# Anatomy Lab:
# Lower Extremity

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# Goals

- Observe scientifically the shape, color, and properties of muscle, skin, ligament, tendons and cartilage tissue
- Understand how bone, tendon, and muscle create the structural framework of movement
- Understand the physics and implications of soft tissue injury of the lower extremity

# Poultry/People similarities

- Bone Structure:
  - Upper Leg - thigh - femur
  - Lower Leg – tibia & fibula
- Muscles
- Fat
- Tendons
- Ligaments

# Poultry/People differences

- Size (of course)
- Fibula in the chicken bone is much smaller in relation to the tibia than the human
- Red Marrow in the shaft of the chicken is replaced by yellow marrow in the adult human

# Come get your “lab specimen”

Make sure you receive:

- Your chicken quarter
- Scissors
- A straight-edge razor
- A pair of gloves

# A look at the Chicken Leg

- Feel the skin (epithelial tissue)

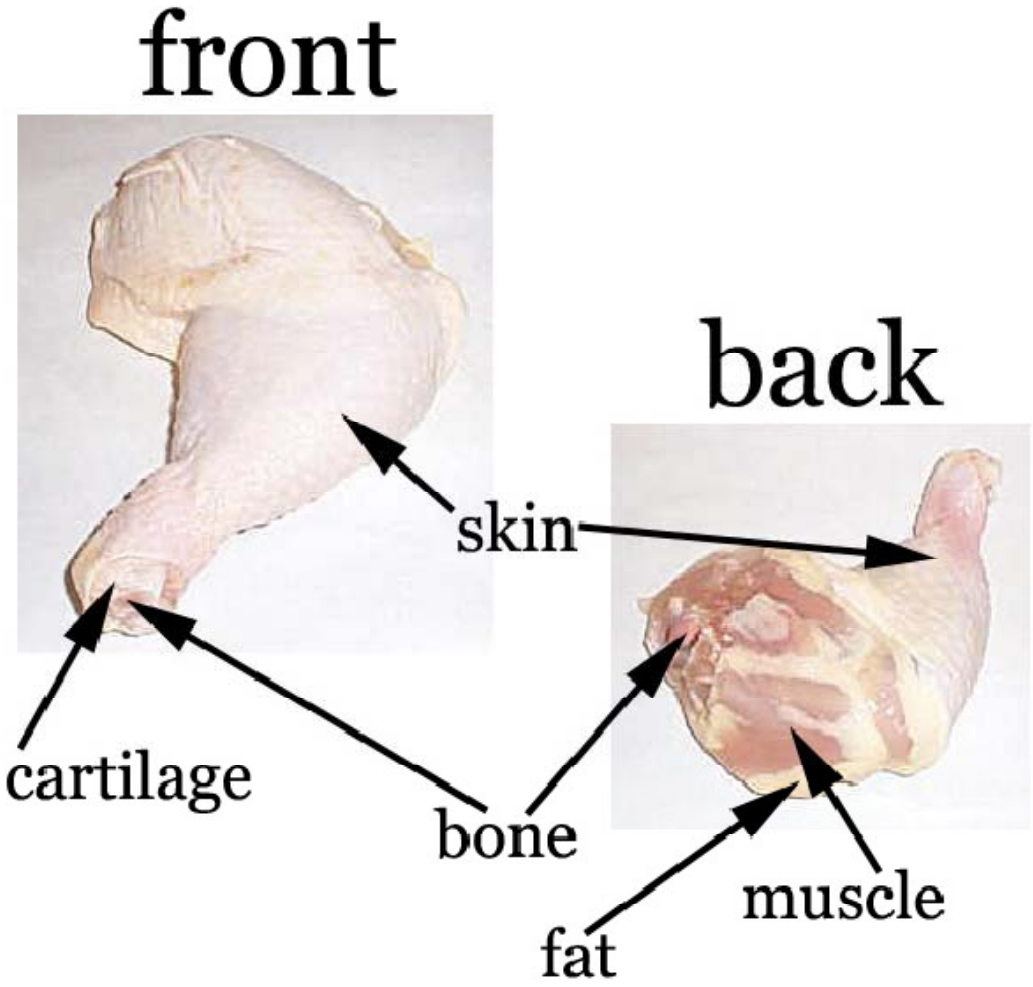
- Do you see the follicles where the feathers were attached to the skin?

