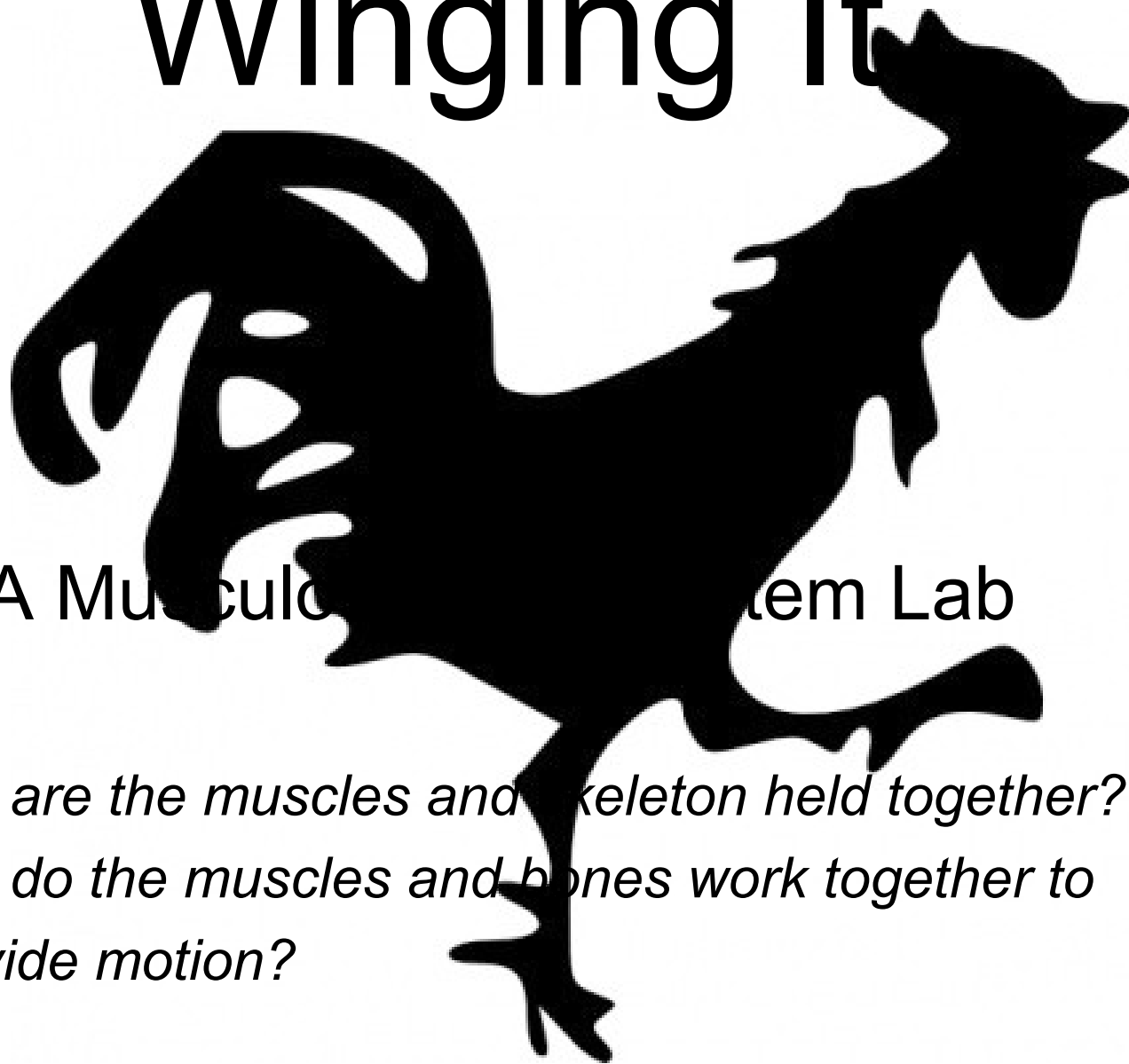


# Winging It

A Musculoskeletal System Lab

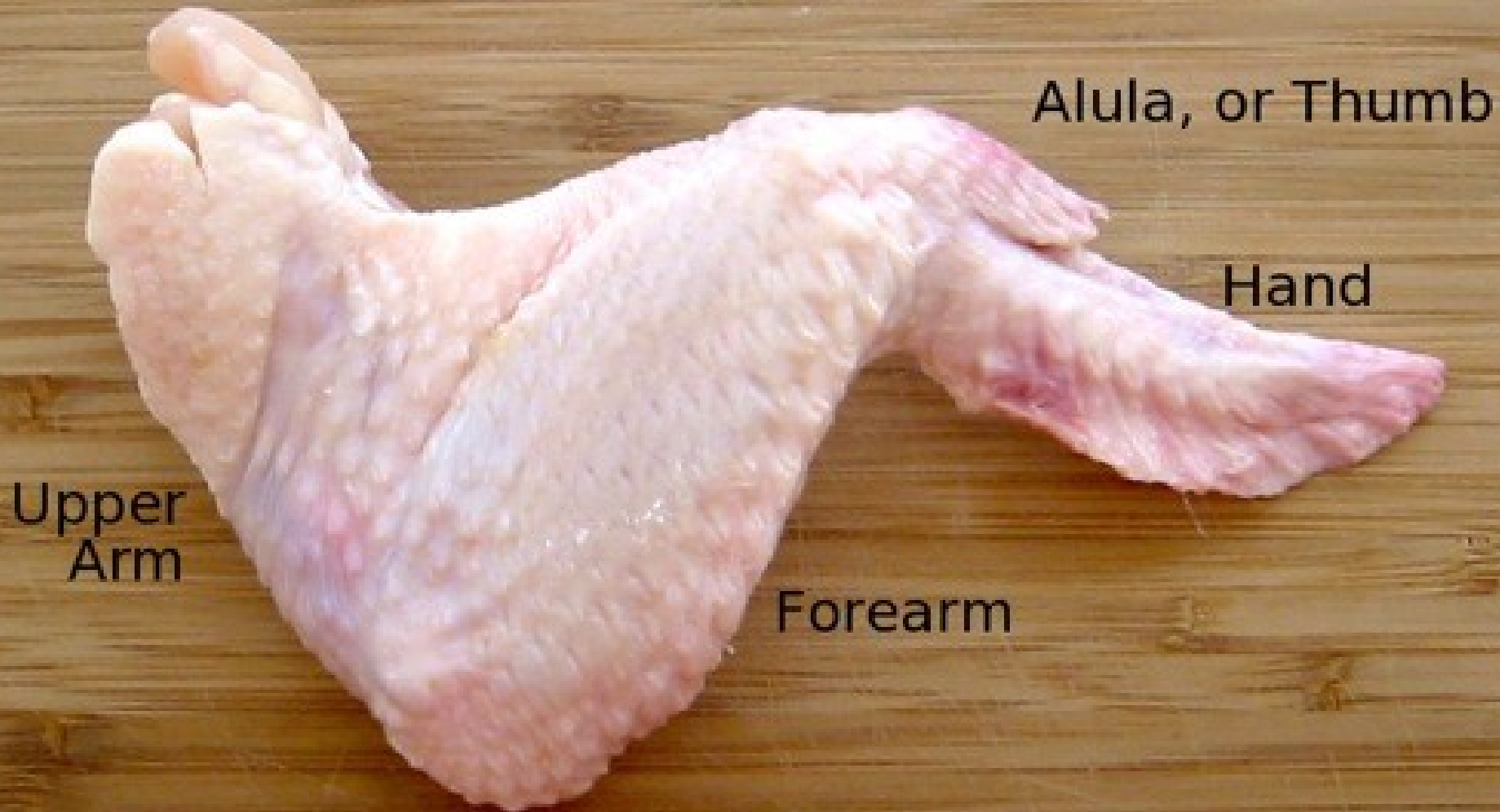
- *How are the muscles and skeleton held together?*
- *How do the muscles and bones work together to provide motion?*



# Why do we dissect?

Most “higher animals” have body plans very much like that of humans—four limbs, a head on top with two eyes and two ears, a torso with chest and belly, etc. We can expect that the more an animal is like us on the outside, the more it will be like us on the inside, too, and by dissecting another mammal or even a bird, we can gain an idea of what we ourselves are like on the inside.

