

2. On the basis of your smell test, did the vanilla extract molecules pass through the balloon?
3. Although a balloon membrane is much thicker than a plasma membrane of a cell, both can be described as nonpolar membranes. Nonpolar membranes repel charged particles and polar molecules but let nonpolar (fat soluble) molecules pass through. Use this information to suggest a hypothesis that explains your observations.
4. Why can polar water molecules pass through a cell's plasma membrane?

PART C Osmosis and the Living Cell

Procedure

16. Place a leaf from the growing tip of an elodea plant in a drop of water on a clean slide. Add a coverslip and examine under low power. Position the slide so that the cells along one edge of the leaf are near the center.
17. Switch to high power, and focus sharply on a few cells near the edge of a leaf. Place a small piece of absorbent paper at the edge of the coverslip opposite the side of the leaf you are observing. (Remember, directions are reversed when you look through a microscope.) Have your lab partner place several drops of glucose solution at the coverslip edge nearest the part of the leaf being observed. Use the fine adjustment to adjust the focus while the water is being replaced. Continue observing the cells until you see changes in them.
18. Make simple sketches showing cells both before and after the glucose solution was added.
19. Remove the glucose solution, and replace it with distilled water. Use a new piece of absorbent paper, and allow 2 or 3 drops of distilled water to flow across the slide into the paper to make sure that most of the glucose solution is washed away. Make observations while this is being done.
20. Exchange places with your lab partner. Repeat steps 17–19.
21. Repeat steps 17–19 with salt solution in place of the glucose solution.

Analysis

1. Did water move into or out of the cells while the leaf was surrounded by the glucose solution? by the salt solution? What evidence do you have to support your answer?
2. In which direction did water move through the plasma membrane when the cell was surrounded by distilled water?
3. What do you think would happen to elodea cells if they were left in the glucose solution for several hours? Could elodea from a freshwater lake be expected to survive if transplanted into the ocean? (Assume that the salt concentration of the ocean is about the same as the salt solution used in this experiment.)
4. An effective way to kill plants is to pour salt on the ground around them. Using principles discovered in this investigation, explain why the plants die.
5. Bacteria cause food to spoil and meat to rot. Explain why salted pork, strawberry preserves, and sweet pickles do not spoil even though they are exposed to bacteria. Name other foods preserved in the same manner.


PART D Membranes in Living and Dead Cells

Procedure

22. Place one drop of yeast suspension on a slide, add a coverslip, and observe the yeast cells under low power and then high power. Describe what you see, and sketch two or three cells to show their general appearance.
23. Place about 1 mL of yeast suspension in each of two small test tubes. Label one tube *boiled* and the other *unboiled*. Heat one of the test tubes in a beaker of boiling water until the contents have boiled for at least 2 minutes. This action will kill the yeast cells. Allow the test tube and its contents to cool for a few minutes.

WARNING: Use test-tube clamps to hold hot test tubes. Boiling water will scald, causing second-degree burns. Do not touch the beaker or allow boiling water to contact your skin. Avoid vigorous boiling. If a burn occurs, immediately place the burned area under cold running water; then call your teacher.

24. Add 5 drops of brilliant cresyl blue solution to the boiled yeast suspension and 5 drops to the unheated yeast suspension.

 **CAUTION: Brilliant cresyl blue solution is a mild *irritant*. Avoid skin/eye contact; do not ingest. If contact occurs, flush affected area with water for 15 minutes; rinse mouth with water; call your teacher.**

25. Label one microscope slide *boiled* and another *unboiled*. Prepare a slide from each test tube and examine under high power. Record any differences between the yeast cells in the two suspensions.
26. Wash your hands thoroughly before leaving the laboratory.

Analysis

1. What effect does heat seem to have on the yeast plasma membrane?
2. In a preparation of unheated yeast solution and brilliant cresyl blue, a few blue yeast cells are usually visible. What assumption can you make concerning these cells?
3. Which passes more easily through membranes of living cells, brilliant cresyl blue molecules or water molecules? Develop a hypothesis to account for your observation and answer.