



Musculoskeletal system

Appendicular system

Anatomy lecture # 2

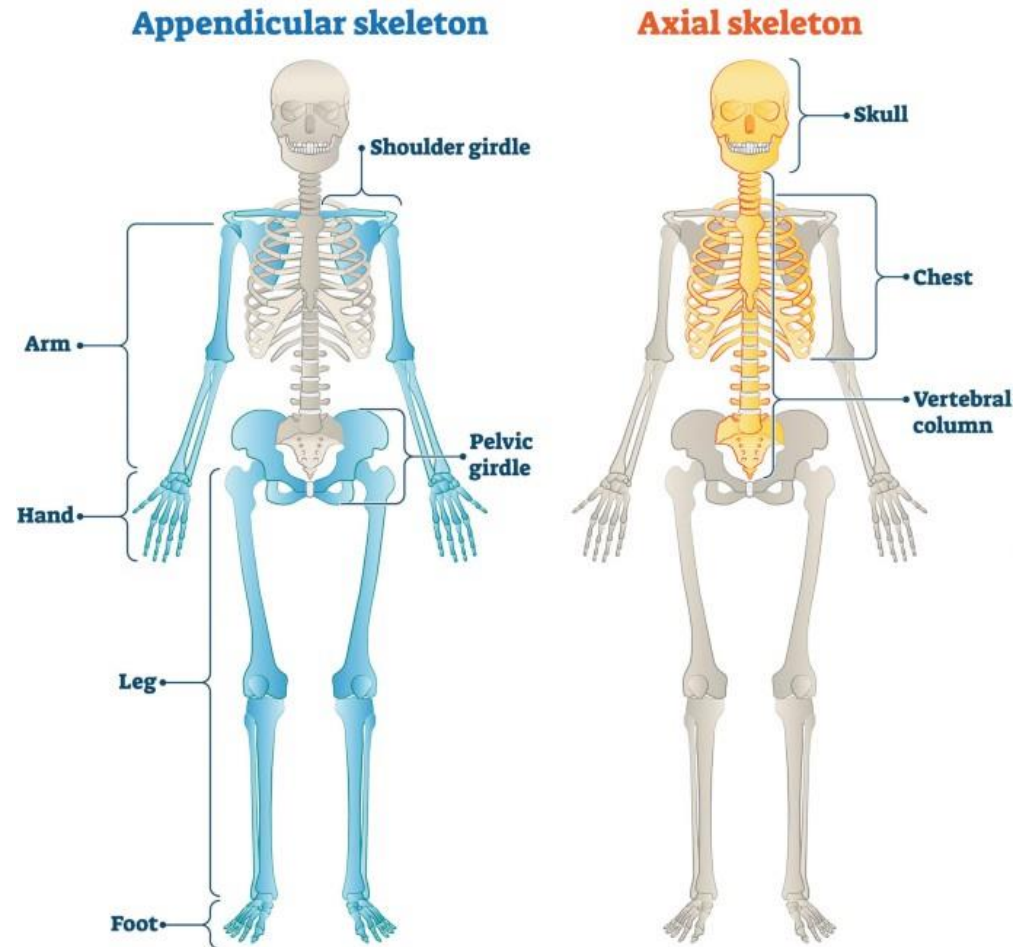
Anatomy of upper limb

By Heba Ali
DDS, MSc, PhD (UK)



DIVISIONS OF THE SKELETAL SYSTEM

The **axial skeleton** consists of the elements forming the central axis of the body. The **appendicular skeleton** consists of the bones forming the upper and lower limb girdles and extremities.

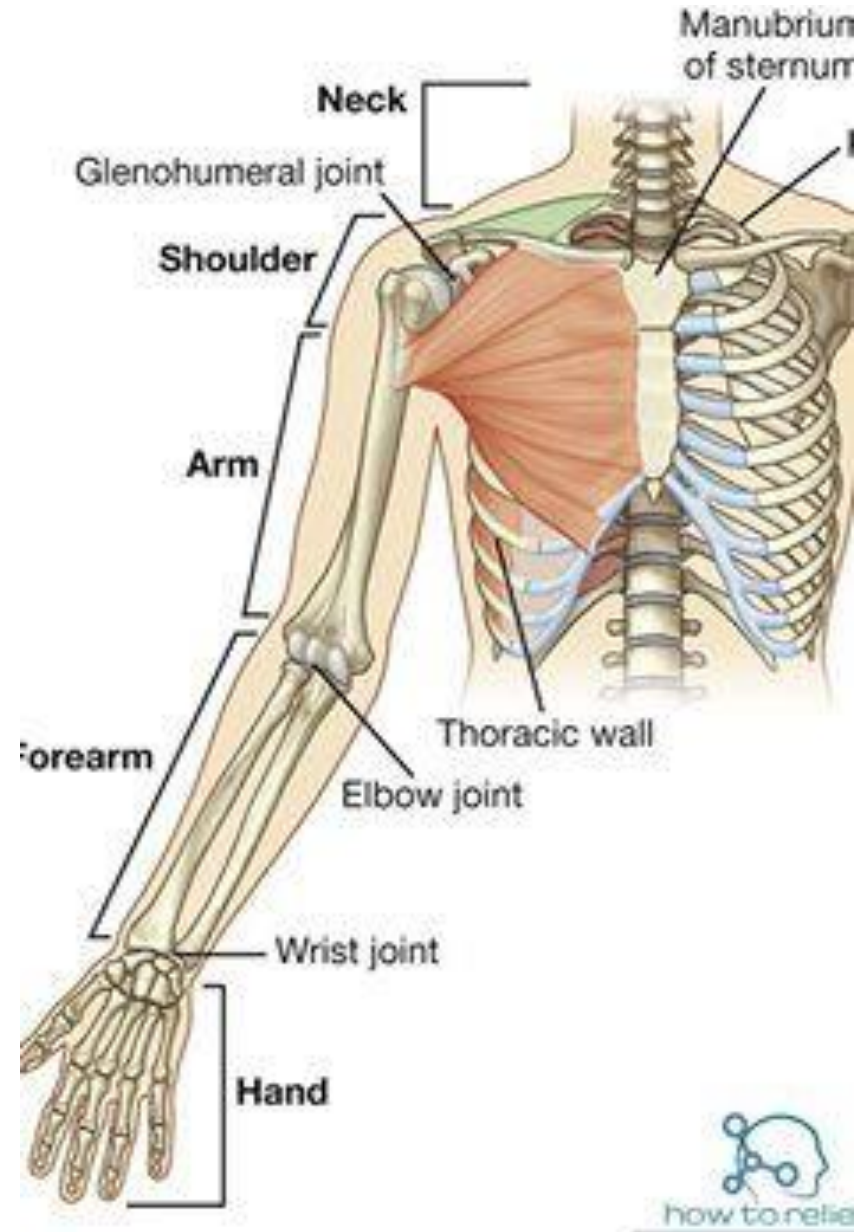


Objectives

1. Identify the specific anatomical regions of the upper limb.
2. Identify the bones of the upper limb and their major anatomical features.
3. Identify the muscles of the upper limb, their attachments, actions and innervation
4. Describe the anatomy of the axilla, cubital fossa and identify its contents.
5. Define the components of the shoulder complex. Identify the muscles of the shoulder, indicating their attachments, innervation, and major actions.
6. Identify the muscles composing the “rotator cuff.” Describe the functional significance of this group.

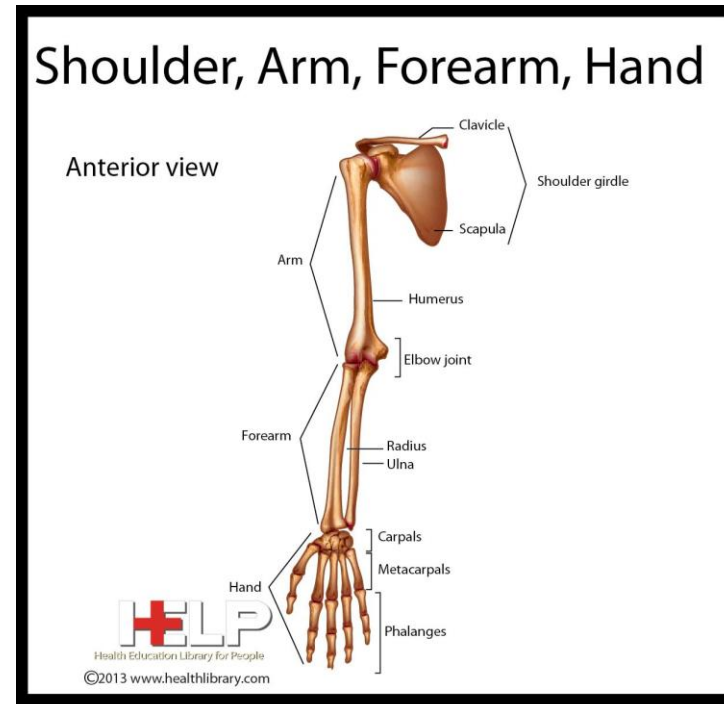
UPPER LIMB REGIONS

- The shoulder, arm, elbow, forearm, wrist, and hand.
- **The shoulder** is a complex region connecting the trunk with the upper limb and can be divided into three parts: **pectoral region**, **scapular region**, and **axilla**.

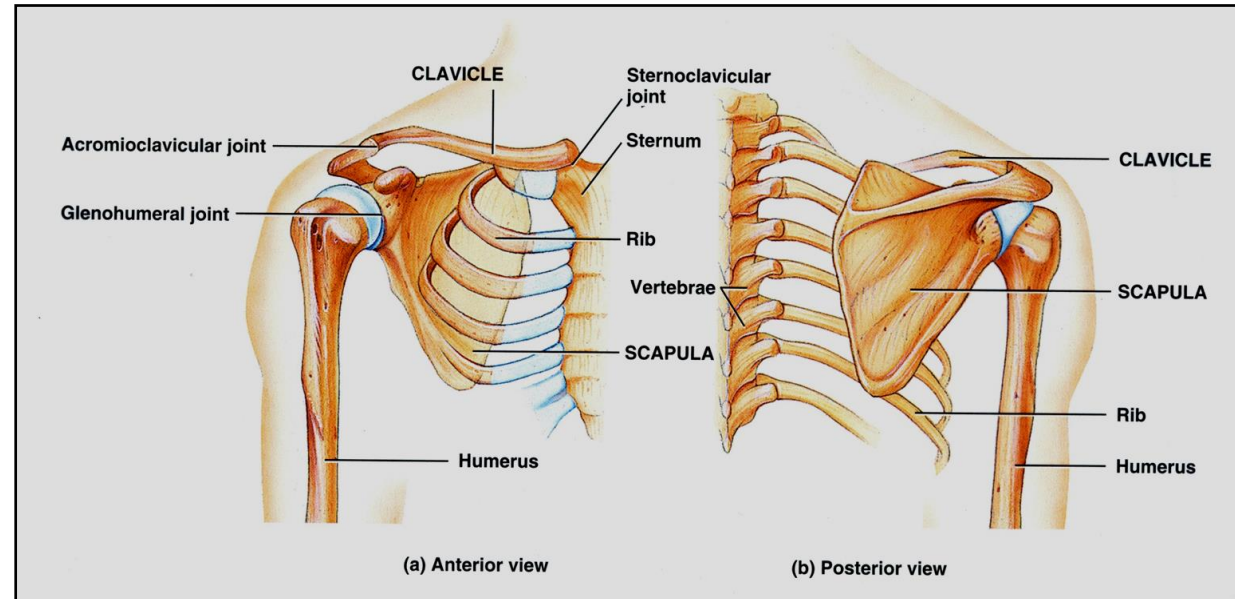


Bones of upper limb

- The upper limb is a component of the appendicular skeleton. The bones included here are the **clavicle**, **scapula**, **humerus**, **ulna**, **radius**, **carpal bones**, **metacarpal bones**, and **phalanges**.