# *Chicken Wing*



Upper  
Arm

Forearm

Alula, or Thumb

Hand



# Safety

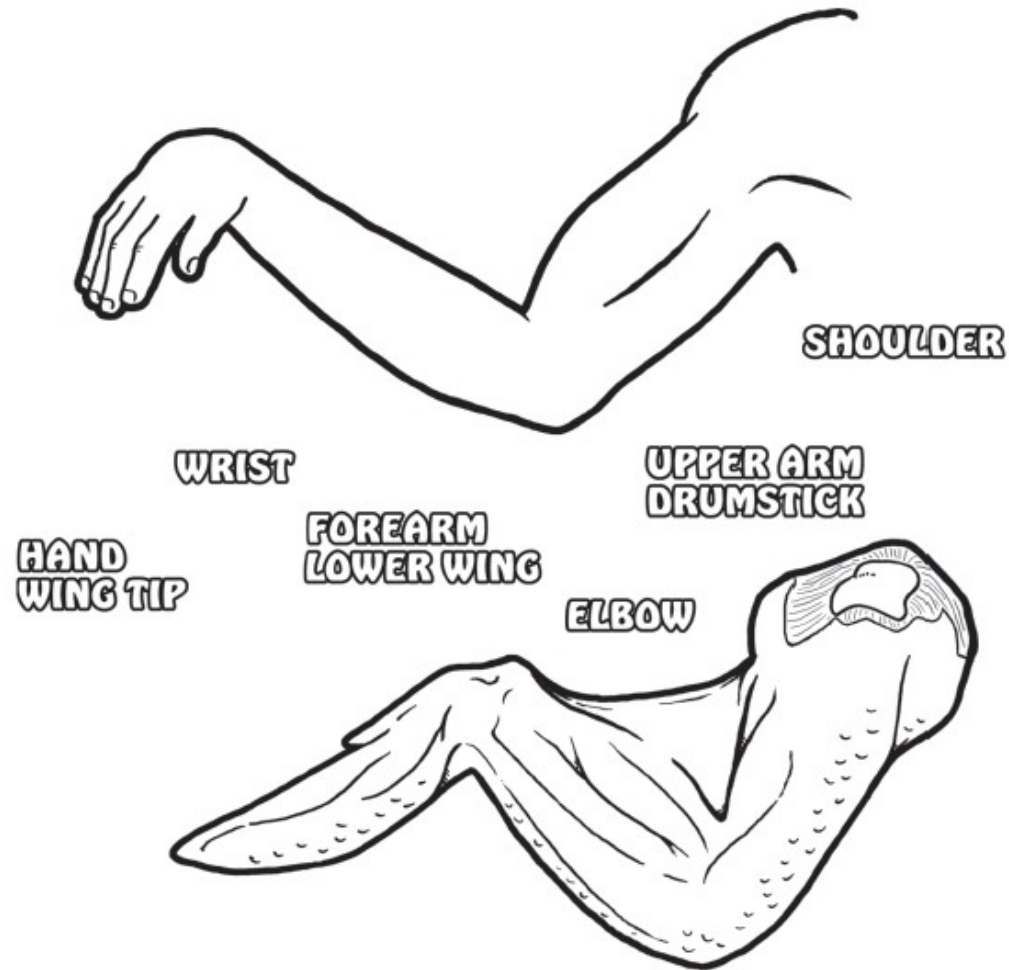
- Raw chicken can carry salmonella.  
During the lab do not touch your face.
- At the end of the lab you **MUST** wash your hands!
- You will wear aprons.

# Clean- up

- At the end of the lab, your group is responsible for cleaning up your table.
- You must throw your plate and your dissection paper away.
- I will give you Clorox wipes for your tools and table.

# How is your arm like a chicken wing?

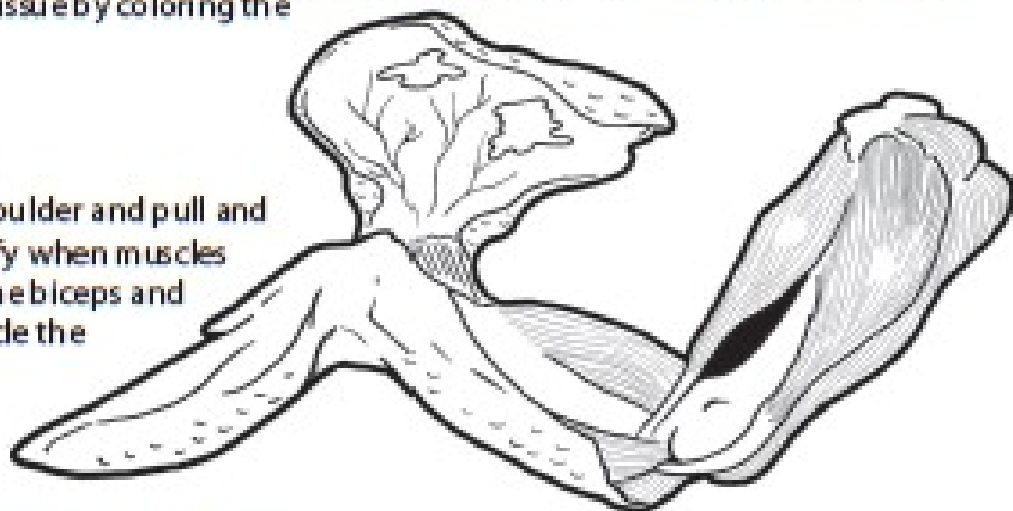
Look at your wing, hold it up to your body if you need to, do you think it is the right wing or the left wing?



# WINGING IT!

- 1.** Carefully cut a slit down the wing from the shoulder to the lower wing. Try to cut from the inside of the skin to the outside so you do not cut up the muscles. Pull on the skin by the shoulder and pull it back to the lower wing. You might have to cut some of the connective tissue to help the skin separate. Identify the underlayer of fat, the capillaries, and connective tissue by coloring the label and part the same color.

- 2.** Grab the wing by the wing tip and shoulder and pull and push it. Watch the muscles, and identify when muscles are stretched and squished. Identify the biceps and triceps by coloring the label and muscle the same color.



- 3.** Carefully work your fingertip or a worn pencil tip between the muscles until they separate into the muscle groups. Pull on each group to see how the muscle makes the wing move. Notice how and where the muscle attaches to the bone. Use several muscle groups and see if you can get the wing to punch or wave. Identify the tendons and bones by coloring the label and the part the same color.

