# Module 10: Classification - Diversity in the Six Kingdoms
## Topic 1 Content: Microorganisms Notes

### Introduction


Microorganisms

Click ***NEXT*** to begin.

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### Instructions


Microorganisms include bacteria, viruses, protists, and fungi. Click each term to explore the different microorganisms, their characteristics, and how they affect the human body.

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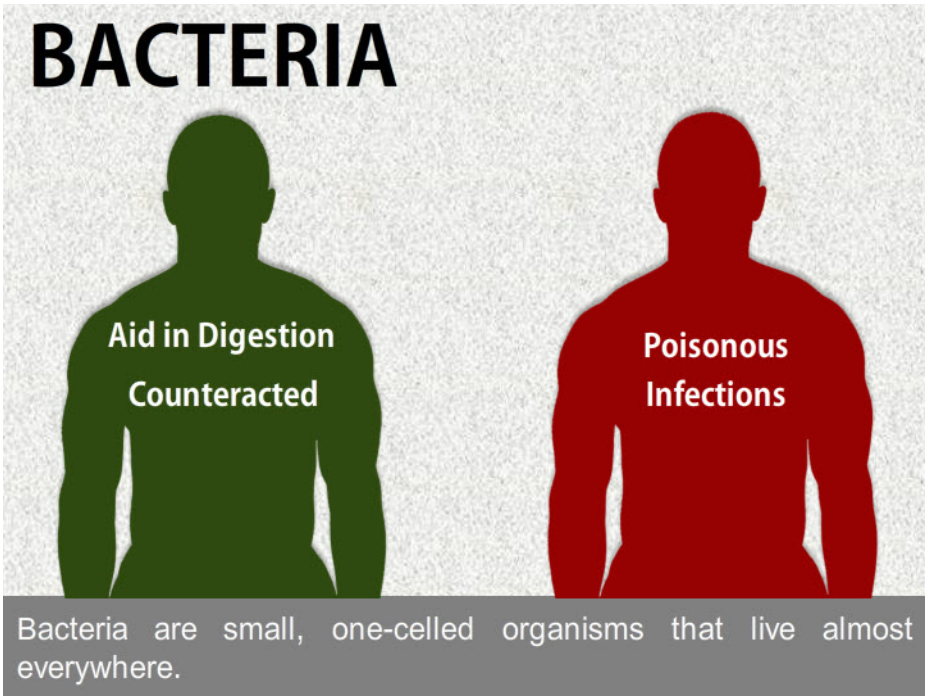
### Bacteria




Bacteria are small, one-celled organisms that live almost everywhere. They can even live on the surface of the computer you are using right now. Some bacteria are good for your body and help with digestion. Harmful bacteria are poisonous to your body. Most of the bad bacteria in your body are counteracted by your immune system; however, pathogenic bacteria can cause serious infections in your respiratory and digestive systems. Bacteria enter the body and begin to reproduce rapidly. If your immune system cannot handle the bacteria quickly and there are many of them, you can become sick.