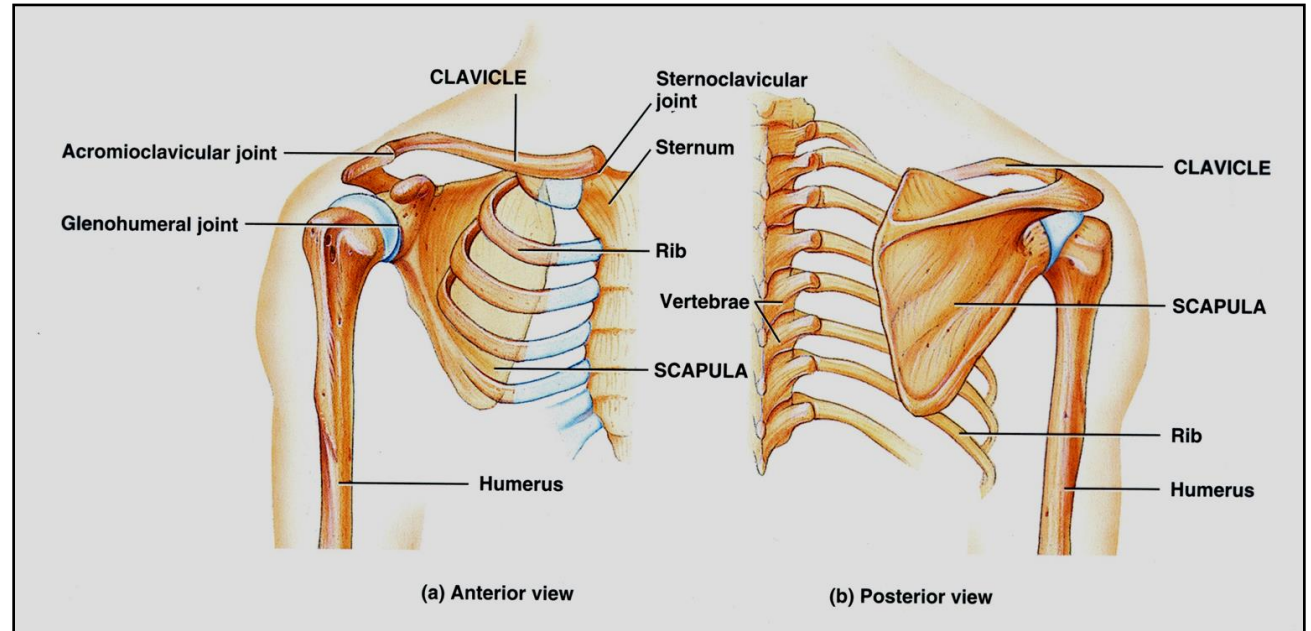


- The clavicle and scapula form **the shoulder girdle**.



Clavicle

- Located between the sternum and the scapula
- Lies horizontally across the root of the neck
- S-shaped and resembles a large, old-style key.
- Connects the upper limb to the thorax and allows the limb to move freely from the trunk , “strut”.
- The clavicle is subcutaneous and easily palpable along its entire length.
- The medial two-thirds of the clavicle is convex anteriorly, whereas the lateral one-third is concave anteriorly.
- The superior surface of the clavicle is smooth, whereas the inferior surface is rough.



Clavicle

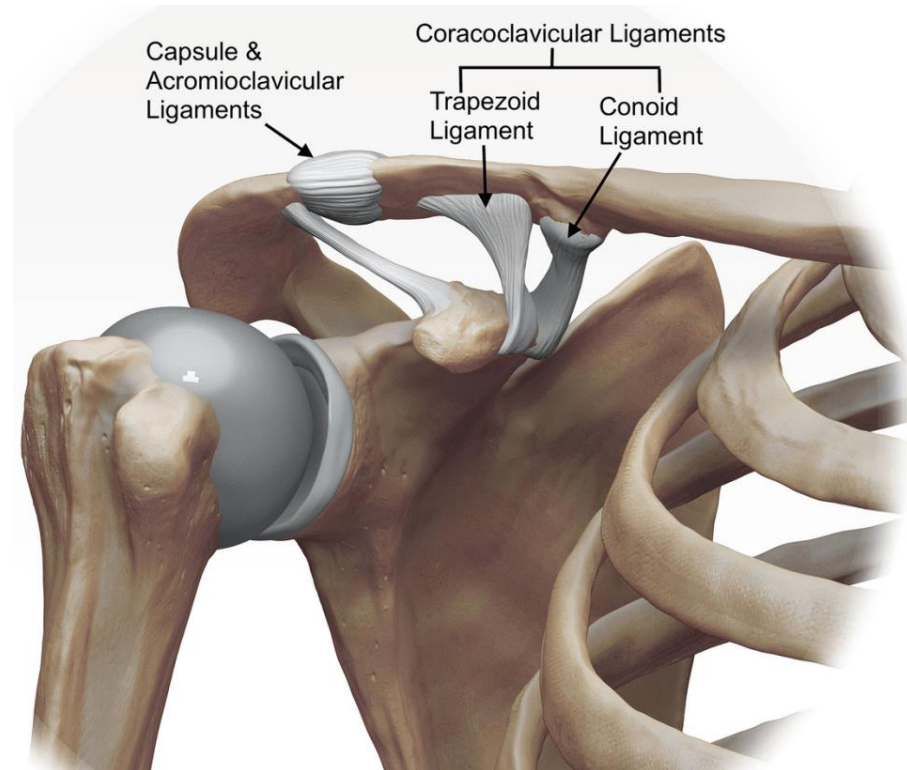
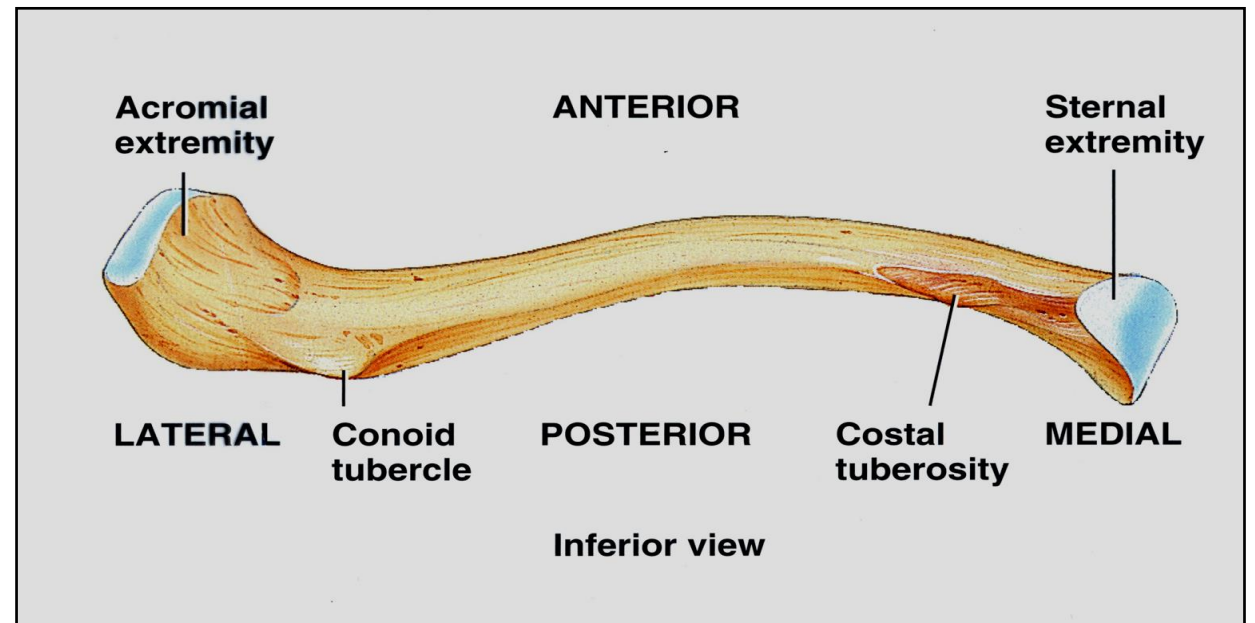
- Has two ends:

1. Sternal extremity: it is rounded & articulates with manubrium part of sternum to form **sterno-clavicular joint**.

2. Acromial extremity

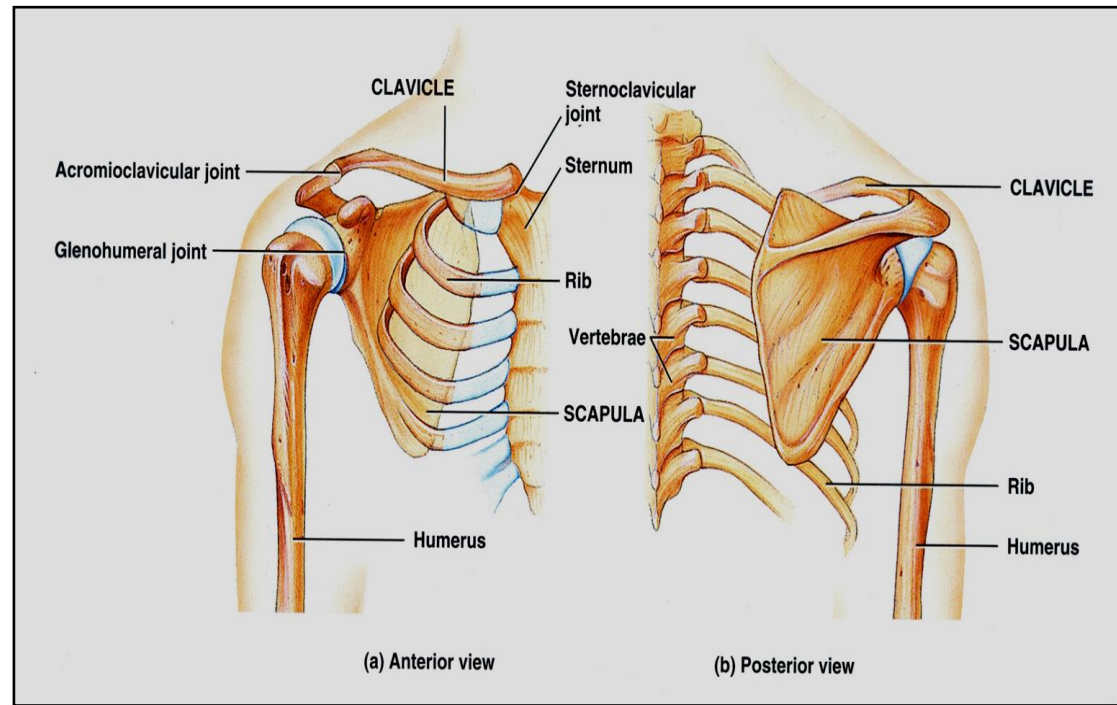
is broad and flat & articulates with the acromion process of scapula to form acromio-clavicular joint.

