



Appendicular system part 1

General Anatomy lecture # 3

Bones of upper limb

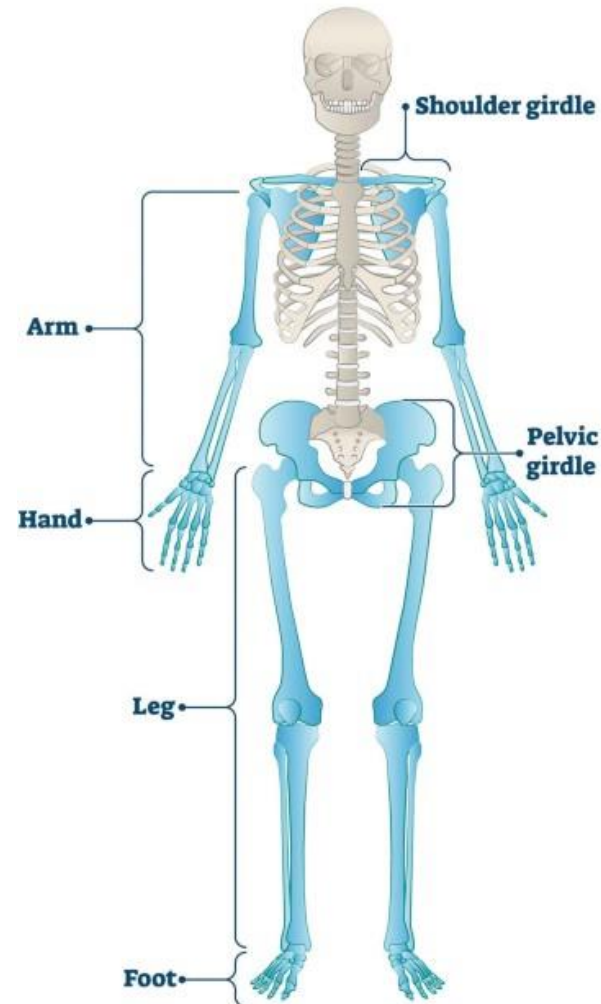
By Heba Ali
DDS, MSc, PhD (UK)

DIVISIONS OF THE SKELETAL SYSTEM

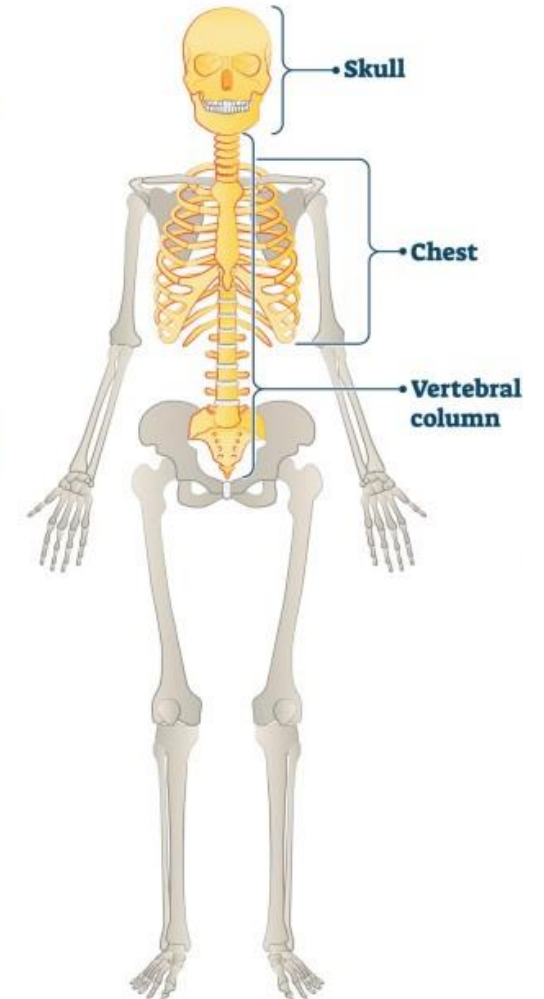
The axial skeleton consists of the elements forming the central axis of the body.

The appendicular skeleton consists of the bones forming the upper and lower limb girdles and extremities.

Appendicular skeleton



Axial skeleton



REGION OF SKELETON	NUMBER OF BONES (ADULT)
I. Axial skeleton	
Skull	
Cranium	8
Face	14
Auditory ossicles	6
Hyoid	1
Vertebrae (including sacrum and coccyx)	26
Sternum	1
Ribs	24
II. Appendicular skeleton	
Shoulder girdles	
Clavicle	2
Scapula	2
Upper extremities	
Humerus	2
Radius	2
Ulna	2
Carpals	16
Metacarpals	10
Phalanges	28
Pelvic girdle	
Os coxae	2
Lower extremities	
Femur	2
Patella	2
Fibula	2
Tibia	2
Tarsals	14
Metatarsals	10
Phalanges	28
	206

BONE MARKING	EXAMPLE
Linear elevation	
Line	Superior nuchal line of the occipital bone
Ridge	The medial and lateral supracondylar ridges of the humerus
Crest	The iliac crest of the hip bone
Rounded elevation	
Tubercle	Pubic tubercle
Protuberance	External occipital protuberance
Tuberosity	Greater and lesser tuberosities of the humerus
Malleolus	Medial malleolus of the tibia, lateral malleolus of the fibula
Trochanter	Greater and lesser tuberosities of the humerus
Sharp elevation	
Spine or spinous process	Ischial spine, spine of the vertebra
Styloid process	Styloid process of temporal bone

Expanded ends for articulation

Head	Head of humerus, head of femur
Condyle	Medial and lateral condyles of femur (knuckle-like process)
Epicondyle (a prominence situated just above condyle)	Medial and lateral epicondyles of femur

Small flat area for articulation

Facet	Facet on head of rib for articulation with vertebral body
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Depressions

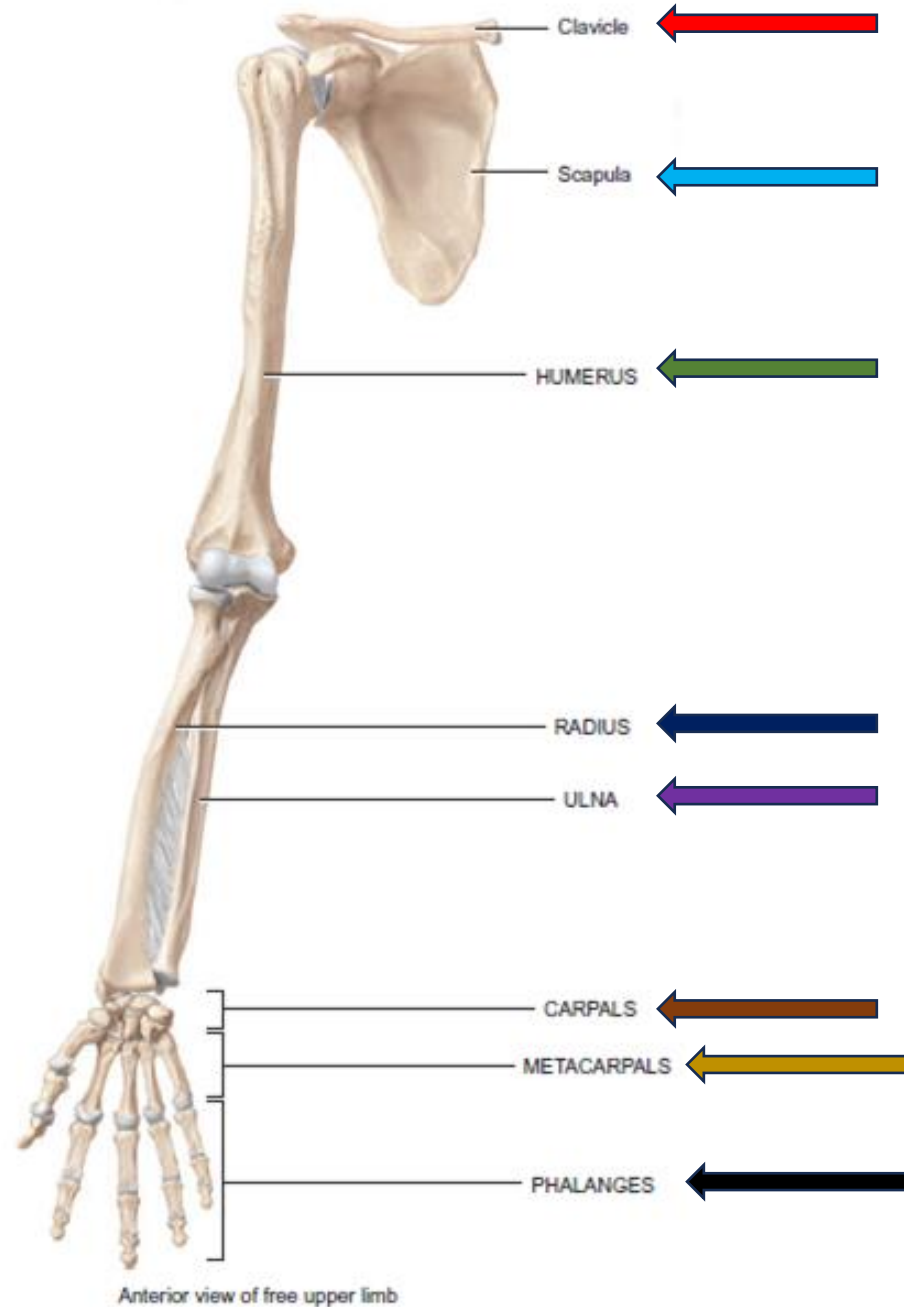
Notch	Greater sciatic notch of hip bone
Groove or sulcus	Bicipital groove of humerus
Fossa	Olecranon fossa of humerus, acetabular fossa of hip bone