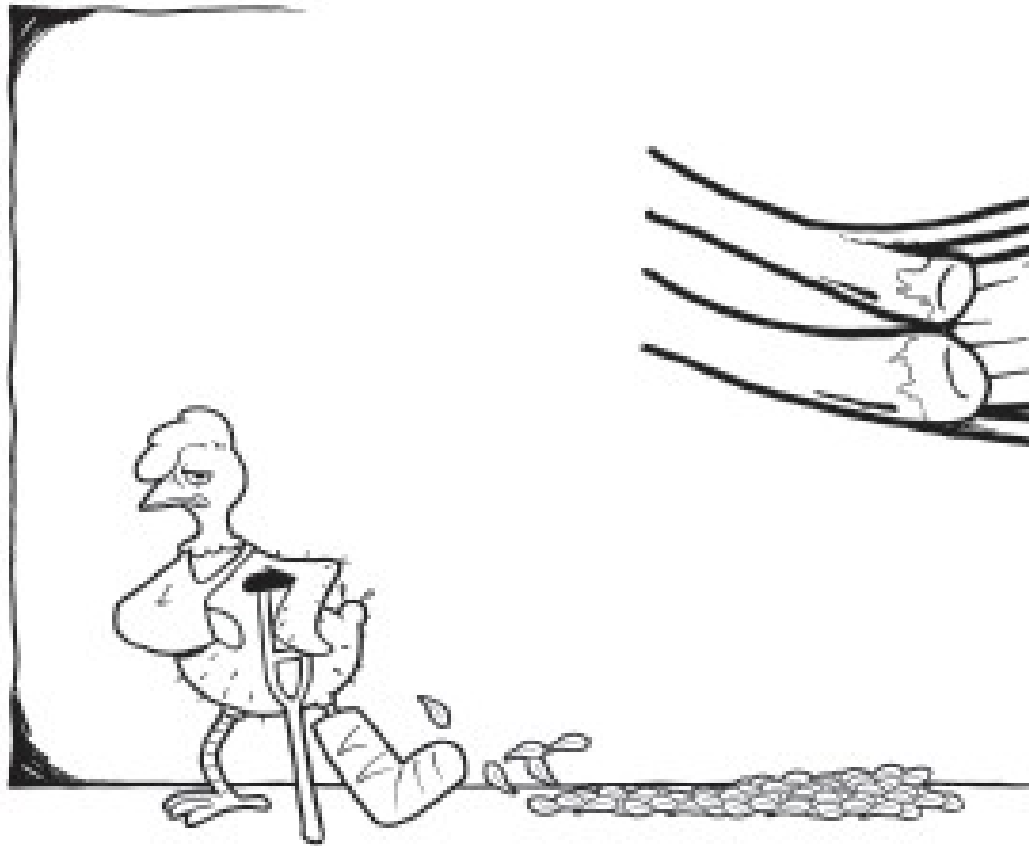
## KEY

- UNDERLAYER FAT
- CAPILLARIES
- CONNECTIVE TISSUE
- BICEP
- TRICEP
- TENDONS
- BONES

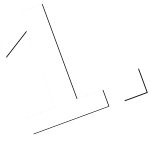


# WINGING IT!

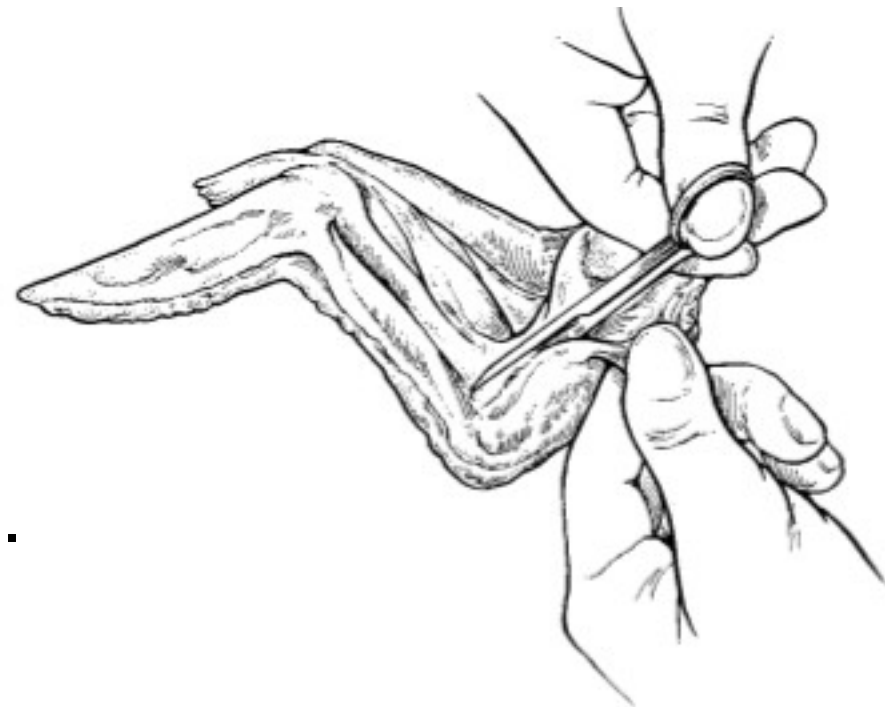
4. Cut all the tendons around the elbow and pull away the muscles. Pull slowly on the bones to make a small gap in the elbow. You should be able to see the ligaments inside the joint. Cut the ligaments to separate the joint. Look and see how and where the ligaments and tendons attach. Feel the cartilage in the joint where the bones touch. Scrap the cartilage and bone to see how different they are. Identify all the labeled parts by coloring them the same color.



KEY	
<input type="checkbox"/>	LIGAMENTS
<input type="checkbox"/>	CARTILAGE
<input type="checkbox"/>	TENDONS
<input type="checkbox"/>	BONES
<input type="checkbox"/>	MUSCLES



- Carefully cut a slit down the wing from the shoulder to the lower wing. Try to cut from the inside of the skin to the outside so you do not cut up the muscles.
- Pull on the skin by the shoulder and pull it back to the lower wing. You might have to cut some of the connective tissue to help the skin separate.





Use closed scissors to “tease” the skin from the muscle.