The conoid tubercle is a small, roughened elevation on the inferior surface, near the acromial end. This serves as the attachment area for the conoid ligament part of the **coracoclavicular ligament**.

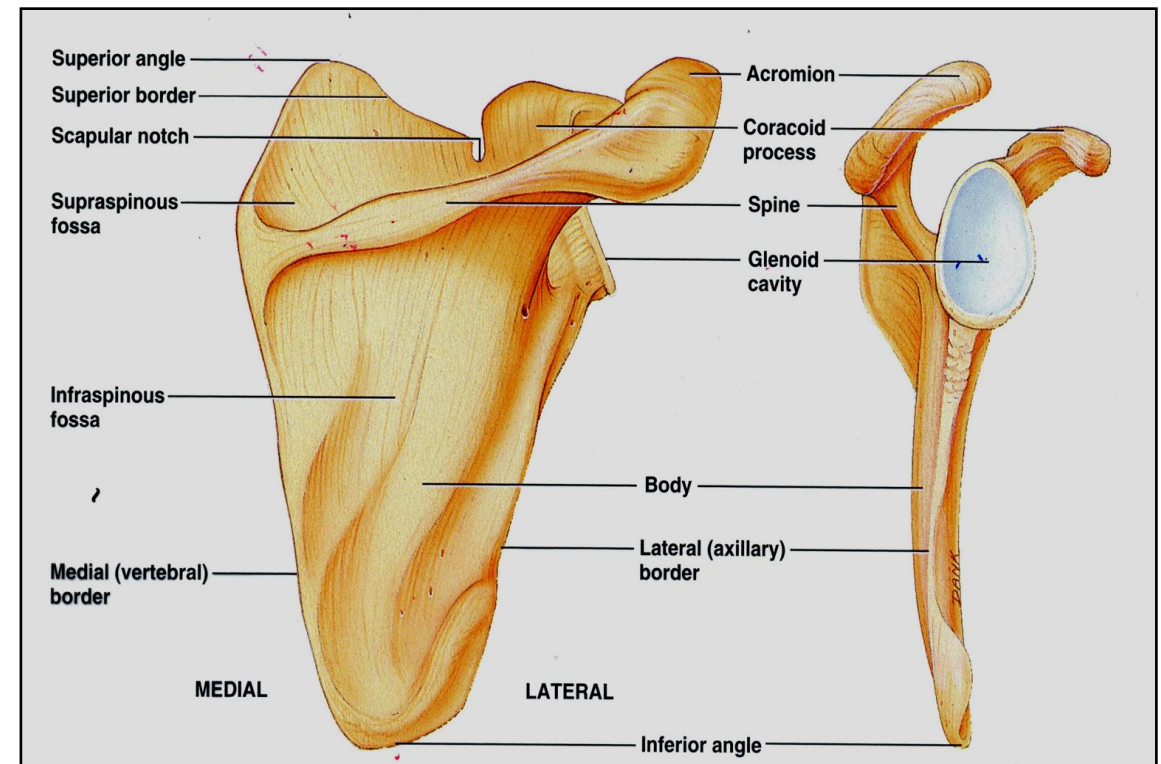
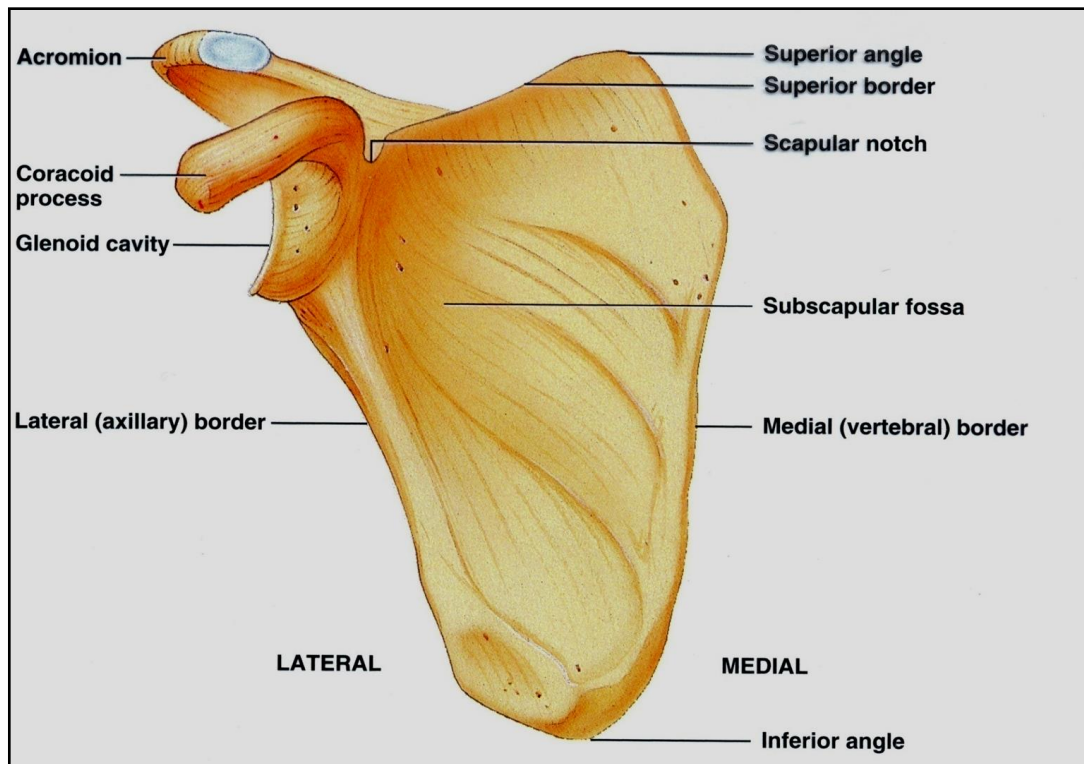


Scapula

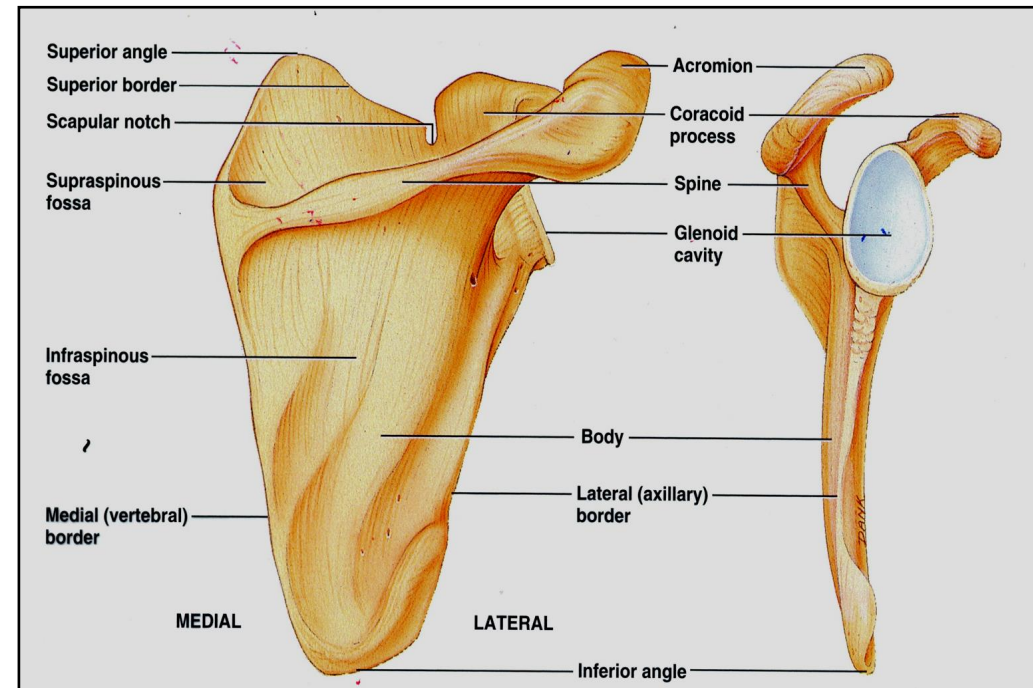
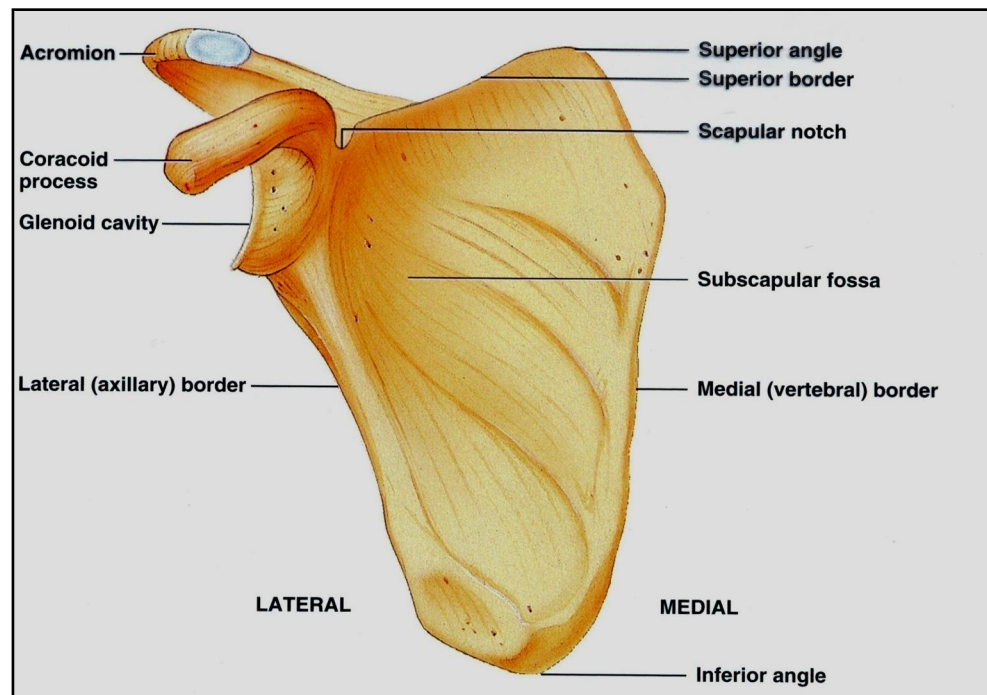
- Shoulder bone
- Floating freely posteriorly
- a large, flat, triangular bone that **lies on the posterior chest wall between the second and seventh ribs**
- Articulates with the acromial extremity of the clavicle and the head of the humerus



