



The pectoral girdle is the set of bones which connect the upper limb to the axial skeleton on each side.

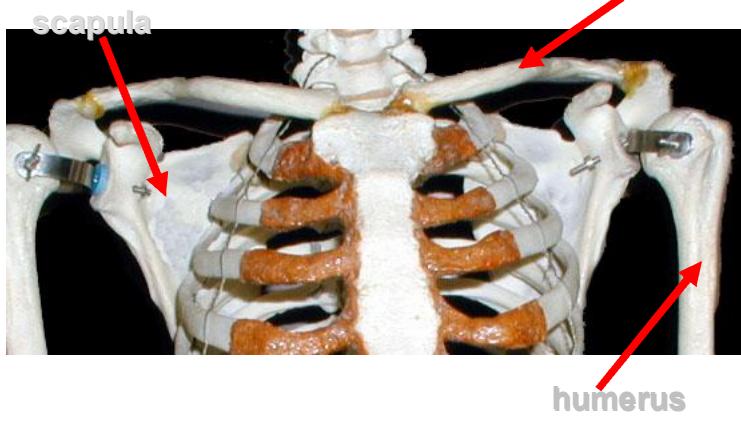
It consists of the

- clavicle
- scapula in humans
- in those species with three bones in the pectoral girdle, the coracoid.
- No joint exists between each clavicle and the thorax, instead the muscular connection between the two permits relatively great mobility of the shoulder girdle in relation to the pelvic girdle.



• In humans, the only joints between shoulder girdle and axial skeleton are the sternoclavicular joints on each side.

Pectoral Girdle

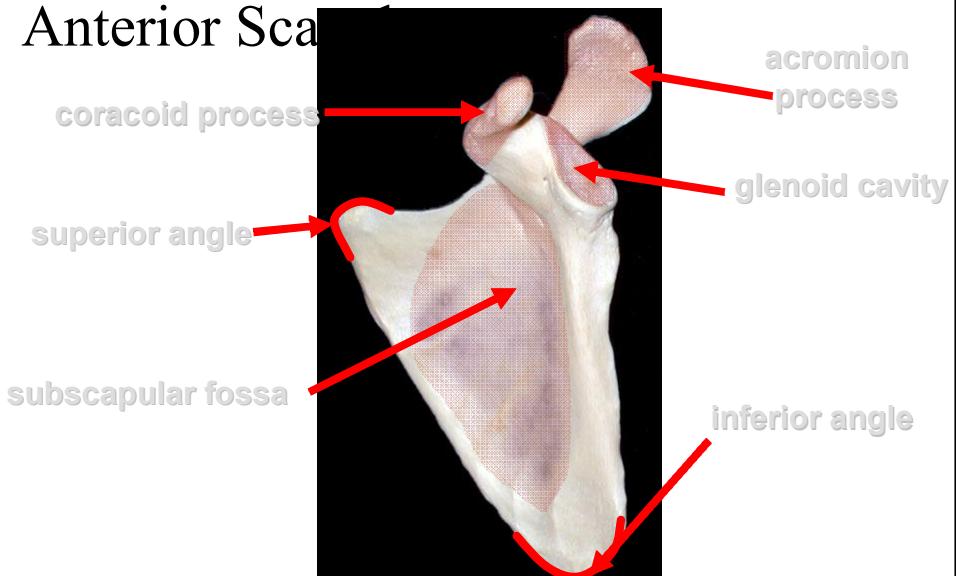


Clavicle

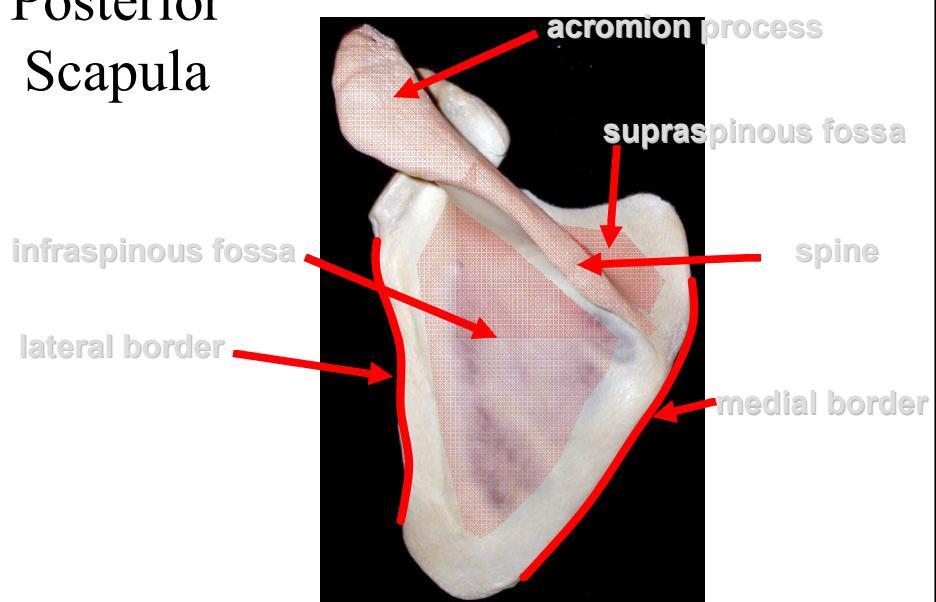
acromial end sternal end

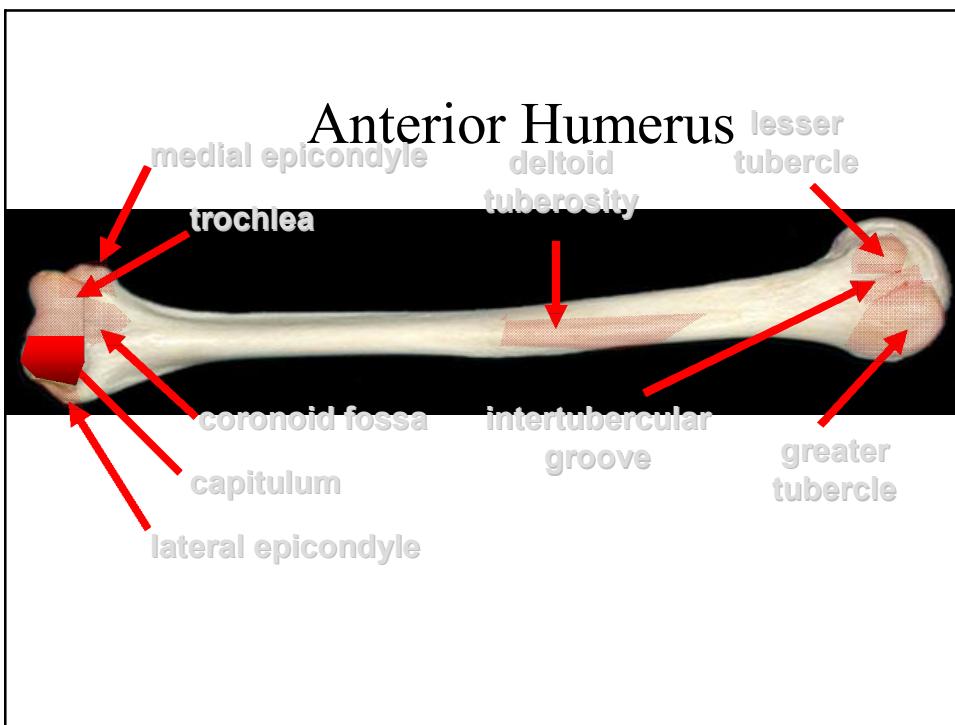
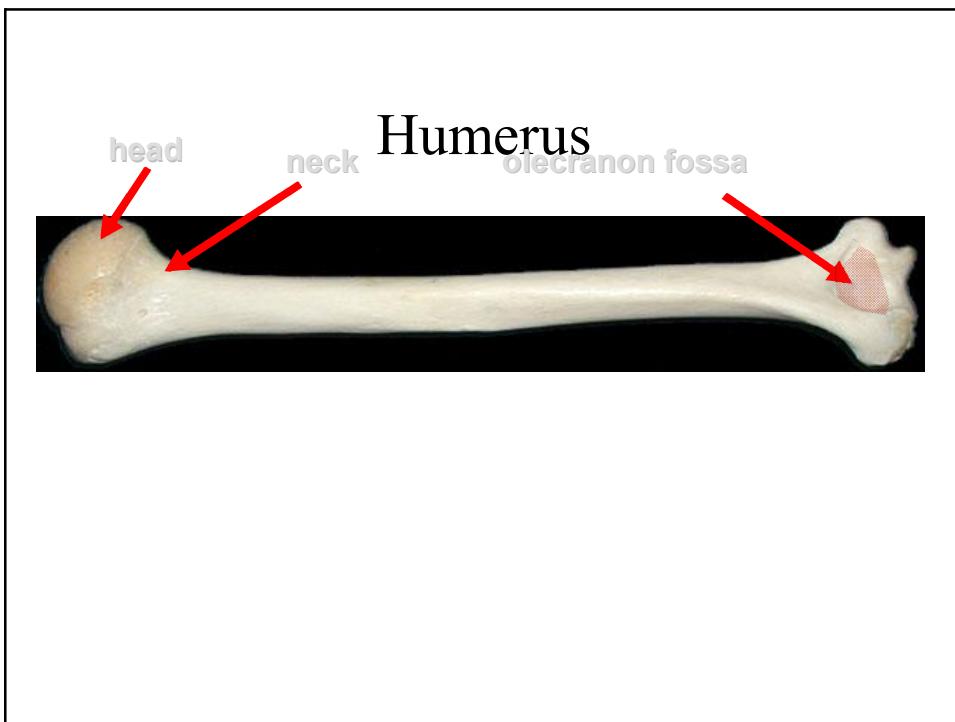


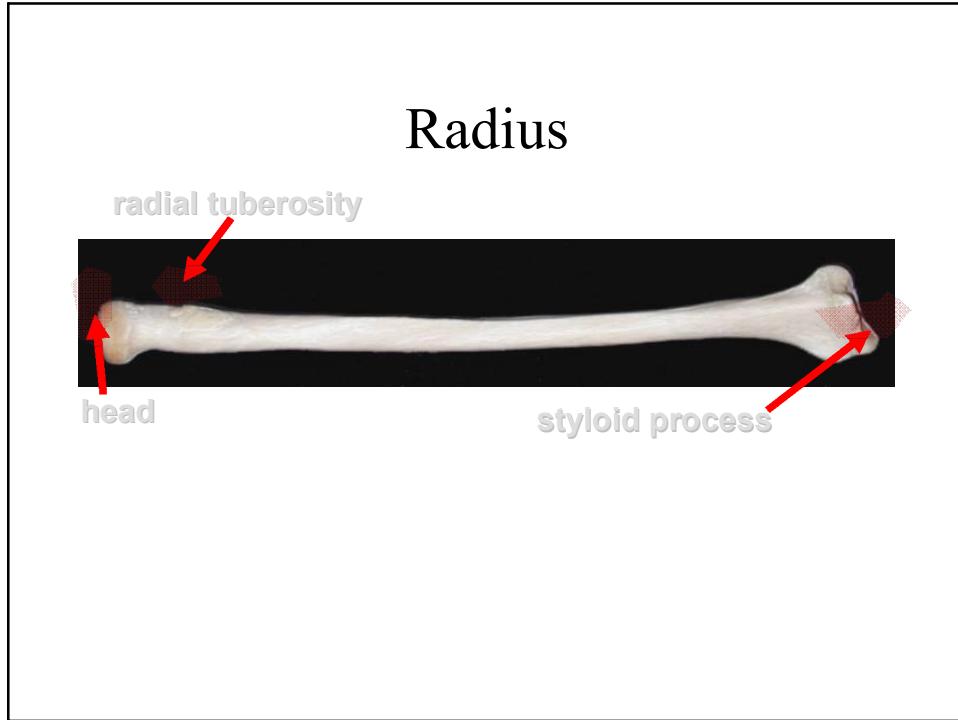
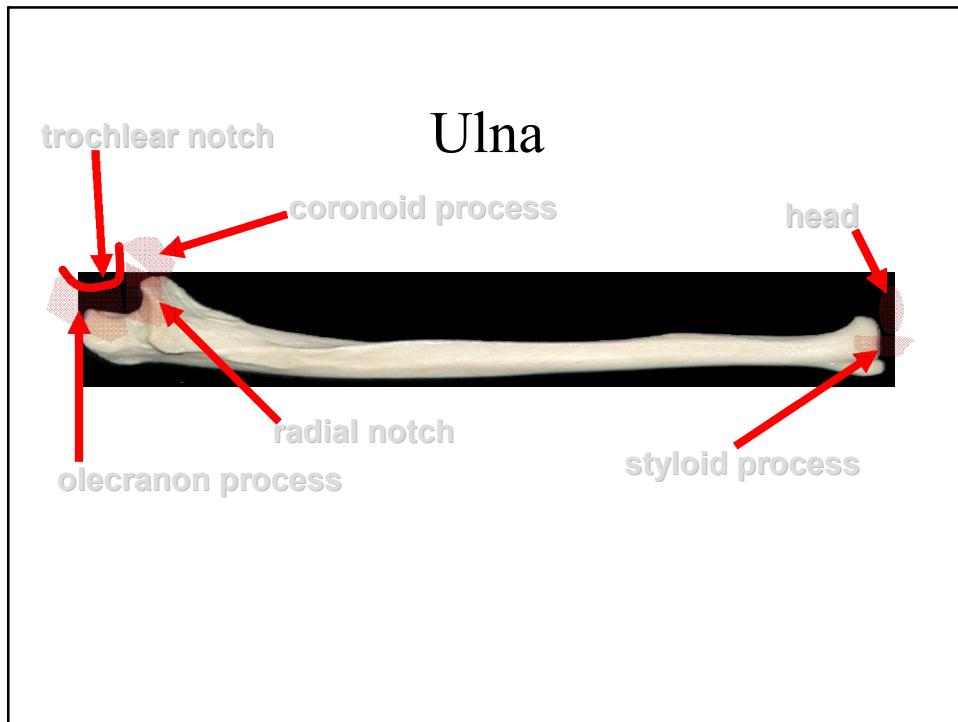
Anterior Scapula