Openings

Fissure	Superior orbital fissure
Foramen	Infraorbital foramen of the maxilla
Canal	Carotid canal of temporal bone
Meatus	External acoustic meatus of temporal bone

Bones of upper limb

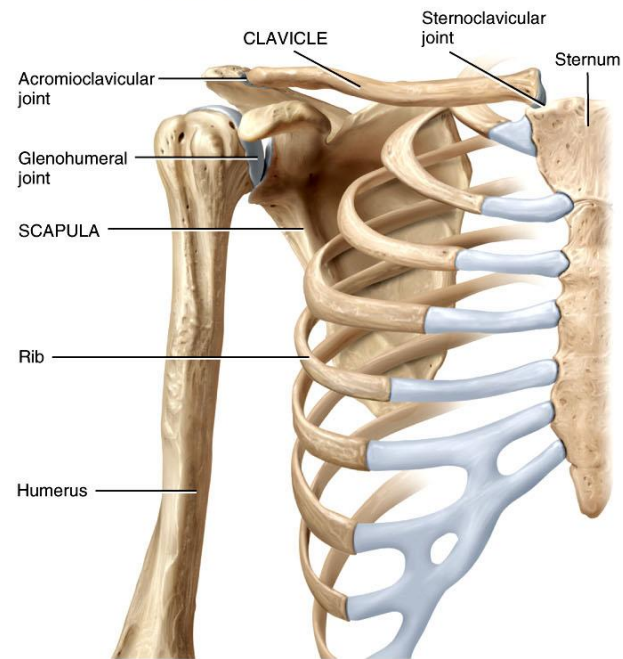
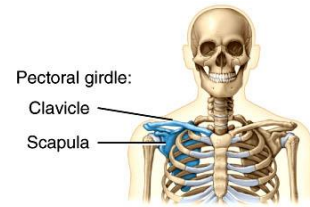
- Clavicle (1), scapula (1), humerus (1), ulna(1), radius(1), carpal bones (8), metacarpal bones (5), and phalanges (14).



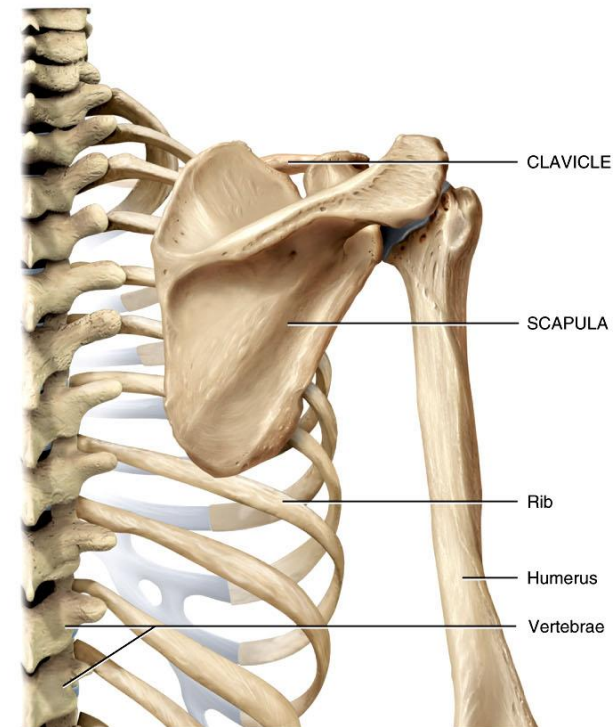
Pectoral (shoulder) girdle

The clavicle and scapula form the **pectoral (shoulder) girdle**.

Attaches the upper limb to the trunk



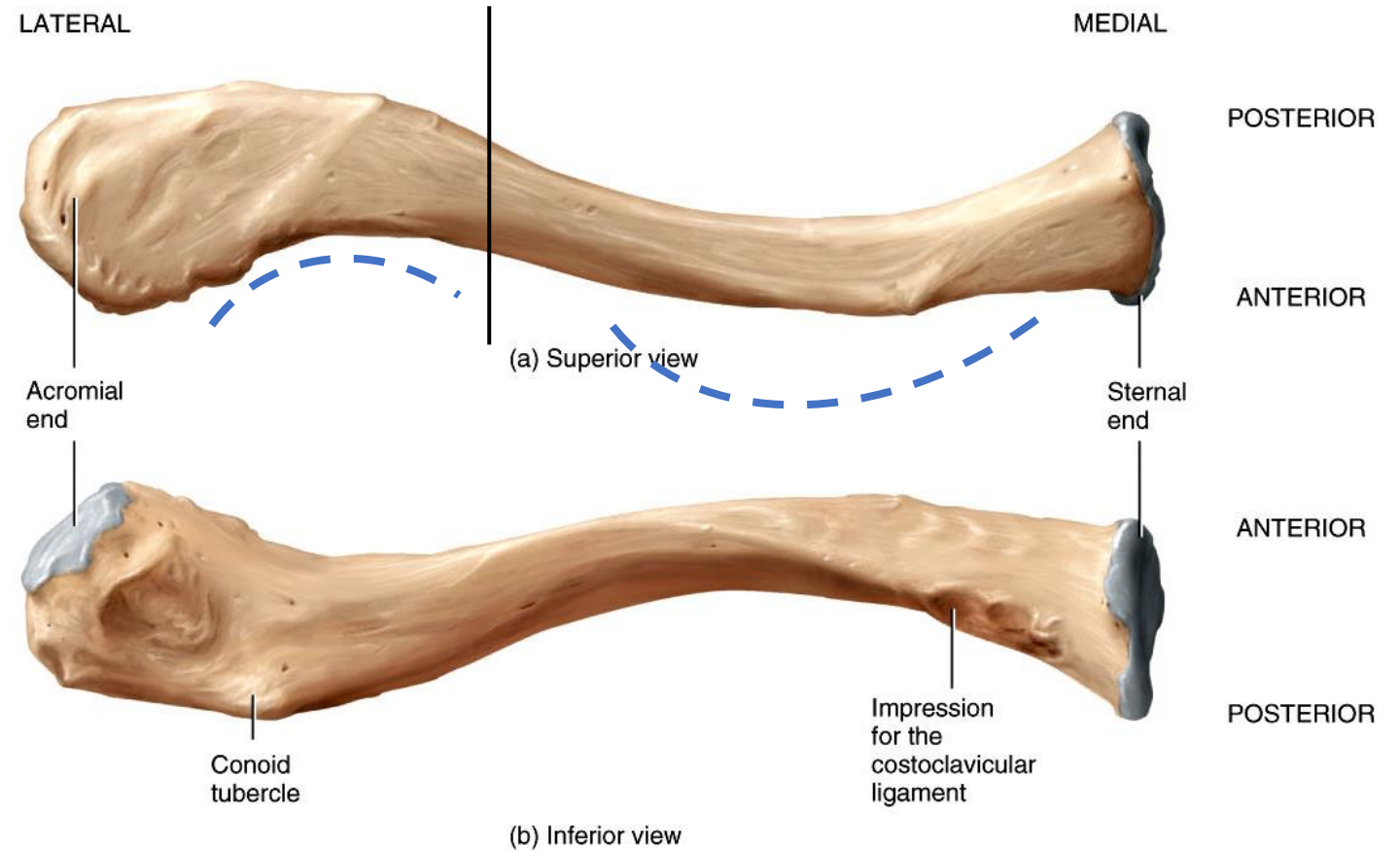
(a) Anterior view of pectoral girdle



(b) Posterior view of pectoral girdle

Clavicle

- S-shaped, located between the sternum and the scapula
- Lies horizontally across the root of the neck
- The clavicle is subcutaneous and easily palpable
- The medial two-thirds of the clavicle is **convex** anteriorly, whereas the lateral one-third is **concave** anteriorly.
- The **s**uperior surface of the clavicle is **s**mooth, while the inferior surface is rough.