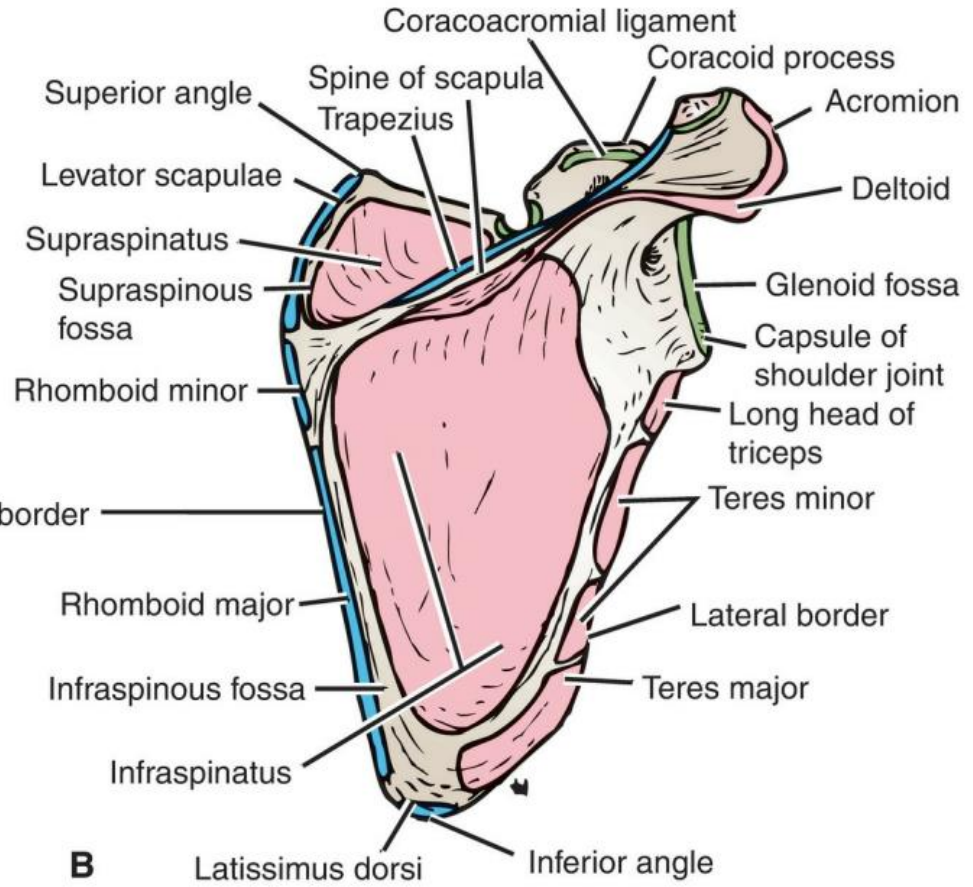
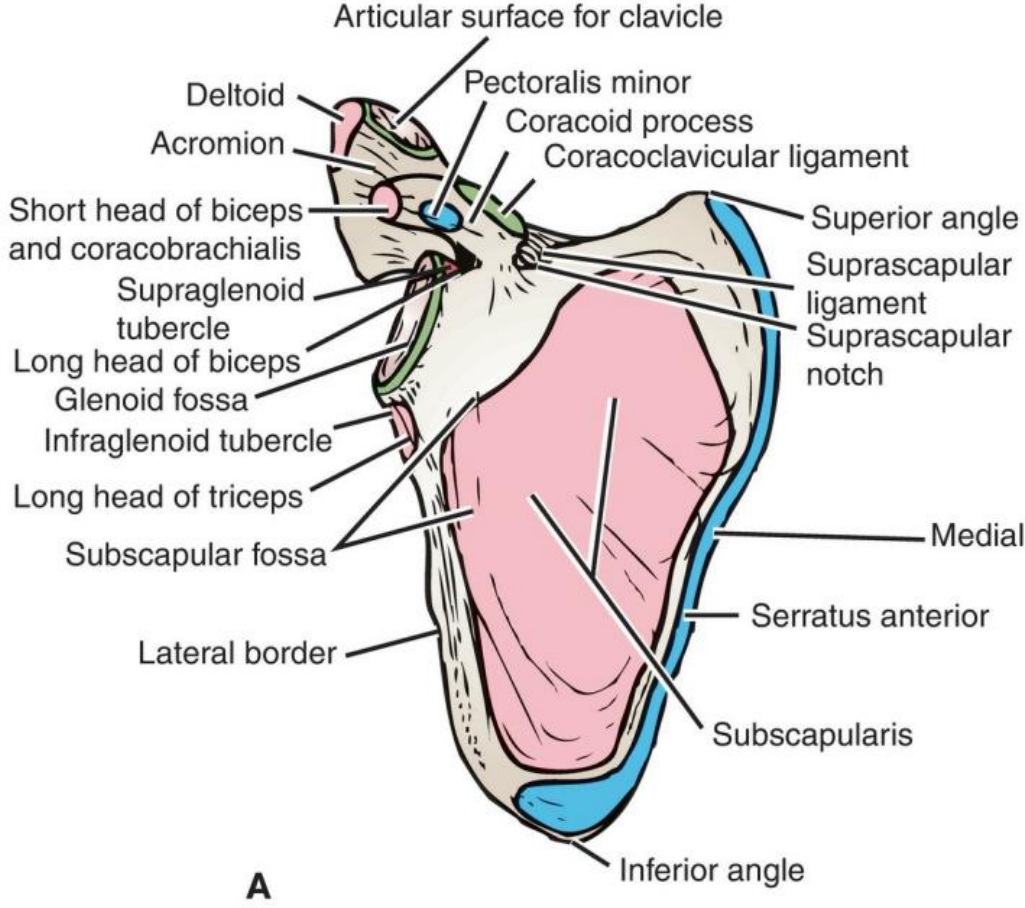
- **Three borders** (superior, medial, lateral), **three angles** (superior, inferior, lateral), **two surfaces** (dorsal, costal), and **three large bony processes** (spine, acromion, coracoid).
- The inferior angle of the scapula can be palpated easily in the living subject and marks the level of the **seventh rib and the spine of the seventh thoracic vertebra**
- a shallow articular surface, **the glenoid cavity** or fossa articulated with the head of the humerus.
- **The coracoid process** a thick, beaklike structure that projects anterolaterally
- **The acromion** is the broad, flat lateral extension of the spine of the scapula, easily palpable tip of the shoulder. articulates with the clavicle at the acromioclavicular joint.



- The dorsal (posterior) surface of the scapula is subdivided into two unequal-sized regions by **the spine of the scapula**. The smaller, area superior to the spine is **the supraspinous fossa**. The much larger area inferior to the spine is **the infraspinous fossa**. The spine is the large, triangular ridge that runs laterally from the medial border of the scapula to merge into the acromion process.
- **A notch (the scapular notch)** is located on the lateral aspect of the superior border, near the base of the coracoid process. The superior transverse scapular ligament bridges the notch.
- **Subscapular fossa**: a shallow concavity at the costal (ventral, anterior) surface of the scapula
- **supraglenoid tubercle and infraglenoid tubercle**