Posterior Scapula







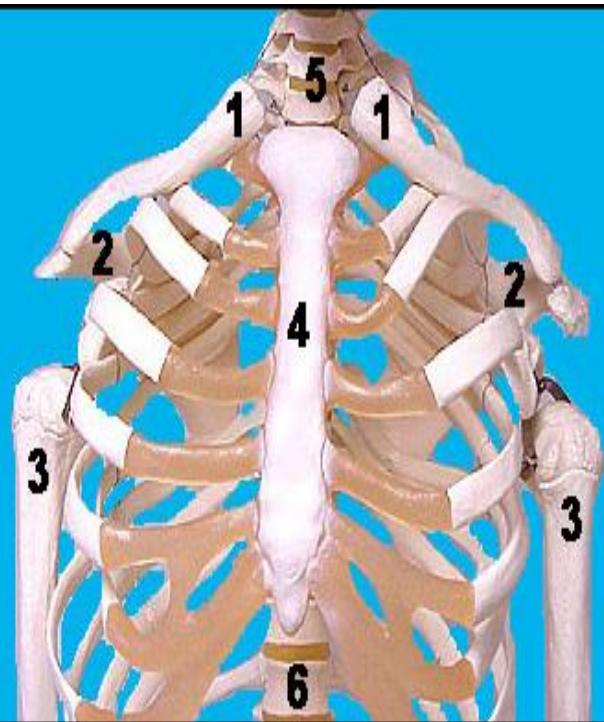
Pectoral girdle

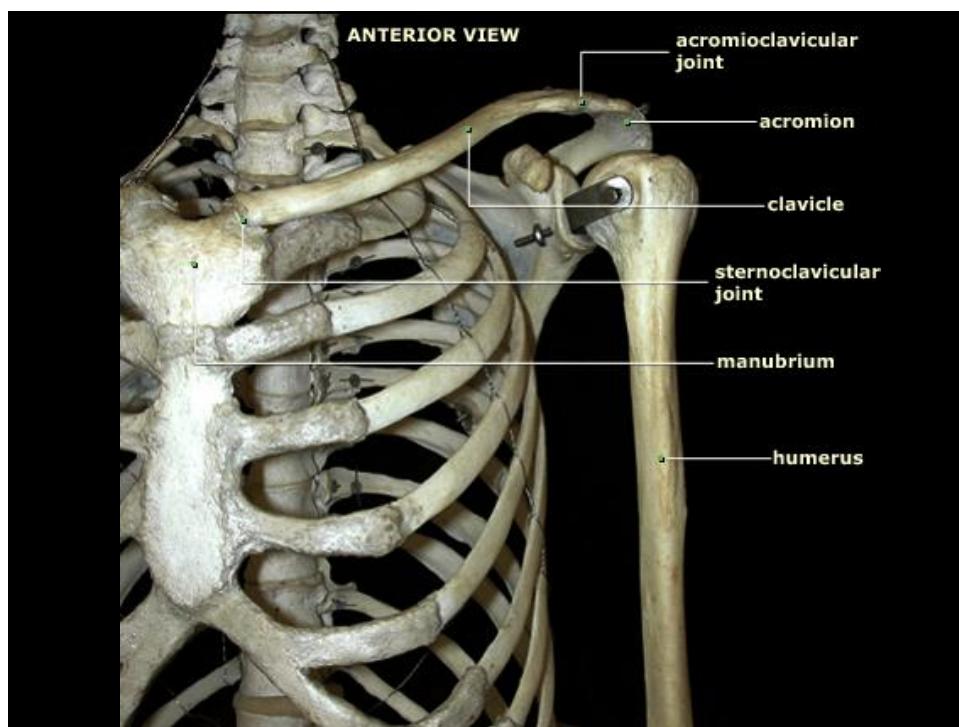
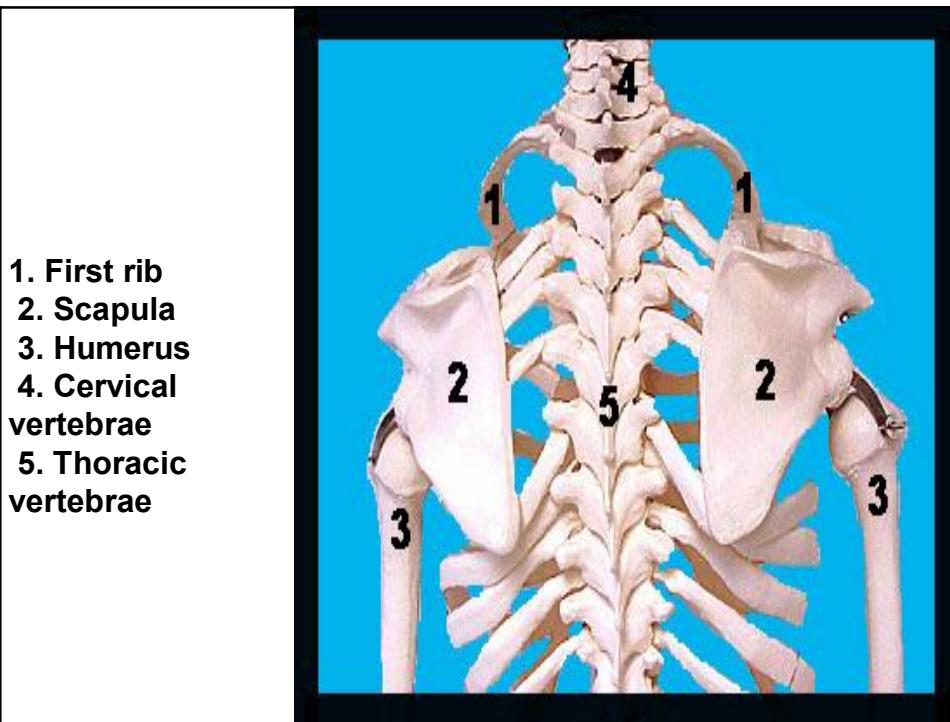
•pectoral girdle = 2 clavicles + 2 scapulae

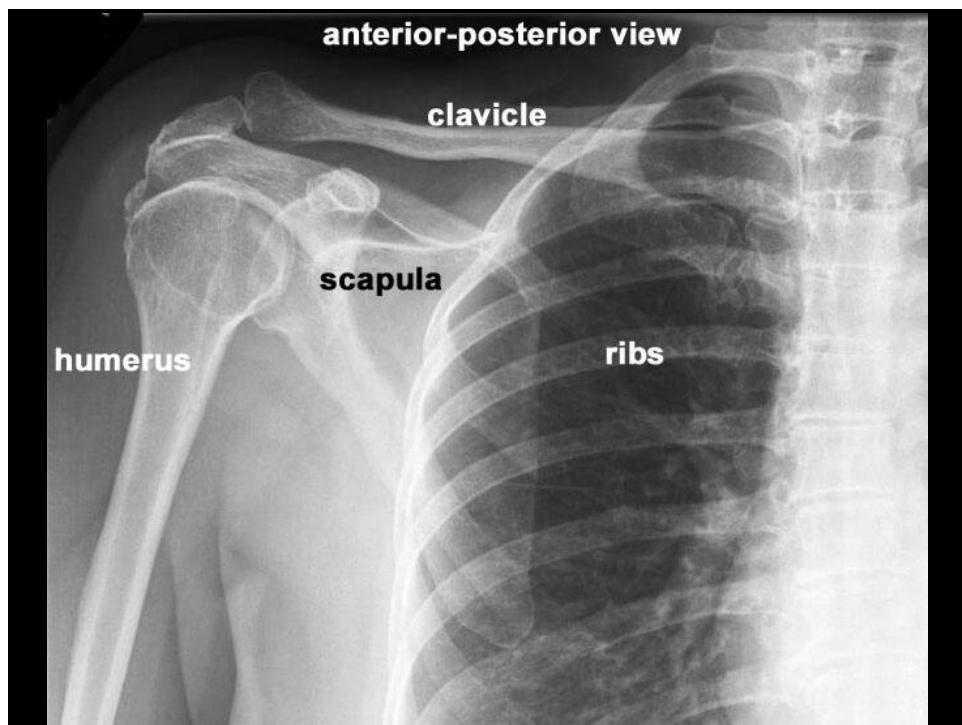
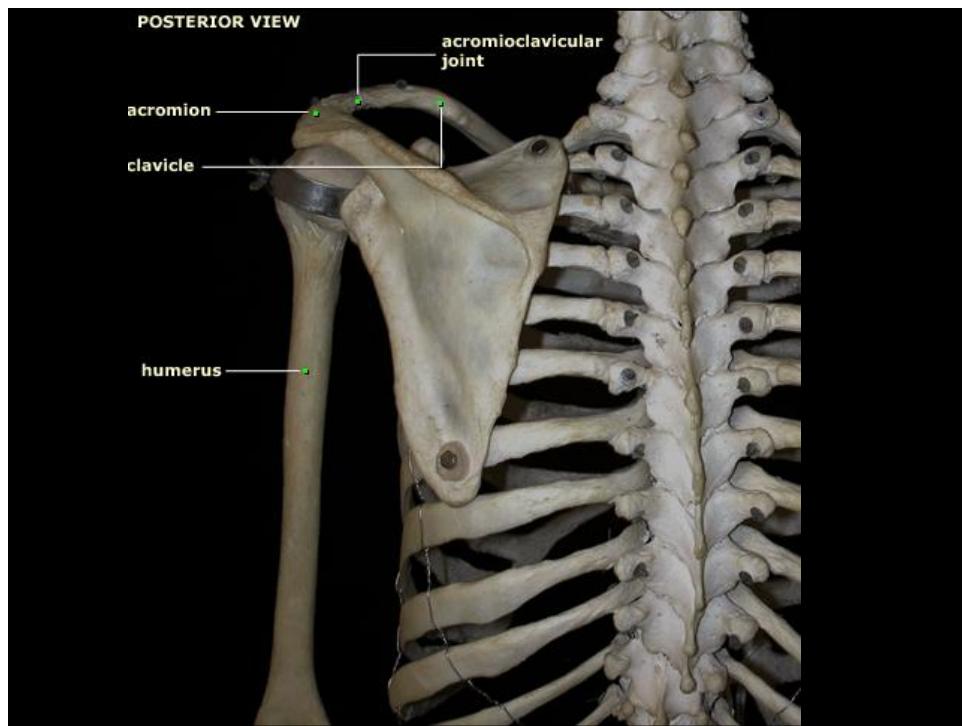
•clavicle: collar bone; keeps shoulders apart; vestigial or absent in quadrupeds; synovial jts with acromion process of scapula, and manubrium (sternum)

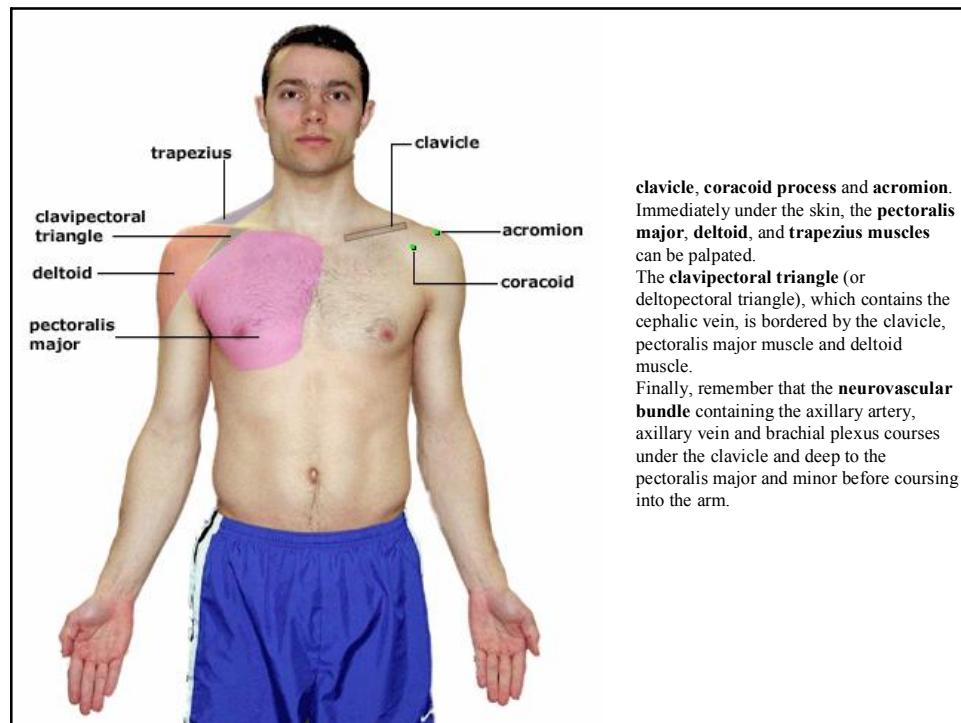
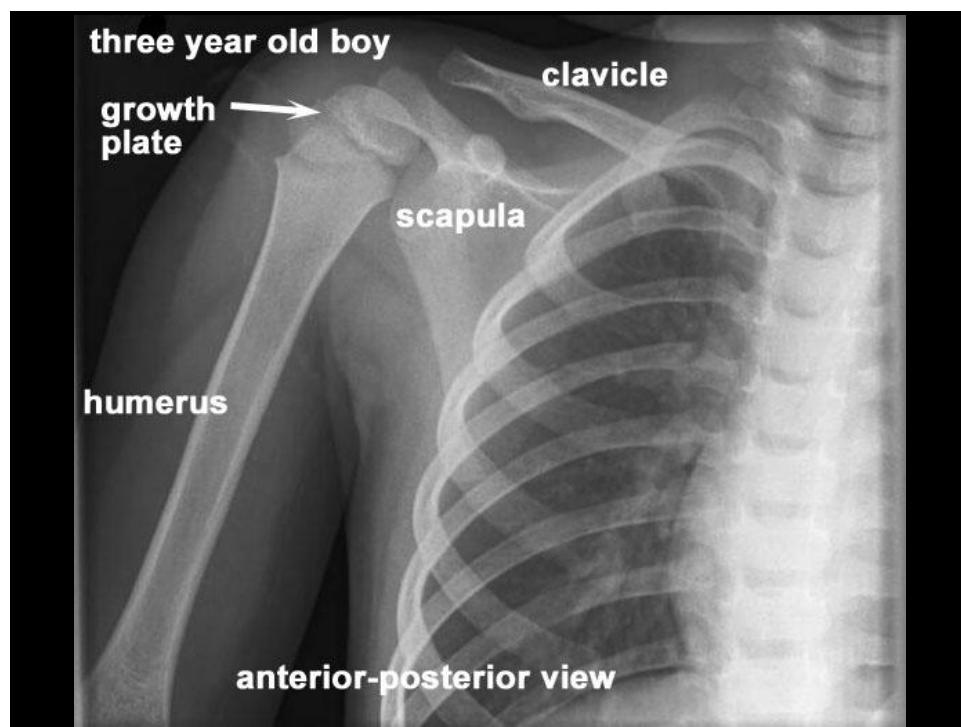
•scapula: shoulder blade; flat bone; coracoid process/spine: sites for muscle attachments to arm/thorax; extension of quadr limb (scapula glide); glenoid fossa forms synovial jt (shoulder) with humerus

