



EXPLORE PLANT CELLS

DISCOVER PARTS OF A CELL AND THEIR FUNCTIONS

INTRODUCTION

10 min

Students investigate vegetable peels to see that plants are made of cells and how cells connect to make living organisms. They will explore how cells have organelles inside them. They will identify cell walls, the nucleus of a tomato cell, and vacuoles in potato cells.

The biologist, searching into the mystery of life, probes more deeply and studies, of necessity, smaller bits and happenings... in encyclopaedic summary; what is known of a cell, or of part of a cell, may fill a volume.

– E.J.H. Corner

Say: "Sometimes, in class, you work alone on independent work. At other times, you work together as a group. Each student comes together with their own special job, or function. All of you contribute to the success of the project, job, or task. Different parts of a cell contribute to how the cell functions as a whole, both separately and together with other structures. We are going to investigate plant cells and see how organelles, or smaller parts inside a cell, help the cell survive."

READING TIME

30-40 min

Read the article:

Read the article with organelle images about organelles. Say: "We are learning about the basic structure of plant and animal cells, and these eukaryotic cells contain organelles (tiny organ-like compartments). Some organelles have their own membrane, which is similar to the plasma membrane. Each organelle has a specific function within the cell that helps it survive." Discuss how the vacuole and chloroplast are also only found in plant cells, and that cell walls are usually only found in plants. Let students color, take notes, and ask questions.

STEM TIME

50-80 min

Explore plant cells through vegetable peels

Say: "We will now see how cells connect to make living organisms and that cells have organelles inside them. We will be able to identify cell walls, the nucleus of a tomato cell, and vacuoles in potato cells. We will carefully prepare cross sections and may need dye to help us see everything clearly. And of course, we need Meeka!" Explain to students that they are venturing into extremely detailed scientific study today. The methylene blue will dye the outside of the cell walls making them easy to see. The red iodine will get inside the cells and dye the organelles and cytoplasm. Without any dye, it can be difficult to see individual cells. Get your students excited about this STEMtaught adventure by modeling enthusiasm yourself! Ask them to brainstorm how they could measure the cells.



STEM TIME

Materials:

- 2 potatoes + 2 tomatoes
- 1 other fruit/vegetable
- Peelers
- Trash bag table cloth (one per student group station)
- Dye (methylene blue and red iodine)
- Meeka microscope
- Petri dishes
- Student lab sheet
- Mezzie measuring tape

Instructions:

Note: This lab will require you to bring and prep materials. Please watch the teacher prep movie before this lab: <https://youtu.be/SO-VAgXL194>

Please also read the lab assistant sheet.

Please save the student lab sheets for the Explore Plant Cells Day 2 lab day. This is when they will fill in the third circle.

1. Read the informational text and lead a class discussion.
2. Show students the class movie while you prep for the lab.
3. Demonstrate how to use a peeler safely (peel away from the body) and how to take a sample (a very thin slice so light shines through) and remind students that one small drop of dye is all they need.
4. Distribute the student lab sheet.
5. Let students begin their adventure! Remember, students will peel their own peelings, use the dye, and observe their samples with 2X and 4X objective lens settings and bottom lighting.
6. Help students explore their samples and share their findings. Let them enjoy the process and motivate them to make detailed drawings. Ask students to write about what they see and use the target vocabulary. Celebrate their wins! Remember to continue emphasizing the key concepts by asking questions. For example, you might ask: "Did you see anything inside the cells? Were the cells flat or did they have volume? Were they connected? What did the dye do?" Answers are: **In the tomato cells the nucleolus is visible as a red-orange ball within the clear cytoplasm. The potato cells were full of organelles called vacuoles which hold and store starch for the potato. Cells are 3-dimensional, not flat. They are full of fluid, cytoplasm, and organelles. The methylene blue dyes the outside of the cell walls making them easy to see. The red iodine gets inside the cells and dyes the organelles and cytoplasm. Without any dye, it can be more difficult to make see individual cells.**
7. For students looking for additional engagement, pose the question of how they might be able to measure the cells. Ask them to measure the total surface of their field of vision through the microscope, and then count across to see how many cells they can see. With simple division, they will be able to see how large (or small) a cell typically is.

Note: If you feel many of your students would benefit from this critical thinking exercise and are ready for it, you can dedicate a completely separate lab day for this. However, if you feel your students aren't yet ready, it is perfectly acceptable for only some of the students to complete the measuring activity. The focus of this lab is to discover parts of a cell, not measure them, and they can explore plant cells in many ways!

Clean up

Have students carefully put away their microscopes and Mezzie measuring tape, rinse out their petri dishes and discard the unused materials.

CLEAN UP

5 min

