The Pelvis and Lower Appendicular Skeleton

Pelvic Girdle:
You have already studied the axial skeleton and the upper appendicular skeleton. In this lab you will look at the bones that constitute the pelvis and lower extremities, otherwise known as the lower portion of the appendicular skeleton.

The pelvic girdle is composed of the left and right hip bones (ossa coxae) only. Whereas the pelvis is composed of four bones, the sacrum and coccyx of the axial skeleton and the left and rightossa coxae.
The os coxae (or innominate) is commonly referred to as the hip bone (see above). However, this bone is composed of three separate bones that have fused to be one; the ilium, the ischium, and the pubis. Fusion of these three bones occurs between the ages of 13-15.

A. Identify the common landmarks of the hip bone. Common landmarks are structures that are formed by at least 2 of the 3 bones of the innominate.
   i. Acetabulum – the acetabulum is the point of articulation for the head of the femur.
   ii. Obturator foramen – the obturator foramen allows passage of muscles and blood vessels.

B. Ilium –
   Use your text to identify the features of the ilium, the bone that effectively composes the “wings” of the os coxae.
   i. Iliac fossa
   ii. Iliac crest
   iii. Posterior superior iliac spine
   iv. Posterior inferior iliac spine
   v. Anterior superior iliac spine
   vi. Anterior inferior iliac spine
   vii. Greater sciatic notch
   viii. Auricular surface
From examining these structures on the bones, fill in the blanks on the following questions

1. When someone places their hands on their hips, they are touching their ________________________.

2. The iliac crest extends from the ________________________ to the ________________________.

3. The most likely feature of the ilium that allows the sciatic nerve to pass is the ________________________.

4. ________________________ is the point of articulation between the ilium and the sacrum.

C. Ischium

Using your text again, identify the following structures on the ischium.

i. Ischial tuberosity

ii. Ischial spine

From examining these structures on the bones, fill in the blanks on the following questions

1. The ________________________ also known as the “sits bones” are often found as a base in the practice of yoga.

D. Pubis

Using your text again, identify the final bone of the os coxae, the pubis.

Using your text again, identify the following structures on the pubis.

i. Pubic symphysis
From your previous labs, recall the differences in the male and female pelvis. List three of those differences and the bones involved below.

1._____________________________________________

2._____________________________________________

3._____________________________________________

E. The final aspect of examining the os coxae is determining whether you are looking at the right side or the left side. There are many tricks to doing this and feel free to develop your own. However, one that has proven beneficial to students in the past is as follows: placing the os coxae in this position will reveal if it is a left or right.

a. Use the os coxae as a telephone
b. The acetabulum is facing lateral
c. The obturator foramen is the mouthpiece
d. The medial side of the ilium is the ear piece
e. The ischial tuberosity and greater sciatic notch are posterior.

   1. Is the os coxae in front of you a LEFT or a RIGHT?
THE LOWER LIMB

The lower limb consists of 29 bones in each limb. Not all of these bones are present at birth, one of these bones develops because of stress and pressure on a tendon in a certain area, also known as a sesamoid bone (a bone that develops over time).

Which bone of the lower limb do you think is absent at birth? ____________________________

As you study the bones of the lower limb it is a very good idea to compare and contrast them with the bones of the upper limb. There are many similarities, however, there are also several differences. Throughout the next section you will be asked to name many of these similarities and differences.

A. Identify the only bone found in the femoral region. You will need to be able to distinguish the proximal end from the distal end.

Locate the following structures on the proximal end.

i. Head – round ball that articulates with the acetabulum
ii. Lesser trochanter – small posterior protrusion
iii. Greater trochanter – larger lateral protrusion
Recalling the information from your first lab, which trochanter will have either more or stronger muscles attached to it, or both and how do you know this?

b. Locate the following structures on the shaft of the femur.
   i. Linea aspera – vertical line on the posterior aspect of the femur.

   c. The distal end of the femur resembles the foot of a moose. You can notice many rounded smooth surfaces. These are points of articulation with other bones, and known as condyles. Typically above each condyle will be a point of muscular or ligamentous attachment, or epicondyle. Use your text to identify the following structures and apply this information to answer the questions.
      i. Medial condyle
      ii. Medial epicondyle
      iii. Lateral condyle
      iv. Lateral epicondyle
      v. Intercondylar fossa
      vi. Patellar surface
      vii. Popliteal surface

Putting the knowledge you have about the femur into a cohesive package, determine whether the bone you are looking at is a right or left (remember the head is medial and linea aspera is posterior!)