Clavicle

- Has two ends:

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

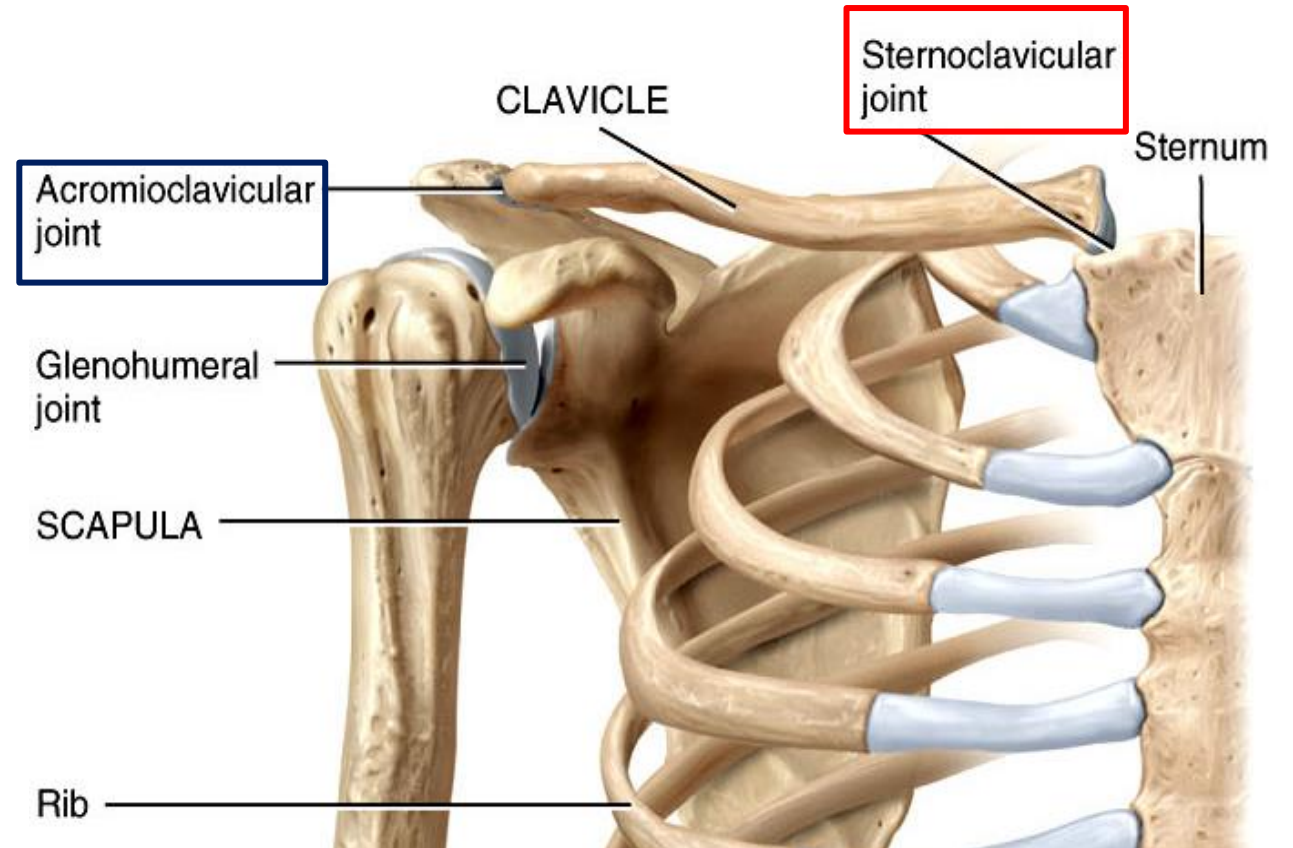
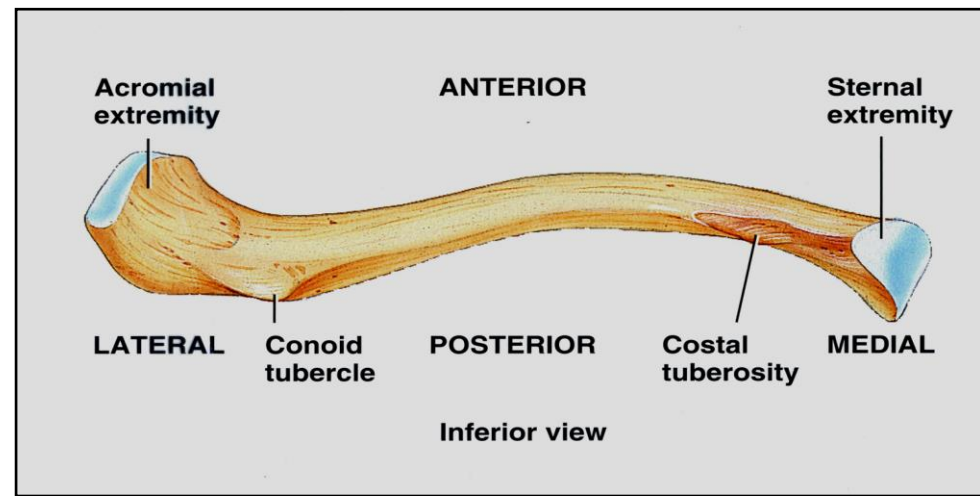
Sterno-clavicular joint.

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.



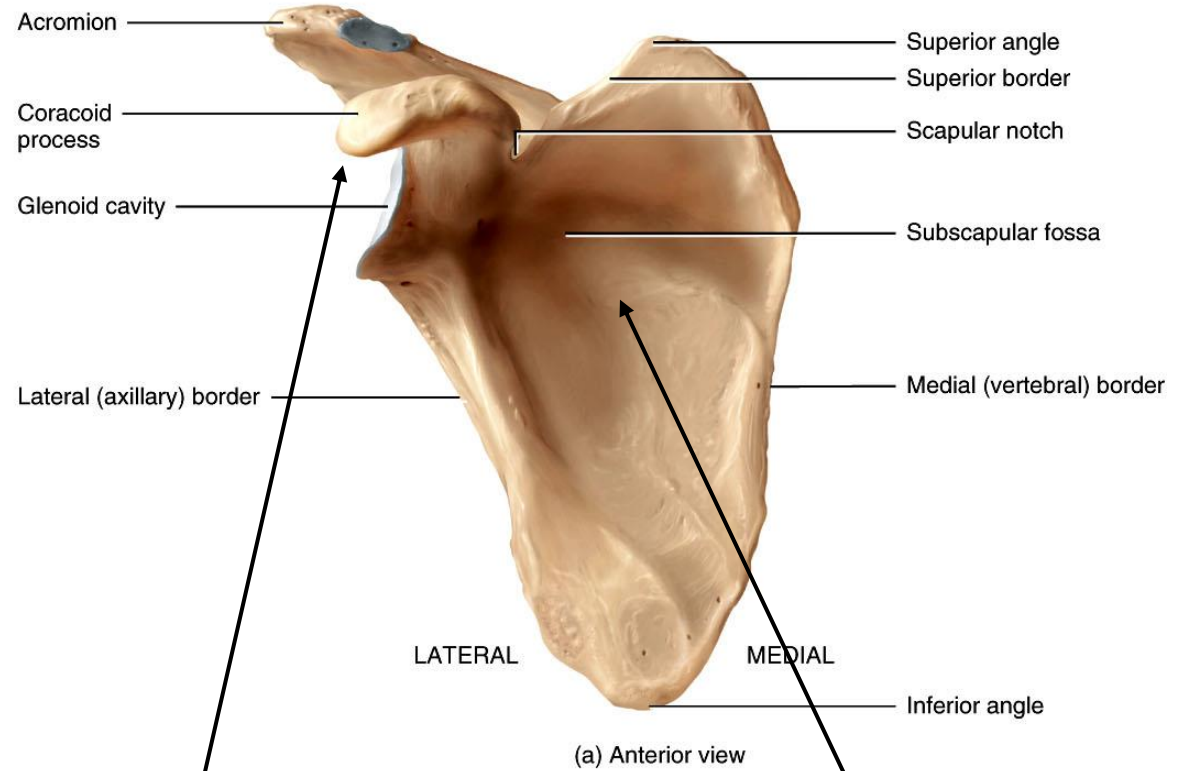
Scapula (shoulder blade)

- Triangular in shape
- Floating freely posteriorly
- 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**



Scapula

- **Three borders** (superior, medial, & lateral)
- **Three angles** (superior, inferior, & lateral)
- **Two surfaces**: dorsal (post.), costal (ant.)
- **Three large bony processes** (acromion, coracoid, & spine).



