Name: _____Period: _____ Date:_____

Lab 4 - Cool as a Cucumber

Purpose

To observe the process of osmosis by exposing plant cells to air, to distilled water and to a concentrated salt solution.

Background

Osmosis is the movement of solvent molecules through a selectively permeable membrane into a region of higher solute concentration, aiming to equalize the solute concentrations on the two sides of the membrane. The movement of solvent is from the less-concentrated (*hypotonic*) to the more-concentrated (*hypertonic*) solution, which tends to reduce the difference in concentrations.

Osmosis is important in biological systems, as many biological membranes are semipermeable. Osmosis provides the primary means by which water is transported into and out of cells. The turgor pressure of a cell is largely maintained by osmosis, across the cell membrane, between the cell interior and its relatively hypotonic environment. When a cell is submerged in water, the water molecules pass through the cell membrane from an area of low solute concentration (outside the cell) to one of high solute concentration (inside the cell). The cell membrane is selectively permeable, so only necessary materials are let into the cell and wastes are left out. When a plant cell is placed in a hypertonic solution, the water in the cells moves to an area higher in solute concentration and the cell shrinks. This can be seen by putting potato slices into to a high concentration of salt solution. The water from inside the potato moves to the salt solution, causing the potato to shrink and to lose its turgor pressure. The more concentrated the salt solution, the greater the reduction in the size and the weight of the potato slice.

Materials

3 Cucumber Slices	3 Petri dishes
Elodea	balance
distilled water	salt solution
paper towels	marking pencil

Procedure

1. Label bottoms of Petri dishes “A”, “B”, “C.”

2. Weigh the first cucumber slice. Record its mass in your data table.
   - Describe the texture as *stiff, crisp; slightly limp, or limp, soft* in your data table.
   - Place the slice in Petri dish “A.”
   - Repeat the procedure for the second slice. Place in Petri dish “B.”
   - Repeat the procedure for the third slice. Place in dish “C.”

3. Add enough distilled water to Petri dish “A” to completely cover the cucumber. Place lid on dish.

4. Add enough salt solution to Petri dish “B” to completely cover the cucumber. Place lid on dish.

5. Leave the slice in Petri dish “C” open to the air. ADD NO LIQUID.

6. Predict what you think will happen to each slice. Record on chart.

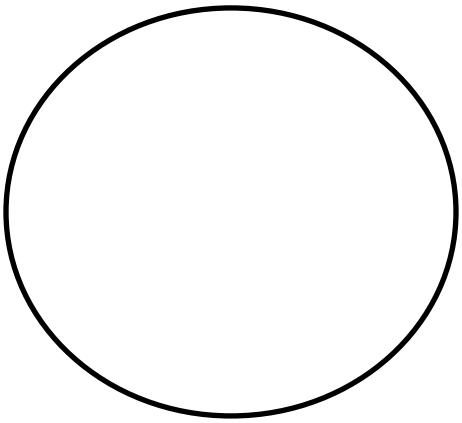
7. Wait 20-40 minutes.

8. **While waiting, perform the following investigation**:
Prepare a salt water wet mount of an Elodea leaf. Likewise prepare a freshwater wet mount of the same type of leaf. Focus and draw what you see in the “microscope results” section on the next page.

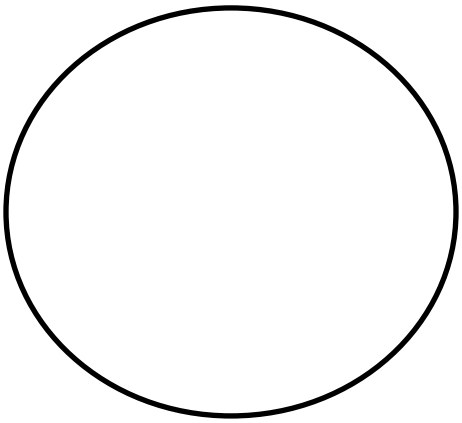
9. Remove slice A, pat gently with paper towel, weigh and record its mass in your data table. Repeat with slices B and C.

10. Observe the texture of each slice as you remove it from its respective Petri dish. Record the “texture after” in your data table.

Microscope Results



Salt water wet mount



Freshwater wet mount

1. What is different about the cells on the two slides?

_____
_____

2. Explain these differences using the principle of osmosis.

_____
_____

Cucumber cells Results:

1. Calculate the difference in mass. Record in data table.

2. Calculate the % change in mass, using the formula below. Record in data.

Difference in mass
_____ *x 100 =* _____ *% of change*

Mass before

Prediction Chart

Slices	Predictions
"A" in Distilled Water	
"B" in Salt Water	
"C" in Air	

Data Table

Slices			
	A	**B**	**C**
Texture Before			
Texture After			
Mass Before (g)			
Mass After (g)			
Difference In Mass (g)			

% of Change			
Slice			
Change			

Analysis

1. Describe the texture of the cucumber slice left in Petri dish “A” (soaked in distilled water) after 30 minutes. Has it changed? If so, how?

_____
_____
_____

2. Describe the texture of the cucumber slice soaked in Petri dish “B” (soaked in salt water) after 30 minutes. Has it changed? If so, how?

_____
_____
_____

3. Describe the texture of the sliced cucumber in Petri dish “C” after 30 minutes. Has it changed? If so, how?

_____
_____
_____

4. Does the slice in Petri dish “B” have more or less turgor pressure (stiffness) that the slice left open to the air (Petri dish “C”)? Explain the difference.

_____
_____
_____

5. Compare your actual results with your predictions.

“A” _____
_____

“B”_____
_____

“C”_____
_____

6. What conclusions can you make from the results?

_____
_____
_____
_____
_____
_____
_____