   RIGHT of LEFT

B. The next bone you are required to identify is the patella, do so now.
C. You will now be examining the bones of the crural region. This lower region of the lower limb consist of 2 bones, the larger and more stout tibia, and the smaller and thinner fibula.

Using knowledge from pervious labs, which bone of the crural region do you believe to be the weight bearing bone and why?

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

D. The first bone of the crural region that you will identify is the tibia. The tibia is the larger bone of the crural region. It is also located on the medial aspect.

a. Locate the following structure on the proximal end of the tibia. As a clue, the proximal end is the larger flattened end that articulates directly with the femur.
   i. Medial condyle
   ii. Lateral condyle
   iii. Intercondylar eminence
   iv. Fibular articular facet – this facet articulates with the other bone of the crural region, the fibula. It is located on the lateral aspect just below the articulation points with the femur (this information will help in determining whether the tibia is a right or left)

b. Locate the following structures on the shaft of the tibia. As a clue, the prominent ridge is anterior.
   i. Tibial tuberosity
   ii. Anterior crest

c. The distal end of the tibia has three structures of anatomical significance. Locate them now.
   i. Medial malleolus
   ii. Articular surface for talus
   iii. Fibular notch
Using the fully articulated skeleton and the bone in front of you, answer the following questions:

1. Which bone does the tibia articulate with, forming the joint we commonly call the knee? ______________________________
2. Is the fibula (the other one in the crural region) lateral or medial to the tibia?_______________________
3. Which three structures of the tibia are easily palpable on your body? ________________________________,
   ______________________, and ______________________
4. Is the bone in the bone box you are using a RIGHT or LEFT tibia?_______________________

E. The second and final bone of the crural region is the fibula. Find it now. Using your text, identify the following structures on the fibula.
   i. Head
   ii. Lateral malleolus

Using your knowledge on the crural region as well as your own body to palpate and the fully articulated skeleton; answer the following questions:
1. A boot line fracture is the term used to describe breaking a bone of the crural region as one falls while skiing. Explain which bone this most likely refers to and why:

2. Which two structures of the crural region are commonly incorrectly referred to as the “ankle”, and what purpose might these two structures serve:

F. The final region of the lower limb for you to identify is the pedal region. There are many similarities between the pedal and manus regions, the most noticeable being the phalanges. Identify the foot from your bone box. Use your text to locate and identify the following bones:

a. Locate the tarsal bones: The bones are comparable to the carpal bones of the manus.
   i. Talus
   ii. Calcaneus
   iii. Cuboid
   iv. Navicular (a common memory technique is the remember that the navicular “navigates” the cuneiform bones)

v. Three cuneiform bones
   1. Medial
   2. Intermediate
   3. Lateral
b. Locate the metatarsal bones: (these bones are comparable to the metacarpal bones of the manus).
   
i. Identify these bones as I through V from medial to lateral.

c. Locate the phalanges: (these bones are comparable to the phalanges of the manus). Take note, as you will see this word several times throughout this semester in lab, hallux refers to the great toe (commonly called the “big toe”).
   
i. Identify the phalanges. The are numbered and in a similar arrangement to the phalanges of the manus, with the only difference being proximal and distal phalanx one is medial.
   
1. Proximal, middle (where applicable), distal phalanx I through V.
Using your knowledge about the dynamic nature of bone, as well as your own body, your text, and the fully articulated skeleton: answer the following questions.

1. Which two bones make up the joint commonly referred to as the “ankle”? ______________________________

2. In reference to the above question, what do you believe the functions of the medial and lateral malleolus include and why? __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

3. Based on your examination and knowledge of the bones, which tarsal do you believe bears the most weight? What evidence would you use to support your hypothesis?
   __________________________________________
   __________________________________________
   __________________________________________

4. Why is it very difficult to break the phalanges of your 5th toe? ______________________________
   __________________________________________
   __________________________________________