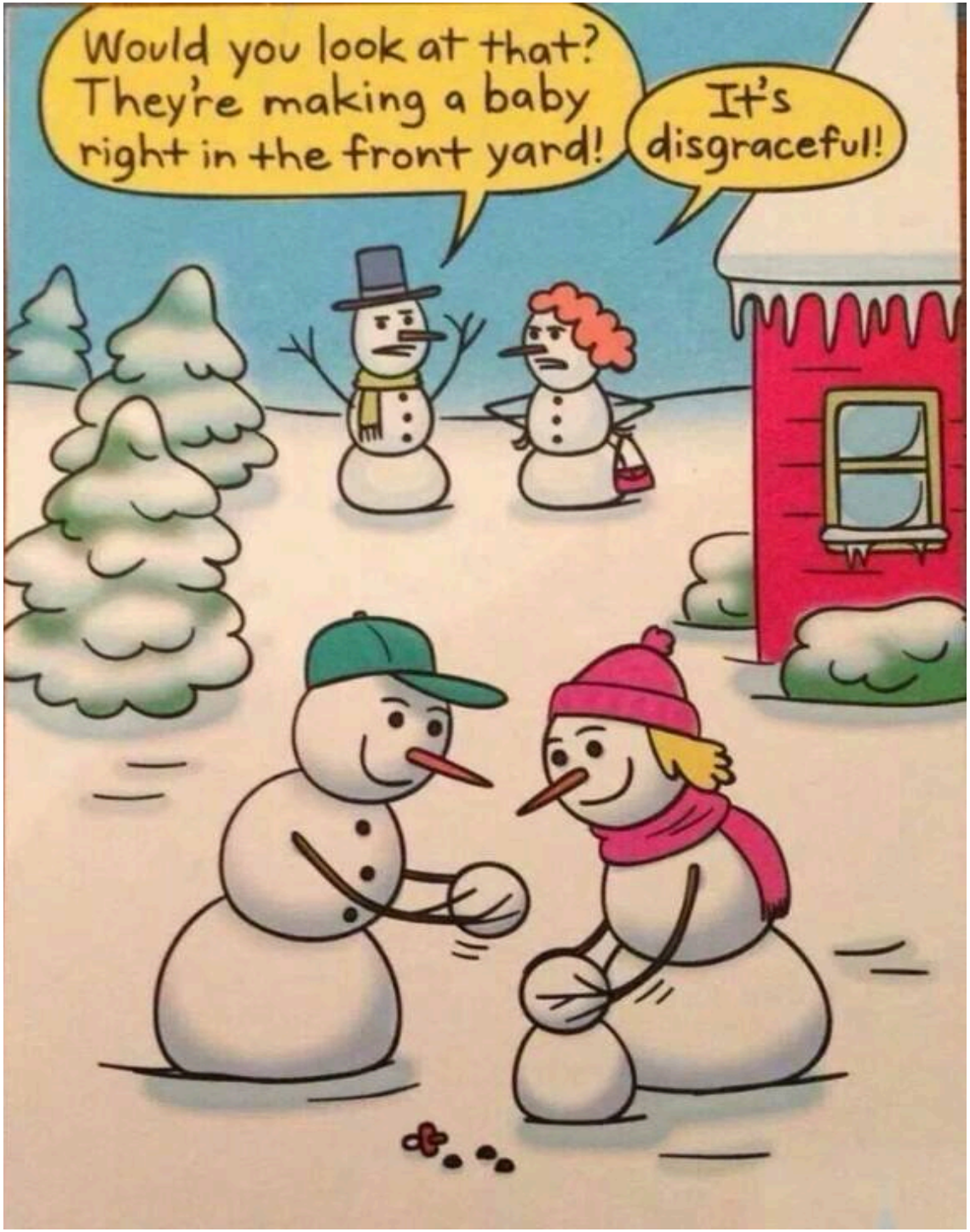


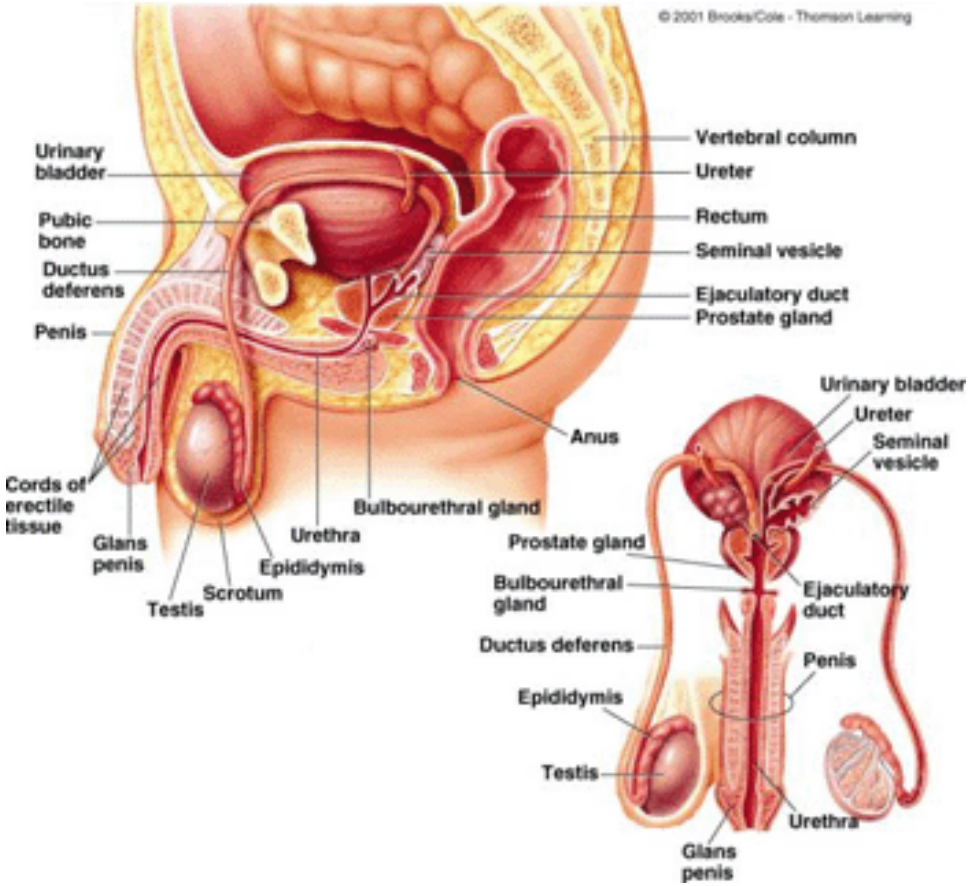
BOOKLET 1

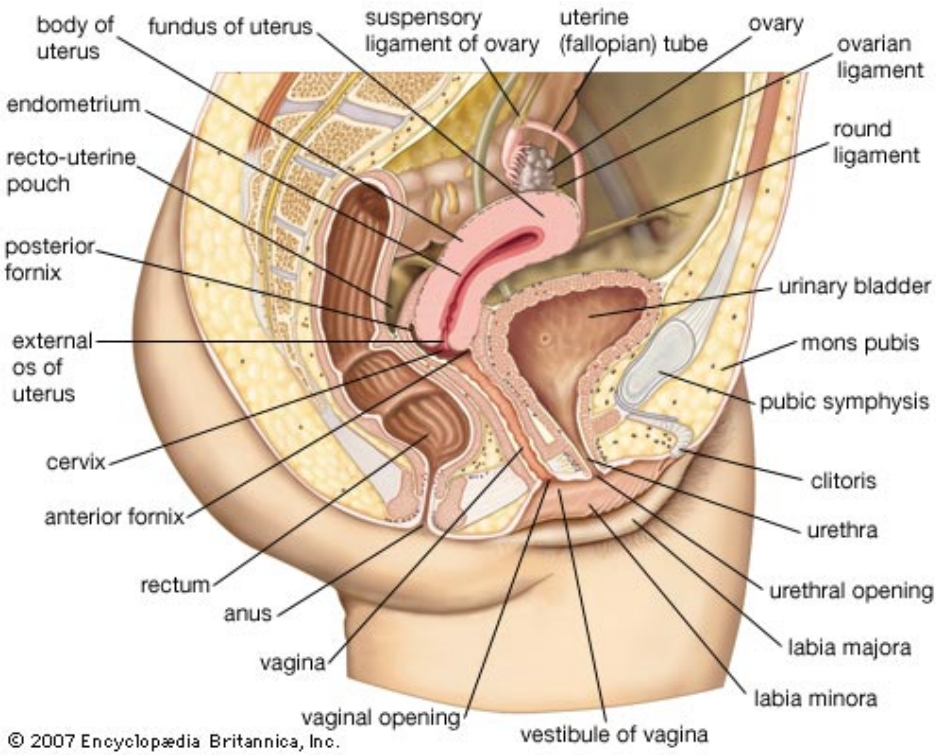
Unit 5: Reproduction & Prenatal Development

Unit 5: Reproduction

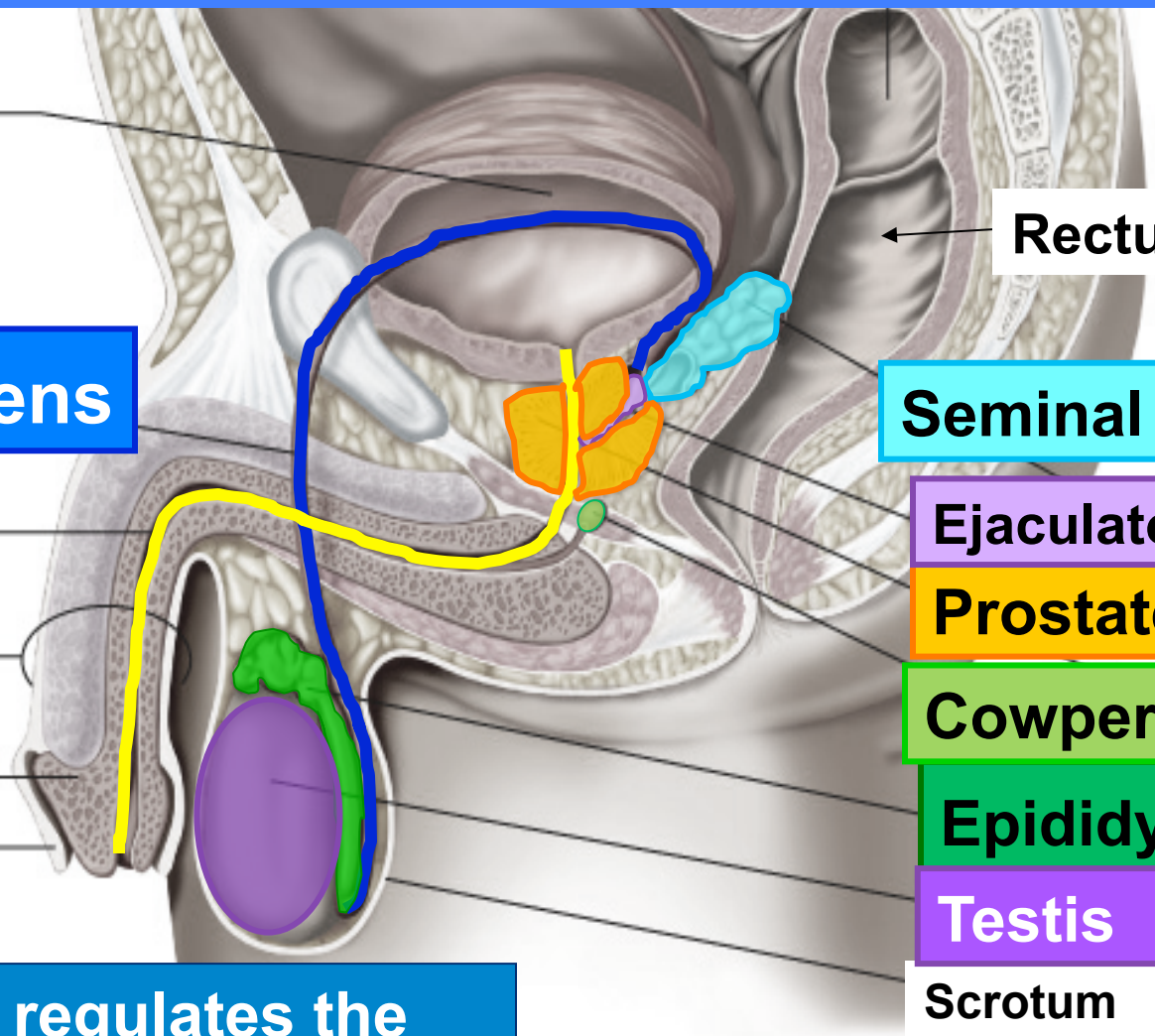
Male Reproductive System

Female Reproductive System





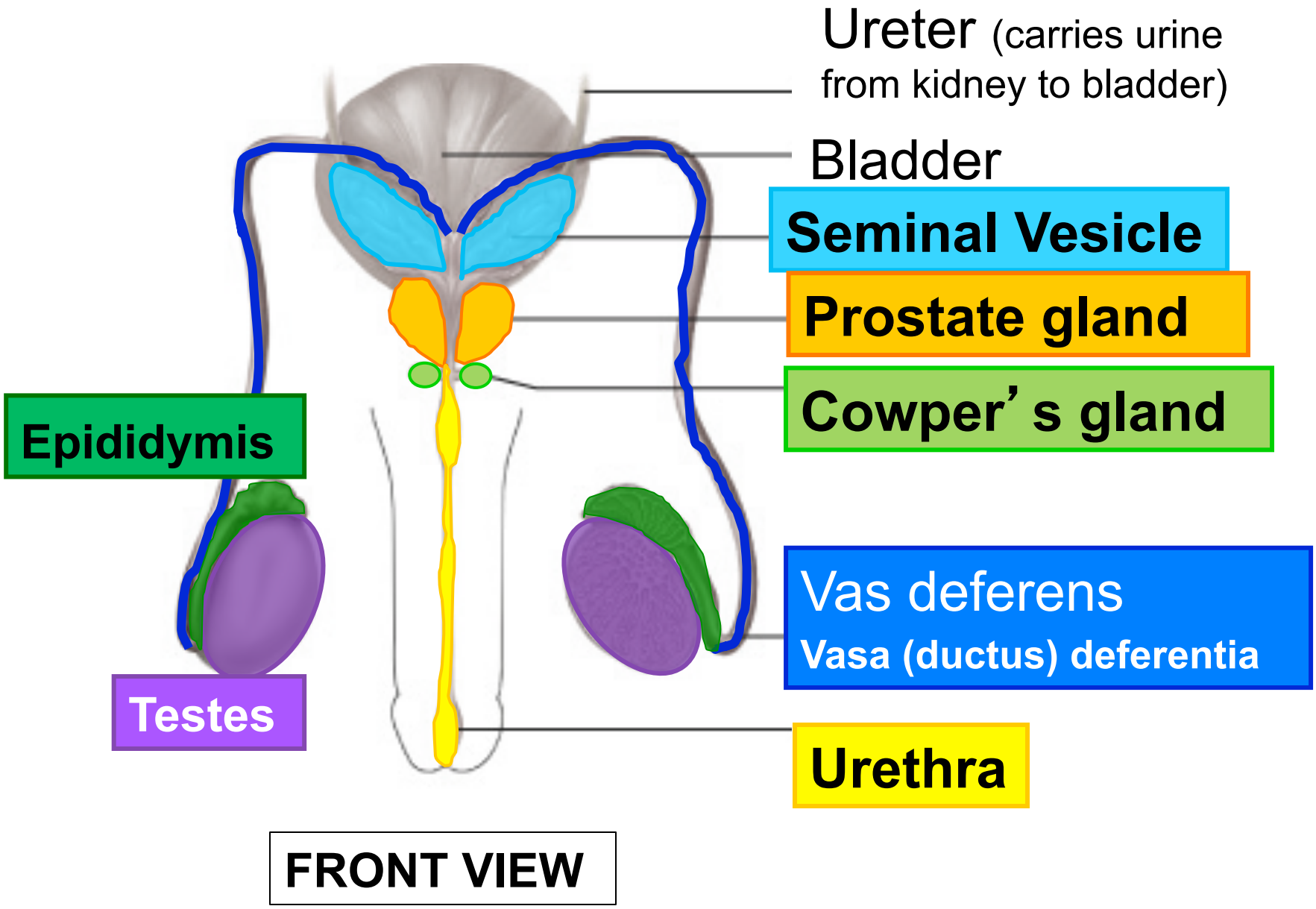
Label the following diagram



The scrotum regulates the temperature of the testes.

