Rainbow Density Column

(Material source: http://www.hometrainingtools.com/a/density-column-science-project/)

Materials needed: Liquids of different densities: honey, corn syrup, dish soap, water, vegetable oil, rubbing alcohol, graduated cylinder and Food coloring

Procedure

1. Pour an inch (or, however, much you want) of honey into the bottom of the cylinder.
2. Slowly and carefully pour an inch of corn syrup on top of the honey.
3. Color some liquid dish soap and carefully add an inch on top of the corn syrup.
4. Next, add an inch of colored water on top of the dish soap.
5. Go ahead and add an inch of oil on top of the water. You won't be able to color the vegetable oil because food coloring is water-based and water and oil don't mix!
6. Finish it off with an inch of colored rubbing alcohol.

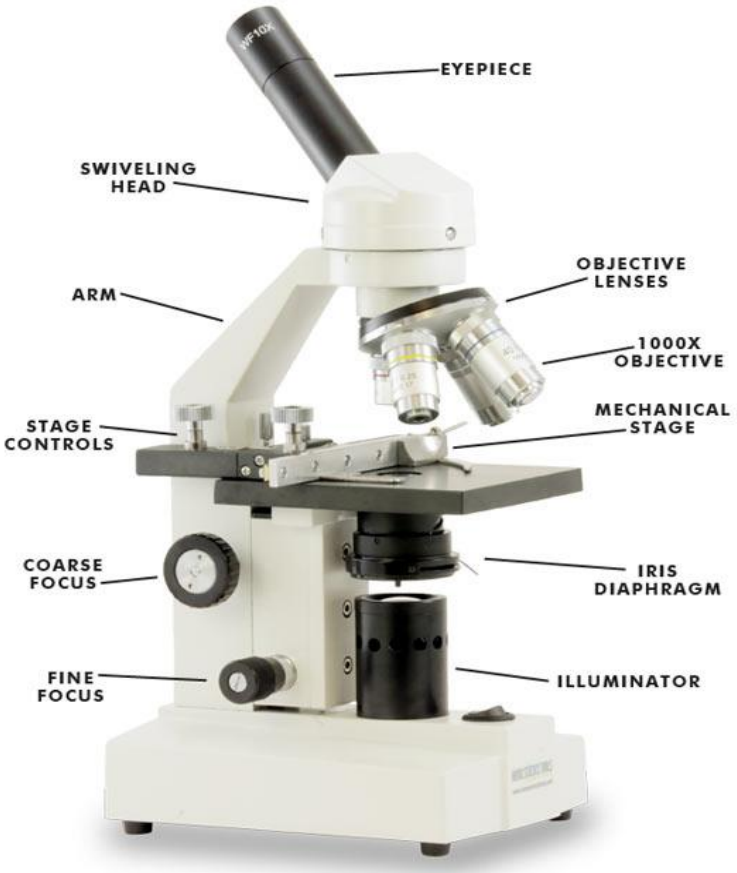
Each of the liquids you used had a different **density**. You added them to the cylinder in order of most dense (honey) to least dense (rubbing alcohol). Since each new liquid was less dense than the one before it, it floated on top instead of mixing together.

MICROSCOPY OF RED BLOOD CELLS

(Material Source: https://www.backyardbrains.com/experiments/bloodcells)

Apparatus: Lancet, Microscope, Hypodermic needle, glass slide, coverslip, cleaning cloth, cotton swab, rubbing alcohol