# A look at the Chicken Leg

Turn your chicken over and look for:

- Muscle
- Fat
- Tendons
- Cartilage

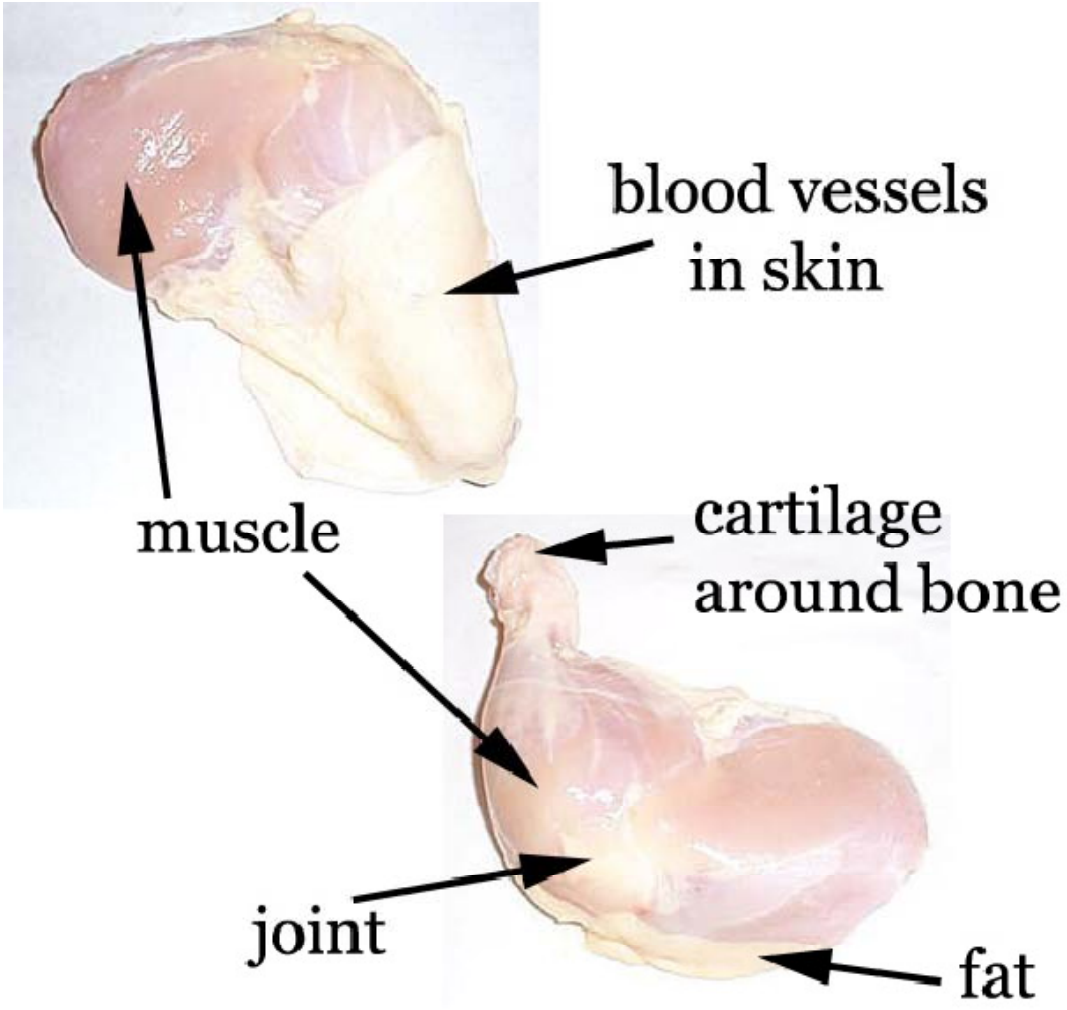
# A look at the Chicken Leg



# Remove the skin

- Carefully! It will be adherent in some places.
- Do not disturb the underlying tissue
- Pull the skin of the thigh back to show the underside of the skin.
- Notice the blood vessels in the skin.
- Identify:
  - Muscle (meat)
  - Fat (yellow-white material found under the skin)
  - Cartilage (pearly white over bones)

# Remove the skin



# Identify the fascia

- Identify fascia
  - Shiny lining covering the muscle
  - Tough connective tissue

- Once you push through the fascia, you will be able to easily separate muscle groups

