



**Lecture:** 4

**Done By:** Haneen Frehat



الجامعة الهاشمية  
The Hashemite University

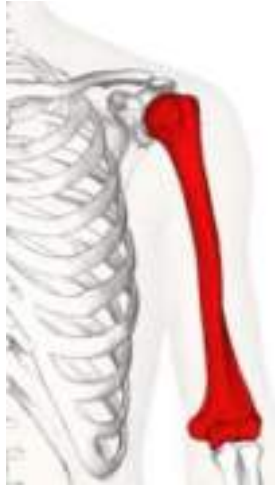


# General Anatomy

## Lecture 4: Appendicular Skeleton (1): Bones of Upper Limb

**Dr. Mohamed Fathi Elrefai**

**Ass. Professor of Anatomy & Embryology**  
**mohamed@hu.edu.jo**



humerus bone

⇒ Long bone  
typical

Upper and lower  
end and shaft

## مضبوط Typical Intvnoical غد

متى نقول عن عظمة typical long bone (عندما تكون  
طولية في الجسم) و متى نقول Intybycal longi  
bone (عندما تكون بالعرض)

Long bone: عظمة لها two ends and shaft



Clavical

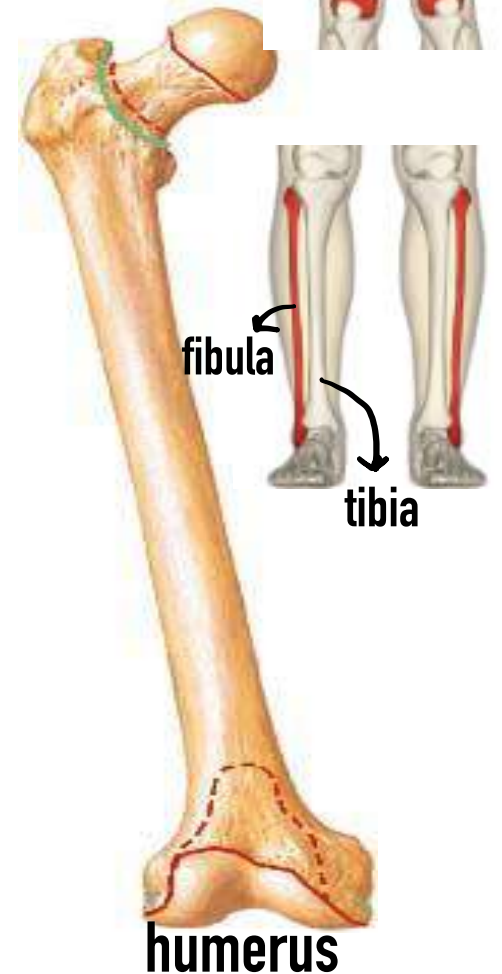
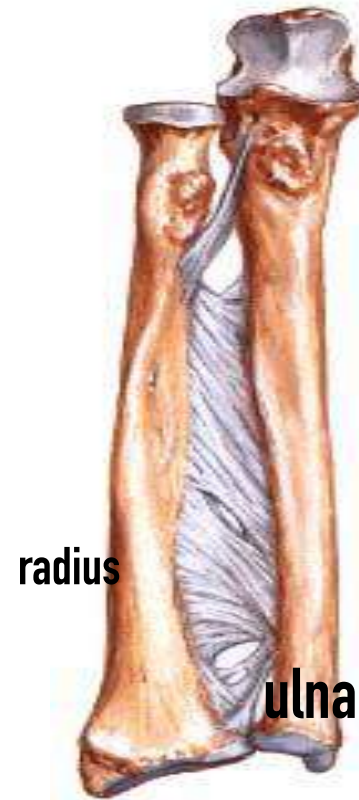
⇒ Long bone  
intybycal

Medial and lateral  
end and shaft

# Classification of Bones

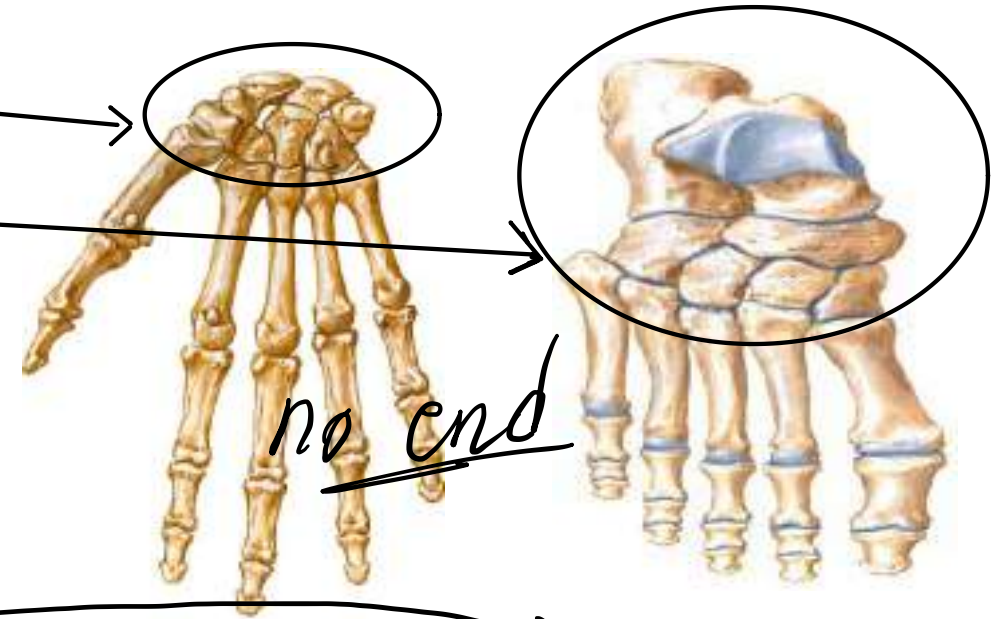
(A) Morphological (Anatomical)  
classification according to shape  
of bone: ⇒ تصنيف و تقسيم بوعسها

**1. Long bones:** have 2 ends  
& a shaft as bones of proximal  
& intermediate segments of  
the limbs (**humerus, radius,**  
**ulna, femur, tibia & fibula**).



# Classification of Bones (contd)

2. **Short bones:** as **carpal & tarsal bones.** These bones are **strong & help in limited movements.**

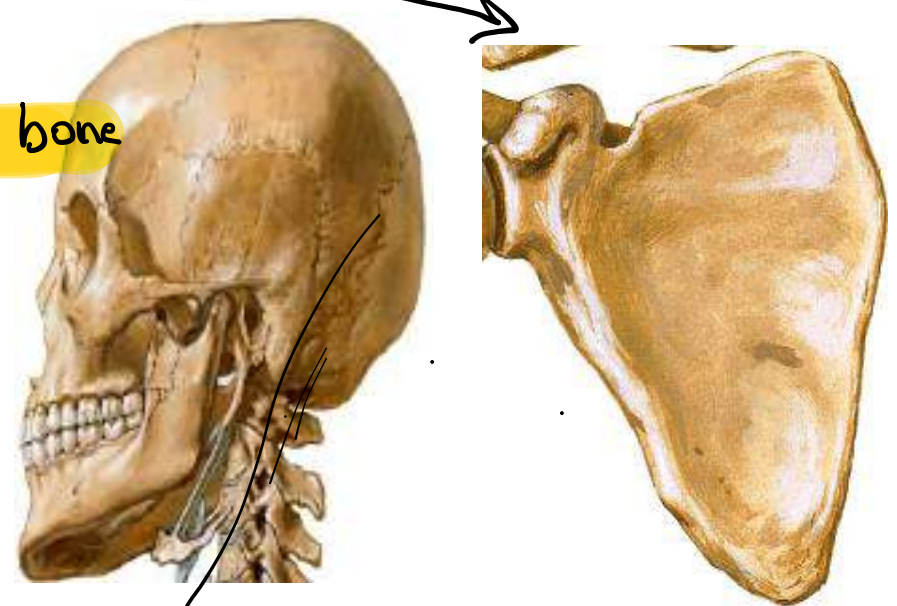


3. **Flat bones:** as **scapula, sternum & skull cap.** + **Ilium** in hip bone. These **have wide surface for muscle attachment or protection.**

عظام مصفحة

الكتف

القص



4. **Irregular bones:** as **vertebrae & hip bones.**

ليس له شكل  
عظام فيها مواد

الفقرات

Body , vertebral arch , process



5. **Pneumatic bones:** contain air-filled spaces lined with mucous membrane (paranasal sinuses) in skull bones (maxilla & frontal bones) to reduce the weight of skull, help in resonance of voice & warm air.

مخون  
انفية

Sphenoid sinus in Sphenoid bone

انبات العضلة  
هبوط العضلة

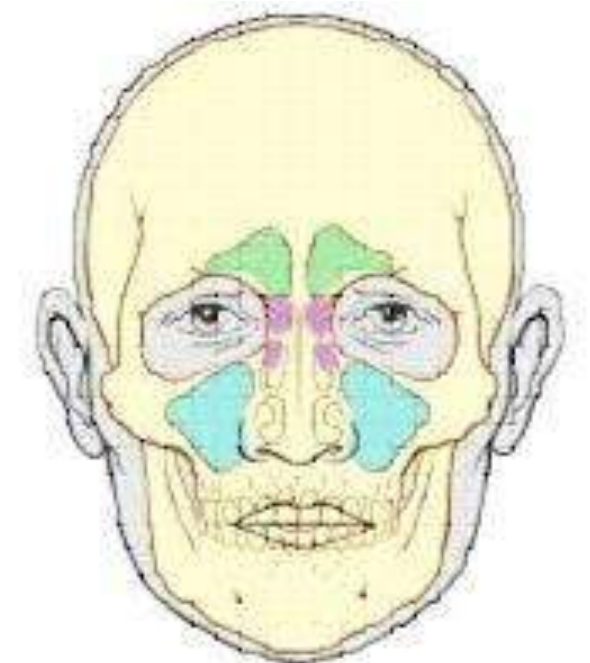
فالعضلة وهي ماشية بقابلها عظم صغير يسمى sesamoid العظم السمسامي

6. **Sesamoid bone:** are small nodules of bone found in the tendons of certain muscles to reduce friction over bony surfaces. e.g. patella & pisiform bones.

اوتار

الارتكبات

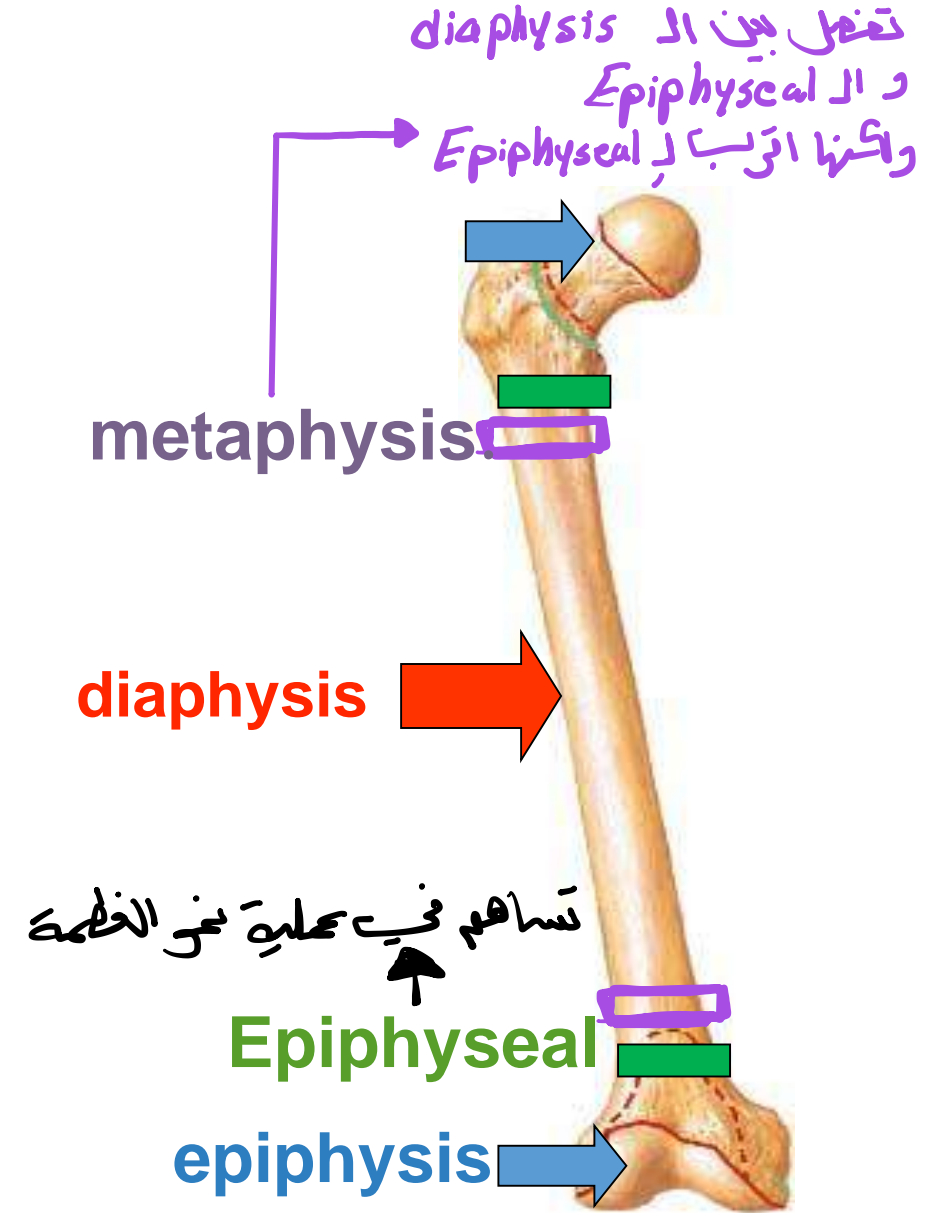
صابونة  
الركبة



## @ Parts of a growing long bone:

1. **2 ends** called **epiphysis**.
2. A **shaft** called **diaphysis**.
3. **Epiphyseal plate of cartilage** between the diaphysis & epiphysis. This is the most important factor for the growth of bone in length.
4. The **part of the shaft close to the plate** is called **metaphysis**.

