Chapter 8

LECTURE OUTLINE

A. Introduction (p. 203)

1. The appendicular skeleton contains 126 bones that form:
    i. two **pectoral (shoulder) girdles**
    ii. two **upper limbs**
    iii. one **pelvic (hip) girdle**
    iv. two **lower limbs**

B. Pectoral (Shoulder) Girdle (p. 204)

1. The two pectoral girdles attach the bones of the upper limbs to the axial skeleton.
2. Each pectoral girdle consists of two bones (each having specific **surface markings**):
    i. **Clavicle** (collarbone)
        a. **sternal extremity** (contributes to the **sternoclavicular joint**)
        b. **acromial extremity** (contributes to the **acromioclavicular joint**)
        c. **conoid tubercle**
        d. **costal tuberosity**
    ii. **Scapula** (shoulder blade)
        a. **spine**
        b. **body**
        c. **acromion**
        d. **glenoid cavity (fossa)**
        e. **medial (vertebral) border**
        f. **lateral (axillary) border**
        g. **superior border**

h. **inferior angle**
i. **superior angle**
j. **scapular notch**
k. **coracoid process**
l. **supraspinous fossa**
m. **infraspinous fossa**
n. **subscapular fossa**

C. Upper Limb (Extremity) (p. 206)

1. Each upper limb contains 30 bones:
   i. **Humerus** is located in the arm;
      a. **head**
      b. **anatomical neck**
      c. **greater tubercle**
      d. **lesser tubercle**
      e. **intertubercular sulcus**
      f. **surgical neck**
      g. **body (shaft)**
      h. **deltoid tuberosity**
      i. **capitulum**
      j. **radial fossa**
      k. **trochlea**
      l. **coronoid fossa**
      m. **olecranon fossa**
      n. **medial epicondyle**
      o. **lateral epicondyle**
   ii. **Ulna** is located on the medial aspect of the forearm; its shaft is connected to the radius by the **interosseous membrane**
      a. **olecranon** (or **olecranon process**)
      b. **coronoid process**
      c. **trochlear notch**
      d. **ulnar tuberosity**
      e. **radial notch**
      f. **head**
      g. **styloid process**
   iii. **Radius** is located on the lateral aspect of the forearm;
      a. **head** and **neck**
      b. **radial tuberosity**
      c. **styloid process**
      d. **ulnar notch**
   iv. 8 **carpal** bones are located in the **carpus** (wrist);
      a. the proximal row contains (from lateral to medial position):
         - scaphoid
         - lunate
         - triquetrum
         - pisiform
      b. the distal row contains (from lateral to medial position):
         - trapezium
         - trapezoid
         - capitate
         - hamate

v. 5 **metacarpal** bones, numbered I to V (from lateral to medial position), are located in the **metacarpus** (palm); each bone consists of:
    a. proximal **base**
    b. intermediate **shaft**
    c. distal **head**

vi. 14 **phalanges** are located in the digits; each **phalanx** consists of:
    a. **base**
    b. **shaft**
    c. **head**

The thumb (**pollex**) has a **proximal phalanx** and a **distal phalanx**.
The other four fingers each have **proximal, middle,** and **distal phalanges.**

D. Pelvic (Hip) Girdle (p. 212)

1. The pelvic girdle provides a strong and stable support for the vertebral column and viscera.
2. The pelvic girdle consists of two **coxal** bones (hip bones) that meet anteriorly at the **pubic symphysis**.
3. Each coxal bone of a newborn consists of three bones which eventually fuse into one bone; these three bones (and their important **surface markings**) are:
    i. superior **ilium** consists of a superior **ala** and an inferior **body**
        a. **iliac crest**
        b. **anterior superior iliac spine**
        c. **anterior inferior iliac spine**
        d. **posterior superior iliac spine**
        e. **posterior inferior iliac spine**
        f. **greater sciatic notch**
        g. **iliac fossa**
        h. **iliac tuberosity**
        i. **auricular surface**
        j. **sacroiliac joint**
        k. **arcuate line**
        l. **posterior, anterior,** and **inferior gluteal lines**
    ii. inferior and posterior **ischium** consists of a superior **body** and an inferior **ramus**
        a. **ischial spine**
        b. **lesser sciatic notch**
        c. **ischial tuberosity**
        d. **ramus**
        e. **obturator foramen** (mostly closed by the **obturator membrane**)
    iii. inferior and anterior **pubis** (or **os pubis**)
        a. **superior ramus**
        b. **body**
        c. **inferior ramus**
        d. **pubic crest**
        e. **pubic tubercle**
        f. **iliopectineal line**
4. The **acetabulum,** a deep socket for the head of the femur, is formed by the fusion of the ilium, ischium, and pubis; it has an inferior **acetabular notch**.
5. The **pelvis** consists of the two coxal bones plus the sacrum and coccyx; important features include:
        a. **pelvic brim**

b. **false (greater) pelvis**
c. **true (lesser) pelvis**
d. **pelvic inlet**
e. **pelvic outlet**
f. **pelvic axis**

