

Life Science: Protists and Fungi

Teacher's Guide

Grade Level: 6–8

Curriculum Focus: Life Science

Lesson Duration: 1–2 class periods

Program Description

There are approximately 50,000 species of fungi. Many have symbiotic relationships with other plants and animals. From ants that “farm” fungus to lichens, which are a combination of algae and fungi, these organisms benefit from each other. Most types of algae belong in the protist kingdom. Pfiesteria algae become toxic under certain conditions, killing fish. The protozoan that causes malaria spreads the deadly disease from person to person by mosquito bite. But many types of fungi and protists are beneficial. Yeast is one example. Another is the bacteria-killing ability of molds, from which the first antibiotics were derived.

Discussion Questions

- What is a fungus and how does it reproduce?
 - What is symbiosis? Give an example of a symbiotic relationship.
 - What are lichens and how does the partnership between the lichen organisms help them survive?
 - What causes malaria, and how is it spread?
 - Explain the relationship between leaf-cutter ants and fungus.
 - What is pfiesteria and what triggers its toxic effects?
 - What ability of certain molds led to the development of life-saving drugs?
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Lesson Plan

Student Objectives

- Understand what fungi and protists are.
- Discover symbiotic relationships fungi have with other organisms.
- Conduct research into symbiotic relationships and play a game that reinforces the concept.

Materials

- Paper and markers
- Scissors
- Computer with Internet access
- Print resources about fungi and symbiotic relationships

Procedures

1. One symbiotic relationship between an animal and a fungus is detailed in the video: that of the leaf-cutter ant, which “farms” fungus. There are many other such relationships in which fungi play a crucial role, and by creating and playing a matching game, your students will understand them better.
2. First you’ll need to prepare the game pieces. For each symbiotic group listed below, cut a single sheet of paper into the appropriate number of puzzle pieces. Some will have only two pieces, others three. Each puzzle should be different from the others so that students won’t have too much trouble finding their matching pieces when the time comes. Write the name of one organism from a symbiotic group on each puzzle piece. For example, one complete puzzle with three fitting pieces will have the following organisms written on each piece: oak trees, truffles, pigs. Below are five symbiotic groups for which you can make puzzles. You may need to prepare more than one set of puzzles to accommodate the number of students in your class.
 - Leaf-cutter ants, fungus
 - Algae, fungus
 - Hardwood trees, heart-rotting fungus, bats
 - Oak trees, truffles, pigs
 - Mycorrhizae hyphae, orchids
3. Divide students into two- and three-member teams, depending on how many puzzle pieces are in the group. Each team member gets one piece of the group’s puzzle. For example, one two-person team will get the puzzle pieces that have leaf-cutter ants and fungus written on them. Team members should work together to research the relationship between or among the organisms. On the back of each puzzle piece students should write a brief description of the organism’s relationship to the other group members. The following Web sites will help students find out more about the symbiotic relationships in the groups:
 - Ancient Tree Forum: The Invertebrate Fauna of Wood Decay
<http://www.woodland-trust.org.uk/ancient-tree-forum/atfecology/invertebrate.htm>
 - Fun Facts About Fungi
<http://www.herbarium.usu.edu/fungi/funfacts/factindx.htm>
 - Lovable Lichens
<http://www.earthlife.net/lichens/intro.html>



- Virtual Museum Canada: The Fungus Among Us
<http://www.virtualmuseum.ca/Exhibitions/Mushroom/English/index2.html>
 - Zoogoer: The First Farmers (leaf-cutter ants)
<http://nationalzoo.si.edu/Publications/ZooGoer/2004/4/antfarmers.cfm>
4. After teams have finished their research, collect all the puzzles and then redistribute among the students, being careful not to give a student a puzzle piece from the group he or she researched. Students are to find their matching puzzle pieces, put them together and read about the symbiotic relationship described. If you like, you can repeat the matching game to give students a chance to learn about all five groups of symbiotic organisms.
 5. To follow up, ask students what would happen if any living “piece” of a symbiotic puzzle were lost. How would the other organisms in the group be affected?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students were highly engaged in class discussions; conducted thorough research; and learned about all the different groups by playing the game.
- **2 points:** Students participated in class discussions; conducted adequate research; and learned about some different groups by playing the game.
- **1 point:** Students participated minimally in class discussions; conducted minimal research; and retained little information about the different groups after playing the game.

Vocabulary

algae

Definition: A group of mostly aquatic plantlike protists that make food by photosynthesis

Context: Algae combine with fungi to form lichens.

fungi

Definition: A kingdom of organisms that feed off other organisms, have branching filaments, and fruiting bodies that produce spores to reproduce

Context: Mushrooms, yeasts, and molds are types of fungi.

hyphae

Definition: Branching filaments of fungi

Context: The hyphae of fungi can help tree roots obtain water and nutrients by extending the roots' reach.

lichens

Definition: An organism that grows on trees and rocks and is formed by the combination of algae and fungi.

Context: Thanks to the combined abilities of algae and fungi, lichens can live hundreds of years.

mold

Definition: Microscopic fungi

Context: Some mold's ability to kill bacteria led to the development of antibiotics.

protists

Definition: a group of mostly unicellular organisms that share certain characteristics with animals or plants, or both

Context: Most protists are microscopic, although they can join together to form colonies.

protozoa

Definition: Animal-like single celled organisms that are part of the protist kingdom

Context: Amoebas are one type of protozoa.

pfisteria

Definition: An alga that can become toxic and kill fish

Context: Pfiesteria causes lesions on fish and ultimately kills them.

spore

Definition: Tiny particle that is the means of reproduction in fungi

Context: To reproduce, a fungus grows a fruiting body (mushroom), which releases spores that can be carried to new locations and grow new fungi.

symbiosis

Definition: A beneficial relationship between two or more organisms

Context: The symbiosis between a leaf-cutter ant and the fungus it farms benefits both.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit this Web site:

<http://books.nap.edu/html/nses/html/overview.html#content>

This lesson plan addresses the following national standards:

- Life Science: Structure and function in living systems; Populations and ecosystems



Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/compendium/browse.asp>

This lesson plan addresses the following national standards:

- Science: Life Sciences – Understands the structure and function of cells and organisms; Understands relationships among organisms and their physical environment
 - Language Arts: Viewing – Uses viewing skills and strategies to understand and interpret visual media; Writing – Uses the general skills and strategies of the writing process, Gathers and uses information for research purposes; Reading – Uses reading skills and strategies to understand and interpret a variety of informational texts
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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