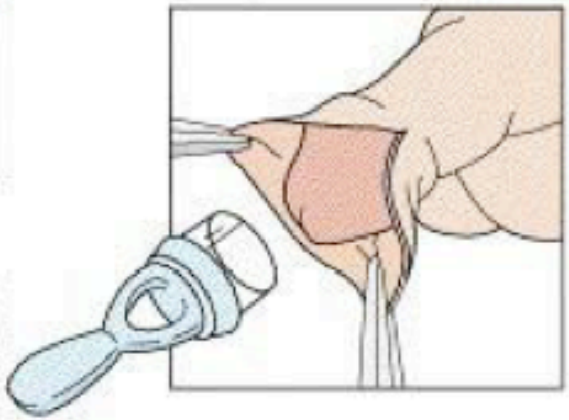
Sperm form best at 35°C.

Label the following diagram



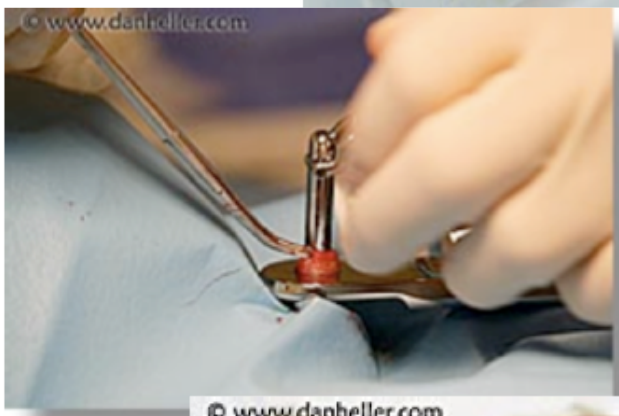
Circumcision

1. An incision is made in the top of the foreskin.



2. The plastibel is placed over the head of the penis and the foreskin is pulled over the plastibel.

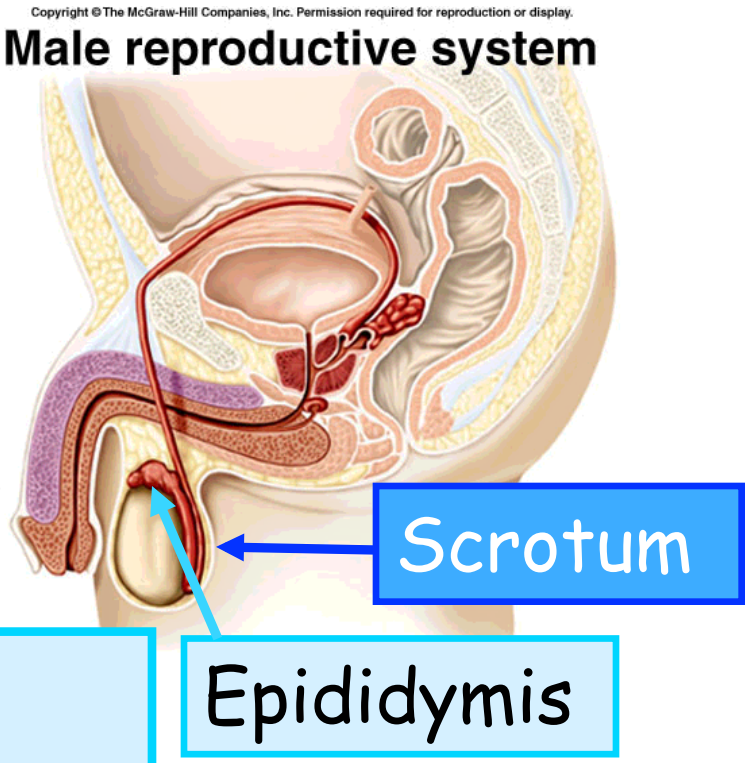
3. A suture is tied around the foreskin over the tieing groove in the plastibel. Excess skin beyond the suture is trimmed away. The plastibel falls off 3-7 days later.



Scrotum and Epididymis

Scrotum

- **Skin and muscle covering the testes**
- Allows sperm to develop at optimal temperature **(35°C)**

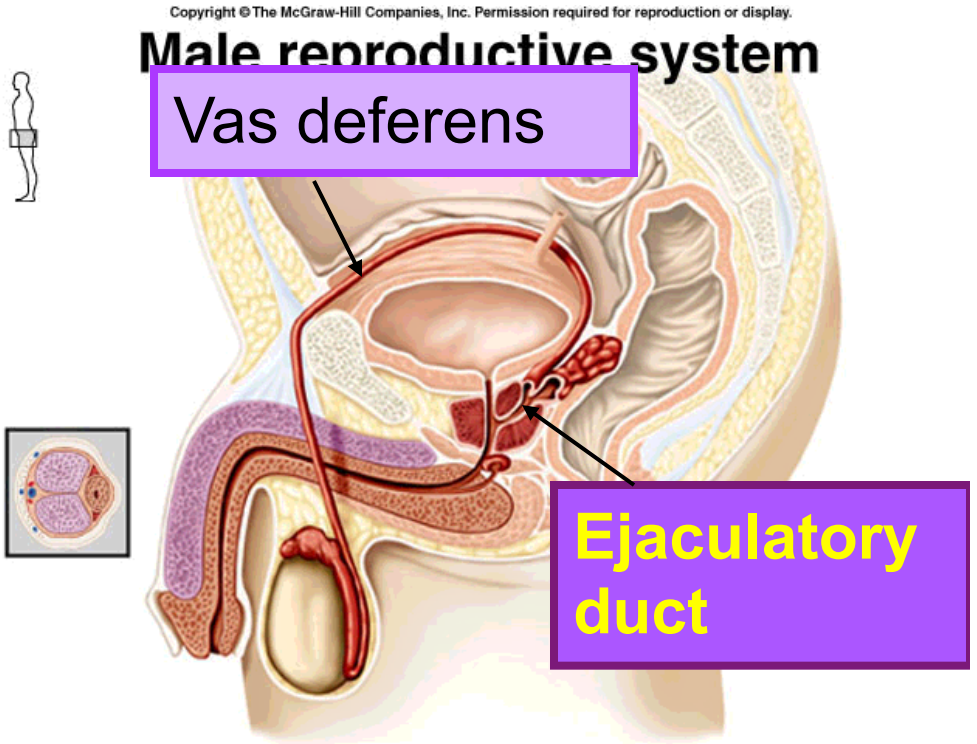


Epididymis

- storage and **maturation** of sperm
- the immune system **destroys the "bad" sperm**
- further develop a **flagellum** to swim.

Vas Deferens and Ejaculatory Duct

Ductus (Vas) Deferens – carries sperm from epididimus-> ejaculatory duct



Ejaculatory Duct

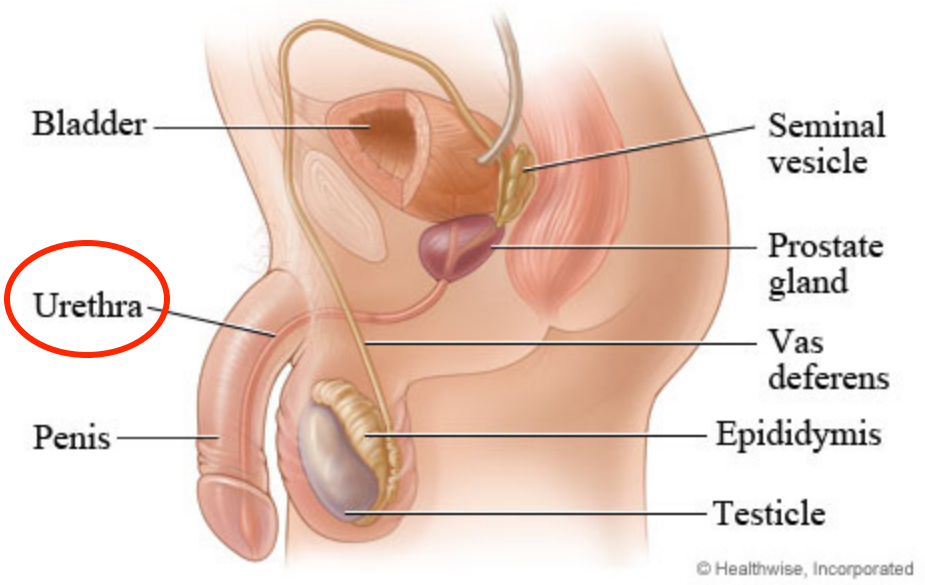
-regulates the movement of **semen into the urethra.**

(A sphincter regulates the removal of urine from the bladder.)

Penis and Urethra

Urethra

- carries **semen** (reproductive system) and **urine** (excretory system).



Penis

How does an erection happen?

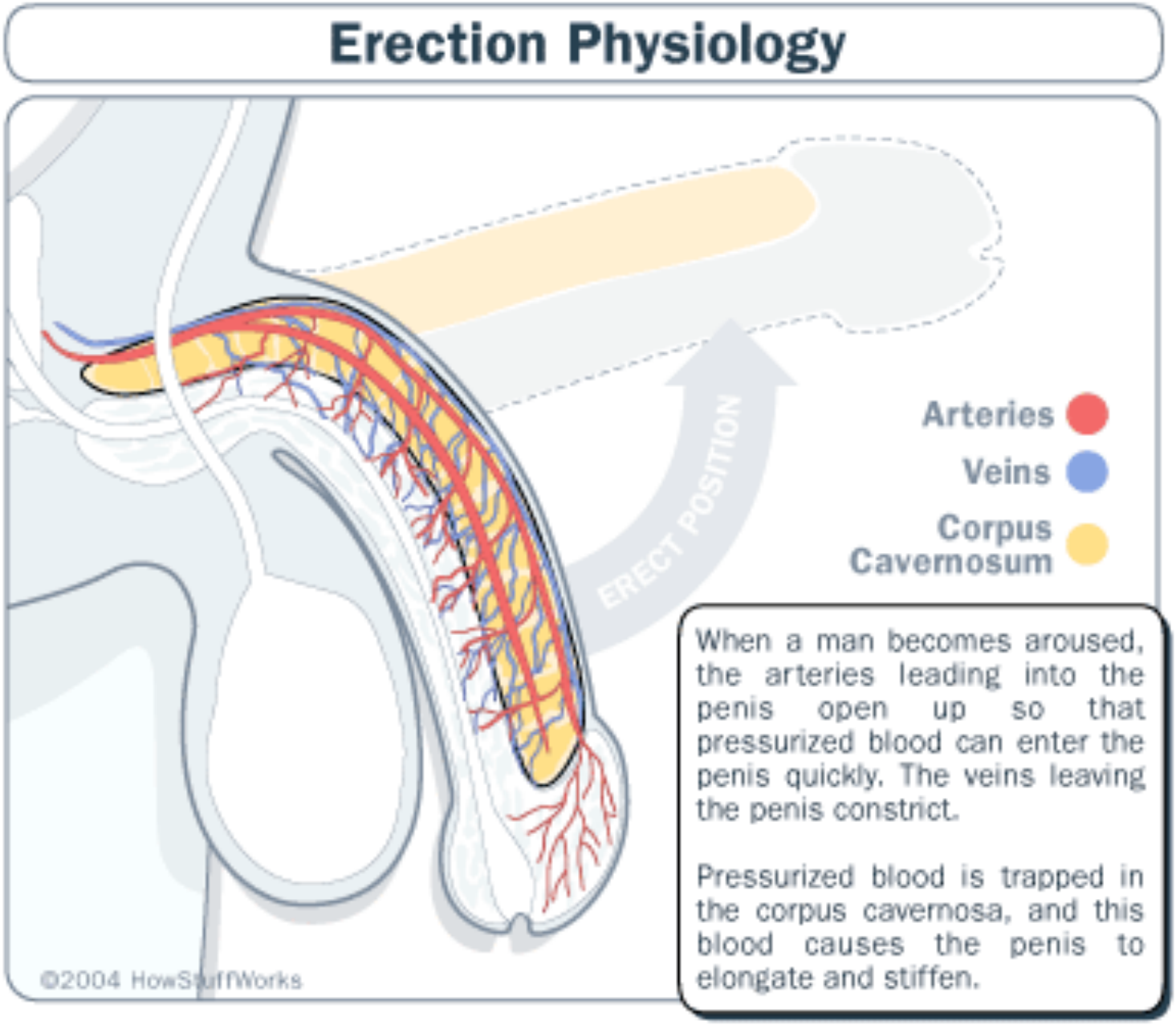
Delivers semen to female vagina

Arterioles dilate → increase blood flow→ fills with blood

while…

Compressing veins that carry blood away from penis → pressure builds → erection

Dilation of the arteries (**erection**) of the penis is under the influence of the **parasympathetic nervous system.**



http://static.howstuffworks.com/gif/viagra-erection.gif

How is a penis like a camera?

Because for both you just
Point and Shoot...

