

Cell Structures: Osmosis in Elodea

Osmosis is the movement of water in response to solute concentrations. Water will always move to the region of higher solute concentration. In this activity you will examine the movement of water using leaflets of the alga Elodea. Elodea is a fresh water alga and is commonly used in the aquarium trade. In many more temperate areas it has become a pest plant.

Here are some quick bullet points relevant to this activity.

1. Elodea is a plant and as such its cells are enclosed by cell walls.
2. The leaflet has several visible plant organelles including the central vacuole, nucleus and chloroplasts.
3. Under isotonic conditions water moves into and out of a cell at the same rate. There is no net movement of water.
4. Under hypertonic conditions, the solute concentration in the environment is greater than the solute concentration of the cell's cytoplasm, therefore water flows from the cell into the environment. The plasma membrane will collapse and the cell may shrivel.
5. Under hypotonic conditions, the solute concentration in the environment is less than the solute concentration of the cell's cytoplasm, therefore water flows from the environment into the cell. The central vacuole enlarges and the plasma membrane presses against the cell wall. The cell is turgid.

In this activity, you will be immersing an Elodea leaflet first in distilled water and then in a salt water solution. Write your hypothesis for this activity here: _____

Materials

Elodea
10 % NaCl solution
Distilled water

Microscope slide
Coverslip
Paper towel

Procedure

Wet mount of elodea

1. Remove a clean slide and coverslip from the materials box on the bench.
2. Add a small drop of water to the center of the slide.
3. Select a leaflet from the alga Elodea. Pick a leaflet from the growing tip.
4. Suspend the leaflet in the drop of water.
5. Pick up the coverslip and slide it across the slide at a 60 degree angle. Once the coverslip hits the drop, let the coverslip drop on to the specimen. Angling the coverslip, rather than dropping the coverslip flatly onto the specimen minimizes the air bubbles that form under the coverslip.
6. Place the slide on the microscope. Start with the scanning objective (4X). Then proceed to the 10X objective.
7. You will see distinct green ovals within the leaflet. Those are the chloroplasts. Watch the leaf for a few minutes. What do you see? Are the chloroplasts moving? If so, that is called cytoplasmic streaming. The cytoskeleton is moving the chloroplasts around the cell. Where are the chloroplasts? Are they equally

distributed throughout the cell or are around the periphery? How do you explain this observation?

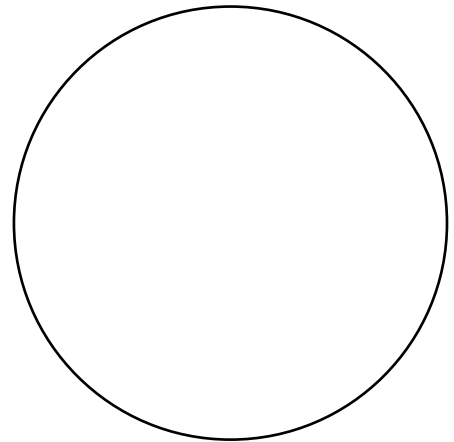
9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.

10. Draw at least 5 cells in your lab report. Remember to exaggerate the size of the cells. Label the cell wall, plasma membrane, chloroplast, nucleus, and cytoplasm. Make sure to include the magnification.

Specimen: _____

Magnification: _____

Description: _____



11. After making your observations and completing your drawing of Elodea cells remove the slide from the microscope and place it on your desk. Gently lift the coverslip. You may want to use a paper towel to absorb some of the water from your wet mount, but that is not necessary. Be careful not to wipe off your leaflet.

12. With the coverslip raised add a drop or two of 10 % NaCl onto the Elodea leaflet.

13. Replace the coverslip. Allow the slide to sit on your desk for 5-10 minutes.

14. Place the slide on the microscope. Start with the scanning objective (4X). Then proceed to the 10X objective.

15. What do you see? Are the chloroplasts still there? Where are the chloroplasts? Are they equally distributed throughout the cell or are they located around the periphery? Are the chloroplasts moving? How do you explain this observation?

9. Continue increasing magnification until you reach 400X. Don't forget to adjust the light levels as you increase magnification.

10. Draw at least 5 cells in your lab report. Remember to exaggerate the size of the cells. Label the cell wall, plasma membrane, chloroplast, nucleus, and cytoplasm. Make sure to include the magnification.

Magnification: _____

Description: _____

A large, empty circle with a thin black outline, centered on the page. It occupies most of the width and height of the drawing area.

1. How would you describe the distilled water environment with respect to the cells in Elodea? (isotonic, hypotonic, hypertonic) In which direction was water moving, into or out of the cells?
2. How would you describe the 10 % NaCl environment with respect to the cells in Elodea? (isotonic, hypotonic, hypertonic) In which direction is water moving?
3. Was your hypothesis supported? Why or why not?
4. Name the independent variable.
5. Name the dependent variable.