Arthrology

- It is the science that deals with the joints
- A synarthrosis is a continuous structure bridging two adjacent bones. which builds either
  1. Fibrous union
  2. Fibrous joint.
  3. Cartilaginous union

- A true or synovial joint is characterized by a joint gap and a joint cavity filled with joint fluid (synovia).

Synarthroses

1. **Fibrous unions can be subdivided into three types:**
   A. Connective tissue joints (syndesmoses), e.g. the attachment of the dew claws to the metapodium in the ox,
   B. Sutures, which unite, for example, the bones of the skull and include the:
      a. serrate suture.
      b. flat suture.
      c. Squamous suture.
      d. foliate suture.
   C. Impactions (gomphoses), e.g. the anchoring of the teeth roots in the dental alveoli by dense connective tissue, in this case the periodontal membrane.

2. **Cartilaginous unions are:**
   A. Hyaline cartilage unions (synchondroses), e.g. between base of the skull and the hyoid bone
   B. Fibrocartilage unions (symphyses), e.g. the pelvic symphysis.

3. **A synarthrose in which bone unites two structures referred to as a synostosis**. A good example of a synostosis is the ossified union between the radius and the ulna in the horse.

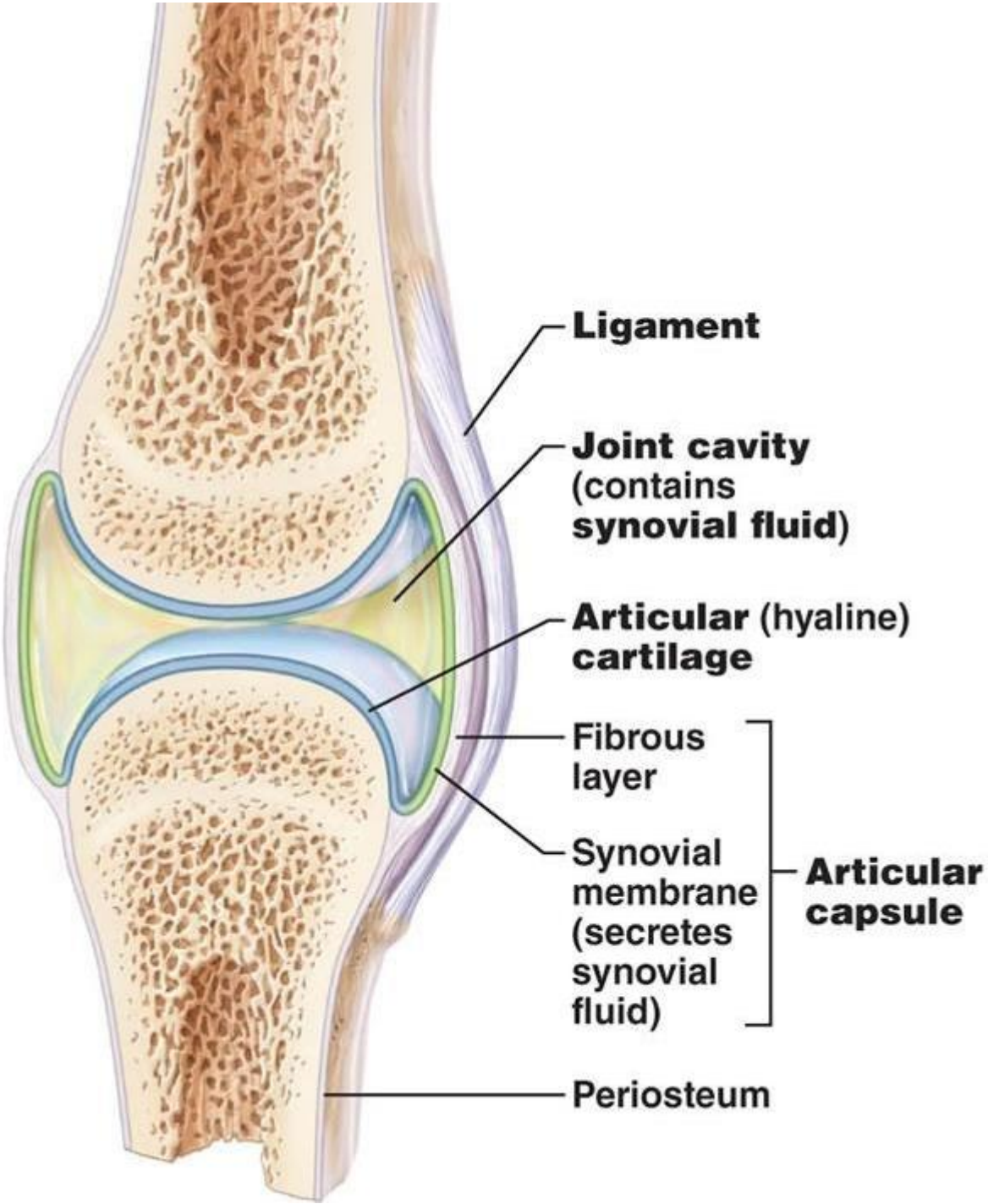
True joints (articulationes synoviales)

