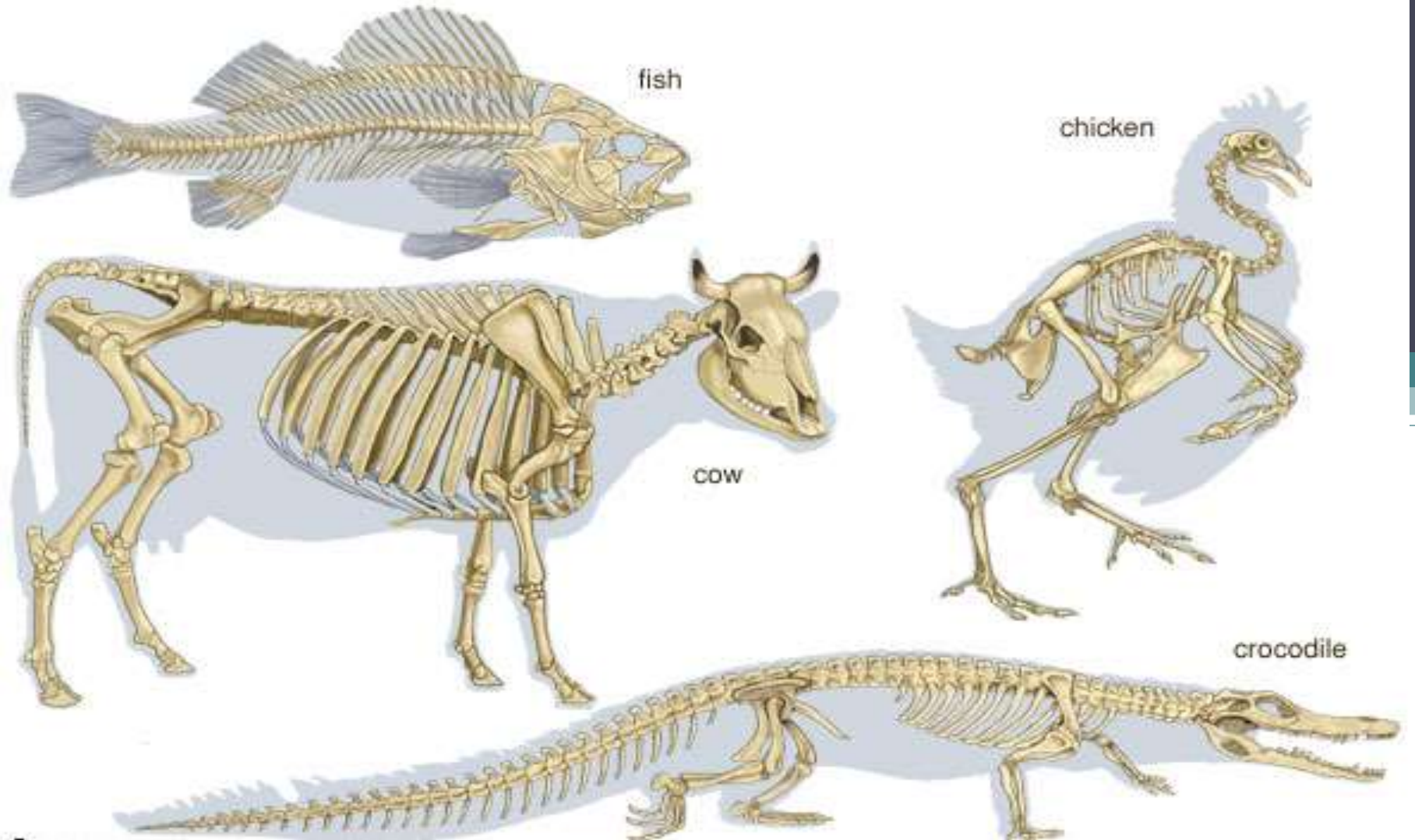


# ARTHROLOGY



# *Arthrology*

- **Branch** of anatomy concerned with joints.
- **Science** concerned with the study of anatomy, function, dysfunction and treatment of joints and articulations.
- **Joints or articulations** are structures formed by the union of two or more articular ends of bones or cartilages with the help of certain binding materials i.e., the ligaments.