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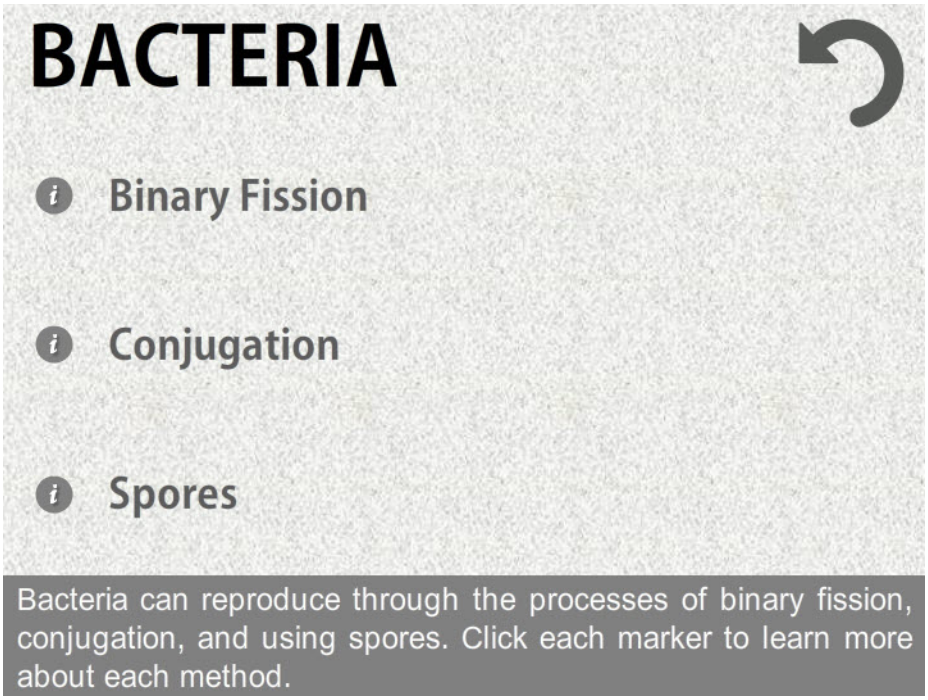
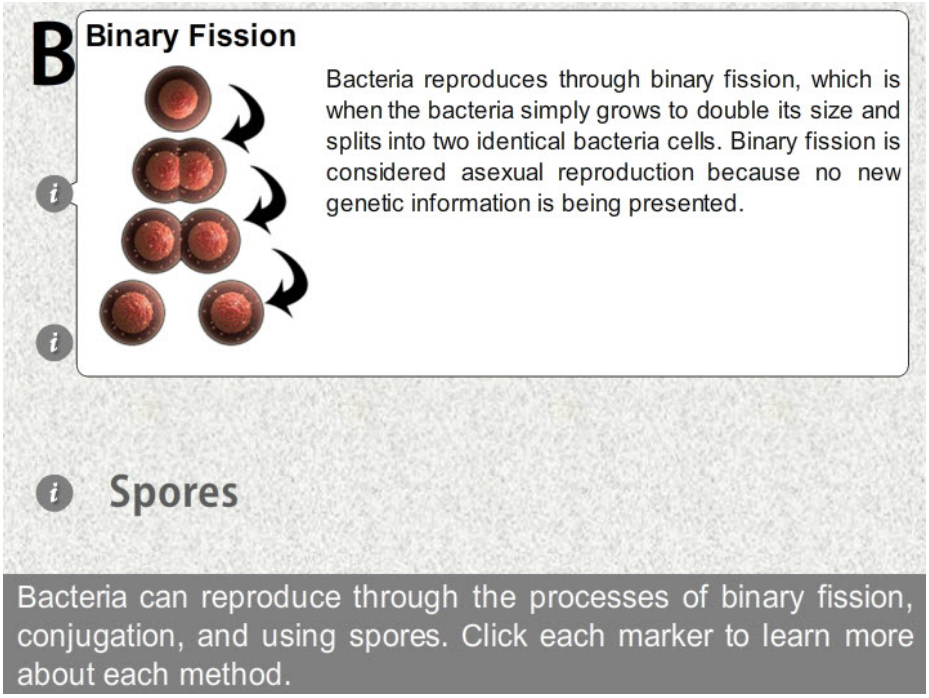
**Instructions**



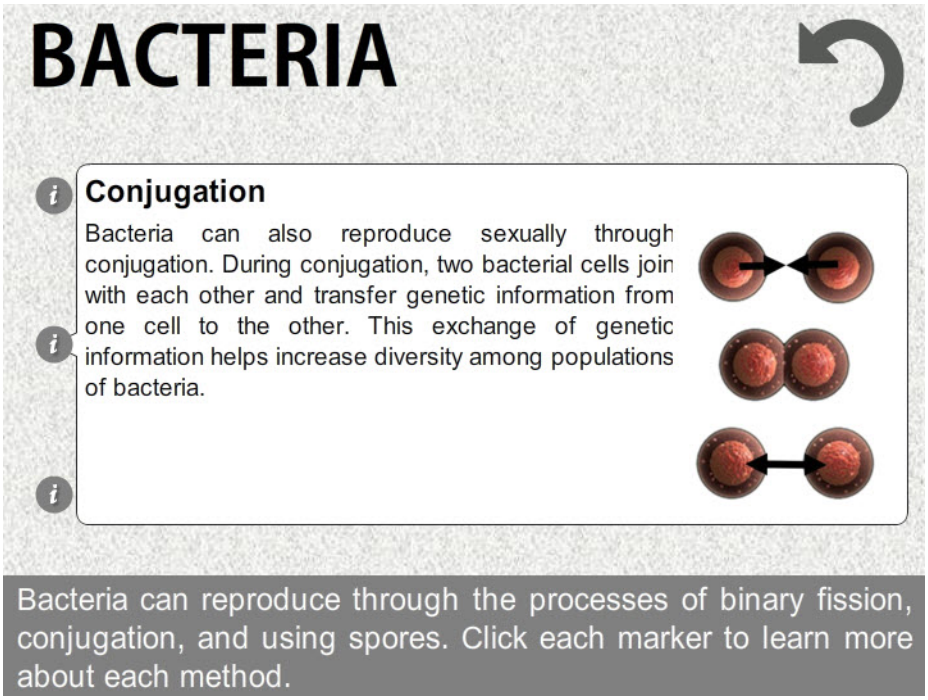

Bacteria can reproduce through the processes of binary fission, conjugation, and using spores. Click each marker to learn more about each method.