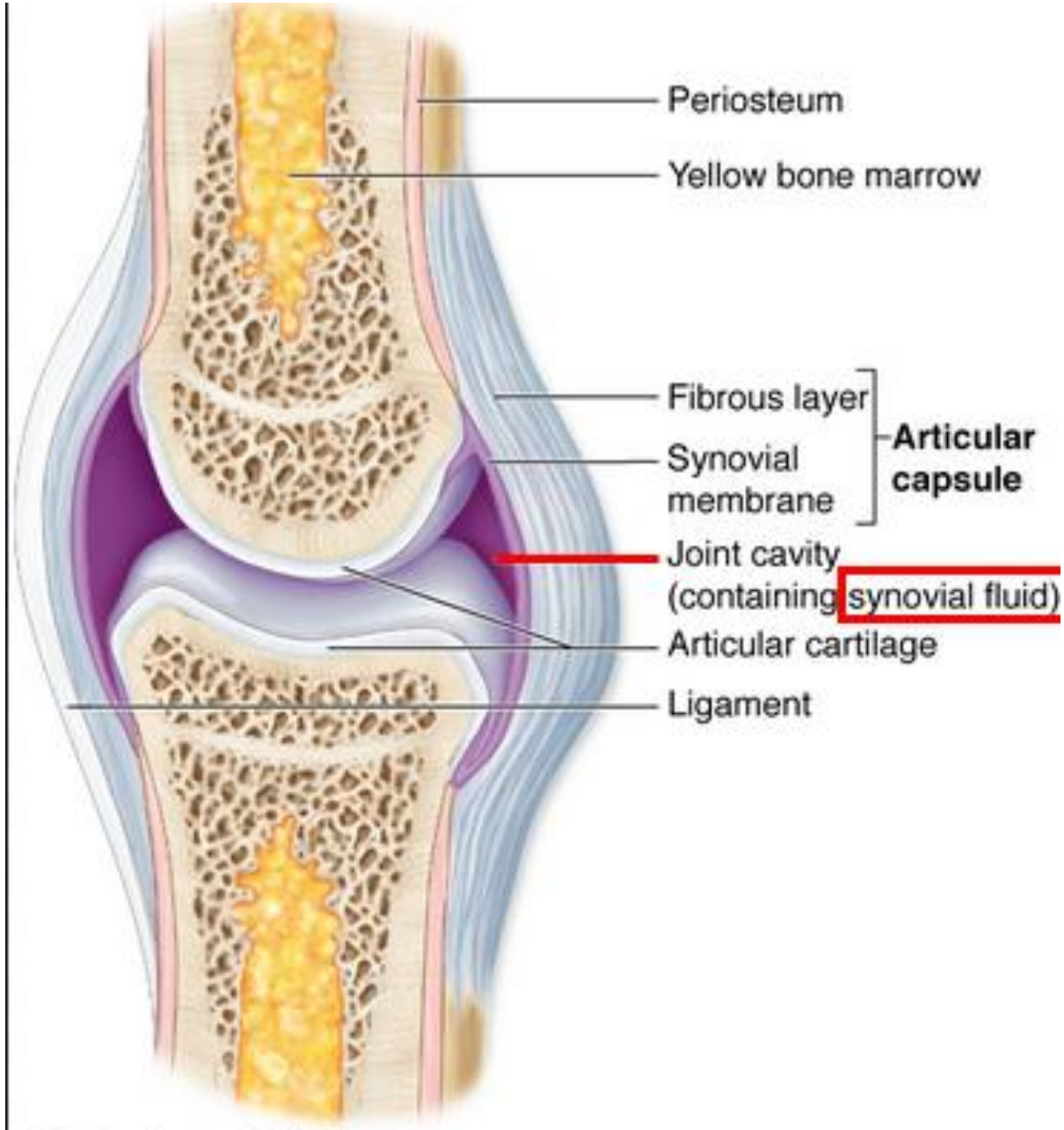
Joints share common structural and functional features:

1. **The joint capsule** is comprised of two layers:
   a. The outer fibrous layer (stratum fibrosum)
   b. The inner layer (stratum synovial) lines the joint cavity

* An abundance of sensory nerve fibers innervate the stratum fibrosum, which explains the pain experienced after injury to the capsule itself or through stretching of the capsule due to swelling within the joint.