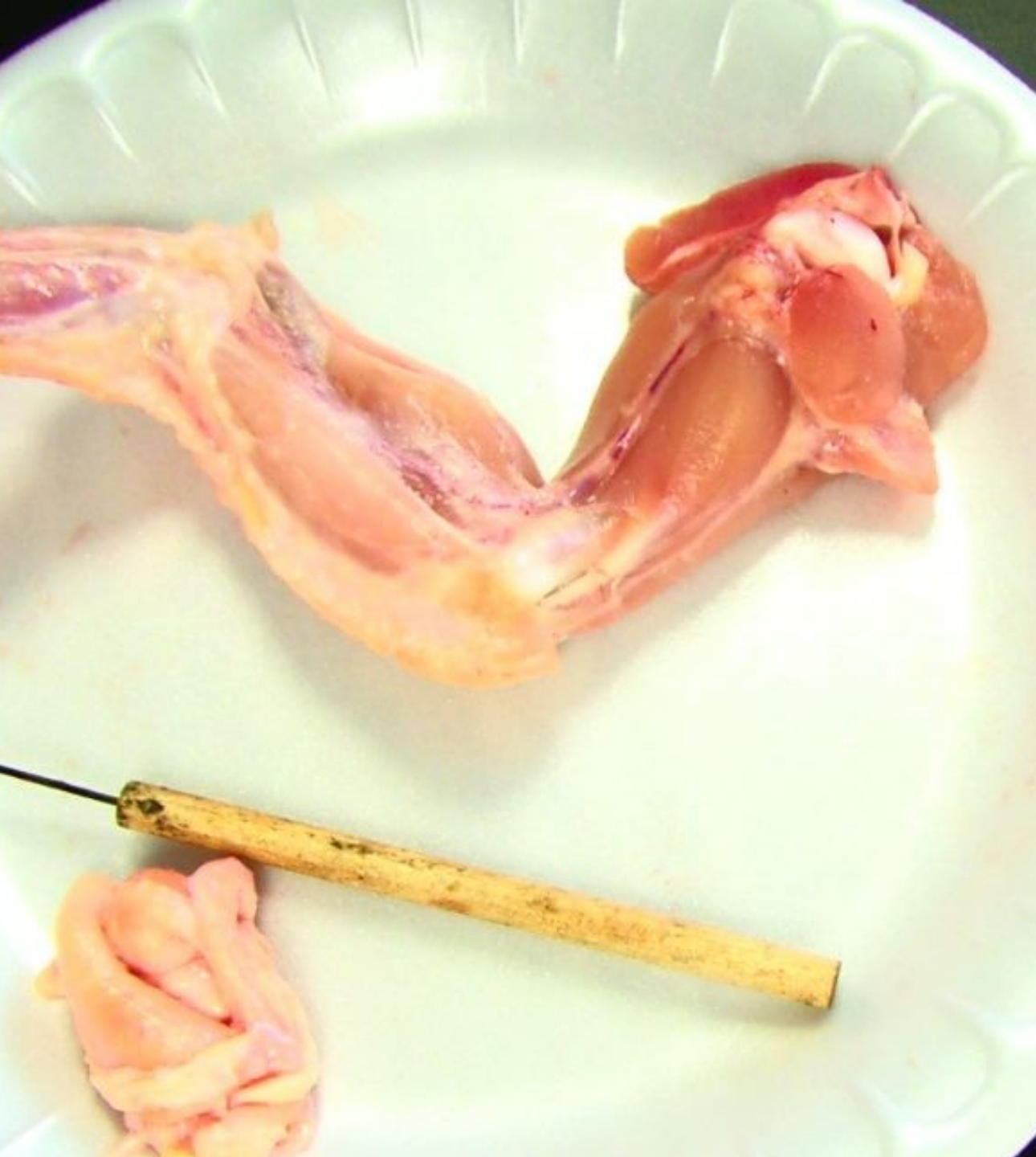
Stick the scissor tip between the muscle and skin, pointing toward the skin and away from the muscle.

Open the scissors to tear the skin from the muscle.

You will see clear connective tissue. Pull the skin back gently. Use the scissors and forceps, to cut the skin and peel it away from the muscle below.

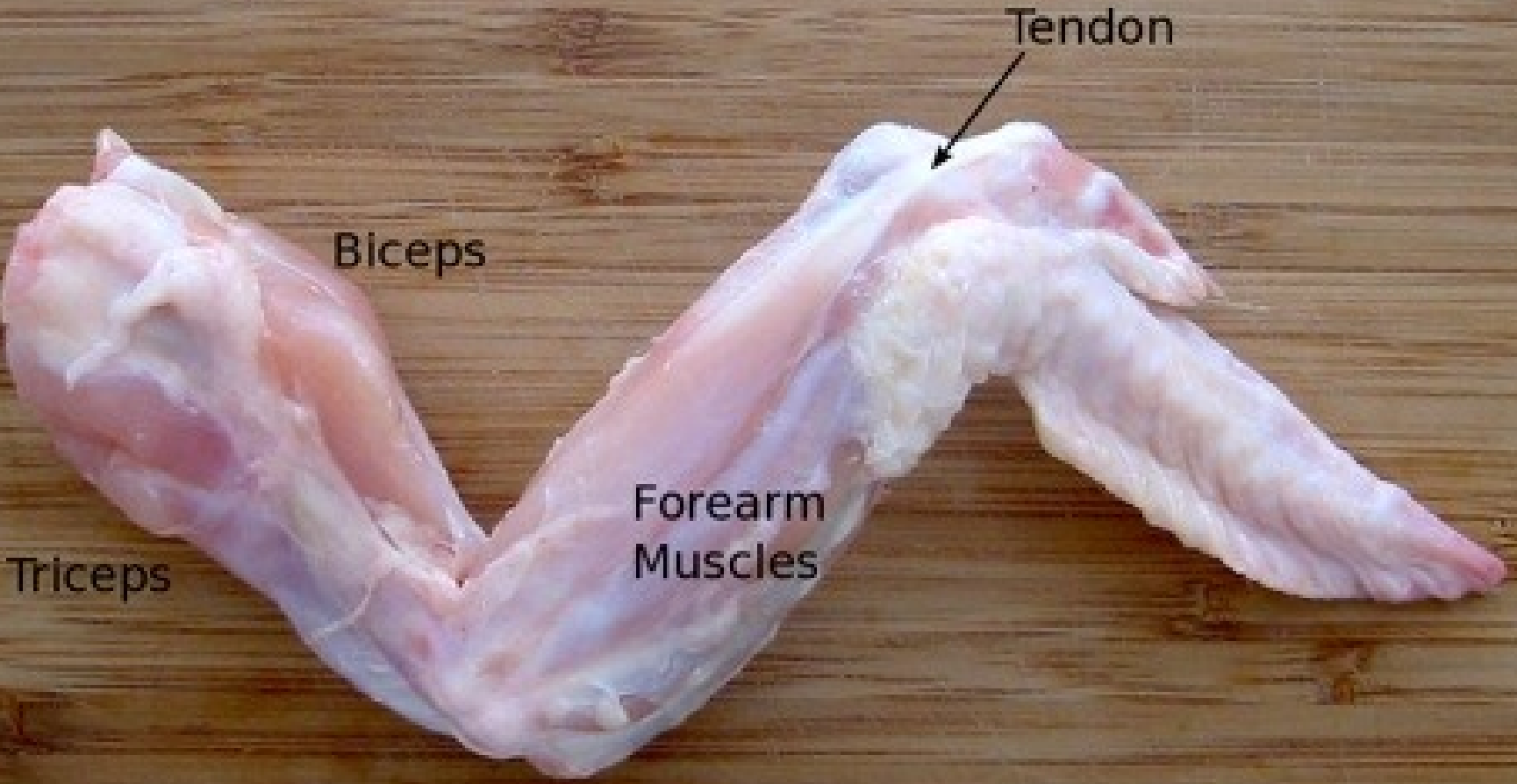


- Identify the underlayer of fat, the capillaries, and connective tissue by coloring the label and part the same color.



Skin your chicken wing.

Do NOT cut the muscles!