Point = **Parasympathetic**…
controls erections

Shoot = **Sympathetic**
controls ejaculations

The Great Sperm Race

Ejaculation: the release of semen through the **urethra**

Ejaculation is accomplished by the contraction of the vas deferens, the prostate and the muscles at the base of the penis, under the influence of the **sympathetic nervous system.**

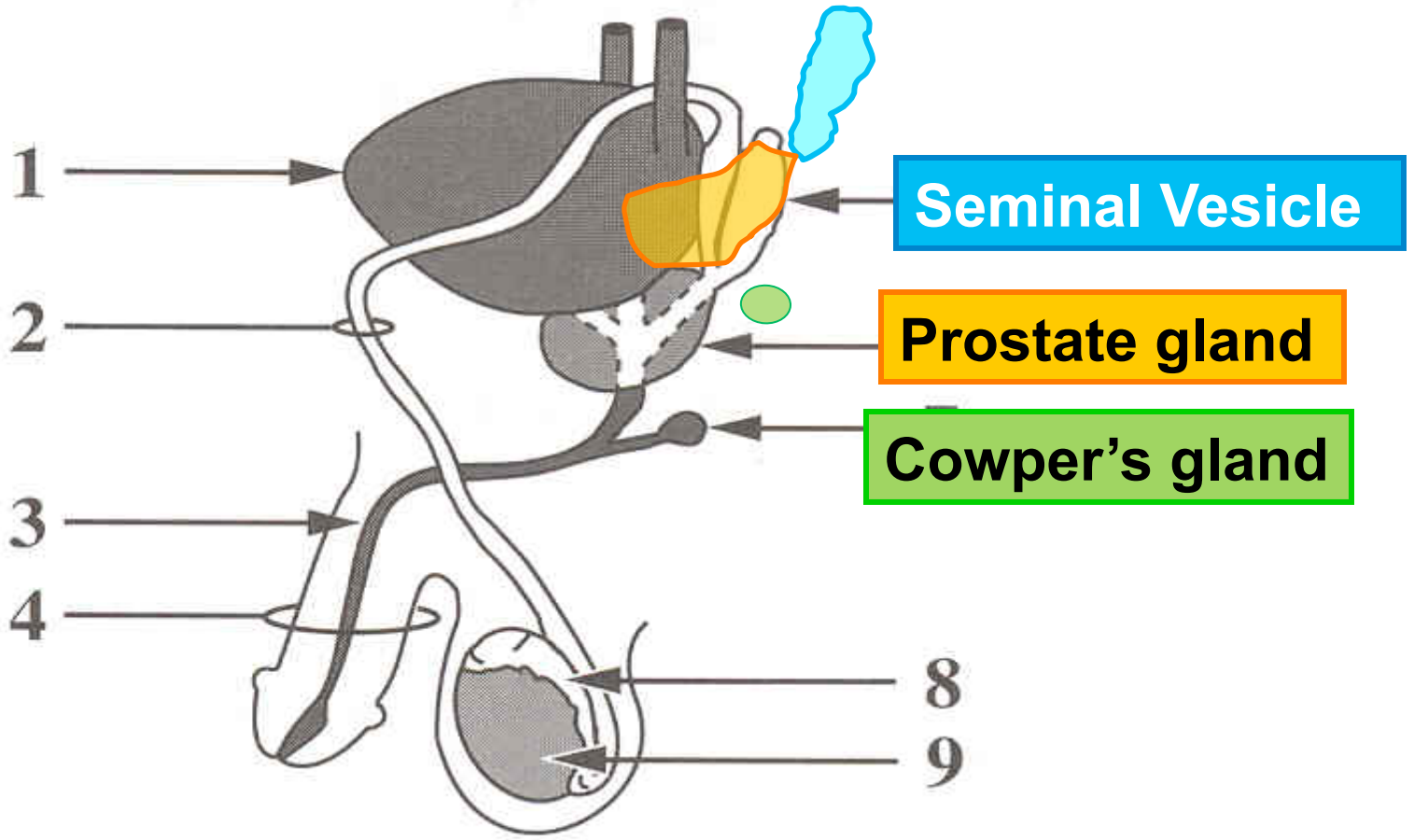
Refractory period: period of time that must pass prior to a **second erection.**

Seminal Fluid(semen)

Student Price Card

an acronym to remember the order

Secreted by Accessory Glands:

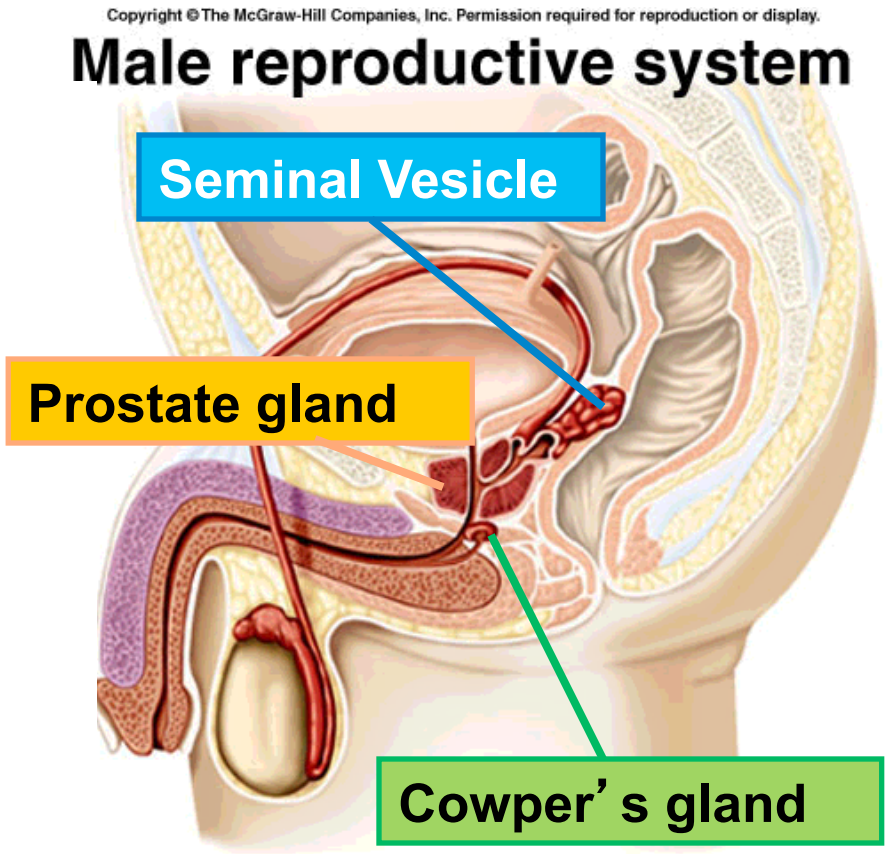


Seminal Fluid (Semen)

1) **Seminal vesicles** - 60% of total fluid

Contains fructose for energy

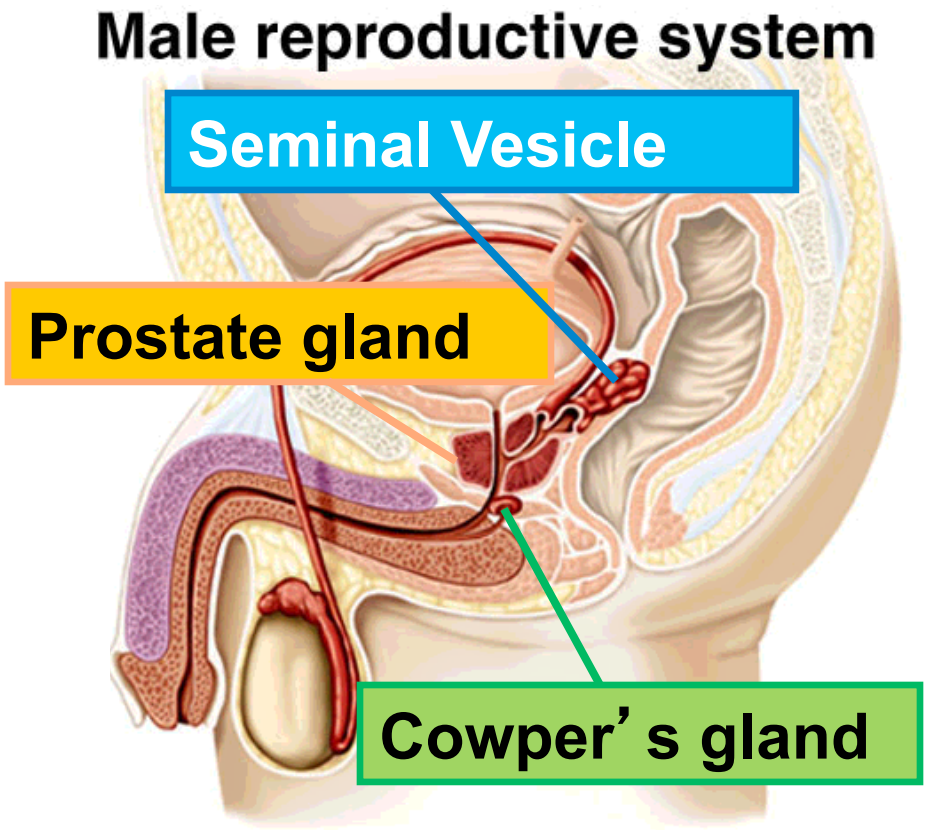
and **Prostaglandins** which cause rhythmic contractions of the smooth muscles in female, which help **sperm move up the uterus.**



Seminal Fluid (Semen)

2) **Prostate gland**:

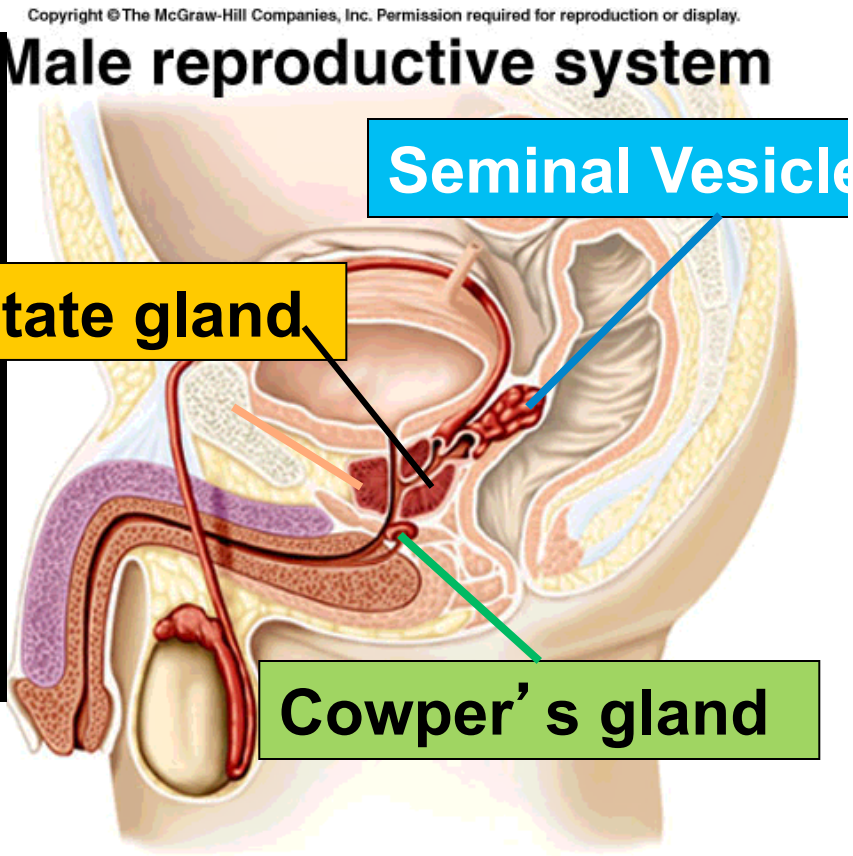
- **alkaline buffer and mucus that protects sperm** against acidic environments in the urethra and the vagina.
- Increases mobility of sperm



Seminal Fluid (Semen)

3) **Cowper's gland**:

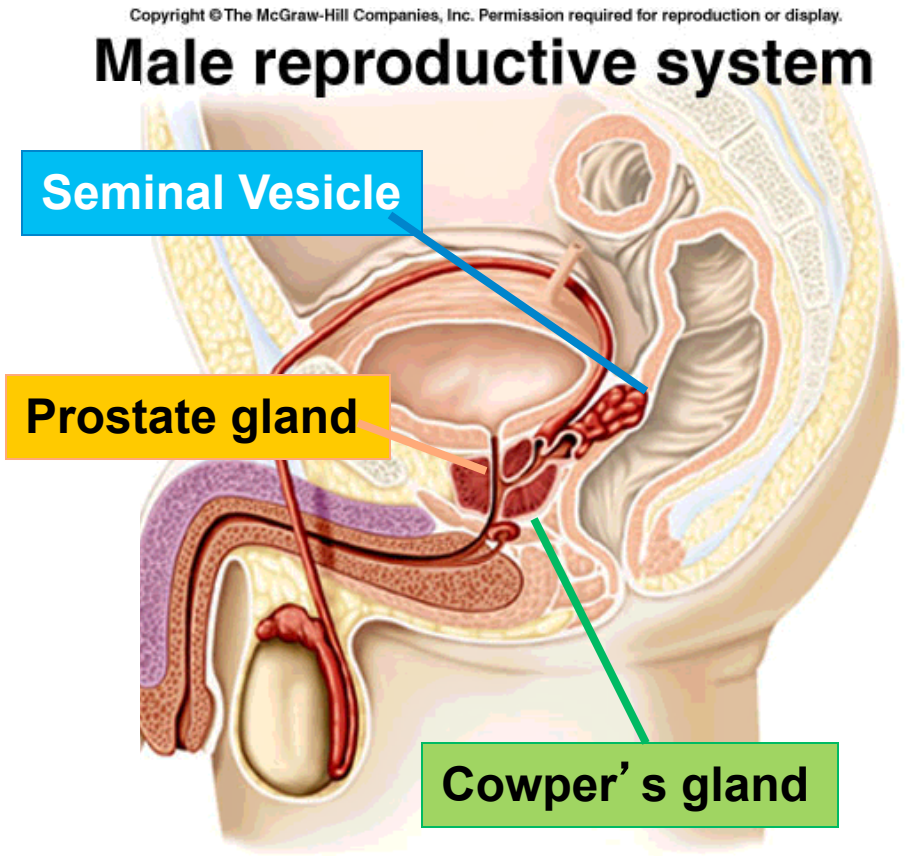
- Secretes a **mucus and alkaline buffer** prior to ejaculation
- **protects against acid in urine** and increases mobility.



