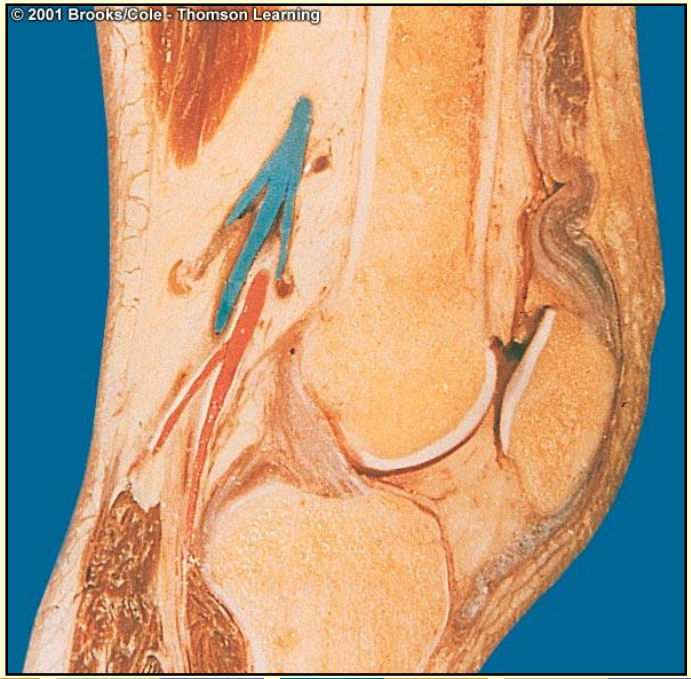
Articulations (Joints)

Can’t We Just All Keep it Together

Joints

With one exception (the hyoid bone), every bone in the body is connected to or forms a joint with at least one other bone.

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Functions of Joints (2)

1. they **hold the skeletal bones together** and
2. they **allow the rigid skeleton some flexibility** so that gross movements can occur

Classification

- You can classify joints two ways; one based on their function, the other their structure.
- They may be more or less freely moveable, or fixed, allowing no movement whatsoever between the bones they join.

Based on Function

1. **immovable joints** (= synarthroses: *arthrose=joint, syn=together - bone stuck together*),
2. **slightly movable joints** (= amphiarthroses: *arthrose=joint, amphi=both - in between immovable and freely movable*), and…

Based on Function

3. **freely movable joints** (= diarthroses: *arthrose=joint, dia=apart - bone apart, can move easily*).

You can also classify by structure…

Based on Structure

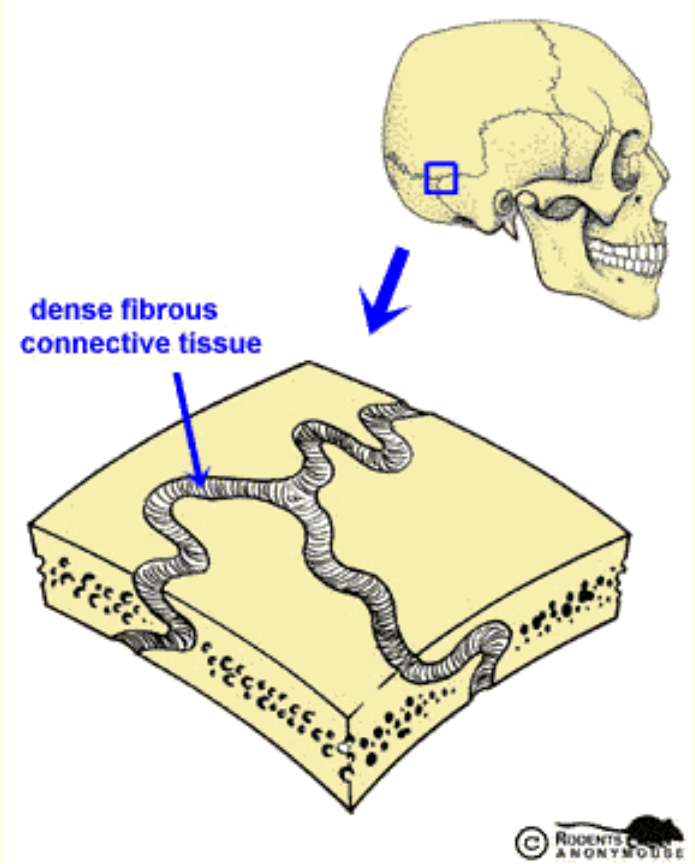
1. **fibrous joints** (joints held together by fibrous connective tissue and with no joint cavity),
2. **cartilaginous joints** (held together by cartilage, lacking a joint cavity)
3. **synovial joints** (in which the joint contains a synovial cavity).