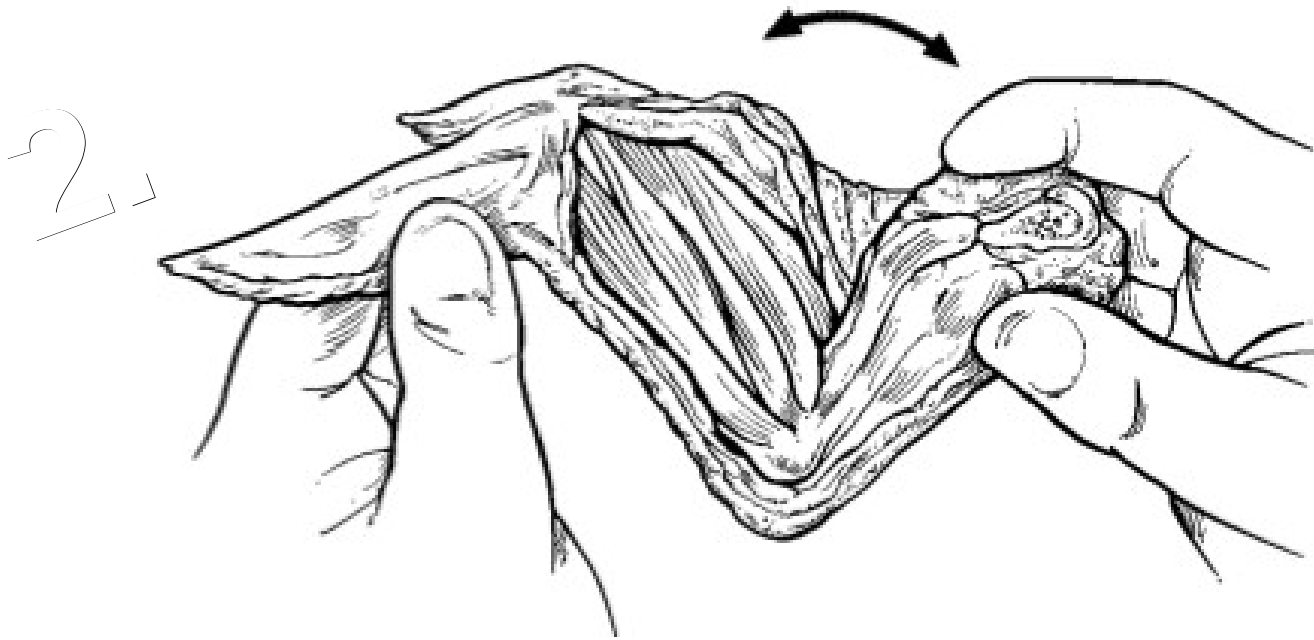


Triceps

Biceps

Forearm  
Muscles

Tendon



- Observe the muscles in the wing. They look like bundles of pale pink tissue.
- Grab the wing by the wing tip and shoulder and pull and push it.
- Watch the muscles, and identify when muscles are stretched and squished.
- Identify the biceps and triceps by coloring the label and muscle the same color.

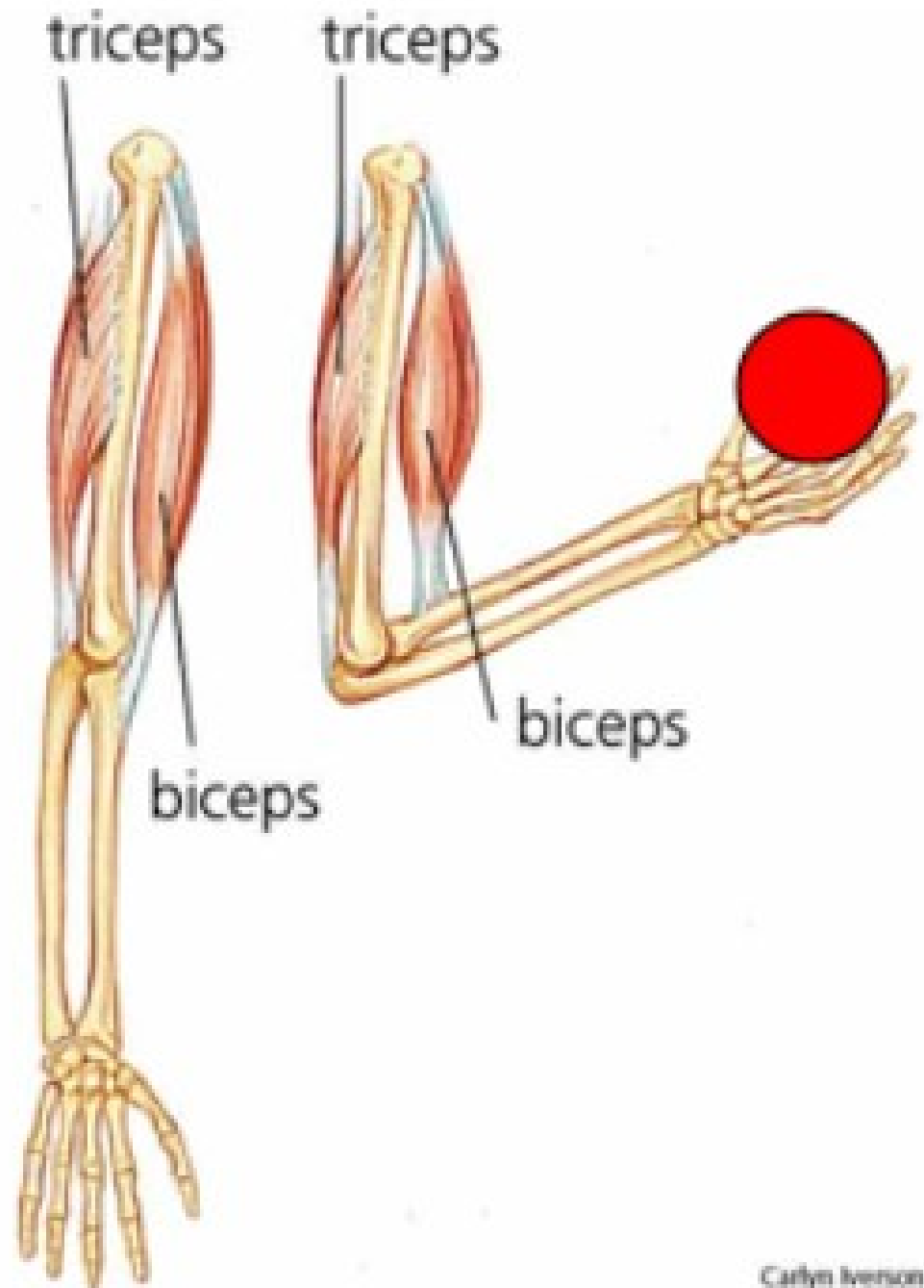




What happened to each muscle as you raised and lowered it?

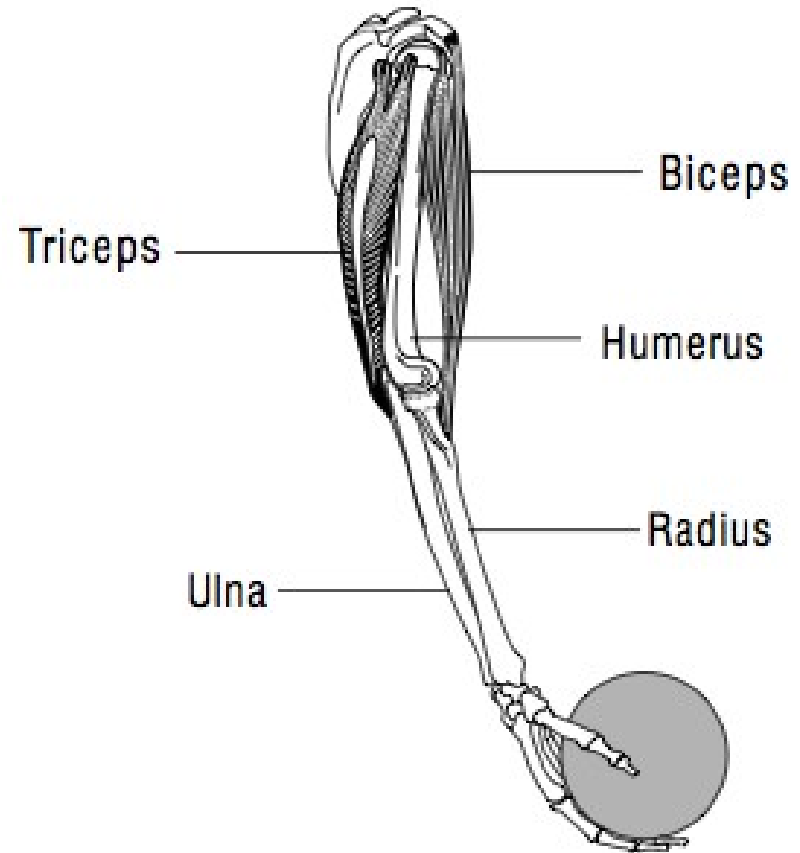
Which bones in the arm moved?