Sperm + seminal fluids = semen

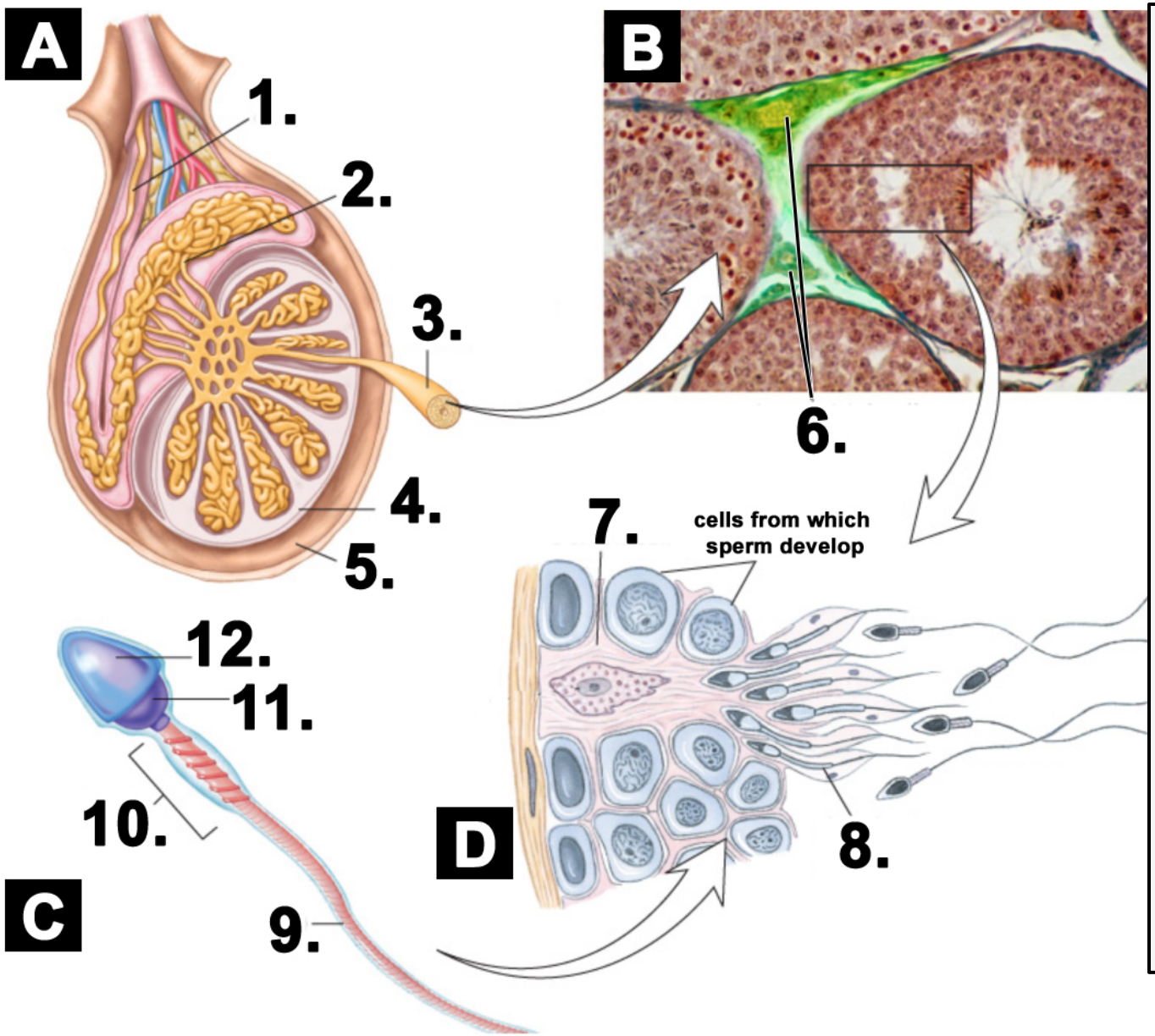
Semen

In one ejaculate there is about 3 – 4 mL of fluid and about 40 – 100 million sperm cells per mL



(Note: at least a few dozen must reach the egg to ensure fertilization!)

Testes- sperm formation



1. Ductus deferens
2. Epididymis
3. Seminiferous tubule
4. Testis
5. Scrotum
6. Interstitial cells
7. Sertoli cells
8. Developing sperm cells
9. Tail(flagellum)
10. Middle section
11. Head
12. Acrosome

Testes

Contain:

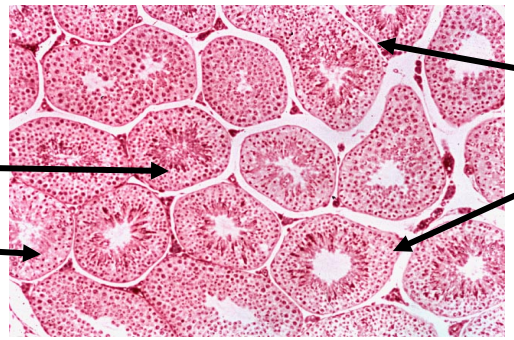
1. **Sertoli Cells** (in seminiferous tubules)

- Secrete chemicals required for the **nourishment** and development of sperm cells
- Responsible for **spermatogenesis**.
- Protection from man's immune system
- Influenced by **FSH** (follicle stimulating hormone) from pituitary **and by testosterone from interstitial cells.**

2. **Interstitial Cells** (between seminiferous tubules)

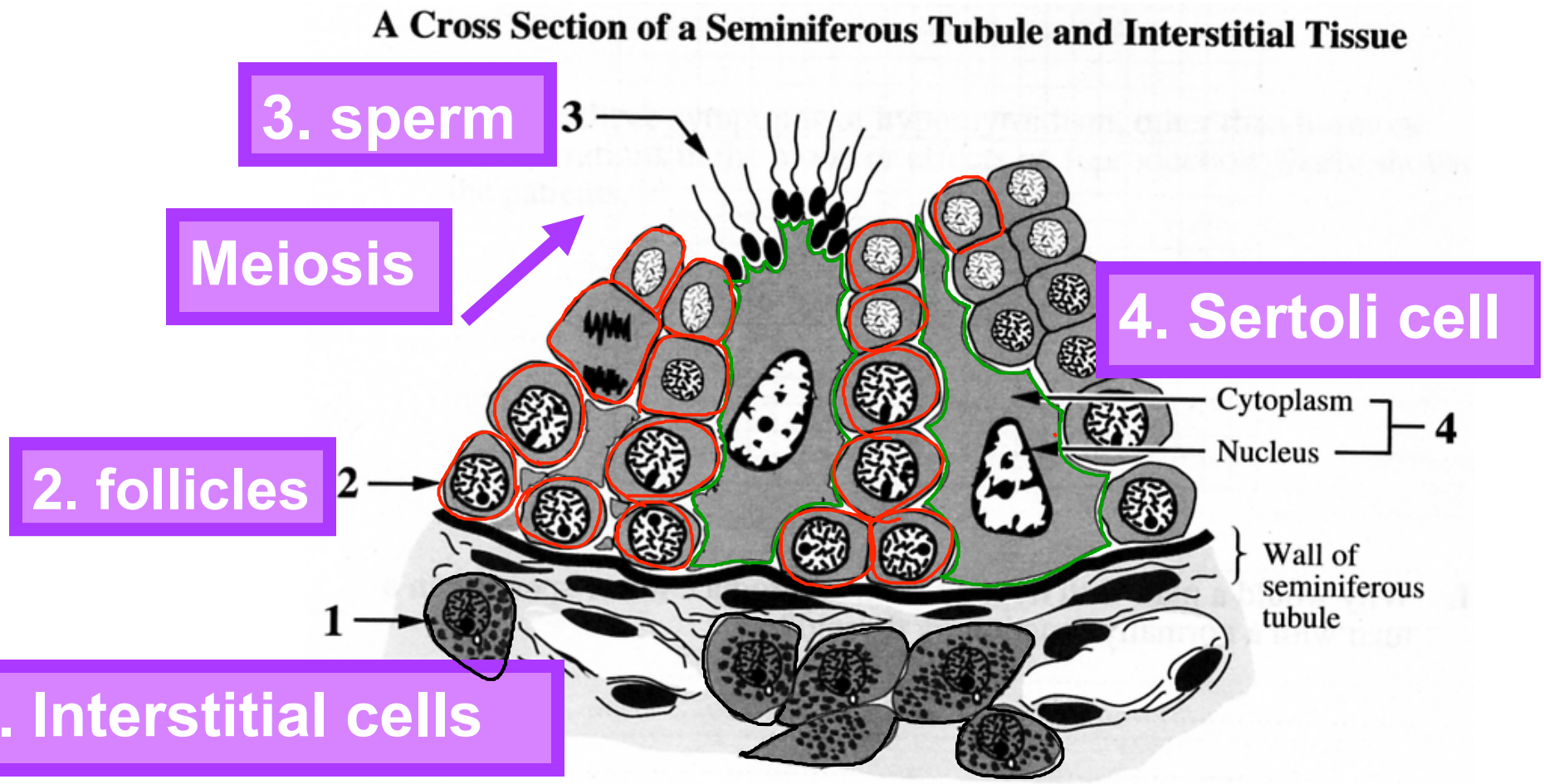
- Produce **testosterone**
- Influenced by **LH (leutinizing hormone)** from the pituitary