# Fascia disorders & treatments

- Myofascial Pain Syndrome – Pain of the fascia surrounding and separating muscle tissue

- Compartmental Syndrome/Acute Compartment Syndrom (ACS)
  - Pressure builds up within one of the fascial compartments
  - Rest, anti-inflammatories, elevation of limb
  - Subcutaneous fasciotomy or open fasciectomy

# Isolate and separate muscles

# Muscle disorders & treatments

- Strains
  - Muscle or tendon is stretched or torn.
  - Typically happens when one muscle group is much stronger than its opposing muscle group (quadriceps/hamstring)

- Whiplash
  - Caused from sudden extension and flexion

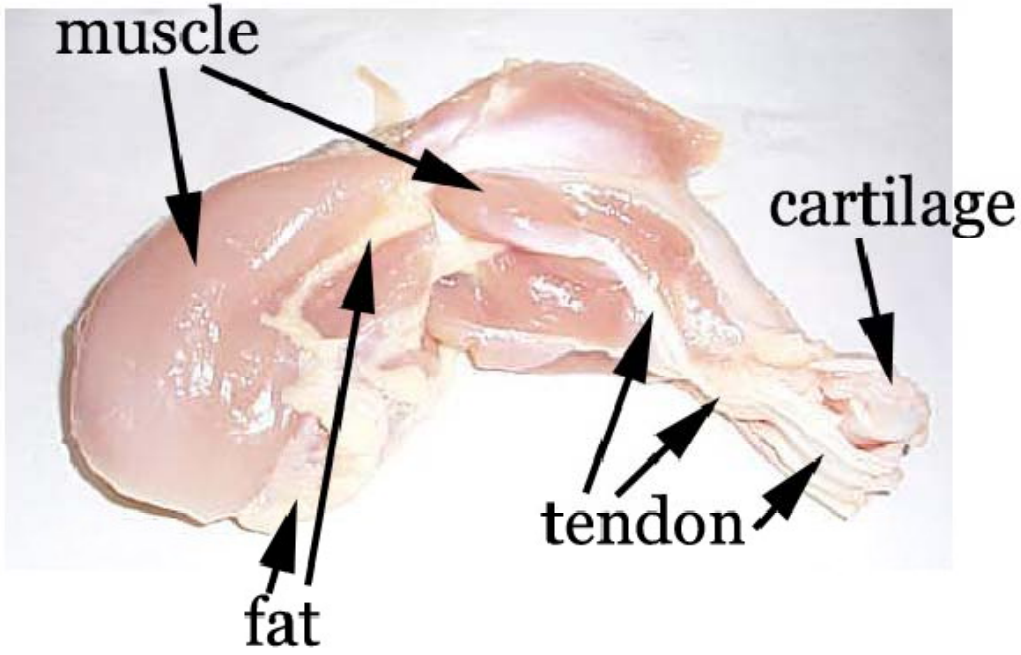
# Locate the tendon

- Strong white cord
- Hold muscle to bone

- Gently pull away muscle from the bone and look for the tendon which connects the muscle to the bone.

- What are the physical differences where the tendon attaches to the bone and where it attaches to the muscle?

# Locate and separate muscles



# Tendon disorders & treatments

- Achilles Tendonitis
  - Rest, Isolation, Compression, Elevation (RICE)
  - Surgery in extreme cases
- Tenosynovitis
  - Inflammation of the protective covering around the tendon (tendon sheath)
- Achilles tendon tear or rupture
- Lengthening & shortening of the tendons

# Locate the ligament

- Attach bone to bone
- More difficult to find than a tendon

- Cut the across the “ankle” of the chicken drumstick.
- Gently pull away muscle from the bone around the joint and look for a ligament which connects the bone to the bone. (Peel it like a banana)

# Locate the ligaments & cartilage

- Cut away the muscle over the joint.
- Make cuts parallel to the bones so you do not cut into the capsule over the joint.
- Remove as much of the pink  muscle tissue as possible so you can see the shiny white of the ligaments and cartilage around the joint.