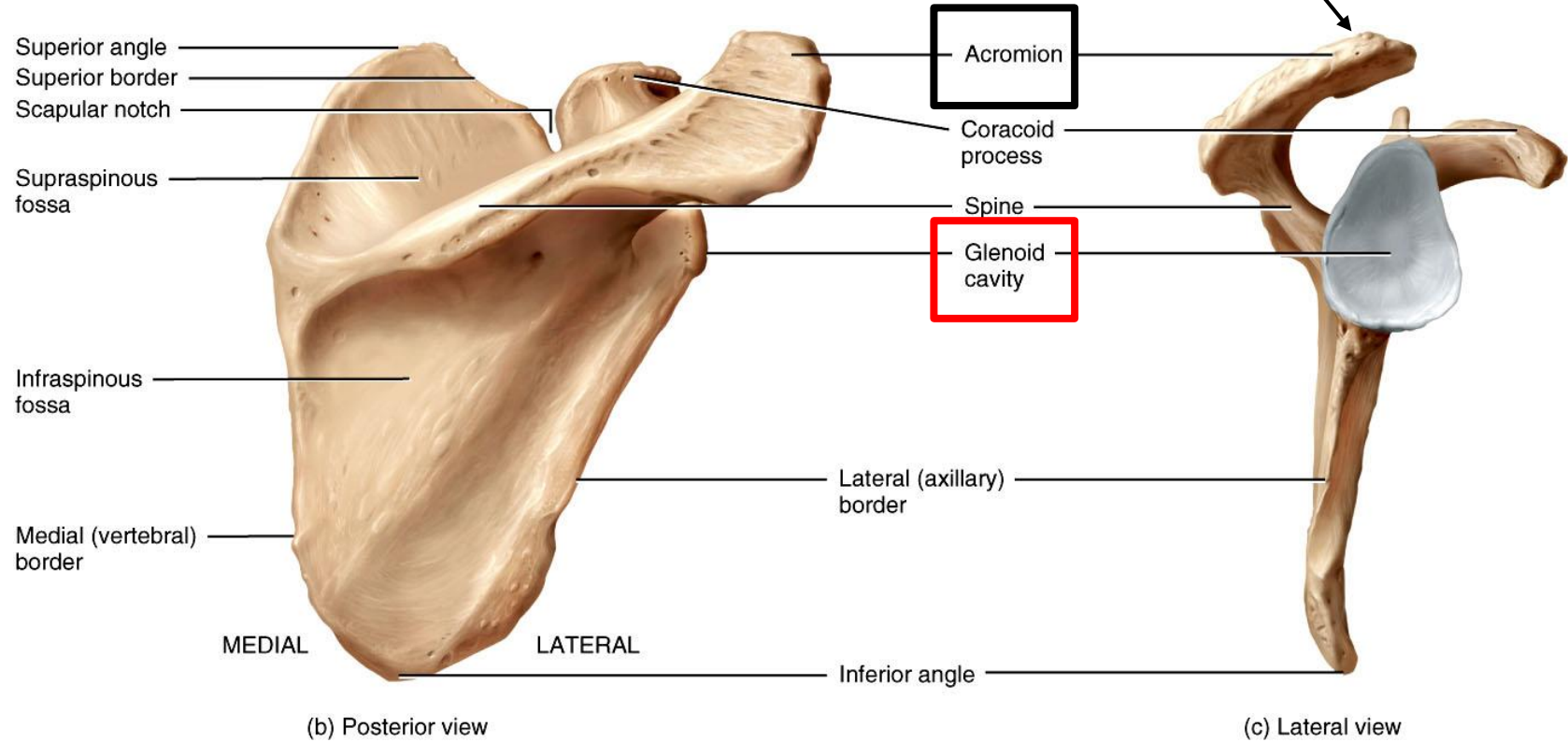
Coracoid process
Beaklike structure projects anterolaterally

Subscapular fossa
Shallow concavity at the costal (ventral, anterior) surface of the scapula

Scapula

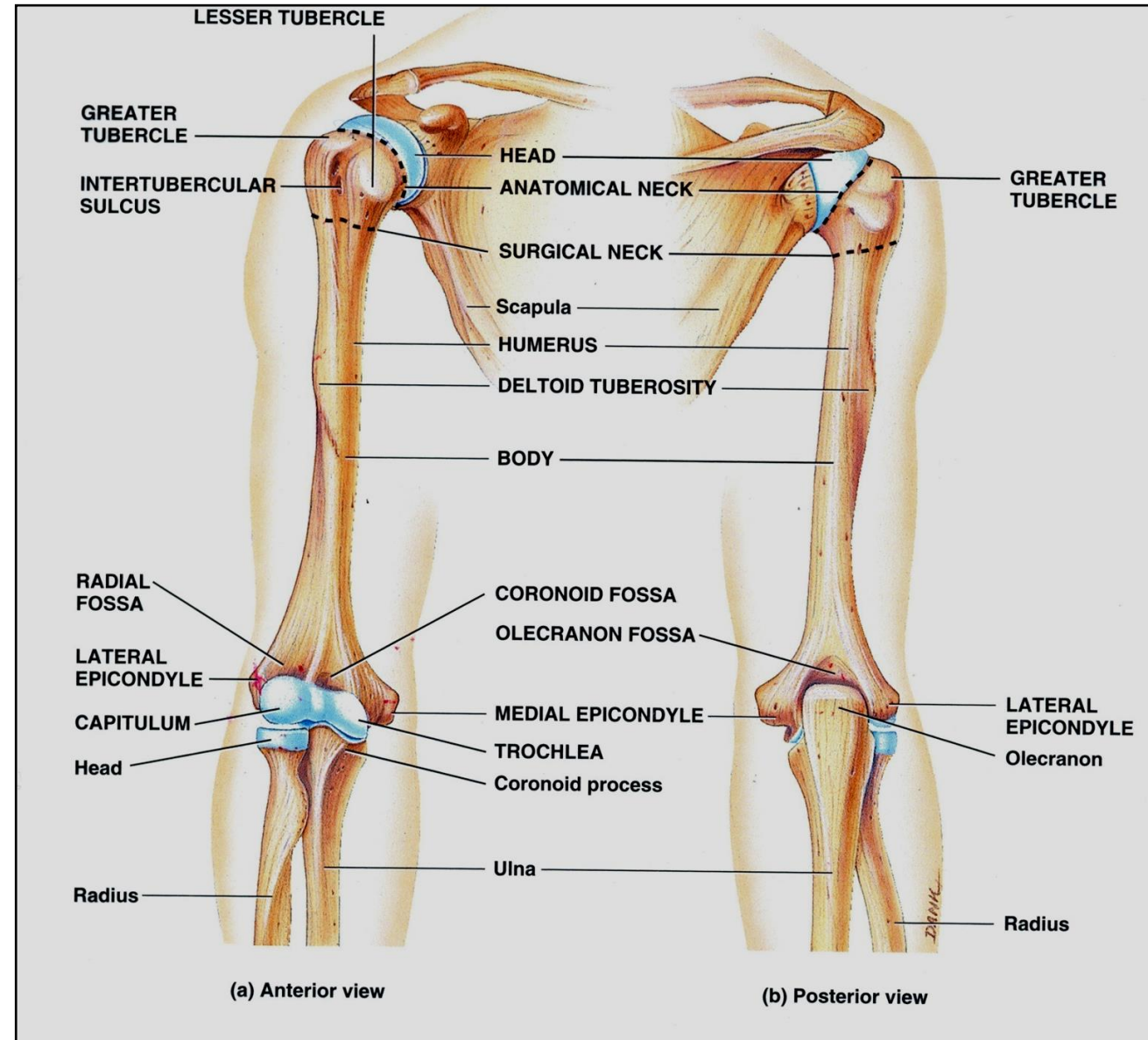
- **The glenoid cavity** is a shallow articular surface, or fossa articulates with the head of the humerus.

Acromion: Flat lateral extension of the spine of the scapula, easily palpable tip of the shoulder.



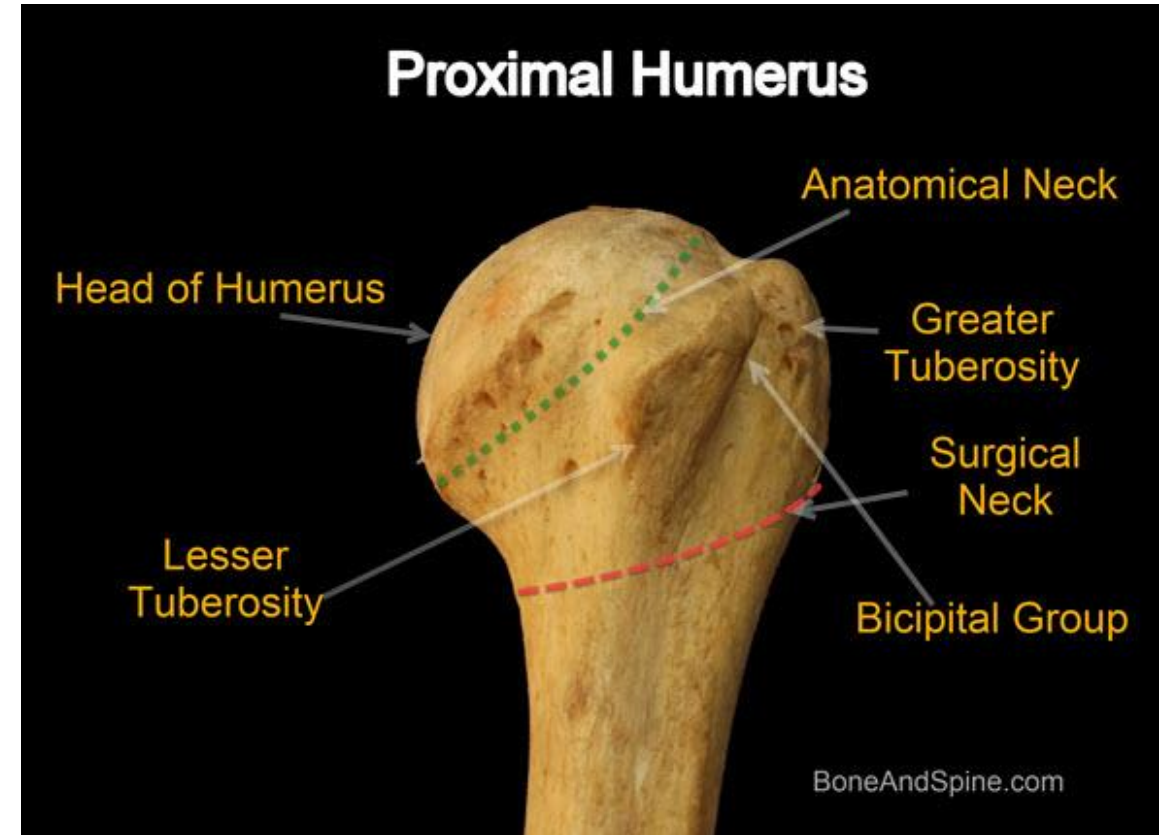
Humerus

- 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**.



