

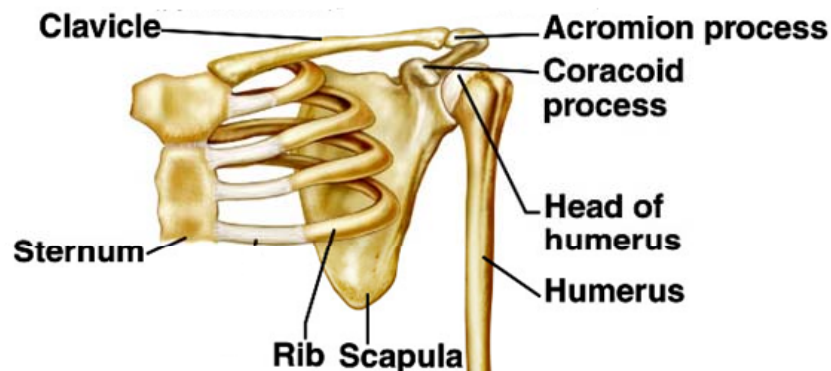
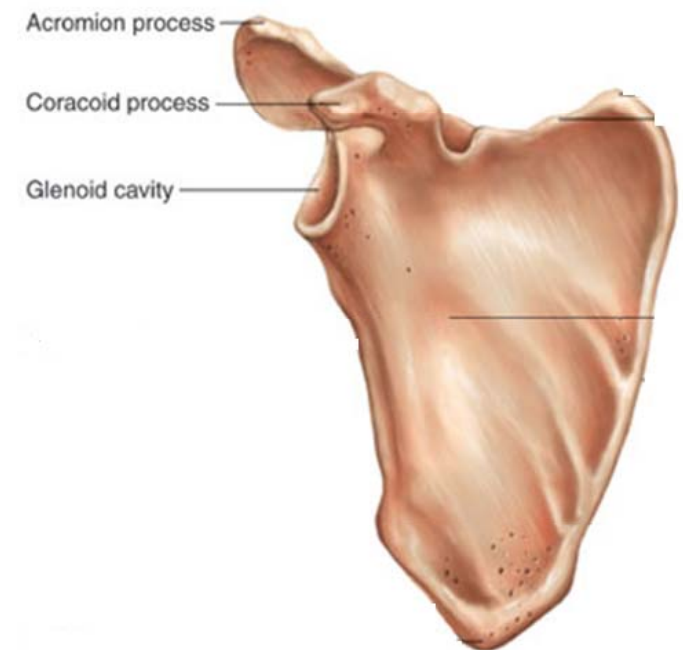
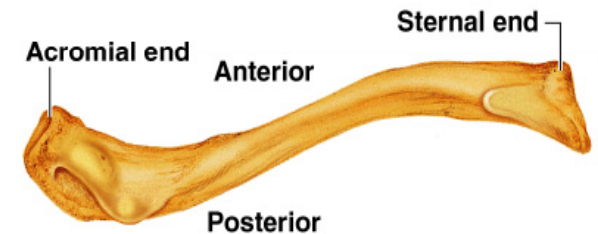
Pectoral girdle

(1) Clavicle (collar bone):

- ❑ A long bone, nearly horizontally at the upper part of the thorax, immediately above the first rib. Forms the anterior portion of the shoulder girdle.
- ❑ Holds the arm laterally so that it can move freely on the trunk.
- ❑ Exposed to trauma & transmits forces from the upper limb to the trunk.
- ❑ Articulates laterally with the acromion of the scapula. Sternoclavicular articulation is between the upper limb and the axial skeleton. Through acromioclavicular articulation, the clavicle can act as a support maintaining the upper limb away from the thorax permitting a greater range of upper limb motion.

(2) Scapula (shoulder blade):

- ❑ Flat, triangular bone, with two processes. Forms posterior part of shoulder girdle.
- ❑ Acromion process: a large oblong process that forms summit of shoulder, helps to overhang the glenoid cavity.
- ❑ Coracoid process: a thick curved process attached by a broad base to the upper part of the neck of the scapula.



Upper limbs

Humerus (Arm Bone)

• Longest & largest bone of upper extremity, connects scapula & lower arm.

Upper end:

with a round head, a narrow neck and 2 short processes (tubercle/tuberosity). Head articulates with glenoid cavity of scapula.

▪ Circumference of articular surface of head slightly constricted → anatomical neck & a constriction below the tubercles → surgical neck.

▪ Greater Tubercle: upper surface rounded & marked by 3 flat impressions.

▪ Lesser Tubercle-smaller, but more prominent than the greater.

▪ Tubercles separated by bicipital groove.

Body-

▪ a rough, triangular elevation- deltoid tuberosity for insertion of Deltoideus muscle.

Lower end:

▪ Consists of 2 epicondyles, 2 processes (trochlea & capitulum), & 3 fossae (radial, coronoid & olecranon fossa).

▪ **Capitulum** articulates with cupshaped depression on head of radius.