Part of the shaft but the diaphysis is all the shaft



	The 2 ends	The shaft
<b>1. Name:</b>	<b>epiphysis</b>	<b>diaphysis</b>
<b>2. Develops from:</b>	<b>2ry center of ossification</b>	<b>1ry center of ossification</b>
<b>3. Covered by:</b>	<b>Articular hyaline cartilage</b>	<b>Periosteum</b>
<b>4. Medullary (bone marrow) cavity:</b>	<b>Absent</b>	<b>Present</b>
<b>5. Formed of:</b>	<b>Spongy bone</b>	<b>Compact bone</b>

Center of Ossification نقط معينه يطلع منها بقية العظم  
 يتكون بالنهاية بعد ال shaft لذلك هو 2ry الذي يتكون ببداية تكوين العظمة لذلك هو 1ry

زجاجي عظمت خارجي  
 مغطاة بفضروف لـ عشاء العظم

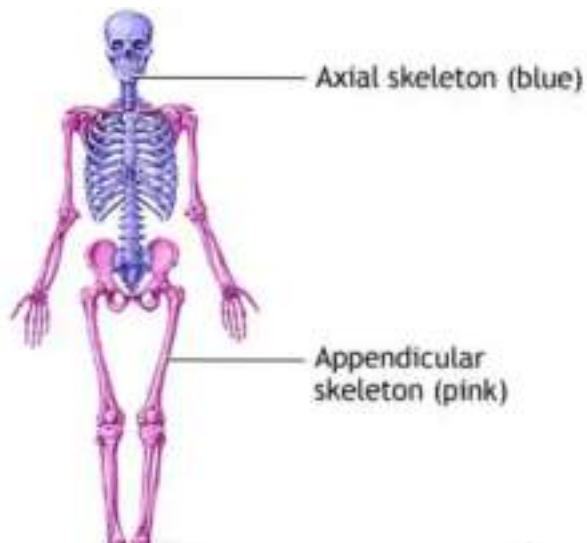
تخام العظم مادافله

مثل الاسفنج حلب ولا يوجد  
 لـ يحتوي على فراغات فراغات



# Bones of Upper Limb

الإطراف العليا



Girdle (حزام الكتف) الكتف الاول

Joint

الكتف الثاني (مفصل)

الكتف

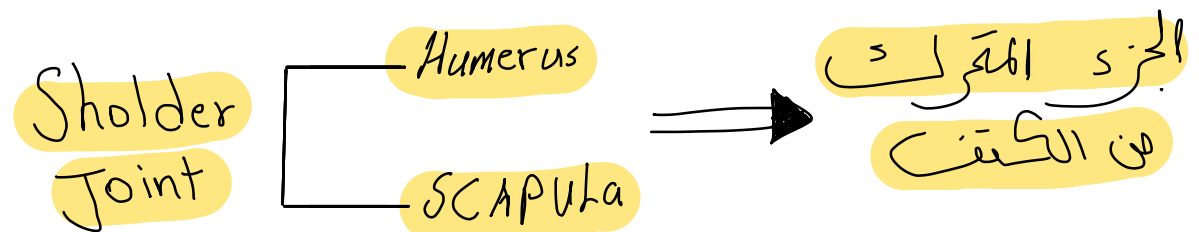
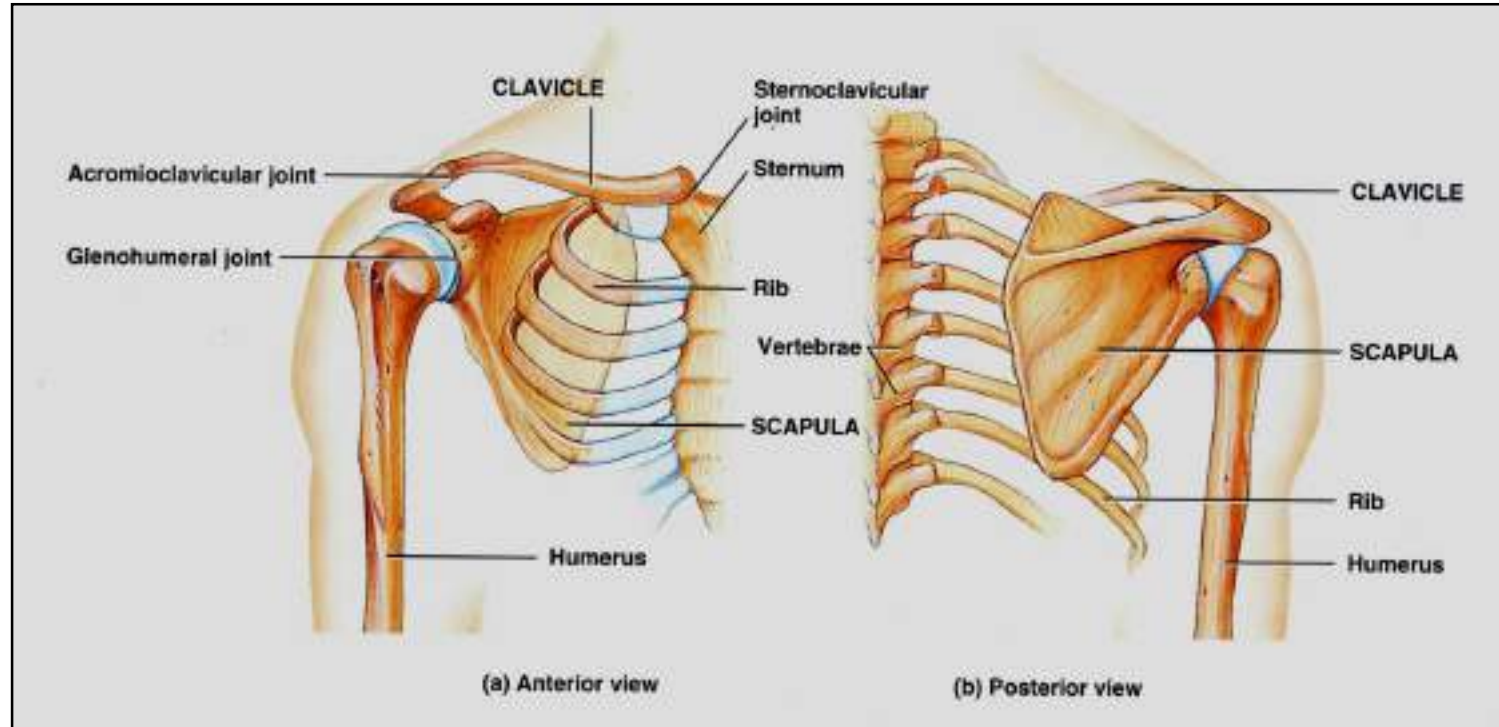
# The Shoulder (Pectoral) Girdle


\* It is formed by the **bones that connect the axial skeleton (i.e. sternum) with the appendicular skeleton (i.e. Humerus or bone of arm).**

Shoulders  
من كتفها

\* It is formed of 2 bones: **clavicle & scapula.**

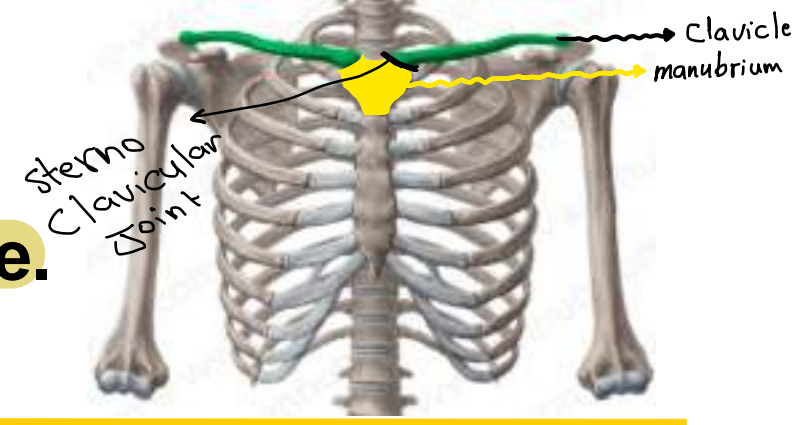
Girdle



In Typical Long Bone 



# 1. The Clavicle



\* The clavicle is the **anterior bone** of **pectoral girdle**.

\* It has **two ends** → **medial** and **lateral**.

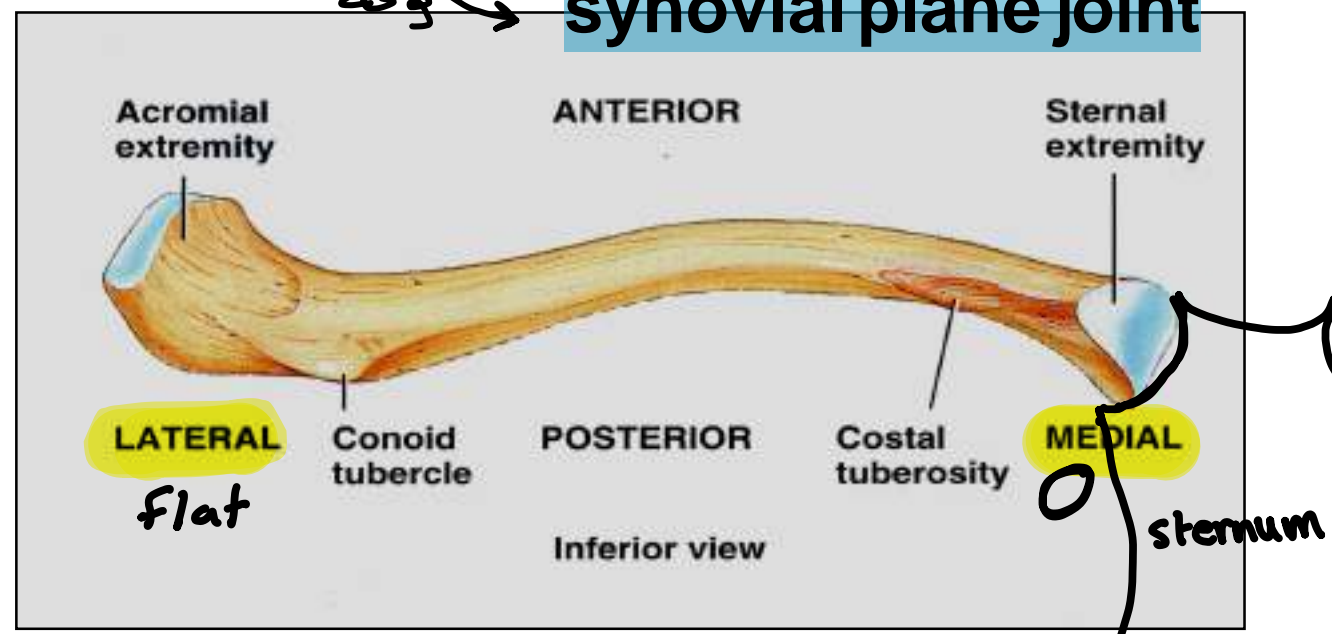
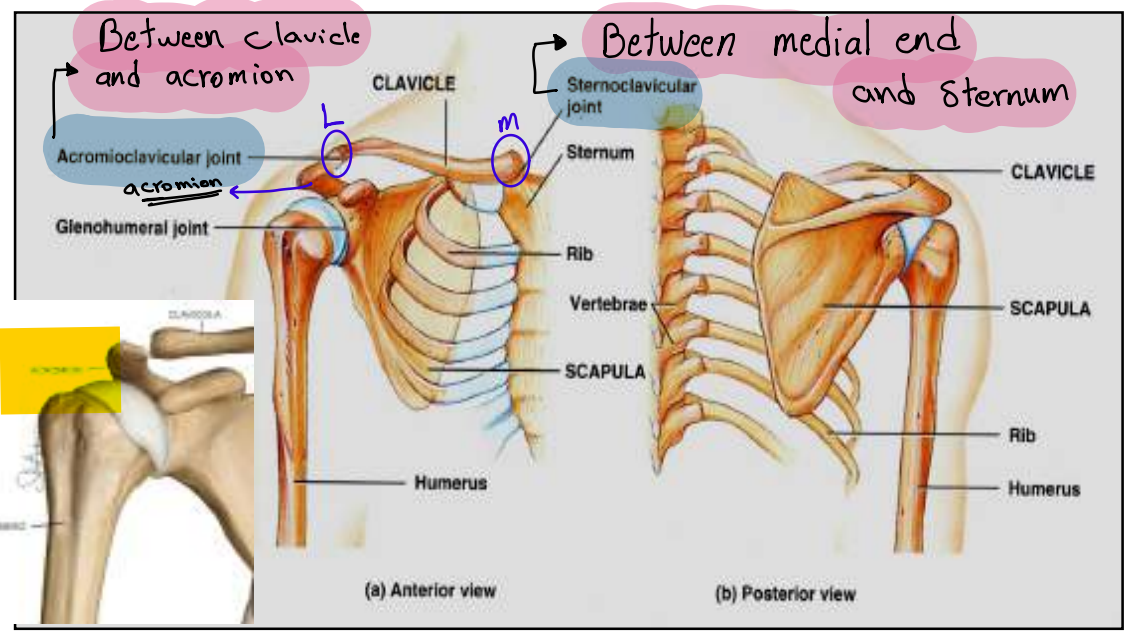
\* The **medial** end: is called the **sternal end**, it is **rounded & articulates with manubrium part of sternum** to form **sterno-clavicular joint**.

القفص

saddle synovial

\* The **lateral** end: is called **acromial end**, is **broad and flat & articulates with the acromion process of scapula** to form **acromio-clavicular joint**.

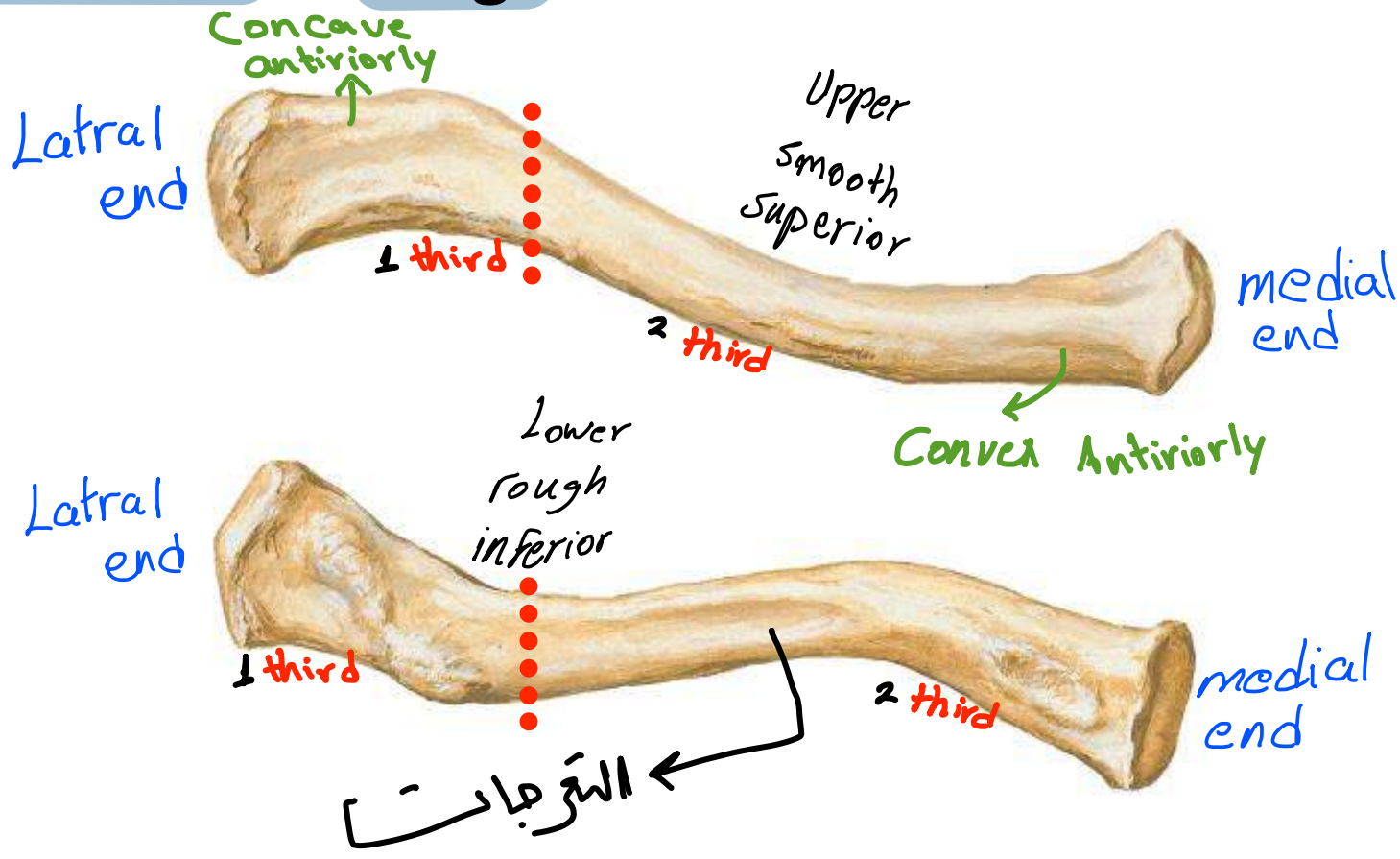
synovial plane joint



حجاب

\* 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.