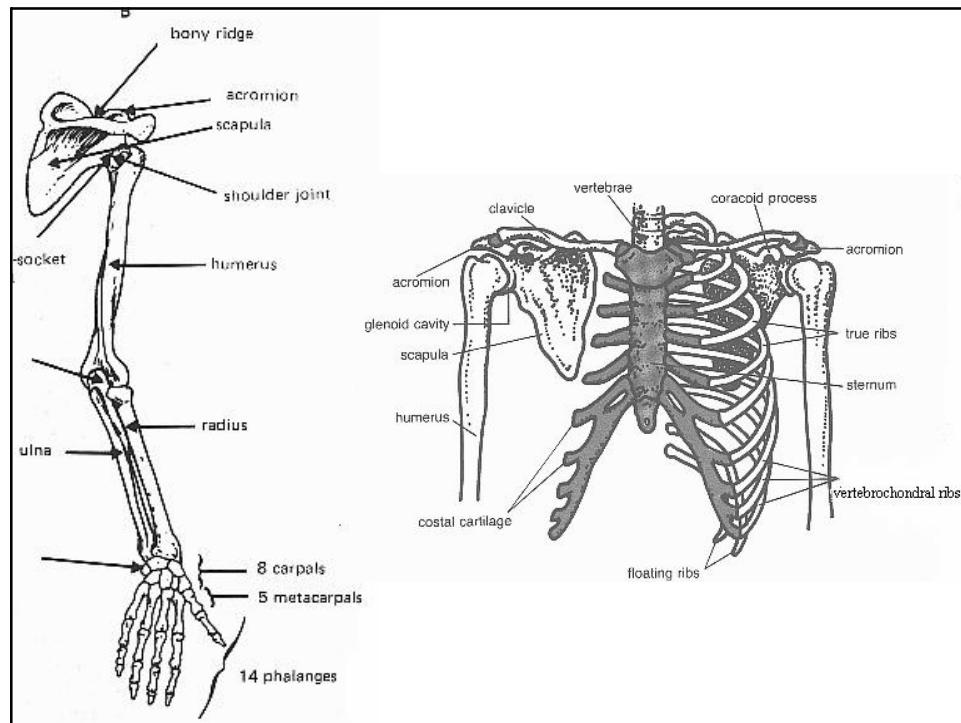
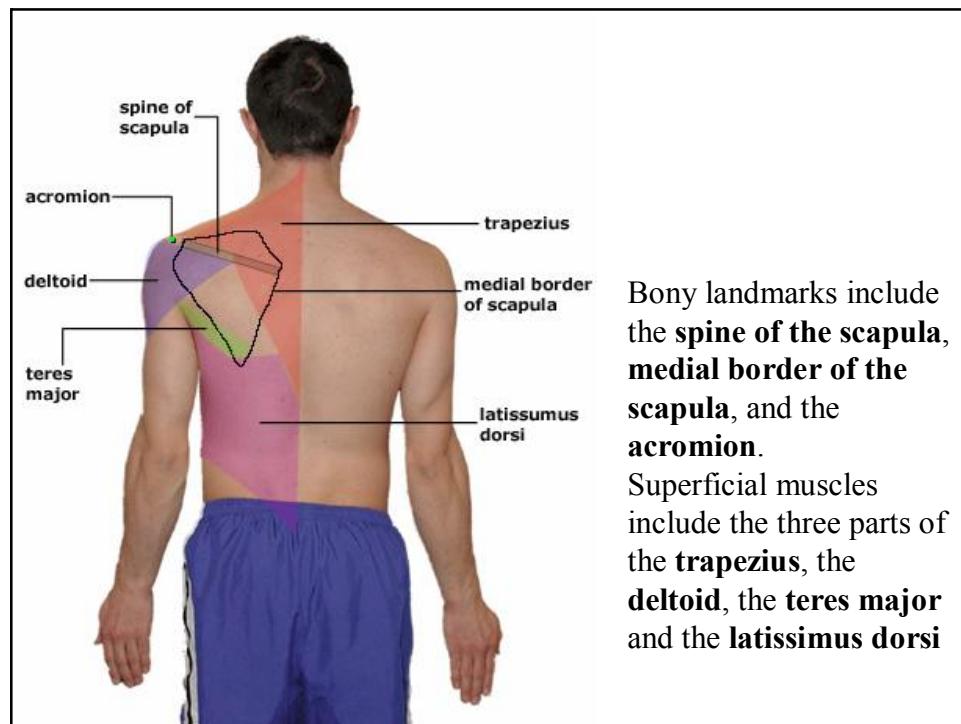
1. Clavicle
2. Scapula
3. Humerus
4. Sternum
5. Cervical vertebrae
6. Thoracic vertebra

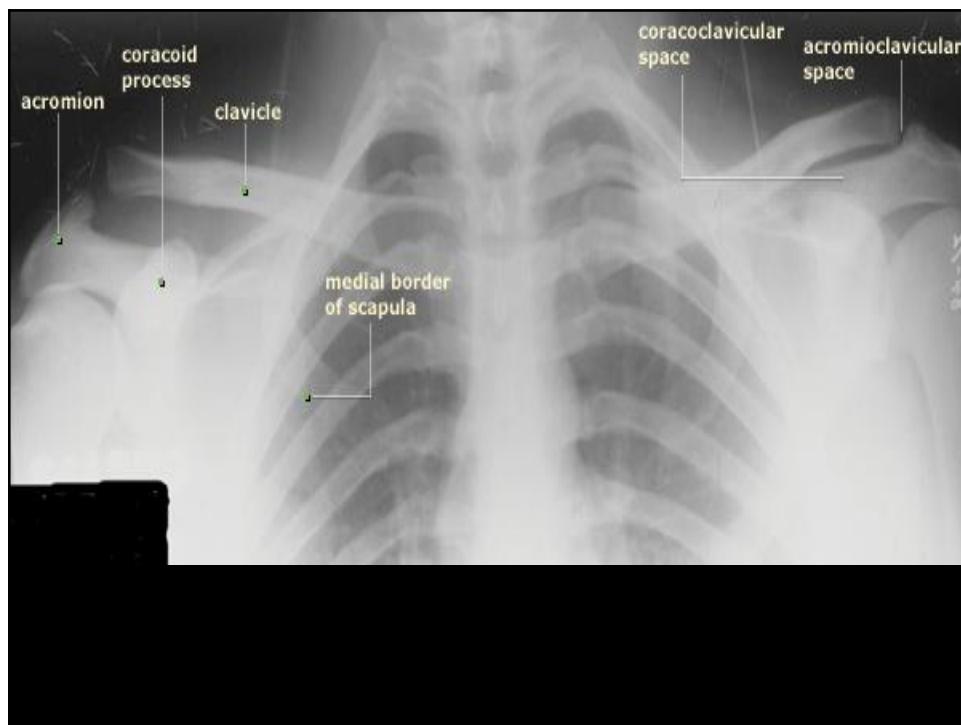
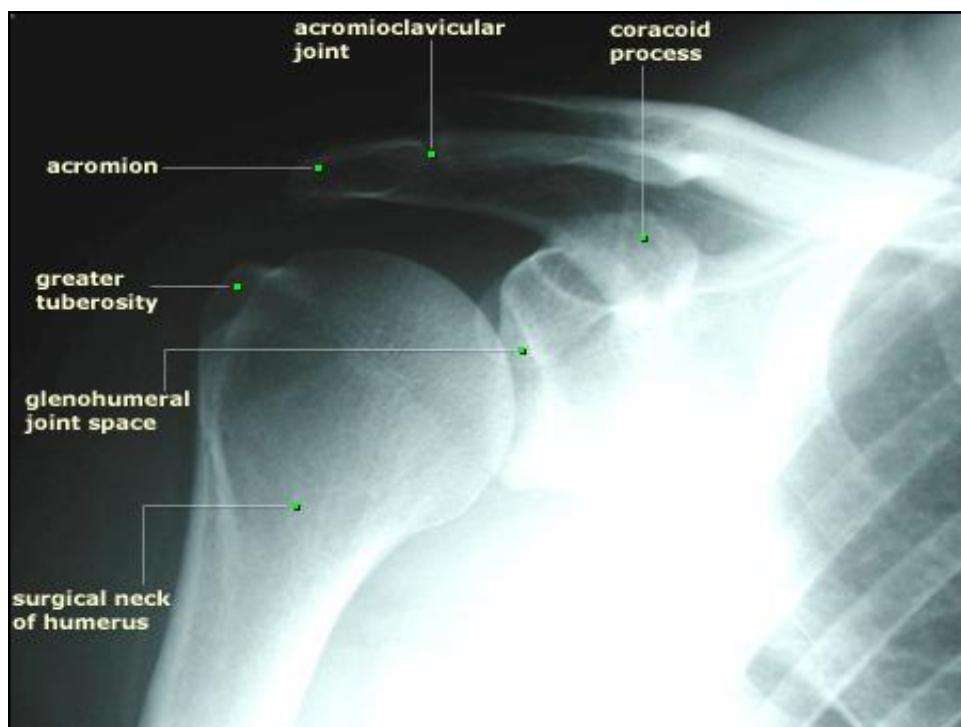


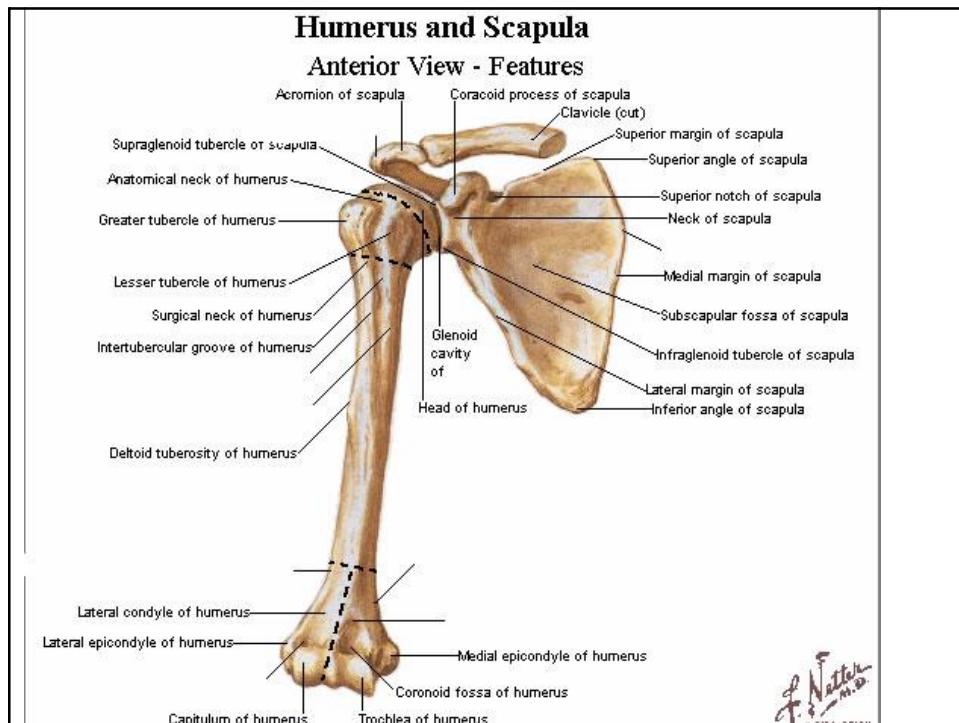
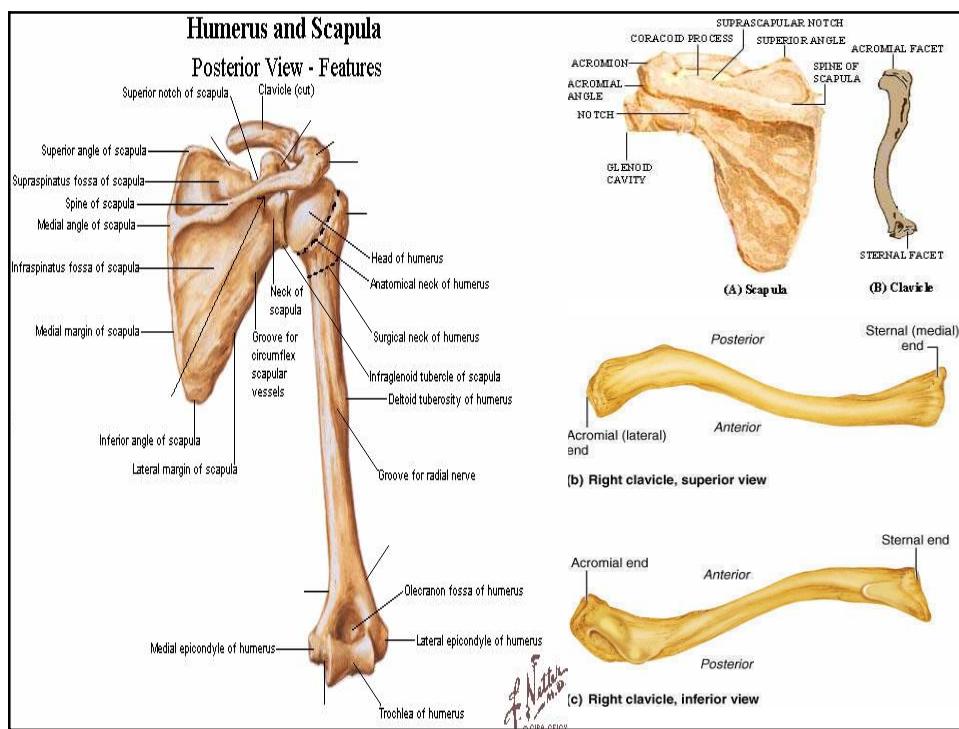


