

IT'S THE FBI! (FUNGI, BACTERIA, AND INSECTS)

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Adapted from: PLT activity "Nature's Recyclers"

Age level: 6-12th grades

Time: 50 minutes

Overview This activity introduces participants to the process of decomposition in logs and the organisms involved using hands-on investigation and discussion.

Benchmarks Addressed

7th and 8th Grades:

CCG: Writing Applications: Expository Writing

CCG: Research Report Writing

CCG: Speaking and Listening

This activity introduces students to the important concepts of decomposition and the role of fallen logs in the forest. Students get a chance to gather data on the organisms they find in a fallen log and answer questions about decomposition using their findings.

Learning Objectives

By the end of this activity, participants will be able to:

1. Understand and describe the process of decomposition
2. Understand the importance of downed logs in a forest
3. Understand how scientists collect data to answer questions.

Materials Needed

- Paper (either in a notebook or on a clipboard) and pencils for every 3-4 students

Background Material

Plants need nutrients, like nitrogen and phosphorous, to grow and reproduce. They use their roots to gather these nutrients from the soil. But how do the nutrients get there in the first place? When plants die, their nutrients are recycled back into the environment through a process known as decomposition. Decomposers, which can include fungi, insects, and bacteria, get their energy by breaking down dead matter such as leaves, branches, trees, and animals. They return the nutrients found in the dead matter to the soil for future generations to use. Decomposers play an essential role in the forest because they keep the soil nutrient-rich. Without them, life could not continue.

As you walk down the trail, you may see many types of decomposers on and in downed logs. You may also see lichen, trees, bushes, and moss growing out of the rotting logs. These logs are often called "nurse logs" because they provide rich nutrients for the new

plants' growth. You will also see standing dead trees, called snags. These decomposing trees provide habitat for birds, such as the spotted owl, and decomposers like insects and fungi. Because they house insects, they also serve as a rich food source for woodpeckers and other animals. When they eventually fall, they will return nutrients to the ground.

In this activity, the students will be examining rotting logs. These are some examples of the creatures they may find:

Growth on decaying logs: Plants rooted in logs gain nutrients from the decay, and help break apart the dead wood as they grow. Lichens (a symbiotic partnership between a fungi and an algae), release an acid that helps break down the wood. Moss helps keep logs moist, improving the habitat for other plants and animals that need the moisture to grow. Several species of fungi break down logs to obtain the nutrients they need.

Wood-eating organisms: Sow bugs, carpenter ants, bark beetles, and termites are common scavengers that eat or burrow through decaying wood. These animals break down dead plant material by chewing and excreting it.

Predators: Centipedes, beetles, spiders, and other predators feed on the sow bugs, millipedes, and other scavengers that eat logs.

Burrowers: Many organisms make rotting logs their homes. Some beetle species may spend the winter in a rotting log, while other beetles, along with some wasps, slugs, and other animals lay their eggs in decaying wood. Newts and salamanders often spend hot days hiding in the cool, damp log. As these animals burrow into the log, they break it down further. .

Activity Description

Step 0. Preparation

0. Find a place with several fallen logs on or near the trail. Check for potential hazards such as holes or poisonous and stinging plants. Make sure to choose safe logs that are stable and will not roll.

Step 1. Getting Started: Introductions (5 minutes)

1. Ask students why the forest floor isn't covered with a deep layer of fallen trees, branches, and leaves. What happens to trees after they fall? Today, the students are going to observe fallen logs to answer these questions.

Step 2. Investigation (20 minutes)

1. Have students come up with a list of more questions that they want to explore during their study. These might include:

- How do you think the tree died?
 - How long do you think the tree has been dead?
 - What kinds of species live on the log? Does this differ from the kinds of species that live under the log or nearby in other habitats?
 - What do these animals eat?
 - If plants live on the log, how do they live without soil?
2. Divide the group into teams of three or four. The teams will each be examining a downed log and recording the types of organisms found there. They should record the number of each plant, animal, and fungi species present on the log. If they cannot identify the organisms, have them ask for help and/or draw the organism and give it a name for data collection purposes. Since they will not see every organism, they should also record evidence of animal activities such as spider webs, insect or animal holes, piles of sawdust, or patterns in the wood under the bark.
 3. Explain that students may not disturb the log during their study. They should focus on observing the organisms visible on the outside of their log. When they have finished with the log, they can observe the area around it. They should record the different types of organisms found in leaf litter, under rocks, and other nearby areas for comparison.

Step 3. Analysis and Presentations (10 minutes)

1. Have students use field guides and instructor help to identify any organisms that they were unable to identify during the study. Ask them to think about whether they answered the questions posed at the beginning. Then have each team present their data to the rest of the group.

Step 4. Gauging Understanding (10 minutes)

Discuss the following questions to help students understand the role of the organisms found during their studies.

- What were the similarities and differences between the groups' findings? Why would they differ?
 - i. (Answer: The logs may be in different states of decomposition, located in different sites, etc. For a high school science class, you could choose to focus on what this means for designing a scientific study - controlling for variables, etc)
- Which organisms were found both on the log and in nearby areas? What do those areas and the log have in common?
- What types of interactions occur between the animals and the log? (Answer: The log provides habitat, including shelter, food, a place to raise offspring, and space to live).
- Why is it important for logs to decompose? (Answer: Decomposition recycles the nutrients stored in the log. With high school groups, you can discuss the nutrient cycles in more depth).
- How does the forest ecosystem benefit from a fallen log? (Answer: The log, often called a "nurse log" provides a habitat for plants and animals that are, in turn, foods for other creatures. As animals and

plants break down the log, its stored nutrients become available for other plants and animals)

- How does the forest benefit from a standing dead tree? (Answer: These “snags” provide habitat for birds, such as the spotted owl, and decomposers like insects and fungi. Because they house insects, they also serve as a rich food source for woodpeckers and other animals. When they eventually fall, they will return nutrients to the ground.)
- In this forest there is a debate about nurse logs, snags and “widow makers,” many people think they are dangerous and want them removed. If we were to do this how might that effect the forest? (We would lose the rich source of nutrients and habitat that these logs and snags provide).

Appendix 1: Common organisms on logs

Leaf Lichen



Bark Beetle trails



Sow Bugs



Cyanide Millipede



Rough skinned newt



Shelf fungi



Termites