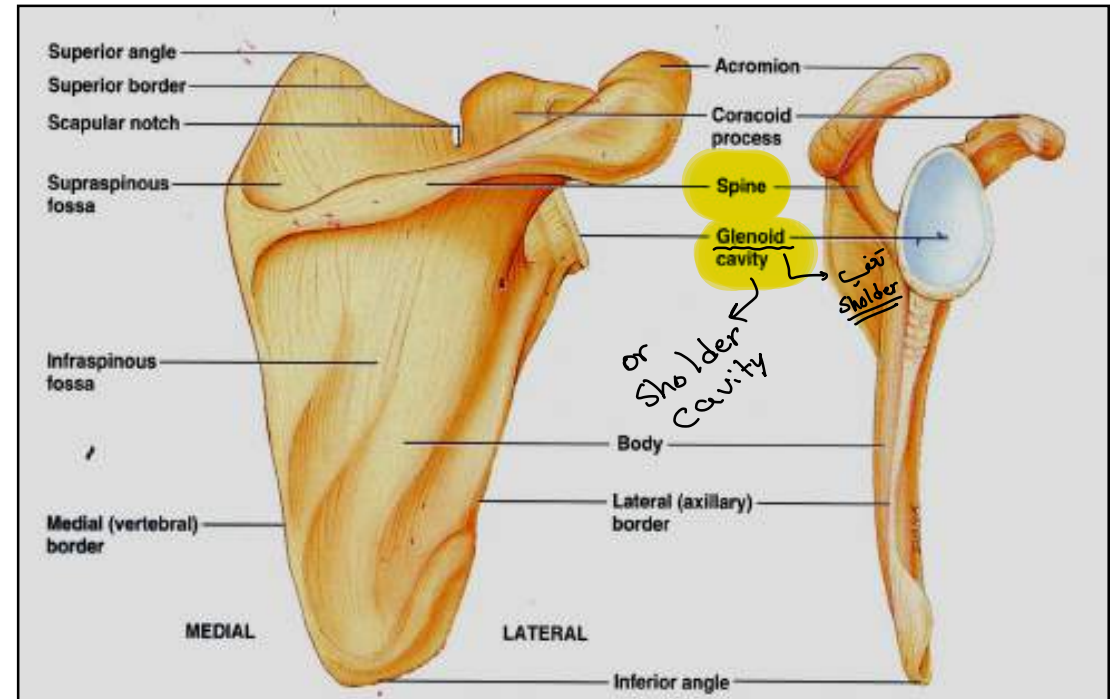
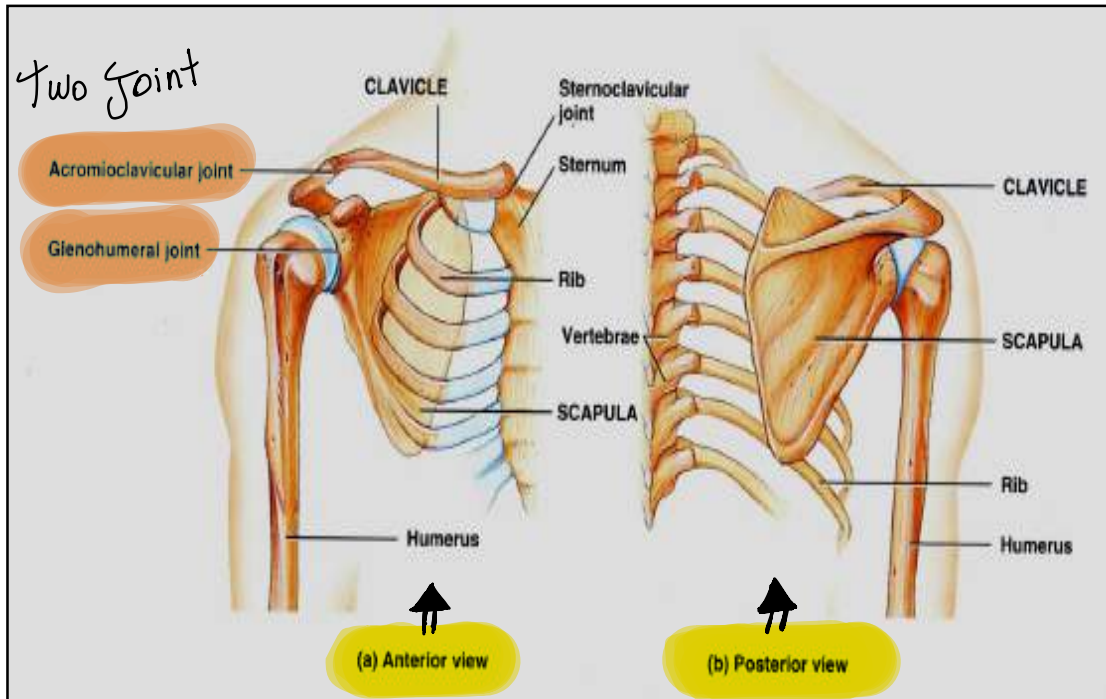


⇒ thorax

# 2. The Scapula

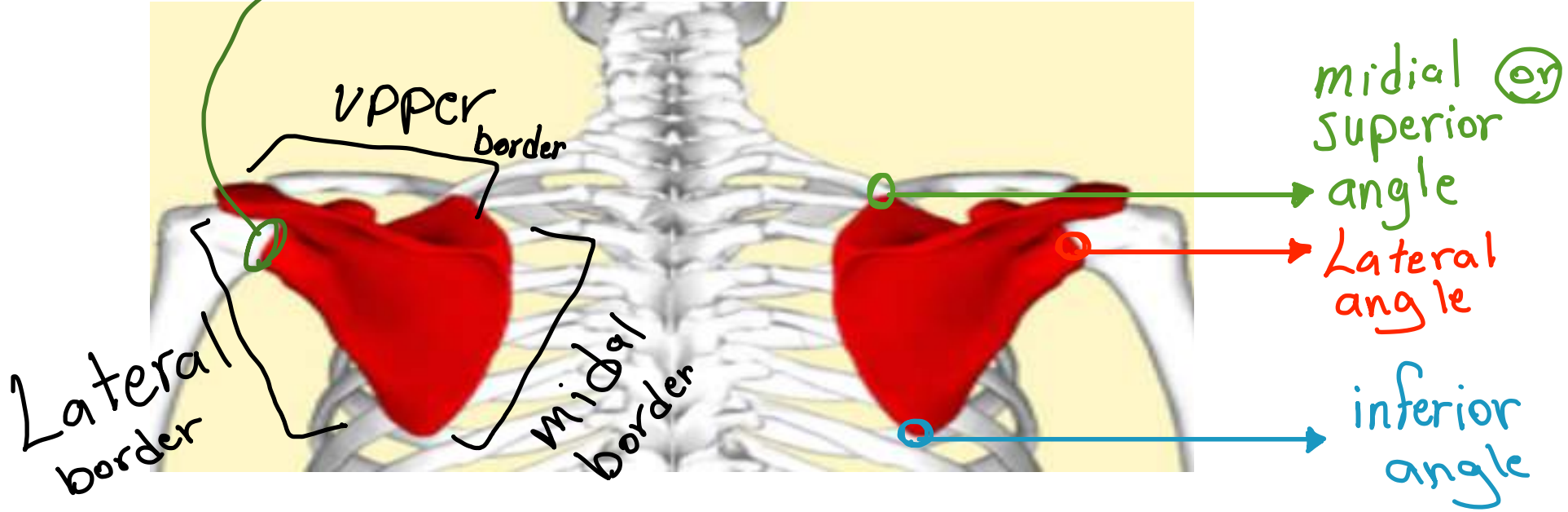
shoulder

- \* The scapula is the **posterior** bone of pectoral girdle.
- \* It is a **large, flattened, triangular** bone. → 3 borders + 3 angles
- \* It lies on the **posterior wall of thorax**, overlapping the **2<sup>nd</sup> – 7<sup>th</sup> ribs**. ↳ رقبۃ علی الاربعة الى الاربعة عشر (محدودها)
- \* It has two surfaces: **anterior (costal)** and **posterior**. ↳ رقبۃ علی الاربعة الى الاربعة عشر (محدودها)

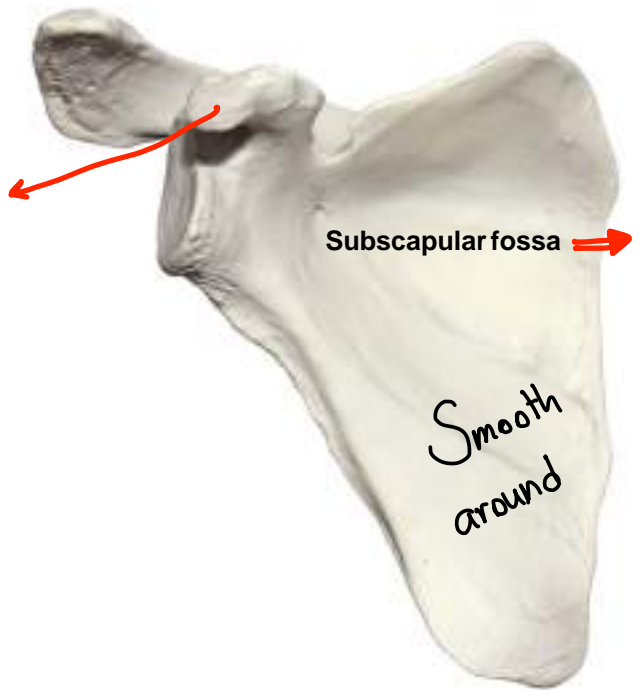


# Clenoid Cavity :

المكان التي تدخل فيه ال head of the humerus حتى تعمل shoulder Joint (Lateral angle)



Coracoid process

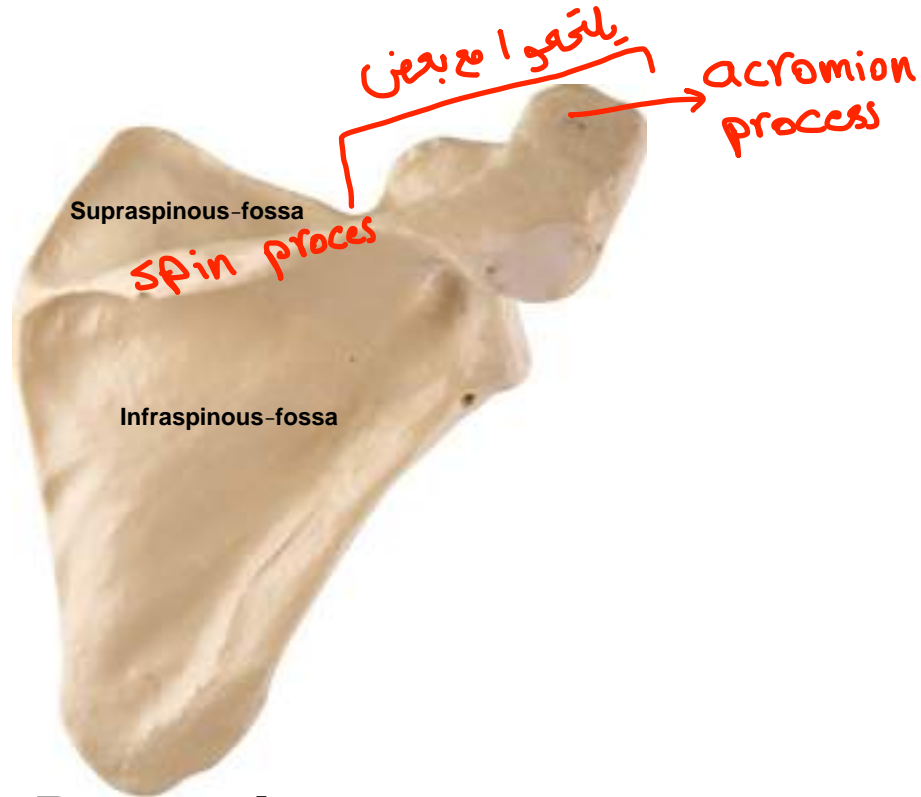


Subscapular fossa

Smooth around

Anterior

يخرج منه عظمة



Supraspinous-fossa

Spin process

Infraspinous-fossa

acromion process

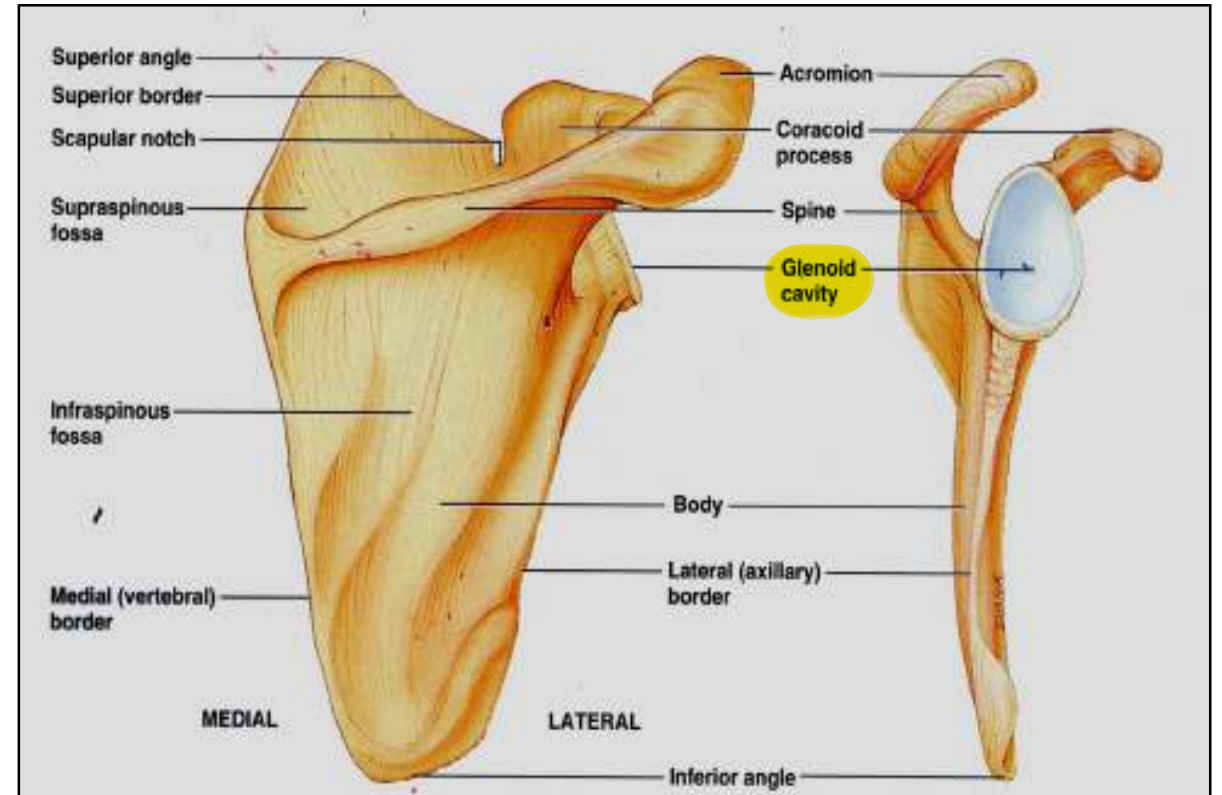
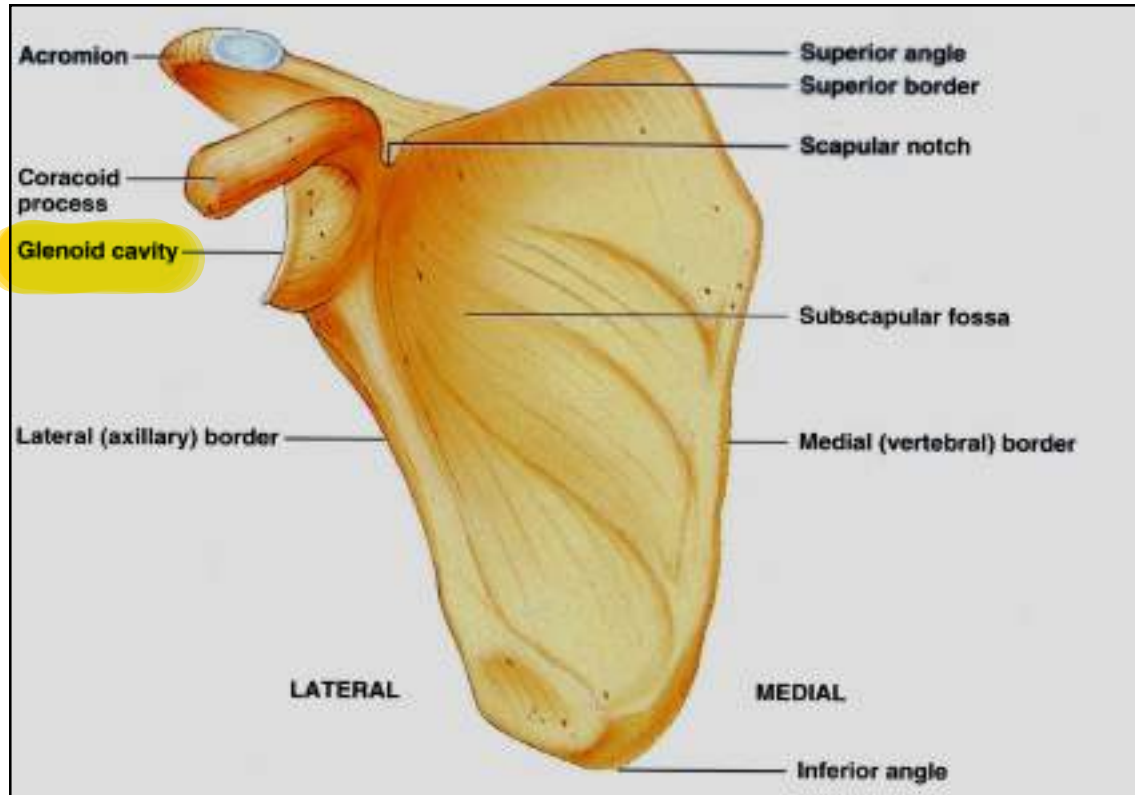
يلتصقوا مع بعض