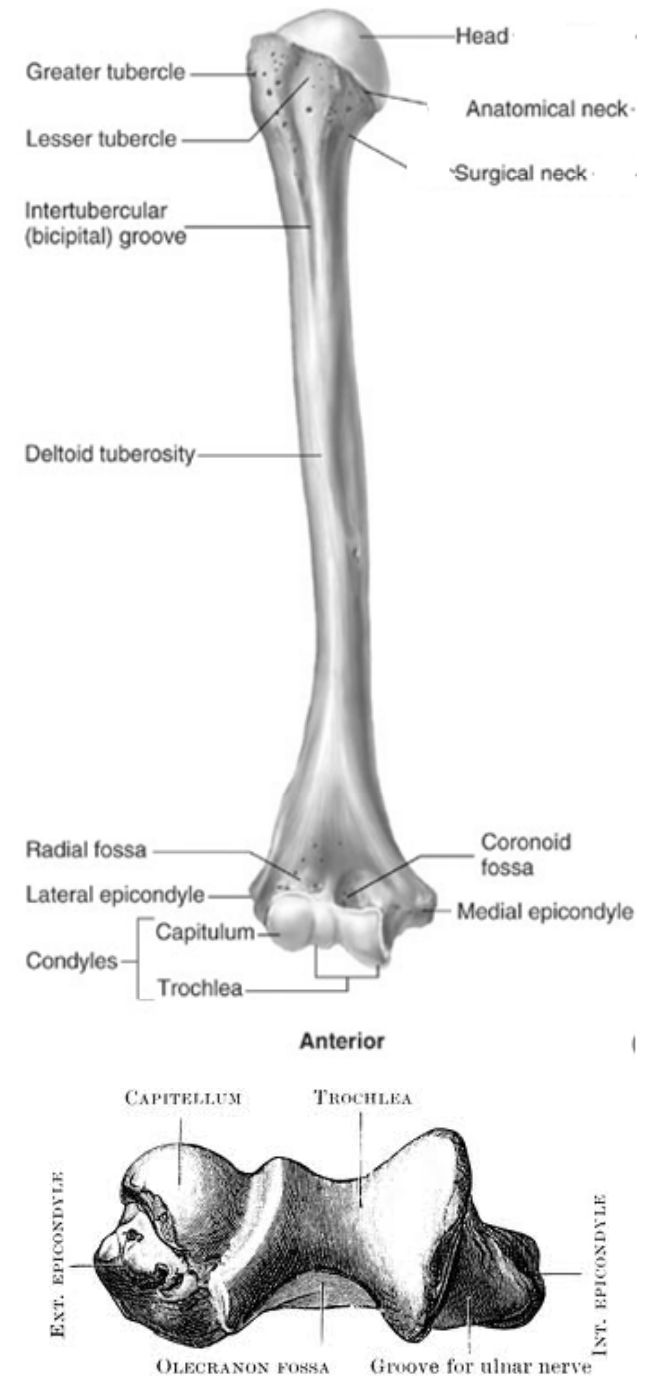
• **Trochlea:** a deep depression that articulates with trochlear notch of ulna.

Lower end:

• Above the capitulum is a slight depression- **radial fossa**, which receives the anterior border of head of the radius.

• Above the front part of trochlea is a small depression- **coronoid fossa**, which receives the coronoid process of ulna.

• Above the back part of trochlea is a deep triangular depression, **olecranon fossa**, that receives the olecranon.



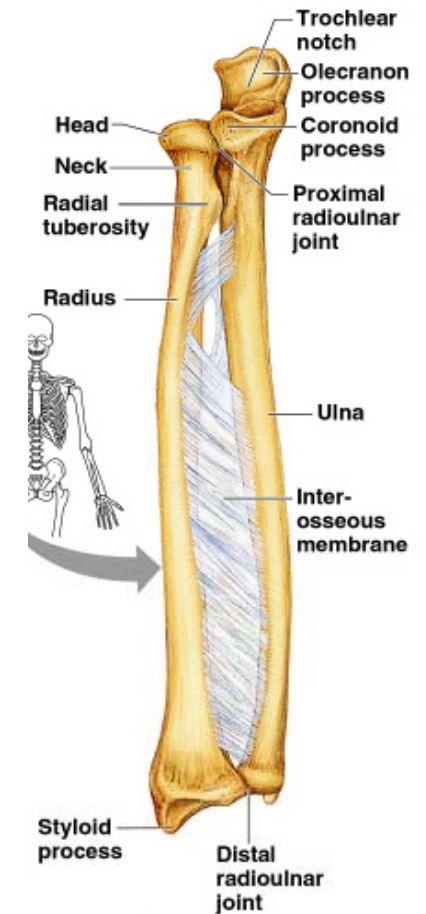
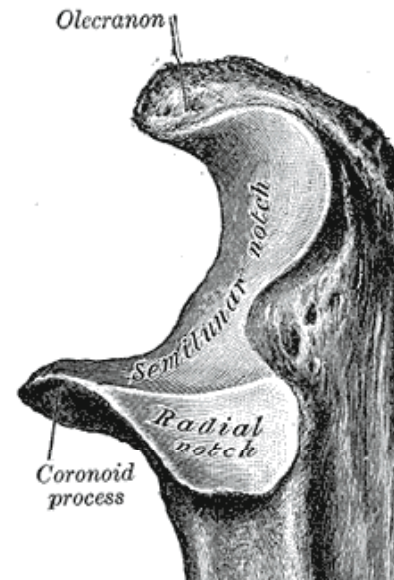
Upper limbs