Sertoli cells in Seminiferous tubules

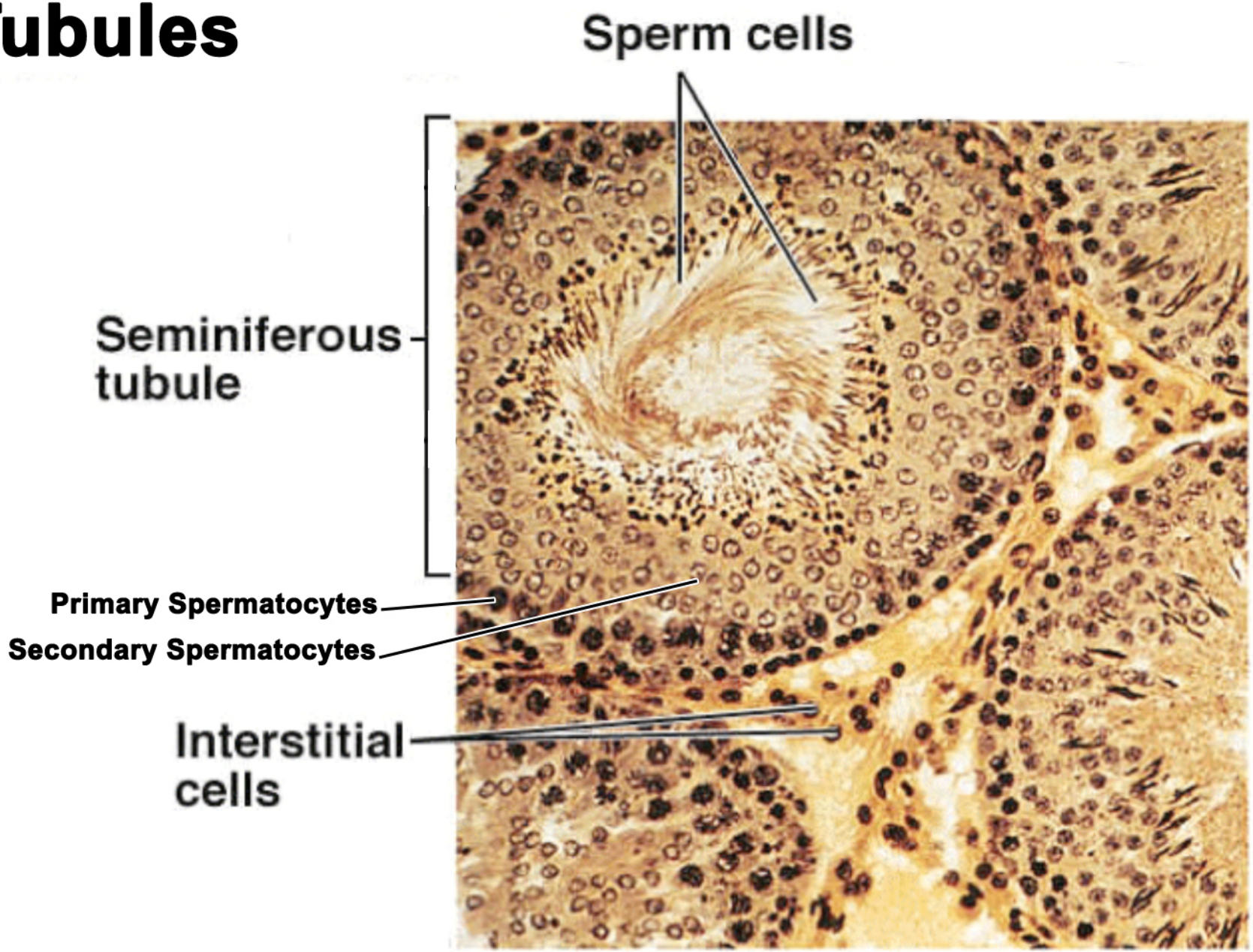


Interstitial cells

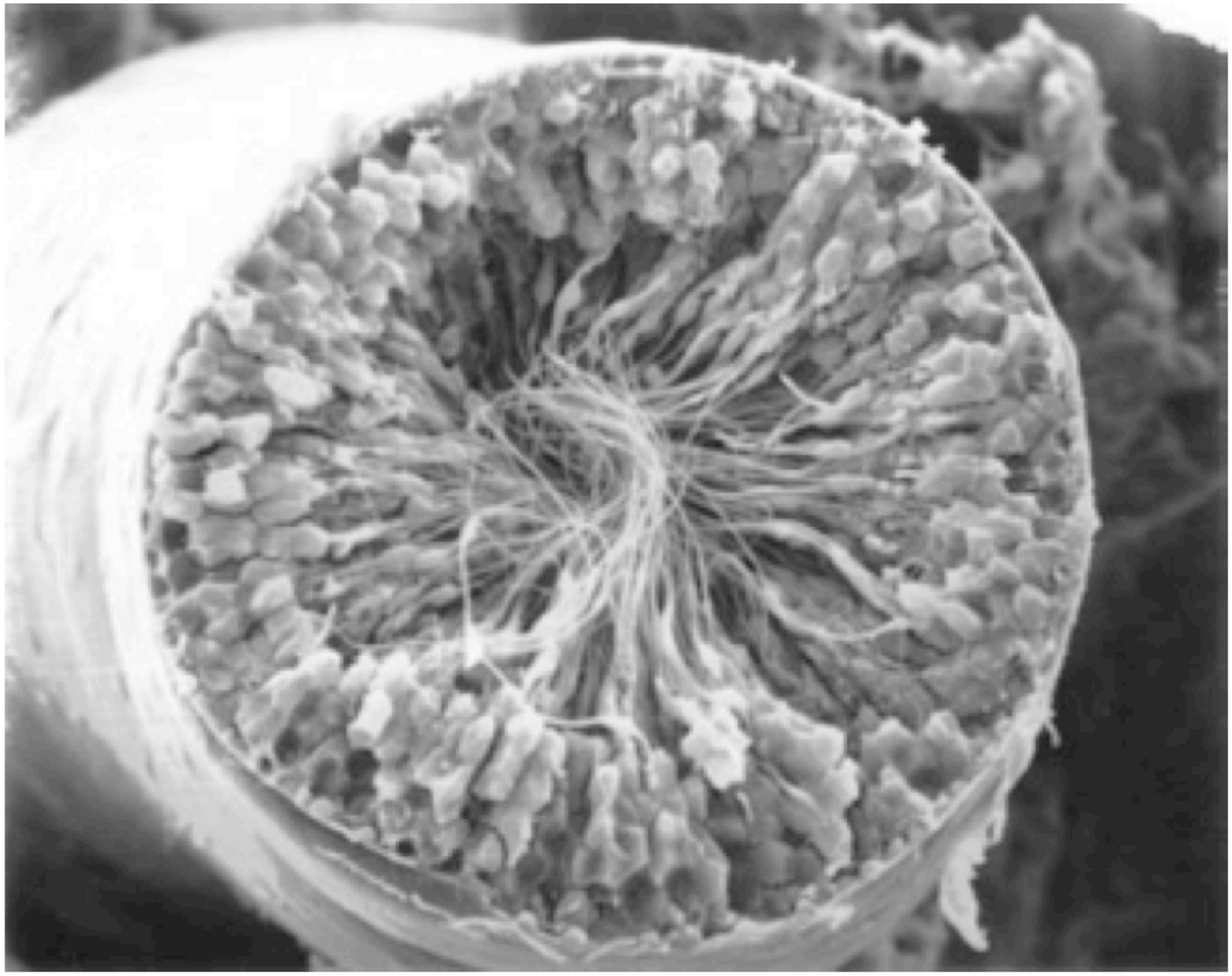
Diagram from Diploma Exam



Seminiferous Tubules

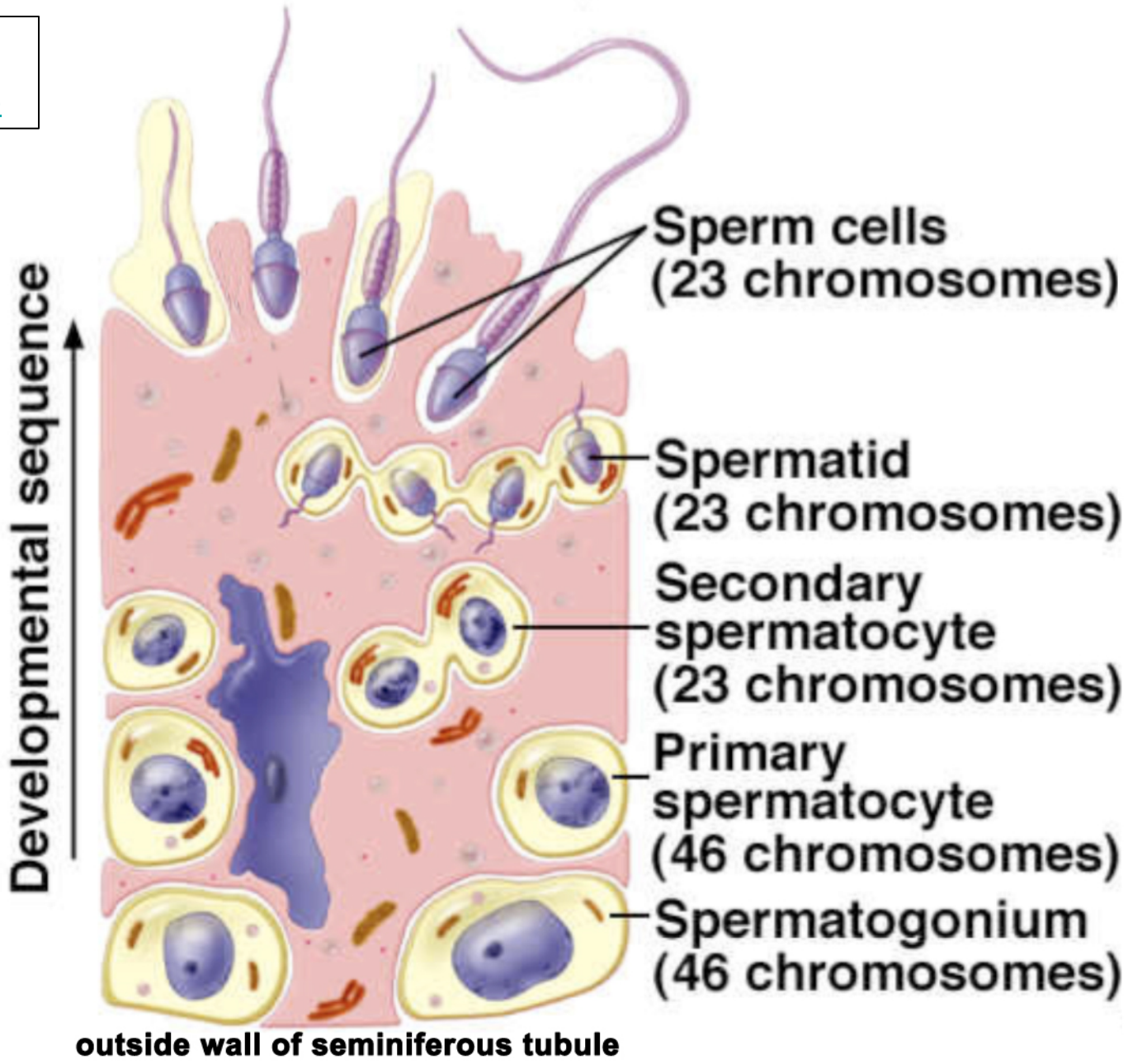


Seminiferous Tubule Cross-section

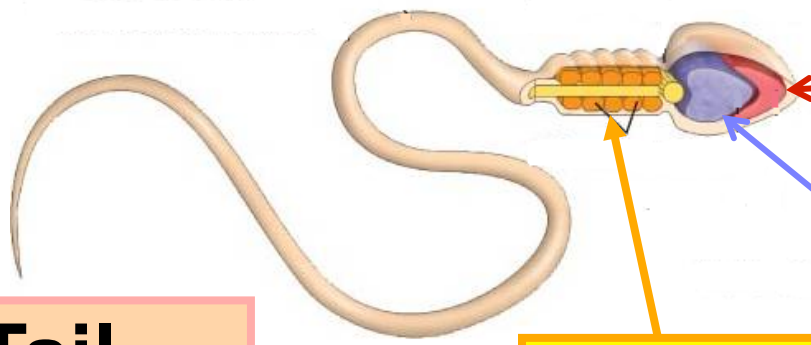


Spermatogenesis

Animation of Spermatogenesis



Sperm



Head

Acrosome
Contains an enzyme to penetrate layers surrounding the ovum

Tail
Flagellum for swimming

Midpiece
Mitochondria for energy

Nucleus
23 chromosomes

Life span of a sperm cell:

- In the epididymis - **many years**
- In semen – at body temperature, **1-5 days**
- Stored at -100°C - **many years**

Watch sperm swim

Fertility Clinics Check for…

-mobility (propel forward)

-morphology(size & shape)

-semen volume

-pH

-fructose content

-sperm count: less than 20 million / mL is too low

Pathway of Sperm The Great Sperm Race

Seminiferous Tubules

↓

Testes

↓

Epididymis

↓

Vas deferens

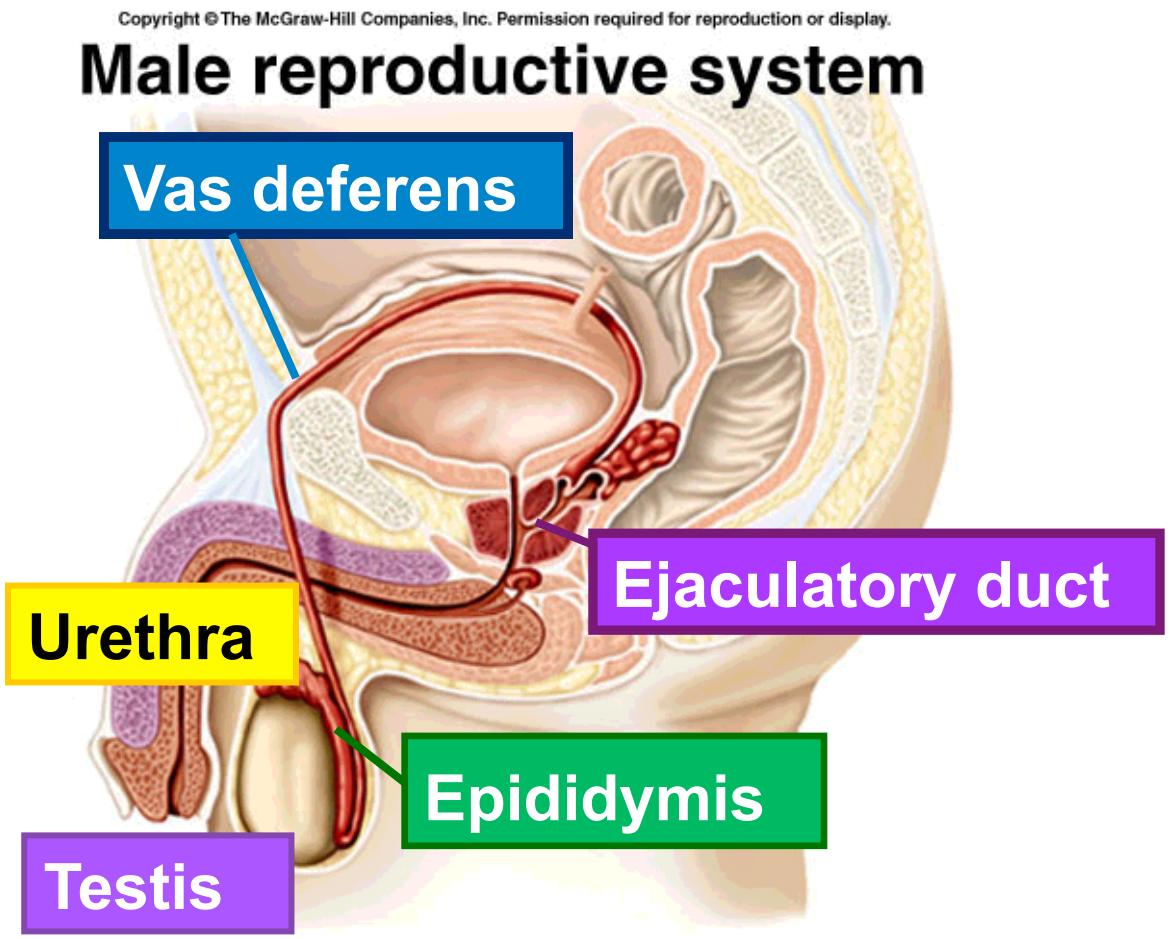
↓

Ejaculatory Duct

↓

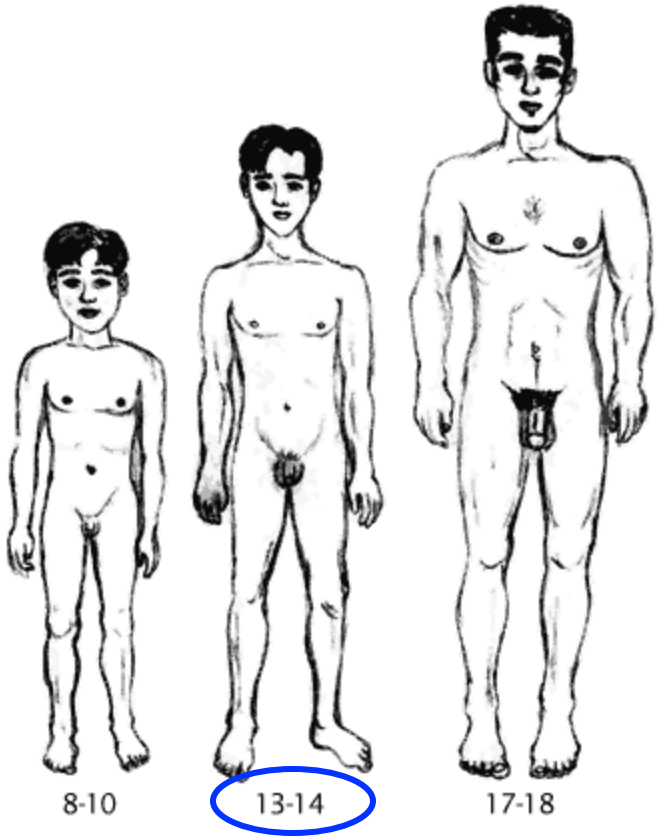
Urethra

STEVEU



Puberty in boys

- Puberty is **when the reproductive system completes its development and becomes fully functional**
- Puberty begins when the **hypothalamus** begins releasing gonadotropin releasing hormone **(GnRH)**
- GnRH acts on the **anterior pituitary** to produce **FSH** and **LH**



Puberty begins

Hormonal Control

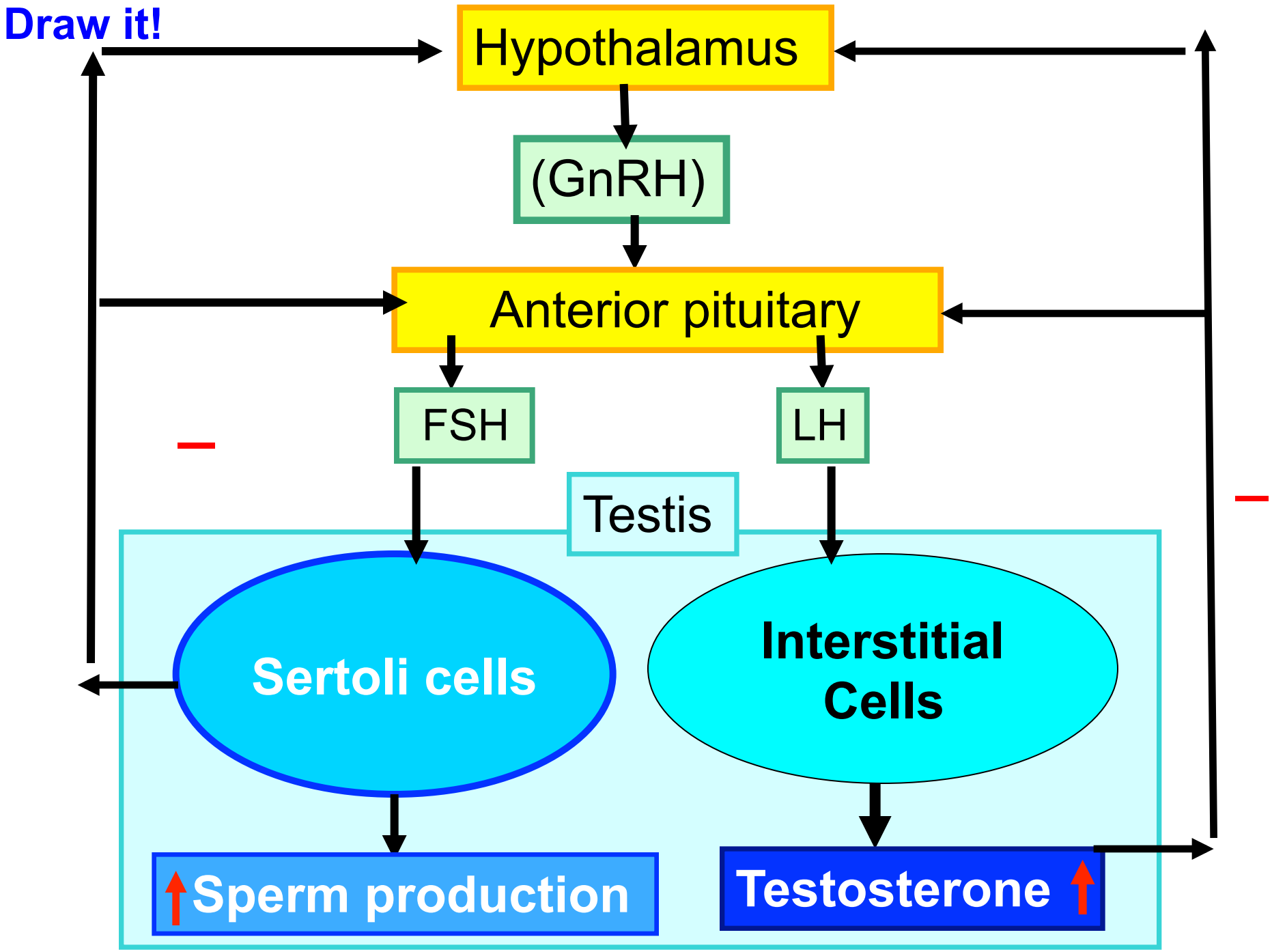
- **Testosterone**- stimulates: **spermatogenesis**