Posterior

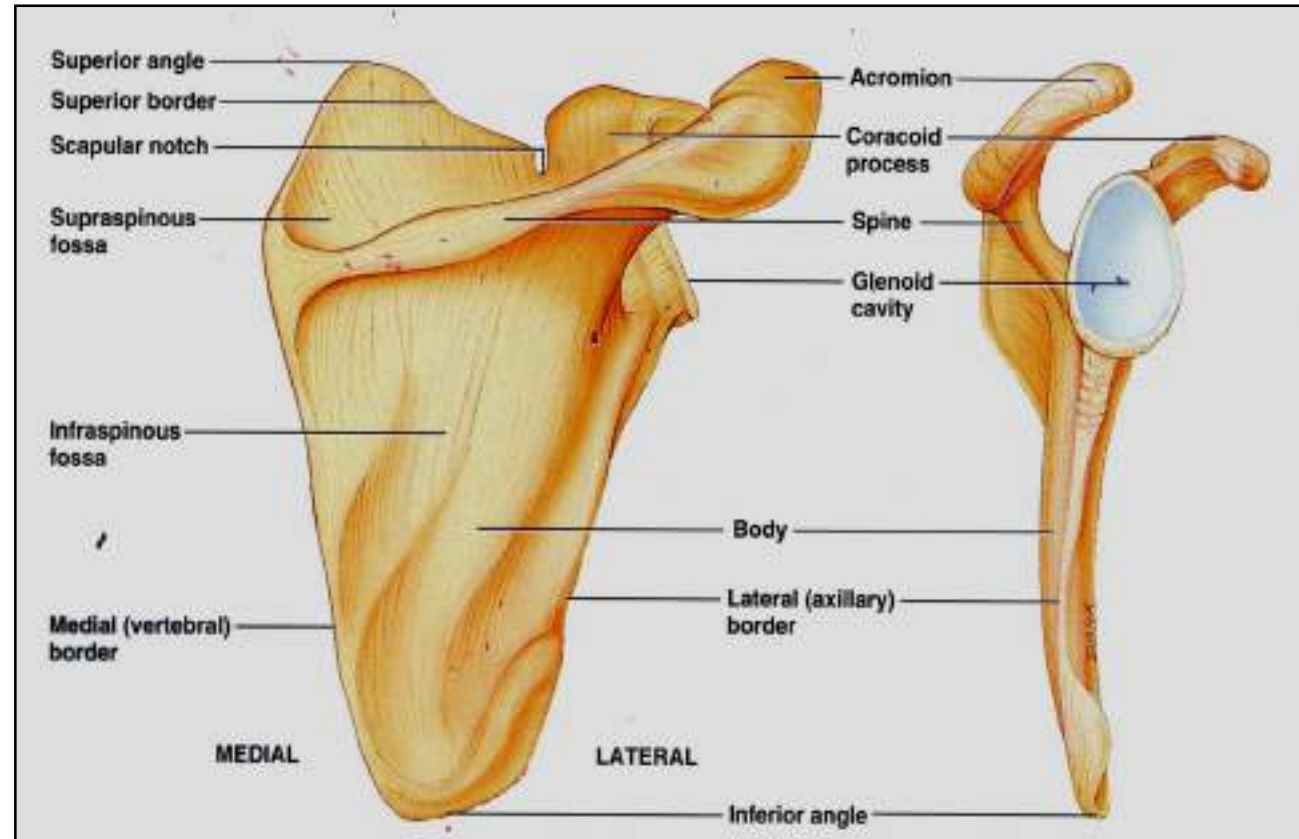
\* It has three angles: superior, inferior & lateral.

\* It has three processes: spine, acromion process & coracoid process.

\* The costal (anterior) surface forms the subscapular fossa.

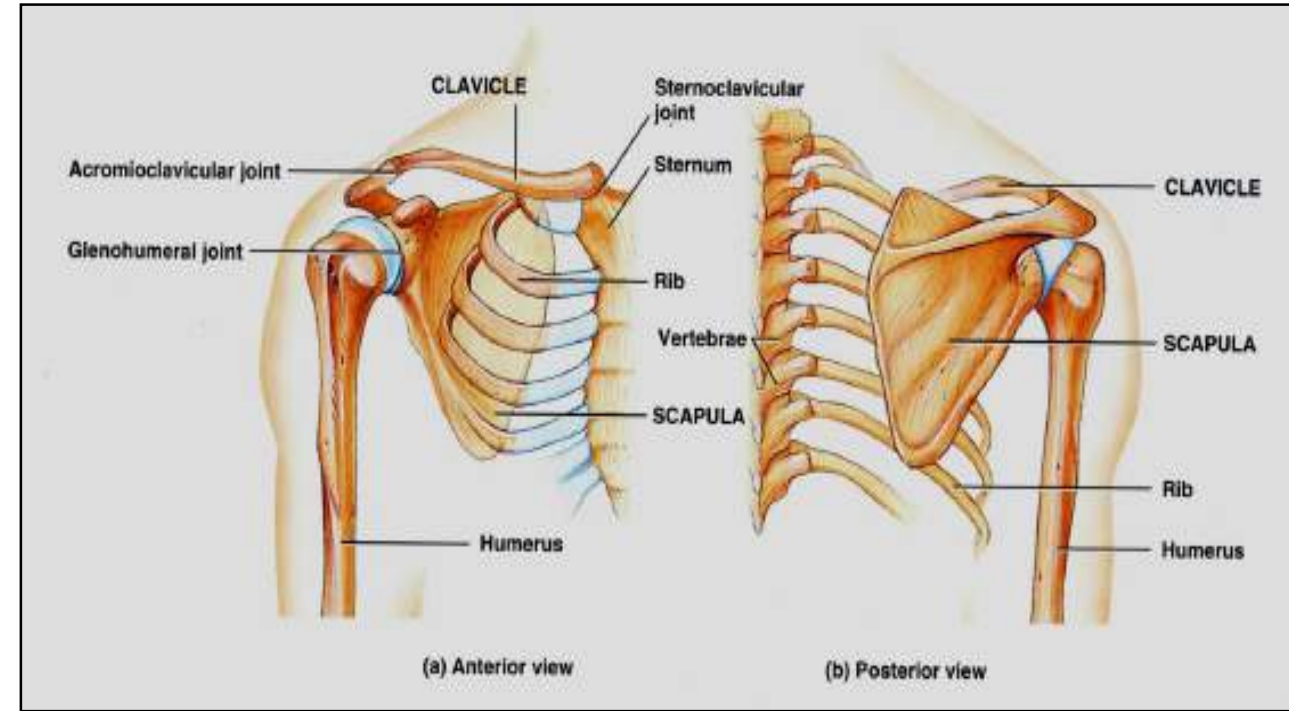
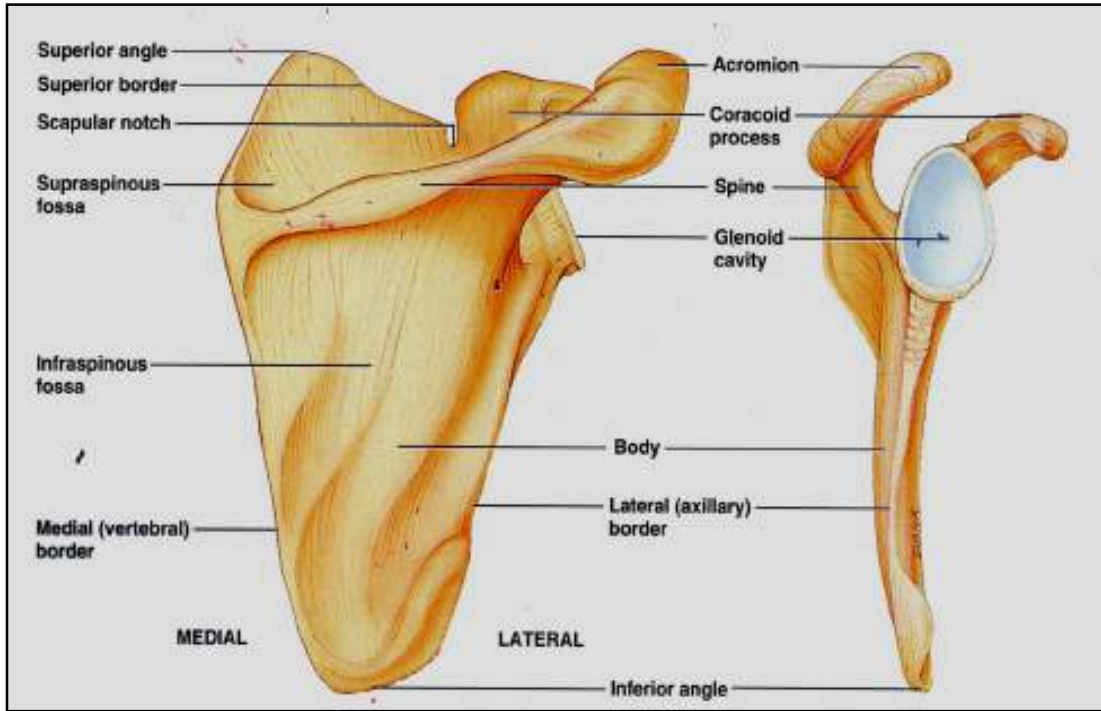






\* The **posterior surface** is divided into a **smaller upper area** → the **supraspinous fossa** & a larger lower area → the **infraspinous fossa**, by a **shelf-like projection**, called the **spine of the scapula**.

\* The **lateral end of the spine projects** as a flattened, expanded process called the **acromion process**.



\* The **coracoid process** arises from **lateral end of superior border**.

\* The **lateral angle** of the scapula presents the **glenoid cavity** for **articulation with head of the humerus** (in **shoulder joint**).

## Typical long bone

# 3. The Humerus

تعمل Two joints

بروز في Process

\* This is the bone of the arm.

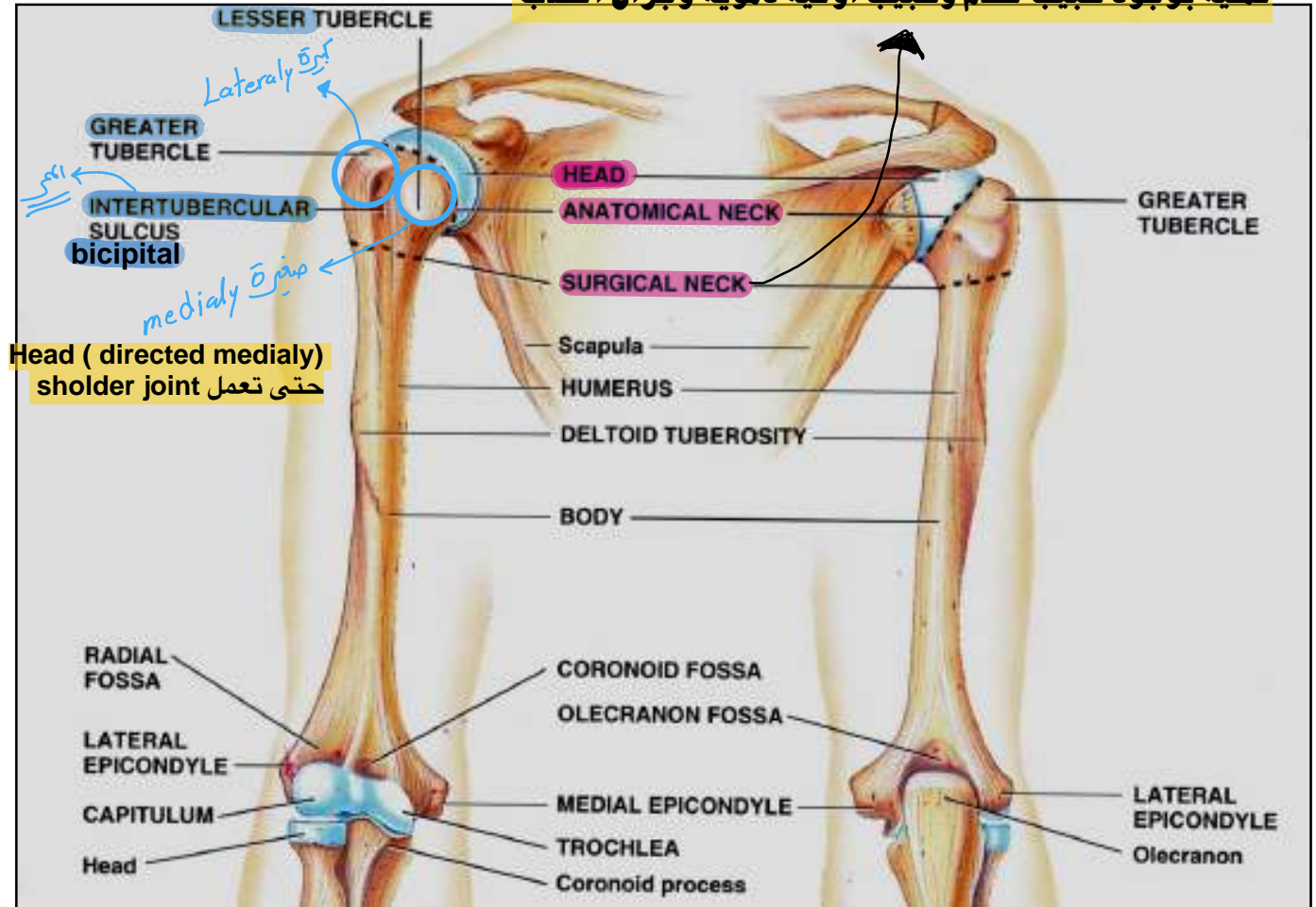
\* It has an upper end, a shaft & a lower end.

A. The upper end: shows:

1. **The head:** which is less than half of a sphere. It articulates with the glenoid cavity of scapula to form shoulder (glenohumeral) joint.