## Binary Fission



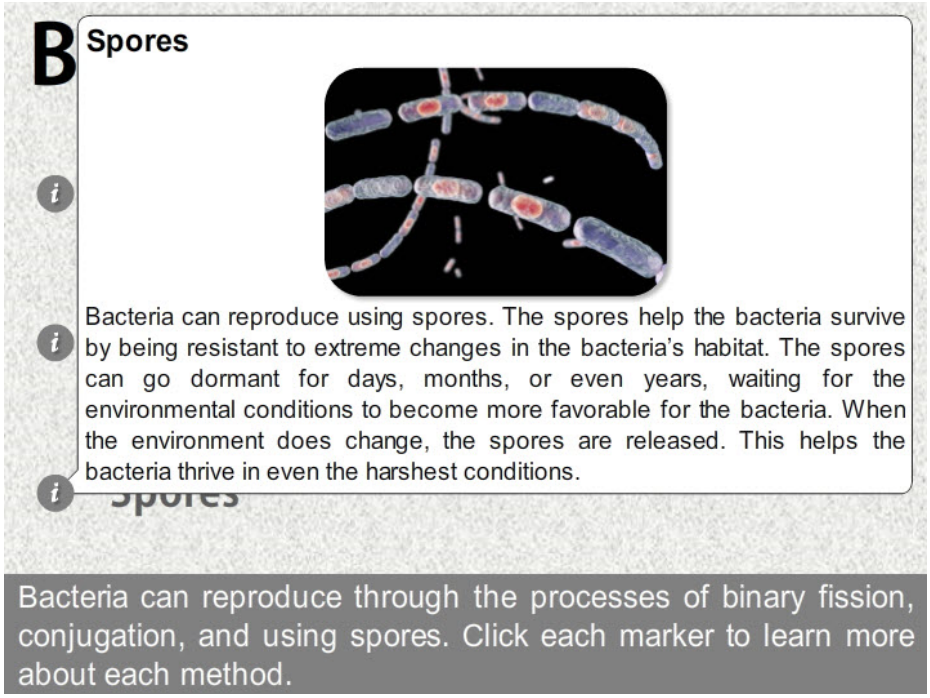

Bacteria reproduces through binary fission, which is when the bacteria simply grows to double its size and splits into two identical bacteria cells. Binary fission is considered asexual reproduction because no new genetic information is being presented.

## Conjugation



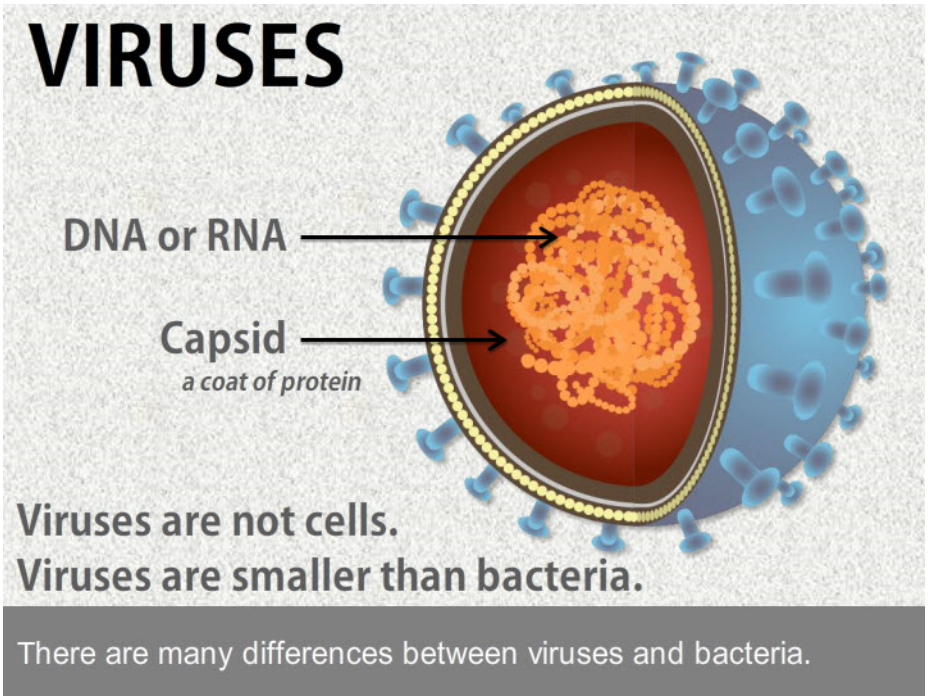

Bacteria can also reproduce sexually through conjugation. During conjugation, two bacterial cells join with each other and transfer genetic information from one cell to the other. This exchange of genetic information helps increase diversity among populations of bacteria.

