Vertebral Column and Upper Appendicular Skeleton

The **axial skeleton** consists of 80 bones in the head and trunk of the human body. In this lab you will look at the vertebral column, just one part of that axial skeleton. The word “axial” comes from “axis” and refers to those bones located close or along the central axis of the body.

The **appendicular skeleton** consists of 120 bones and is made up of the “appendages” connected to the axial skeleton. The word “appendage” means a part that is joined to something larger. In this lab we will look at three sections of the upper appendicular skeleton. The first is the arms and forearms made up of 6 bones, the second is the pectoral girdle made up of four bones, and the third being the hands, made up of 58 bones.

### Vertebral Column

The vertebral column consists of 33 bones. The sections are listed below.

- Cervical: 7 bones
- Thoracic: 12 bones
- Lumbar: 5 bones
- Sacral: 5 bones
- Coccygeal: 4 bones

How to remember the first three sections?

- Breakfast @ 7
- Lunch @ 12
- Dinner @ 5

The sacral bones are fused and the coccygeal bones may be separate or fused and vary in number from 3-5.

Is there any function for the “tail” bones?

What determines whether a vertebra is thoracic?
A. Visit one of the skeletons in lab and notice the curvature of the spine while looking at it laterally. How many curves do you see?_____________________

Which section(s) exhibits a concave curve? (curving anteriorly)

____________________________________

Which section(s) exhibits a convex curve? (curving posteriorly)

____________________________________

Is this curvature normal? _________. Why do we need it? _________________

__________________________________________________________________

__________________________________________________________________

When the curvature in side view is concave, we call it lordosis. When the curvature in side view is convex, we call it kyphosis. Determine the appropriate names for the four curvatures:

The cervical curve is a __________________
The thoracic curvature is a ________________
The lumbar curve is a ___________________
The sacral curve is a ______________________

What kind of a curvature is scoliosis? ________________

__________________________________________________________________.

Is scoliosis a normal curvature of the spine? _________

__________________________________________________________________.

Name the sections 1-5.

1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
Name the bones 6-7

6. __________________________
7. __________________________

B. Collect all the vertebrae out of your bone plastic box. Lay them out in front of you and determine which is cervical, thoracic or lumbar. Use the skeleton or diagrams to match them up.

C. On a vertebra from each region, use your text to identify the following structures:

- body
- vertebral foramen
- transverse process
- spinous process
- intervertebral foramen
- lamina
- pedicle
- superior articular facet
- inferior articular facet

For these two last structures, note how their positioning differs in the thoracic and lumbar vertebrae.

Fill in the blanks with *thoracic or lumbar*.

The superior articular facets that tend to point more posteriorly and only slightly laterally are on the ____________________ vertebrae.

The inferior articular facets that tend to point anteriorly and slightly medially are on the ____________________ vertebrae.

The superior articular facets directed medially are on the ____________________ vertebrae.

The inferior articular facets directed more laterally are on the ____________________ vertebrae.
Why would the orientation of the facets vary in the thoracic and lumbar vertebrae? 
*(Hint: Think of the movement involved)*

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D. Still using your text, identify the structures specific to the Cervical Vertebrae

- C1 or atlas
- C2 or axis
- dens (odontoid process)
- bifid spinous process
- transverse foramen

E. Identify the structures specific to the Thoracic Vertebra

- transverse costal facet

F. Identify the structures specific to the Sacral Vertebra

- sacrum
- sacral foramina
- auricular surface
G. Once you have studied the structures on the bones of the four regions, practice again by filling in the blanks naming the structures indicated on a thoracic vertebra.

1. ________________________  
2. ________________________  
3. ________________________  
4. ________________________  
5. ________________________  
6. ________________________  
7. ________________________

**Sternum and Ribs**

The sternum is the flat, vertically elongated bone that forms the middle of the anterior part of the thoracic cage. Identify the three parts of the sternum:

- manubrium
- body
- xiphoid process

Locate the notches found on the manubrium. These are the:

- jugular notch
- clavicular notch

The ribs are curved, flat bones that form most of the thoracic cage. They are very light in weight, yet highly resilient. There are three types of ribs:

- true ribs (1-7) Attach to the sternum through their own costal cartilages.
- false ribs (8-10) Their connection to the sternum is indirect.
- floating ribs (11-12) Do not connect to the sternum at all.
Upper Appendicular Skeleton

Clavicle

This bone (collarbone) connects the upper limb to the trunk, articulating with the sternum and scapula. The clavicle serves as a rigid support that keeps the arm away from the thorax so that the arm has maximum freedom of motion. Observe the clavicle and learn to distinguish the right clavicle from the left. Use the skeleton in class.