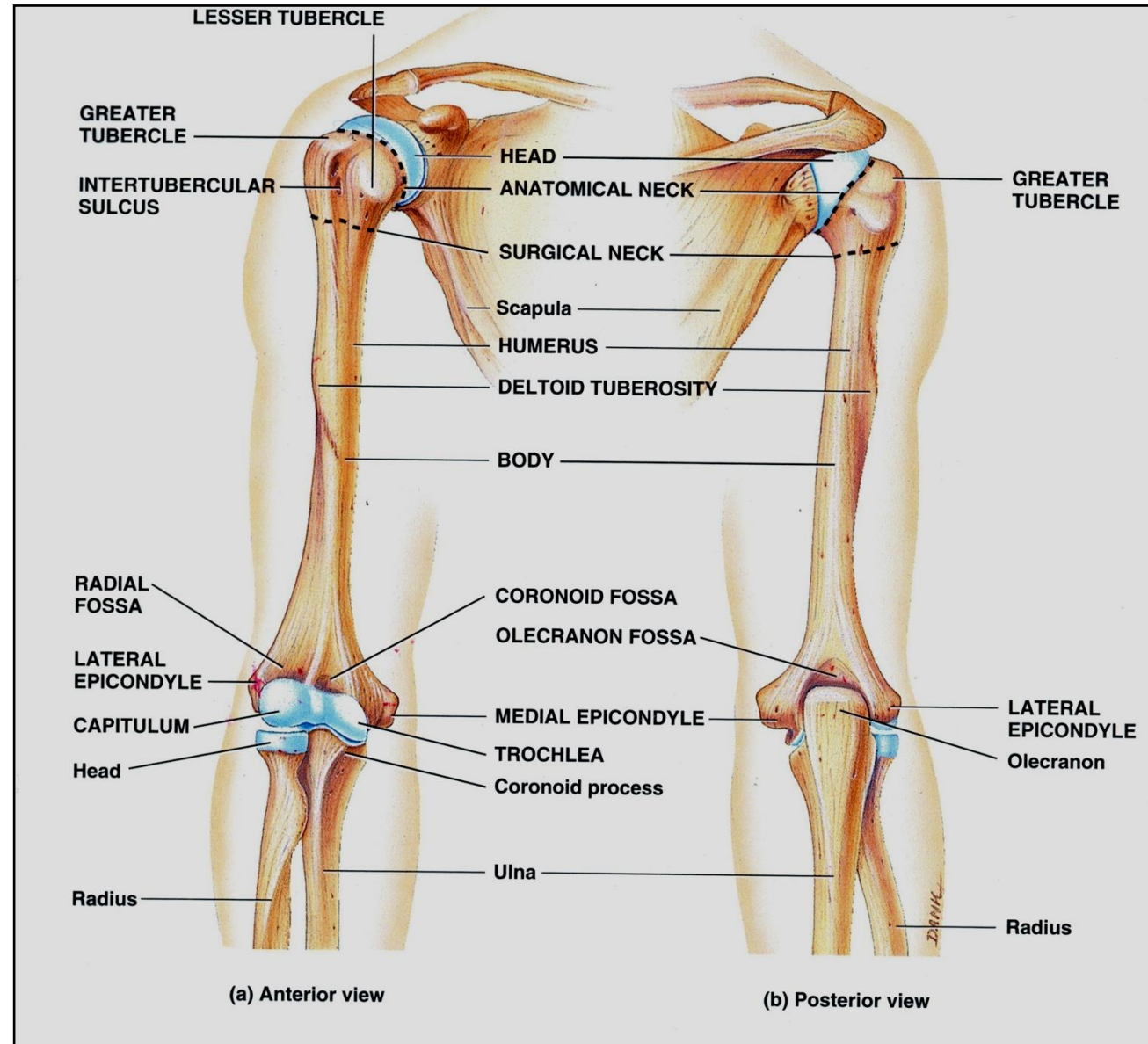


Scapula



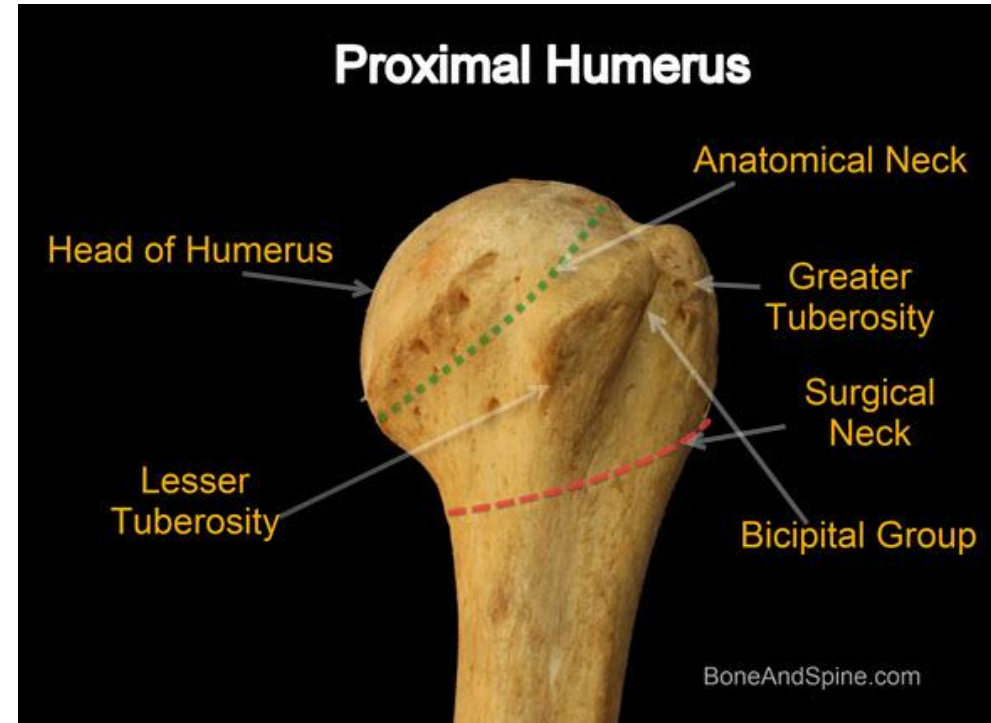
Humerus

- The longest bone of the upper limb.
- **Proximally**, articulates with the glenoid cavity of the scapula, at the glenohumeral (shoulder) joint. **Distally**, it articulates with the head of the radius and the trochlear notch of the ulna, at the elbow joint.
- Can be divided into three main regions: (1) **proximal extremity**, (2) **body or shaft**, and (3) **distal extremity**.



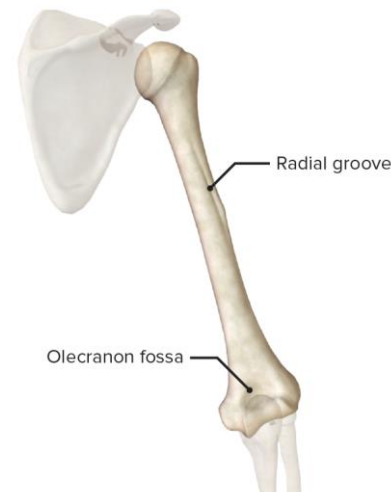
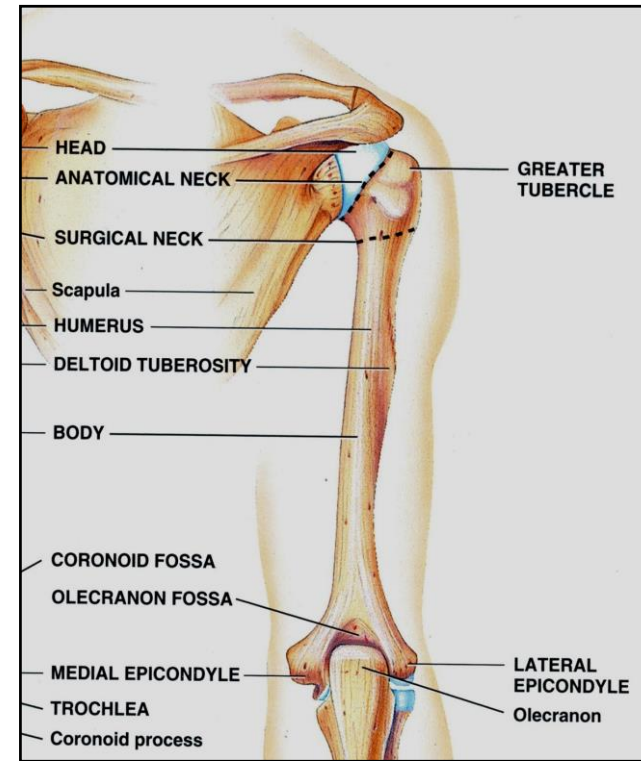
Humerus (proximal end)

- **The head** : round, smooth, proximal end of the humerus (about one third of a sphere) **Orientation**: medially, superiorly, and slightly posteriorly
- **The greater tubercle (tuberosity)**: large, roughened elevation on the lateral proximal end of the humerus, lateral to the head.
- **The lesser tubercle (tuberosity)** is the small, roughened elevation on the anterior proximal end of the humerus, and medial to the greater tubercle.
- **The anatomical neck** is the slightly constricted region surrounding the articular surface of the head.
- **The surgical neck** is the constricted area immediately inferior to the greater and lesser tubercles. **Clinical note:** The surgical neck has important relations with the axillary nerve and the anterior and posterior circumflex humeral vessels. Fractures here are common.
- **The intertubercular (bicipital) groove** is the deep groove on the anterior surface of the humerus that separates the greater and lesser tubercles. It houses the tendon of the long head of the biceps brachii muscle



Humerus (shaft)

- **The deltoid tuberosity** : a roughened triangular elevation on the anterolateral surface of the midshaft of the humerus. This serves as the attachment area for the **deltoid muscle**.
- **Radial groove, or spiral groove** is the shallow depression that spirals around the posterior and lateral aspects of the midshaft of the humerus. It has important relations with **the radial nerve and the profunda brachii vessels**. Fractures of the midshaft humerus are common, especially inferior to the deltoid tuberosity, and may affect the radial groove and its contents.
- **The medial supracondylar ridge** is the narrow ridge running proximally from the medial epicondyle, forming the lower medial border of the humerus.
- **The lateral supracondylar ridge** is the narrow ridge running proximally from the lateral epicondyle, forming the lower lateral border of the humerus.

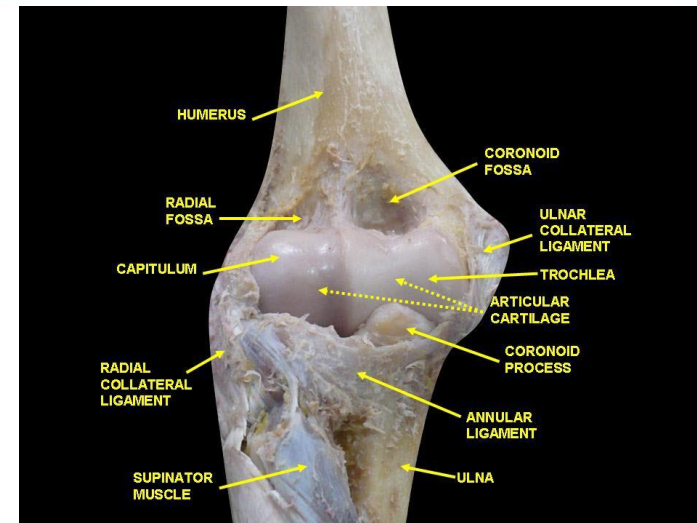
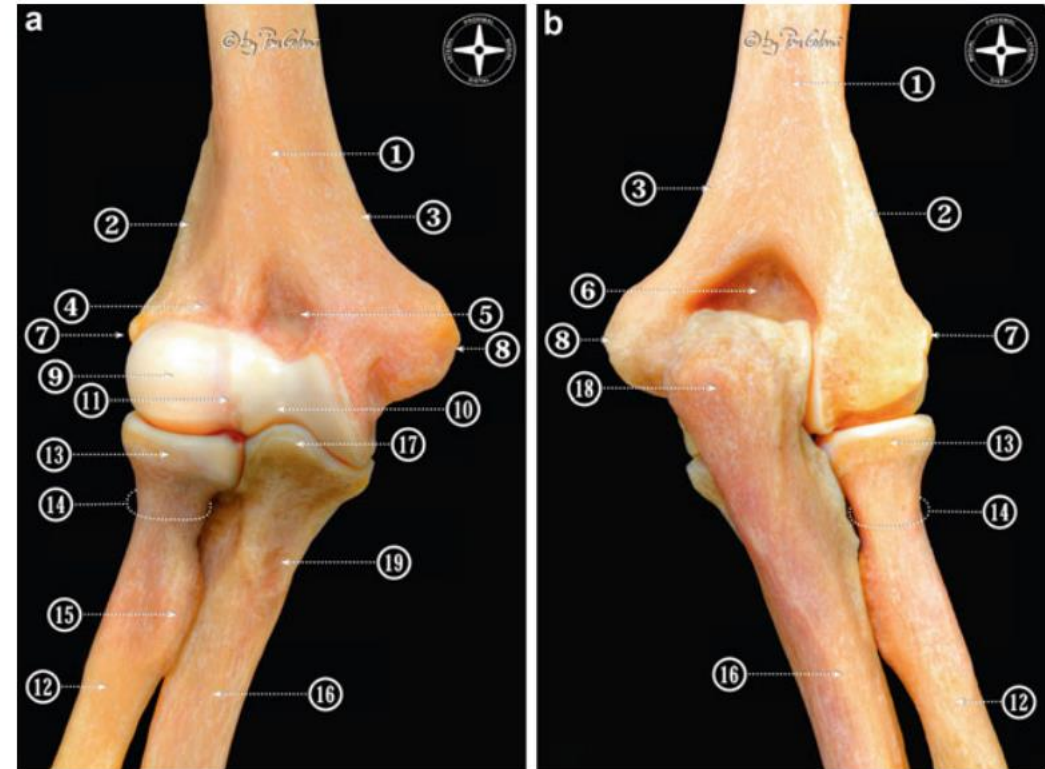


Humerus (distal end)

- **The lateral epicondyle 7:** is the small, roughened projection on the distal, lateral side of the humerus, (common extensor tendon).
- **The medial epicondyle 8:** is the large, knoblike projection on the distal, medial side of the humerus.