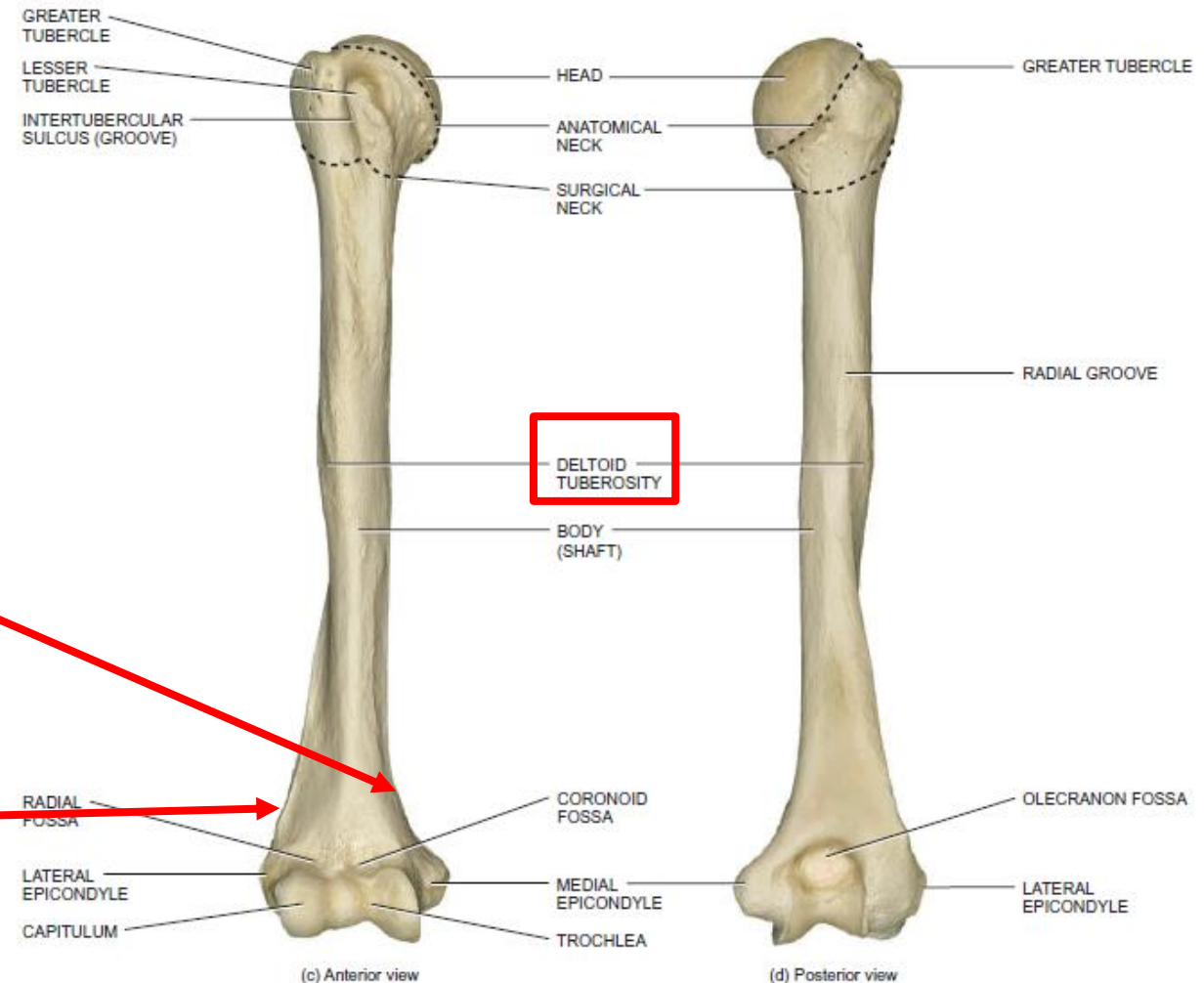
Humerus (proximal end)

- **The head** : round **Orientation**: medially, superiorly, and slightly posteriorly
- **The greater tubercle (tuberosity)**: on the lateral proximal end of the humerus, lateral to the head.
- **The lesser tubercle (tuberosity)** on the anterior proximal end of the humerus, and medial to the greater tubercle.
- **The intertubercular (bicipital) groove** on the anterior surface of the humerus that separates the greater and lesser tubercles.
- **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.



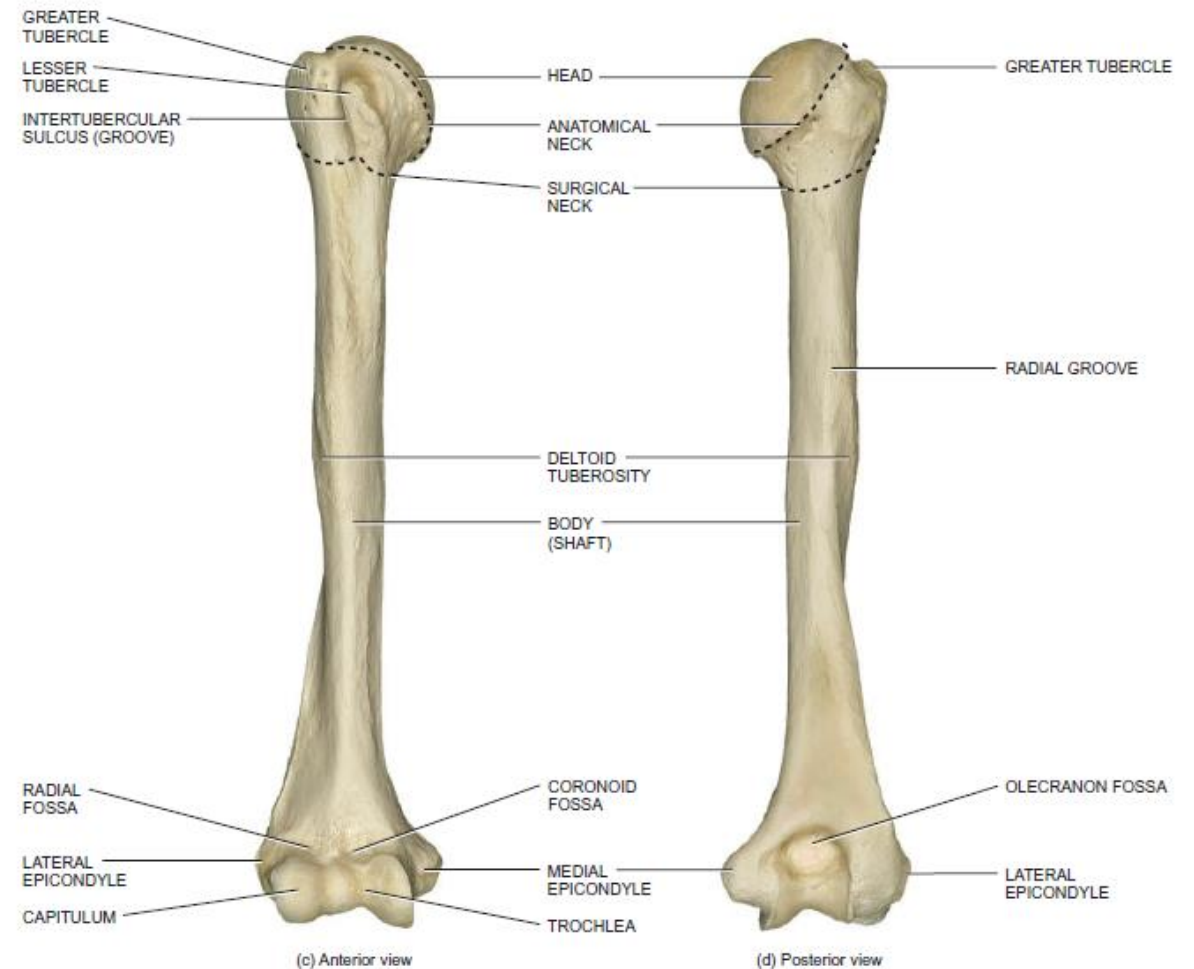
Humerus (shaft)

- **The deltoid tuberosity** : 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.
- **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.