Radius & ulna

- **Radius** is on outside of elbow. Radius connects to the thumb side of the wrist. Its lower end is large & forms the chief part of the wrist-joint.
- **Ulna** is on the inside of the forearm closest to the body. Ulna articulates with humerus & radius.
- Radius and ulna connect to the humerus bone of the upper arm at the elbow joint.
- **Radius**
 - On the medial side, is an eminence, the radial tuberosity.
 - Lateral surface is prolonged into a strong, conical projection-styloid process, which gives attachment to the tendon of the Brachioradialis.
 - Articular surface for ulna is the ulnar notch (sigmoid cavity) of radius.

Ulna:

- Upper end presents two curved processes- **olecranon** & **coronoid process**; & two concave, articular cavities- **semilunar** & **radial notches**.
- **Semilunar Notch** -a large depression, formed by olecranon & coronoid process, serving for articulation with the trochlea of the humerus



Carpal bones:

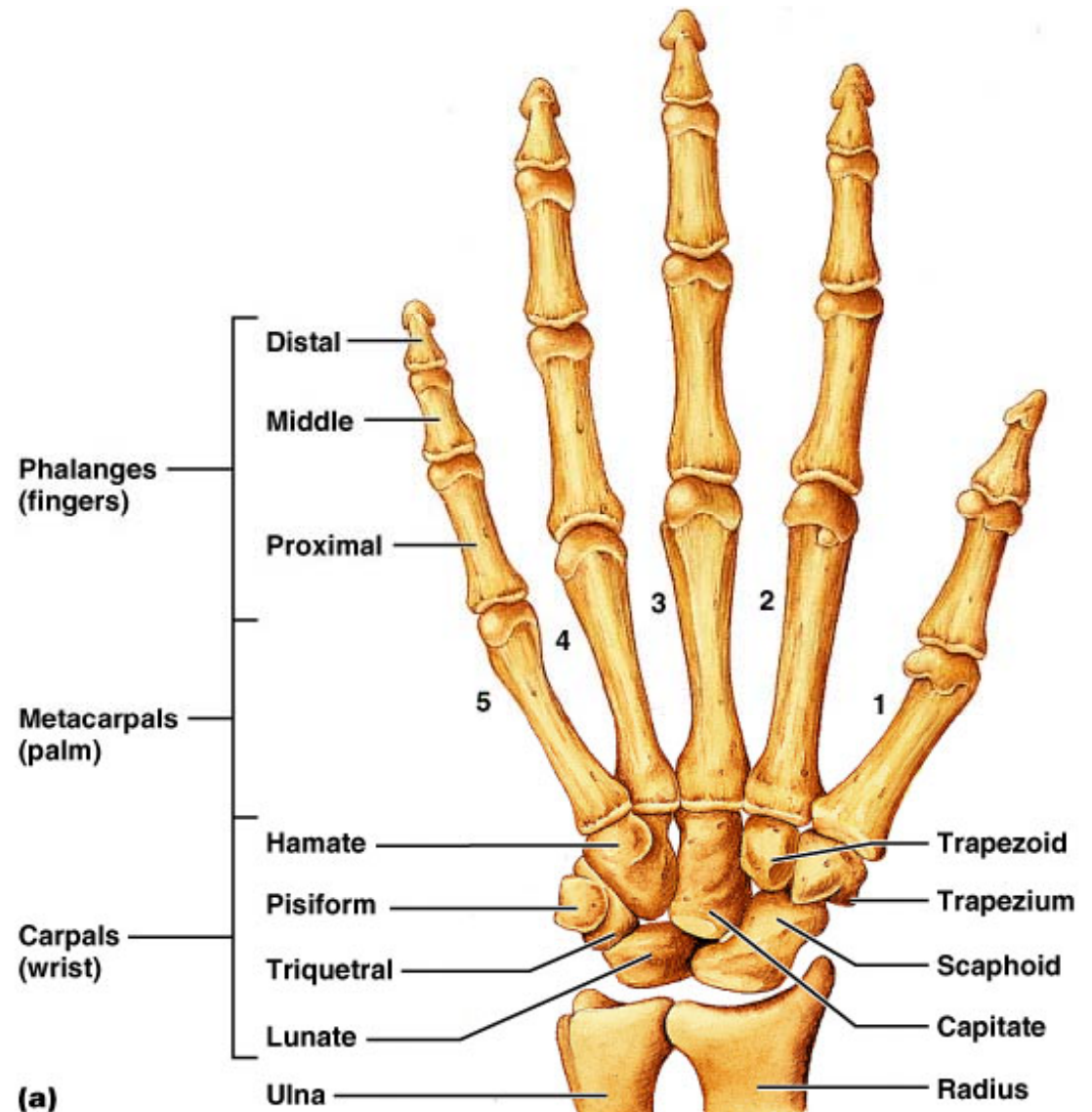
- 8 in number, arranged in 2 rows.
- **Proximal row**, from the radial to the ulnar side → navicular (scaphoid), lunate (semilunar), triquetrum or triquetral (triangular) and pisiform;
- **Distal row** → trapezium (greater multangular), trapezoid (lesser multangular), capitate & hamate (unciform).