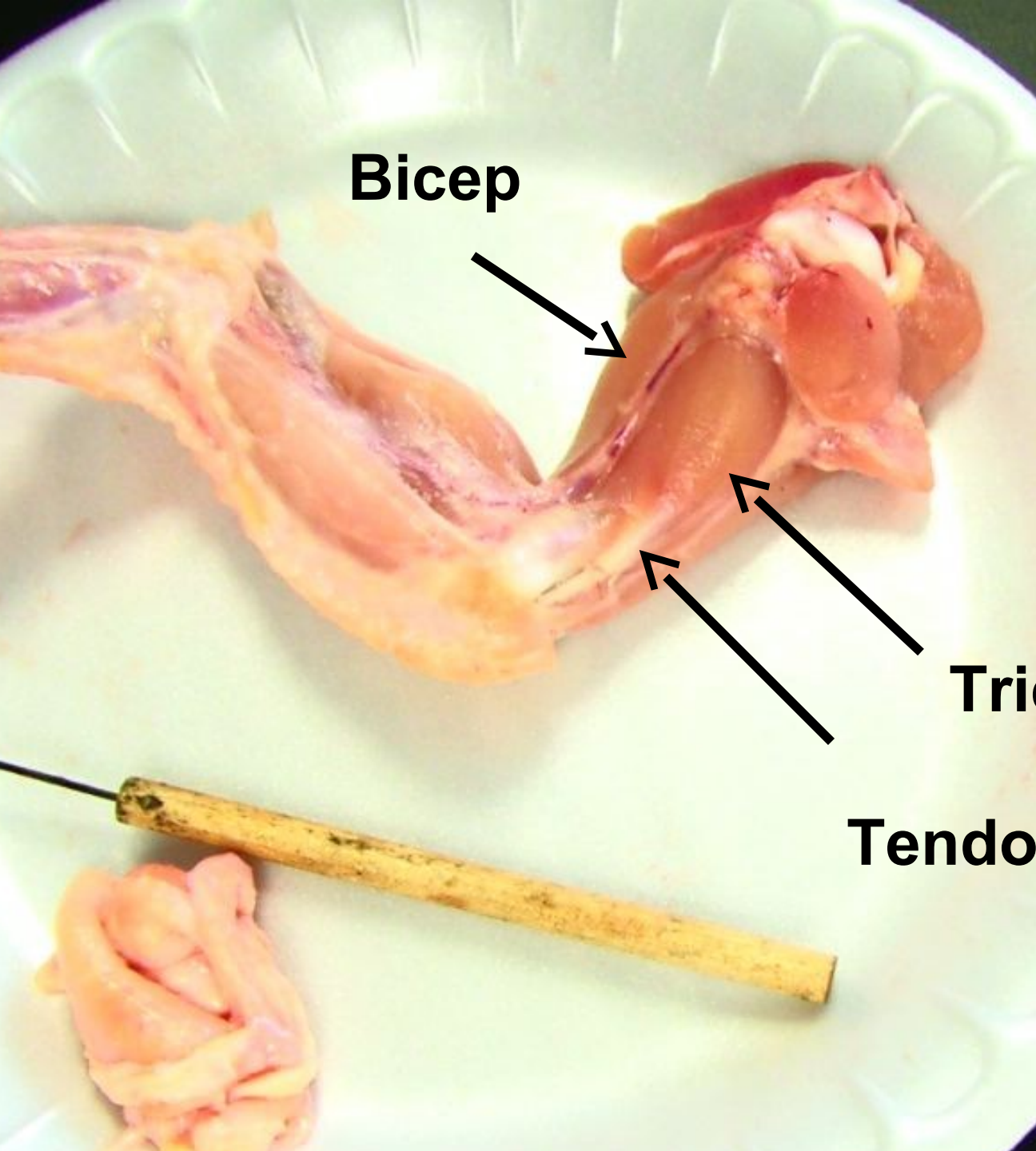
Which bones in the arm didn't move?



The biceps and the triceps are the muscles that work to lift and lower your arm.

Your biceps are on the upper front portion of the arm, and your triceps are on the upper back portion, as shown below.





Skin your chicken wing.

Do NOT cut the muscles!

**Bicep**

**Tricep**

**Tendon**

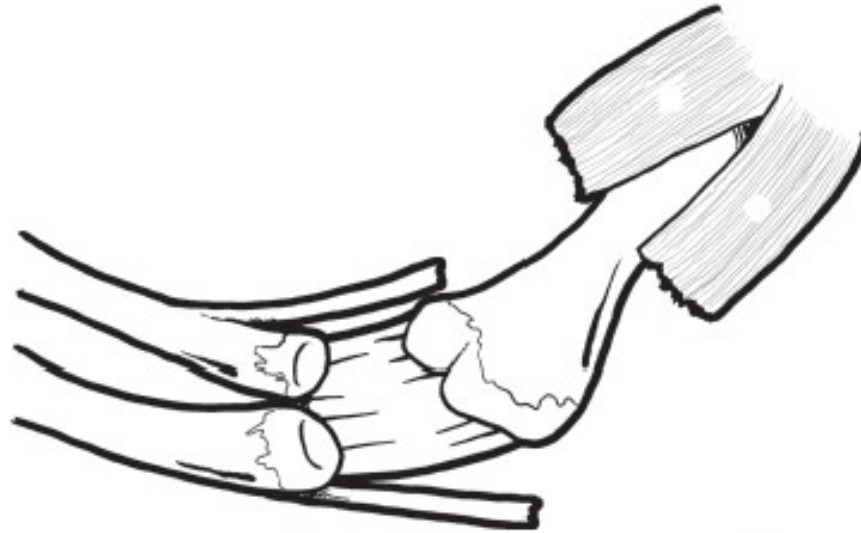
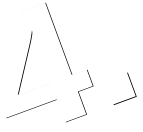


- Carefully work your fingertip or a probe between the muscles until they separate into the muscle groups.
- Pull on each group to see how the muscle makes the wing move.
- Notice how and where the muscle attaches to the bone.
- Use several muscle groups and see if you can get the wing to punch or wave.
- Identify the tendons and bones by coloring the label and muscle the same color.



The tendon is the white, tough, fibrous material that connects the muscle to the bone. The tendons connecting muscle and bone can be seen in several muscle groups. Where these tendons run over joints, like the elbow, they are often in well developed sheaths. Such a sheath can be seen above. Do such sheathes exist in the Human elbow?





- Cut all the tendons around the elbow and pull away the muscles.
- Pull slowly on the bones to make a small gap in the elbow. You should be able to see the ligaments inside the joint.
- Cut the ligaments to separate the joint. Observe and see how and where the ligaments and tendons attach.
- Feel the cartilage in the joint where the bones touch. Scrape the cartilage and bone to see how different they are.
- Identify all the labeled parts by coloring them the same color.