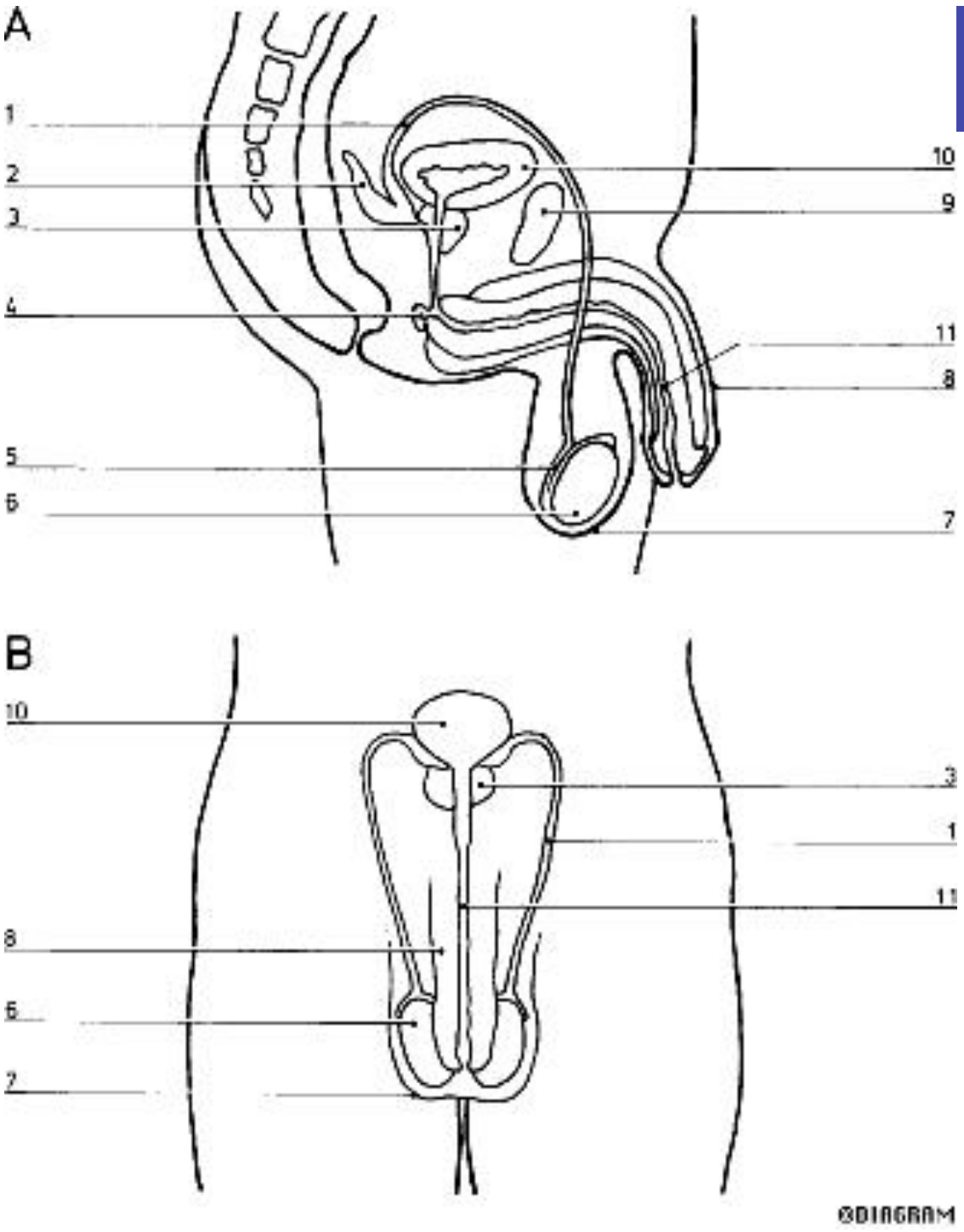
- **Primary characteristics (reproductive organs)**
- **Secondary characteristics (deepening of voice, facial and pubic hair, muscle growth)**

REMEMBER:

Follicle-stimulating hormone (FSH) stimulates production of sperm cells in seminiferous tubules

Luteinizing Hormone (LH) stimulates production of testosterone in interstitial cells


Draw it!
Hypothalamus
(GnRH)
Anterior pituitary
FSH
LH
–
–
Testis
Sertoli cells
Interstitial Cells
Sperm production
Testosterone



Test Yourself

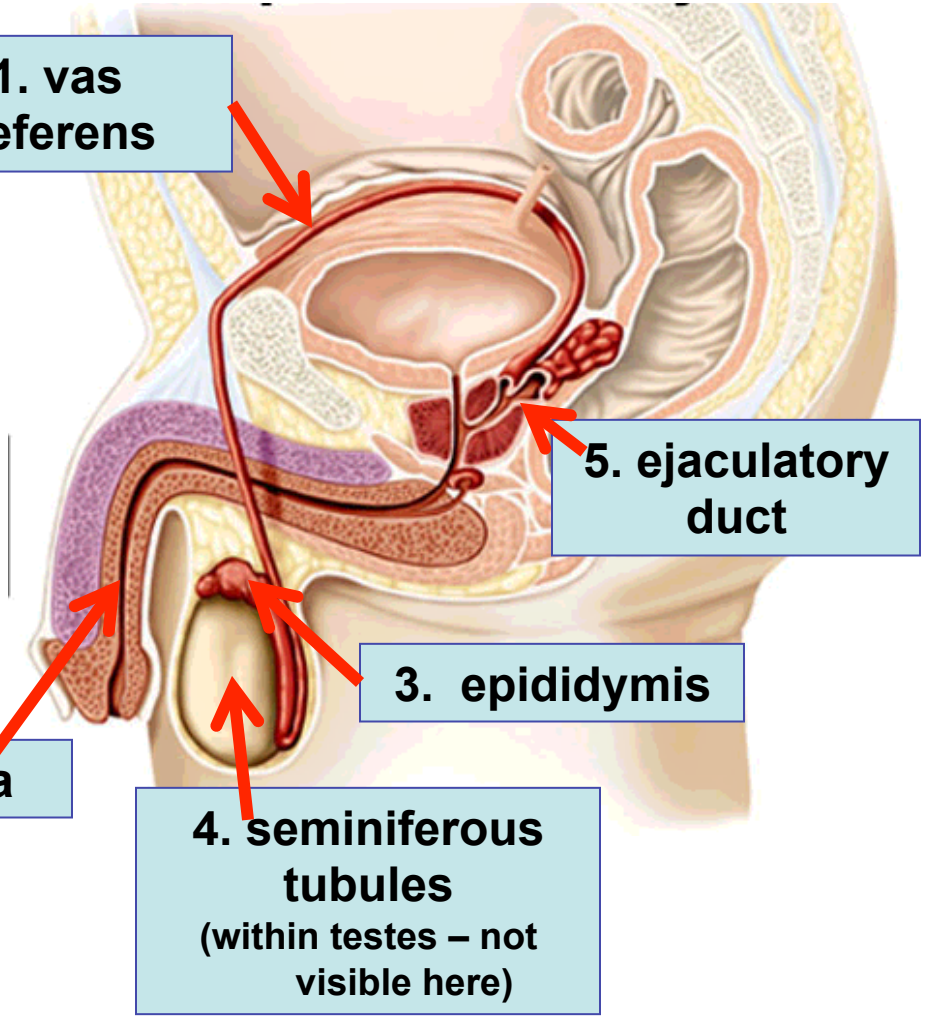
1. Vas Deferens
2. Seminal Vesicles
3. Prostate gland
4. Cowper's gland
5. Epididymis
6. Testis
7. Scrotum
8. Penis
9. Pubic Bone
10. Bladder
11. Urethra

Male Reproductive System Mini-Review

1. Arrange the following structures in the order that sperm passes through them:

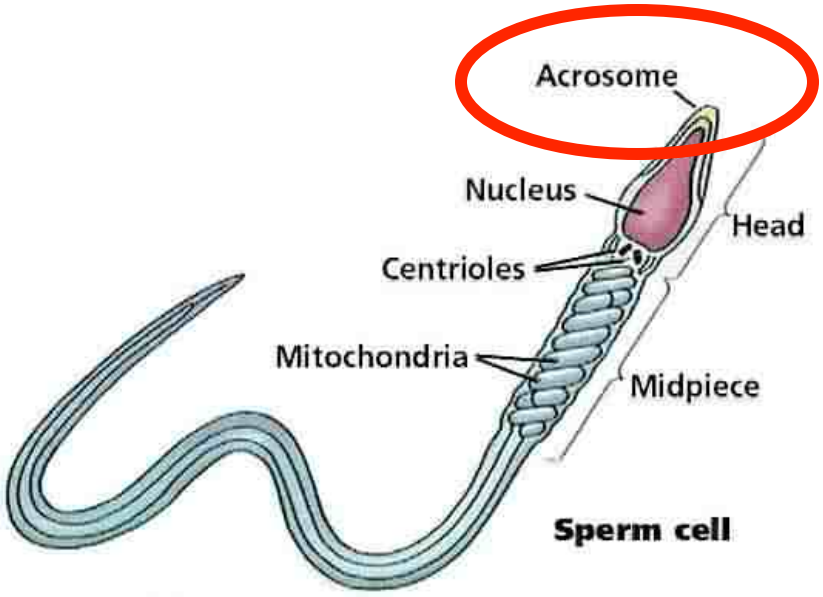
1. vas deferens
2. urethra
3. epididymis
4. seminiferous tubules
5. ejaculatory duct

4, 3, 1, 5, 2

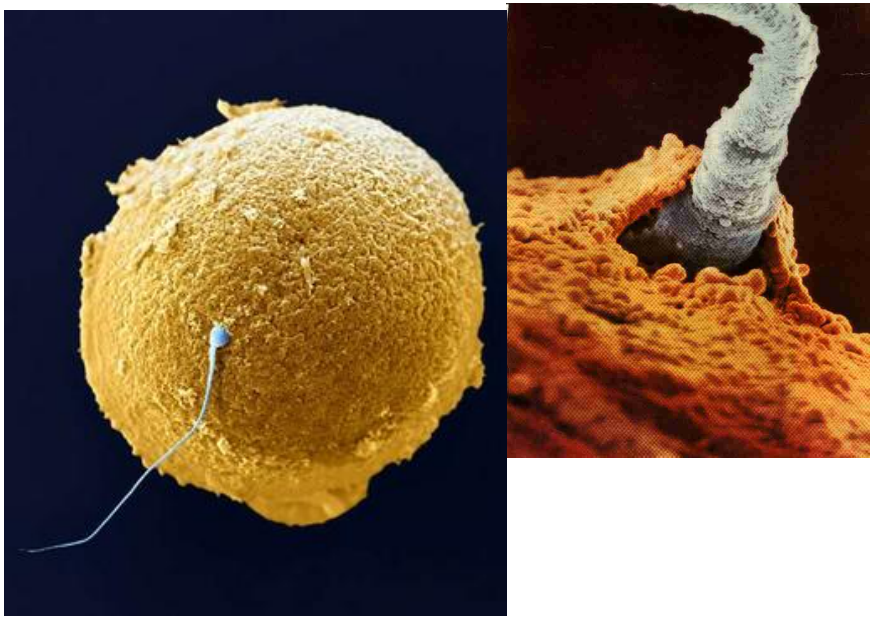


Male Reproductive System Mini-Review

2. What is the significance of the acrosome of the sperm?



A: The acrosome contains enzymes needed to help the sperm penetrate through the protective layer surrounding a female egg



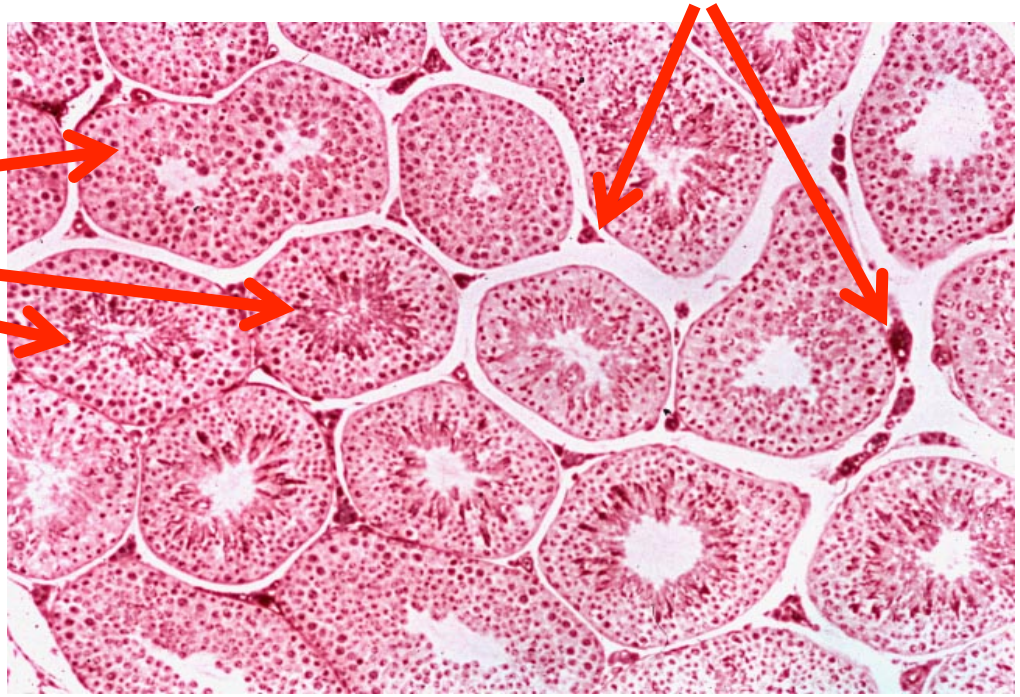
Bozeman: Repro system
0:00 – 3:08

http://www.youtube.com/watch?v=QSN5gfbzgwc

Male Reproductive System
Mini-Review

3. What is the difference between interstitial cells and Sertoli cells?

Interstitial cells:
- **Located between seminiferous tubules**
- **Secrete testosterone**



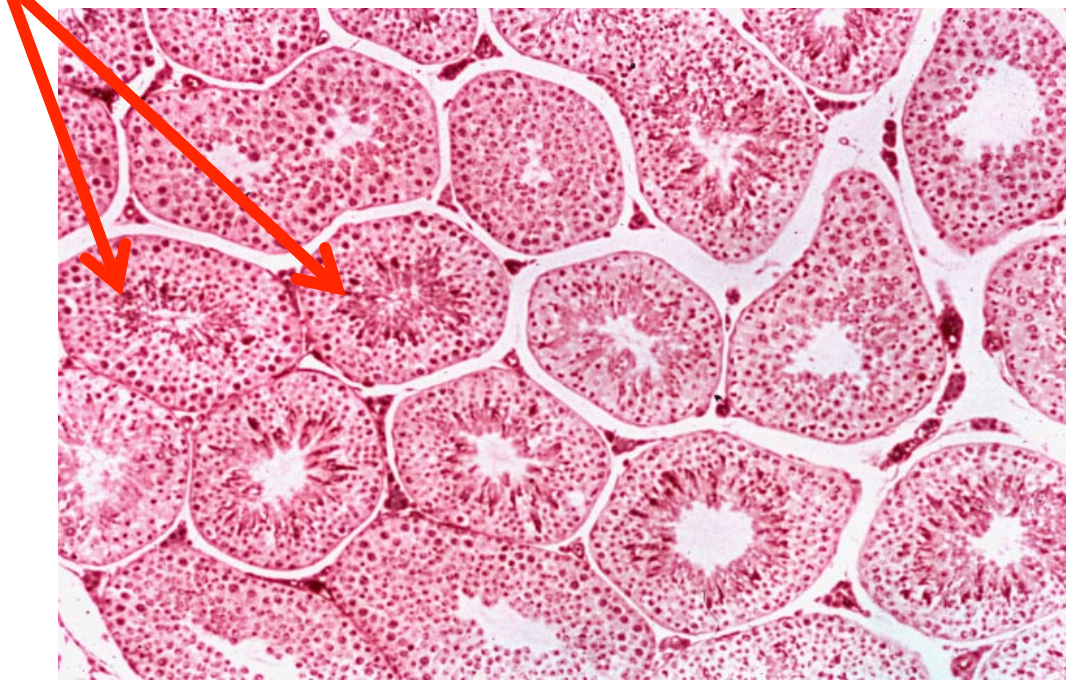
Sertoli cells:
- **Located inside seminiferous tubules**
- **Nourish and support developing sperm**
- **Responsible for spermatogenesis**
- **Release inhibin**