Metacarpus:

- 5 cylindrical bones
- Each consists of a body & 2 extremities.

Phalanges (Phalanges Digitorum Manus):

- 14 in number, 3 for each finger & 2 for the thumb.



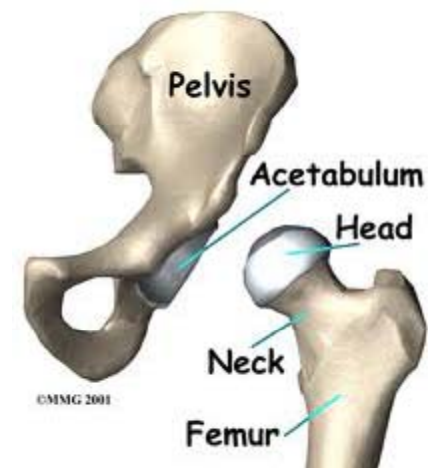
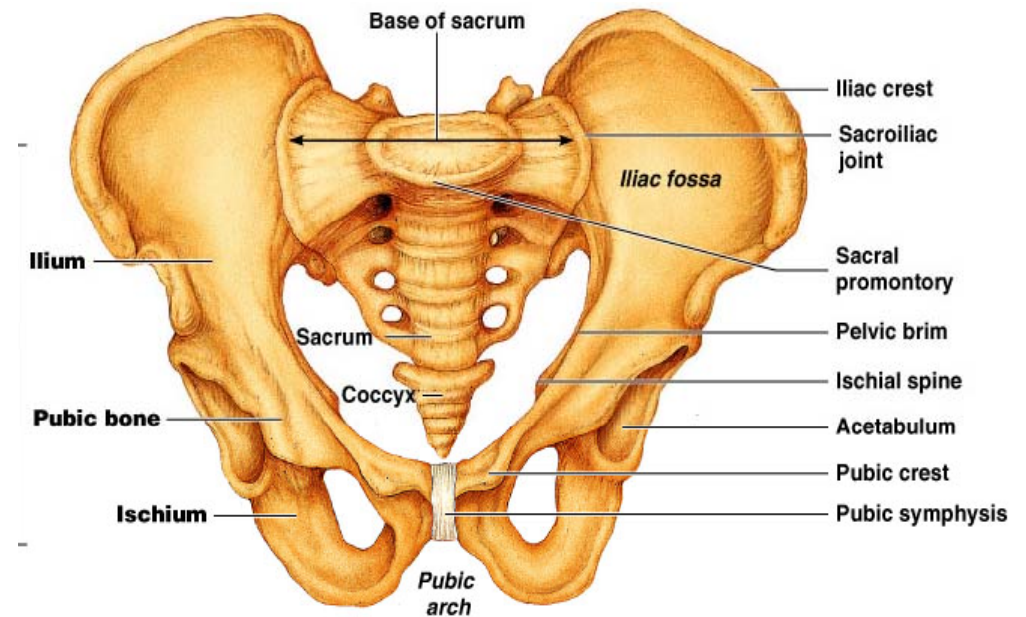
Pelvic girdle (Hip girdle)

Bones:

- Os Coxae or hip bone: contains acetabulum (hip socket)
- Ilium, ischium, pubis
- Sacrum
 - Protects several organs