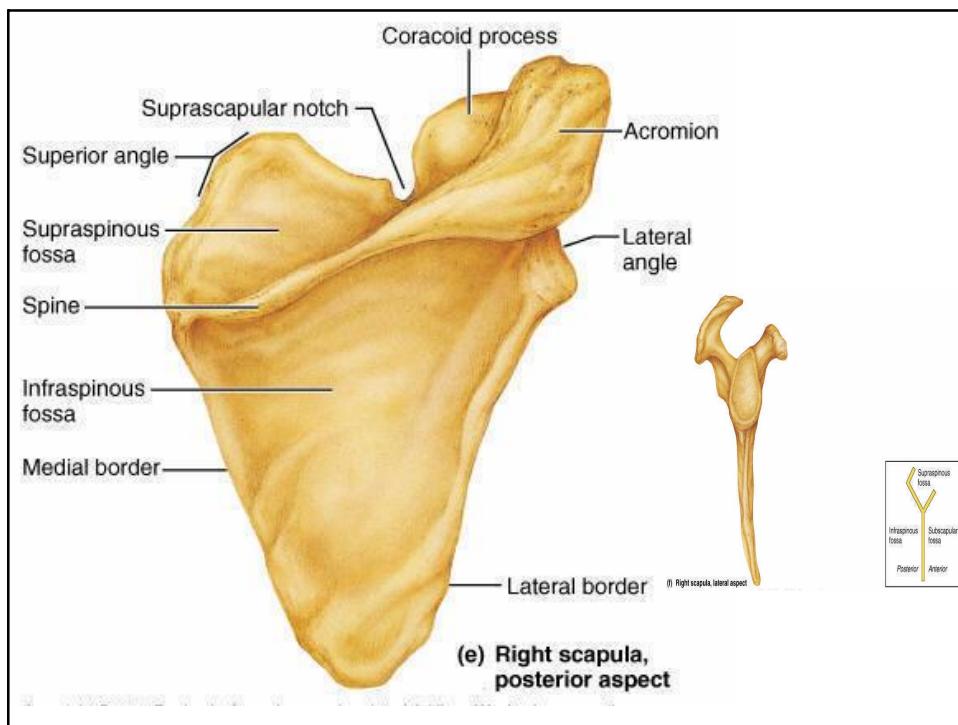
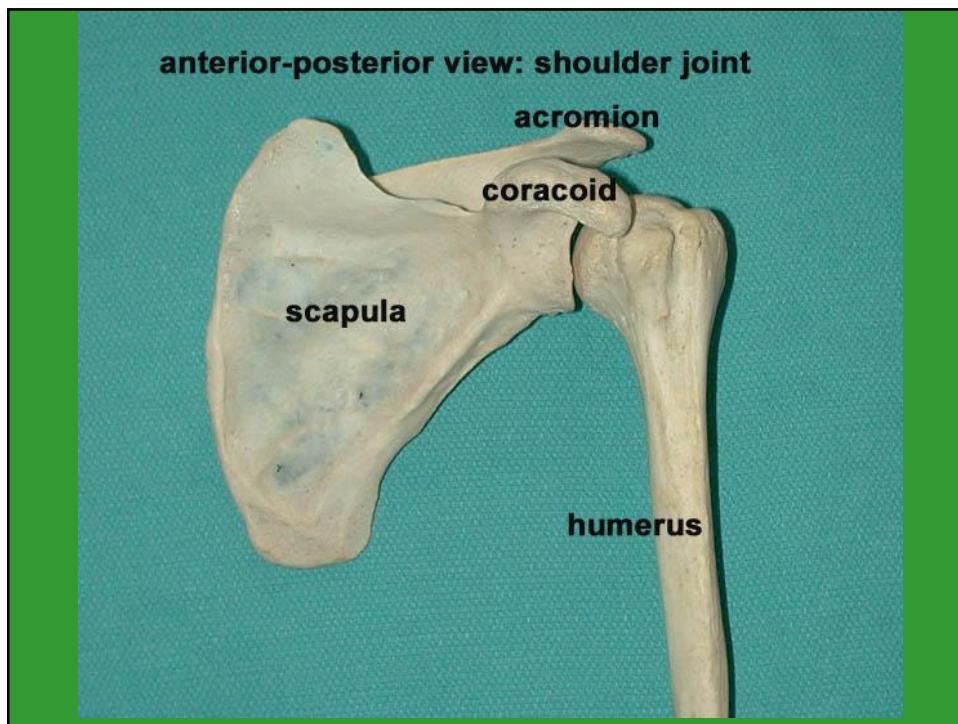






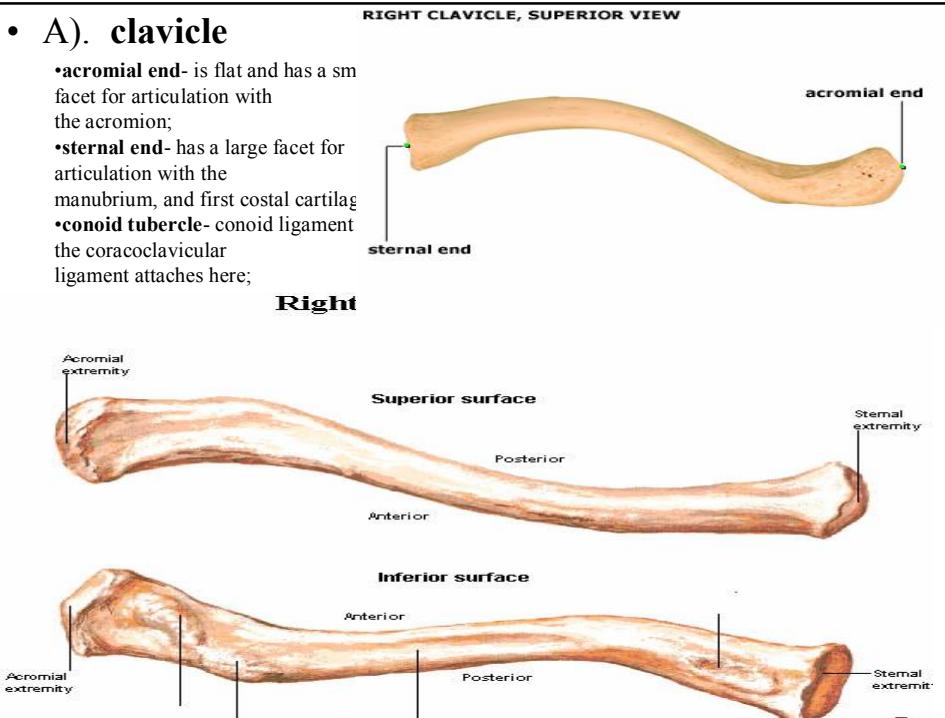






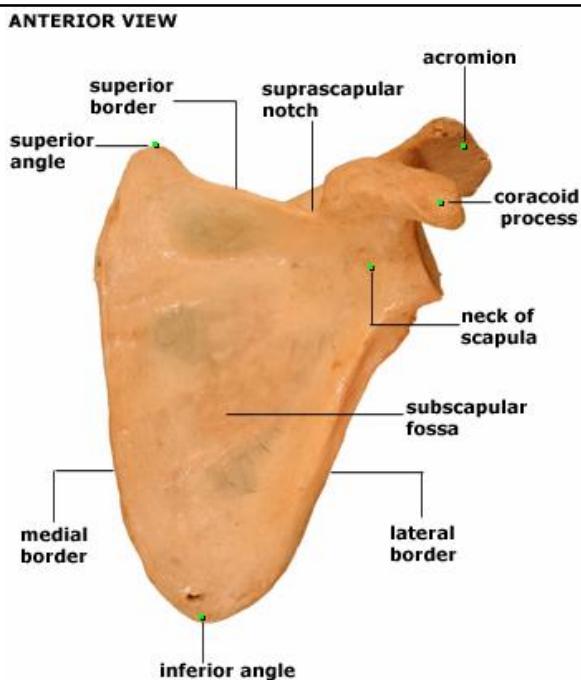
• A). clavicle

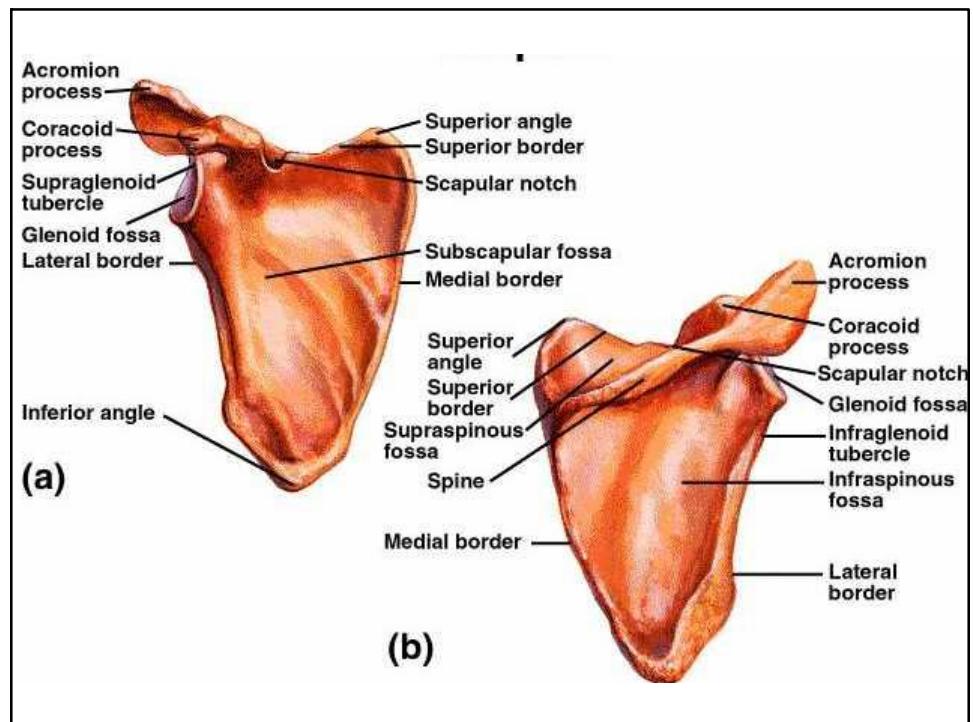
- **acromial end**- is flat and has a small facet for articulation with the acromion;
- **sternal end**- has a large facet for articulation with the manubrium, and first costal cartilage
- **conoid tubercle**- conoid ligament the coracoclavicular ligament attaches here;



• B). scapula

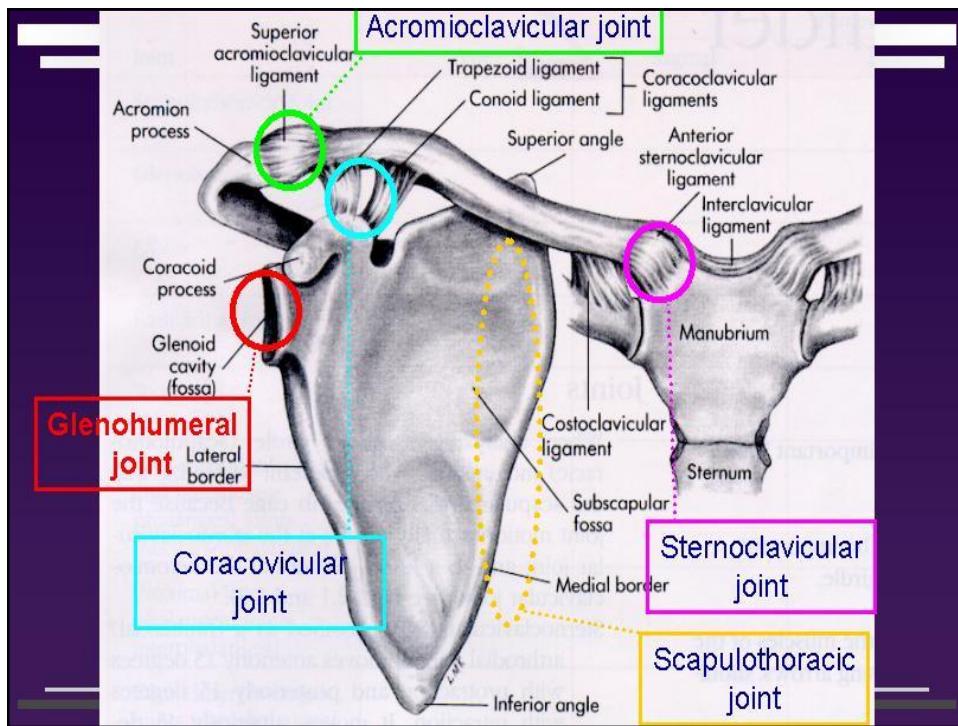
- 1). posterior surface
 - spine
 - acromion
 - coracoid process
 - suprascapular notch
 - supraspinous fossae
 - infraspinous fossae
- 2). borders
 - superior border
 - medial border
 - lateral border
- 3). anterior surface
 - scapular fossae
- 4). lateral end
 - glenoid cavity