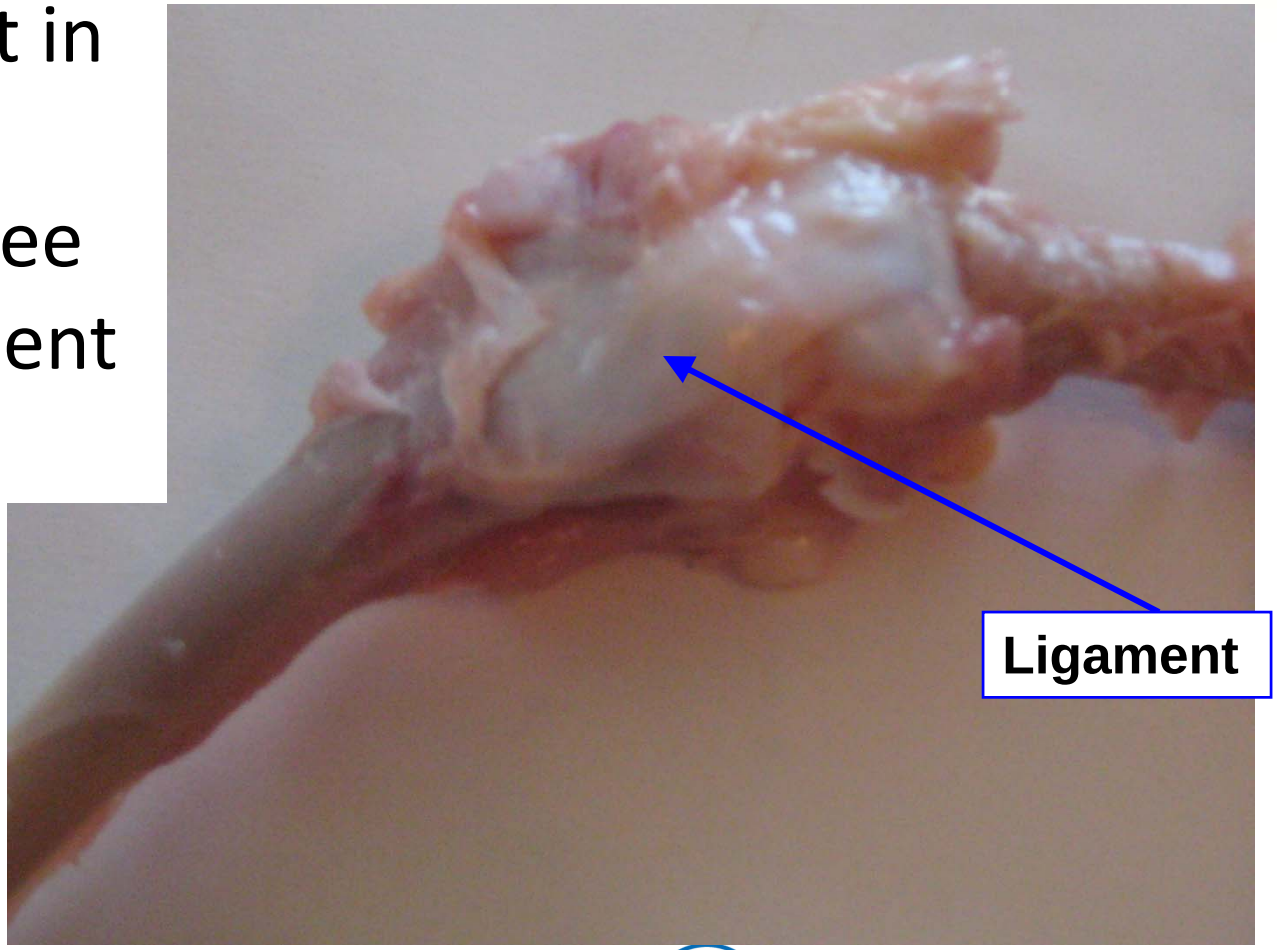
# Locate the ligaments & cartilage

- Locate one white band of ligament on each side of the joint (these exterior ligaments hold the bones together)