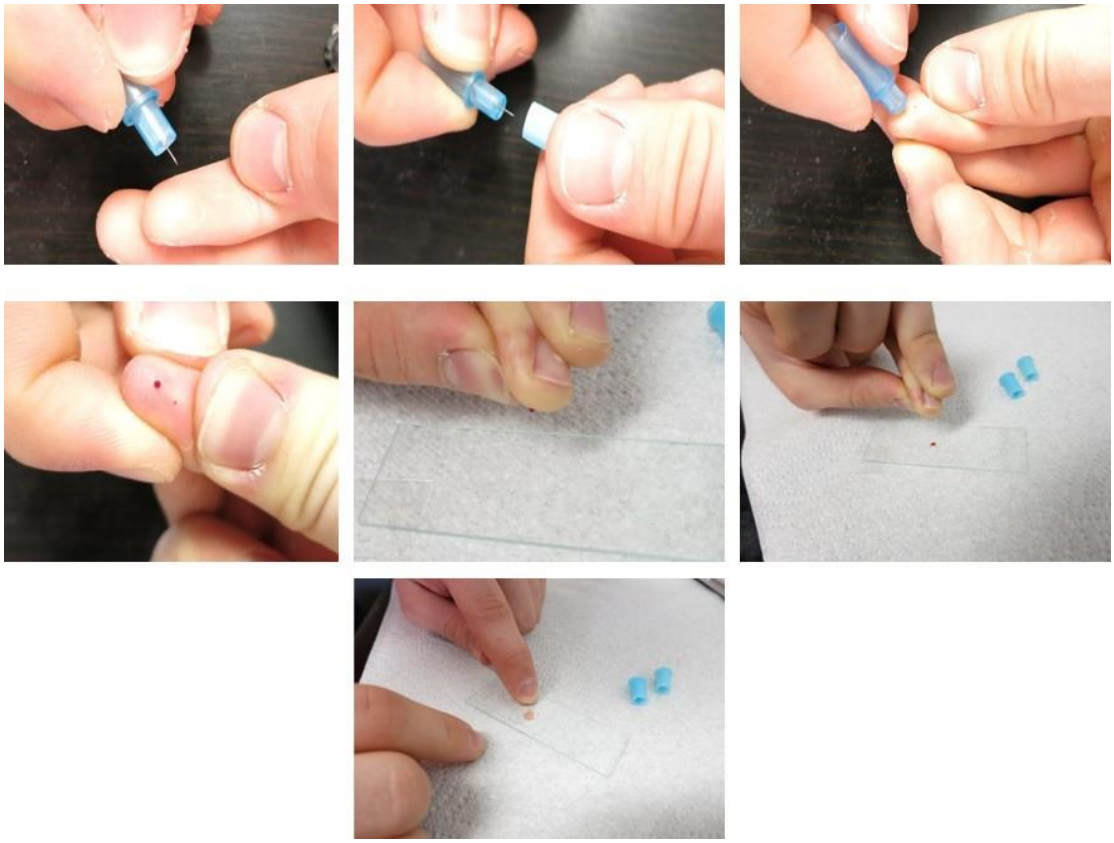
1. Begin by preparing the microscope



2. Prepare glass slide and slide cover by cleaning them with cleaning cloth.

3. Thoroughly scrub the skin of one fingertip with a cotton swab and rubbing alcohol.

4. Open a lancet to expose the sharp point and quickly puncture the cleaned fingertip, put the lancet down, and gently squeeze the finger until a small drop of blood forms on the fingertip.



5. Place the drop (only a small drop) of blood from the finger into the middle of the glass slide and then wipe the fingertip to clean excess blood. (Bleeding should not be a problem, but if it persists, apply pressure with a cotton ball or paper towel until it stops).

6. Before the droplet begins to dry on the slide, place a coverslip on one edge so that it touches the blood droplet at an acute angle. Smoothly, with a single motion, move the edge of the coverslip away from the blood drop, across the surface of the slide to smear the blood out. Then quickly allow the coverslip to fall flat and stick to the blood smear surface.

7. Put the covered blood smear on the microscope stage with the cover slip toward the objective lens and focus until blood cells are visible