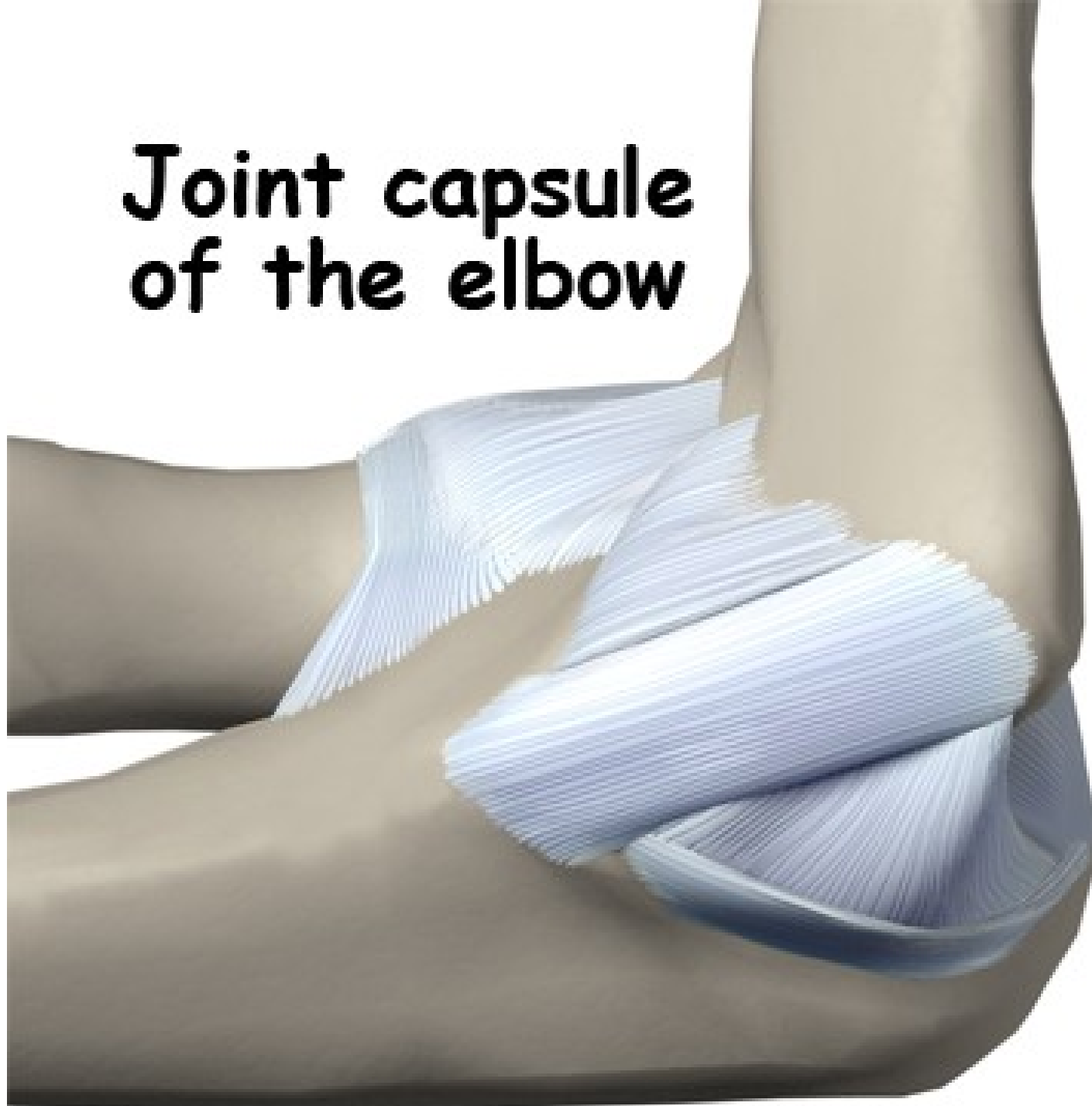


Look at the elbow joint. Identify at least one ligament. Ligaments connect bones together.

Ligaments are around between the bones.



# Joint capsule of the elbow



At the surface of each bone forming the joint is a white, shiny, slippery substance called cartilage.

What is the purpose of cartilage in joints?