In anatomy Under any head there is a neck

سمي بذلك لانه هذا المكان يعدي فيه nerves and vessels فالكسر في هذا المكان يجب ان يدخل صاحبه عملية بوجود طبيب عظام وطبيب اوعية دموية وجراح اعصاب



Two neck :

↳ Anatomical and surgical ↳

بعد ال head مباشرة

عبارة عن التواء بين ال upper end and shaft وهي اكثر جزء معرض للكسر في هذه العظمة

2. The **greater** → *Lateral*  
**tuberosity** (tubercle)

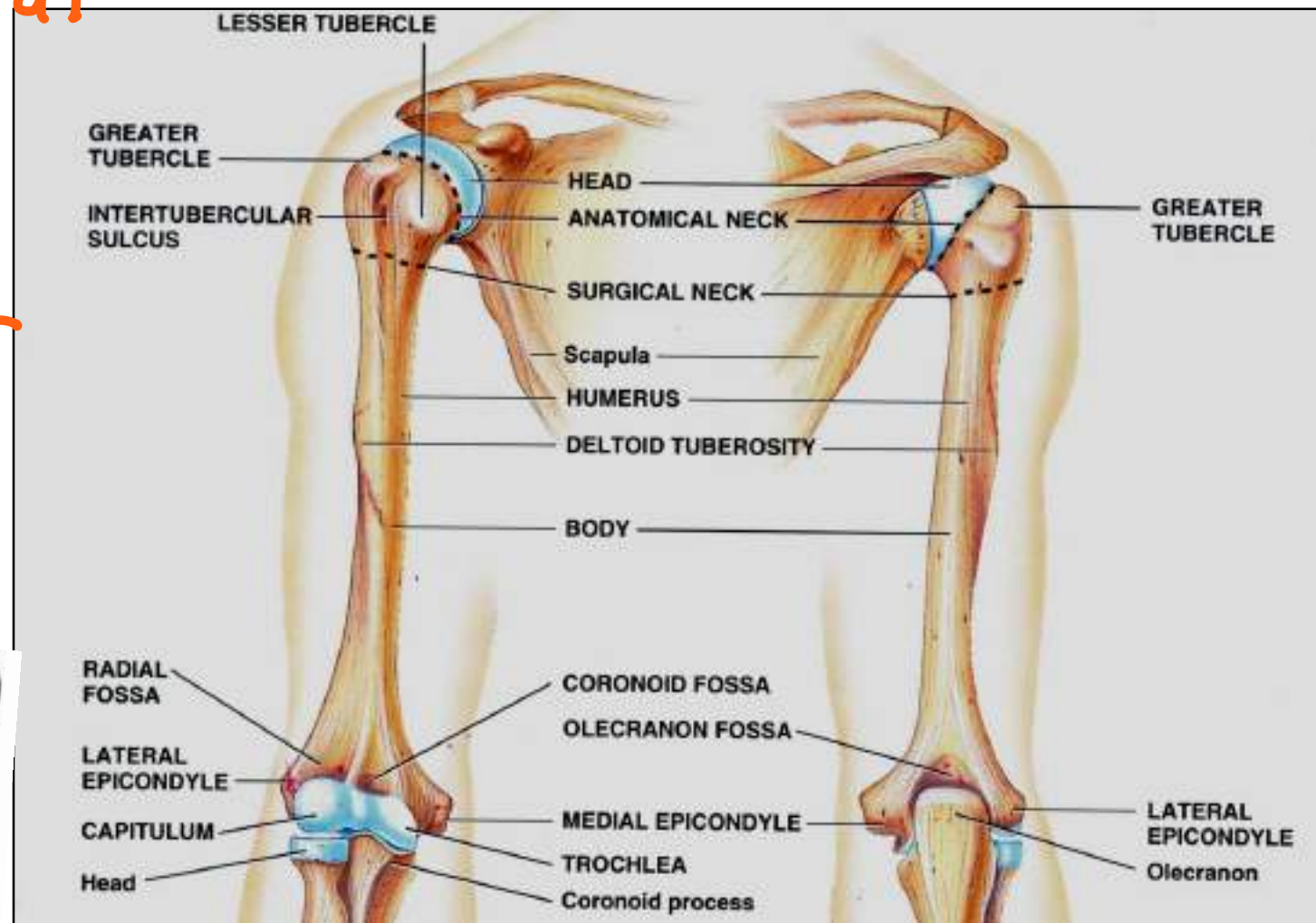
→ which is a **lateral**  
**projection.**

3. The **lesser** → *anterior*  
**tuberosity** (tubercle)

→ which is an  
*Medial*  
**anterior projection.**

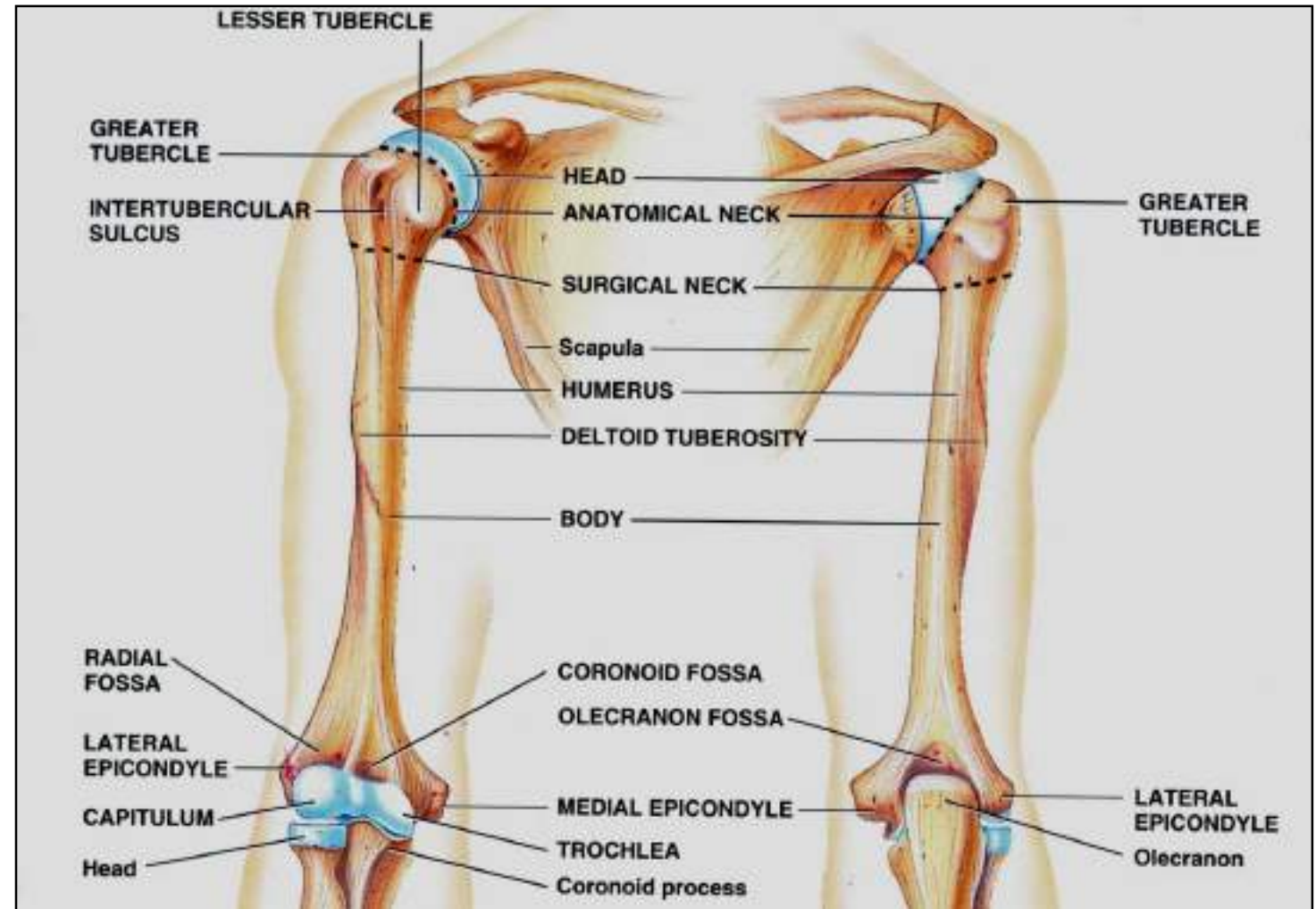
4. The **bicipital**  
**groove** (inter-  
*يفترق*  
tubercular sulcus)  
separates the 2  
tuberosities.

*لينة العظمة هنا*  
**bicipis**



**5. The anatomical neck** → is the margin of the head that separates it from the tuberosities.

**6. The surgical neck** → is the constriction that separates the upper end from the shaft.



ال Head هي المفتاح لل Medial

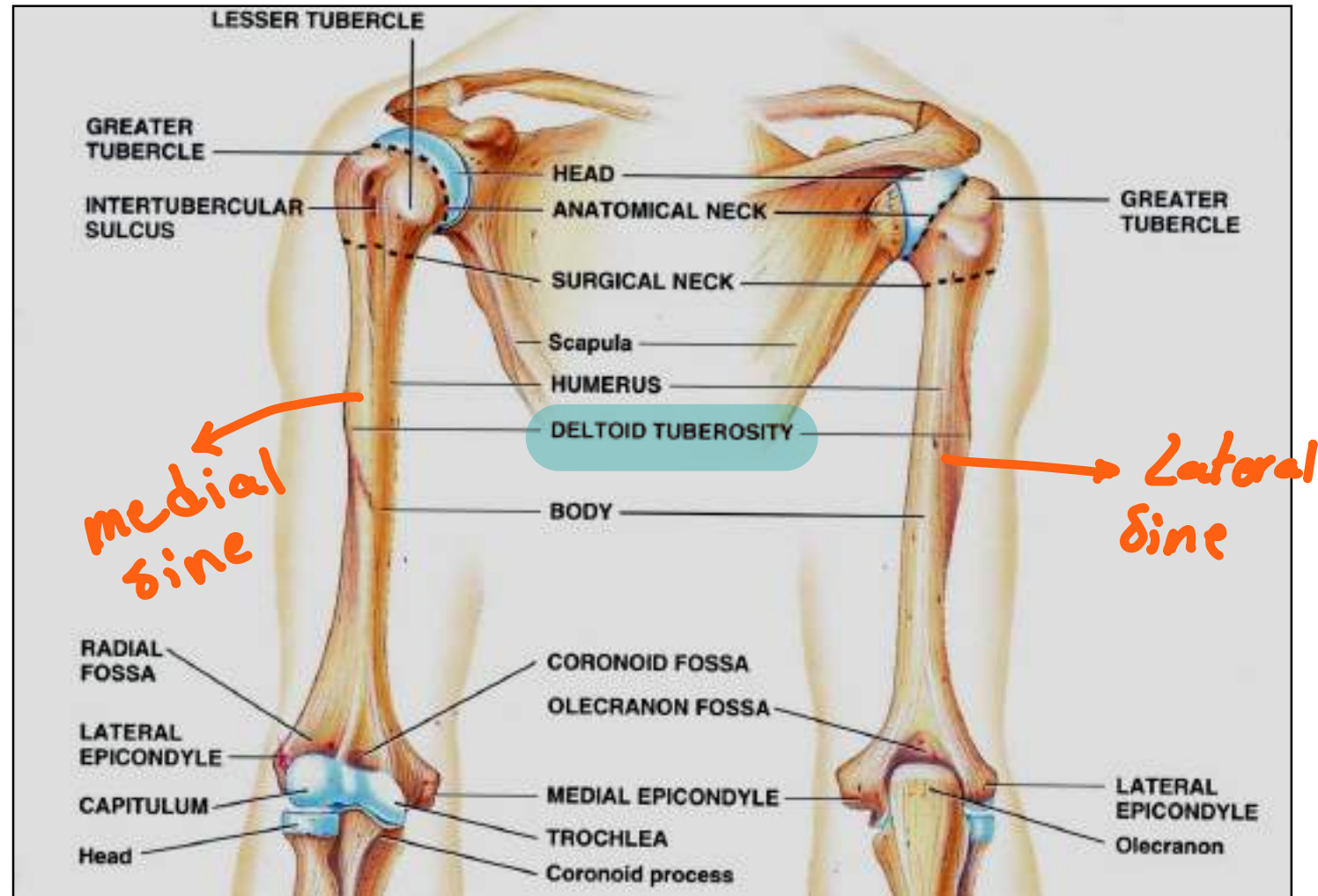
## B. Shaft (body):

**Laterally** → it presents about its middle a rough area called the **deltoid tuberosity**.

في ال laterally

في النص عندي

هضبة يمسك فيها



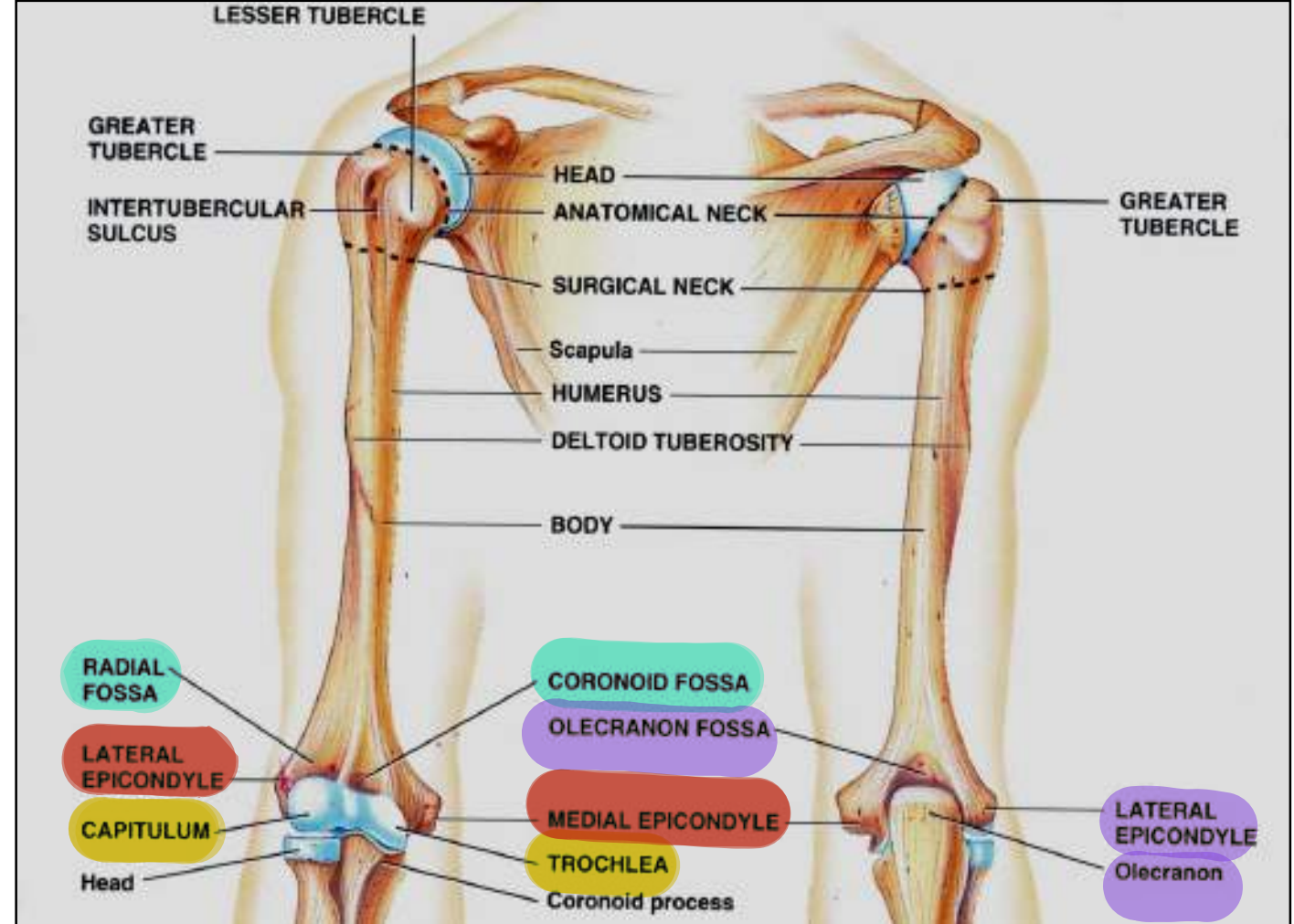
## C. The Lower end: shows:

### 1. Two articular surfaces:

a. The capitulum → a convex surface laterally. It articulates with the radius in humero-radial articulation.

