Topic 8: Body Systems – 8e. Muscle System
8e1. Chicken Wing Dissection Lab

Resources: Campbell et al. *Biology: Exploring Life.* Prentice Hall, Chapter 27.

Campbell et al. *Biology: Concepts and Connections.* Pearson, Chapter 30.

Miller and Levine, *Biology.* Prentice Hall, Chapter 36.

Building on: Cell Structure and function
Homeostasis

Links to Chemistry: Chemical reactions
Chemistry of proteins

Links to Physics: Conservation of energy
Electricity of nerve impulses

Stories: It is amazing how "sanitized" our world can be. We often have little to no interaction with life processes, including how we obtain much of our food. With this in mind, do not be surprised if some high school students have not yet made the connection with the fact that meat is muscle! I usually get a couple of students in each class that do not yet realize this fact of life!

Lab Instructions and Materials for the Teacher:

You will need to purchase chicken wings and a small amount of roast beef (lunch meat) at the grocery store. The wings are usually inexpensive and plentiful. An interesting supplement to this lab is to purchase chicken feet at an ethnic grocery store. The ligaments and tendons are attached at the top, and some systematic tugging of the various bands will yield a variety of movements that the students will find very interesting! Using grocery store items for dissection runs the risk of being less sanitary, so use good housekeeping practices; the materials that you can obtain (including hearts, kidneys, intestines, and others) retains a much more life-like quality that preserved materials cannot. I also find students more receptive to the idea of dissection if the material is otherwise sold as food.

Chicken Wing Dissection Lab

Chicken wings are useful for studying antagonist pairs of muscles and connective tissues. In this lab, you will dissect a chicken wing to observe the muscles and their action; then you will prepare a wet mount of roast beef to observe striated muscle under the microscope. (You will probably never look at dinner the same way again.) Please keep in mind that chicken wings and roast beef are fresh materials, which carry bacteria. Be especially careful with the chicken because the bacteria that it contains is *Salmonella,* which can give you a big (deadly) "tummy-ache." So, WASH YOUR HANDS WITH SOAP after you have completed the lab!

Procedure for Dissecting the Chicken Wing:

- Rinse the chicken wing with tap water.

- Using forceps, lift the skin at the shoulder end of the upper wing. Insert one point of your scissors under the skin and cut toward the first joint. (As you cut, tilt the scissors away from the underlying muscle so it is not damaged.)

- Cut the skin away from the muscle. The clear connective tissue that surrounds the muscle and holds it to the skin is called mesentery.

- Carefully cut the mesentery as you peel back the skin. The skin right above the joints is the most difficult to remove. Work carefully and slowly with scissors and forceps until the joints and muscles are completely exposed. (If the wing feels too greasy, rinse it.) Note the tapered shape of the muscles. The tough white bands at the ends of the muscles are called tendons; they attach muscle to bone. (Guess what "gristle" in your meat is!!)

- Bend and straighten the wing several times by pulling on the muscles. Note that as one muscle group bends, another group straightens; these groups are antagonist pairs. See if you can find two sets of antagonist pairs on the wing.

- Wash your hands with soap; then answer the following questions:

    1. What are antagonist pairs of muscles?

    2. What is mesentery? Describe how it looks and feels.

    3. What are tendons? Describe how they look and feel.

4. What structures attach bone to bone? Did you find any on the wing?

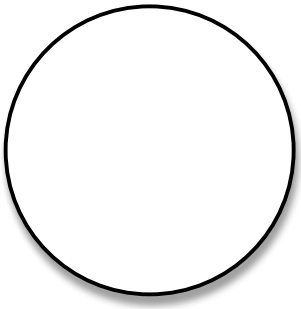
5. Draw a diagram of a dissected chicken wing below.

Wet Mount of Roast Beef:

- Tease off a small amount of roast beef with forceps. (A dissecting probe may also be used.) You may need to scrape the surface of the beef until individual strands can be seen.

- Prepare a temporary wet mount of the beef with iodine stain.

- Observe the strand under low power. Draw a diagram showing the arrangement of the muscle fibers in the strand.



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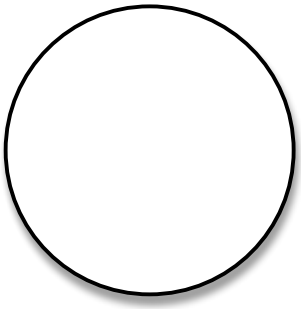

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- Now switch to high power. Note the striated (striped) appearance of the muscle fibers. The unit of muscle from one stripe to the next is called a sarcomere. Each sarcomere is composed of many parallel filaments of protein. These filaments are made of two types of protein called actin and myosin. The movement of these filaments relative to one another is responsible for muscle contraction. The darkly stained, circular structures amid the striations are the nuclei of the muscle cells.

- Draw a diagram (above) showing several muscle fibers as they appear under high power. Label a sarcomere and a nucleus.

6. Why is roast beef (and all other skeletal muscle) called “striated” muscle?

7. What is a sarcomere?

8. What are actin and myosin?

9. What causes muscle contraction?

10. From your observations, is a muscle fiber composed of many small cells, each with its own nucleus or of one long cell with many nuclei?