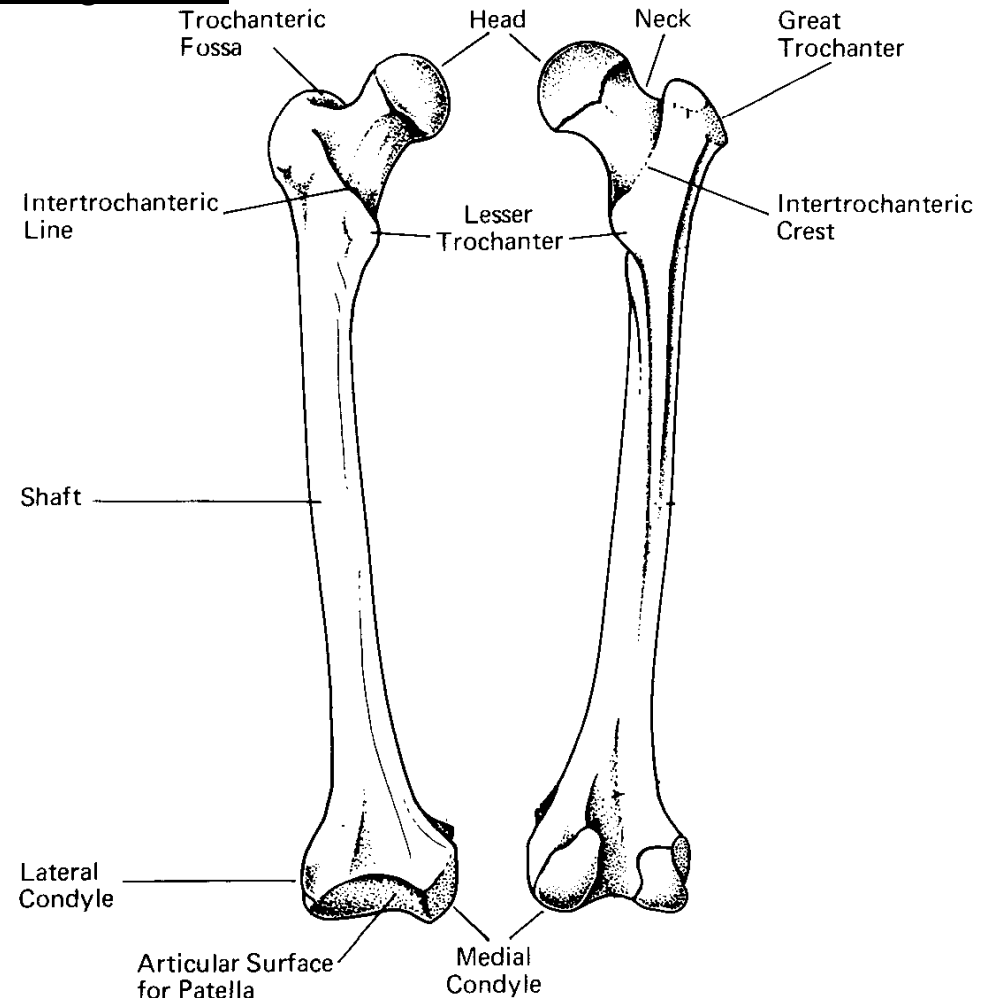
Hip bone (innominate bone)

- Composed of 3 pairs of fused bones: Ilium, Ischium, Pubis.
- Union of 3 parts occurs around **acetabulum**. (cotyloid cavity): a deep, large, cup-shaped, hemispherical depression, formed medially by the pubis, above by ilium & below by ischium.
- **Ilium**: supports the flank, expanded portion which extends upward from the acetabulum.
- **Ischium**: lowest & strongest portion of the bone.
- **Obturator foramen**: a large aperture, between ischium & pubis. In male it is large & oval, while in female it is smaller, and more triangular.
- **Pubis** extends downward from acetabulum & articulates in middle line with the bone of opposite side: it forms front of pelvis & supports external organs of generation.



Femur or thigh bone

- Longest, strongest, largest bone in the body.
- **Upper end:**
 - contains a **head**, a **neck**, a **greater** and a **lesser trochanter**.
 - Trochanters are prominent processes which afford leverage to the muscles that rotate the thigh on its axis.
- **Lower end:** lateral & medial condyle, patellar surface.
- **Medial & lateral epicondyles** - muscle site attachments for the knee muscles.



Anterior (left) and posterior views of right femur.

Patella or kneecap:

- a flat, triangular sesamoid bone (Largest sesamoid bone in the body)
- Enclosed within the quadriceps tendon
- Forms the patellofemoral joint



Tibia & fibula

Tibia (shin bone)

- Tibia articulates with femur at superior end- forms the knee joint and with talus at inferior end- forms the ankle joint.

Fibula (peroneal bone or calf bone)

- long slender bone placed parallel with the tibia.

Tibia

Upper end:

- Expanded into 2 eminences- medial & lateral condyles.
- **Medial condyle:** a deep transverse groove, for the insertion of tendon.
- **Lateral condyle:** a flat articular facet for articulation with head of fibula.
- **Tibial tuberosity:** a large oblong elevation that gives attachment to patellar ligament.