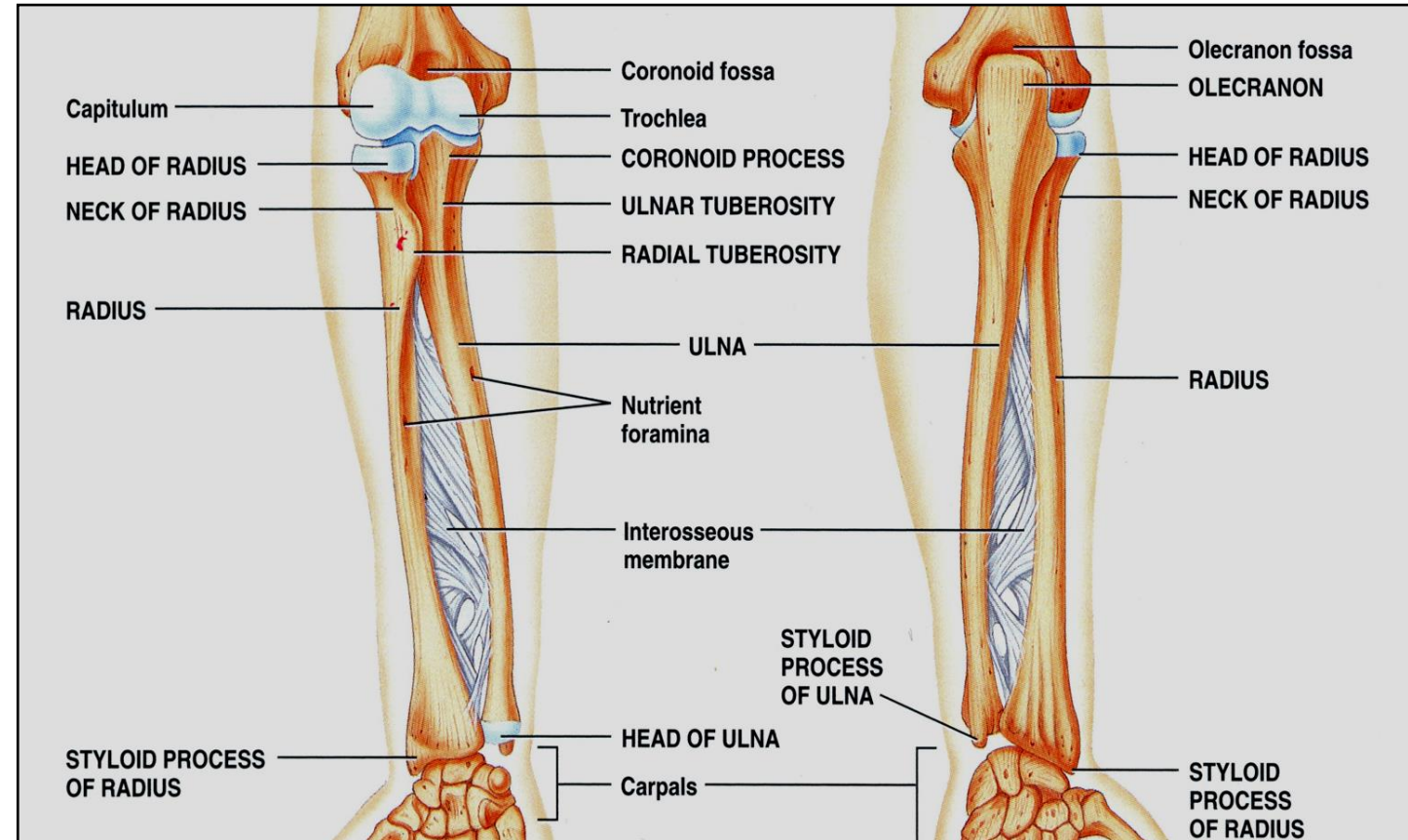
Clinical note: The ulnar nerve crosses the posterior surface of this epicondyle in the shallow ulnar sulcus and is susceptible to injury here. “funny bone” response of tingling sensations in the medial border of the hand and fifth digit.

- **The capitulum 9** is the rounded, half-spherical, articular process at the distal, lateral end of the humerus. articulates with the head of the radius.
- **The trochlea 10** is the pulley-shaped articular process at the distal, medial end of the humerus.
- **The coronoid fossa 5** is the depression on the distal, anterior end of the humerus. This receives the coronoid process of the ulna when the elbow is fully flexed.
- **The radial fossa 4** is the shallow depression on the distal, anterior end of the humerus, immediately proximal to the capitulum. This receives the margin of the head of the radius when the elbow is fully flexed.
- **The olecranon fossa 6** is the deep depression on the distal, posterior end of the humerus, immediately proximal to the trochlea. This holds the apex of the olecranon process of the ulna when the elbow is extended.



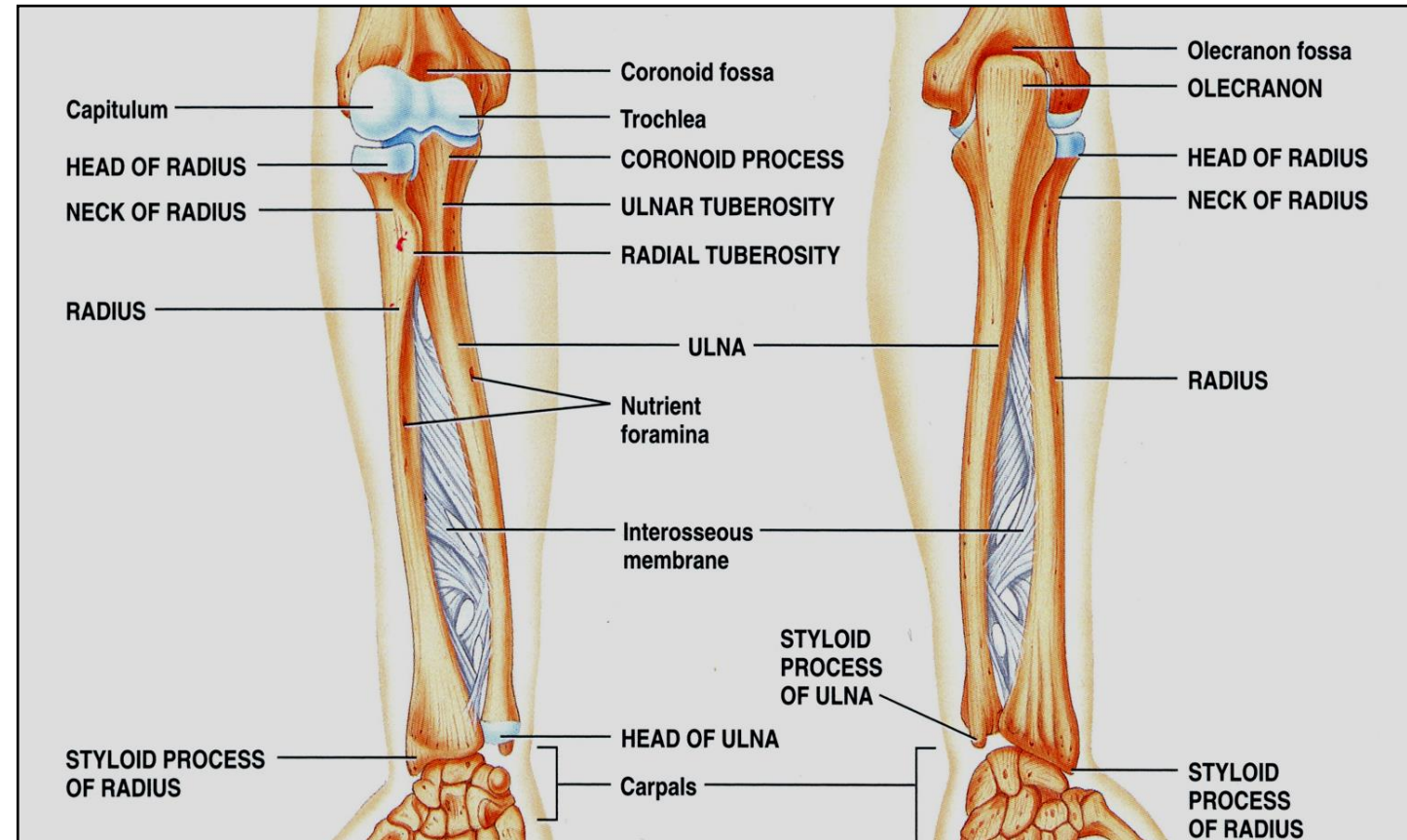
Radius

- The bone on the lateral side of the forearm (antebrachium).
- Proximally, it articulates with both **the capitulum of the humerus** and **the radial notch of the ulna**, in the elbow joint.
- Distally, it articulates with **the head of the ulna** and **the scaphoid and lunate bones**, in the wrist.
- **The head** round, proximal end of the radius. Its proximal surface is a shallow concavity for articulation with the capitulum of the humerus. Its periphery articulates with the radial notch of the ulna.
- **The neck** is the constricted area immediately distal to the head.
- **The radial tuberosity** is the raised, roughened area on the anteromedial, proximal aspect of the radius, the insertion site of the biceps brachii muscle.

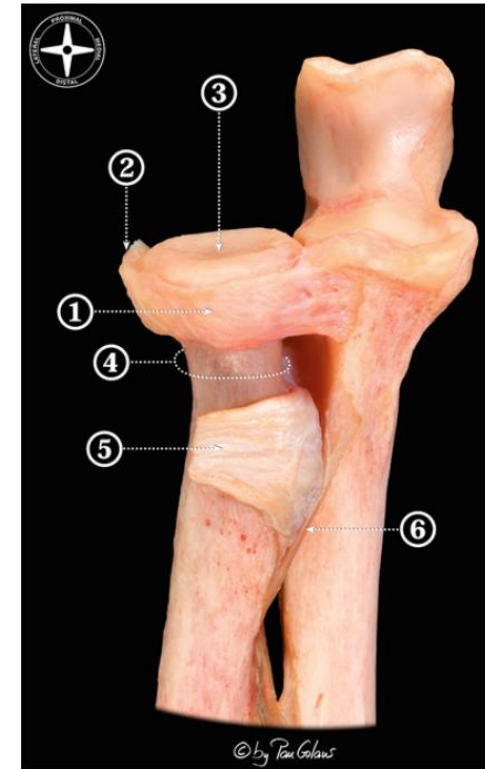
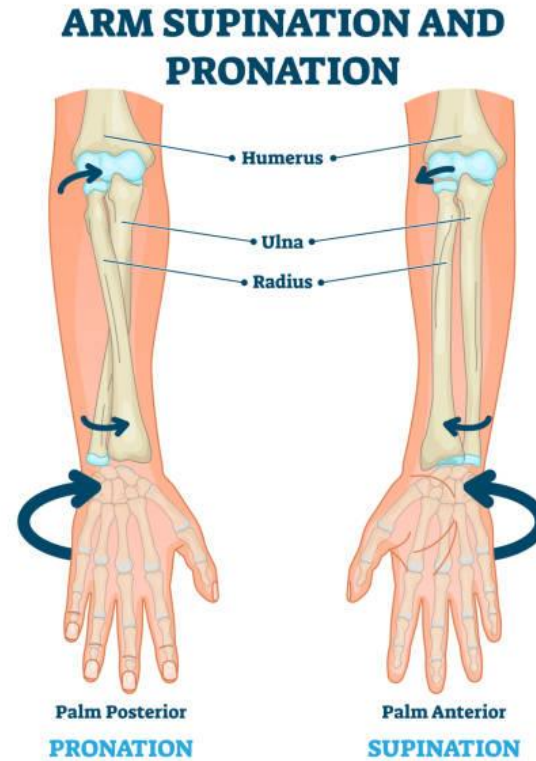


Radius

- **The body (shaft)** widens along its proximal to distal extent. The medial border of the shaft forms a sharp crest (**the interosseous border**) for the attachment of the interosseous membrane.
- **The ulnar notch** is the shallow depression on the distal, medial aspect of the radius.
- **The styloid process** is the distal projection from distal aspect of the radius. This extends lateral to the proximal row of carpal bones.