# Classification of joints:

By their structure, joints can be classified several ways according to

- (1) The number of articulating bones
- (2) Structural classification
- (3) Functional classification

# Classification based on number of articulating bones

## Simple joint

- has only two articulating bones forming the joint



## Compound joint

- has three or more articulating bones.



# Functional/physiological classification of joints

- It indicates the degree of mobility in the joint.

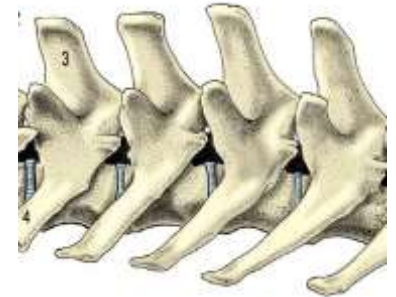
## Synarthrotic:

- Movements in these joints are absent or extremely limited.
- Examples: sutures in the cranium.



## Amphiarthrotic:

- There is slight movement in these joints.
- Examples: intervertebral articulation.
- **Inter-central articulation.**



## Diarthrotic:

- Also called synovial joints, these joints have considerable movement.
- They allow for one-, two-, or three-dimensional movement.
- **Inter-neural articulation (between articular process of vertebrae)**



# Structural classification

- Here joints can be classified by the medium holding the joint together.



# Fibrous joints or immovable joints

- **Fibrous tissue between bones holds the bones together.**
- **These are temporary joints where the uniting media is invaded by process of ossification, providing little or no movement .**
- **No joint capsule is present.**
- **According to details of formation, fibrous joints are classified as sutures, syndesmoses, Schindylesis or gomphoses.**

**Sutures** - found in skull, the borders of adjacent bones are united by fibrous tissue, the sutural ligament.

- a. **Sutura serrata** – edges are serrated like teeth of saw and inter-digitate with each other e.g., frontal suture.
- b. **Sutura squamosa** – in this articulation the edges are in the form of thin plates which overlap with each other to make a union, e.g., suture between parietal and temporal bone.
- c. **Sutura harmonia or plane suture** - articulations with plane or slightly roughened edges, e.g., nasal suture.



2. **Syndesmosis** - uniting media is white fibrous tissue, e.g., joints between bodies of **metacarpal** bones or attachments between costal cartilages.
3. **Schindylesis** - when a bone is fitted into a **groove** of another bone, e.g., Junction between vomar and sphenoid bone.
4. **Gomphosis** – articulation between roots of teeth in the alveolar sockets, where the peg like roots of teeth are implanted into the alveolar sockets.

# Cartilaginous – Amphiarthrodial joints

- Bones are united by cartilage.
- Fibrocartilage, hyaline cartilage or both hold the joint together.
- These joints only allow slight movement.
- Like fibrous joints, they lack a joint capsule.
- Two types of cartilaginous joints are present.

1. **Synchondroses:** The opposing bones are connected by hyaline cartilage E.g. **Sphenoido-occipital and chondrosternal articulation.**
2. **Symphyses:** These are the fibro-cartilaginous articulations between the symmetrical bones.
  - Also called **secondary cartilaginous joints** and persist throughout the life.
  - They permit certain amount of movement.
  - These articulations are generally placed at the longitudinal median plane of the body e.g., **Mandibular Symphysis and Pelvic symphysis.**