Lower end:

- **Medial malleolus:** prominence on inner side of ankle, formed by lower end of the tibia. (medial surface of ankle joint)

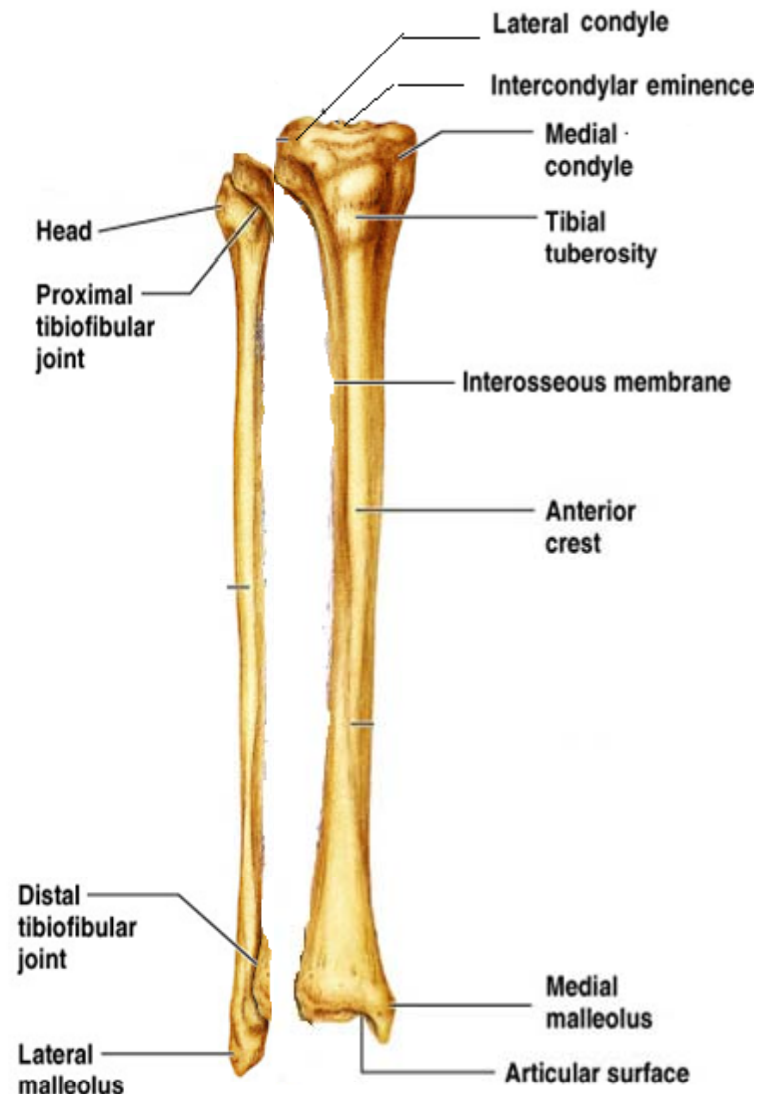
Fibula

Upper end:

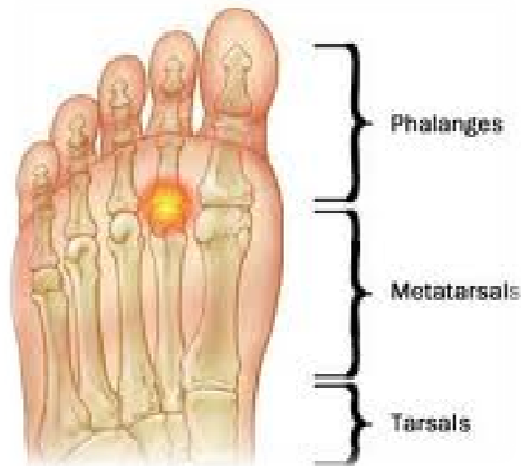
- Small, placed toward the back of the head of the tibia, below the level of the knee-joint.
- Excluded from the formation of knee joint. Note: **Fibula does not contribute to knee joint**- stabilizes the ankle joint.

Lower end

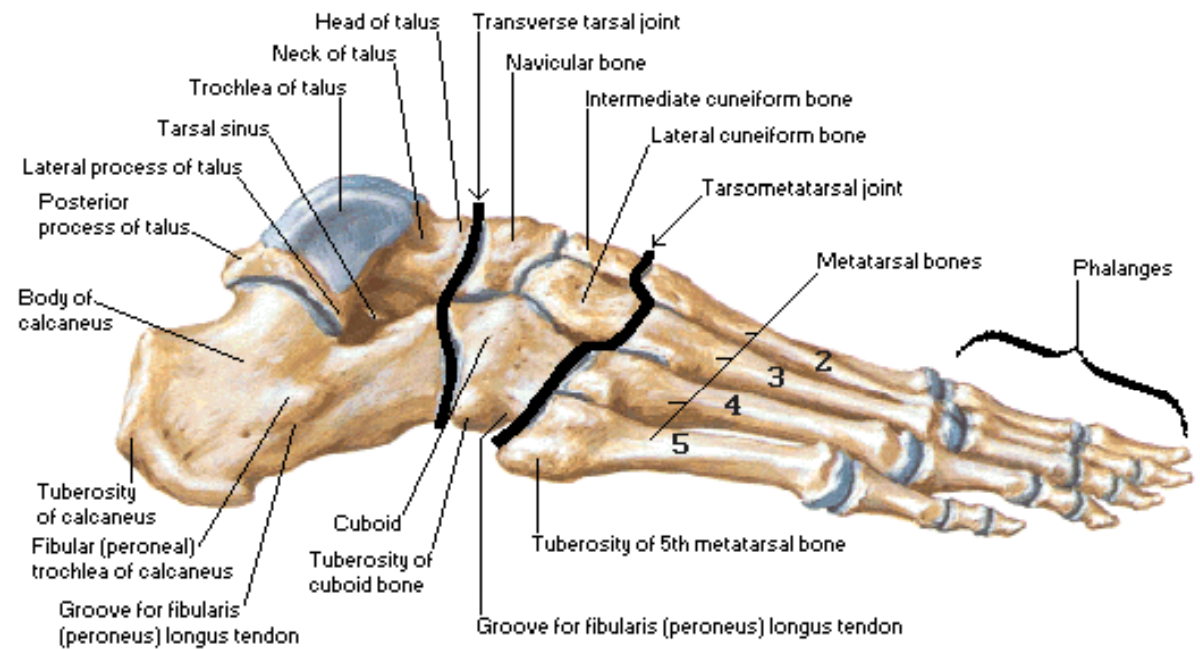
- Projects below the tibia
- Forms the lateral part of ankle-joint.
- **Lateral malleolus:** prominence on outer side of the ankle, formed by the lower end of the fibula.