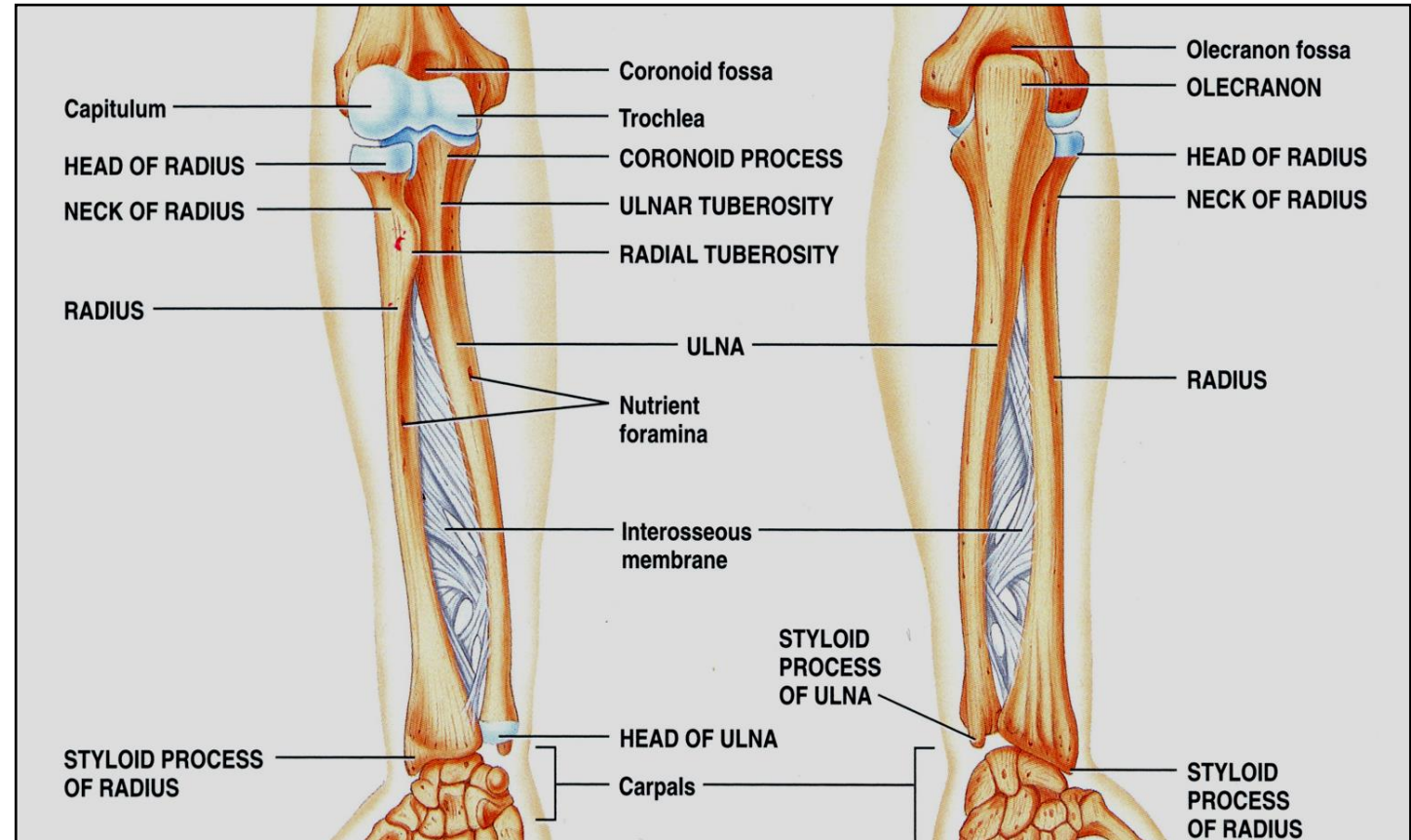


- During pronation and supination, the radius rotates about its long axis.
- The head is held in place against the ulna by the encircling **annular ligament (1)**.



Ulna

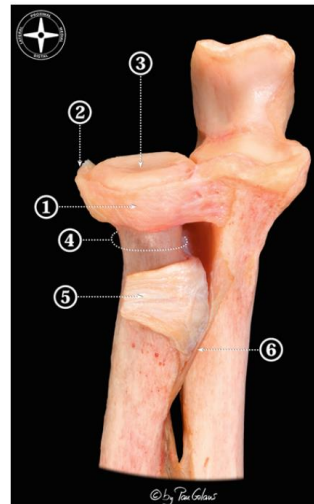
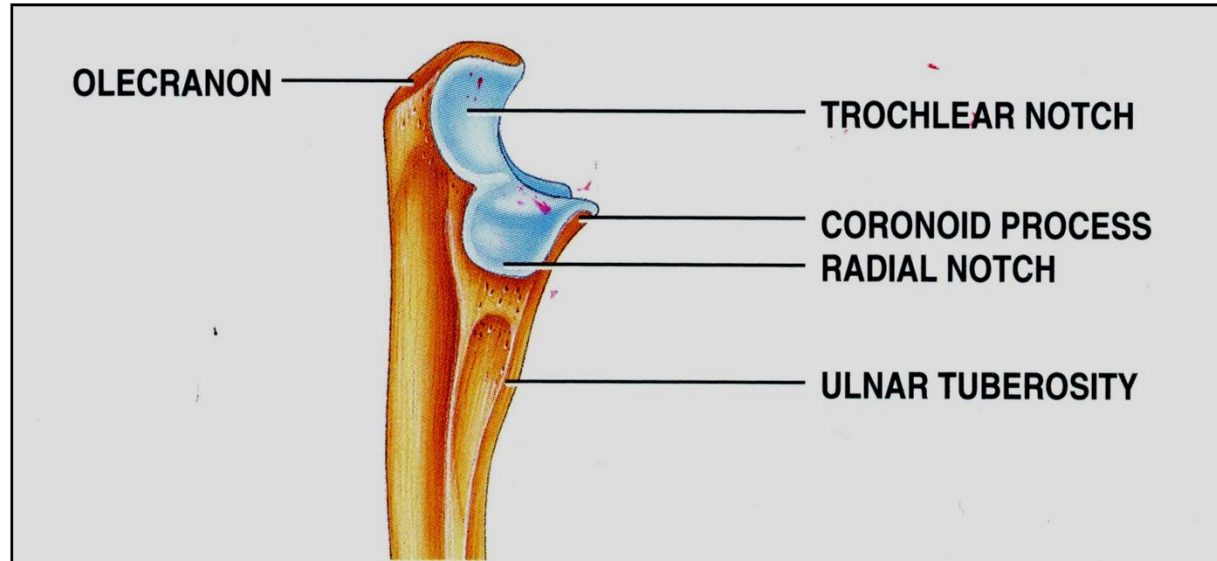
- Lies on the **medial side of the forearm (antebrachium)**.
- Proximally articulates with both **the trochlea of the humerus and the head of the radius, in the elbow joint**. Distally, it articulates with **the ulnar notch of the radius**.
- **The ulnar tuberosity** is the anterior, distal, roughened aspect of the coronoid process. This serves as the insertion area for the **brachialis muscle**.
- **The body (shaft)** is the elongated midportion of the ulna.
- **The head** is the small, rounded distal end of the ulna. the distal end of the head is separated and excluded from the wrist joint by an articular disc.
- **The styloid process** is a small projection from distal end of the ulna.



Ulna

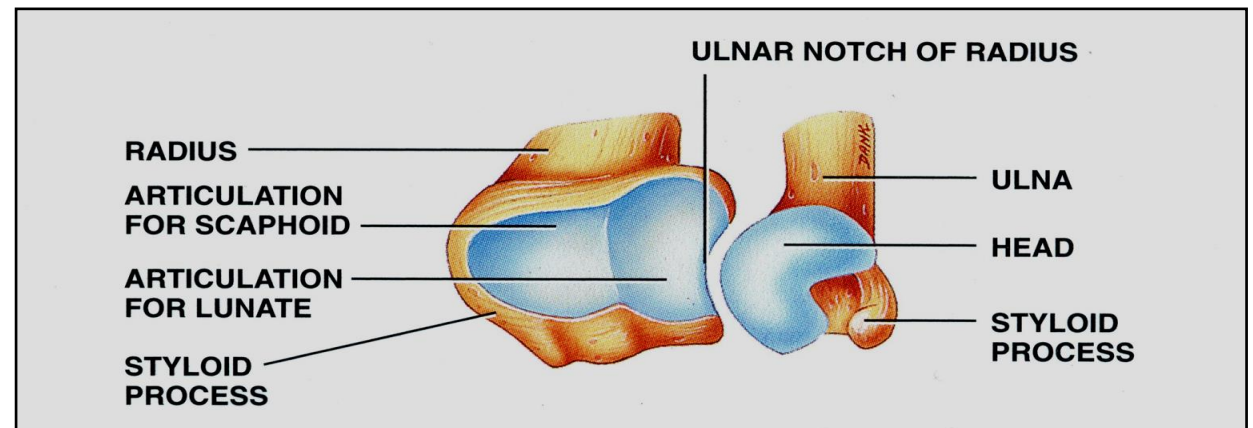
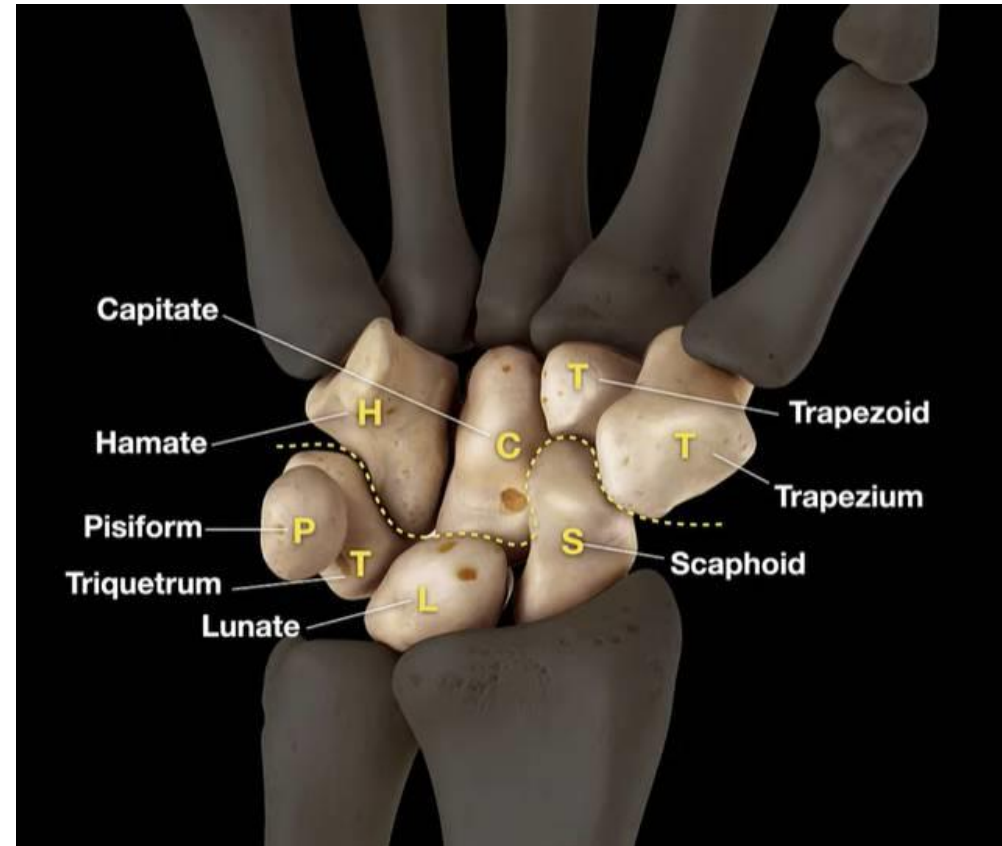
large, hook-shaped proximal end characterizes the bone.