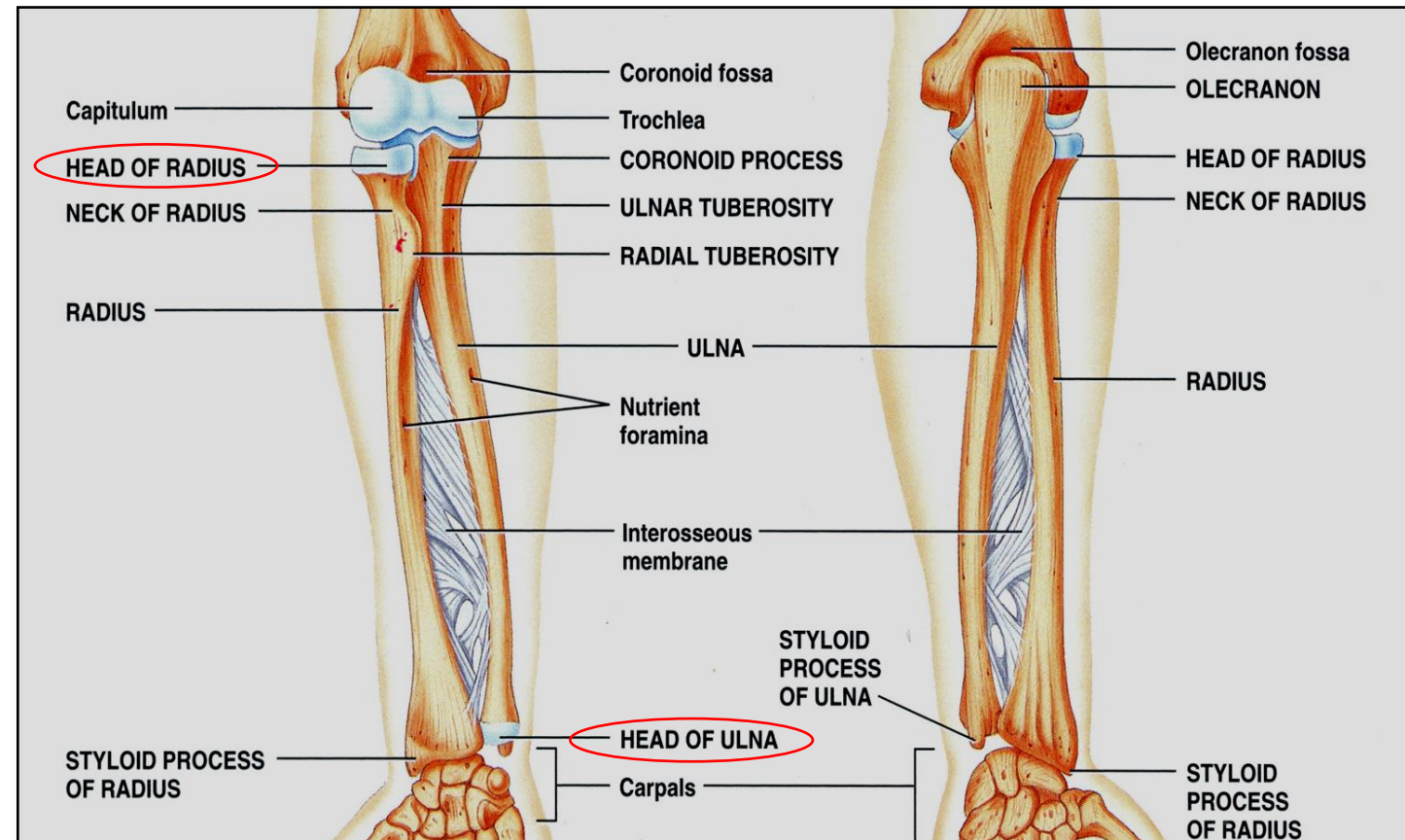
Humerus (distal end)

- **The lateral epicondyle**
- **The medial epicondyle:** larger, knoblike projection on the distal, medial side of the humerus (ulnar nerve, funny nerve!).
- **The capitulum** at distal lateral end, articulates with the head of the radius.
- **The trochlea** is the pulley-shaped articular process at the distal, medial end of the humerus.
- **The coronoid fossa** on anterior end of the humerus. This receives the coronoid process of the ulna when the elbow is fully flexed.
- **The radial fossa** This receives the head of the radius when the elbow is fully flexed.
- **The olecranon fossa** on the distal, posterior end of the humerus receives the olecranon process of the ulna when the elbow is extended.



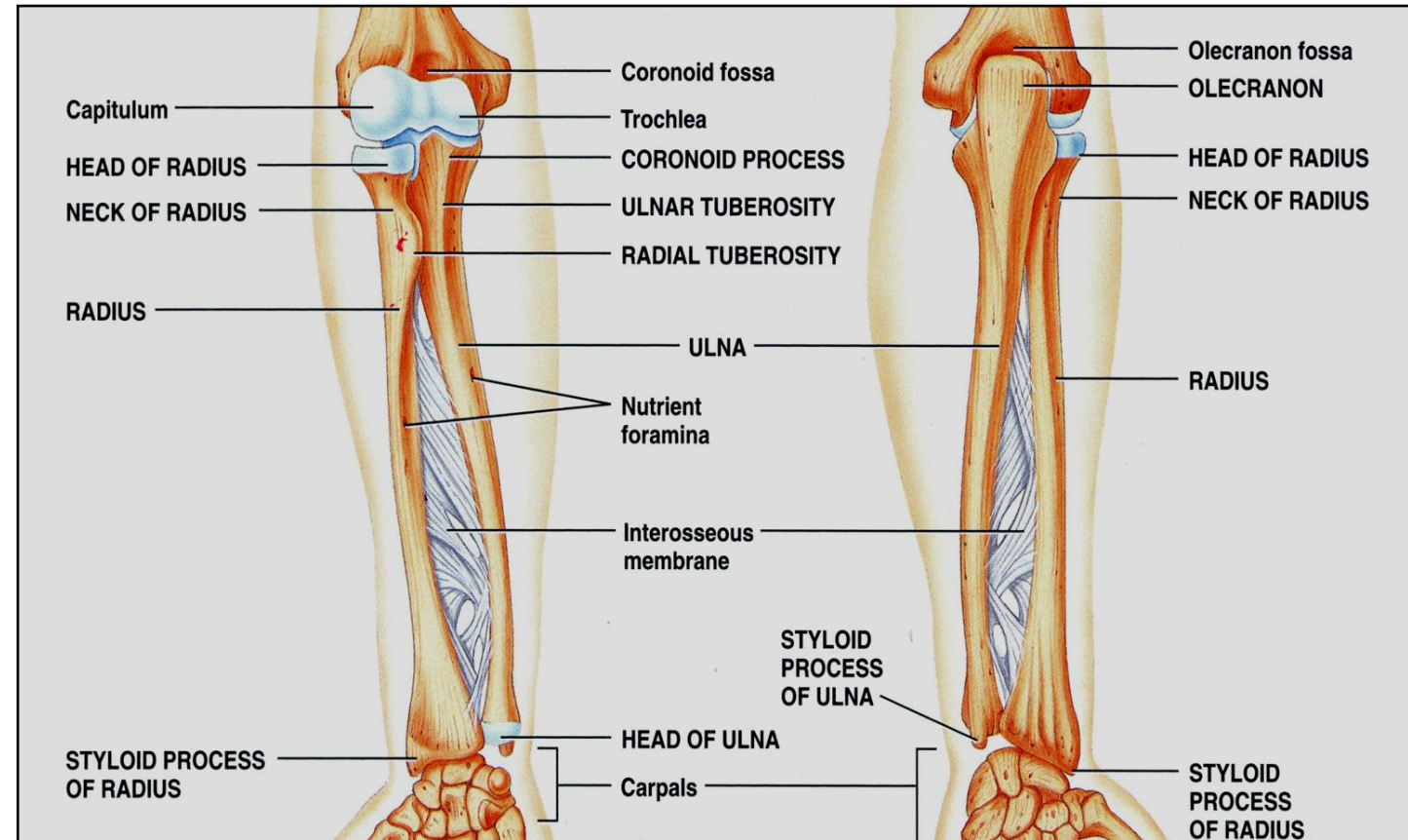
Radius

- The bone on the lateral side of the forearm
- **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** on the anteromedial, proximal aspect of the radius.

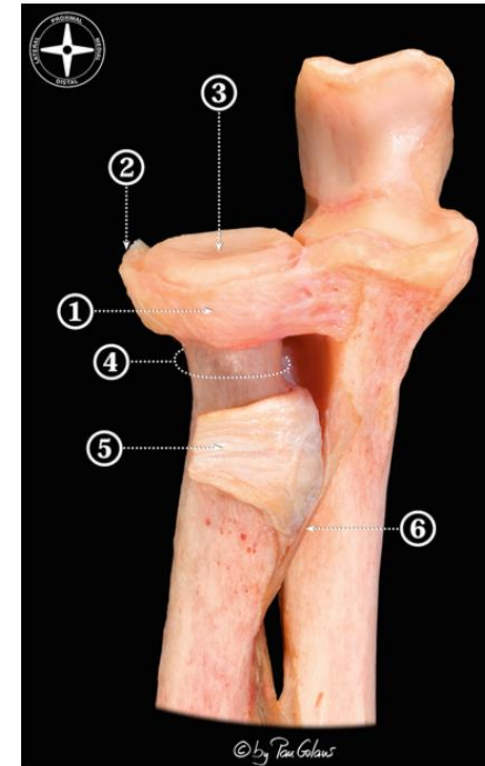
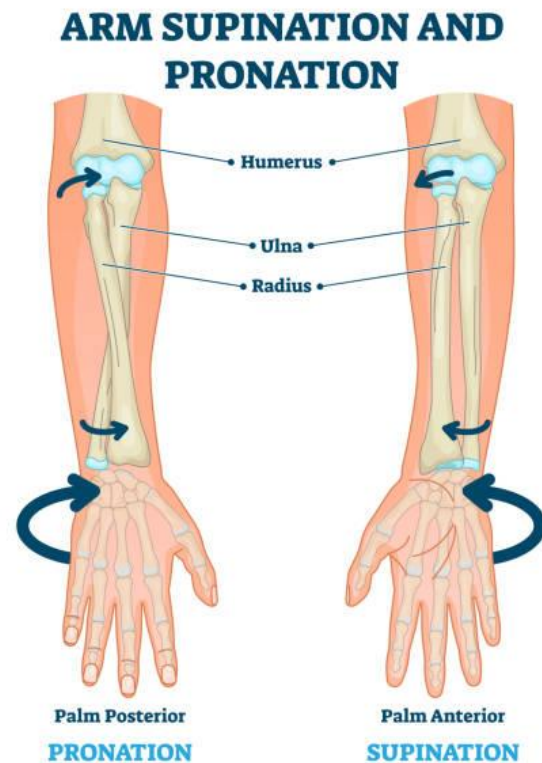


Radius

- **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 styloid process** is the distal projection from distal aspect of the radius..