## Spores




Bacteria can reproduce using spores. The spores help the bacteria survive by being resistant to extreme changes in the bacteria's habitat. The spores can go dormant for days, months, or even years, waiting for the environmental conditions to become more favorable for the bacteria. When the environment does change, the spores are released. This helps the bacteria thrive in even the harshest conditions.

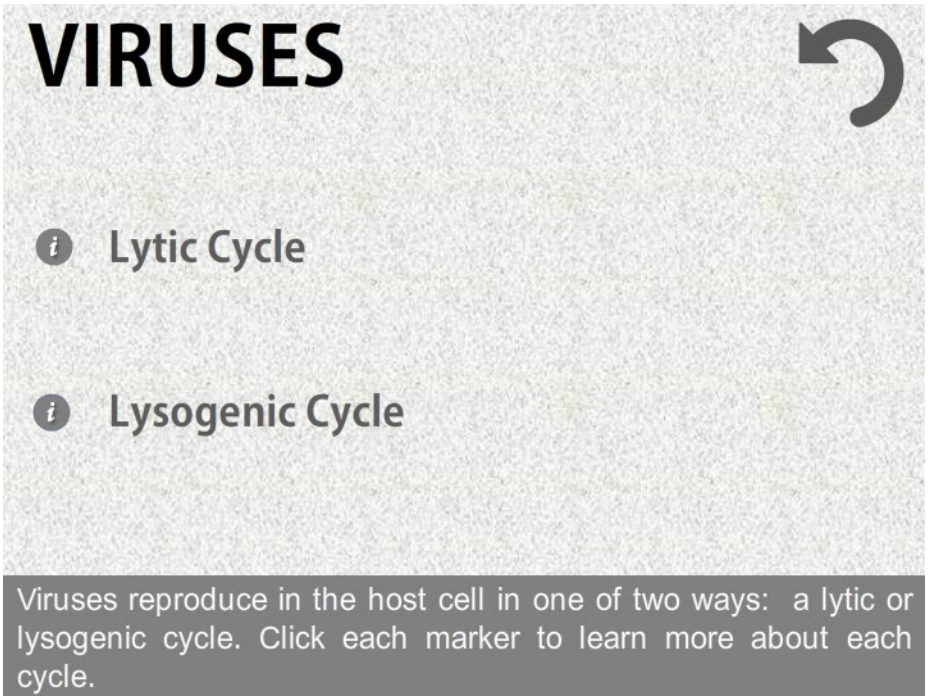
## Viruses




Viruses can sometimes be confused with bacteria, especially when people are sick at the doctor's office. Even though they can both cause illness, there are many differences between these two microorganisms. Viruses do not share many characteristics of living organisms; they are not even cells. The body of a virus is composed of a core of DNA or RNA which is surrounded by a coat of protein called a capsid. Viruses are also much smaller than bacteria and can only be observed with a light microscope.

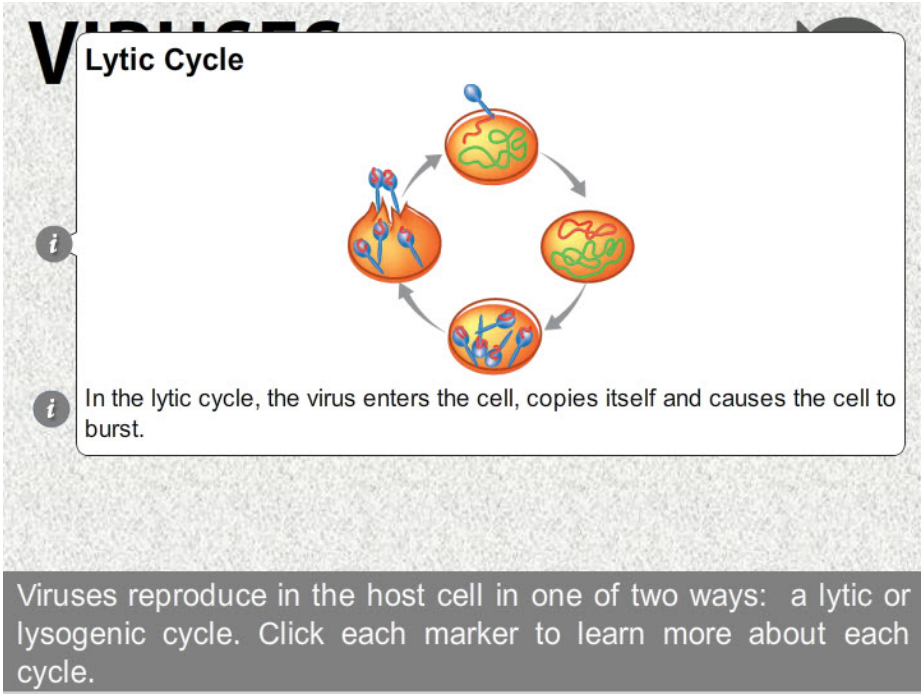
Viruses cannot reproduce by themselves like bacteria; instead they must invade a host and use the host cells to undergo reproduction. Because of this trait, viruses are usually very specific to their hosts. For example, a virus that attacks a maple tree has no effect on a human.