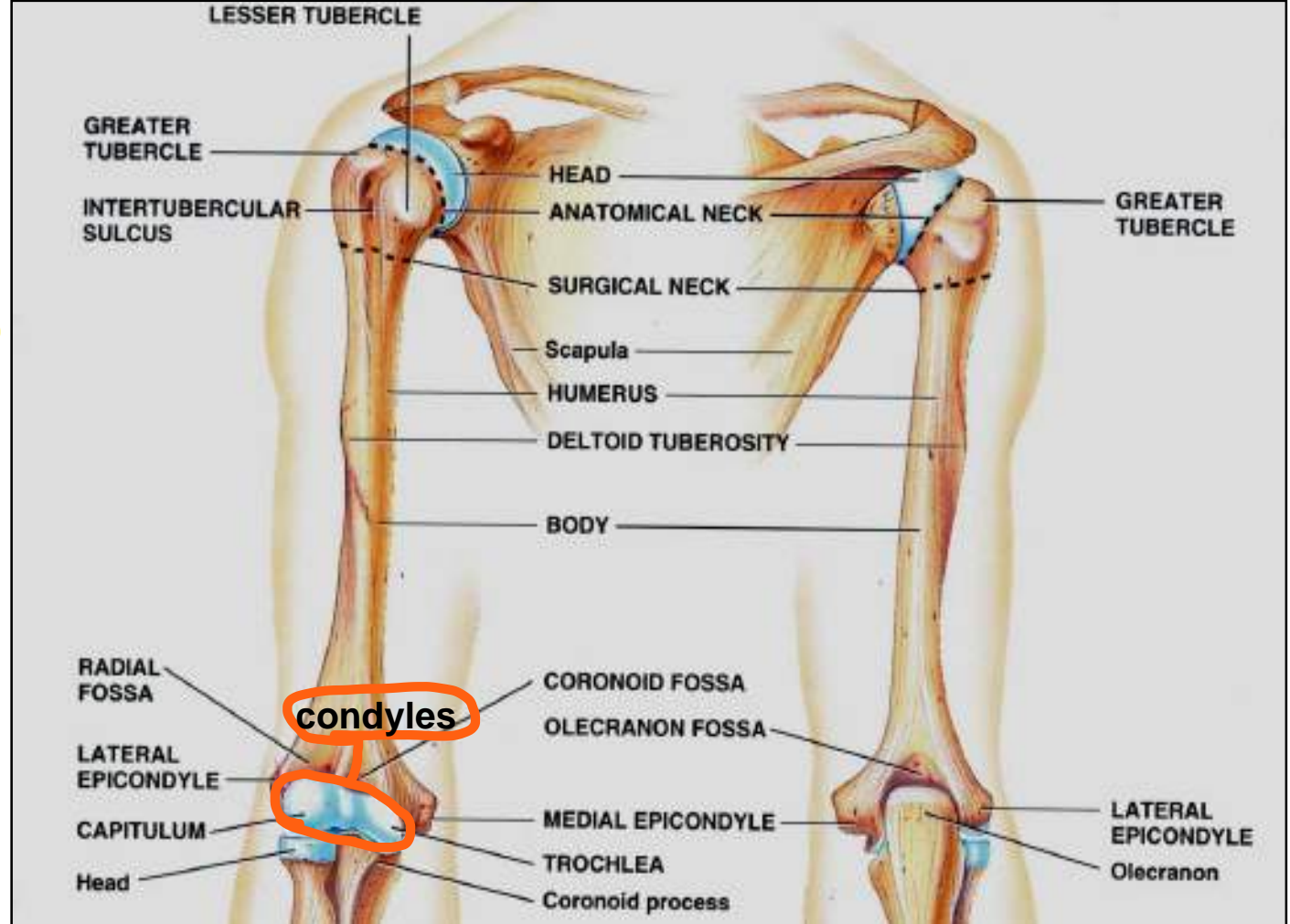
b. The trochlea → a pulley-shaped surface medially. It articulates with the ulna in humero-ulnar articulation.

\* Both the humero-radial & humero-ulnar articulations form the elbow joint.



## 2. Two non-articular side projections → the medial & lateral epicondyles.

\* The **medial epicondyle** is more **prominent** and **wider** <sup>بارد</sup> <sup>اوسع</sup> than the **lateral**, and is crossed on its **posterior surface** by **ulnar nerve**.





elbow joint: joint between humerus with ulna and radius

condyle articulation

Lateral epicondyle

Lateral condyle  
Capitulum

Medial epicondyle

Medial condyle  
Trochlea

مثل البكرة

جزء من ال elbow joint اسمه  
humero radial articulation

articulation with

Radius

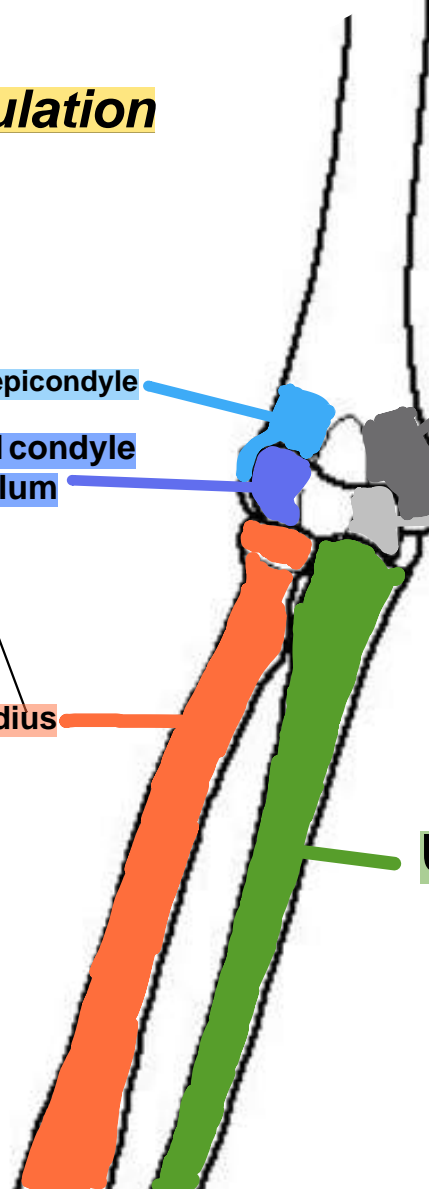
articulation with

جزء من ال elbow joint اسمه  
humero alner articulation

Ulna

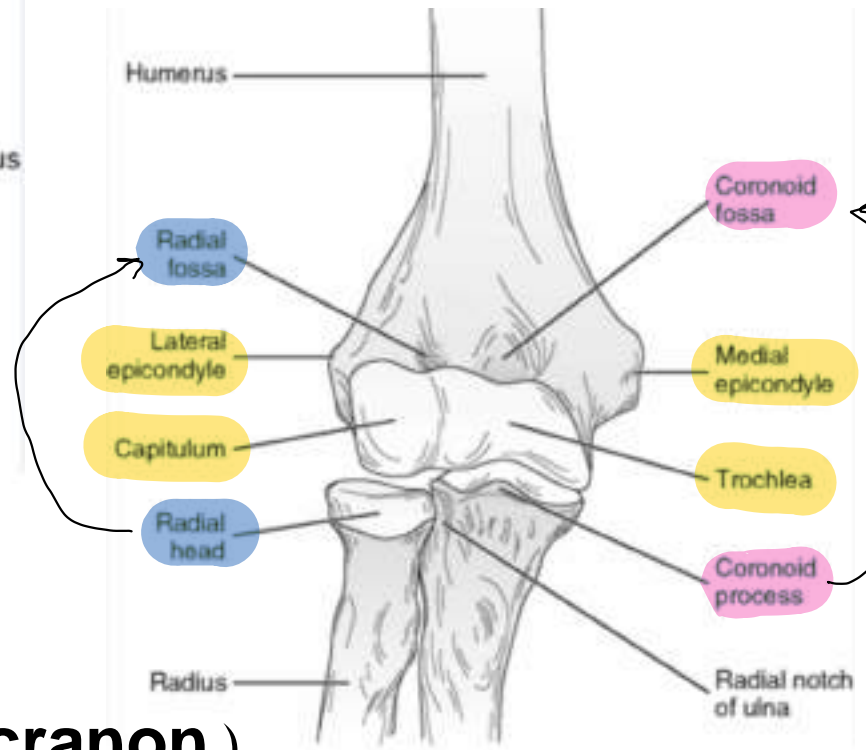
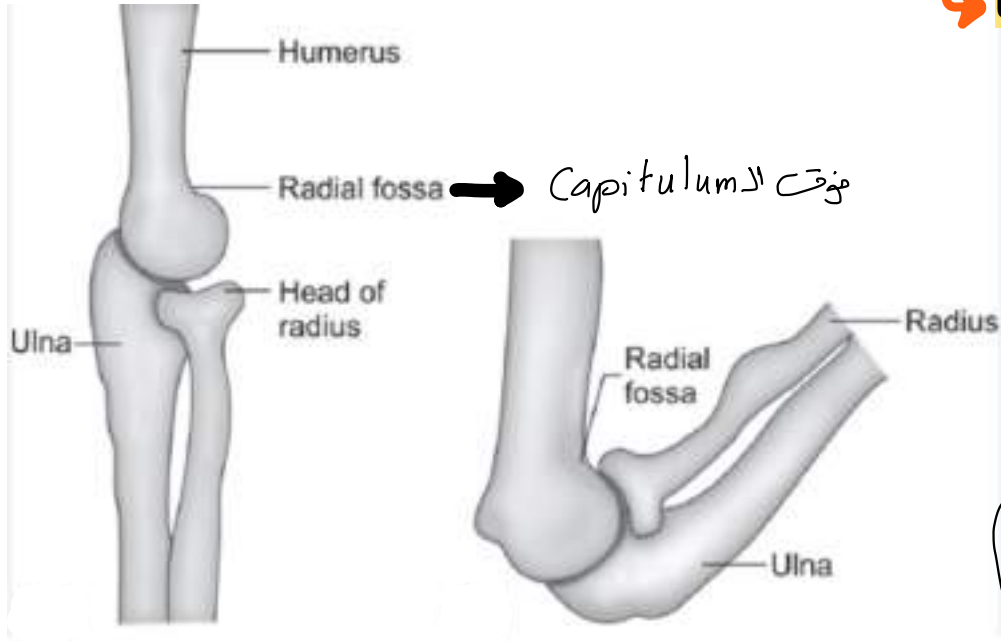
( أكثر بروز )

مهمه لان يمشي خلفها nerve مهم  
يسمى ال ulnar nerve المشكلة

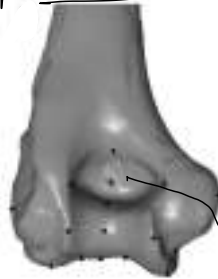


# flexion and extension عند تحريك ال elbow joint يعمل

عمل ال joints في ال (synovial ensh) upper and lower



posterior



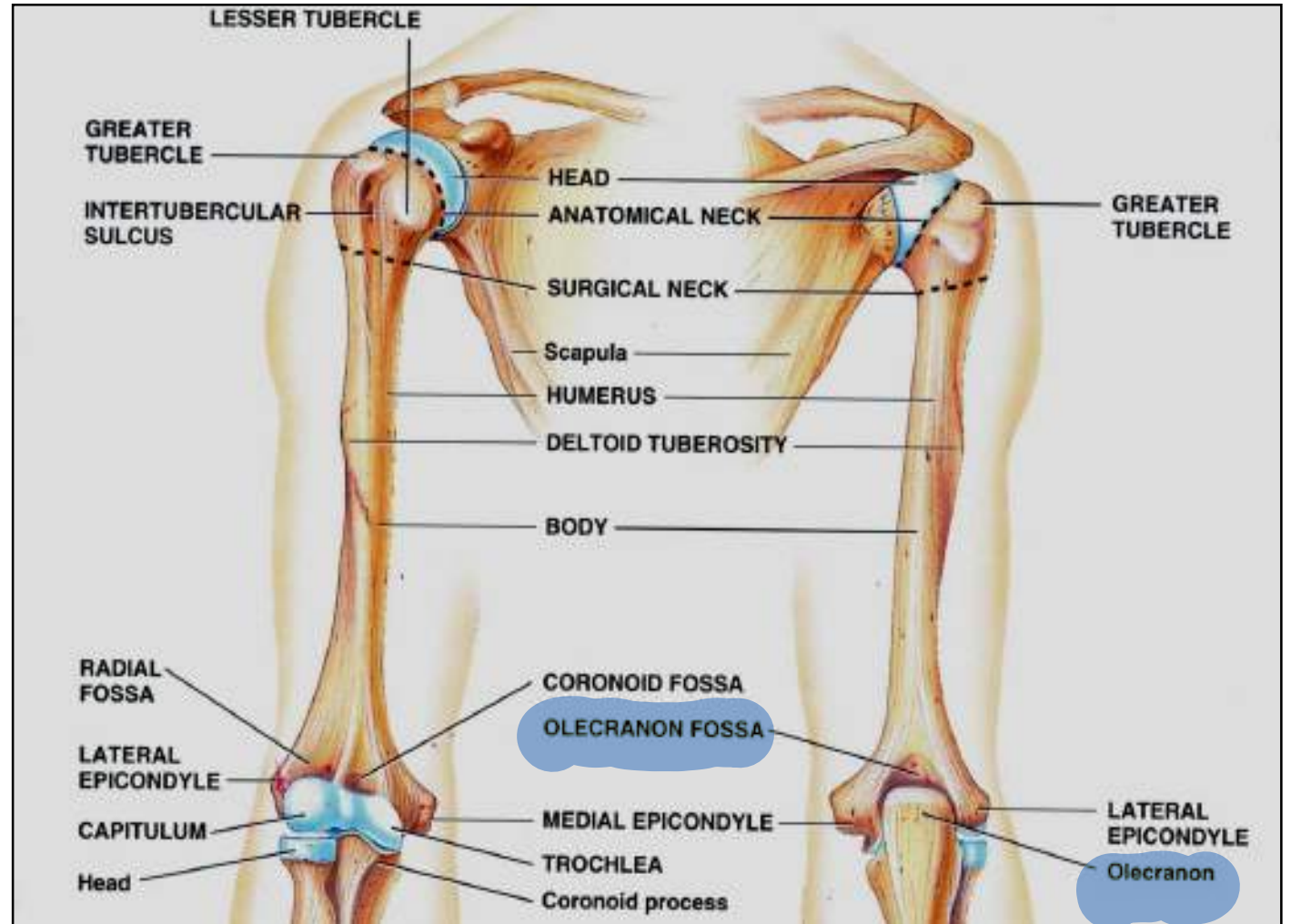
Ulan process (olecranon) يدخل في olecranon fossa

### 3. Three depressed fossae:

a. **Radial fossa** →  
**above capitulum**  
**anteriorly.**

b. **Coronoid fossa** →  
**above trochlea**  
**anteriorly.**

c. **Olecranon fossa** →  
**above trochlea**  
**posteriorly.**



# 4. The Radius Long bone

\* This is the **lateral bone** of the forearm.

\* It has an upper end, a shaft & a lower end.