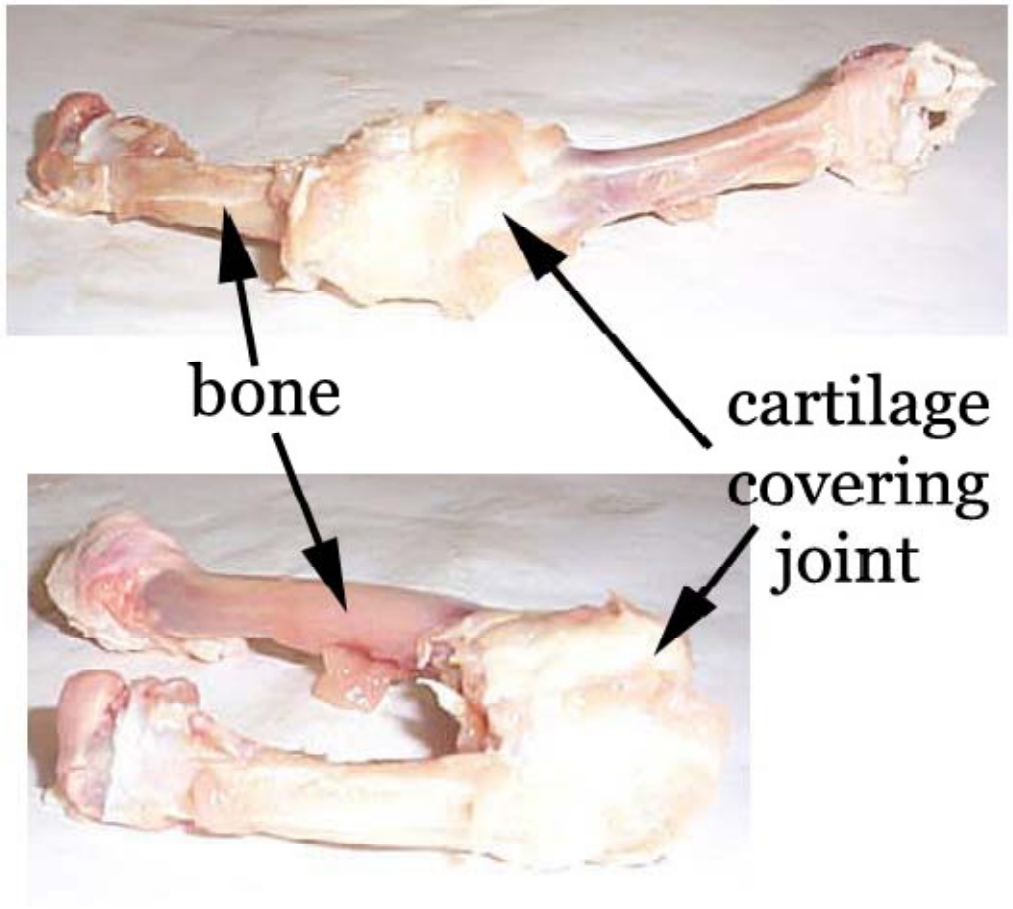
- Notice how the cartilage protects the joint