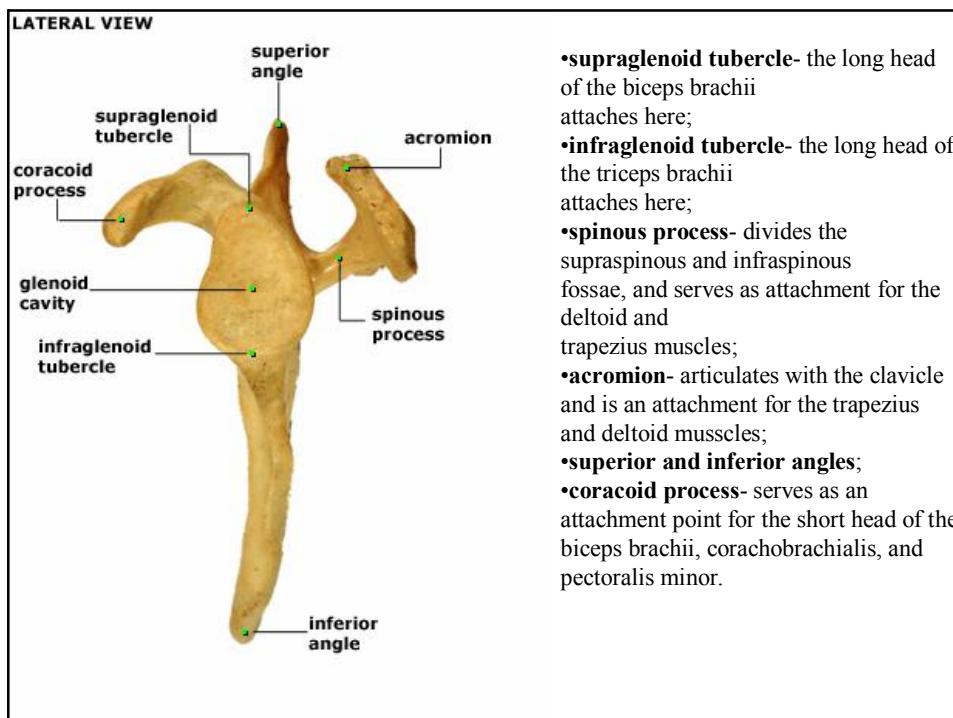
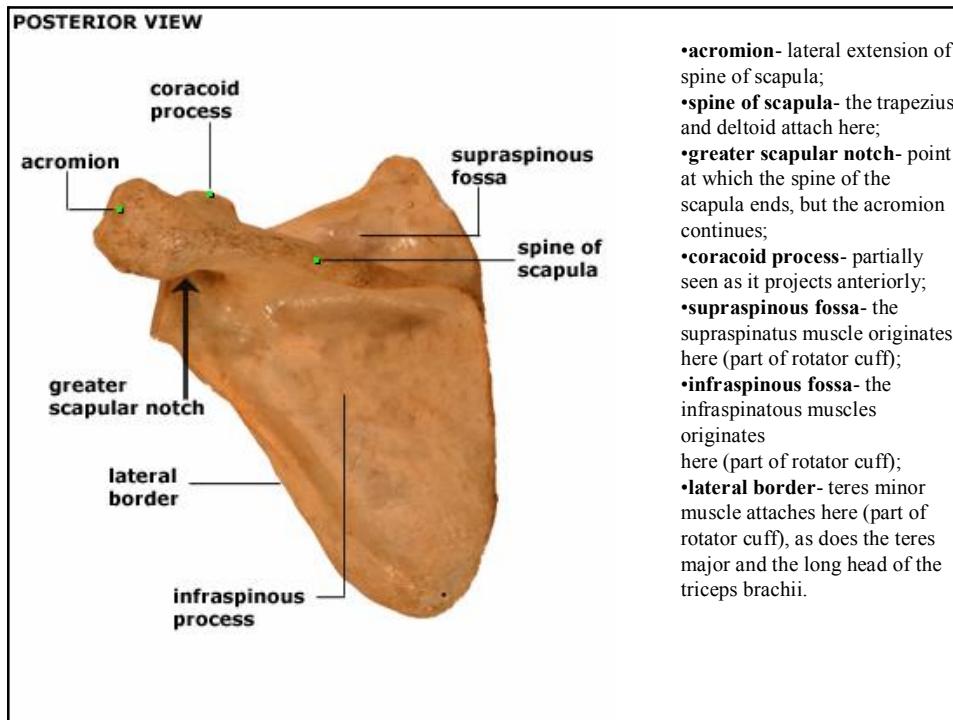
Joints

- *Glenohumeral* - humerus articulating with glenoid fossa of scapula
- *Sternoclavicular (SC)* - proximal clavicle articulating with manubrium and cartilage of rib 1
- *Acromioclavicular (AC)* - acromian process of scapula articulating with distal clavicle
- *Coracoclavicular* - coracoid process of scapula articulating with inferior clavicle
- *Scapulothoracic* - anterior scapula articulating with thoracic wall

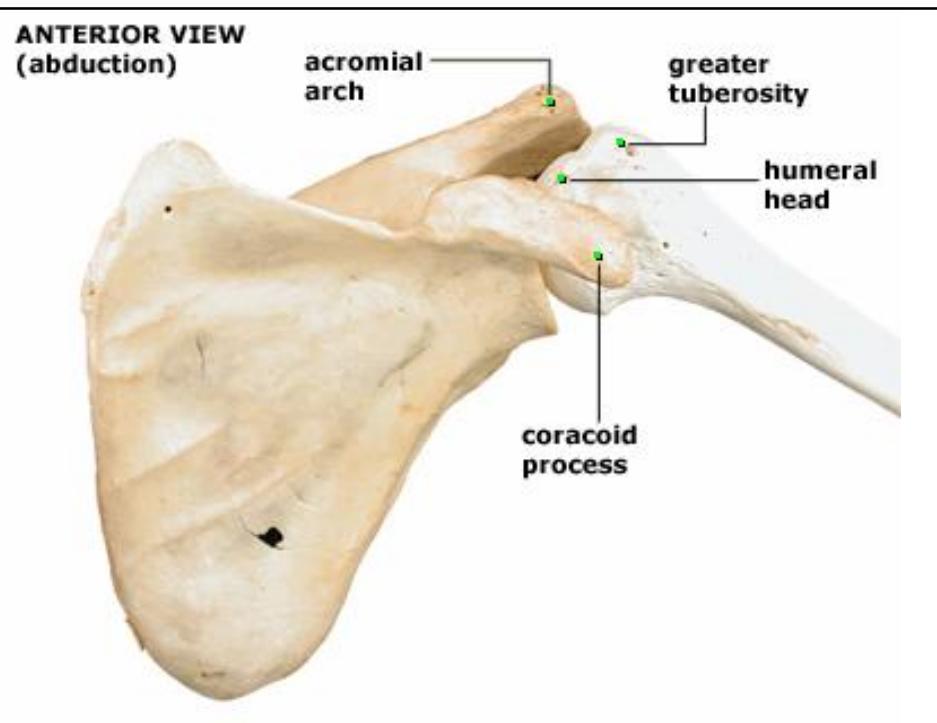


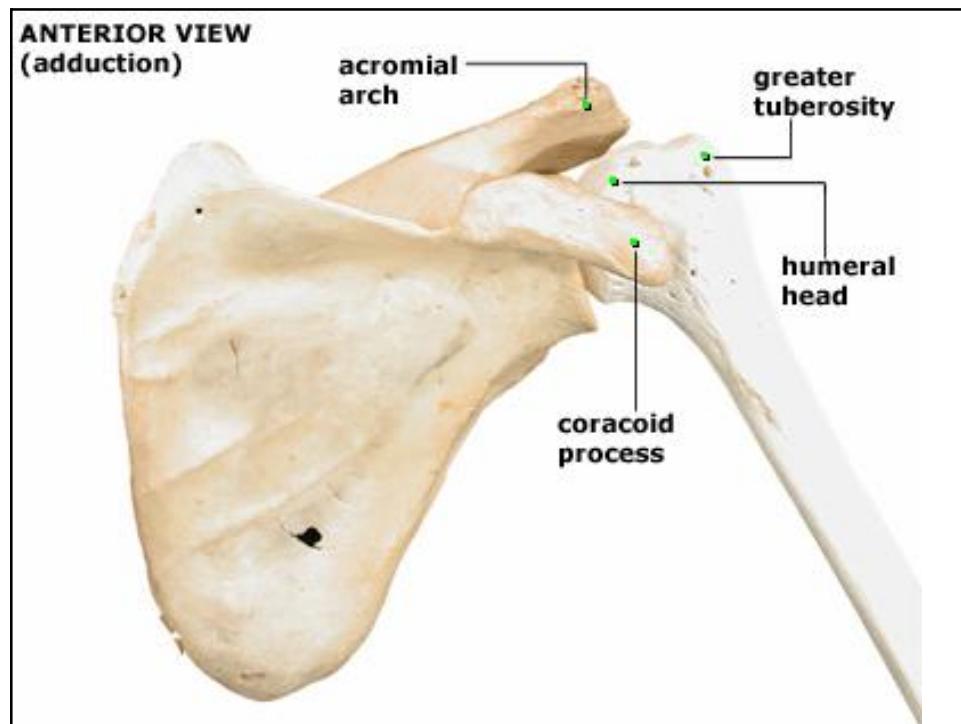
Movements of Scapula and Muscles Causing Movement:

- *Protraction (scapular abduction)* - serratus anterior, pectoralis minor
- *Retraction (scapular adduction)* - trapezius, rhomboid, levator scapulae
- *Downward Rotation* - rhomboids, pectoralis minor
- *Upward rotation* - trapezius, serratus anterior
- *Depression* - trapezius (lower), pectoralis minor, subclavius
- *Elevation* - trapezius (upper), levator scapulae, rhomboid



Glenohumeral joint





The Upper Limb

- The upper limb consists of the arm (brachium), forearm (antebrachium), and hand (manus)
- Thirty-seven bones form the skeletal framework of each upper limb

Arm

- The humerus is the sole bone of the arm
- It articulates with the scapula at the shoulder, and the radius and ulna at the elbow

Arm

- Major markings
 - Proximal humerus includes the head, anatomical and surgical necks, greater and lesser tubercles, and the intertubercular groove
 - Distal humerus includes the capitulum, trochlea, medial and lateral epicondyles, and the coronoid and olecranon fossae
 - Medial portion includes the radial groove and the deltoid process

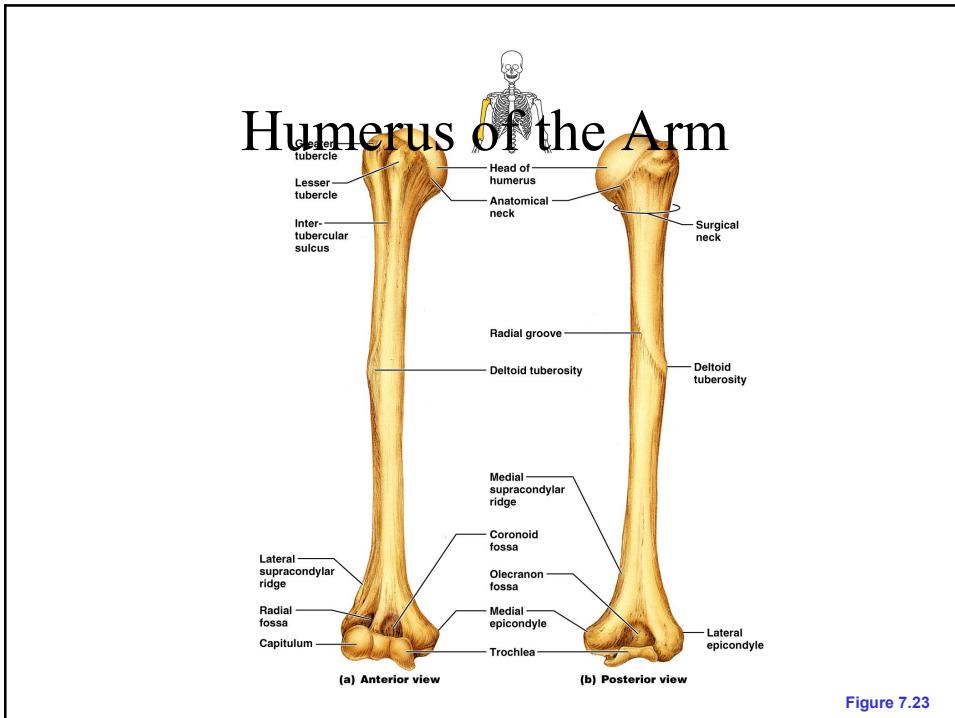


Figure 7.23

Forearm

- The bones of the forearm are the radius and ulna
- They articulate proximally with the humerus and distally with the wrist bones
- They also articulate with each other proximally and distally at small radioulnar joints
- Interosseous membrane connects the two bones along their entire length