A. The upper end: shows:

1. **The head:**

\* **Disc-shaped.**

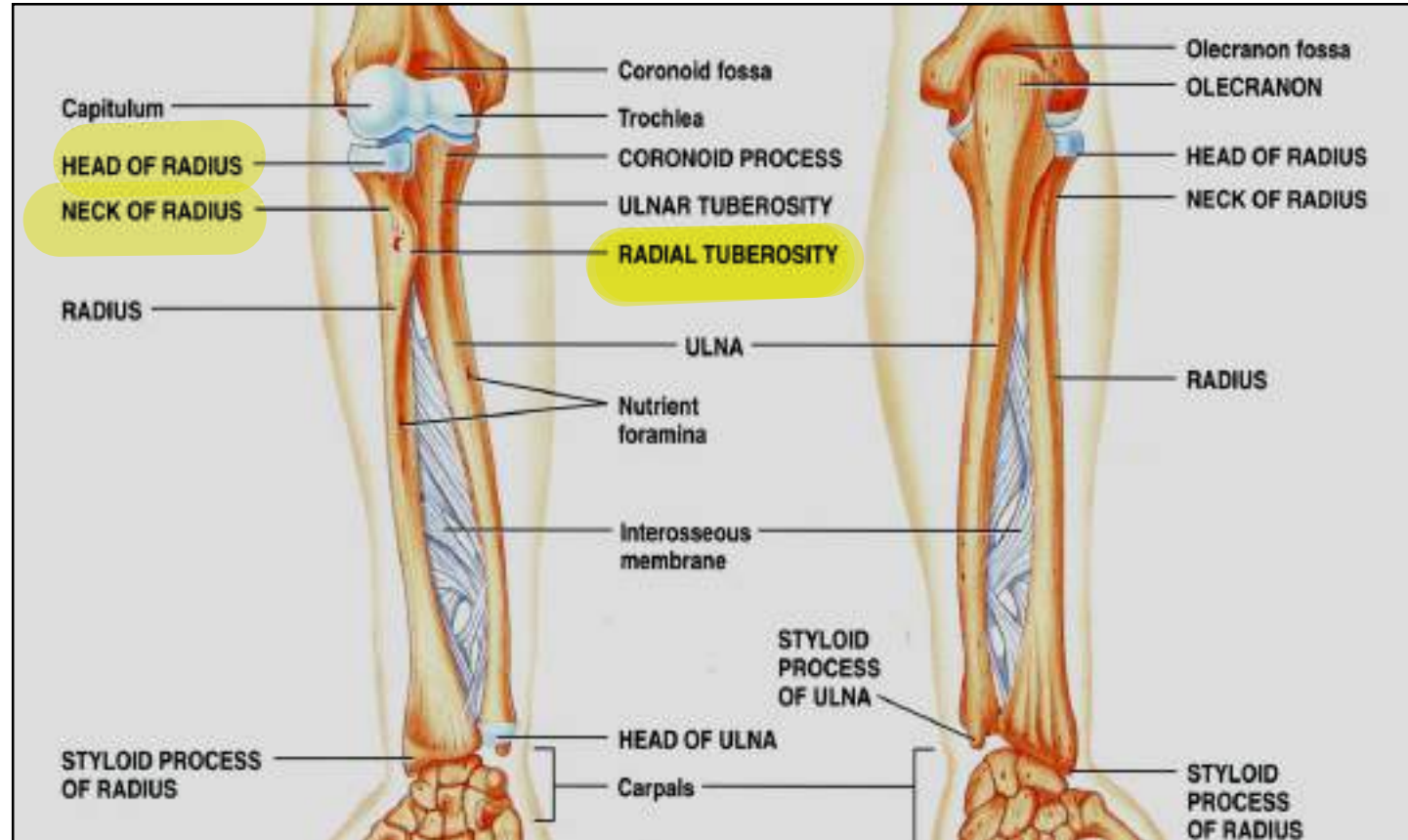
\* It articulates superiorly with the **capitalum** of the humerus.

2. **Neck.**

3. **Radial tuberosity:** a projection on ulnar side of shaft below the neck.

→ **Medially** →

تافيه  
→ ulna



## B. Shaft (body):

Directed to ulna (medial border)

\* Has a sharp medial border, the interosseous border, to which the interosseous membrane is attached.

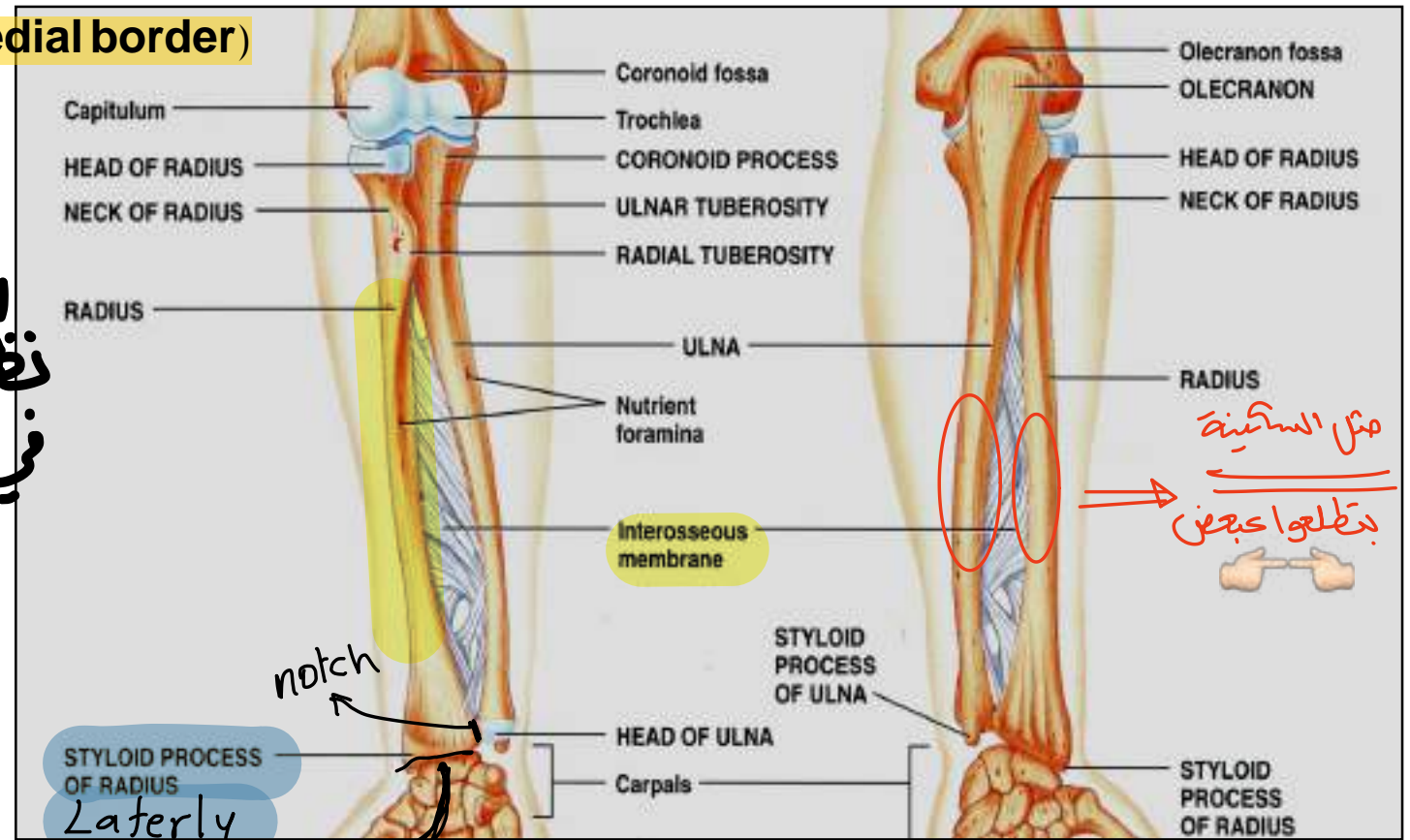
منظر  
في ادوالم

## C. Lower end: shows:

1. The medial surface of lower end presents the ulnar notch, for articulation with head of ulna to form inferior radio-ulnar joint.

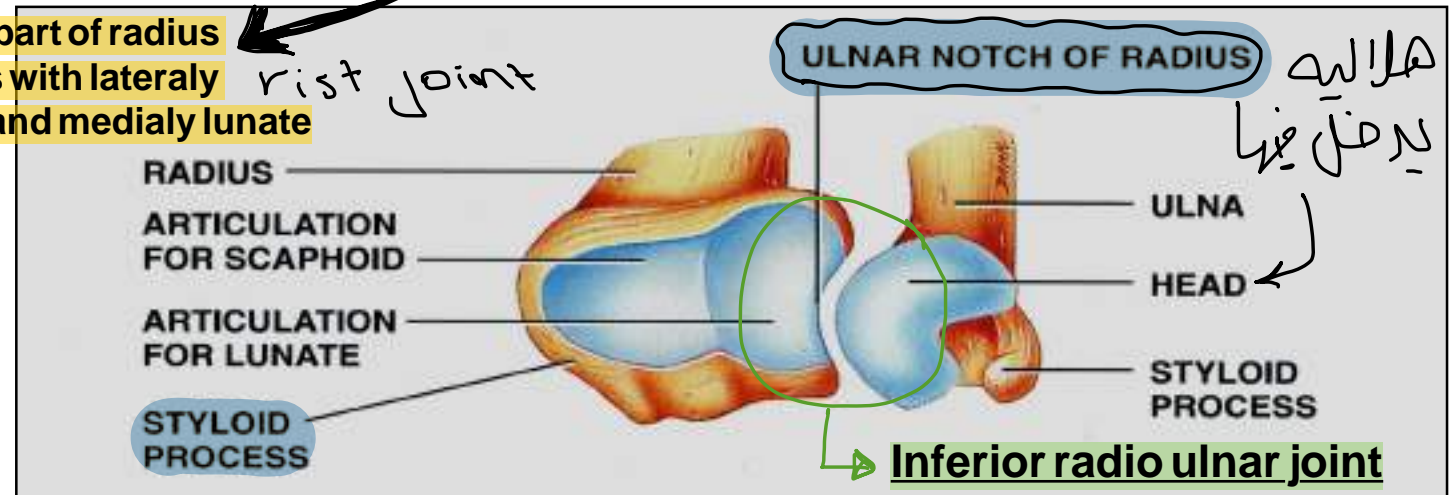
2. Styloid process.

3. The inferior surface of the lower end articulates with scaphoid bone (laterally) and the lunate bone (medially).



The lower part of radius articulates with laterally scaphoid and medially lunate

wrist joint



# 5. The Ulna Long bone

\* This is the medial bone of the forearm.

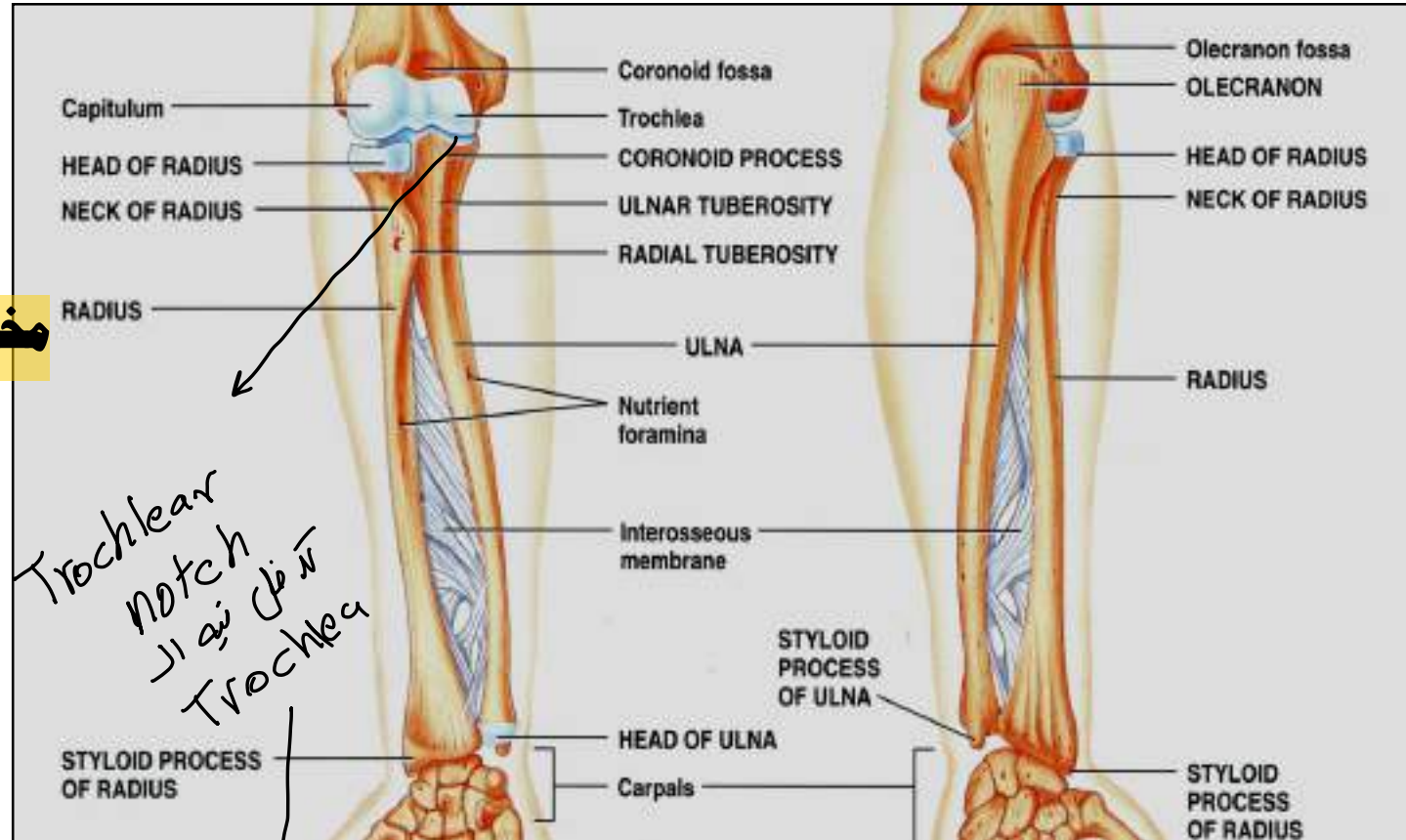
\* It has an upper end, a shaft & a lower end.

A. The upper end: shows: مخفية

**1. The trochlear notch:**

\* A semilunar concavity that lies in the anterior aspect of the upper end of the bone.

\* Articulates with the trochlea of the humerus.