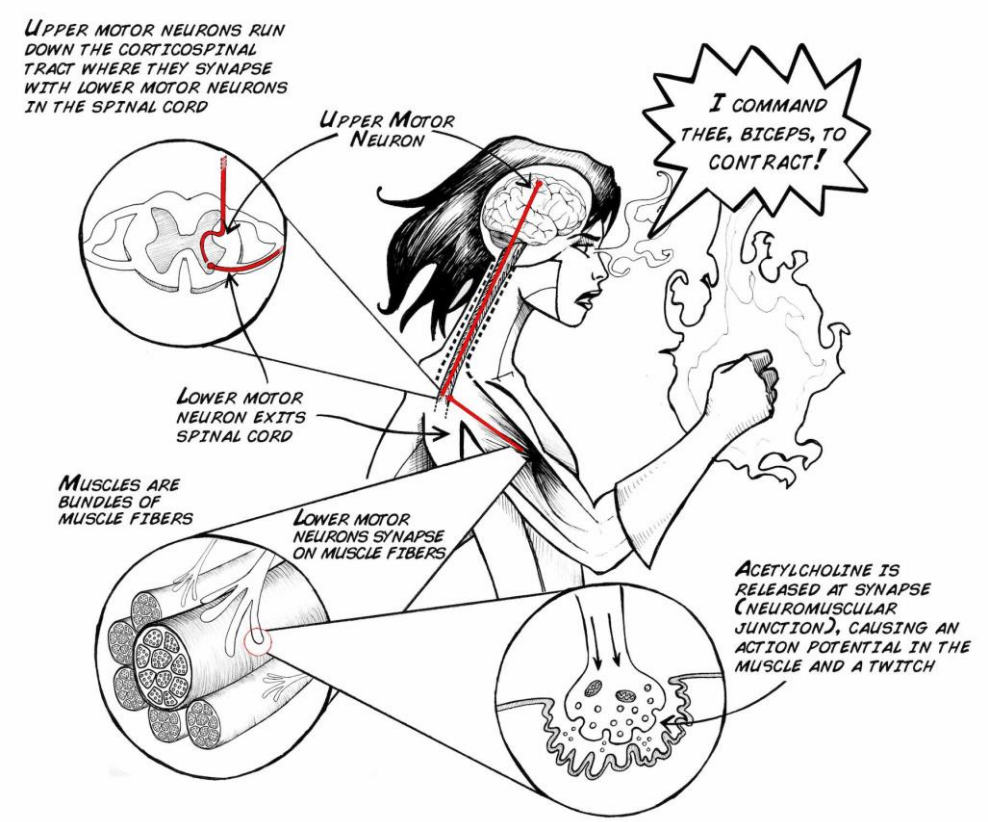
Red blood cells are by far the most numerous and are about 0.007mm in diameter. White blood cells are slightly larger but are much harder to see and require a cell stain or oblique illumination (achieved by adjusting the angle of the light beneath the slide). There is usually only about one white blood cell for every 1,000 red blood cells. If your smear is freshly prepared, the cells should be free-floating in plasma under the cover slip and all of the blood cells will still be alive.

MEASURING MUSCLE ELECTRICAL ACTIVITY USING EMG SPIKERBOX

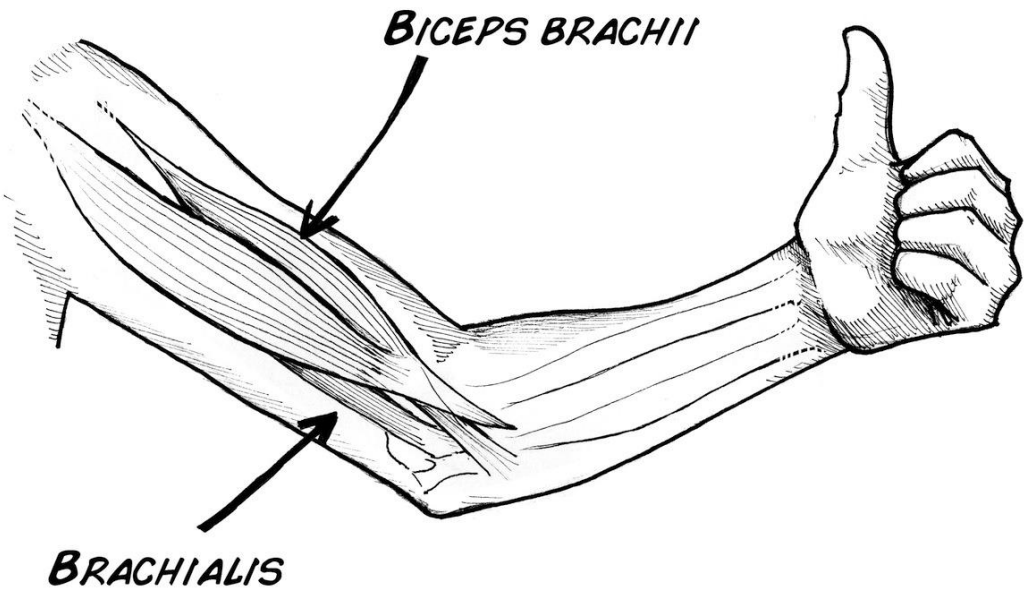
(Material Source of material: https://backyardbrains.com/experiments/emgspikerbox)

