

Plasmolyzed Purple Onion

Introduction

Demonstrate the effects of osmosis on a plant cell.

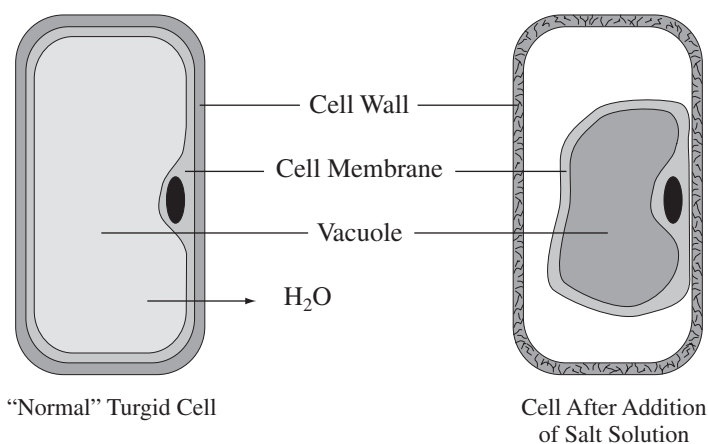
Concepts

- Osmosis
- Diffusion
- Plant adaptations
- Turgor pressure

Background

A plant cell generally maintains a solute concentration that is hyperosmotic to its surroundings. Consequently, water diffuses in and presses the cell membrane against the cell wall. The resulting turgor pressure keeps the cell rigid. Many plants depend on this cell rigidity to remain upright. If turgor pressure falls, the plant wilts.

The epidermis of the purple onion contains an anthocyanin pigment in the vacuoles of its cells. The purple pigment makes it easy to observe the shrinking vacuole and plasma membrane when a cell loses turgor. In this demonstration, the epidermal cells will be exposed to a hyperosmotic salt solution causing water to diffuse out. The plasmolyzed cells will show a dense cluster of purple pigment in the vacuole that has shrunk away from the cell wall.



Materials

Purple onion
Salt solution, NaCl, 10%
Water, distilled
Forceps

Microscope
Microscope slides and cover slips
Paper towels
Video or digital microscope and monitor

Safety Precautions

This activity is not considered hazardous, but always follow appropriate laboratory safety rules.

Preparation

Make a wet mount of purple onion epidermis. Use the thin purple outer layer (epidermis) of one of the bulb's leaf scales. Peel a piece off with forceps and place it in a drop of distilled water on a slide. Place a cover slip on the sample. Focus on the cells using low or medium power.

Procedure

1. Observe the purple epidermal cells and the cell wall.
2. Closely observe the cell membrane pressed against the cell wall.
3. Add a drop of the salt solution on the microscope slide next to the edge of the cover slip. Use a paper towel on the opposite edge of the cover slip to pull the salt solution under the cover slip.
4. Refocus the sample if necessary.

5. Observe the vacuole and the cell membrane shrink away from the cell wall.
6. Repeat steps 2–3 alternating between distilled water and the salt solution.

Disposal

Throw the onion epidermis in the trash according to Flinn Suggested Disposal Method #26a.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Evidence, models, and explanation
Constancy, change, and measurement

Content Standards: Grades 5–8

Content Standard A: Science as Inquiry
Content Standard C: Life Science, structure and function in living systems, regulation and behavior

Content Standards: Grades 9–12

Content Standard A: Science as Inquiry
Content Standard C: Life Science, matter, energy, and organization in living systems, behavior of organisms

Reference

This activity was adapted from A Demo A Day—A Year of Biological Demonstrations, Bilash, Borislav, Shields, Martin ; Flinn Scientific: Batavia, IL (2001), pgs 130 and 131.

Materials for *Plasmolyzed Purple Onion* are available from Flinn Scientific, Inc.

Catalog No.	Description
ML1382	Cover Slips, Glass
ML1381	Microscope Slides, Glass
W0001	Water, Distilled
S0063	Sodium Chloride, 500 g

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.