FIBROUS JOINTS

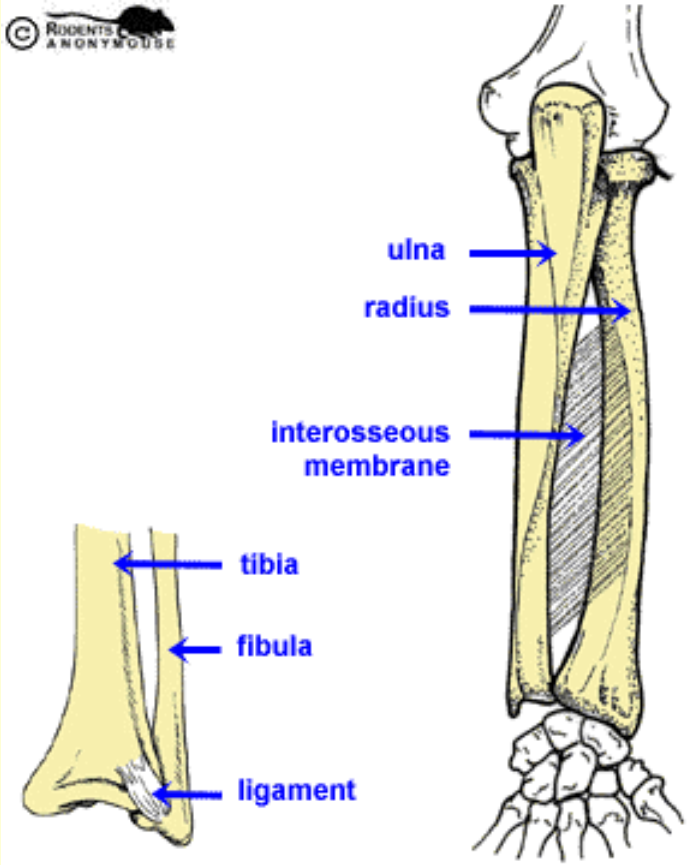
- In fibrous joints **the bones are united by dense connective tissue.**
- **There is NO JOINT CAVITY.**
- **most of the fibrous joints are immovable - a few are slighly movable.**
- **There are three subtypes of fibrous joints:**

Suture Joint (#1)

- Bones are held together by a **thin layer of dense fibrous tissue**
- This type of joint occurs **only in the skull**: cranial sutures.



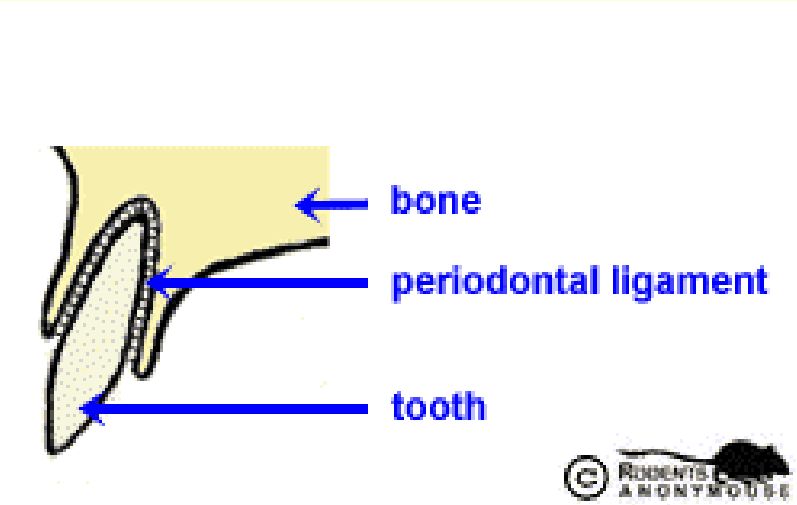
SYNDESMOSES (#2)



- Bones are held together by a **cord or sheet of dense fibrous connective tissue**.
- The **connecting fibers** holding bones together are **long**.