Equipment: EMG SpikerBox. Electrodes, gel, Android phones

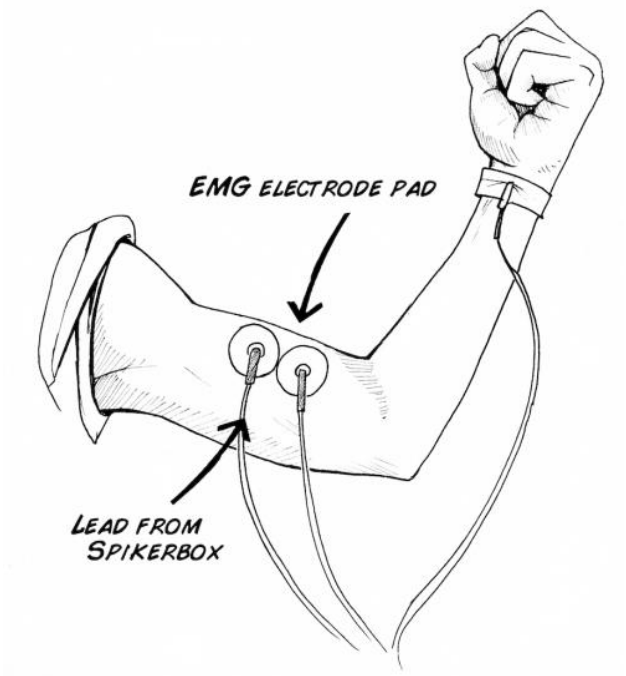
Brain-Muscle relationship



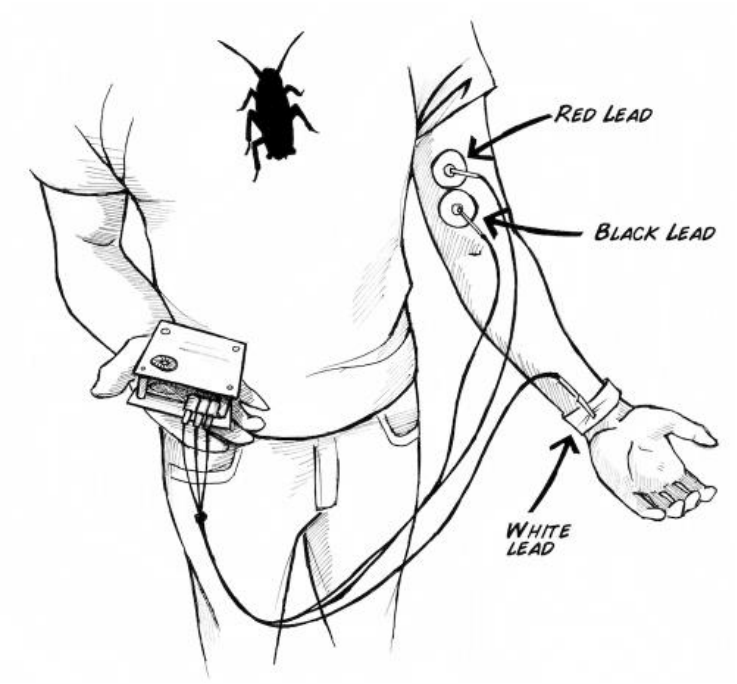
In this experiment, we are going to record the group activity of 1000's of muscle fibers within the bicep muscle.



1. Remove the sticky backing from your EMG electrodes, and place these surface electrodes on two sides of your bicep.



2. Hook up the EMG SpikerBox leads (the red and black alligator clips) to the two surface electrodes on your bicep.



3. Place the reference electrode (White) anywhere on the body. In the figure above it is shown attached to a metal bracelet near the wrist.
4. Turn on the EMG SpikerBox and listen for changes in activity. Do you notice a difference when you flex your muscles?
5. Plug in your SmartPhone (with the Backyard Brains free Android apps installed). Pick up something heavy. Do you see and hear a difference? The "Whoosh" is the sound of many action potentials occurring in your muscles as the muscles contract. You are listening to the conversation between your brain and muscle!