2. **The joint cavity**
3. **The synovial fluid**, whose primary purpose is to lubricate the joint, it is excreted by the synovial membrane
4. **The joint cartilage**, which covers the ends of the two or more bones forming the joint. The articular cartilage can be divided into the:
   a. superficial zone.
   b. intermediate zone.
   c. radial zone.
   d. calcified zone.

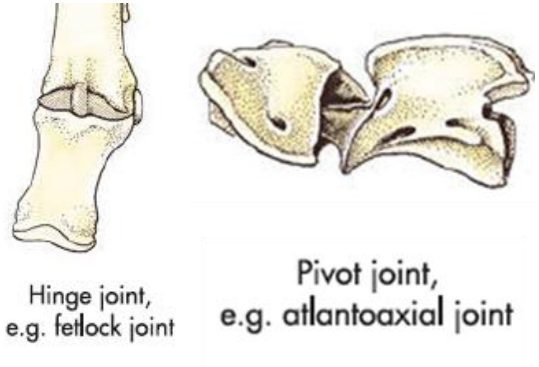

Ligament
Joint cavity (contains synovial fluid)
Articular (hyaline) cartilage
Fibrous layer
Synovial membrane (secretes synovial fluid)
Articular capsule
Periosteum



a Typical synovial joint

Classification of joint depending on

1. **The Number of bones forming the joint:**
   - **A. Simple joints**, involving only two bones (e.g. shoulder joint)
   - **B. Composite joints**, involving more than two bones (e.g. the wrist joint).
2. **Type of movement allowed by the joint:**
   - **A. Uniaxial joints** with:
     - **a. Hinge joint**: the joint axis is perpendicular to the long axis of the bones (e.g. elbow or tibiotarsal joint).
     - **b. Pivot joint:** the joint axis is parallel to the long axis of the bones (e.g. atlanto-axial joint between the 1st and 2nd cervical vertebrae)



   - **B. Biaxial joints with:**
     - **a. Saddle joint:** e.g. between the interphalangeal joints.
     - **b. Ellipsoidal joint:** e.g. atlanto-occipital joint between the occipital bone and the1st cervical vertebra.
   - **C. Multiaxial joints:** spheroidal or ball-and-socket joint: e.g. shoulder or hip joint.
   - **D. Tight joints:** e.g. sacroiliac joint.

3. Form of the articular surfaces:

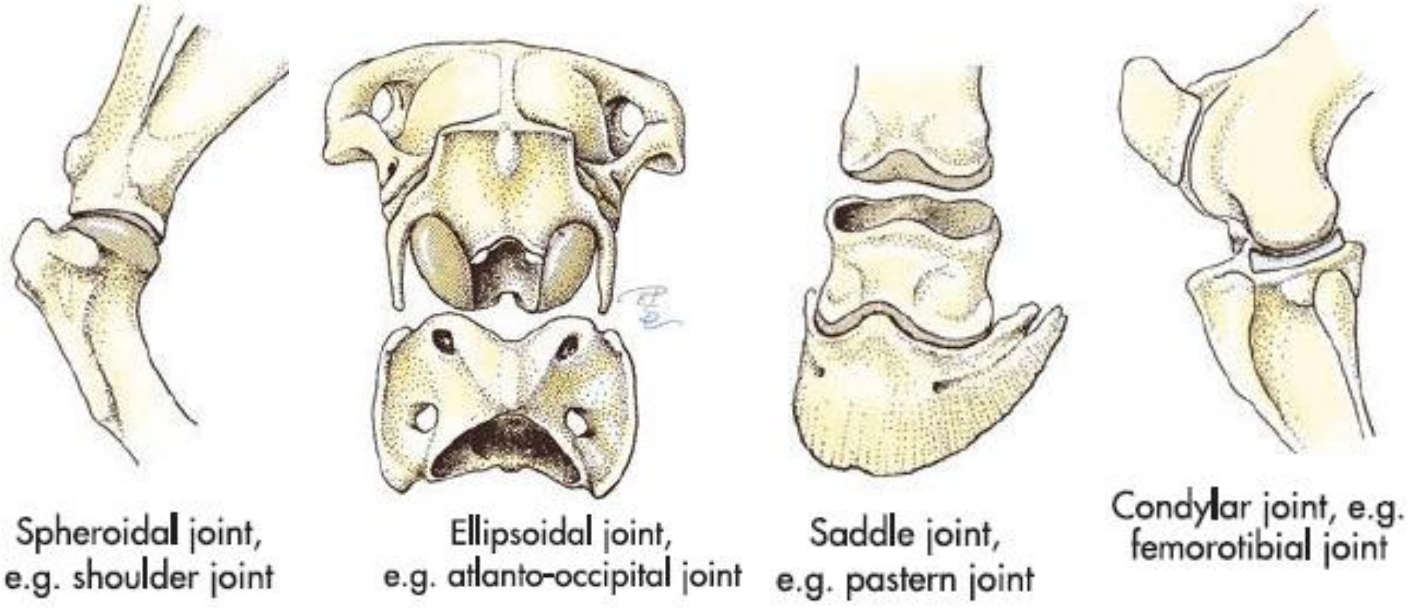
A. Spheroidal or ball-and-socket joint: e.g. shoulder joint or hip joint,