Male Reproductive System
Mini-Review

4. Where are sperm made?

Seminiferous Tubules

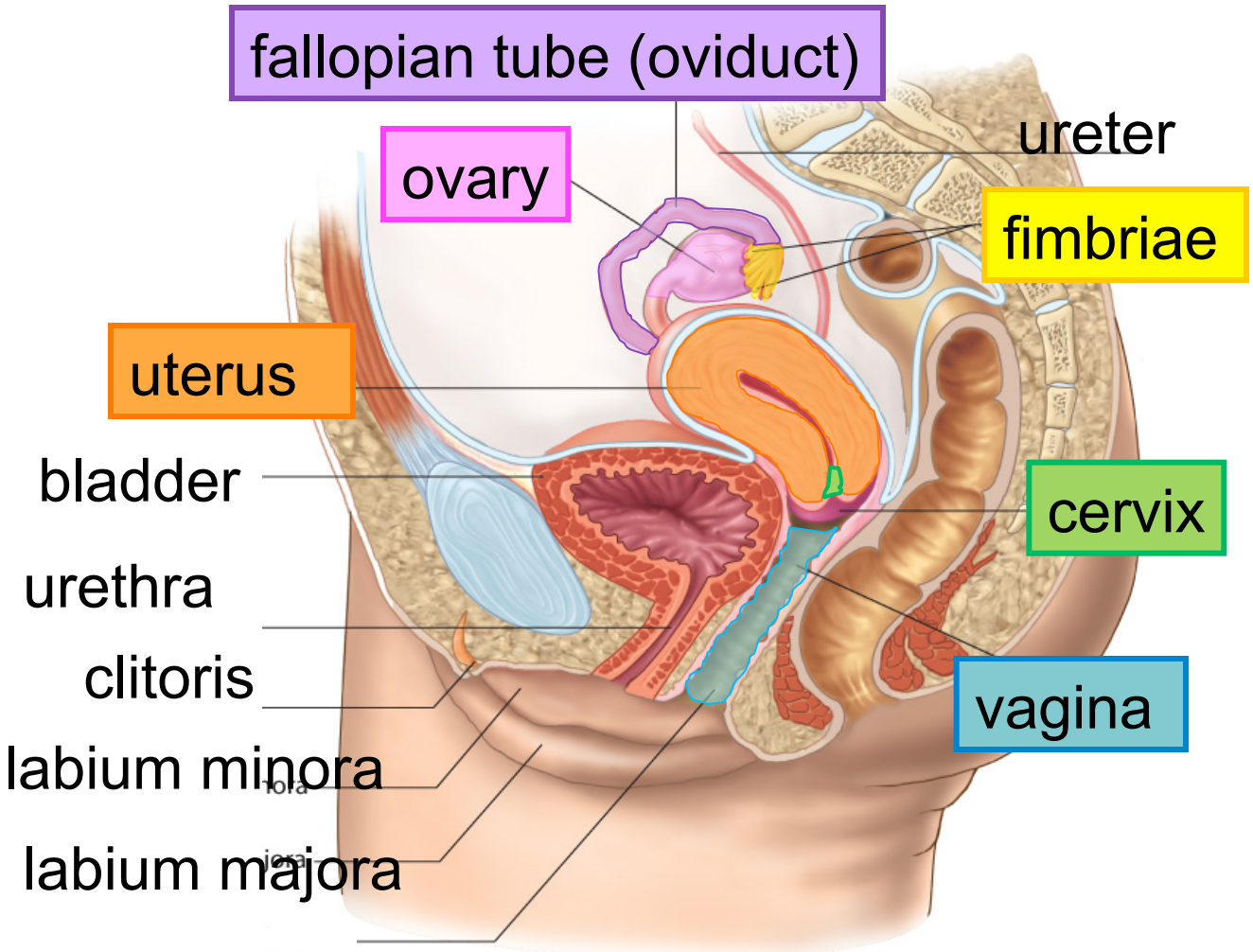
- **Follicle cells are stimulated by the sertoli cells to undergo meiosis.**



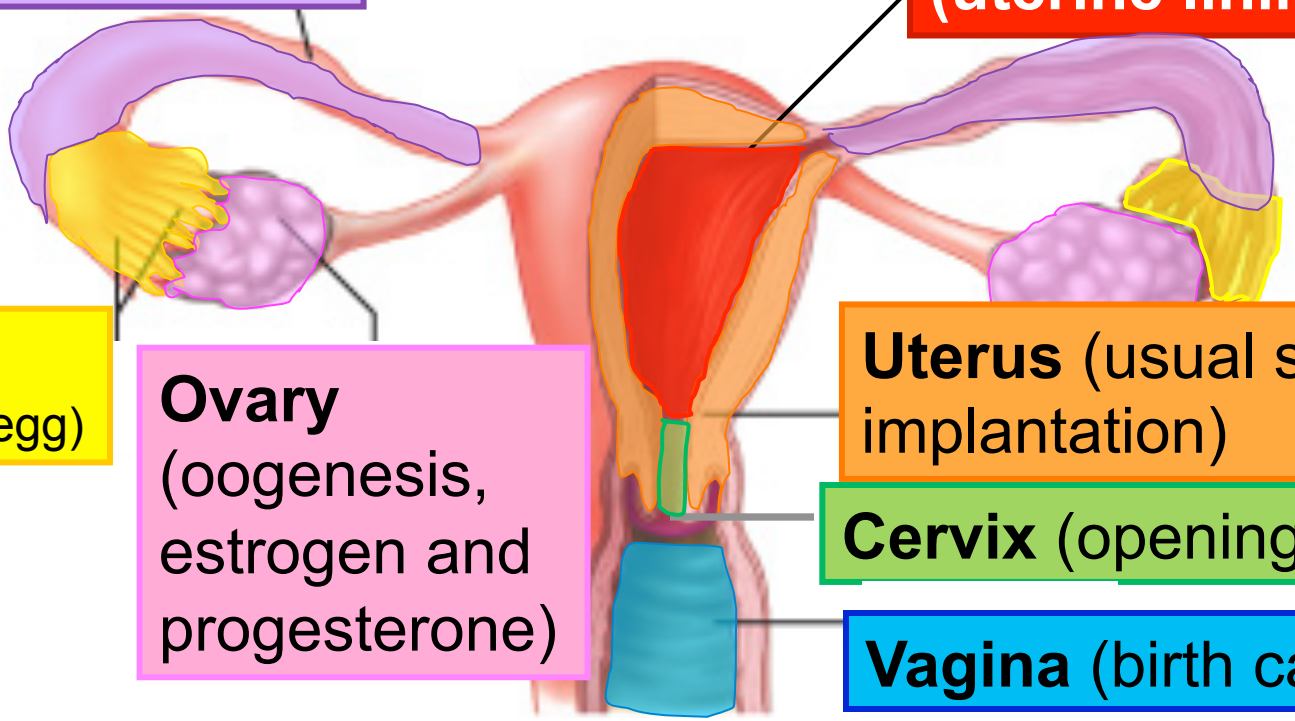
Page 519

#2
#3
#4
#7

Label the following diagram



Label the following diagram



fallopian tube (usual site of fertilization)

Endometrium (uterine lining)

Fimbriae (catches the egg)

Ovary (oogenesis, estrogen and progesterone)

Uterus (usual site of implantation)

Cervix (opening of uterus)

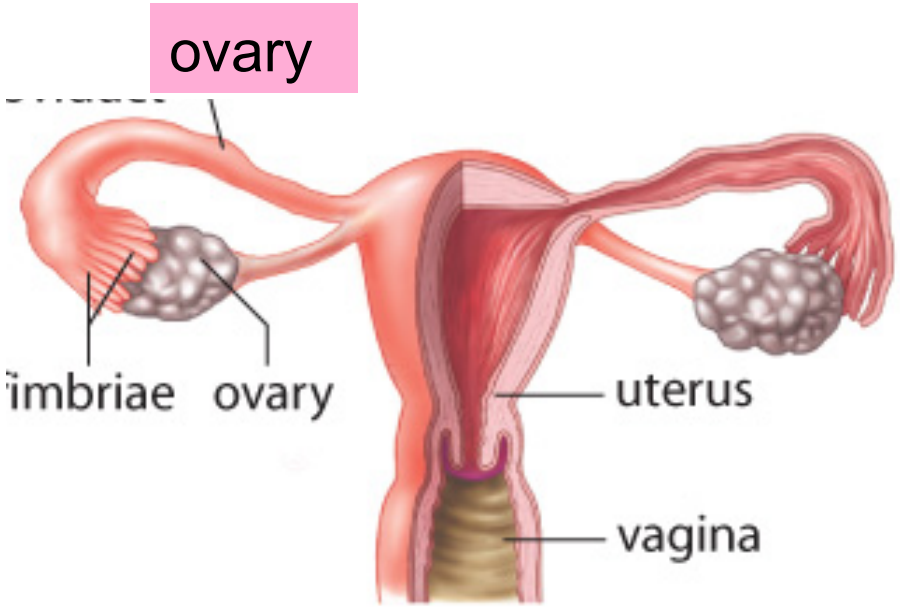
Vagina (birth canal)

Ovaries – site of oogenesis

Females have 2 **ovaries**, which alternate each month to produce an **egg/ovum (oogenesis).**

1. <u>Ova</u> (eggs) are produced from Immature **<u>follicles</u>**

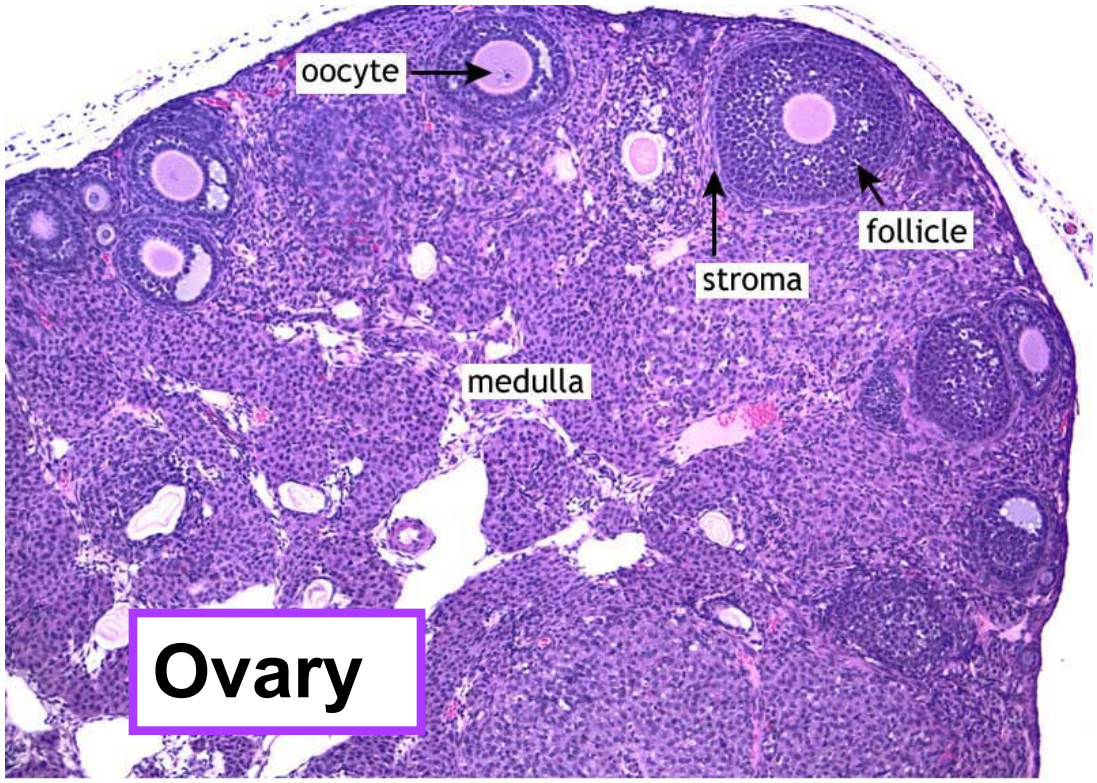
Corpus luteum: secretes hormones (Estrogen & Progesterone)

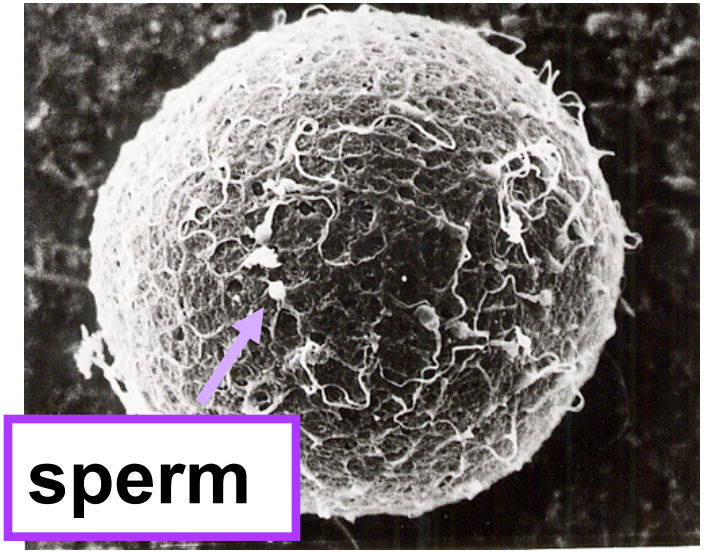


Ovaries contain ~ 400,000 egg cells, but only ~ 400 actually mature between the ages of 12 – 50.

Ovum (egg)

The egg is **larger** than sperm because the cytoplasm in the egg has to provide enough nutrients for **5** days if the egg is fertilized.





