

The Mystery of the Disappearing Cells

Organizing Topic Investigating Cells

Overview Students apply the knowledge about cells that they have gained through the previous lessons to a “real-life” experience.

Related Standards of Learning 5.1f, g; 5.5a

Objectives

The students should be able to

- design an investigation to make observations of cells;
- compare and contrast plant and animal cells and identify their major parts and functions.

Prerequisite Understanding/Knowledge/Skills

- The students should be able to name the cell parts and their functions.
- The students should be able to identify similarities and differences of plant and animal cells.
- The students should understand food webs and chains.
- The students should know how to record and represent collected information.

Materials needed

- Sets of cell pictures (described below)

Instructional activity

Content/Teacher Notes

In this lesson, students will be given a mystery to solve, based on their knowledge of cells. To solve the mystery, they need to know the difference between plant and animal cells. The scenario provided is just a suggestion; you may choose to write your own story to suit your students.

For each small group of students, prepare a set of cell pictures; each set should contain one zooplankton picture and multiple phytoplankton pictures. Each picture should look like it was taken through a microscope — i.e., it should be a close-up cut into a circle, resembling the view one would have through a microscope. Use only those pictures of phytoplankton that clearly show a cell wall.

Introduction

1. If necessary, review with the class the knowledge about cells gained in the previous two activities.

Procedure

1. Tell the students they are going to play the part of crime scene investigators solving a crime. Set up a scenario for them, such as the following:

Scientists have discovered evidence of a previously unknown kind of plant life. They believe this is the basis of a food chain that is very important to the survival of all human beings. They have been investigating the plant life and have found out that without this food source, human life could become extinct. It truly is a matter of life and death!

Because of the importance of this discovery, the lab in which these investigations have been taking place has been under very heavy security, including access to the lab only through palm print identification. Nevertheless, when the scientists arrived at the lab yesterday, they were shocked to find only one cell left, all the others having disappeared! There were no signs of forced entry, and there

were no fingerprints that could not be accounted for. It is possible, however, that the perpetrators may have used some of the plastic gloves that were sitting on a shelf.

Were the cells stolen? If so, by whom? Was it an inside job? Or is there some other explanation for their disappearance? Are there more examples of this plant life available to the scientists, and if there are, where can they be found? Fortunately, the scientists had microscopes with digital cameras attached, and they still have pictures of the cells that were stolen.

2. Put the students into small groups, and give each group a set of cell pictures. Answer any questions they may have before allowing them to begin their investigation.
3. Have student groups decide what they will need to do in order to solve the mystery. Students should conclude that first they need to study what they have — the pictures of the cells taken by the scientists. Tell the groups that they must record in a scientific manner the information they find through their observations and they must organize their data carefully on a chart of their own design. Only then will the mystery begin to unravel.
4. Have student groups conduct observations, record data, and draw conclusions.

Observations and Conclusions

1. Through their investigation, students should identify the phytoplankton as plant cells. When making observations of the zooplankton, they should observe that this cell has no cell wall and that therefore, this organism is not a plant but is an animal. Some students may come up with hypotheses that are not based on their observations, and they will need to be reminded that all the evidence they need to solve the mystery is right in front of them and that inferences about what happened should be based *only* on observations of this evidence. From this, they should be able to infer that the animal cells ate the plant cells; thus there was no robbery!
2. List on the board all student observations about the cells. Then list the inferences they have made, making sure they go back to their observations. This may take a while because students will make inferences that are not based on their observations. When a group or two has come up with the correct answer, tell them that the plant cells are phytoplankton, the basis of the food chain in the ocean, and that the animal cell is zooplankton, which eats phytoplankton. Explain that while the scientists were collecting their specimens, they also collected the zooplankton by mistake and did not notice it until it was too late.

Sample assessment

- Have student groups present to the class their hypotheses of what happened as if they are presenting it to the group of scientists who are missing the cells. Be sure they back up their hypotheses with facts and use their observation chart as evidence.
- Have students write to the scientists, stating their hypotheses, their observations, and their conclusions.

Follow-up/extension

- If the students demonstrate interest in this activity, take it a little farther and have them investigate what food chain the plants produce. Have them hypothesize what would happen to the world's food supply if phytoplankton really did disappear off the face of the Earth.

Specific Options for Differentiating This Lesson

Technology

- Have the students record their data on dry erase boards or charting software.

- Have transparencies made of the cell choices, so the teacher can recreate the activity as a summarizing activity at the end of the lesson.

Multi-sensory

- Have the teacher put a variety of animal and plant cells on sticky notes and place one sticky note on each child's back.
 - When all students have a sticky note on their backs, they are to get up and move around the room asking each other questions about their cell. The questions students might ask of other are:
 - “Do I have a cell wall?”
 - “Do I have a nucleus?”
 - “Do I have a cell wall? “
 - “Do I have a cell membrane?”
 - “Do I have a vacuole?”
 - “Do I have a chloroplast? “
 - “Do I have a cytoplasm?”

Community Connections

- Have the students collect pond or stream samples in the community and take them back to the classroom to examine under the microscope.

Small Group Learning

- Have the students determine whether they see plant or animal cells in their water samples from their community trip. They can work in pairs and draw what they see under the microscope, label their pictures as plants or animals, and identify the parts of the cells they see in their sample.

Vocabulary

- Provide students with different pictures, functions or names of cell parts of plant or animal cells on a piece of cards. Draw two columns on a poster board and label them animals and plants. The students will be instructed to organize the picture cards into one of the two a columns using the paper they received from the teacher. Each group will be instructed to hold up their posters for peers to evaluate whether they have been correctly placed in the diagram.

Student Organization of Content

- Have students make a diorama with two sections. They should make a model of a plant cell and an animal. The diorama should include a key that labels the parts of the cell.