مخفية يطي

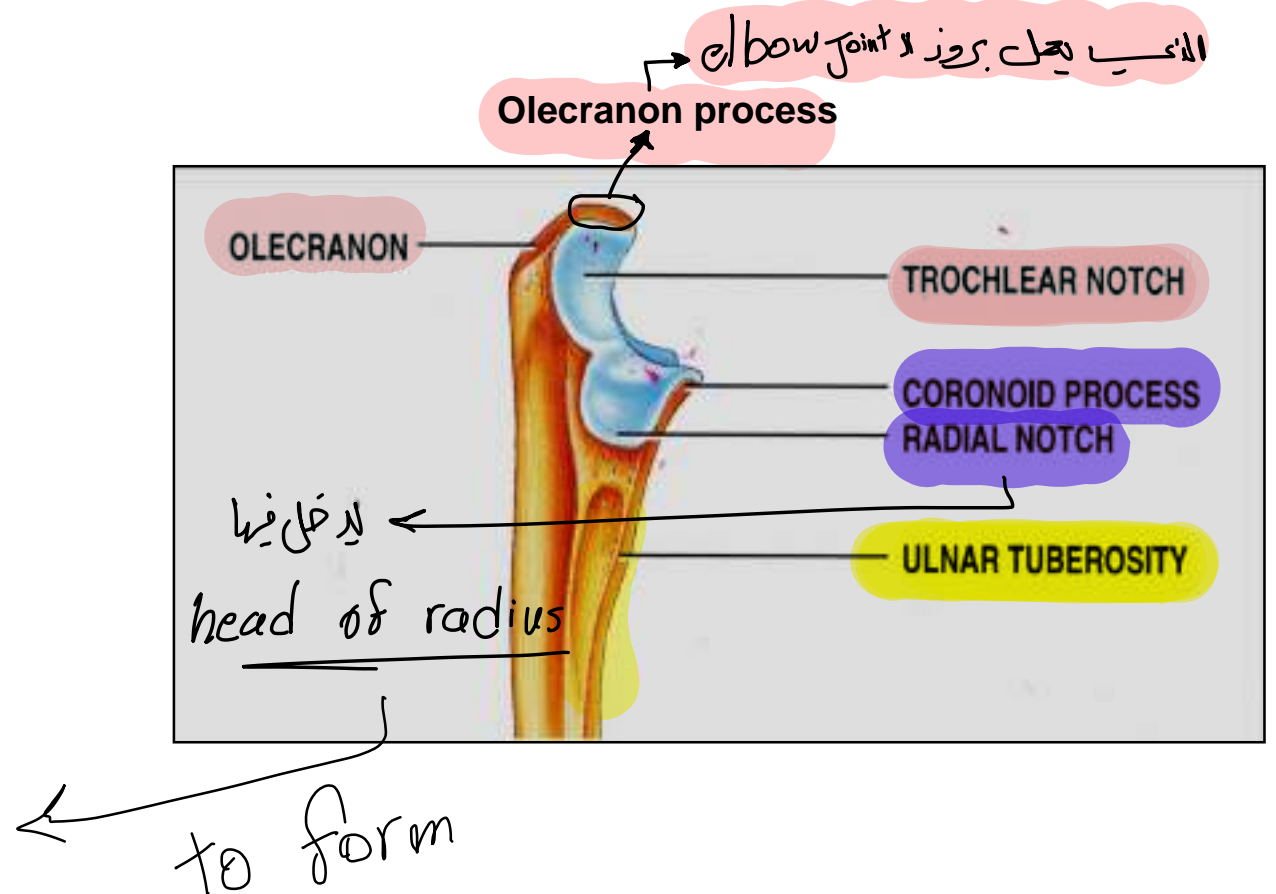
humeral ulnar of elbow joint

## 2. The olecranon process

→ which forms the prominence of elbow.

## 3. The coronoid process.

4. The lateral surface of coronoid process presents the shallow radial notch, for articulation with head of radius to form superior radio-ulnar joint.



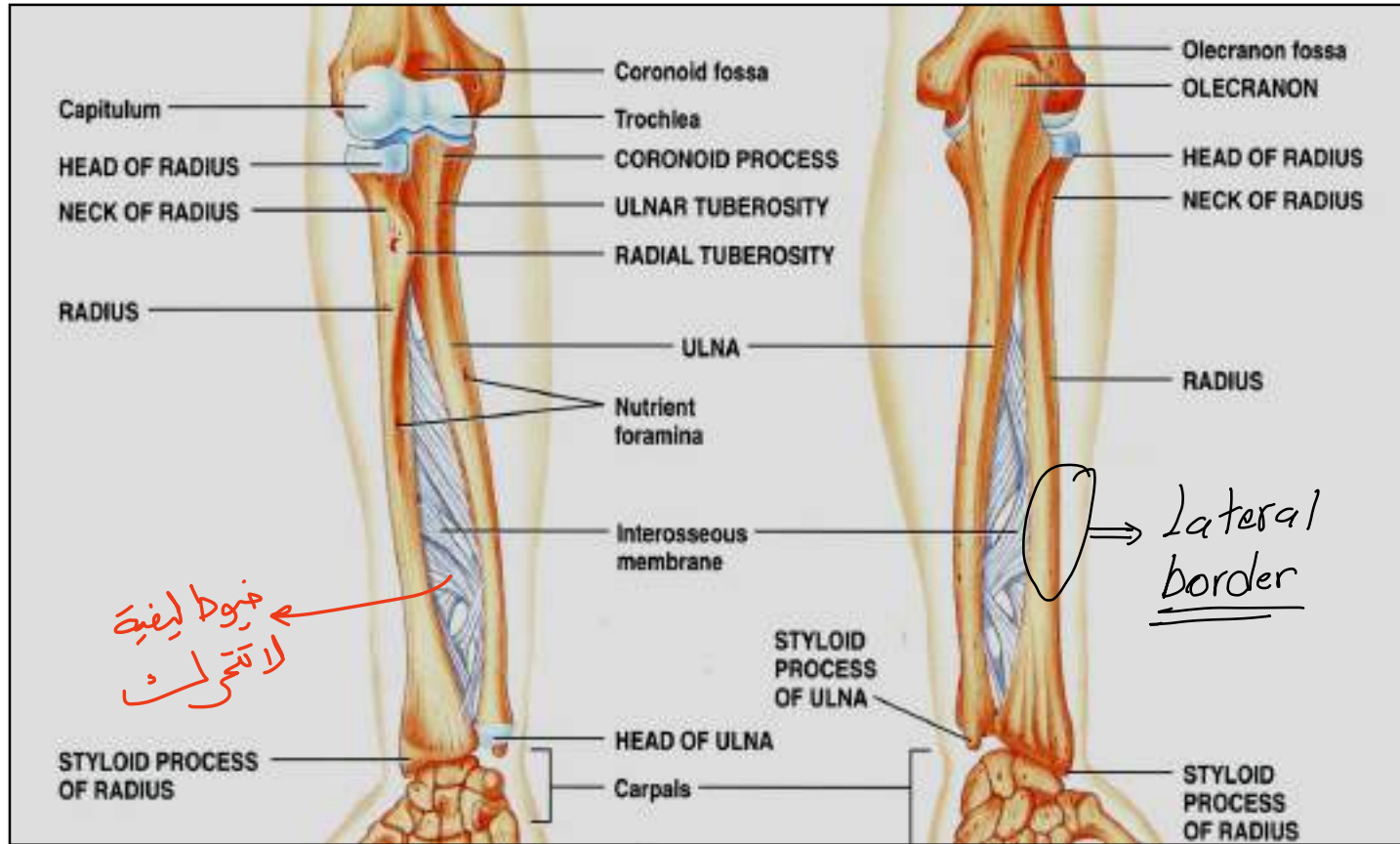
## B. Shaft (body):

\* Has a sharp lateral border, the interosseous border, to which the interosseous membrane is attached.

→ راحة اليد radius

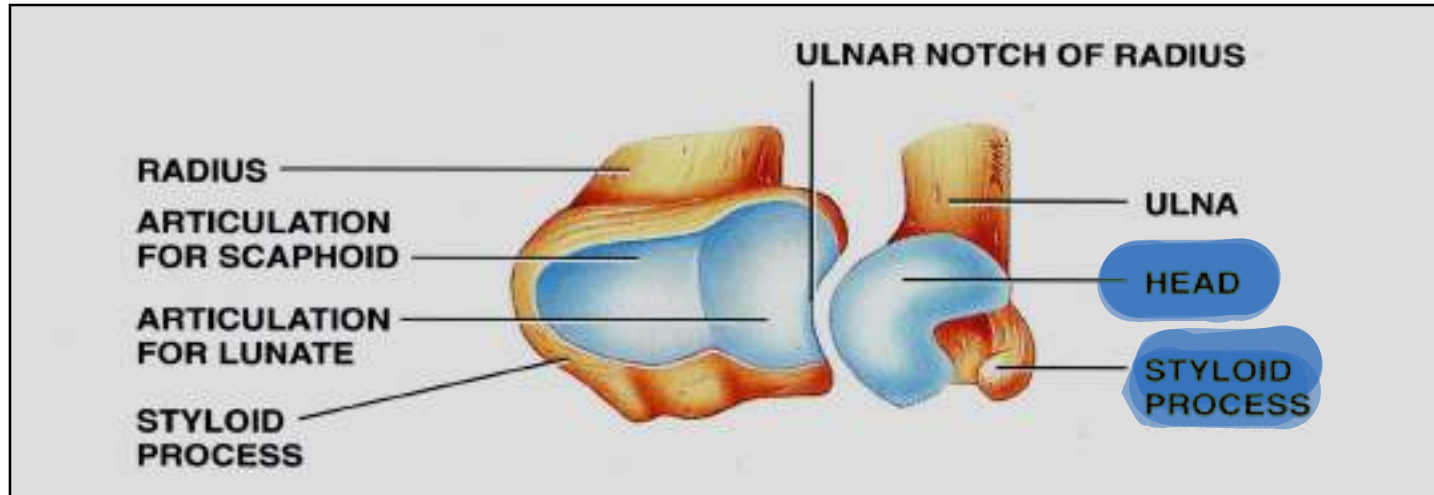
غضوفاً ليفياً  
لا تتحرك

→ Lateral border



## C. Lower end:

\* shows head and styloid process of ulna.





# 6. Bones of Hand

## A. The Carpal Bones (Carpus):

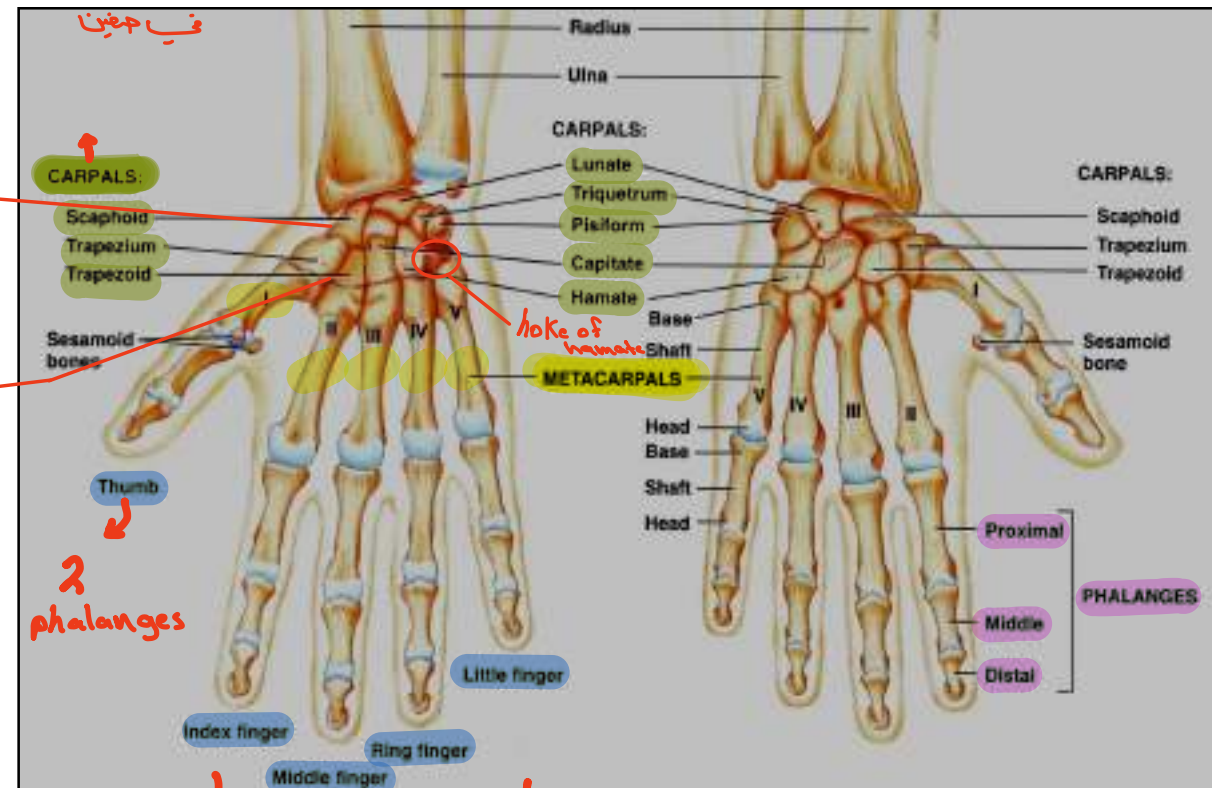
\* The carpal bones are **eight bones** which are arranged in a proximal and a distal row, and are **held firmly together by ligaments**.

### A. **Proximal row:**

\* Is formed by the following bones (from lateral to medial): **scaphoid, lunate, triquetrum, and pisiform**.

### B. **Distal row:**

\* Is formed by the following bones (from lateral to medial): **trapezium, trapezoid, capitate, and hamate**.



## B. The Metacarpal Bones:

Short long bones

→ 2 end and shaft

\* There are five metacarpal bones; the 1<sup>st</sup> one is that of the thumb.

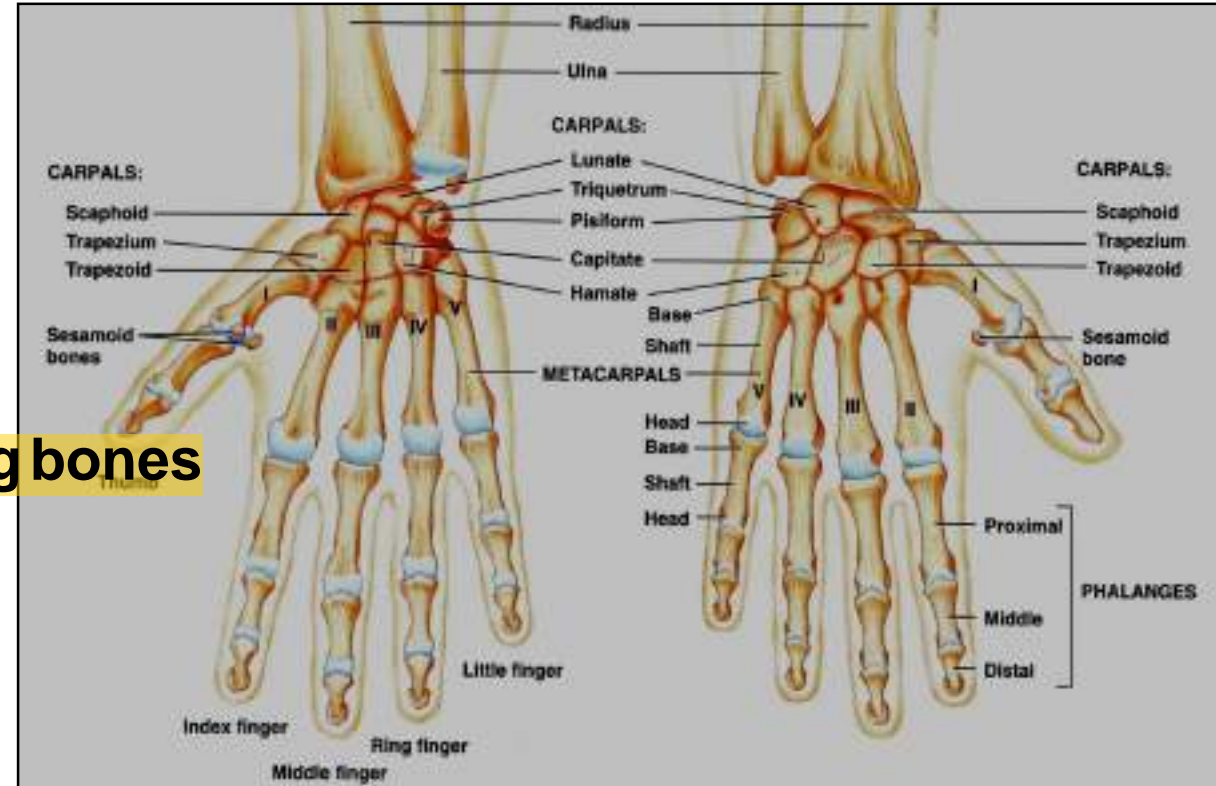
\* Each metacarpal has: a proximal base, a body, and a distal head.

## C. The Phalanges:

Short long bones

\* 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  
Thank You  
Thank You!!!!

SH@Y