Mr. Ulrich
Biology

Name:..Block:.....................

Lab #:.....................

*Note:
This lab, indeed, this whole concept has absolutely nothing to do with the movie *Osmosis Jones*

"Incredible shrinking onion cells!"

ADVENTURES IN OSMOSIS

Background: Water readily diffuses through a selectively permeable membrane. The net movement of water molecules is from regions of high concentrations to regions of low concentration. The diffusion of good ol' H_2O is so important (remember how much of you is H-juice, ya big water bag!) it gets its own term: OSMOSIS. When water diffuses, it follows the same direction down the concentration gradient as anything else that can pass through the membrane. The trick to predicting the net direction of the movement of water is to know the relative concentrations. Solutions that have a lot of stuff dissolved or *solute* in them have less water or *solvent* in them compared to solutions that don't have as much dissolved in them. Think of fountain soda. The less ice (solute); the more soda (water). It's the same with cells in saline solutions. When a cell that is only 5% solute is placed in a solution that is 10% solute (hypertonic to the cell), water moves out of the cell; cell shrinks. This is called *plasmolysis*. If that same cell (cytoplasmically 5% solute) is placed in a 1% salt solution (hypotonic) the opposite occurs; cell swells with water. The excess water puts pressure on the inside of the cell wall and "plumps up" a plant cell. This pressure is called *turgor*.

Purpose: Observe the effects of external water concentrations on plant (red onion) cells.

Pre-Lab Questions: Define the following in five words or less:

osmosis	hypertonic
cytoplasm	hypotonic
solute	turgor
solvent	plasmolysis

Why is it more economical to get soda with no ice at the diner?

Procedure:

A. Prepare a wet mount of red onion buy first removing an epidermal layer from between the leaves of a red onion by snapping a section backwards, peeling away the red dermis and carefully placing it flat on the middle of a clean slide.
B. Add a drop of water to the specimen and carefully lower a coverslip onto the slide, trapping as few air bubbles as possible.

C. Focus under low and then high power draw and label diagram of **one cell** in the space below. The cytoplasm should appear light purple.

<u>Label the following:</u>
cell wall

nucleus?

central vacuole

cytoplasm

D. Describe the distribution of the cytoplasm in this cell.

E. While looking at the cell through the microscope, have your partner drop one drop of hypertonic salt solution on the slide next to the coverslip so that capillary action (remember that?) draws it underneath. Give it a few moments. Try moving the slide to the side that got the salt solution. Remember the image flip!!

F. Describe what happened to the cells. Where is the cytoplasm now?

G. Draw and label a diagram of a single cell in the hypertonic solution

<u>Label the following:</u>
cell wall

nucleus?

cytoplasm

cell membrane

H. Repeat step E only this time use the hypotonic solution (distilled water).

I. Did the cells change back? Give an osmotic explanation as to why or why not.

<u>Conclusion questions:</u> Please answer the following questions using complete sentences on a separate sheet of paper. Typing is appreciated! Thanks.

1. Using the principles of osmosis, account for the changes you observed when the onion was exposed to the hypertonic salt solution.

2. Elodea, the aquatic plant we looked at in the “We Are Not Plants” lab, can live intact in hypotonic solution. Why don’t the plant cells burst open?

3. What would happen if blood cells were put into the same hypotonic solution? Why?

4. On a cellular level, why can’t you drink sea water? What would happen osmotically?