# Locate the ligaments & cartilage

Move the joint in different directions to see how the ligament works



# Locate the cartilage



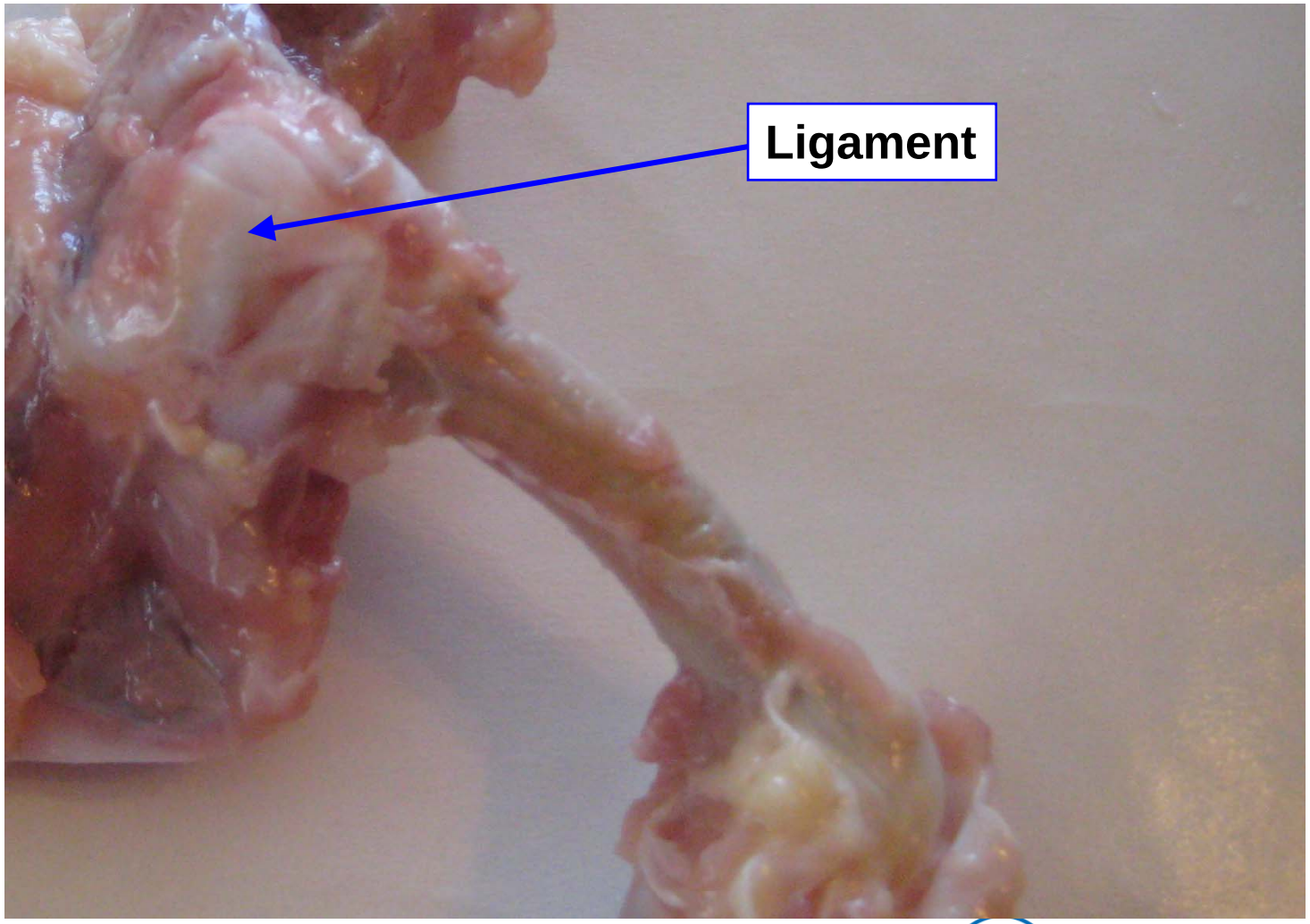
# Cartilage disorders

- Osteoarthritis
  - Occurs when cartilage in your joints wears down over time
  - Arthroplasty
- Baker's Cyst
  - Usually result of arthritis or cartilage tear
  - Needle aspiration
  - May have surgery to repair cartilage tear

# Continue the ligament search

- Continue removing the thigh muscle.  Cut parallel to the femur, upward toward the backbone.
- Remove the muscle until you see white ligament that covers the joint.
- This is an exterior ligament holding the femur in the hip socket.

# Continue the ligament search



# Ligament disorders & treatments

- Sprain
  - Ligaments stretch or tear
- Anterior Cruciate Ligament (ACL) Injury/Posterior Cruciate Ligament (PCL)
  - Physical therapy and a knee brace
  - ACL or PCL reconstruction
- Separated Shoulder
  - Rest, ice, medications, exercises
  - Severe separation - surgery