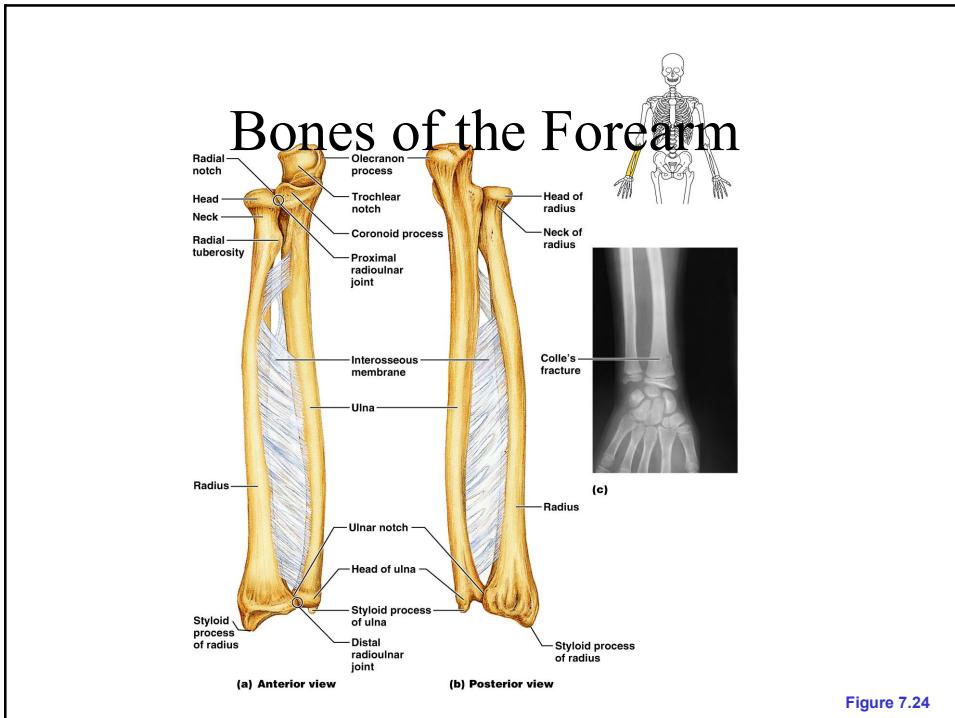


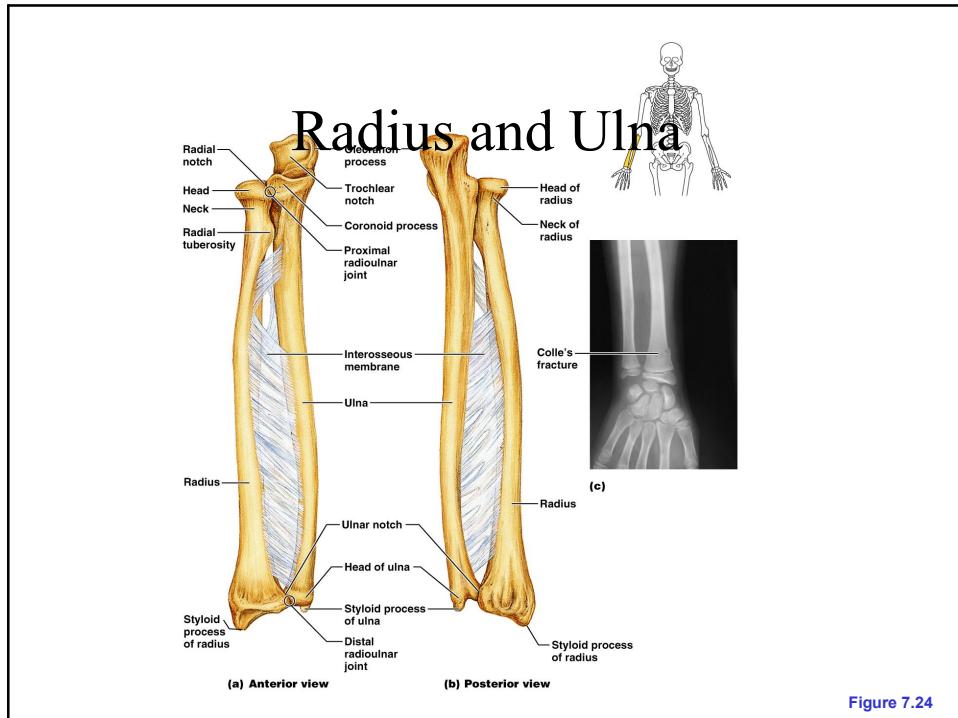
Figure 7.24

Ulna

- The ulna lies medially in the forearm and is slightly longer than the radius
- Forms the major portion of the elbow joint with the humerus
- Its major markings include the olecranon, coronoid process, trochlear notch, radial notch, and the styloid process

Radius

- The radius lies opposite (lateral to) the ulna and is thin at its proximal end, widened distally
- The superior surface of the head articulates with the capitulum of the humerus
- Medially, the head articulates with the radial notch of the ulna
- Major markings include the radial tuberosity, ulnar notch, and styloid process



- Skeleton of the hand contains wrist bones (carpal), bones of the palm (metacarpals), and bones of the fingers (phalanges)

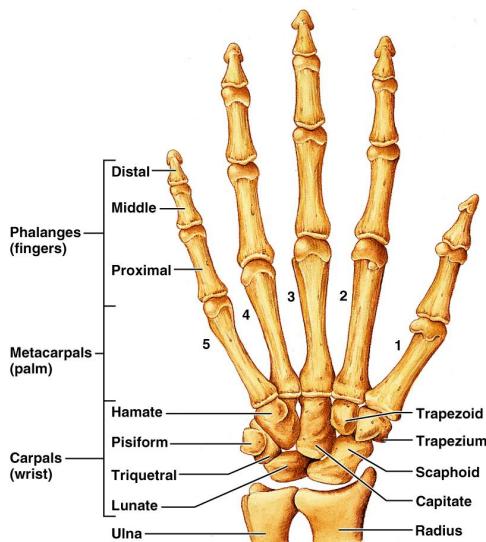


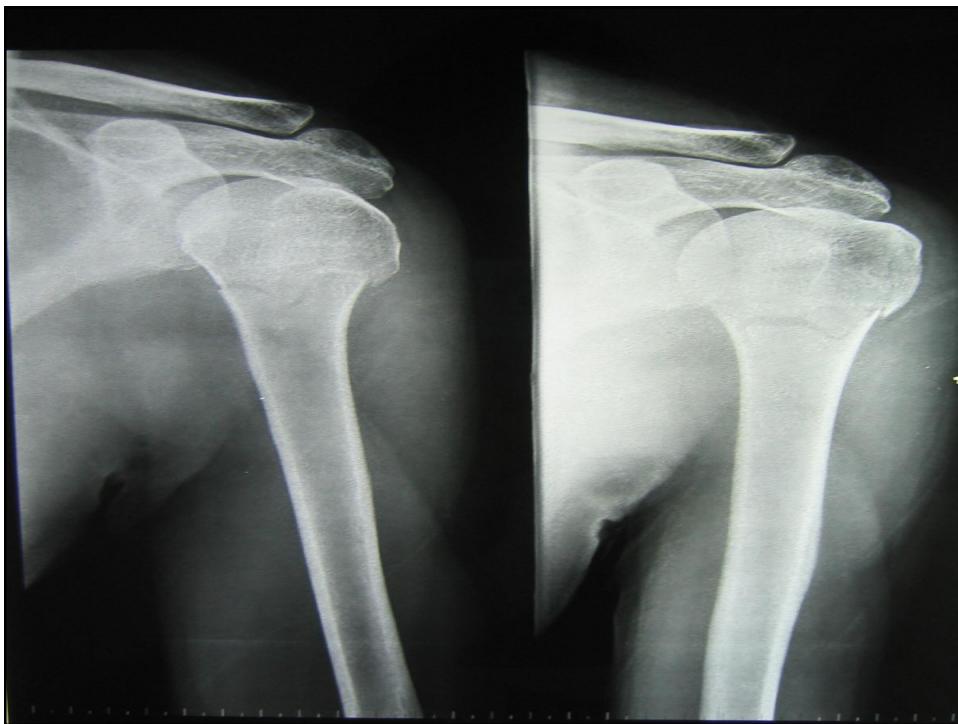
Figure 7.26a

Upper Arm: humerus

A variety of muscles attach to the humerus. These enable movement at the elbow and at the shoulder.

The rotator cuff muscles attach at the *proximal* humerus, and can rotate and abduct the arm at the shoulder.

Some of the forearm muscles, (such as pronator teres, and the flexors and extensors of the wrist) also attach to the *distal* humerus

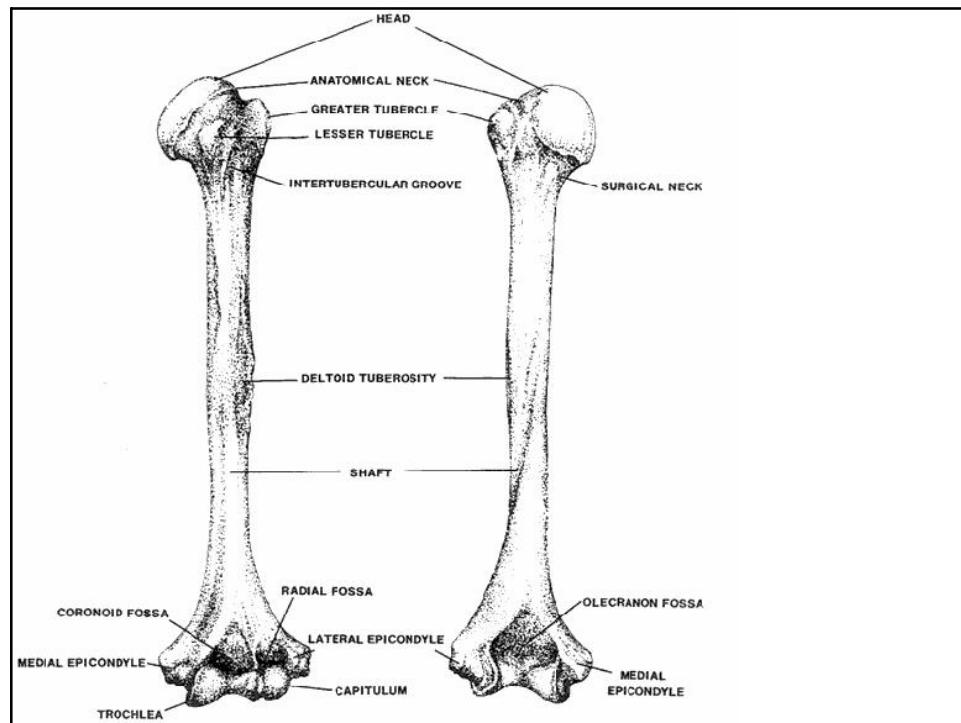
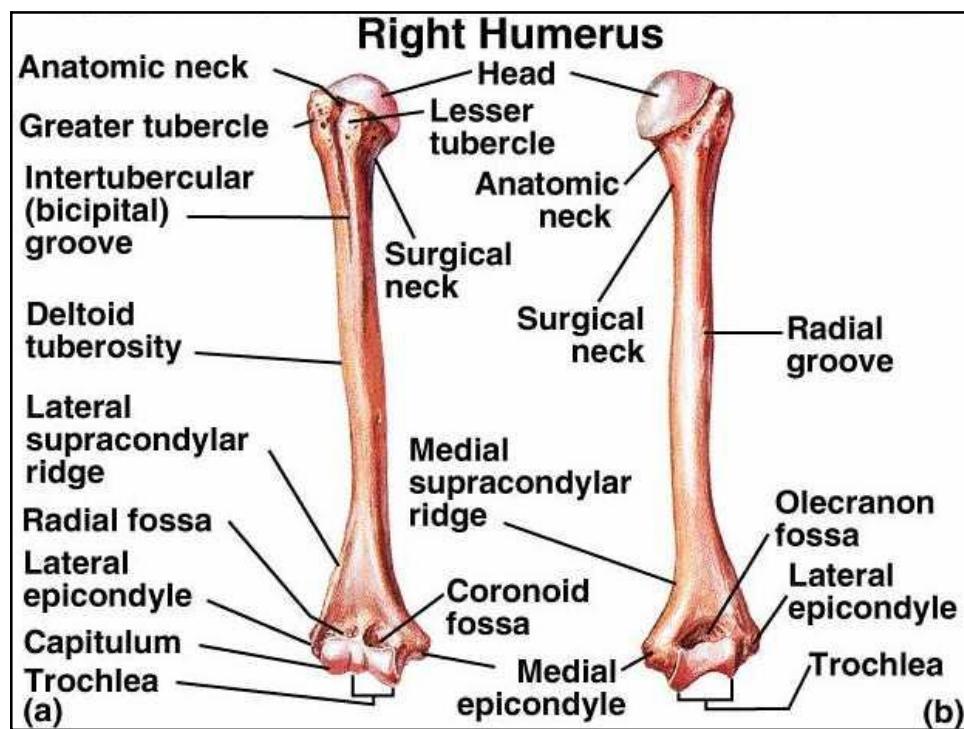