**Instructions**



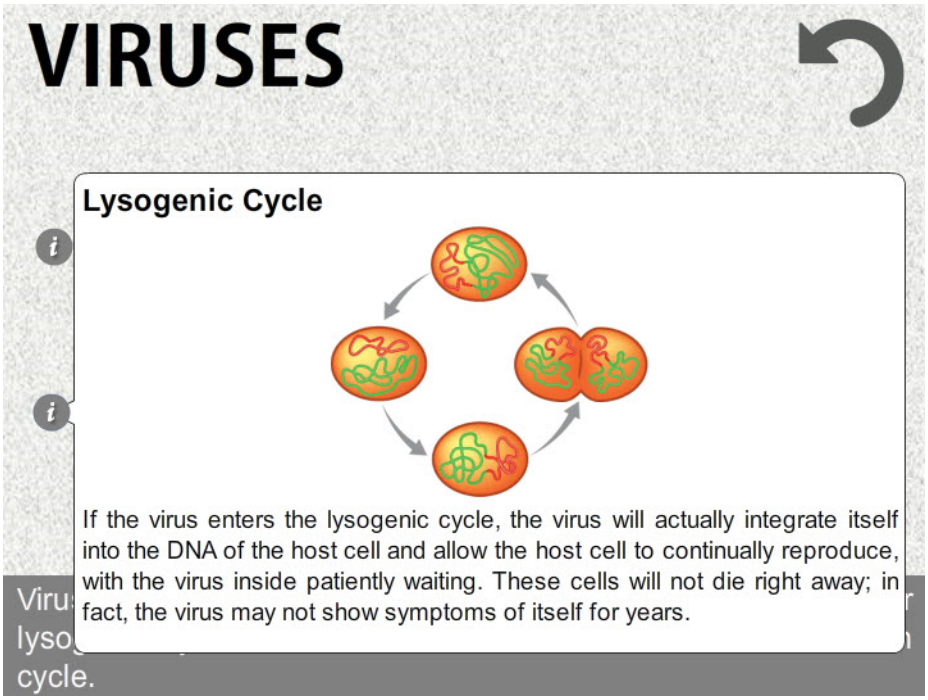

Viruses reproduce in the host cell in one of two ways:  a lytic or lysogenic cycle. Click each marker to learn more about each cycle.