GOMPHOSES (#3)

- It is a peg-in-socket fibrous joint.
- The only examples are the articulations of teeth with the mandible and maxillae.

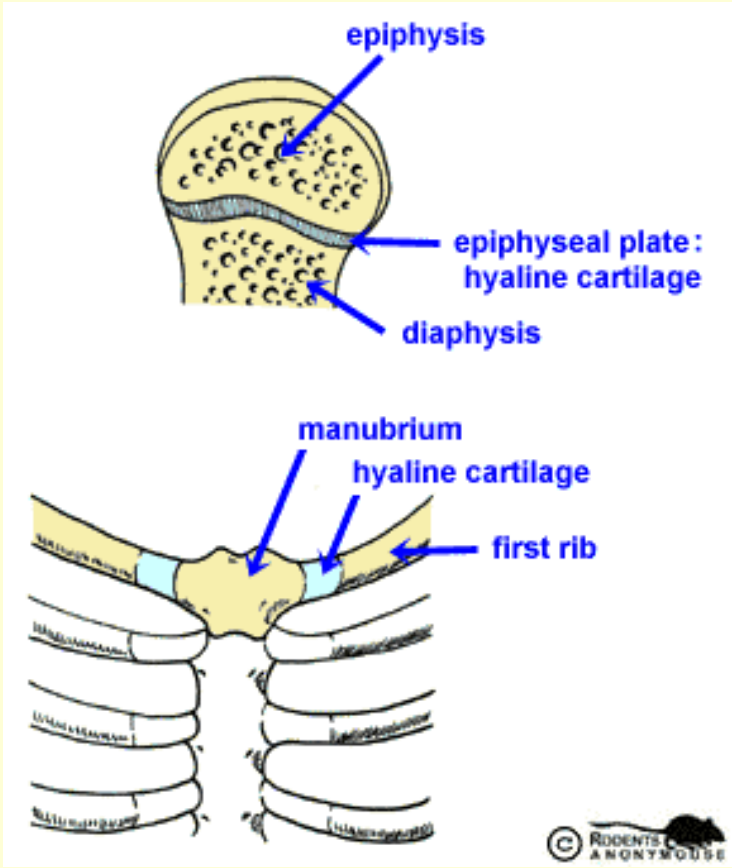


CARTILAGINOUS JOINTS

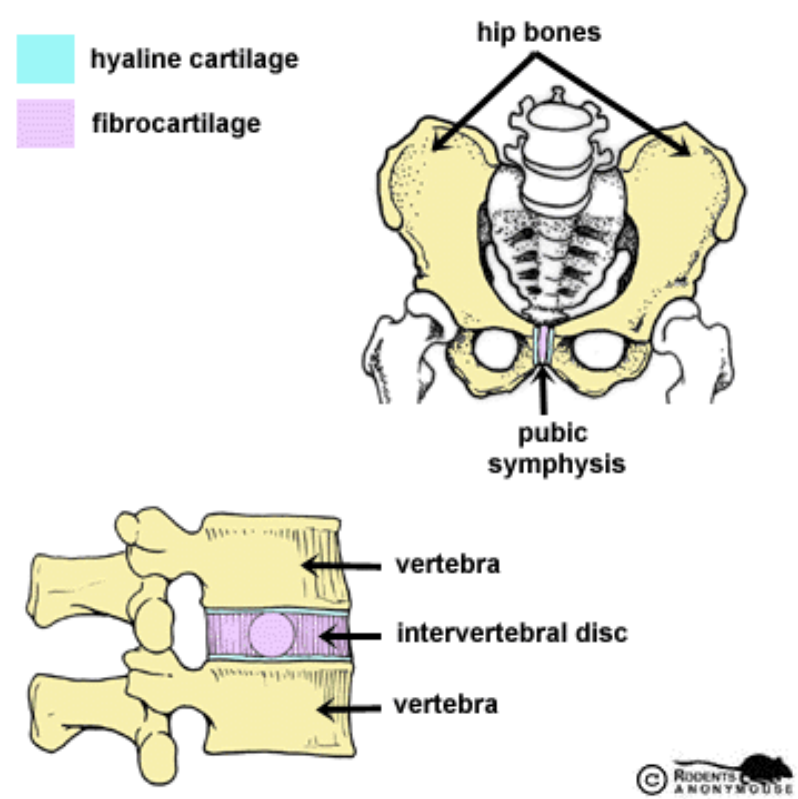
- In cartilaginous joints **the bones are united with each other by cartilage**. Again, there is **NO JOINT CAVITY**.
- There are **two subtypes** of cartilaginous joints:

PRIMARY CARTILAGENOUS JOINTS (#1)

- Hyaline cartilage only – no movement.
  - An example is the cartilaginous epiphyseal plate which separates the epiphysis from the diaphysis in long bones.
    - These joints are immoveable (synarthroses) and are obliterated by bone in the adult.
      - A second example is the **joint between the first rib and the sternum**.



SECONDARY CARTILAGENOUS JOINTS (#2)



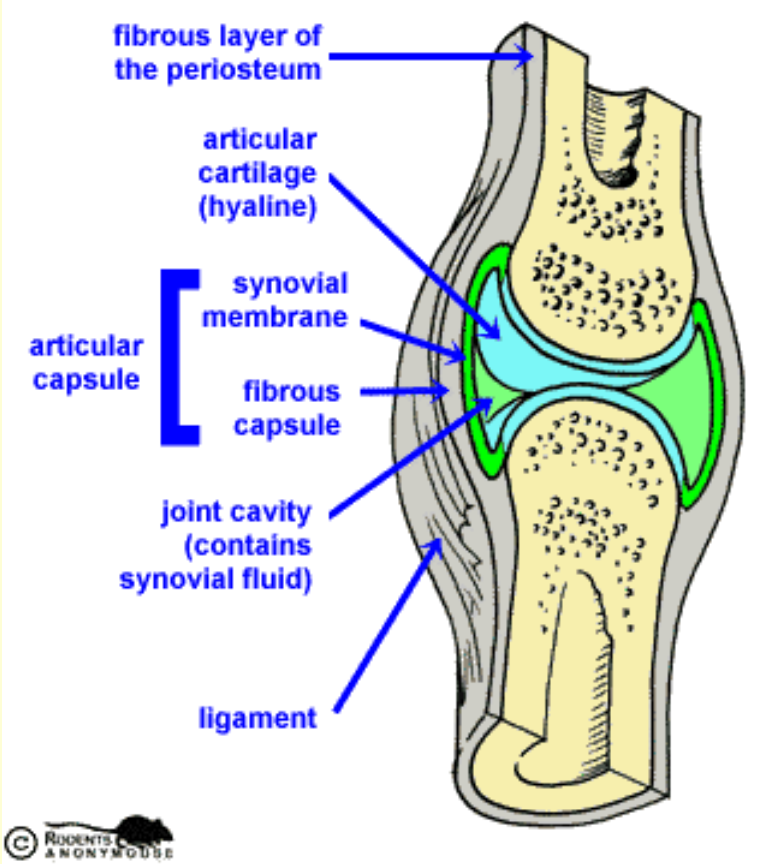
- **Limited movement is permitted** at such joints, depending on the thickness of the fibrocartilage pad which can be compressed or stretched.
- Two important examples are the **pubic symphysis** and the **intervertebral discs**.

SYNOVIAL JOINTS

- The **majority of articulations between bones** are **synovial joints**.
- They are characterized by the **PRESENCE OF** a closed space or **CAVITY** between the bones: the **joint cavity** (= **synovial cavity**).