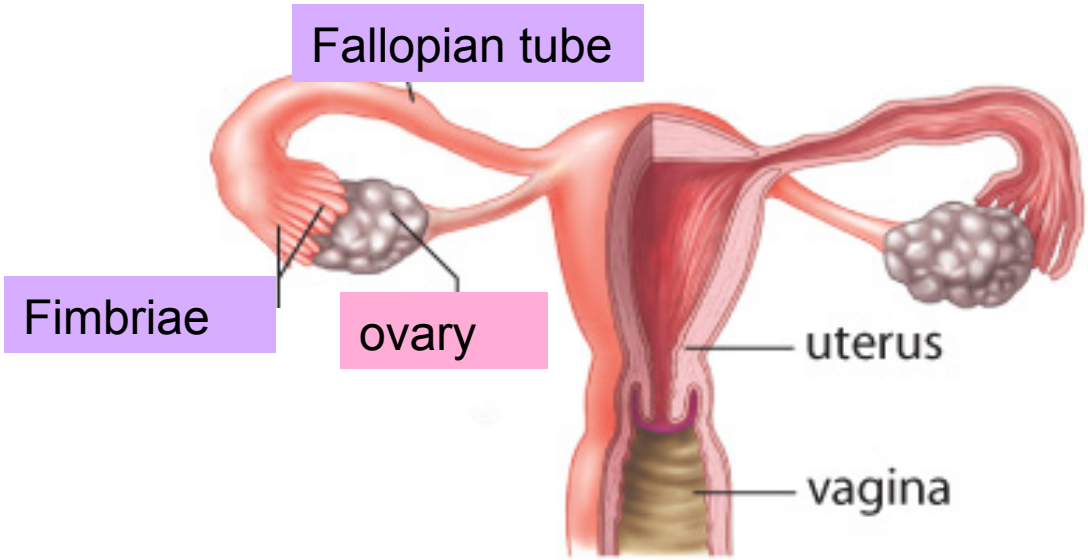
The ovum lives for **24 hours** after ovulation.

- NOVA: The Egg's Journey

Ovulation - When a follicle matures, it ruptures, **releasing the ovum**

Fimbriae - **picks up ovum** from ovary (finger-like extensions of fallopian tube)

Fallopian tube (Oviducts) passage from ovary to **uterus**; site of **fertilization**



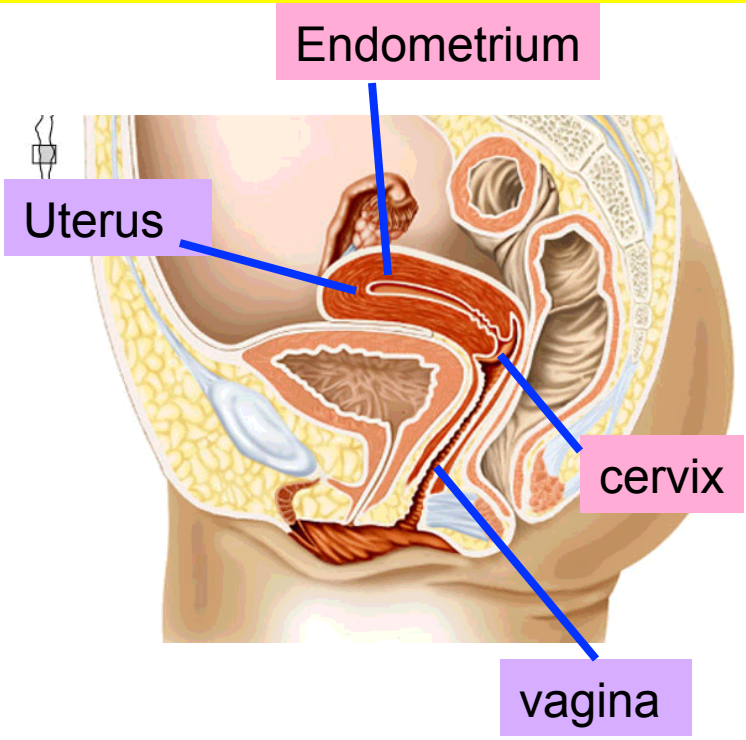
Uterus

Uterus – site of **embryo development**, two layers:

- **endometrium – nourishes** embryo; shed during menstruation; blood vessel rich
- **Myometrium – muscular layer**

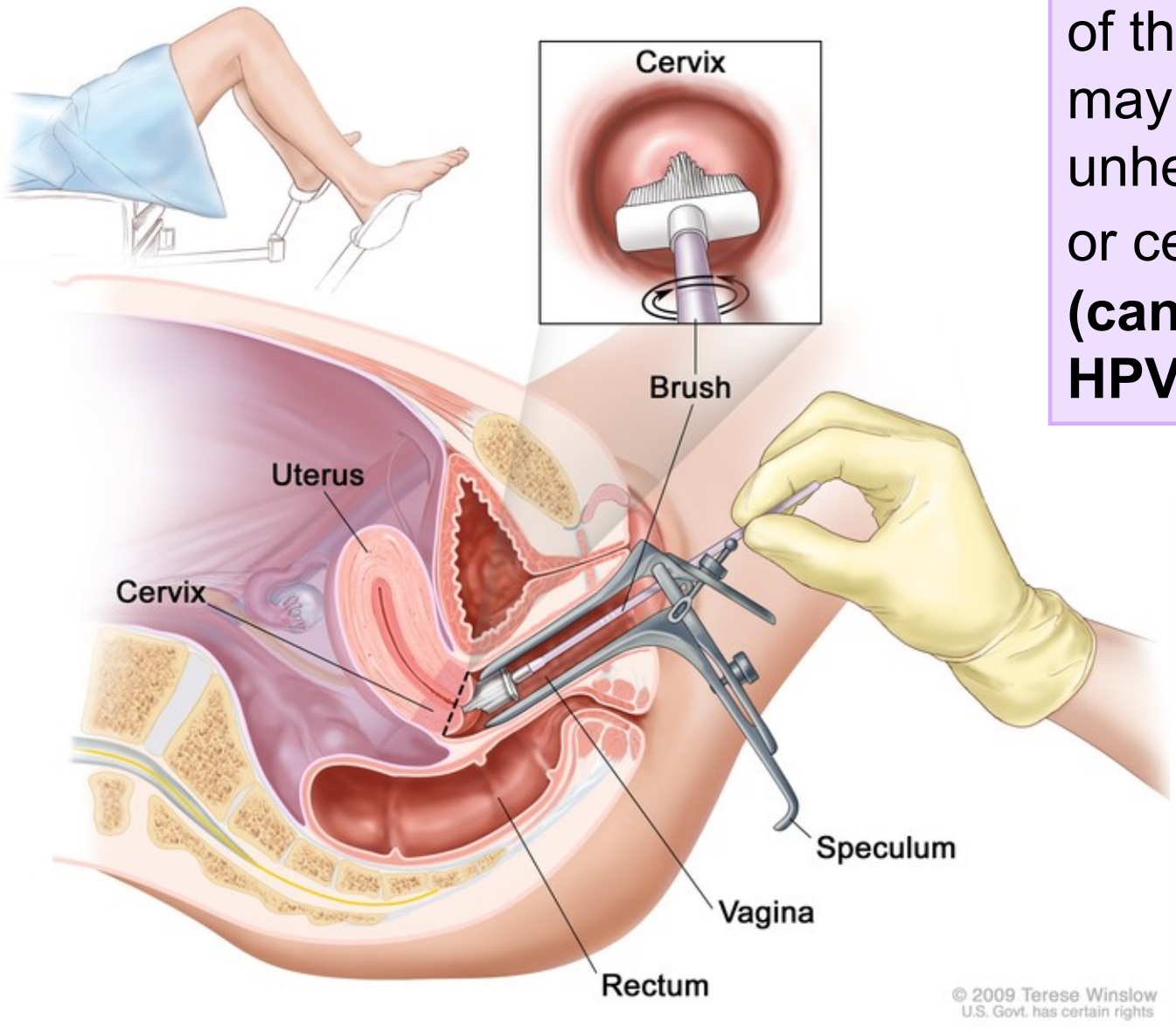
Cervix – muscular opening to uterus

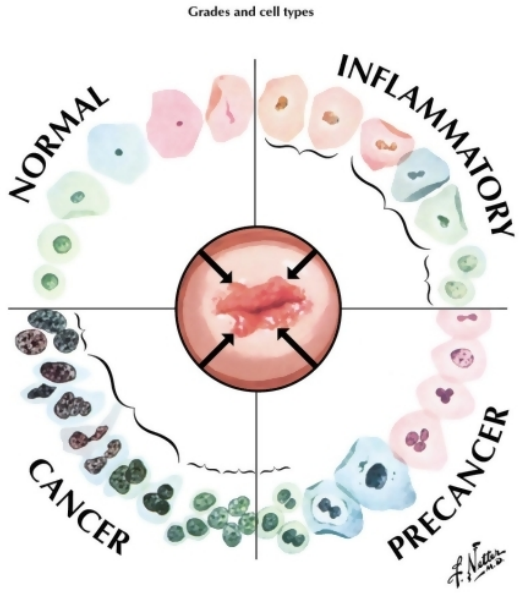
- cells constantly shed and replaced



Pap Smear

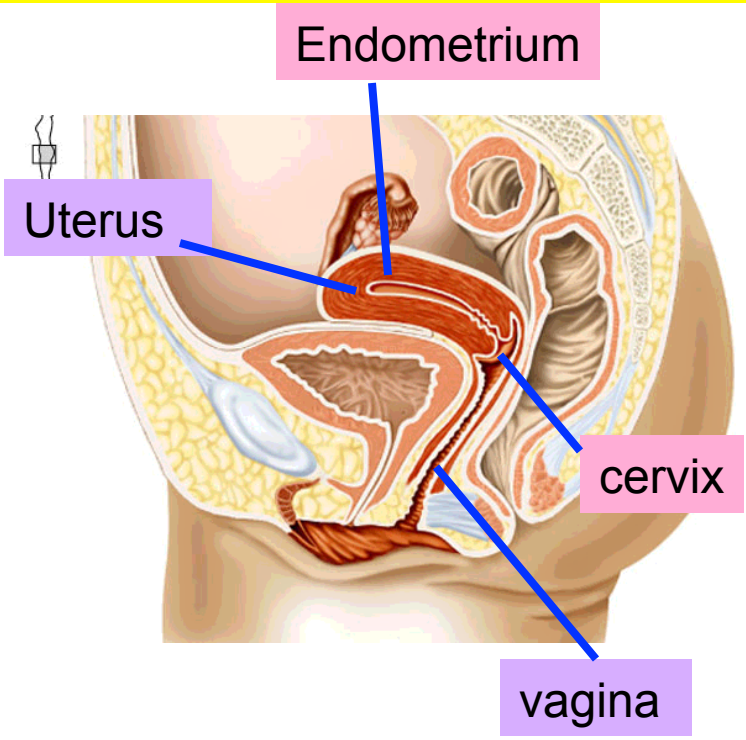
A **pap smear** checks for changes in the cells of the cervix. Changes may indicate infection, unhealthy cervical cells, or cervical **cancer** **(can be caused by HPV(genital warts)).**





Vagina

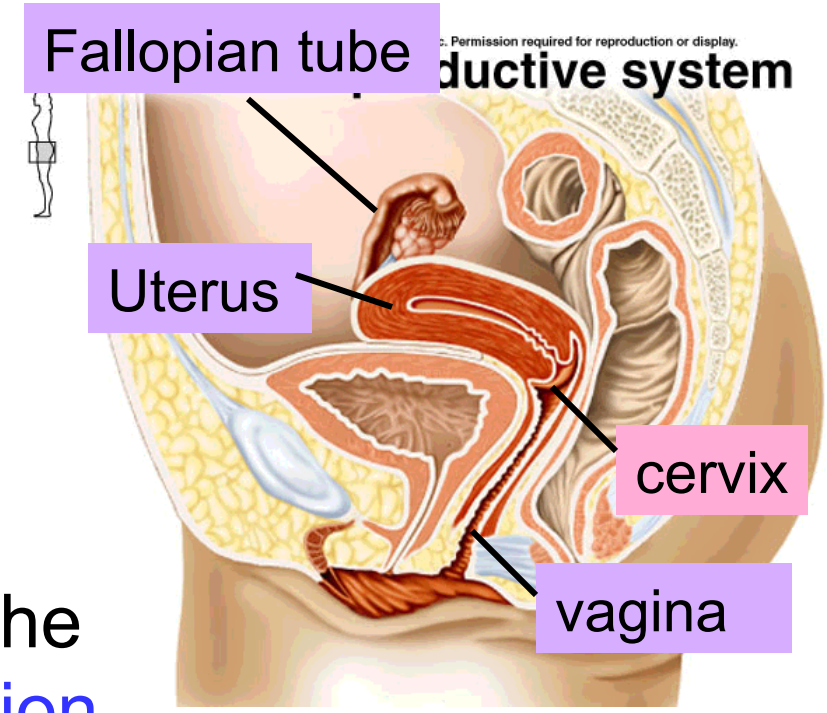
- **Vagina** – entrance for the penis as well as **birth canal**



Fertilization and Implantation

Pathway for sperm:

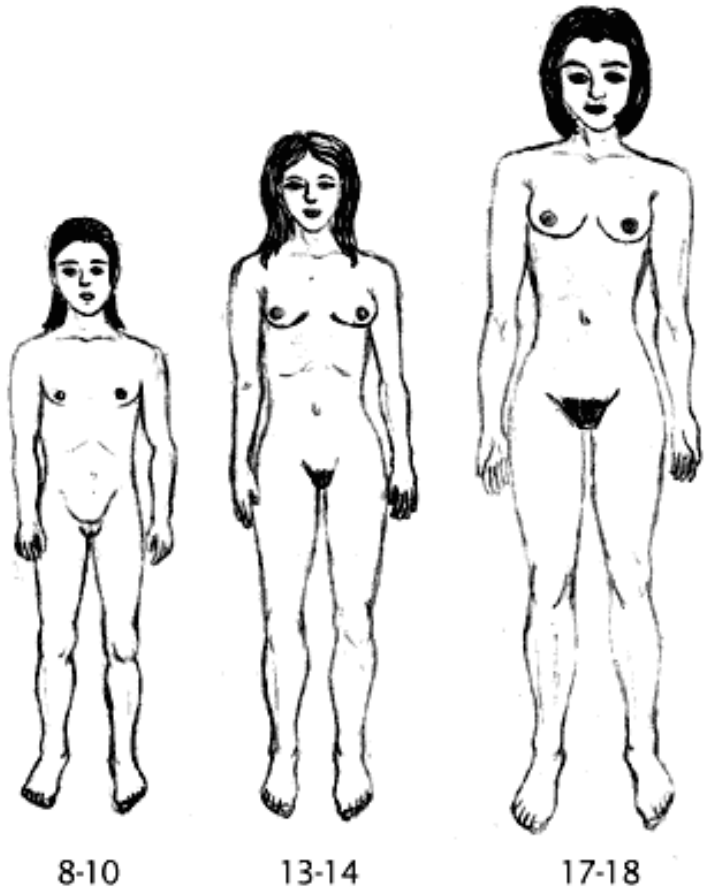
1. **vagina**
2. **cervix**
3. **uterus**
4. **Fallopian tube**



Fertilization usually occurs in the **fallopian tubes** and implantation occurs in the **uterus.**

Puberty in Girls

- At puberty, the hypothalamus releases gonadotropin releasing hormone (GnRH)
- **GnRH** activates the **anterior pituitary** to release **FSH** and **LH**
- FSH secretions are carried by the blood to the **ovary** where follicle development is stimulated.



The follicles within the ovary secrete **estrogen** into the blood which stimulates the development of the secondary female characteristics: **breasts, hair, wider hips.**

Female Reproductive Goals

1. Develop follicle (egg)
2. Develop Endometrium
3. Ovulate
4. Fertilize and Implant
5. Maintain Corpus Luteum and Endometrium
   - (or shed to reset for next month)

- This is all accomplished via **hormonal control!!!!!!!!**