- Notice which is the sternal (medial) end of the bone. Is it the blunt end or the rounded end? ________________.
- How do you tell which region is superior and which is inferior? ______
  ____________________________________________________________________.
- Is the medial two thirds of the clavicle convex anteriorly or posteriorly?
  ______________________. (i.e. does it curve to the front or to the back)

Identify the:

- conoid tubercle

Is this structure anterior or posterior? Inferior or superior?

______________________________________________________________________.

Scapula

The scapula is commonly called the shoulder blade. It articulates with the clavicle and the humerus. Learn to identify the right from the left. The borders should help you identify the side. Identify the bulleted terms.
A. Borders of the scapula
   • superior
   • medial (vertebral)
   • lateral (axillary)

B. Body of the scapula
   • glenoid cavity
   • spine of the scapula
   • coracoid process
   • acromion process

Once you have studied the structures on the bone itself, practice again by filling in the blanks naming the structures indicated on the diagram.

1. ______leave blank____________
2. ___________________________
3. ___________________________
4. ___________________________
5. ___________________________
6. ___________________________

Humerus

Obtain the humerus from the box of bones. Identify if it is from the right or left side of the body.

How can you tell? _____________________________________________________________.

Using your text, identify the following structures on the bone:
A. Proximal end

- head
- greater tubercle
- lesser tubercle
- intertubercular sulcus (groove)

B. Shaft

- deltoid tuberosity

C. Distal End

- medial epicondyle
- lateral epicondyle
- trochlea
- capitulum
- olecranon fossa
- coronoid fossa
- lateral supercondylar ridge

Does the medial epicondyle point medially or laterally? _______________________

Is the medial epicondyle closer to the trochlea or to the capitulum? ______________

The capitulum has one or two protrusions? _________________________________

The trochlea has one or two protrusions? _________________________________

Is it the trochlea or the capitulum that looks like a spool of thread? __________

How would you describe the capitulum? _________________________________

Is the olecranon fossa anterior or posterior? ______________________________

Is the greater tubercle anterior or lateral? ________________________________

Is the lesser tubercle anterior, medial or lateral? __________________________

Is the coronoid fossa anterior or posterior? ________________________________
Radius

A. Proximal end
   • head
   • radial tuberosity

B. Distal end
   • styloid process
   • ulnar notch

What is the meaning of styloid? ________________________________

Why is the head of the Radius so Rounded? ______________________

Which way does the styloid process point? _______________________

How can you tell left from right? ________________________________

Is the radius lateral or medial in the forearm? ____________________

While pronating, does the radius or ulna move most? ______________

Ulna  This bone spells “U”

A. Proximal end
   • trochlear notch
   • olecranon process
   • coronoid process
   • radial notch

B. Distal end
   • styloid process

What bones that you have studied so far have a styloid process? ______________

_________________________________________

The olecranon process hooks into which fossa? ____________________________
Is the radial notch on the radius or on the ulna? _________________________________

The trochlear notch will hinge onto which structure? _______________________________

Is the ulna medial or lateral in the forearm? _____________________________________

Can you tell a right ulna from a left? __________________________________________

Is the radial notch medial or lateral? __________________________________________

Bones of the Hand

A. Carpals

Eight bones make up the carpals, or bones of the wrist. It is easiest to think of them as
being in two rows of 4 bones in each row. Start always with the proximal row and begin
from the medial side.

- scaphoid
- lunate
- triquetrum
- pisiform
- trapezium
- trapezoid
- capitate
- hamate

B. Metacarpals

These are the bones of the palm of your hand. They are numbered one through five (in
roman numerals) from lateral to medial. Label metacarpals I,II,III,IV and V.

C. Phalanges  (Singular= phalanx)

These are the fingers. Three bones make up each digit except for the thumb that has two.
They are referred to as proximal phalanx, middle phalanx and distal phalanx.