- **The radial notch** is the shallow, smooth notch on the lateral aspect of the coronoid process, It is the articular surface for the head of the radius.
- **The olecranon** is the easily palpable proximal end of the ulna that forms the “point” of the elbow. It is the insertion site of **the triceps brachii muscle**. The beaklike tip of the olecranon fits into the olecranon fossa of the humerus when the elbow is extended.
- **The coronoid process** is the anterior projection forming the inferior end of the hooklike proximal end of the ulna. It contributes to the formation of the trochlear notch.
- **The trochlear notch** is the large, crescent-shaped notch on the anterior aspect of the proximal end of the ulna. It is formed by the articular surfaces of the olecranon and the coronoid process and articulates with the trochlea of the humerus.



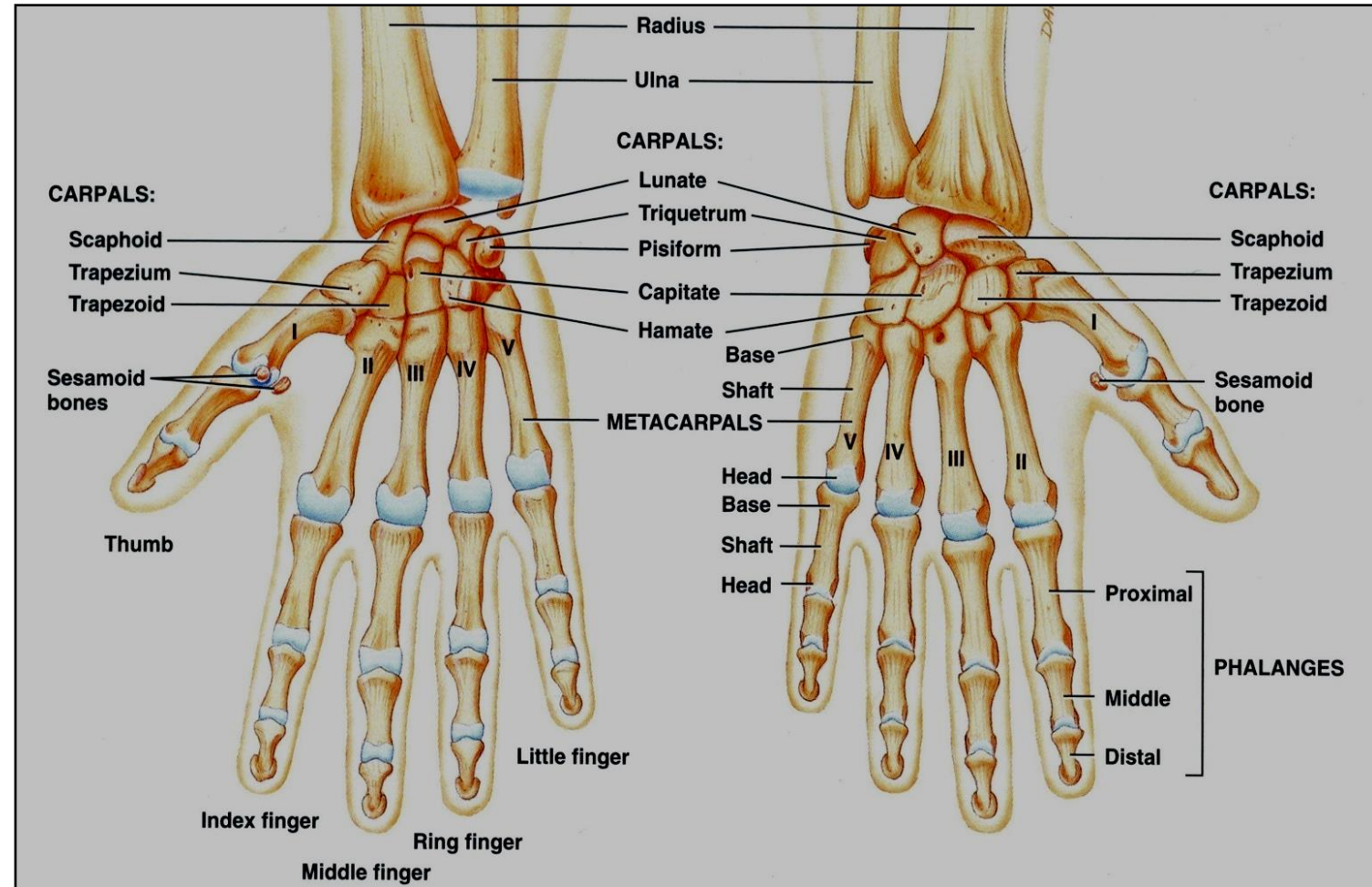
Carpal Bones

- Eight small bones comprising the wrist
- Arranged in two rows (**proximal and distal**), with four bones in each row .
- Forms a deep concave groove on the ventral aspect of the wrist (**the flexor retinaculum**), thus forming the osseofascial carpal tunnel.
- **Carpal tunnel syndrome**
- **Proximal Row** From lateral to medial: scaphoid, lunate, triquetrum, and pisiform. The scaphoid and lunate bones articulate with the carpal articular surface of the radius.
- **Distal row** Is formed by the following bones (from lateral to medial): trapezium, trapezoid, capitate, and hamate.



Metacarpal Bones

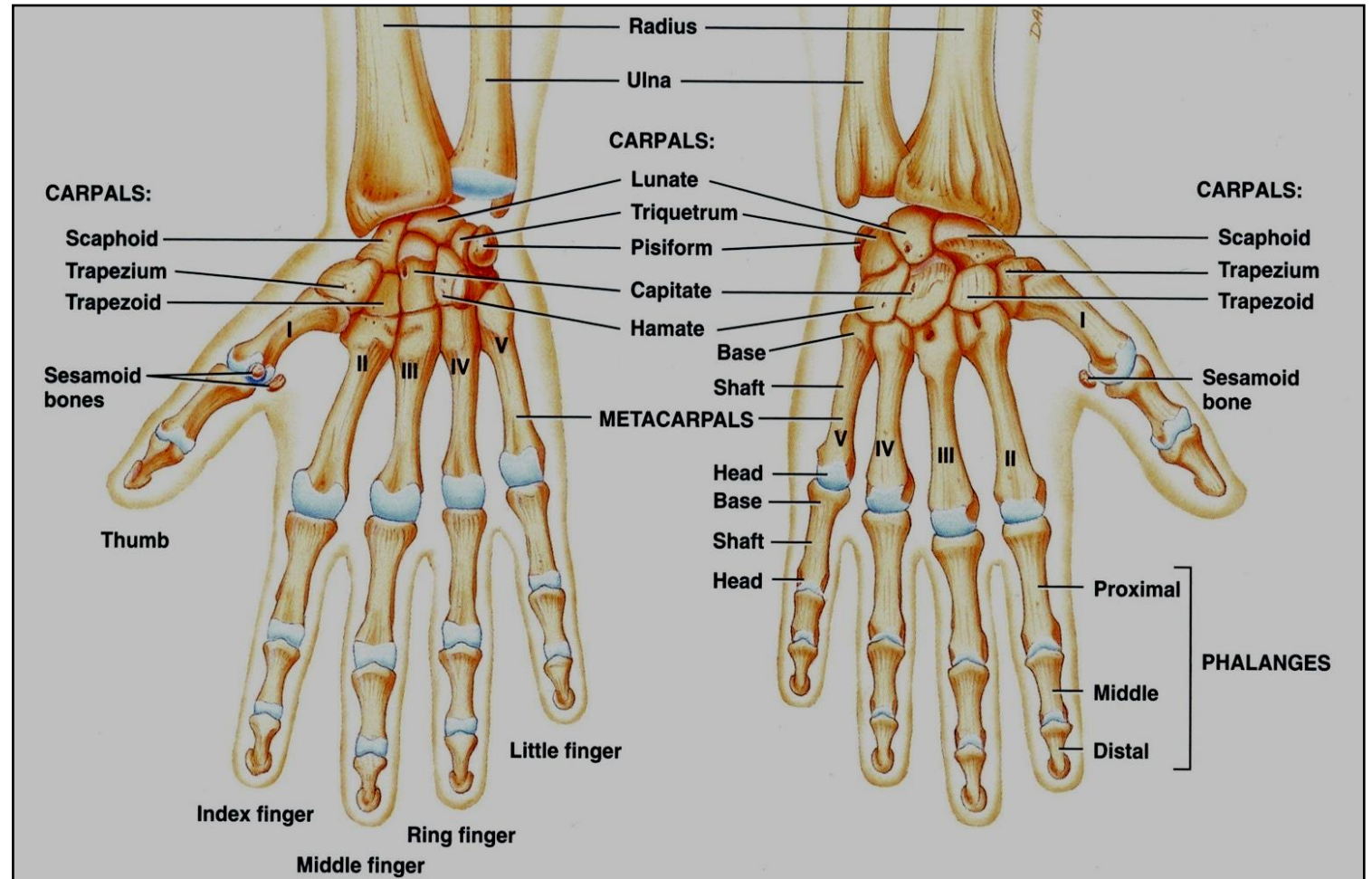
- The metacarpal bones are the five bones located between the carpal bones and the phalanges of the hand
- There are five metacarpal bones; the 1st one is that of the thumb.
- Each metacarpal has: a proximal base, a body, and a distal head.



Phalanges

There are two phalanges in the thumb and three in each of the medial four digits.

Each phalanx has: a proximal base, a body, and a distal head.



- Thank you