

### ACTIVITY #1: Limb Homology

1. Name the bone labeled 153.
2. What was the evidence that you used to draw your conclusion?
3. From the evidence supplied at this activity and around the room at other activities, what bone or group of bones of the forelimb show the most variation? Why do you think they are so variable?
4. For what do you think the limb labeled Specimen A is used? What morphological qualities of the limb labeled Specimen A, suggest a specialized function? What if any, is the specialized function?

ACTIVITY #2: Vertebrate Skeletons

1. Which two specimens (A, B, C, D, E, F, or G – in blue tape) look the most similar to you? Do you think that makes them the most closely related compared to all the other organisms?
  
2. What evidence did you use to draw your conclusion? You may answer generally, but give at least one specific line of evidence.
  
3. In specimen B, the bone labeled #1 is homologous to which bone(s) labeled X, Y, Z, or *none* in the bird? ...to which bone(s) labeled X, Y, Z or *none* in the human?

### ACTIVITY #3: Ungulate Limbs

1. The bone labeled #1 is homologous to which labeled bones in the other two limbs? To what bones on the human skeleton?
2. In Figure 3.2 and Figure 3.3, phalanges are labeled in Roman numeral 1-V and Using that numbering system, list the bones that are completely lost in specimen A.
3. Which bones are extremely reduced in specimen A?
4. Out of the three organisms (represented by the three limb specimens), which are the most closely related? Draw a phylogenetic tree representing your proposed relationships. (Hint: Start by writing down the taxa. Connect the two most closely related).

ACTIVITY #4: Hominoids and out-group.

This ACTIVITY has 7 skulls; 1.) a human skull, 2.) a gorilla skull, 3.) a chimpanzee skull, 4.) a baboon skull, 5.) a lemur skull, 6.) a gibbon skull, 7.) an orangutan skull and 8.) a dog skull used as an out-group for character coding. The following questions will help “determine character polarity” for Foramen magnum (FM) location. That is to say, by using a distantly related species (canine in this case) a researcher can make an educated guess as to which character states are ancestral (older) and which are derived (more recent). Derived traits are used to help determine a new branch on a phylogenetic tree. Ancestral traits are traits shared by all taxa or once shared. Derived traits are new and can represent a new species diverging away from a common ancestor. The character in this case was Foramen magnum location and the character states were medial vs. distal.

1. Carefully pick up skulls and locate the Foramen magnum (FM) on all specimens. It is the empty, round hole (or filled in with black casting) on the underside of the skull. What is the function of the FM?
2. If the dog (labeled E) is the most distantly related taxon among all the specimens, what do you think is the more ancestral character state, a FM located more medially towards the center of gravity or a FM located more distally further away from the center of gravity?
3. Considering that bipedalism is related to the location of the FM, do you think bipedalism is an ancestral or derived trait?
4. List two other characters useful in analyzing skulls and identify the ancestral state for each?

ACTIVITY # 5: Hominids – Bi-pedal, non-ape lineage including *Homo sapiens*

1. Draw a phylogenetic tree of the 7 specimens based solely on the character “size of skull”. Use the capital letters as taxa names.

Small D E G F B A C Large

2. Do you think overall size is a useful character? Why or why not?

3. Draw a final tree based on your gut instincts (Gestalt) as to the real relationship between the taxa represented by these 7 specimens. (For some ideas, see chapter 6, pp - 205-230 in Photographic Atlas for Physical Anthropology, Whitehead et al.).

4. What character(s) most influenced your tree branching pattern?