## Lytic Cycle



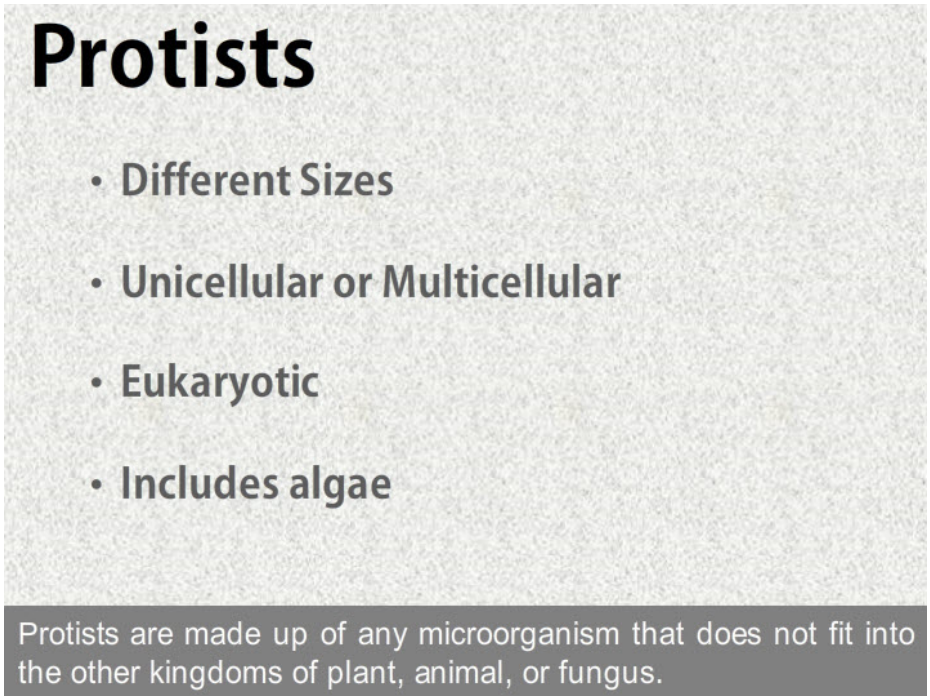

In the lytic cycle, the virus enters the cell, copies itself and causes the cell to burst.

## Lysogenic Cycle




If the virus enters the lysogenic cycle, the virus will actually integrate itself into the DNA of the host cell and allow the host cell to continually reproduce, with the virus inside patiently waiting. These cells will not die right away; in fact, the virus may not show symptoms of itself for years.

## Protists

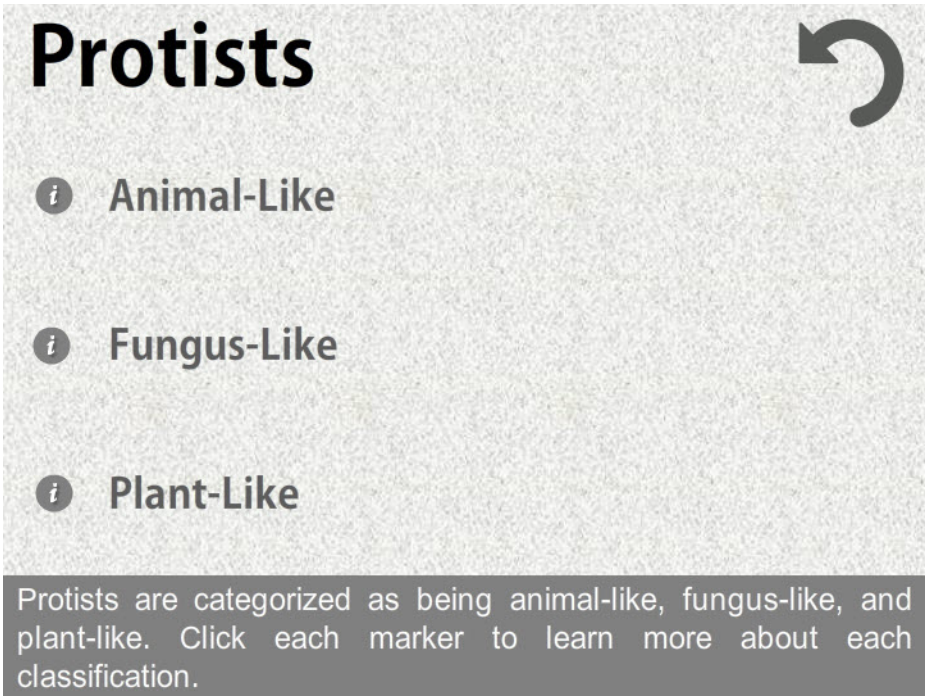



Protists are another diverse group of microorganisms. Protists are made up of any microorganism that does not fit into the other kingdoms of plant, animal, or fungus. Protists are found in a variety of sizes and can be multicellular or unicellular.

Some protists are larger than others, made up of many cells, and some are as small as bacteria, being unicellular. All protists are eukaryotic. Protists include algae, which are the largest oxygen producers on Earth, as well as key organisms on the food web.

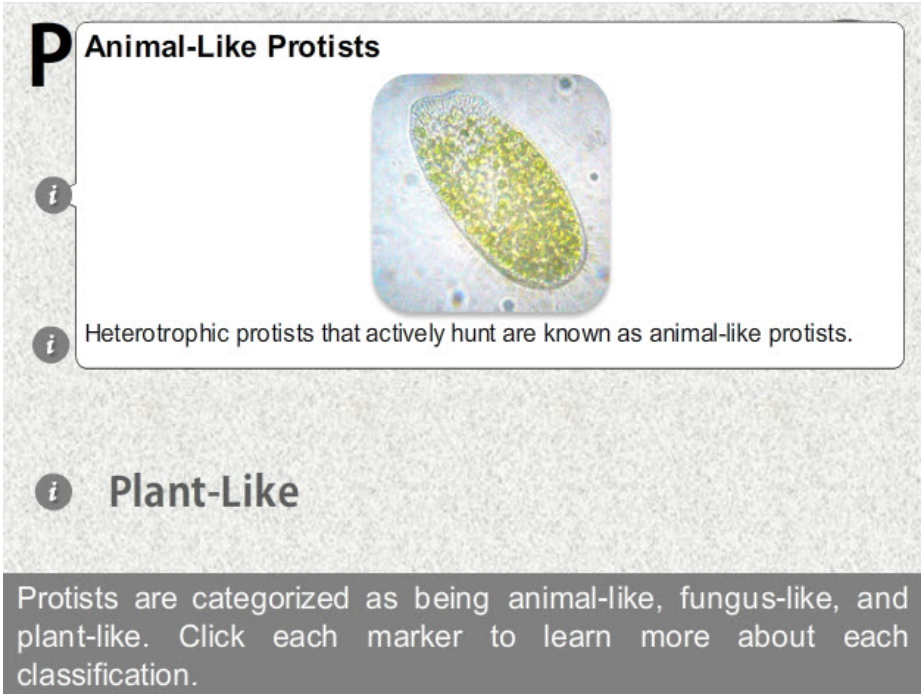
When ingested, certain protists can have negative health effects in humans. The protist plasmodium causes the disease known as malaria. Malaria lives in the bloodstream of humans, and is spread from one person to another when a mosquito bites an infected human and then bites another human. Giardia is a flagellate protist that causes very serious intestinal symptoms in people, and is often acquired through the ingestion of tainted water.

**Instructions**



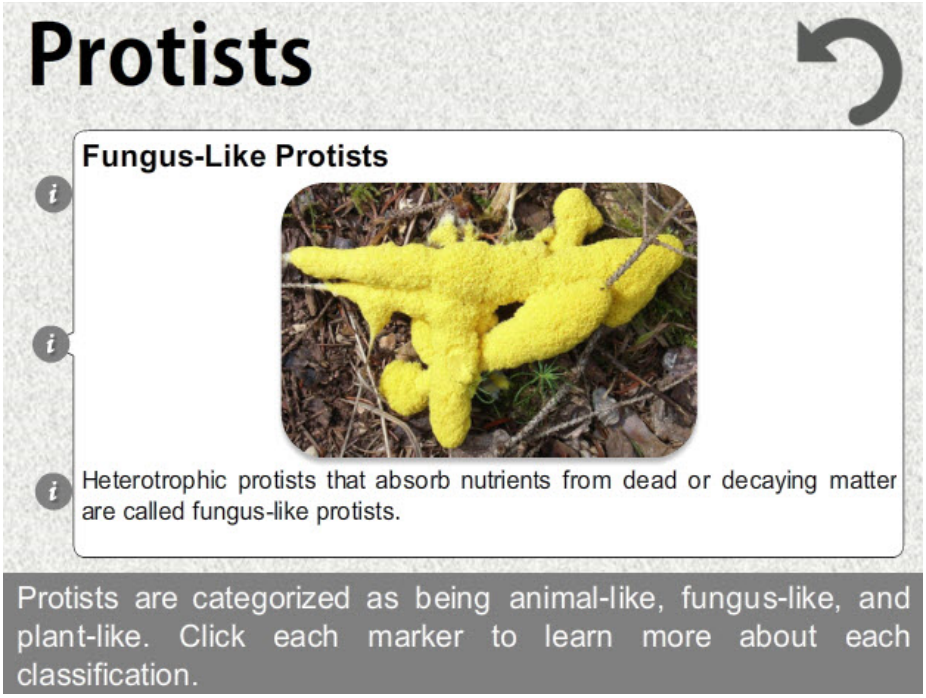

Protists include heterotrophs and autotrophs. Some reproduce sexually with gametes, while others reproduce asexually through binary fission. Protists are categorized as being animal-like, fungus-like, and plant-like. Click each marker to learn more about each classification.

## Animal-Like



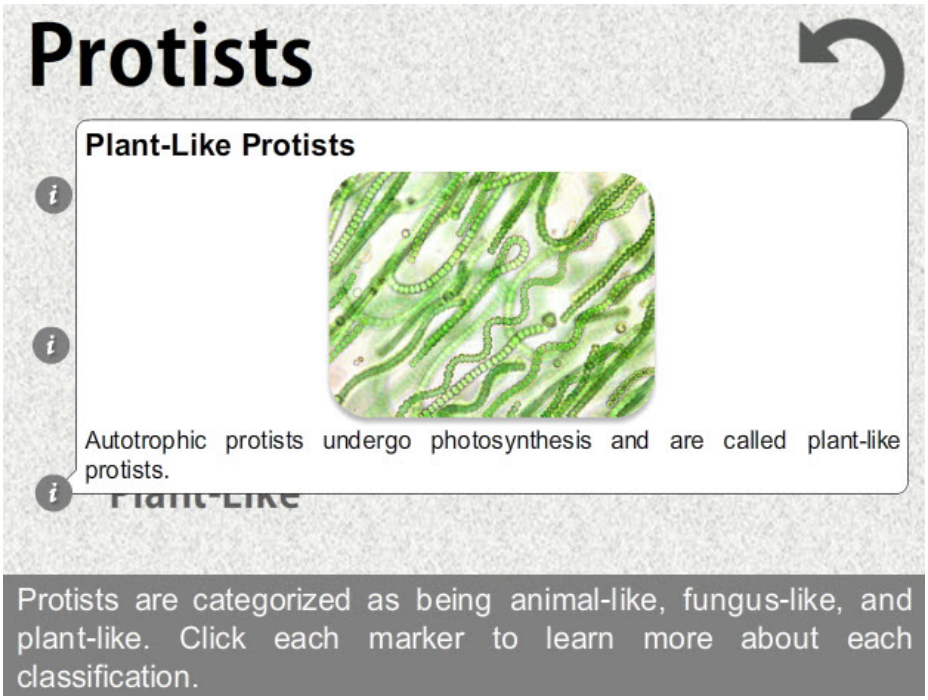

Heterotrophic protists that actively hunt are known as animal-like protists.

## Fungus-Like



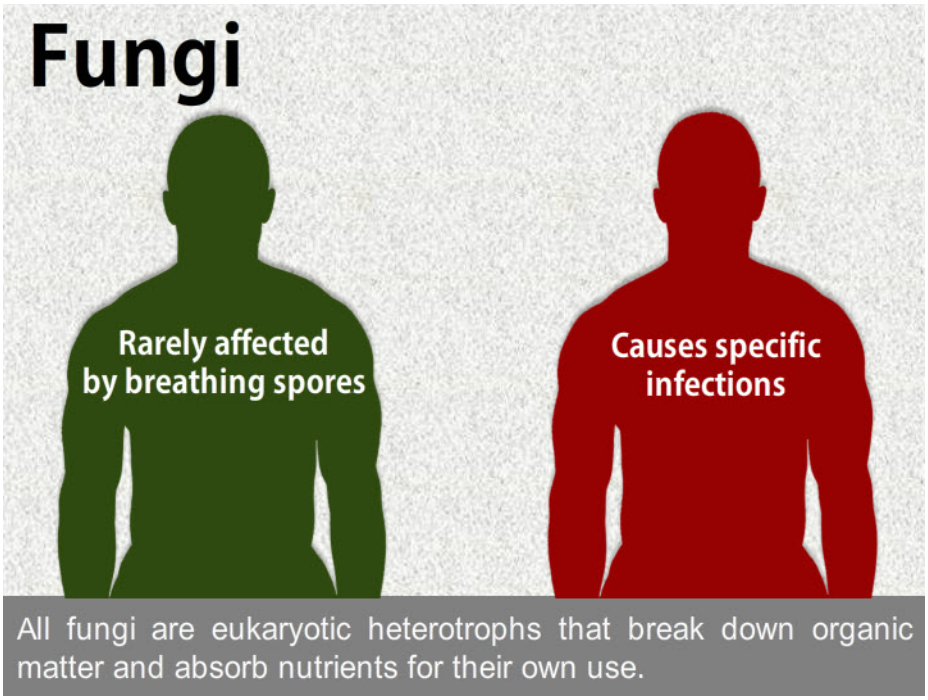

Heterotrophic protists that absorb nutrients from dead or decaying matter are called fungus-like protists.

## Plant-Like




Autotrophic protists undergo photosynthesis and are called plant-like protists.

## Fungi




All fungi are eukaryotic heterotrophs that break down organic matter and absorb nutrients for their own use. Fungi reproduce sexually with spores, or asexually when they break off and grow on their own. Fungi spores are found in almost all the areas of the Earth because they travel easily in the wind.

The majority of fungi do not have a negative effect on humans. Humans are rarely affected by the breathing of fungal spores, because the chance of the spore maturing into a fungus is less than one in a billion. Fungi can be problematic and cause certain infections. One such fungus-related infection is known as athlete's foot.

Many fungi form a close, beneficial relationship with the roots of plants. These fungi are known as mycorrhiza. The spreading threads, or hyphae, increase the surface area available to the roots for absorbing nutrients.