

Name:**“Living Membranes”**

Laura and Bill were in the library one day and Laura was looking through a book on magic tricks. She found one interesting trick that she read to Bill. The trick explained that if you put a chicken egg in vinegar for a couple of days, the egg will become soft and get larger.

Laura and Bill were curious why this would happen. They knew that vinegar is an acid and if you put a chicken egg in vinegar for a long time, the acid will react with the calcium in the egg shell so that the shell will break down and the egg will get soft. Since a chicken egg is one large cell, all that would remain is the egg's membrane and the internal structures of the egg cell.

But *why* would the egg cell get bigger? Laura and Bill predicted that it might have something to do with the concentration of stuff in the vinegar compared to the concentration of stuff in the egg cell and the movement of water through the cell membrane.

They wanted to investigate this hypothesis, but they didn't want to wait for vinegar to remove the shell from an egg. Instead, they decided to investigate their idea with Elodea plant cells by putting the Elodea cells in a solution of salt water.

Your task will be to investigate Laura and Bill's question. The experimental question that you will investigate is **What effect does salt solution have on Elodea cells?**

Observations:

Follow the directions to prepare a microscope slide:

- Place an Elodea leaf in the center of a microscope slide.
- Put a couple of drops of water on the leaf.
- Touch one edge of the top slide or cover slip to the drop of water, then carefully lower it over the leaf. Blot any leaks and place the prepared slide on the stage of your microscope.

1. Observe the Elodea leaf under the microscope at low and high power. Draw your field of view at low power and then draw your field of view at high power. In your drawings, label:

cell wall cell membrane chloroplast

Low Power Field of View

High Power Field of View

2a. Make a hypothesis that answers the question **What effect does the salt solution have on the *Elodea* cells?** Justify your hypothesis by using your knowledge of cells and diffusion.

2b. If your hypothesis is supported by evidence from your experiment, make a prediction how the *Elodea* cells will change in the salt solution.

Setting up and Conducting the Experiment

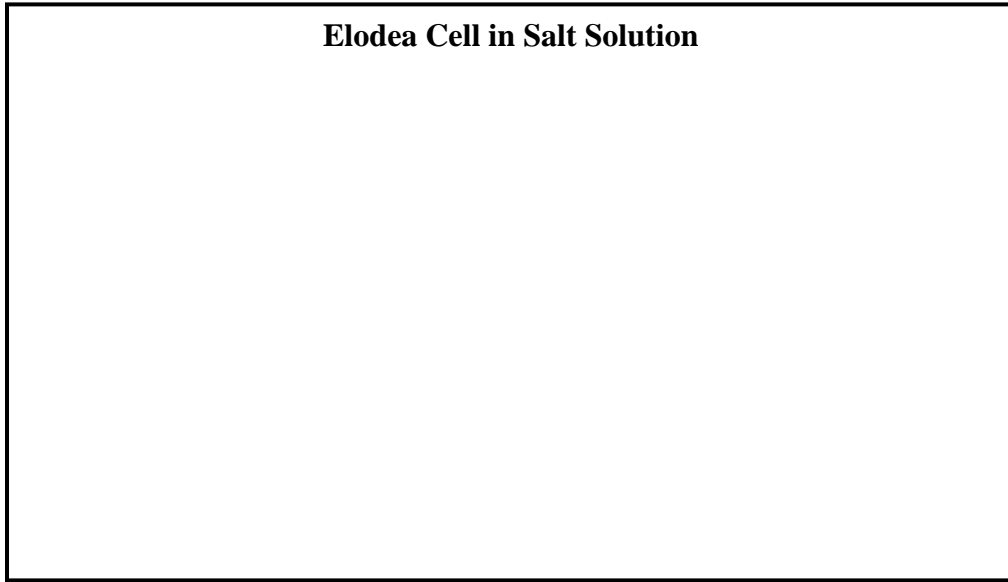
In order to test your prediction, you will use the following materials:

- | |
|--|
| Materials |
| <ul style="list-style-type: none">▪ Microscope▪ Glass microscope slide▪ Microscope cover slip▪ 5% salt solution▪ Elodea leaf▪ Water▪ Eye dropper |

Follow these steps to test your hypothesis:

- a. Use the prepared Elodea slide that you made for question 1 or prepare a new slide.
- b. Focus on Elodea cells using high power.
- c. Put a few drops of salt solution on one side of the cover slip and a small piece of paper towel on the other side of the cover slip (the paper towel will draw the salt solution into the Elodea leaf sample).

3. View the Elodea cells under the microscope at high power and record your observations below.



4. How do your results compare with your predictions? Explain your answer by using your knowledge of cells and diffusion.

5. Examine your experimental set-up and results carefully. Name one possible error an experimenter could make and explain how this error could affect your experimental outcome.

6a.) What additional question about the movement of water into and out of a cell could you investigate with an experiment.

6b. Design an experiment that would test your question.

7. Explain to Laura and Bill why the egg behaves the way it does in the vinegar.

8. Sometimes sailors would run out of fresh water while making a long journey across the ocean. Many would drink saltwater that caused them to die faster than if they didn't drink anything at all. Use the results of your experiment to explain how this could happen?