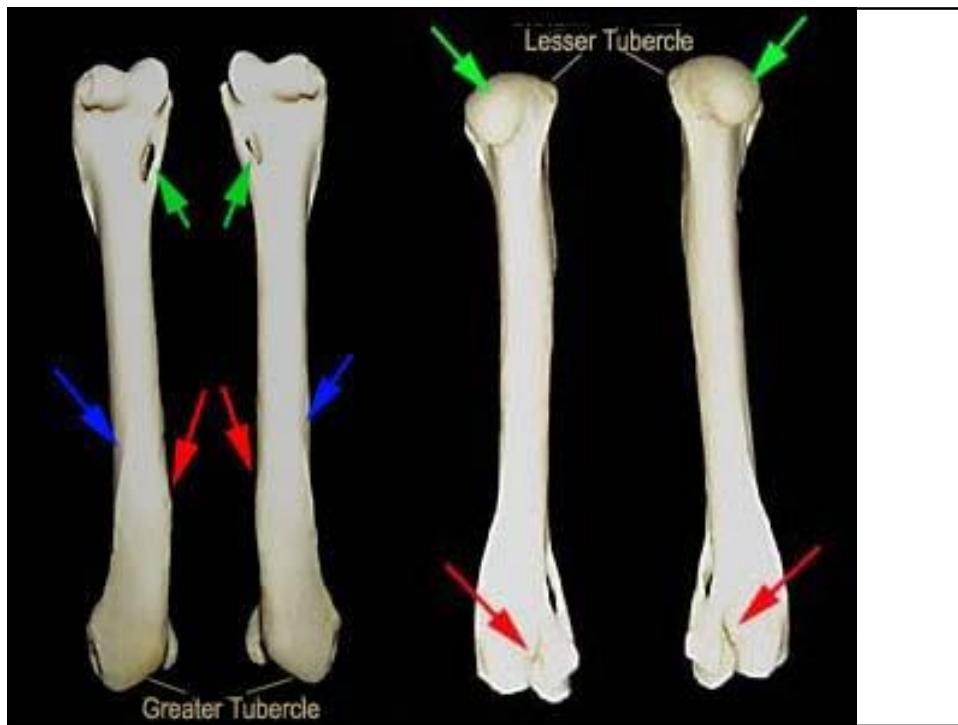
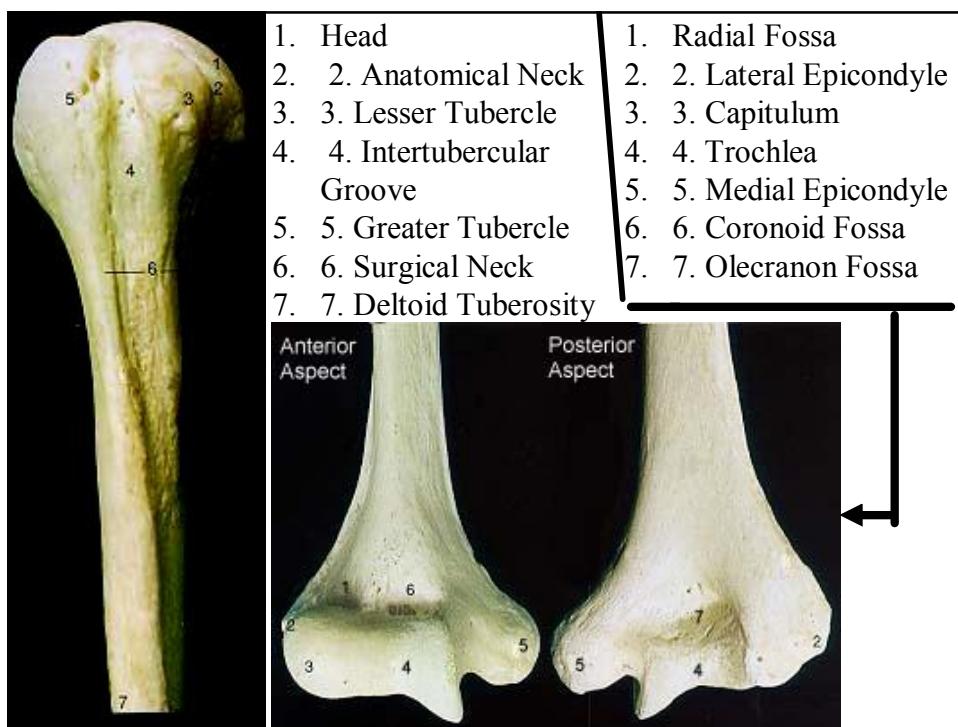
- 1). proximal end
 - head of the humerus
 - greater & lesser tubercle
- 2). distal end
 - condyle
 - capitulum
 - trochlea
 -
 - epicondyle
- 3). fossa
 - coronoid fossa
 - olecranon

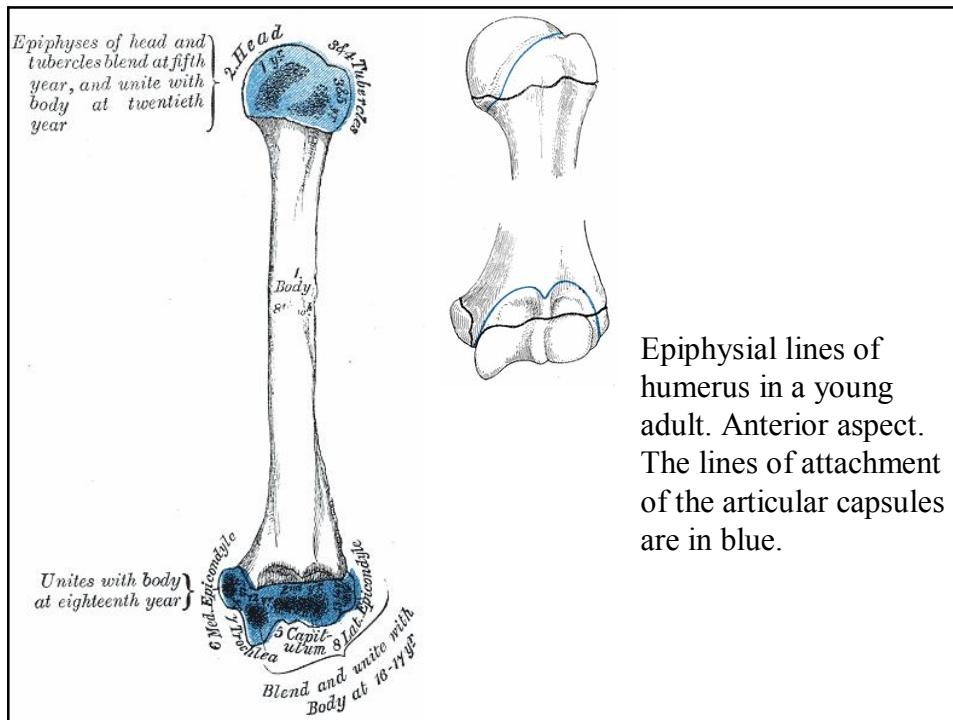


(a) Anterior view

(b) Posterior view







Epiphyseal lines of humerus in a young adult. Anterior aspect. The lines of attachment of the articular capsules are in blue.

Common Shoulder Injuries

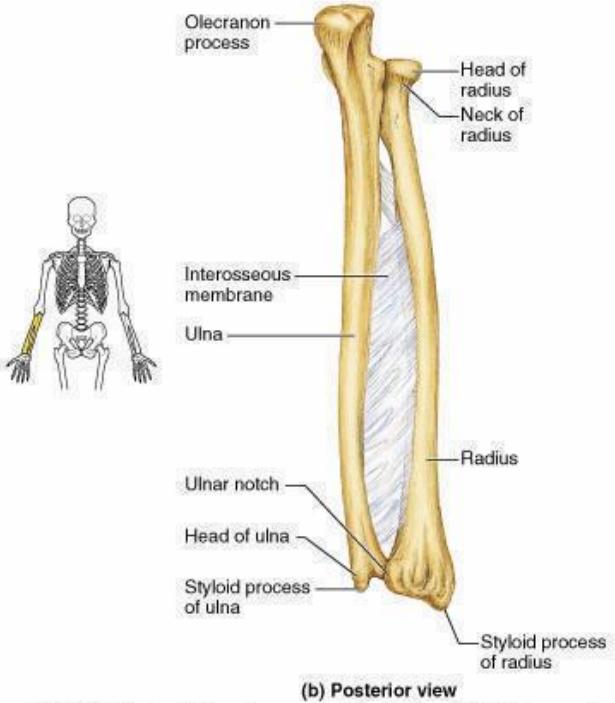
- **Dislocation** - anteriorly (subcoracoid), posteriorly (subspinous) or downward (subglenoid) are three most common
 - common when humerus is abducted and externally rotated
- **Rotator Cuff Damage** (impingement syndrome, tears, especially "throwers" [javelin, tennis, pitchers, swimmers])
- **Subscapular Neuropathy** - denervation of infraspinatus with accompanying loss of strength during external rotation of humerus that is common in volleyball

Forearm

line radius up with thumb
line ulna up with little finger

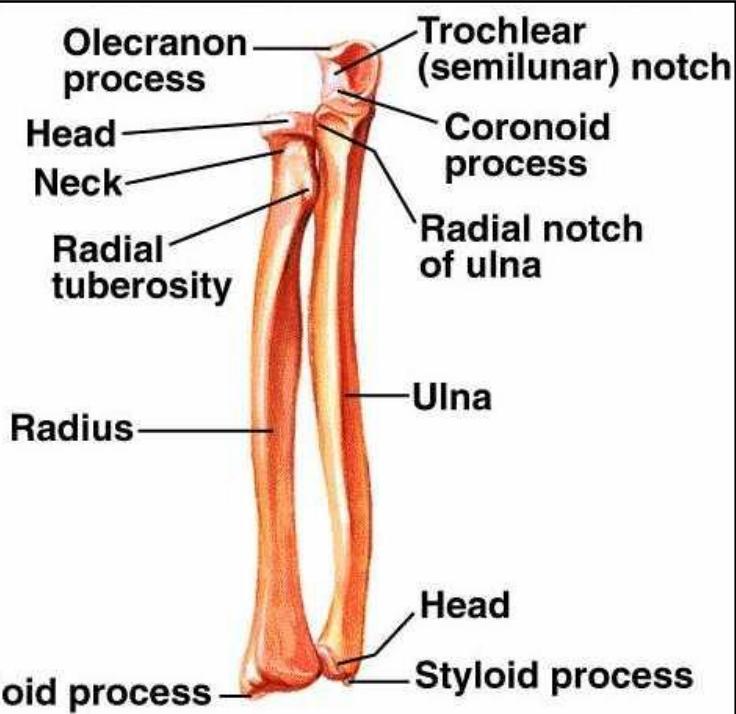
A). ulna

- 1). proximal
 - olecranon
 - coronoid process
 - troclear notch
 - radial notch
 - 2). distal
 - head of the ulna
 - styloid process
- ## B). radius
- 1). proximal
 - head of the radius
 - radial tuberosity
 - 2). distal
 - ulnar notch
 - styloid process



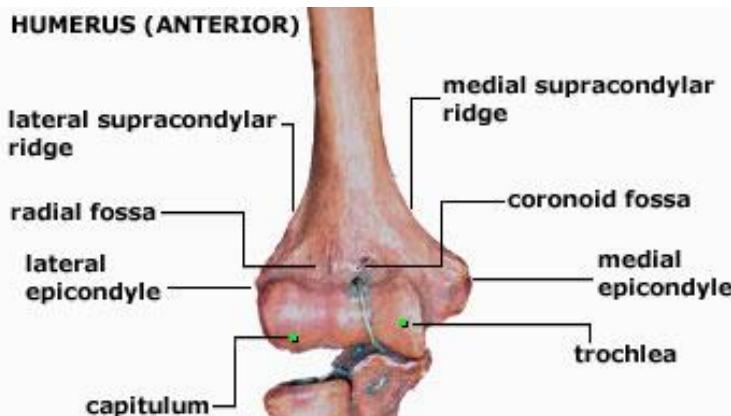
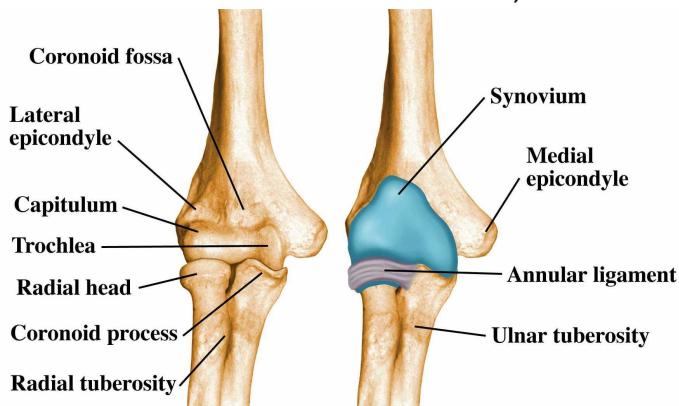
(b) Posterior view

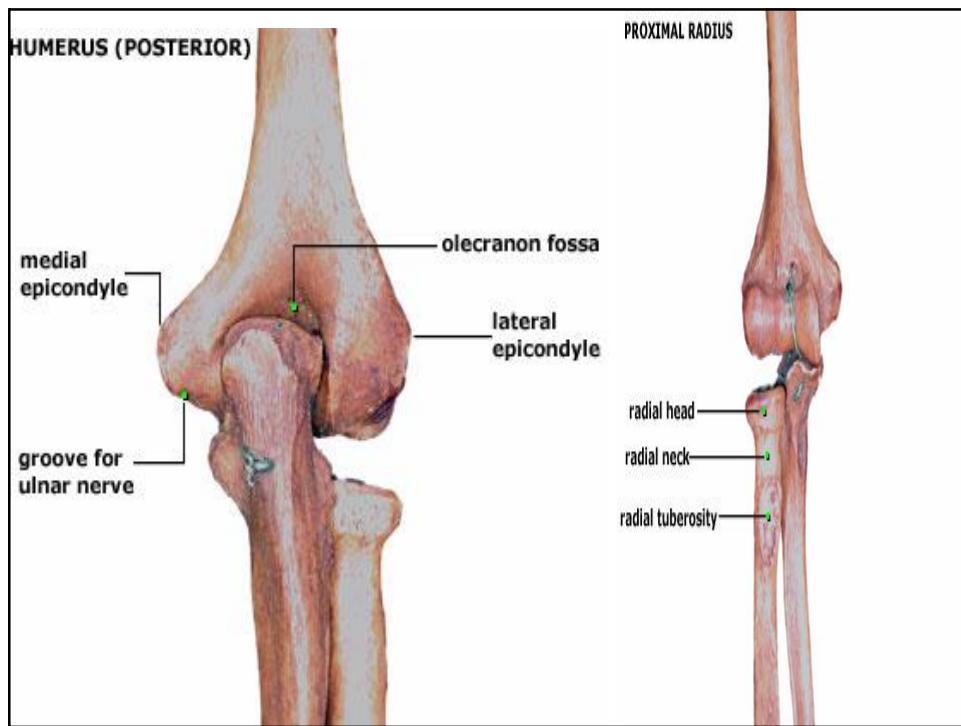
Ulna and Radius of the Right Forearm



Joints

- *Humeroulnar Joint* - hinge joint (between trochlea and trochlear notch of ulna = "elbow joint")
- *Humeroradial Joint* - gliding joint (between capitulum and proximal head of radius)
- *Proximal Radioulnar Joint* - pivot joint (annular ligament binds radial head of radius to radial notch of ulna)





