

Protists

The category of Protists includes many widely ranging microbes, including slime molds, protozoa and primitive algae. They are all eukaryotic <you-carry-ah-tick> creatures, meaning their DNA is enclosed in a nucleus inside the cell (unlike bacteria, which are prokaryotic <pro-carry-ah-tick> and have no nucleus to enclose their DNA.

Algae

When you think of algae, you probably think of seaweed or the green, slimy stuff that forms on the walls of untreated, dirty swimming pools. Here we'll focus on the microscopic algae.

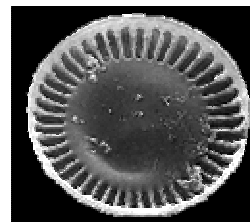
Algae are found in bodies of fresh and salt water across the globe. They can also grow on rocks and trees and in soil when enough moisture is available. (They also grow on the hair of the South American sloth, giving the animal a greenish color.)



Pfiesteria
zoospore
Courtesy Joann
Burkholder

Most algae are able to make energy from sunlight, like plants do. They produce a large amount of the oxygen we breathe. However, at some stages of their lives, some algae get their nutrients from other living things. You may have heard of large fish kills along the east coast of the U.S. caused by *Pfiesteria* <fis-teer-ee-uh>. *Pfiesteria* belongs to a type of algae called the dinoflagellates <die-no-flah-geh-lets>. Some dinoflagellates make their own energy from sunlight, like plants. But others like *Pfiesteria* produce toxic substances that stun passing fish and cause bleeding sores. The *Pfiesteria* then feed on the fish blood and fluids. This microbe has at least 24 different forms it cycles through during its life (wow!).

Diatoms <die-uh-toms> are another kind of algae. They have hard shells made out of silica, or glass. When they die, these shells sink to the bottom of their watery environments. We mine deposits of these silica shells that formed hundreds of thousands of years ago to make abrasives, shiny road paint and grit in toothpaste. Diatoms come in all sorts of shapes—some, like the one pictured here, are round and others are oval. Some look like leaves and others like fat commas.



Cyclotella, a diatom
Courtesy BGSU

Because photosynthetic algae make so much oxygen, these microbes are very helpful. But sometimes certain kinds of algae can also grow in such large numbers called blooms or red tides—that when they suddenly die off en masse, the breaking down of their cells by bacteria depletes the amount of dissolved oxygen in the water, hurting the animals and plants that live there.

Protozoa

The word protozoa means "little animal." They are so named because many species behave like tiny animals—specifically, they hunt and gather other microbes as food.

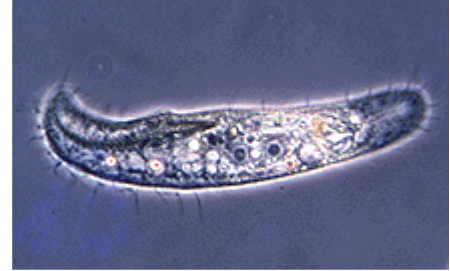
Protozoa mainly feed on bacteria, but they also eat other protozoa, bits of stuff that has come off of other living things—what's generally called organic matter—and sometimes fungi.

Some protozoa absorb food through their cell membranes. Others, like the amoebas <ah-me-buhs>, surround food and engulf it. Others have openings called mouth pores into which they sweep food.

All protozoa digest their food in stomach-like compartments called vacuoles <vac-you-oh/s>. As they chow down, they make and give off nitrogen, which is an element that plants and other higher creatures can use.

Protozoa range in size from 1/5,000 to 1/50 of an inch (5 to 500 μm) in diameter. They can be classified into three general groups based on their shape.

One group is the Ciliates <silly-ates>, which are generally the largest protozoa. They have hair-like projections called cilia <silly-uh> and they eat the other two types of protozoa as well as bacteria. You can just see the thin cilia poking out around the edges of the protozoan in the image to the right.



Loxodes Courtesy David Patterson



Amoeba © James Evarts

The second group is the Amoebae <ah-me-bee>, which can be subdivided into the testate amoebae, which have a shell-like covering, and the naked amoebae, which don't have this covering.

Finally, the third group is the Flagellates <flah-geh-lets>, which are generally the smallest of the protozoa and have one or several long, whip-like projections called flagella poking out of their cells.

To hunt, protozoa have to be able to move about. Amoebas ooze about by extending parts of their cells as pseudopods <sue-doh-pods> or "false feet." Amoebae have fluid cell membranes or coverings that they can stretch out, bend and curve. As the membrane moves outward, the fluid and other parts inside the cell follow, flowing into the new bulge created by the moving membrane. Many ciliates swim along by beating their cilia in a rhythmic pattern, like so many tiny oars. Flagellates swim by waving their flagella, using them much like a fish uses its tail push itself through water.

Some protozoa prefer to latch themselves in one place. For example, a ciliate called *Vorticella* <vor-tih-sell-uh> attaches to a spot on a long, springy stalk. It creates a mini whirlpool around its mouth pore by beating the cilia ringing its bulbous top end so that food particles get sucked in. Whenever anything too big to be eaten hits a *Vorticella*, it springs back out of the way by rapidly coiling up its stalk.

The vast majority of protozoa do us no harm. But, yes, there are a few that cause disease. One type of amoeba can live in human intestines. It feeds on red blood cells and causes a disease known as dysentery <dis-in-tear-ee>. The parasitic protozoan *Cryptosporidium parvum* <cryp-toe-spore-id-ee-um par-vum> sickened around 400,000 people in Milwaukee in 1993 when it got into the tap water. Perhaps the best-known protozoal menace is *Plasmodium* <plaz-mo-dee-um>, the parasite that causes malaria. This terrible disease leads to about 800,000 deaths each year worldwide.

Write 10 facts in complete sentences about protists from this reading.