SYNOVIAL JOINTS

- The **articulating surfaces** of the bones are covered by a **thin layer** of very smooth **hyaline cartilage** (**articular cartilage**) and **lubricated** by a special fluid, the **synovial fluid** secreted by the **synovial membrane** which lines the cavity. This fluid is composed of mucopolysaccharides, is **highly viscous** and slippery and **reduces friction**.



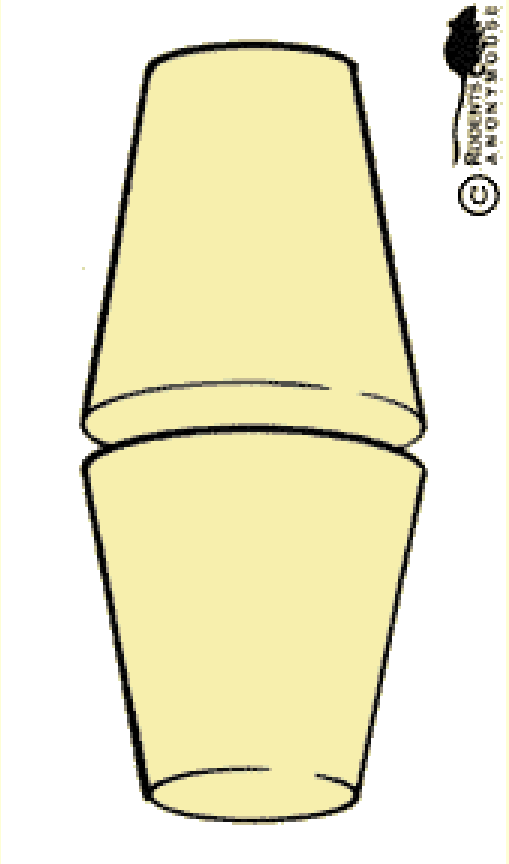
SYNOVIAL JOINTS

- Synovial joints are reinforced by a number of **ligaments**. Ligaments are **bands of dense regular connective tissue proper** that connect **bones to other bones**.
- **In some joints such as the knee, complete or partial discs (menisci) of fibrocartilage occur within the synovial cavity**.
- Types of Synovial Joints:

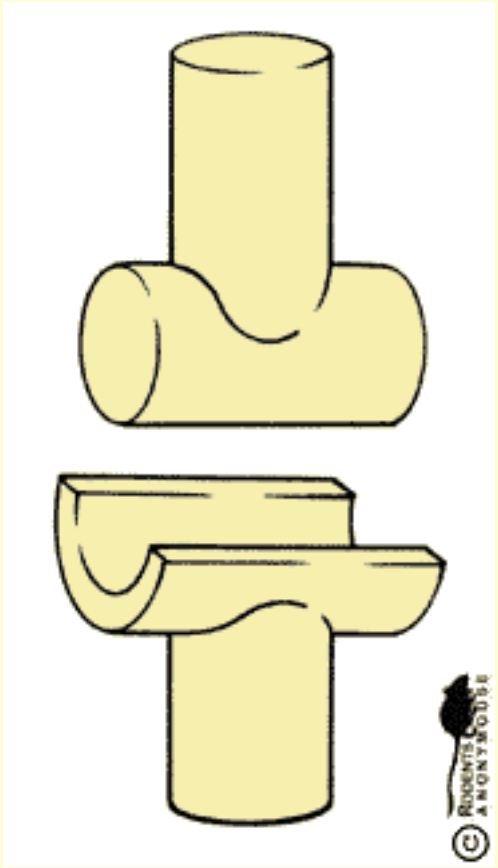
Plane (= gliding).

- Opposite bone surfaces are flat or slightly curved.
- **Only sliding motion in all directions are allowed**.

- Find an example of these joints.