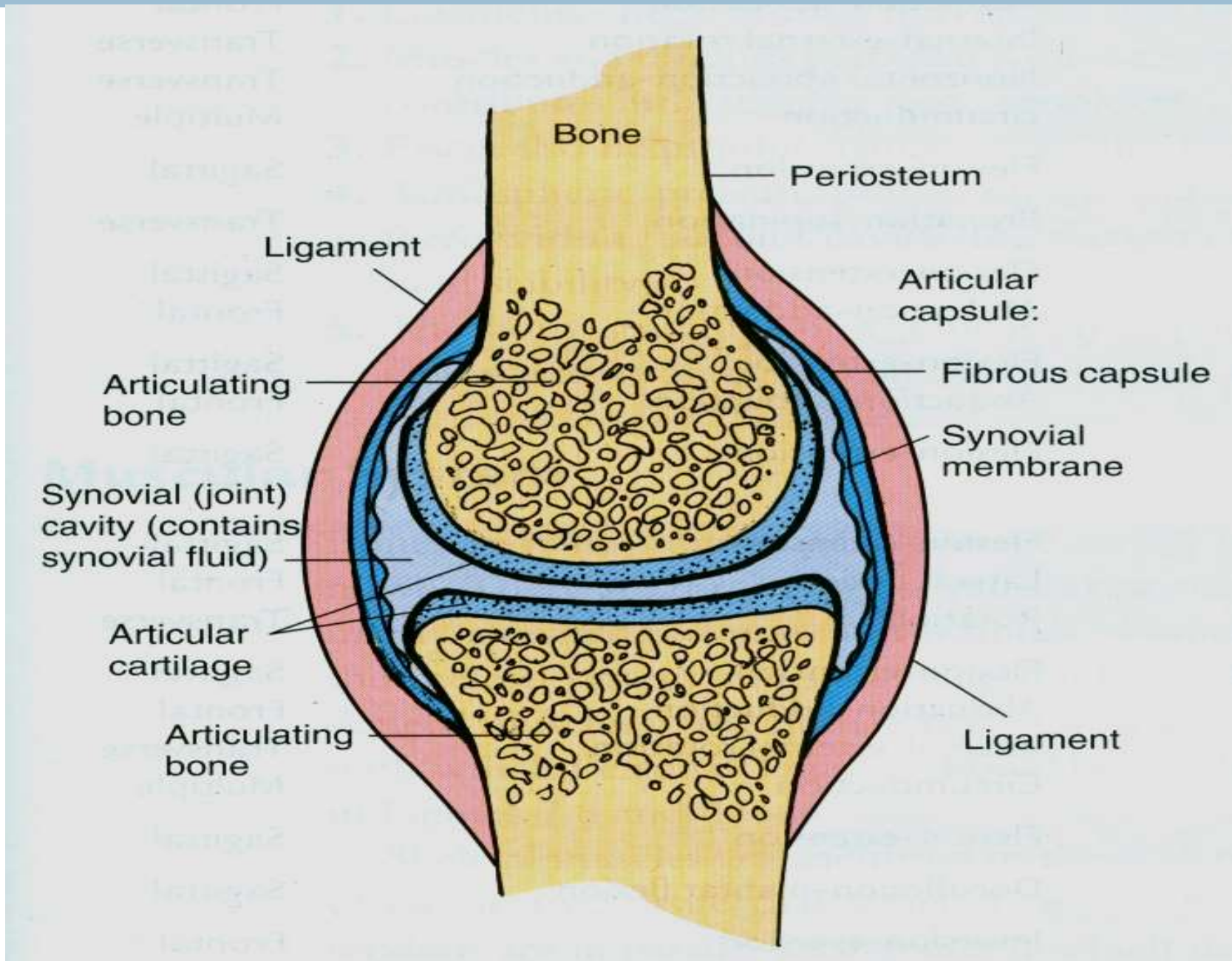
# *Synovial –Diarthrodial Joints*

Formed by *joint cavity*, a *synovial membrane* and the *joint capsule*

## **Articular cartilage**

- Usually **hyaline** in nature cover the articular ends of the bones
- Low friction lubricated surface
- Thicker in young
- Since cartilage is **devoid of nerves** and is **non vascular**, it is believed that this tissue derives its nutrition from vascular network of synovial membrane, synovial fluid and from blood vessels of underlying marrow spaces.

# *Synovial Joints continued...*



# *Functions of joint capsule*

1. It secretes synovial fluid providing nutrition to the articular cartilage.
2. Hyaluronic acid is liberated from it which maintains viscosity of the fluid.
3. It removes worn out cells and particles by phagocytosis.