**Articular  
cartilage**

**Humerus**

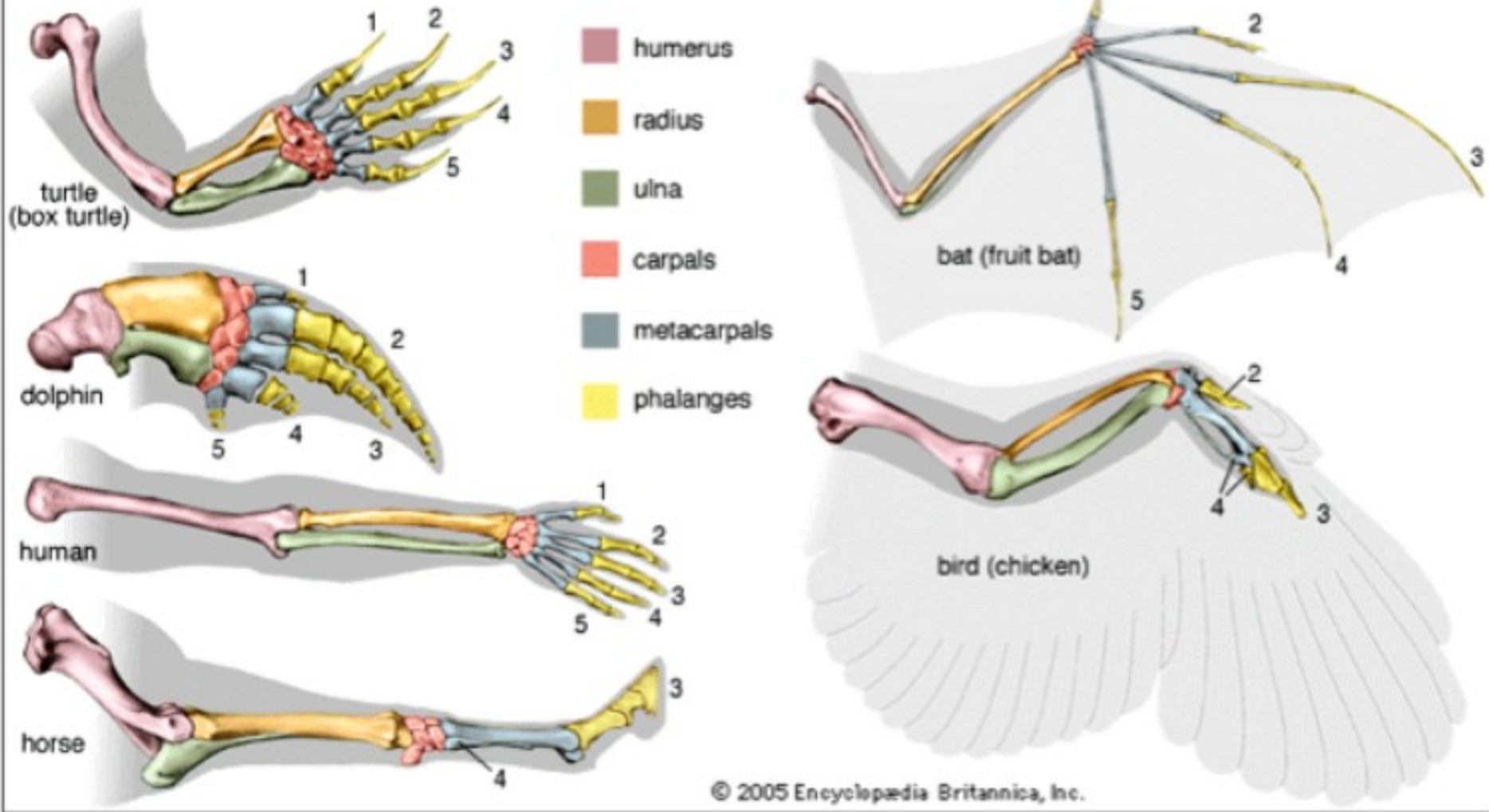
**Radius**

**Ulna**



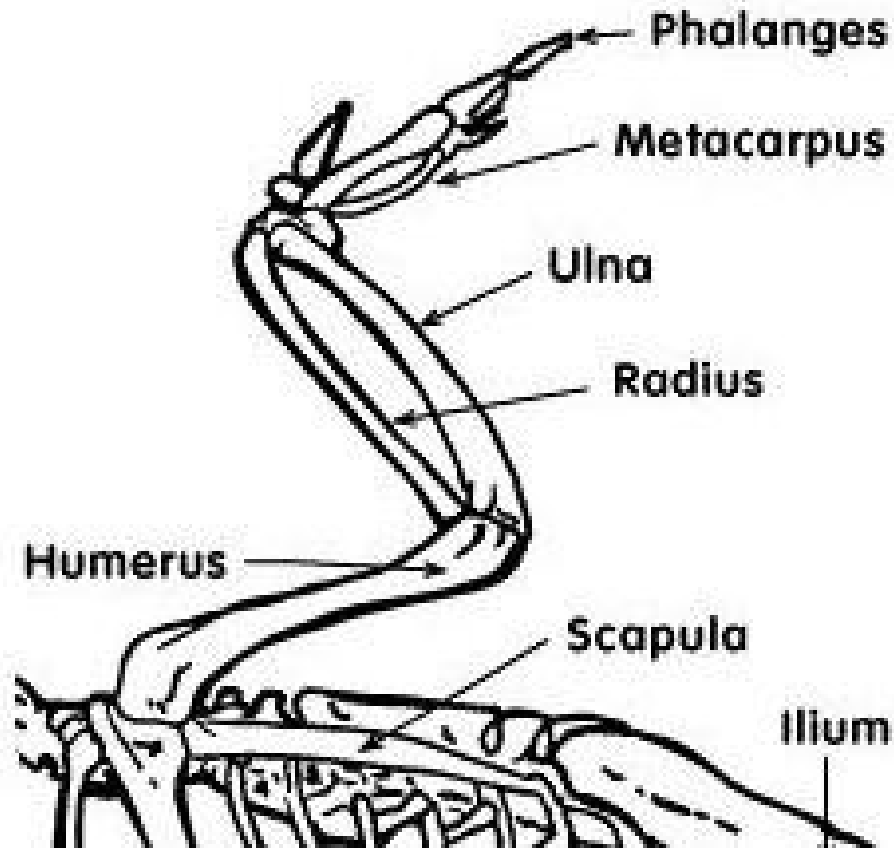
**In order for a muscle to work, it has to cross a joint.** Connecting from one end of a bone to the other without crossing the joint would be pretty much useless because it wouldn't be able to shorten or lengthen with the movement of the joint. So in order to bend your knee, the muscles in your thigh have to cross over to the other side of the knee joint and attach. Then when you tighten the muscle, the knee bends. Cool huh?

## Homologies of the forelimb in six vertebrates

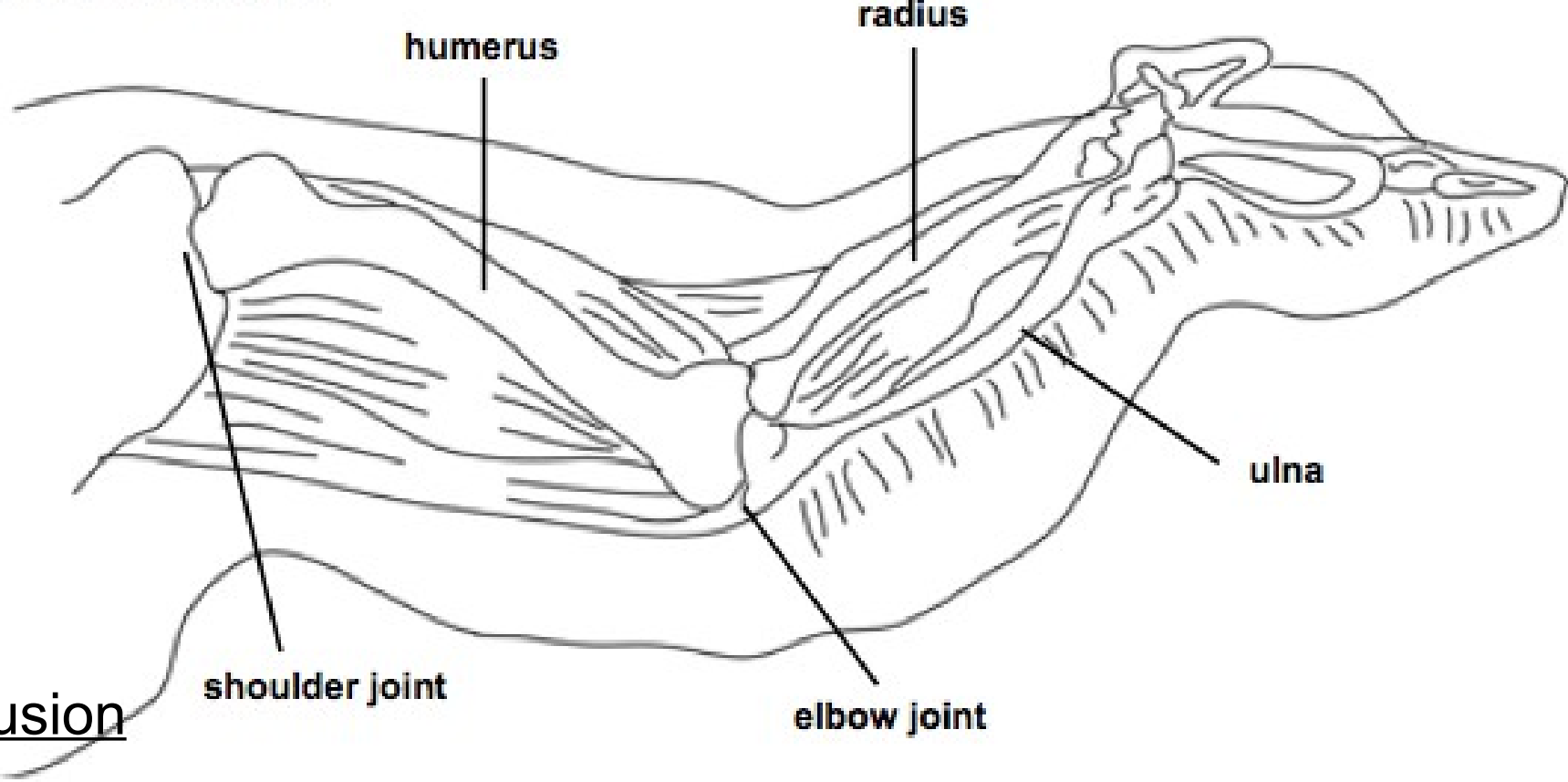


Look at a the bones of the human arm.

Identify the humerus, ulna and radius. Compare the similar features between the chicken wing and the human arm.



Both have a humerus, radius, and ulna. The main difference is that the phalanges that make up the fingers of people are fused in birds to allow for the attachment of feathers.



Based on your observations, explain the roles of muscles, tendons, bones, and joints in the back-and-forth movement of the lower chicken wing.

Write a paragraph on the back of the page. Use complete sentences and be descriptive.