# Joint disarticulation

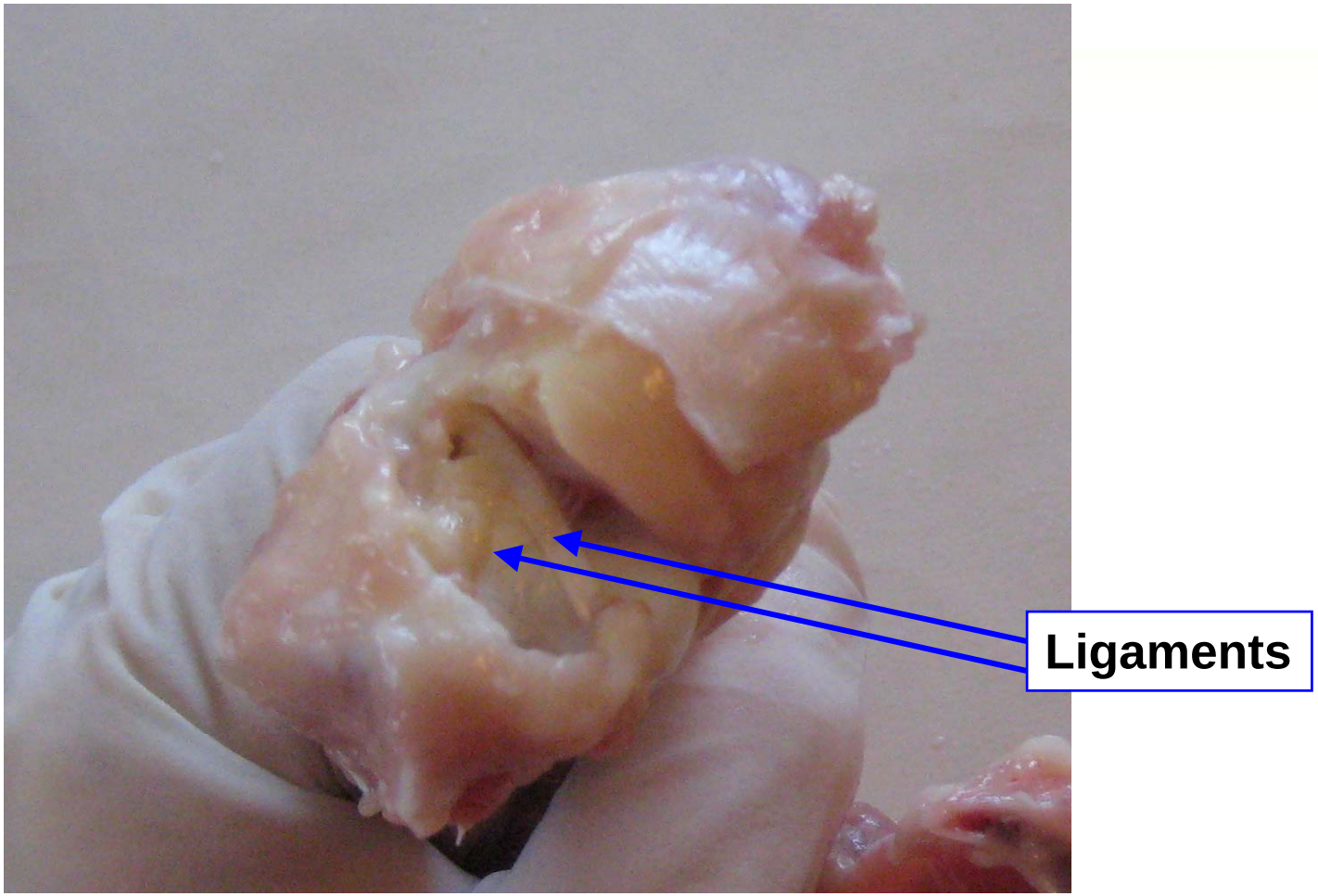
- Look closely at the hip bone.
  - Move it around.
    - Abduction
    - Adduction
    - Circumduction
  - What type of joint does it make?

- Move the knee joint.
  - What type of joint is it?
  - Can it move from side to side?
    - Flexion
    - Extension

# Joint disarticulation

- Cut into the hinge joint by cutting into the top of the covering of the joint from the femur side.
- Remove the knee cap area to expose the menisci and ligaments within.
- Pull up on the knee cap area and cut through it with scissors.
- Pull the covering back and look at the inside of the joint.
- Look at the shape of the ends of both bones and how they fit together to form the joint.