Ulna - Proximal & Distal End (Anterior Aspect)



1. Olecranon Process
2. 2. Semilunar Notch
3. 3. Coronoid Process
4. 4. Tuberosity
5. 5. Radial Notch
6. 6. Ulna (Shaft)
7. 7. Head of Ulna
8. 8. Styloid Process



RADIUS

1. Head of Radius
2. 2. Neck of Radius
3. 3. Radial Tuberosity
4. 4. Radius (Shaft)
5. 5. Styloid Process
6. 6. Ulnar Notch

Wrist and Hand

Bones (29 including radius and ulna)

- radius/ulna
- carpals
 - proximal row (medial to lateral)
 - scaphoid, lunate, triquetrum, pisiform
 - distal row (medial to lateral)
 - trapezium, trapezoid, capitate, hamate
- metacarpals
- phalanges

A). carpals

2 rows of 4 each
lateral to medial



A). carpal

1). proximal (articulate radius and ulna)

a). scaphoid

b). luna

c). triquetral

d). pisiform

2). distal (articulate with metacarpals)

a). trapezium

b). trapezoid

c). capitate

d). hamate

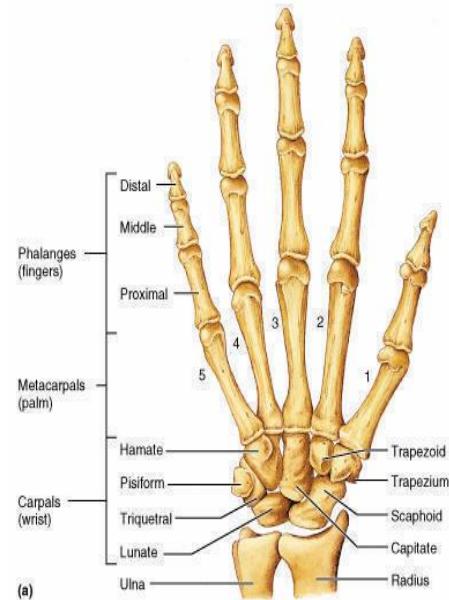
B). metacarpals

numbered 1 to 5 starting with the thumb side

C). phalanges

numbered 1 to 5 starting with the thumb side

- proximal phalanx
- medial phalanx
- distal phalanx





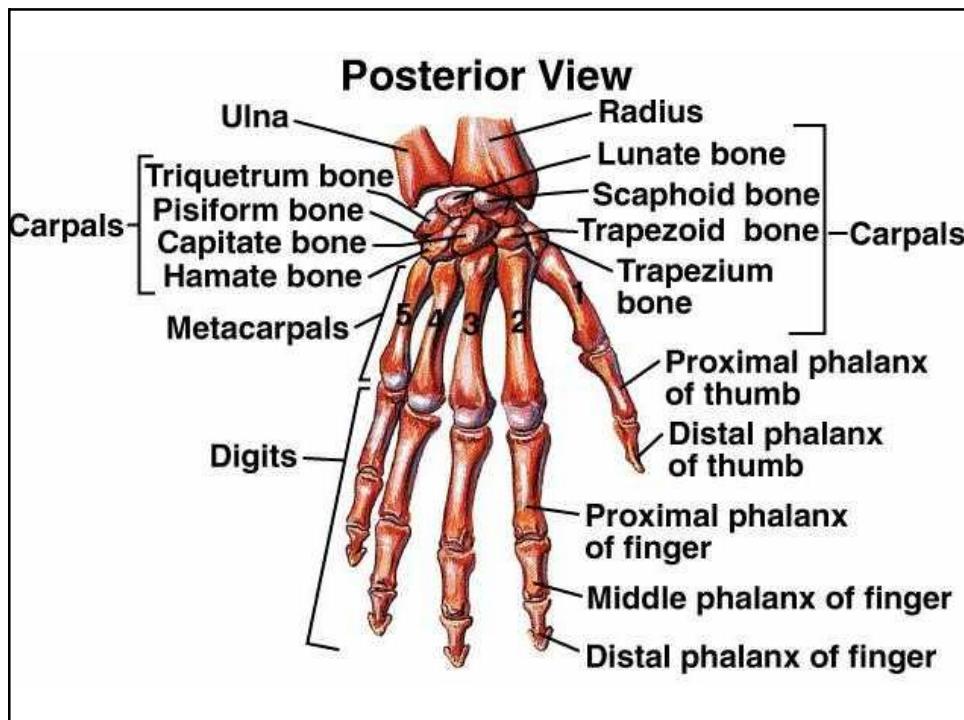
Bones of the Right Hand (Dorsal Surface)

1. Styloid Process of Radius
2. 2. Navicular (Scaphoid)
3. 3. Lunate
4. 4. Triquetral
5. 5. Pisiform
6. 6. Trapezium
7. 7. Trapezoid
8. 8. Capitate
9. 9. Hamate
10. 10. Metacarpal
11. 11. Proximal Phalange
12. 12. Middle Phalange
13. 13. Distal Phalange
14. 14. Styloid Process of Ulna



Bones of the Right Hand (Palmar Surface)

1. Navicular (Scaphoid)
2. 2. Lunate
3. 3. Triquetral
4. 4. Pisiform
5. 5. Trapezium
6. 6. Trapezoid
7. 7. Capitate
8. 8. Hamate
9. 9. Metacarpal
10. 10. Proximal Phalange
11. 11. Middle Phalange
12. 12. Distal Phalange



Some upper extremity bones and landmarks to be familiar with

Clavicle:

- Acromial extremity Acromioclavicular [AC] joint (acromian process and distal clavicle)
- Conoid tubercle
- Subclavian groove
- Costal tuberosity
- Sternal extremity Sternoclavicular [SC] joint (proximal clavicle and manubrium + 1st rib)

Scapula:

- Acromian process
- Coracoid process Coracovicular joint (coracoid process and inferior clavicle)
- Scapular notch
- Superior border
- Medial border Scaupolothoracic joint (anterior scapula and thoracic wall)
- Lateral border
- Superior angle
- Inferior angle
- Subscapular fossa
- Infraspinous fossa
- Supraspinous fossa
- Glenoid fossa Glenohumeral joint (humeral head and glenoid fossa)
- Spine

Humerus:

- Head
- Neck
- Greater tubercle
- Lesser tubercle
- Intertubercular (bicipital) groove
- Deltoid tuberosity
- Shaft (diaphysis)
- Lateral supracondylar ridge
- Lateral epicondyle
- Capitulum **Humeroradial joint (gliding joint between capitulum and radial head)**
- Radial fossa
- Medial supracondylar ridge
- Medial epicondyle
- Trochlea **Humeroulnar joint (humeral trochlea and trochlear notch of ulna) "elbow joint"**
- Coronoid fossa
- Olecranon fossa

Radius:

- Head **Radio-ulnar joints**
- Neck
- Radial tuberosity
- Shaft (diaphysis)
- Styloid process

Ulna:

- Olecranon process
- Semilunar (trochlear) notch
- Coronoid process
- Ulnar tuberosity
- Shaft (diaphysis)
- Head
- Styloid process

Wrist/Hand: **Wrist joint (condyloid between distal radius and proximal carpal)****Carpals: (radial to ulnar)**

- **Proximal Row** **Intercarpals (gliding or plane joints between carpal bone)**
- Scaphoid
- Lunate
- Triquetrum
- Pisiform
- **Disal Row**
- Trapezium
- Trapezoid
- Capitate
- Hamate

5 Metacarpals (1 = thumb) Carpometacarpal (CMC) (saddle for 1, plane for 2-5)

Phalanges/digits (14 per hand)

•5 proximal phalanges

Proximal Interphalangeal (PIP) (hinge joint between 1st and 2nd phalanges of 2-5)

Interphalangeal (IP) (hinge joint on thumb only between distal and proximal phalanx)

•4 middle phalanges (thumb doesn't have)

•5 distal phalanges

Distal Interphalangeal (DIP) (hinge joint between middle and distal phalanges of 2-5)

Want an easy way to remember the carpal bones?!?

Remember this...

Naughty (Navicular)

Lovers (Lunate)

Try (Triquetral)

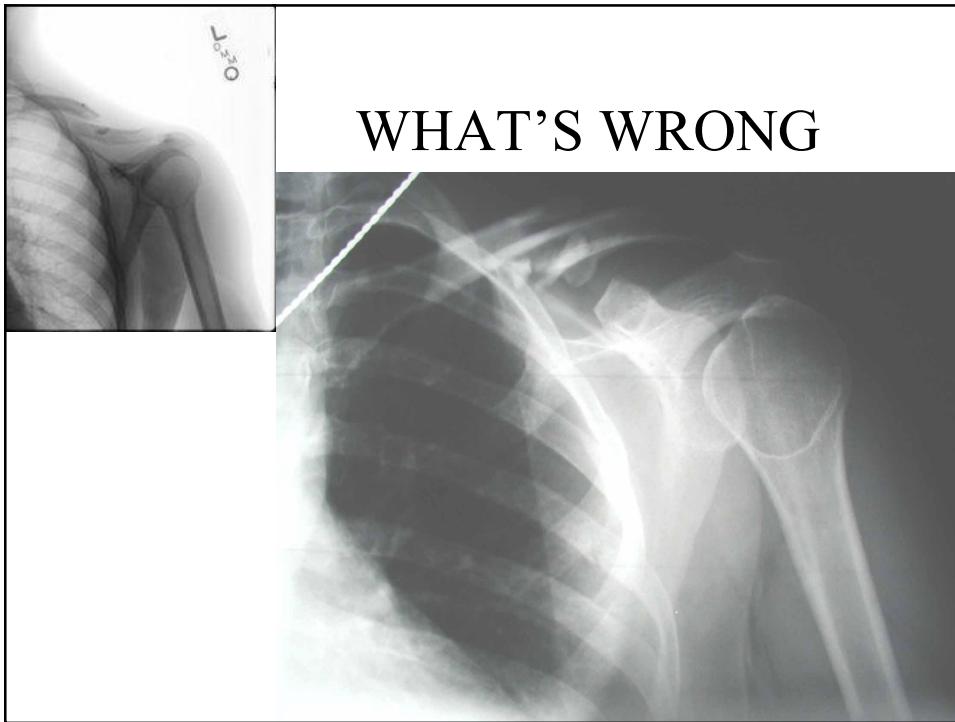
Positions (Pisiform)

That (Trapezium)

They (Trapezoid)

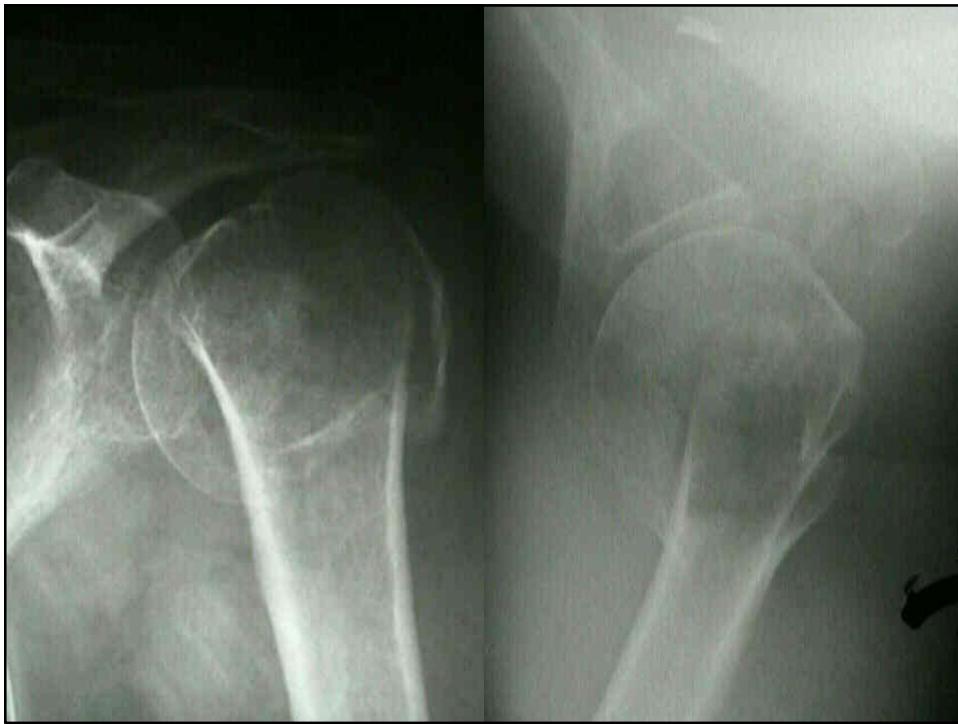
Can't (Capitate)

Handle (Hamate)



WHAT'S WRONG

**Comminuted clavicle fracture;
Note 5th rib fracture in addition**



Fracture Dislocations of the Proximal Humerus:

