Fungi and Bacteria

What Are Decomposers?

You've seen what happens to plant and animal remains. They seem to disappear, but actually they get eaten and pulled apart by many other organisms. Scavengers get food from them. These animals shred the organic matter into smaller and smaller pieces, and carry much of it away. But what happens to organic materials that scavengers leave behind?

Fungi and **bacteria** are two kinds of organisms that also feed on organic remains. They even consume the leftovers and poop of scavengers. Fungi and bacteria consume food matter still left in the remains, breaking it down even further. Fungi and bacteria are called **decomposers** because they finish the process of decomposition.

In this compost pile, molds and bacteria finish the process of decomposition that worms and other invertebrates began.

Word Connection

excrete—To rid the body of waste products.

All of the organisms **excrete** what their bodies don't need. (Worm castings are the perfect example.) That waste matter goes back into the environment as a solid, liquid, or gas—so none of it truly disappears. Fungi and bacteria remove the last of the food energy from organic remains, and release their own waste matter into the air and ground.

Fungi

Have you ever played on a grass-covered field one day and come back the next morning to find the same field suddenly filled with mushrooms? Have you opened your refrigerator to see mold growing on leftover food? Mushrooms and mold are among some of the most amazing decomposers in nature—**fungi**.

Word Connection

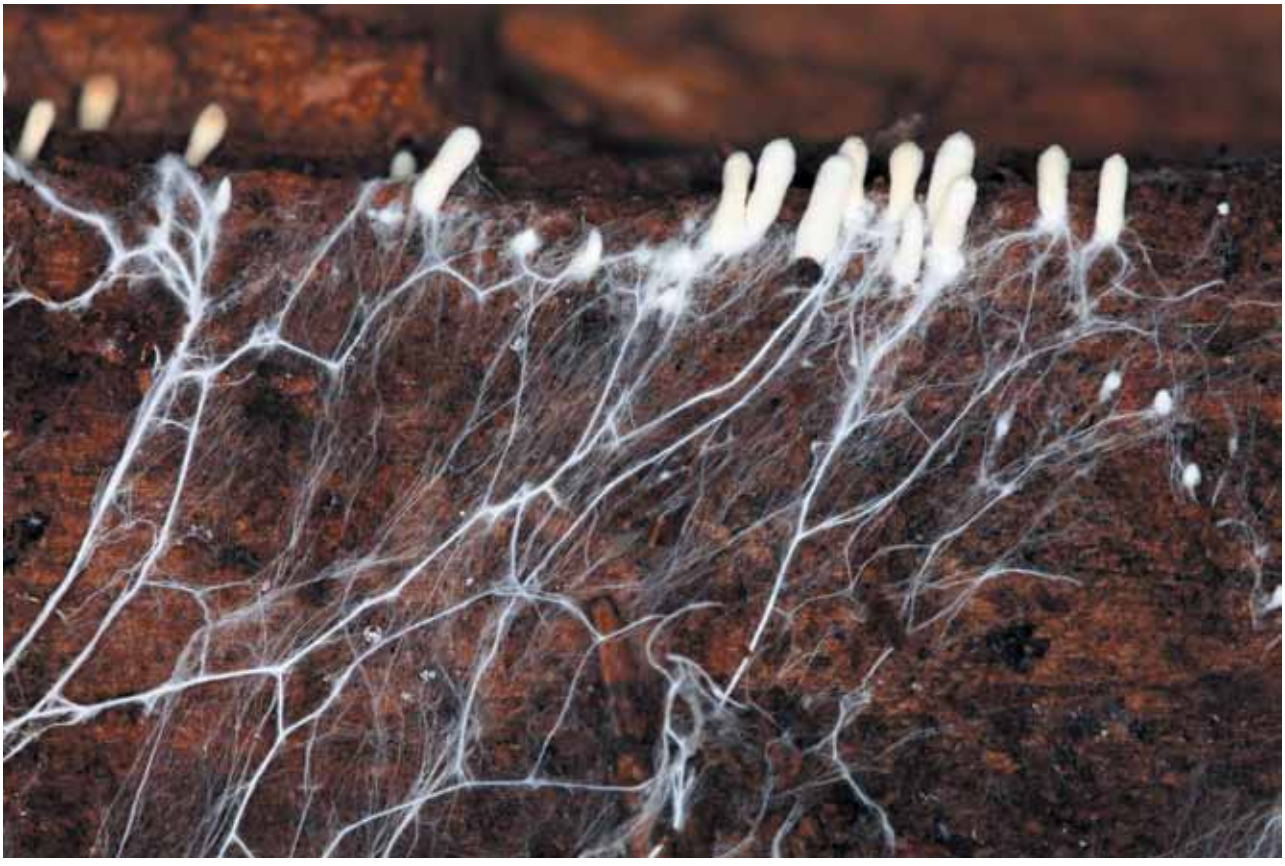
Some of our words come from Latin, like fungus. If you want to refer to more than one "fungus," the word changes to "fungi." (Here's how you say it—"fun guy!")

What Are Fungi?

Fungi come in many different shapes and sizes, and they can grow almost anywhere. They feed on the materials that they rest upon.

Mold, mushrooms, and fungus that looks like a shelf are all different kinds of fungus. They can't make their own food, so they need to feed on organic matter.

When you see a fungus, you're probably not seeing the entire thing, because part of it can be hidden in its food. The main body of a fungus is called the **mycelium**. The mycelium looks like lots of fine, white threads woven together. Sometimes it looks like the roots of a plant or like spider webs.



The mycelium of a fungus looks like a network of white, fine threads. It may be underground where you can't see it.

Fungus Fact

The largest organism ever found is a fungus known as the honey mushroom. It is spreading through the roots of trees in the Blue Mountains of Eastern Oregon. Its mycelium stretches out over 5 ½ kilometers (3 ½ miles), and reaches an average of one meter (3 feet) into the ground.

The part of a mushroom fungus that you see is the reproductive structure of the fungus, also known as its **fruiting body**. You don't usually see a mushroom's mycelium because it is growing underground or inside a rotting log.

Ian Herriott

The white mycelium of this mushroom grows under moss and leaf litter on the forest floor.

But you can see the mycelium of mold. It looks like fuzz when it spreads across cheese or fruit.

The mycelium of this mold looks like white fuzz. You can see how it is spreading across the lemon.

Like plants, fungi don't move around, and their mycelia (more than one mycelium) sometimes look like roots. But they aren't plants. Plants are green and make their own food. Fungi don't.

How Do Fungi Feed?

Since fungi can't make their own food, they need to get food from somewhere else. Like scavengers, they feed on dead plants and animals. But they aren't animals. Fungi **digest** their food outside of their bodies.

A fungus feeds with its mycelium. The mycelium grows and spreads until it reaches organic remains (food for the fungus). Once it finds a food source, the mycelium lets out a substance that turns the remains into a liquid full of nutrients. This nutrient-rich liquid is in a form that the mycelium can take in and **absorb**.

Some of the nutrient-rich liquid is absorbed to help a fungus live, grow, and reproduce. But not all the digested nutrients are taken in. Some stay in the surrounding soil or water, providing plants with important nutrients they need to survive.

Think About It!

Have you ever noticed that moldy foods become wet and mushy? That's because the mold mycelium is digesting the food and making it liquid.

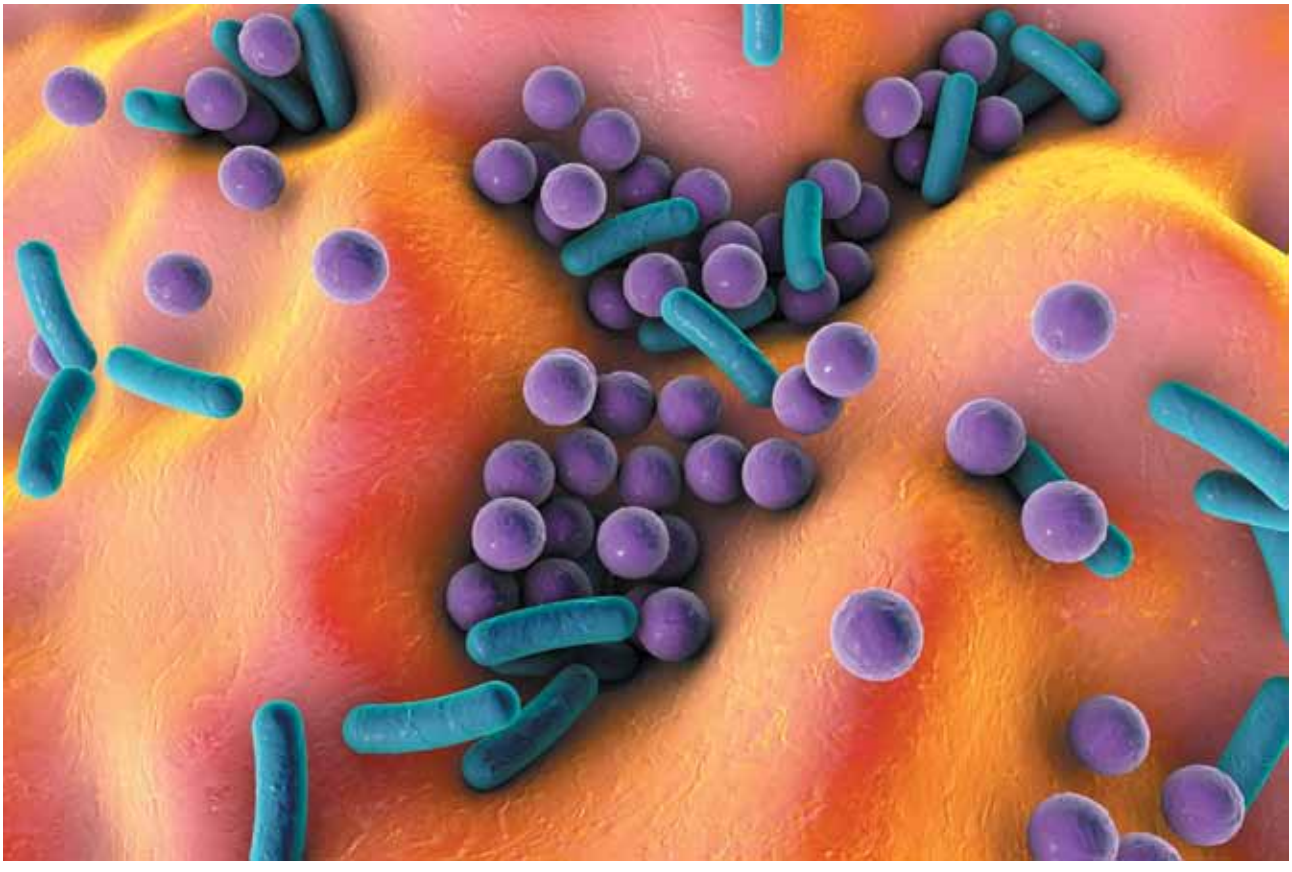
Word Connection

absorb—to soak in or up.

Fungi and moss growing on a decomposing log. The fungi leave nutrients behind that plants need to grow.

Bacteria

Bacteria are another kind of living organism. Bacteria can be found almost everywhere. They live high up in the air, deep in the water of the ocean, in polar ice, boiling hot springs, and soils around the world. Our world wouldn't be the same without bacteria. If you packed all the bacteria in the world into one big lump, some scientists think it would be heavier than all of Earth's plants and animals.



Bacteria are everywhere around us. But they are too small to see without tools.

What Are Bacteria?

All living things are made of **cells**. A human body is made of trillions of cells.

Each bacterium (the single form of the word bacteria) is made of just one cell. These single-celled organisms are so small that we can see them only through a microscope.

Bacteria play many roles in the environment. The bacteria we hear about most are those that cause diseases in plants and animals. But most bacteria are harmless, and many are useful. In fact, the Earth's ecosystem depends on bacteria.

Some bacteria live in plants and animals, including us. We carry about a thousand kinds of bacteria on our skin. These bacteria cause infections only when they get into cuts.

All animals have bacteria that help with digestion. For example, **herbivores**—animals such as cows, rabbits, termites, and earthworms—have bacteria packed throughout their digestive systems. The bacteria do the work of breaking down the tough plant fiber these animals eat.

Bacteria Fact

Around 1000 bacteria would fit on the period at the end of this sentence.

Bacteria Fact

There are even more bacteria in an earthworm's castings than there are in its digestive tract. Bacteria continue decomposing the worm casting after a worm has excreted it. This helps make the castings act like "timed-release" plant fertilizers.

Bacteria break down food inside animals.

Bacteria Fact

One cup of soil may hold as many bacteria as there are people on Earth.

The most important job bacteria have is decomposing natural waste. In soil and water they finish the breakdown of organic remains. They release the broken down matter as gases, solids, and liquids.

How Do Bacteria Feed?

Like all living things, bacteria need food in order to grow and reproduce. These decomposers absorb food from the material they live in or on.

Since most foods are too complex for a bacterial cell to take them in, the bacteria must first break the food down. Like fungi, bacteria let out substances that digest the food outside of their bodies. Then the bacterial cells can absorb the simpler, nutrient-rich forms of the broken-down food.

How Do People Use Bacteria?