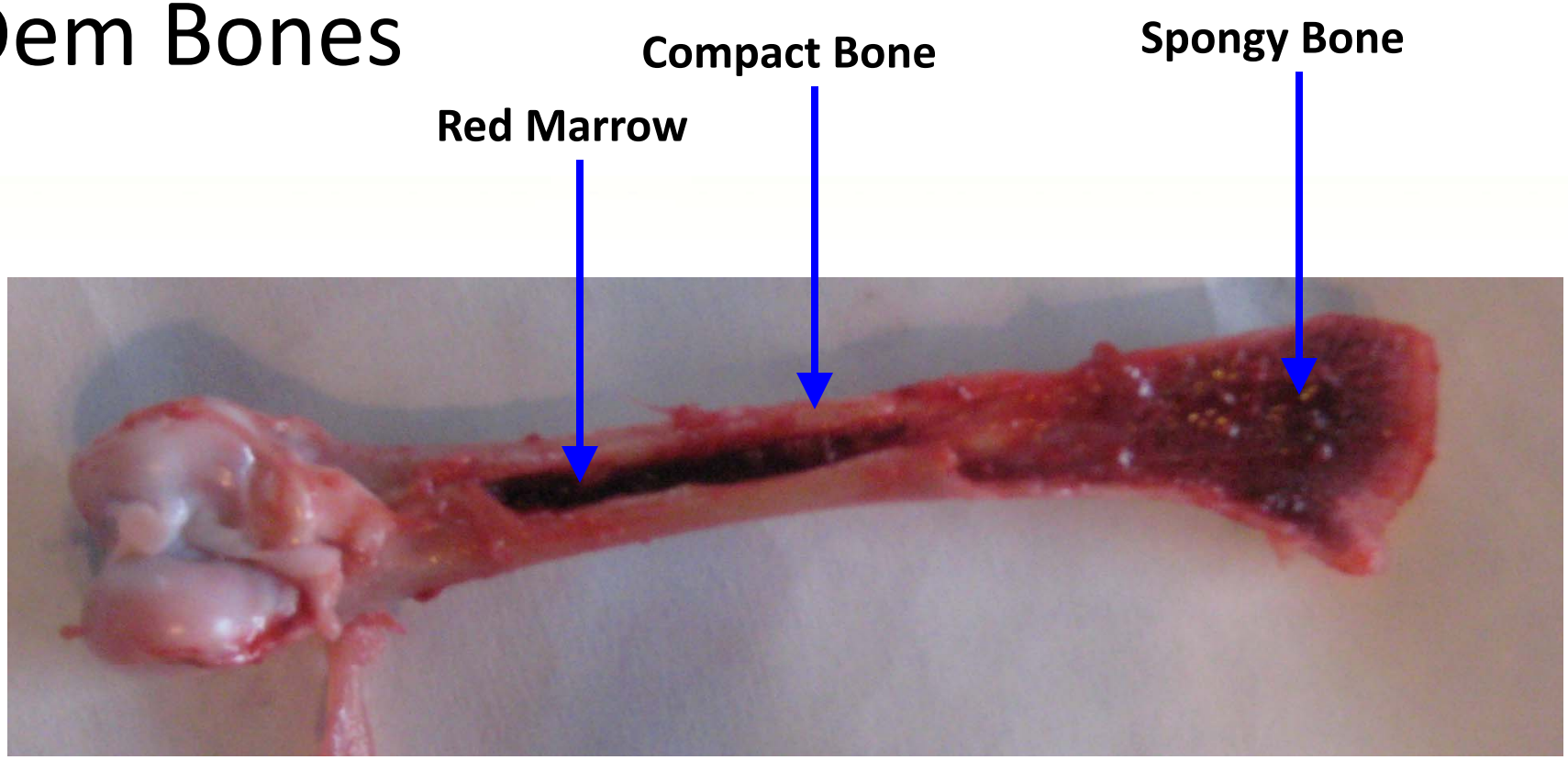
# Joint disarticulation



# Dem Bones

- Remove as much of the muscle, fat, ligaments, tendons, etc as possible from the leg bone
- Slice the bone in half length wise (will need to use the scissors)
- Locate:
  - Periosteum
  - Compact bone
  - Spongy bone
  - Bone marrow

# Dem Bones



# Bone Marrow

- Produces the elements of blood, i.e., RBC, WBC and platelets.
- Examination of blood marrow is used to diagnose a number of conditions which include anemia, leukemia, multiple myeloma and panycytopenia.
- Bone marrow as food:
  - Vietnamese use bone as the soup base for their national staple *pho;*
  - Mexicans use beef bone marrow from leg bones which is cooked and served as filling for tacos and tostados!

# Bone disorders & treatment

- Shin splints
  - Rest and anti-inflammatory treatments
  - Untreated – stress fracture
- Fractures
- Osteomalacia/Rickets
- Paget's Disease

# Apply what you see to procedural coding

- Approach: open
- Knee replacement surgery – what gets replaced
- Knee brace – what does it accomplish?
- Stripping veins – why doesn't it eliminate blood supply?

# Apply what you see to procedural coding

- Approach: arthroscopic
- w/ video snaps of drill, screw, etc
- Arthroscopic knee surgery: what are the benefits? What are the  drawbacks?

# Cleanup

- Keep straight razor blades separate from other organics.
- Scissors go back into scissor bag
- Everything else in the garbage bags

# Thank you!