X. Reproductive System and Embryology

a. Male Reproductive anatomy

1. Testes
   - **a. Location**
     External to body, in scrotum
   - **b. Structure**
     1) 5 x 3 cm
     2) each testis subdivided into 250 chambers called lobules
     3) lobules contain seminiferous tubules

2. Epididimus
   - **a. Location – posterior surface of each testis**
   - **b. 6 m long**
   - **c. formed from sem. Tub**
   - **d. Join to form Vas Deferens**

3. Vas Deferens
   - **a. Location – from lower end of each epididimus, through inguinal canal, to piont behind bladder.**
   - **b. Muscular wall**
   - **c. 45 cm long**
   - **d. Joins with other vas at prostate**

4. Seminal vessicle
   - **a. Location – attached to vas deferens near base of urinary bladder**
   - **b. 5 cm long**

5. Prostate Gland
   - **a. Location – surrounds urethra below bladder**
   - **b. Structure – contains secretory tubules which drain into the urethra**
   - **c. Relatively small at birth, enlarges at puberty**

6. Bulbourethral gland
   Small pea sized gland below prostate, connected to urethra

7. Scrotum
   - **a. Location – surrounds testes**
   - **b. Structure - Smooth muscle sac surrounded in epithelial tissue**

8. Penis
   - **a. Location –**
   - **b. Structure**
     1) urethra located along ventral surface opening through glans penis
     2) two spongy masses of tissue – corpora cavernosa above urethra
     3) corpus spongiosum surrounds urethra
     4) Prepuce covers glans penis

b. Female Reproductive Anatomy

1. Ovaries – egg production.
   - **a) Location – Lateral wall of Pelvic cavity**
   - **b) Structure**
     1) 3.5 x 2 cm

2) attached to pelvic wall by several ligaments
3) Medulla – Inner region , areolar, blood vessles
4) Cortex – Outer region
a)) Ovarian follicles – contain single primary oocytes at birth, mature oocytes after puberty

2. Fallopian (uterine) tubes – trans egg to uterus, fertilization
   a) Location
      1) internal uterine cavity
      2) Peritoneal cavity near ovaries
   b) Strucutre
      1) 10 cm long, .7 cm diameter
      2) Infundibulum – funnel shaped opening near ovaries
      3) Fimbrae - finger like projections around infundibulum
      4) Lined in Pseudostratified ciliated columnar

3. Uterus – fetal development
   a) Location – suspended in a hammock of ligaments in lower pelvic cavity
   b) Structure
      1) Shape of inverted pear
      2) 7cm x 5 cm
      3) three layers thick
         a)) Endometrium – columnar epi.
         b)) Myometrium – smooth muscle
         c)) Perimetrium – Serosa
4. Vagina – insertion of penis, receive sperm
   a) Location – from uterus, posterior to bladder, downward to the outside
   b) Structure
      1) 9cm in length
      2) 3 layers thick
         a)) mucosa – strat squam. in a pattern of ridges
         b)) Smooth muscle layer
         c)) Fiberous layer- areolar, heavy on the collagen
      3) forms curved cervix at opening of uterus.
      4) Hymen – outer flap of epi. provides protection. Opening varies in diameter.
5. Labia majora and Labia minora - protect
   a) Loc. – Both are located around the vaginal opening. Form area called vulva
      1)Majora larger, more lateral folds of skin which protect the internal organs from external trauma. Like scrotum
      3) Minora along lateral edge of vaginal opening and over clitorus. Outer seal.
   b) Structure
      1. majora – folds of skin with a layer of adipose beneath. Form perineum at posterior. (episeotomy)
      2. small folds of Strat squam.
6. Clitorus - sensory
   a) Location – Anterior end of vulva, mostly imbedded in surrounding tissue. End is above surface.
   b) Structure – corresponds to penis
      1) 2cm long x .5 cm in diameter
      2) corpora cavernosa – erectile like penis
      3) glans – visible surface highly sensitive
7. Vestibular Gland – mucus for lubrication

a) Location – two glands, under labia majora on each side of vaginal opening. Ducts open edge of vaginal opening.

C. Gametes

1. Sperm
    - **a. Structure**
        1) .06 mm long
        2) Head – contains chromosomes, acrosome – digestive enzyme cap
        3) Body – connection of tail, mitochondria
        4) Tail – for propulsion, rich in ATP
    - **b. Spermatogenesis**
        1) In seminiferous tubules of testes
        2) Process
            a) Begin as spermatogonia in juveniles (46 chrom.)
            b) At puberty some devide into additional spermeratogonia, some become Primary spermatocytes. (46 Chrom)
            c) Primary spermatocytes do meiosis forming 2 secondary spermatocytes (23 chrom)
            d) Secondary divide again into 2 spermatids each (23 chrom)- non motile
            e) Spermatids are pushed along the seminiferous tubule by the newly formed ones behind them.
            f) Enter epididimus where they develop a functional tail.
2. Oocyte
    - **a. Structure**
        1) Largest cell in human species
        2) Contains large amount of cytoplasm and nutrients
        3) Surrounded by thick layer of follicular cells which may help supply the oocyte with nutrients.
    - **b. Oogenesis**
        1) In ovarian follicles within cortex of ovary
            a) Tens of millions of primary oocytes form in fetal development
            b) At birth, 1 million – by puberty 400,000
            c) Oocyte development happens only once a month
        2) Process
            a) 10 – 20 primary oocytes begin meiosis (46 chrom)
            b) each splits into 2 a secondary oocyte (23 chrom) and a polar body. S oocyte gets the majority of cytoplasm, polar body dies.
            c) S. oocyte divides again to form what may result in an ovum (23 chrom)

D. Reproductive physiology

1. Male reproductive physiology
    - **a. Stages of male reproduction**
        1) Erection – the swelling of the erectile tissuse (corpora cavernosa and corpus spongiosum) with blood
            a) Arteries entering penis vasodialate
            b) Veins vasoconstrict
            c) Blood accumulates in erectile tissues
        2) Orgasm – involuntary culmination of stumulation which triggers the release of sperm from testes
        3) Emission – the release of all of the secretions and sperm in the proper sequence.

a)) Bulbourethral gland – provide lubrication.

b)) Prostate - neutralize acidic environment of vagina

c)) Sperm

d)) Seminal fluid – nourishment of sperm

4) Ejaculation – the forceful expulsion of the emission from the open of the urethra in the glans penis.

4) Ejaculation – the

2. Physiology of female reproduction

a. Mentrual cycle

1) Menarch – 1st menstrual cycle

a) Ovaries are mature, hypothalamus and pituitary secrete hormones

b) Ovaries produce estrogen from testosterone

2) 28 day cycle

a) Days 4 – 13 (proliferation)

1)) ~12 follicles begin to mature (pit hormones) Follicular cells surround developing ovum.

2)) Uterine endometrium thickens

b) Day 14 (ovulation)

1)) 1 of the follicles bursts – a race- others break up and die.

2)) vacated follicle becomes corpus luteum. Secretes progesterone.

3)) Ovum is taken up by infund of fallop tube. 3 days

c)Days 15- 28 (secretory phase)

1)) Progesterone causes uterus to begin secreting glycogen, glucose and lipids to nourish potential sperm and embryo

c) Days 1-3 (Menstruation)

1)) If by 28th day, no embryo, Corpus luteum shuts down. Drop in progesterone causes built up endometrium to slough off and be discharged as menstrual flow.