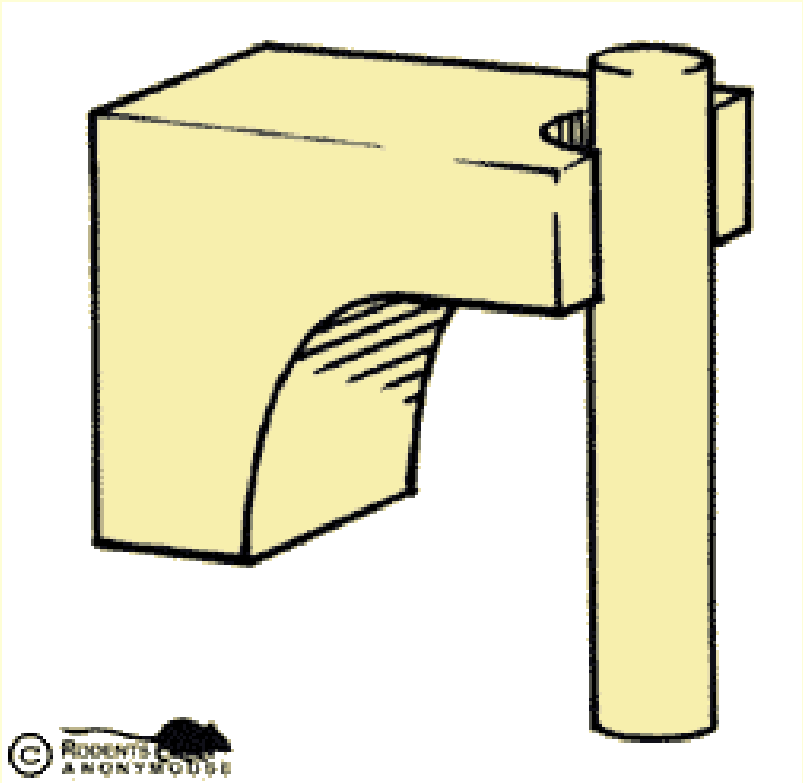
Hinge



- Convex surface of one bone fits smoothly into concave surface of the second bone
- The movements allowed are similar to those allowed by a mechanical door hinge
- Find an example of these joints.

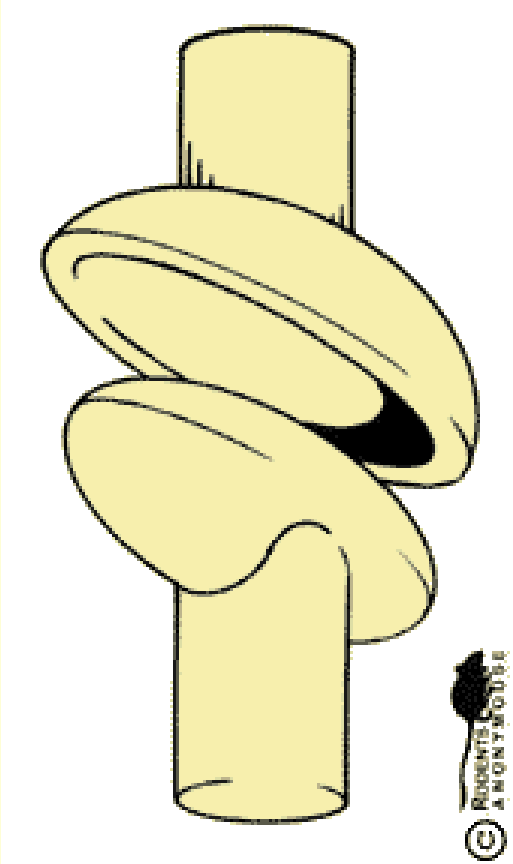
Pivot

- A rounded, pinted or conical surface of one bone is inserted into a ring made partly of another bone and partly of a ligament
- The only movement allowed is the **rotation** of one bone around its own axis