Lower limbs



Bones of Foot Lateral View



Tarsus (Ossa Tarsi):

- 7 in number
- Calcaneus, talus (astragalus or ankle bone), cuboid, navicular (scaphoid), first, second & third cuneiforms.
- **Calcaneus (heel bone):** largest of tarsal bones, serves to transmit the weight of the body to the ground, form a strong lever for the muscles of the calf. Muscles attached to calcaneus by Achilles tendon.
- **Talus :** 2nd largest of tarsal bones. Occupies middle & upper part of tarsus.
- First cuneiform bone is the largest & second cuneiform bone is the smallest of 3 cuneiforms.

Metatarsus :

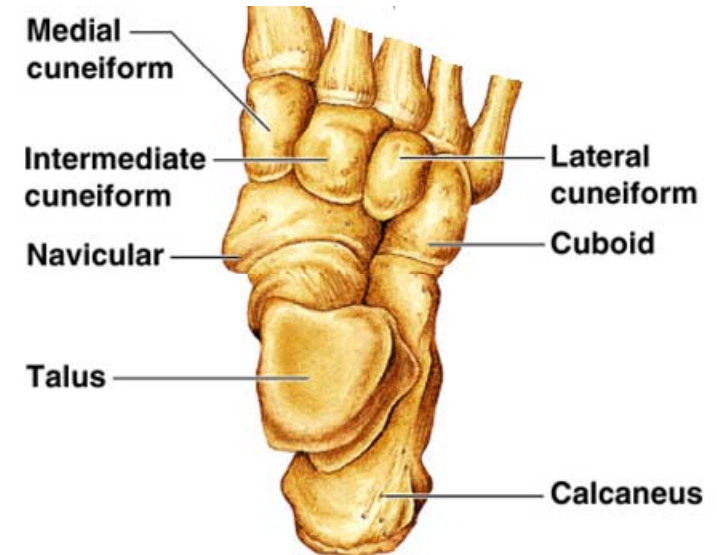
- Consists of 5 bones.
- **1st metatarsal Bone** (metatarsal bone of great toe): remarkable for its great thickness, shortest of metatarsal bones. supports body weight
- **2nd metatarsal bone:** longest of metatarsal bones.
- **5th metatarsal bone:** recognized by a rough eminence-*tuberosity*.

Phalanges of Foot (Phalanges Digitorum Pedis):

- 2 in the great toe
- 3 in each of the other toes.

Foot

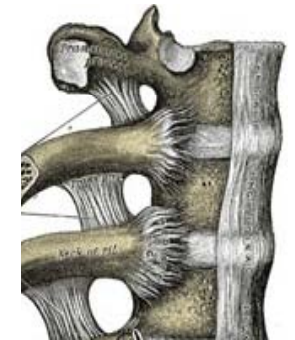
Lower limbs



A **bunion** is one of the most common big (great) toe problems - misalignment of bone in the joint. In addition to causing pain, a bunion changes the shape of the foot causing further problems in adjacent toes. Bunions may be caused by heredity, incorrect mechanics of foot & ankle arthritis or injury.

Functional Classification of Joints

- ❑ **Immovable (synarthrosis):** A fixed joint that allows no movement. Include all those articulations in which the surfaces of bones are in almost direct contact, fastened together by intervening connective tissue or hyaline cartilage & so no appreciable motion. Eg: joint between bones of the skull (excepting those of the mandible).
- ❑ **Slightly movable (amphiarthrosis):** joint that permits limited movement. In these articulations the contiguous bony surfaces are either connected by broad flattened disks of fibrocartilage, or united by an interosseous ligament. Eg: pubic symphysis, vertebral joints, sacroiliac joint.
- ❑ **Freely movable (diarthrosis):** Permits movement in one or more directions. Contiguous bony surfaces are covered with articular cartilage, & connected by ligaments lined by synovial membrane. Includes the greater number of the joints in the body.