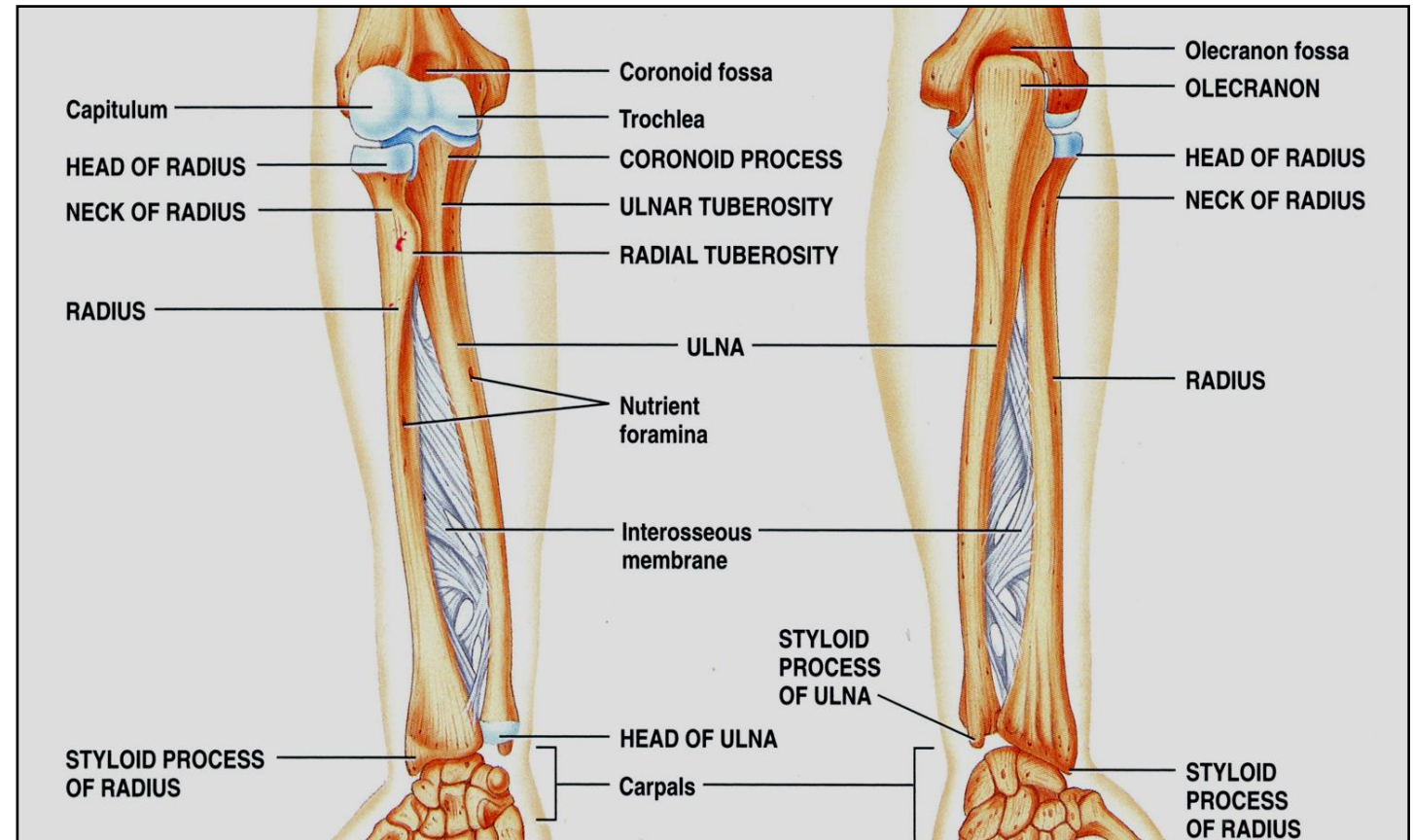


- During pronation and supination, the radius rotates about its long axis.



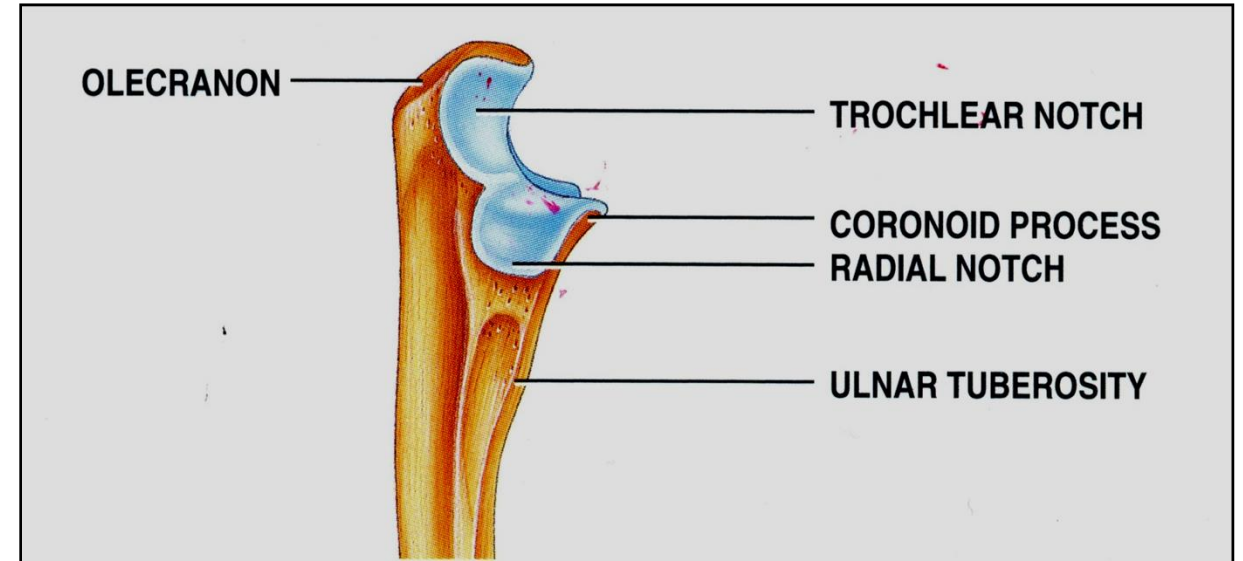
Ulna

- Lies on **the medial side of the forearm.**
- **Proximally:** the trochlea of the humerus and the head of the radius
- **Distally,** 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 styloid process** is a small projection from distal end of the ulna.



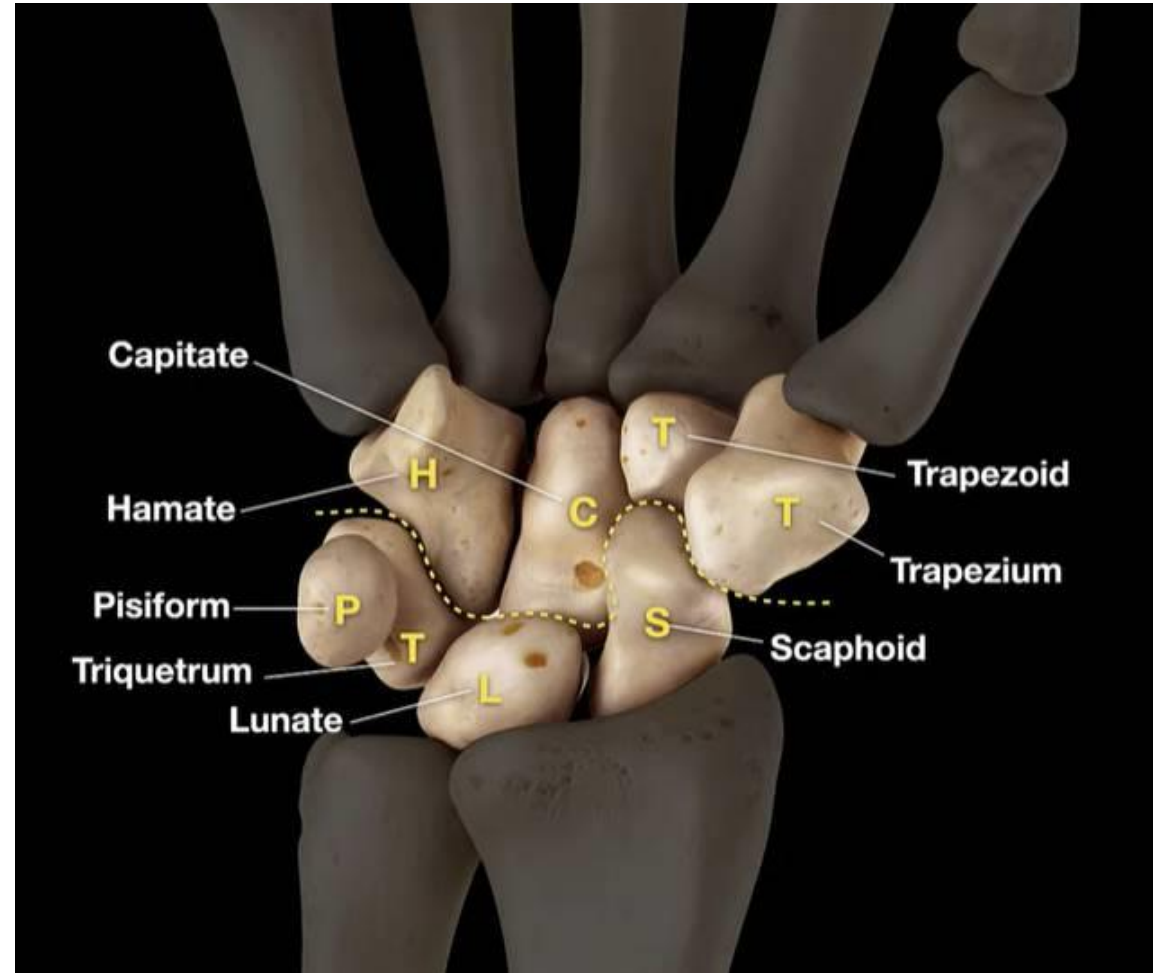
Ulna

- **The radial notch** 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 coronoid process** is the anterior projection 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.