Sewage Treatment

The smell at a sewage treatment plant comes from bacteria working to decompose human waste. The bacteria already present in the waste are encouraged to grow even further at the treatment plant.

The sewage is mixed with water and pumped into large tanks. There, air is bubbled through. The conditions encourage bacteria to feed and reproduce rapidly. The bacteria break down the waste into harmless, nutrient-rich substances.

At a sewage treatment plant, people use bacteria to decompose human waste.

Foods

People have found many other ways to use bacteria in their role as decomposers. In almost every culture around the world, humans have made foods and drinks with the help of bacteria.

Word Connection

fermented—changed to a simpler organic substance. Bacteria ferment foods by feeding on the sugars in them.

Foods spoiled by certain bacteria can have an awful taste. They can even make you sick to your stomach. One way to prevent the growth of food-spoiling bacteria is by encouraging "good" bacteria to grow instead. Making pickled, or **fermented**, food with good bacteria can actually preserve the food.

Because bacteria let out substances that do the digestion outside of their bodies, they change the flavor and texture of foods. People have developed many foods that are made with bacteria. In some of these foods, the bacteria give a special sharp or sour taste that people enjoy.

For example, yogurt is made with a special kind of bacteria that breaks down the sugars in milk. They produce an acid that gives the yogurt its tangy taste.

Think About It!

Cultures throughout the world have developed special foods made with bacteria. Are any of these fermented or pickled foods special to your family's heritage or culture: kimchi, miso, fish sauce, poi, sauerkraut, brined pickles, brined olives, sourdough bread, yogurt, kefir, pickled meat, achar, or torshi?

Yogurt is made with the help of bacteria.

The cheese in the picture below was made with bacteria. The bacteria digested the sugar in milk (called lactose) and produced lactic acid. The lactic acid curdled and thickened the milk. (This is how Little Miss Muffett got her curds and whey!) The curds then were made into cheese.

The olives in this picture were fermented. Fresh olives have skin so tough they can't be eaten. So olives are soaked in a salty solution called **brine**. In that solution, salt-loving bacteria soften the skin of the olives—so they're soft enough for you to eat.

Cheese and olives are made with the help of bacteria.

Another food product made by bacteria is called **xanthan** (zan-than). Bacteria ferment a simple sugar, and make this sweet, gummy substance. Xanthan is used as an ingredient in gummy bears, jelly candies, and many salad dressings and sauces.

A product of bacteria is used as an ingredient in gummy bear candy.

Glossary

absorb
To soak in or soak up.

bacteria
Microscopic, single-celled organisms. Some of which work as *decomposers* that feed on dead organisms. (The singular form is bacterium.)

brine
Salt water used for preserving or pickling foods.

cell
The smallest structure of an organism that can grow, reproduce, and die. Some living things are single cells, while others are made up of billions of cells working together.

decomposers
Organisms that break down dead plant or animal material to get their nutrients, and leave behind some nutrients in the soil or water. Decomposers include *fungi* and *bacteria*.

digest
To break down foods into nutrients organisms can use to live and grow.

excrete
To remove waste products from the body.

fermented
Changed to a simpler organic substance. Bacteria ferment foods by feeding on the sugars in them.

fruiting body
The part of a fungus that makes and releases the spores. A mushroom is one example.

fungi
A kingdom of living things that are different from both plants and animals. Fungi break down the remains of the organic material they live in or live on to get nutrients. Mushrooms and molds are fungi. (The singular form is fungus.)

herbivore
A *consumer* that eats only plants.

mold
A fuzzy looking fungus that commonly grows on old, moist food in warm areas.

mycelium
The main part of a *fungus*. It looks like tangled white threads, and is usually out of sight inside the organic material it feeds on. It is used to absorb nutrients. (The plural form is mycelia.)

xanthan
A sweet, gummy substance produced by some bacteria.

Credits

Page 2: Catherine Grubin. **Page 3:** (top) shutterstock.com, smuay;
(bottom left) shutterstock.com, Masterovoy; (bottom right) shutterstock.com, Jane Rix.
Page 4: shutterstock.com, Kichigin. **Page 5:** Ian Herriott. **Page 6:** Catherine Grubin.
Page 7: shutterstock.com, flaviano fabrizi. **Page 8:** shutterstock.com, Kateryna Kon.
Page 9: shutterstock.com, ewastudio. **Page 11:** Dane S. Johnson.
Page 12: Amy Herzog. **Page 13:** Photos.com. **Page 14:** Catherine Grubin.