Structural Classification of Joints

(1) Fibrous joints:

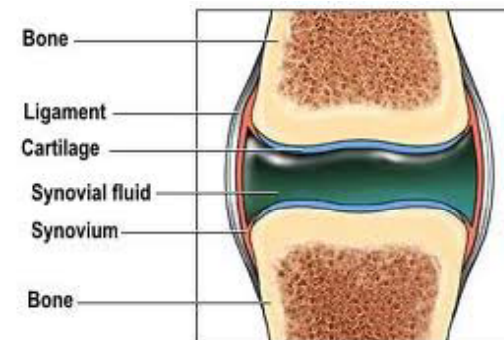
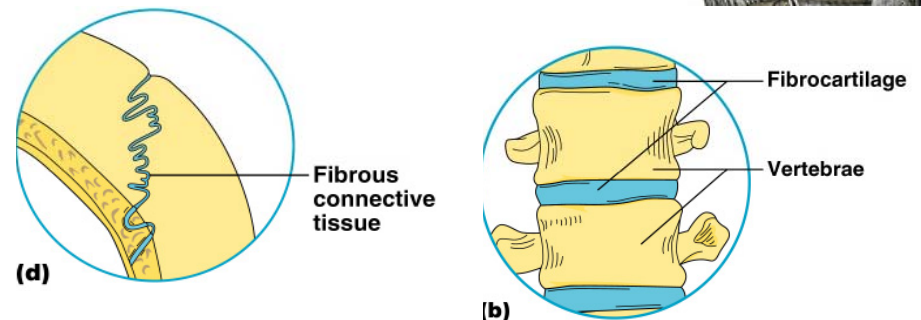
- Bones united by fibrous tissue
- generally immovable.
- Eg: bones of skull & pelvis are held together by fibrous joints.

(2) Cartilaginous joints:

- Bones connected by cartilage
- mostly amphiarthrosis
- Eg: Pubic symphysis, Intervertebral joints.

(3) Synovial joints:

- Freely moveable
- Articulating bones are separated by a joint cavity
- Synovial fluid is found in the joint cavity.
- Eg: Hip, Knee, Ankle, Shoulder, Elbow, Wrist, Thumb



Types of Synovial Joints Based on Shape

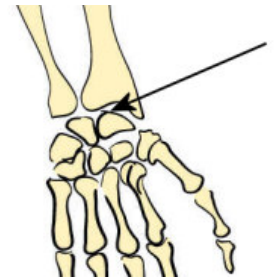
Gliding joint:

- Allow for smooth movement in several directions along a plane or other smooth surface.
- Joint is like two plates sliding across each other.
- Eg: carpal bones of the wrist (inter carpal joint).



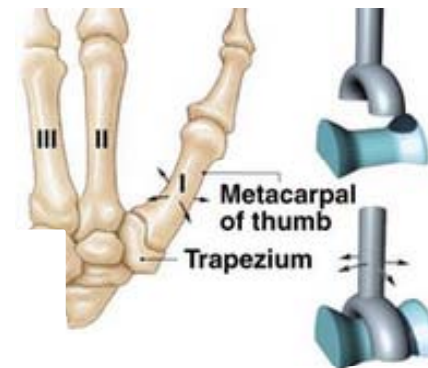
Condyloid joint:

- Have an irregular surface where the bones move past one another.
- It is like two bowls fitted together.
- Eg: wrist joint, metacarpophalangeal joints .



Saddle joint:

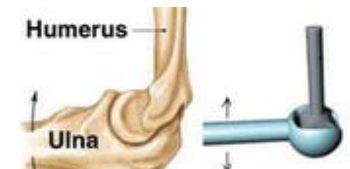
- Characterized by two bones that fit together in a manner similar to a rider in a saddle.
- Allows bending motion in several directions without sliding.
- Eg: carpal-metacarpal joint of the thumb.



(e) Saddle joint

Hinge Joint:

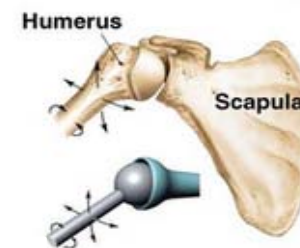
- Allows for stable flexion & extension without sliding or deviation.
- Eg: elbow joint between the humerus and ulna.



(b) Hinge joint

Ball and Socket Joint:

- Allow for stable movement in several directions without slippage.
- Allows bending in several directions without slipping.
- Creates a highly stable, strong joint.
- Eg: hip joint (femur-acetabulum), shoulder joint (humerus- glenoid cavity).



Ball-and-socket joint

Pivot Joint:

- Joint in which rotational motion occurs without gliding.
- Allows for turning motions without sideways displacement or bending.
- Eg: joint between atlas-axis, allows for most of our head's range of motion while maintaining the stability of head on neck.



(c) Pivot joint