

Figure 18-16 Trypanosomes are parasites that live in the blood of vertebrates and cause a number of diseases, such as African sleeping sickness and Chagas disease.

How Animallike Protists Fit into the World

The animallike protists are found throughout the world. They are some of the most common organisms in the oceans, and they are also abundant in fresh water, on land, and in the bodies of larger organisms.

HARMFUL RELATIONSHIPS Unfortunately for us and for other organisms, there are a great many parasitic protists. Parasitic protists affect plants, all types of animals (including humans), and even other protists. You have already read about one important protist parasite and pathogen (something that causes disease)—the genus of sporozoans called *Plasmodium*, which causes malaria.

Zoomastiginans, which belong to the genus *Trypanosoma*, are another example of pathogenic protists. Trypanosomes (trih-PAN-oh-sohmz) live in the blood of vertebrates such as humans and other mammals and cause a number of diseases. Although these diseases have different common names, any disease caused by trypanosomes is called trypanosomiasis, which means trypanosome infection. One form of trypanosomiasis that affects humans is commonly known as African sleeping sickness.

The trypanosomes that cause African sleeping sickness are passed from one person to another by an insect known as the tsetse (TSEET-see) fly. These trypanosomes destroy blood cells and infect other tissues in the body. The symptoms of infection include fever, chills, and skin rash. As the trypanosomes attack the nervous system, infected individuals become weak and lose consciousness, passing into a deep and often fatal sleep from which the disease gets its name.

Some trypanosome species infect domestic livestock. In areas infested with the tsetse fly, which include vast regions of central Africa, the raising of cattle is virtually impossible. The control of the tsetse fly and the protist pathogens that it spreads is a major goal of scientists in Africa and around the world. The only trypanosome native to the Western Hemisphere is *T. cruzi*, which causes Chagas disease. This disease can result in heart failure because the trypanosomes invade and weaken muscle, especially heart muscle. Some historians believe that Charles Darwin contracted this disease during his visit to South America and that it was this parasite that made him ill much of his life.

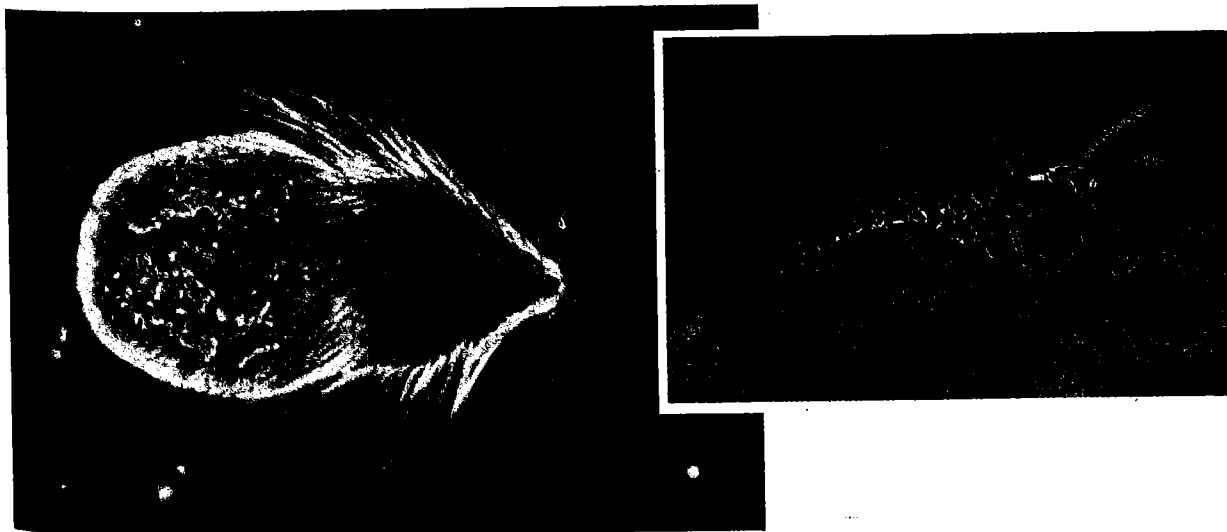
A third kind of pathogenic protist is similar in appearance to the harmless amebas that you may find in a nearby pond or examine under a microscope. In certain regions of the world, many people are infected with species of *Entamoeba*, which cause a disease known as amebic dysentery. The parasitic amebas that cause this disease live in the intestines, where they absorb food from the host. They also attack the wall of the

intestine itself, destroying parts of it in the process and causing severe bleeding. These amebas are passed out of the body in feces. In places where sanitation is poor, the amebas may then find their way into supplies of food and water. In some areas of the world, amebic dysentery is a major health problem, weakening the human population and contributing to the spread of other diseases.

HELPFUL RELATIONSHIPS Although many animallike protists are responsible for disease, there are many that are beneficial to other organisms. An interesting example of a beneficial protist is *Trichonympha*, a zoomastiginan that lives within the digestive systems of the termite and the wood roach. Termites eat wood, the major component of which is the carbohydrate cellulose. But termites do not have enzymes to break apart the chemical bonds that hold the simple sugars in cellulose together. Neither do we, incidentally, so it does us little good to munch on a woodchip. How, then, does a termite digest cellulose? It doesn't. *Trichonympha* does.

Young termites ingest some of the feces of an adult termite, thereby swallowing several thousand *Trichonympha*, which then take up residence in the termites' digestive system. Experiments have shown that insects deprived of these protists cannot live more than a few days. *Trichonympha* and other organisms living in the termites' gut manufacture cellulase, the enzyme that the termites need to break the chemical bonds in cellulose. Without these symbionts, termites and wood roaches would be no more able to digest wood than we are.

Figure 18-17 Particles of wood appear as irregular grains inside the body of Trichonympha, a wood-digesting protist (left). Trichonympha lives in the digestive system of insects such as termites (right), making it possible for them to obtain nutrients from the wood they eat.



The animallike protists play another major role in the living world. Enormous numbers of protists living in the seas are food for tiny multicellular animals that in turn serve as food for larger animals. A similar role is played by protists in freshwater lakes, streams, and ponds. Without such tiny organisms, the larger fish would have no food supply. The animallike protists thus perform an essential function for all other living things.

18-2 SECTION REVIEW

1. List the four phyla of animallike protists. Give an example of each.
2. Compare the forms of locomotion used by the four phyla of animallike protists.
3. Describe the process of conjugation. Is conjugation a form of reproduction? Explain your answer.
4. **Connection—Ecology** In what ways are animallike protists helpful to other living things?