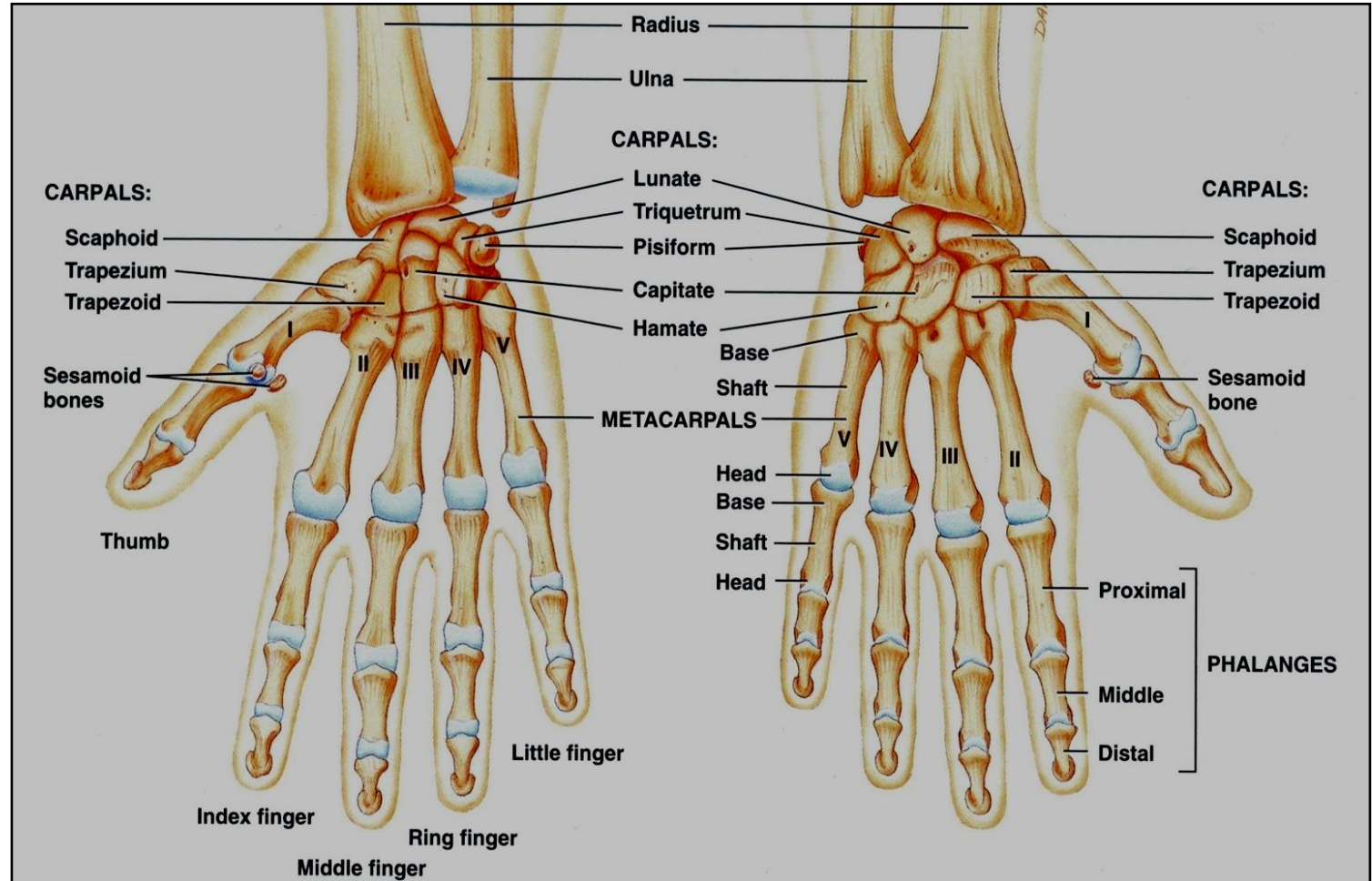
Carpal Bones

- 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 (carpal tunnel).
- **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

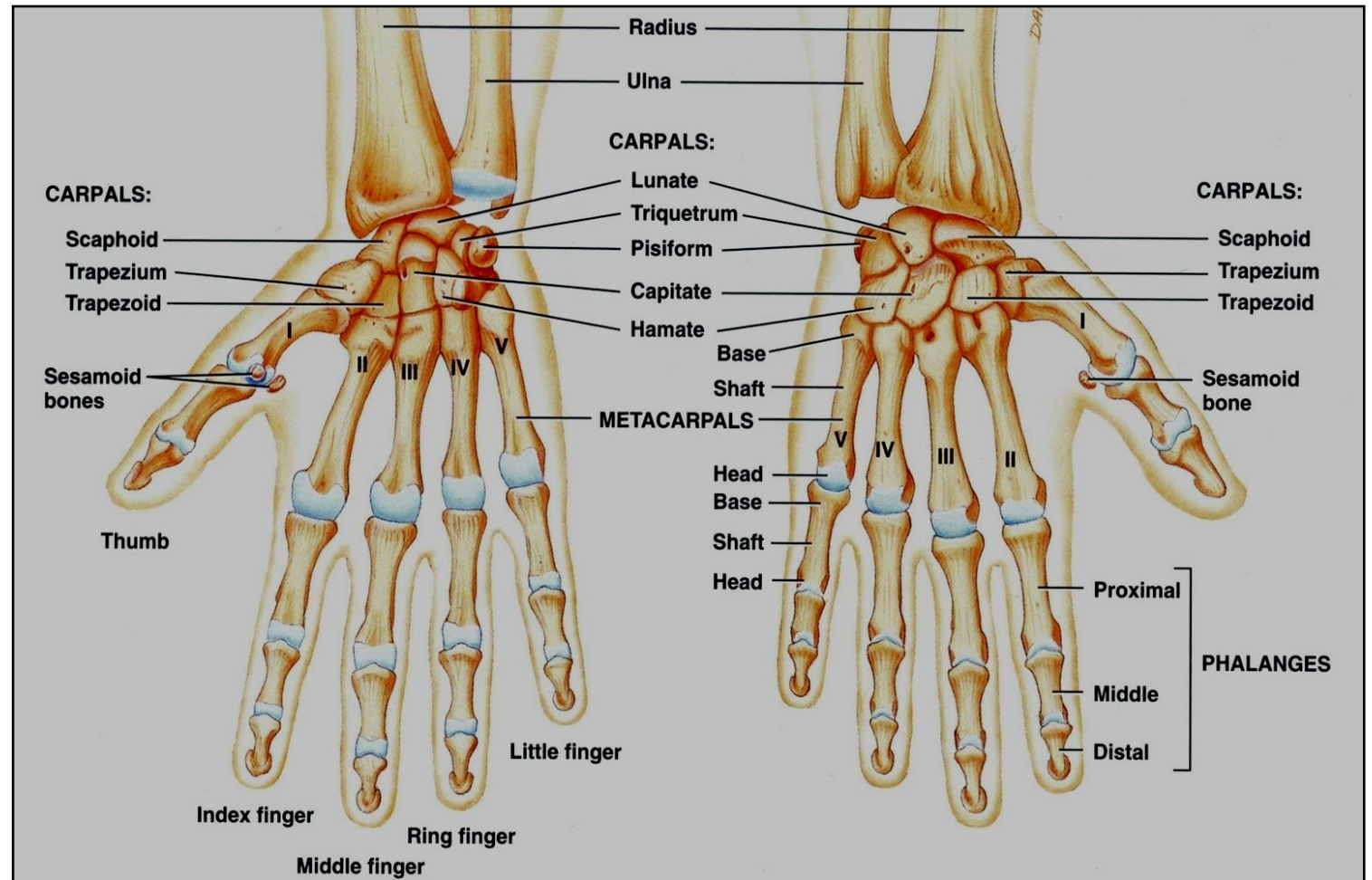
- The five bones located between the carpal bones and the phalanges of the hand
- There are five metacarpal bones; the 1st one is that of the thumb.
- Each metacarpal has: a **proximal base**, a **body**, and a **distal head**.



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