B. Cotyloid joint: a spheroidal joint e.g. the aviary hip joint,

C. Ellipsoidal joint: e.g. between the occipital bone and the 1st cervical vertebra,

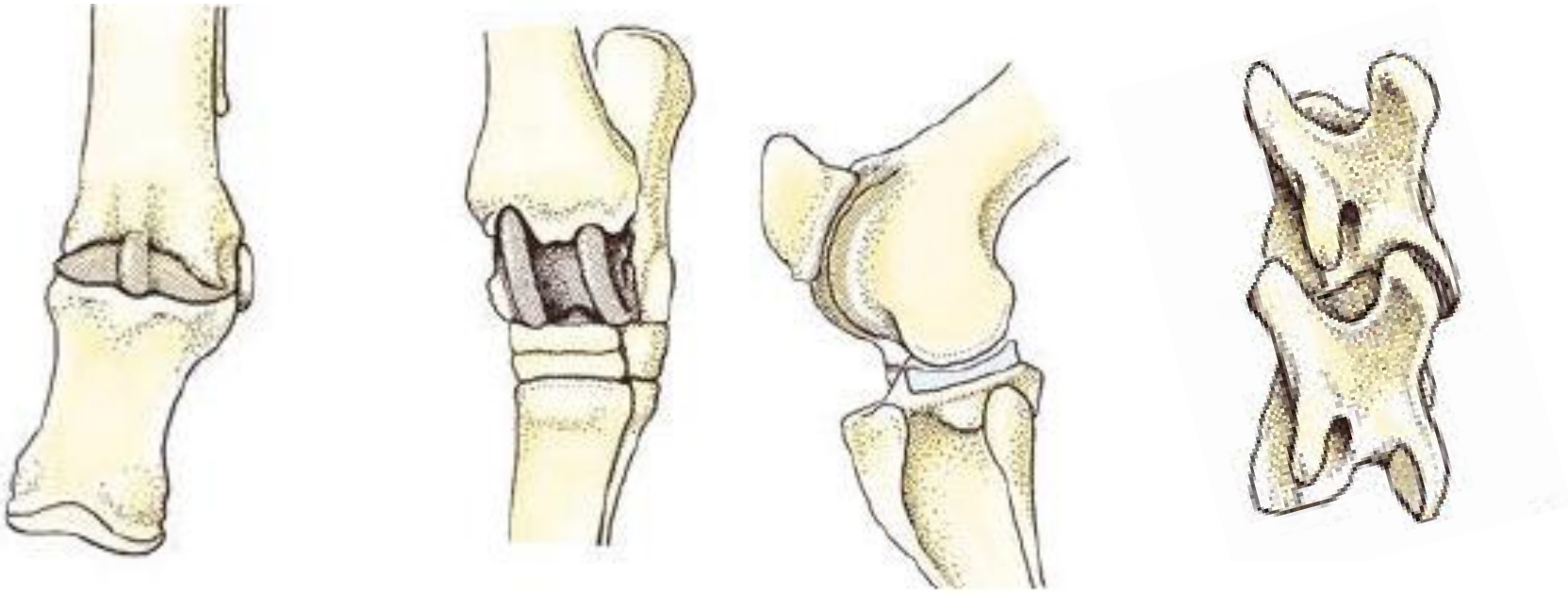
D. Saddle joint: e.g. the interphalangeal joints.

E. Condylar joint: e.g. the femorotibial joint.



4. Joints are classified according to their functional characteristics:

A. Hinge joint: e.g. fetlock joint.
B. Cochlear joint: e.g. hock joint of the horse.
C. Spring or snap joint: e.g. the elbow joint of the horse.
D. Sledge or gliding joint: e.g. femoro-patellar joint.
E. Spiral joint: e.g. the stifle joint of the horse.
F. Plane joints: e.g. the joints between the articular processes of the vertebrae.
G. Incongruent joints: e.g. femorotibial joint or in the temporomandibular joint.



Hinge joint, e.g. fetlock joint

Cochlear joint, e.g. tarsal joint

Sledge joint, e.g. femoropatellar joint

Plane joint, e.g. intervertebral joints