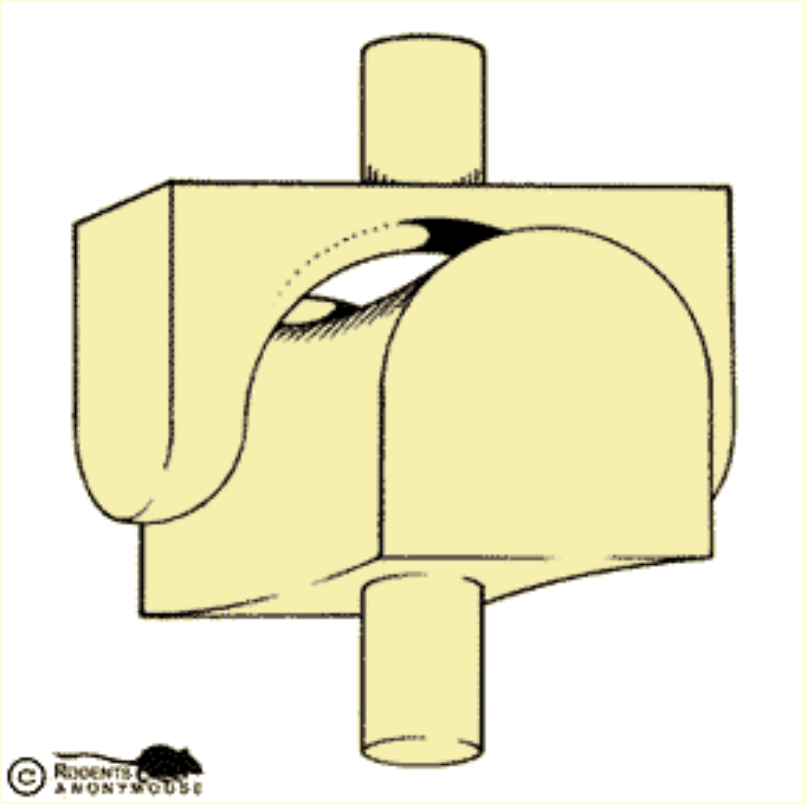


Ellipsoidal (= condyloid)

- Oval-shaped surface fits into an oval-shaped cavity (ellipse means oval).
- The movements allowed are **flexion/extension**, **adduction/abduction** and **circumduction** but NO ROTATION

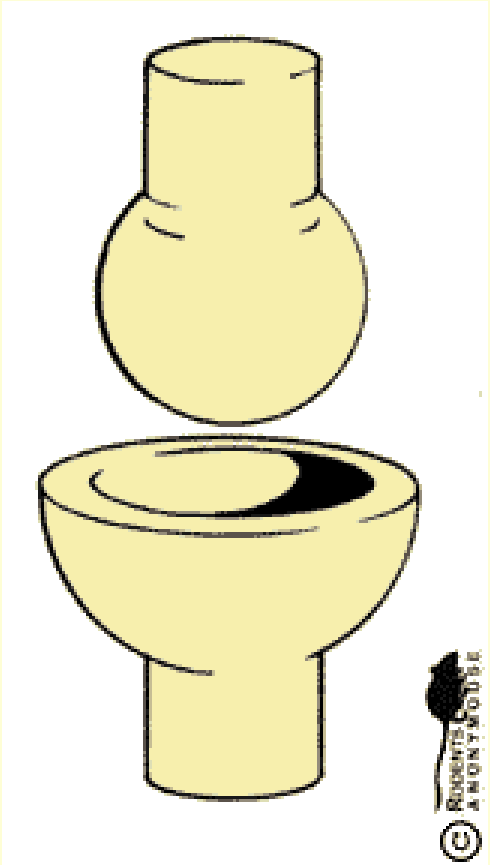


Saddle



- First bone's articular surface is concave in one direction and convex in the other while the second bone is just the opposite (or if you prefer, one bone is shaped like a saddle, and the other is shaped like its rider)
  - NO ROTATION in this joint