E. Female and Male Pelves (p. 216)

1. In comparison to female bones, male bones in general:
    i. are larger and heavier
    ii. have thicker articular ends
    iii. have larger points of muscle attachment (due to larger muscles)
2. Many significant differences are located in the female pelvis due to adaptations for pregnancy and childbirth; the female pelvis has several important characteristics(see Table 8.1):
    i. the greater pelvis is shallow
    ii. the pelvic inlet is larger and more oval
    iii. the **pubic arch** has a greater than 90 degree angle
    iv. the pelvic outlet is wider
    v. the ilium is less vertical
    vi. the greater sciatic notch is wide
    vii. the iliac crest is less curved
    viii. the acetabulum is small and faces anteriorly
    ix. the obturator foramen is oval

F. Comparison of Pectoral and Pelvic Girdles (p. 218)

1. Structural differences include:
    i. the pectoral girdles do not articulate directly with the spine
    ii. the glenoid fossae are shallow while the acetabula are deep
    iii. the pectoral girdles offer more mobility while the pelvic girdle offers more strength

G. Lower Limb (Extremity) (p. 218)

1. Each lower extremity contains 30 bones:
    i. **Femur** (thighbone) is located in the thigh;
        a. **body (shaft)**
        b. **head**
        c. **fovea capitis**
        d. **neck**
        e. **greater trochanter**
        f. **lesser trochanter**
        g. **intertrochanteric line**
        h. **intertrochanteric crest**
        i. **gluteal tuberosity**
        j. **linea aspera**
        k. **medial condyle**
        l. **lateral condyle**
        m. **medial epicondyle**
        n. **lateral epicondyle**
        o. **intercondylar fossa**
        p. **patellar surface**
    ii. **Patella** (kneecap) is a sesamoid bone;

a. **base**
b. **apex**
c. **articular facets**

iii. **Tibia** (shin bone) is the larger and medial bone in the leg (and it is connected to the fibula by the interosseous membrane):
a. **lateral condyle**
b. **medial condyle**
c. **intercondylar eminence**
d. **tibial tuberosity**
e. **anterior border (crest)**
f. **medial malleolus**
g. **fibular notch**

iv. **Fibula** is the lateral bone in the leg:
a. **head**
b. **lateral malleolus**

v. The **tarsus** (ankle) consists of 7 **tarsal** bones:
a. **talus**
b. **calcaneus** (heel bone)
c. **cuboid**
d. **navicular**
e. **first (medial) cuneiform**
f. **second (intermediate) cuneiform**
g. **third (lateral) cuneiform**

vi. The **metatarsus** consists of 5 **metatarsal** bones, numbered I to V from the medial to lateral position; each bone consists of:
a. **base**
b. **shaft**
c. **head**

vii. 14 **phalanges** are located in the toes; each **phalanx** consists of:
a. **base**
b. **shaft**
c. **head**

The big toe (**hallux**) has a **proximal phalanx** and a **distal phalanx.**
The other four toes each have **proximal, middle,** and **distal phalanges**.

viii. The bones of the foot are arranged to form two nonrigid **arches**:
a. **longitudinal arch** (with **medial** and **lateral parts**)
b. **transverse arch**

These arches enable the foot to support the weight of the body, provide an ideal distribution of body weight over tissues of the foot, and provide leverage while walking.

H. Development of the Skeletal System (p. 225)

1. All skeletal tissue arises from mesenchymal cells that are derived from **mesoderm**.
2. In some cases, bones develop via intramembranous ossification; in other cases, bones develop via endochondral ossification.
3. The skull develops from mesenchyme and consists of 2 major portions:
   i. **neurocranium**, which consists of the **cartilaginous neurocranium** and the **membranous neurocranium**
   ii. **viscerocranium**, which consists of the **cartilaginous viscerocranium** and the **membranous viscerocranium**
4. The vertebrae are derived from the sclerotomes of somites.

5. Processes from the vertebrae develop into ribs; the sternum develops from mesoderm in the ventral body wall.
6. The skeleton of the limbs originates at **upper** and **lower limb buds**, which consist of **mesenchyme** covered by **ectoderm**.
7. Distal segments of the limb buds develop into **hand plates** and **foot plates**.
8. Ossification progresses at a specific pace throughout the weeks of fetal development.

I. Key Medical Terms Associated with the Appendicular Skeleton (p. 226)

1. Students should familiarize themselves with the glossary of key medical terms.