# *Synovial Joints continued...*

## **Synovial bursa**

Sac like structure containing synovial fluid occurring at the site of friction between a tendon and a bone.

## **Synovial tendon sheath**

**Tubular bursa** surrounds a tendon where it runs in a **tunnel** and is subjected to friction on all sides.

Majority of these bursa communicate with the joint cavity.

## *Synovial Joints continued...*

### **Synovial fluid:**

- Lubricant fluid secreted by synovial membrane.
- Resembles the egg **albumin**, slightly **alkaline** but have **yellowish** tinge .
- Made up of albumin, mucin, salts, hyaluronic acid, water and a small mixed population of cells.



# *Blood and nerve supply*

## **Blood supply**

The **epiphysal vessels** enters the long bones through the attachment of the fibrous capsule.

## **Nerve supply**

Nerves supplying the nearby muscles also innervates the diarthroidal joint mostly.

**Hilton's law:** the nerves which supply a joint also furnish branches to the group of muscles regulating the movement of the joint.

# *Ligaments*

**Binding materials of the joints** (connects bone to bone)

Made up of closely packed bundles of **collagen** and are in the form of strong bands or membranes-

They are of following varieties:

**1. Joint capsule:**

**2. Collateral ligaments:** These are fibrous bands, situated on either side of the joint. They are generally attached to the lateral and medial aspects of the ends of bones outside joint capsule.

**3. Intra-articular ligaments:** connecting bands which remains inside the joint cavity and is covered by synovial membrane.

# *Ligaments continued...*

4. **Interosseous ligaments:** opposed surface of the bones are connected by these ligaments.
5. **Annular ligaments:** these in the form of rings or tunnels, over or near the joints for passage and protection of tendons.

## **Factors maintaining the stability of joints**

- a. Bony configuration
- b. Ligaments
- c. Muscles

# *Movements of synovial joints*

1. **Translation or Gliding** – one surface slides over another, e.g., femoropatellar articulation
2. **Angular movements** – movement during which the angle between two adjoining bones change
  - a. **Flexion** – angle **reduces** and the segments come close together
  - b. **Extension** – angle **increases** or the segment straightens
  - c. **Abduction** – **outward** movement of one segment from the central axis
  - d. **Adduction** – **inward** movement of bones towards the central axis

# *Movements of synovial joints*

- 3. Circumduction** - distal end of a bone **circumscribes** a **conical** space, e.g., **shoulder** or **hip** joint
- 4. Rotation** - one bone rotates around the **longitudinal axis** of other bone, e.g., atlanto-axial articulation
- 5. Pronation and Supination** - refer to the position and movement of forearm and manus,

In supination the volar (palmar in men) surface of the manus is turned forward(outward) and in pronation, it faces backwards (downwards).

# *Classification of synovial/diarthrodial joints*

**On the basis of axis of movement the synovial joints are classified as follows**

**1-Uniaxial** – permit movement in one plane only, e.g.,

**(i) Hinge/Ginglymus** –occipito-atlantal –(‘Yes’ joint) and elbow joint,

**(ii) Pivot/Trochoid**-atlanto-axial-joint-(‘No’-joint)

**(iii) Condylod joints**-temporomandibular joint.

**2-Biaxial** – these joints permit movement in two planes at right angles, e.g., extension-flexion and abduction –adduction.

**(i) Ellipsoid-** convex male surface received by concave surface eg carpal joint.(in some books yes joint is considered as biaxial joint)

**(ii) Sellar/Saddle-**opposing surface are saddle shaped interphalangeal articulation., carpo-metacarpal

**3-Multi-axial or Ball and socket joints/Enanthrosis/Universal/True joint**–a round head is received by a cup like concavity, permitting angular, rotation and circum-duction movements e.g., Hip joint, Shoulder joint.

Thank You

SACROILIAC ARTICULATION IS TYPE OF  
DIARTHRODIAL JOINT