Ball and Socket

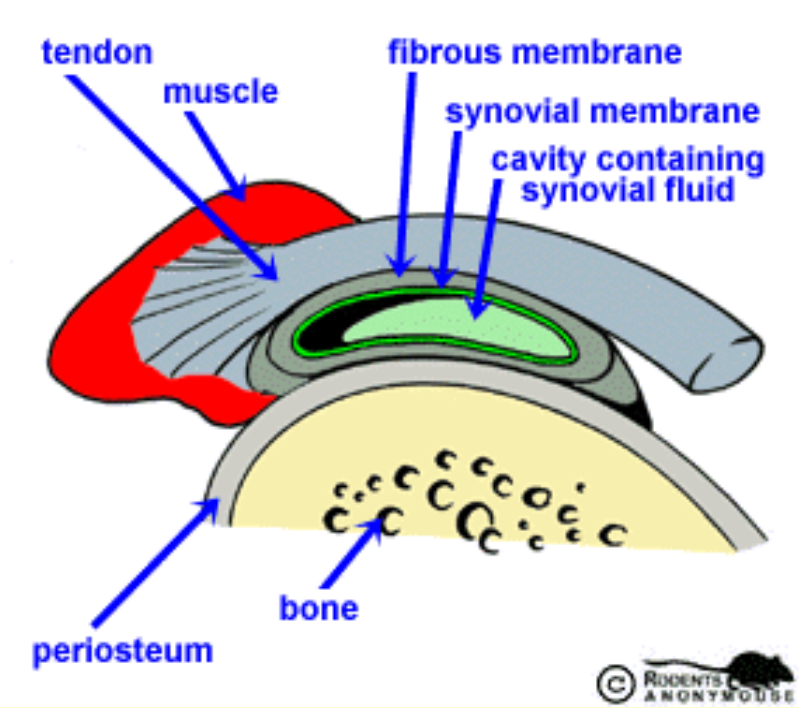


- Ball-shaped head fits into a cup-shaped depression
- These joints are the most freely moving of all synovial joints

Bursa

- **Bursae** (singular = bursa) are closed, partially collapsed **balloon** containing **synovial fluid**
- They are found in the **vicinity of joints** where movement between two adjacent tissues might otherwise result in excessive friction

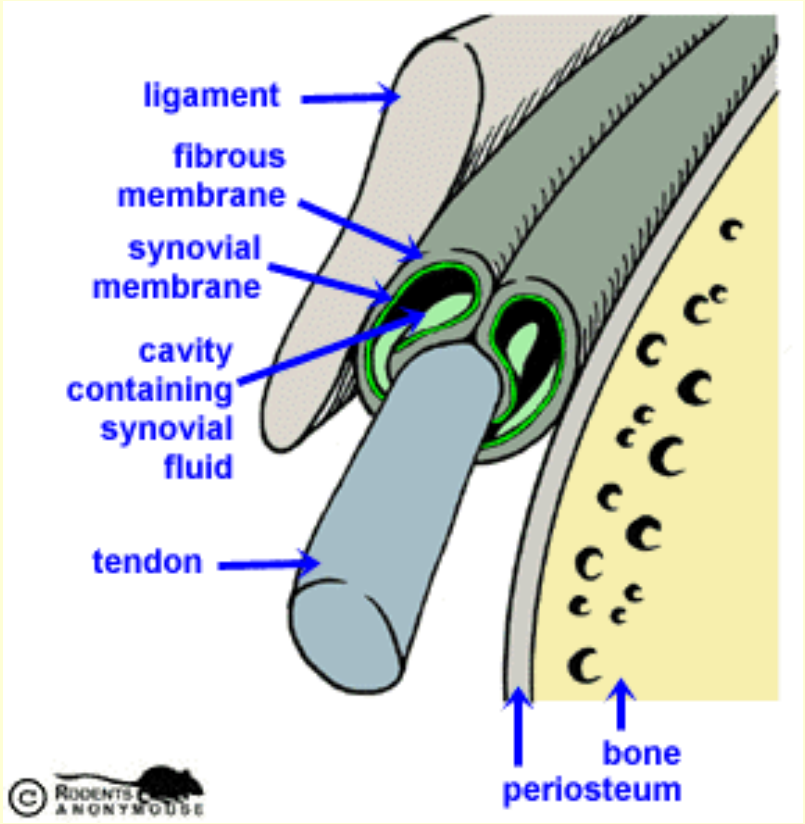
Bursae (continued)



- They are located between any two of bone, tendon, muscle or skin and they prevent these organs to rub against each other
- They serve to **reduce friction**

Tendon Sheaths

- **Tendon sheaths** are **similar to bursae**, but differ in shape
- They look like **sausage-shaped ballons** that **wrap around long tendons** subjected to friction



Credit to:

- This lecture modified from Al's Online Tutorial
- Check out his web site:

http://www.science.ubc.ca/~biomania/tutorial/tutoutln.htm