

Unicellular Organisms

Unicellular organisms perform the same life processes as multicellular organisms. Individually, these cells can only be seen using a microscope. For this reason, unicellular organisms are often called “micro-organisms.” Even when found in large groups, such as bacterial colonies, each cell displays all of the characteristics of a living thing. Unicellular organisms include bacteria and some protists and fungi.

Nutrition

Many unicellular organisms live in bodies of water and must move around to find food. Most often, they must obtain nutrients by eating other organisms. Plant-like protists, and some types of bacteria, can make their own food through photosynthesis. The *Euglena* shown in Figure 1 is a protist that has both plant and animal characteristics, which it uses for obtaining nutrients. Other micro-organisms, such as fungi and bacteria, interact with one another to obtain nutrients. Lichens are organisms that form from the interaction of a fungus with an alga (Figure 2).

Paramecia

Paramecia are unicellular organisms that are found in aquatic environments (Figure 3). These animal-like protists feed on bacteria and algae. Paramecia are covered with cilia that beat in unison, creating water currents that move the paramecium toward a food source. The oral groove of the paramecium also contains cilia that create currents that draw the food into a cavity. Once this cavity is filled, the food is enclosed in a vacuole where it is slowly digested. As the food vacuole travels through the cell, nutrients diffuse through the vacuole’s membrane into the cytoplasm. Any remaining waste materials are eliminated through an anal pore.



Figure 1 *Euglena* have chloroplasts, which allow them to make food by photosynthesis, and a flagellum for locomotion.



Figure 2 The algae in this lichen make food for the fungus, which provides protection in return.

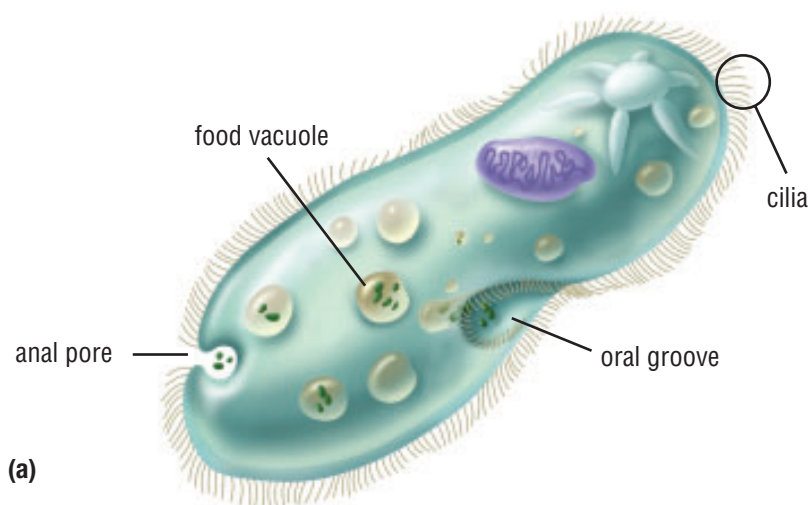


Figure 3 (a) A typical paramecium (b) A paramecium as seen under a light microscope (magnification approximately 130×)

Amoeba

The amoeba is another animal-like protist that must move about to find food. The amoeba uses phagocytosis to feed on organisms (Figure 4). The pseudopods extend around the food material and form a food vacuole. The vacuole acts as a site of both storage and digestion. When the amoeba needs nutrients, chemicals are released into the vacuole to break down the stored food. The food particles are then able to diffuse into the cytoplasm of the cell. Once digestion is complete, wastes are released out of the cell by exocytosis.

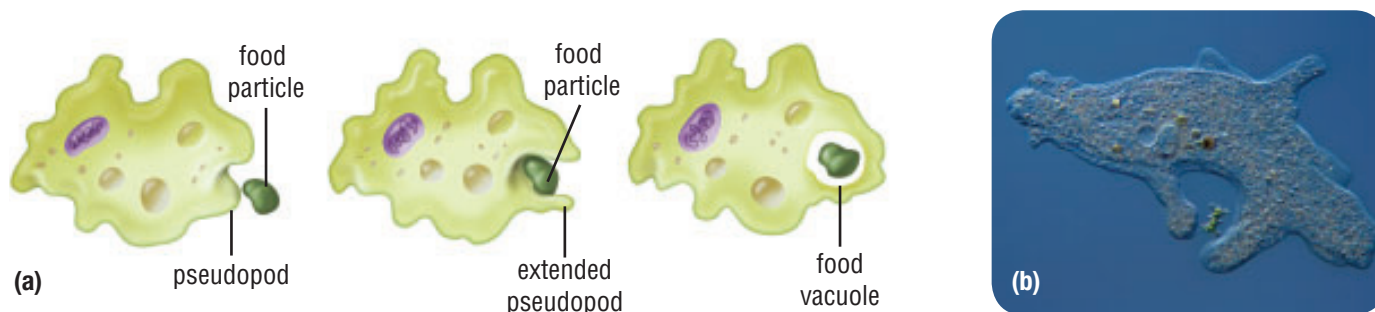


Figure 4 (a) An amoeba uses phagocytosis to obtain nutrients. (b) An amoeba uses pseudopods to engulf an algal cell (magnification 16×).

Gas Exchange

Most organisms also need oxygen to survive. The chemical reactions that allow organisms to obtain energy from food use oxygen and release carbon dioxide as a waste product. This means that there must be a steady exchange of oxygen and carbon dioxide into and out of the cell. In unicellular organisms, oxygen diffuses across the cell membrane into the cell. Carbon dioxide diffuses out of the cell once the concentration of carbon dioxide is higher inside the cell than it is outside of the cell.

Some micro-organisms, including some bacteria and fungi, can survive without oxygen. Yeast is a unicellular fungus that can survive without oxygen. This characteristic makes yeast useful in many industries. You will learn more about how yeast is used in industries in Section 6.6.

To learn more about the use of micro-organisms in industry,

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Responding to the Environment

Humans are able to detect changes in the environment using the five senses (hearing, sight, smell, taste, and feeling). Unicellular organisms do not have this ability. They must sense their surroundings in other ways. Some bacteria can detect chemicals, such as sugar, in their environment and move toward them. Photosynthetic protists, like *Euglena*, can detect light using special sensors. All organisms are able to sense their environment in some way and respond to it.

Movement and Locomotion

Unicellular organisms sometimes move toward or away from things in their environment. This includes food, light, and predators.

Unicellular organisms can move in two distinct ways—movement and locomotion.

Movement enables an organism to change its form or shape. This is achieved using pseudopods. Protists, such as the amoeba, use pseudopods to obtain nutrients or to get rid of wastes. Some cells in multicellular organisms, such as white blood cells, use pseudopods to engulf invading organisms by phagocytosis (Figure 5).

Locomotion enables an organism to change its position in the environment. Unicellular organisms achieve locomotion using cilia and flagella. By creating currents in the surrounding environment, cilia and flagella can move the cell in one direction or another (Figure 6).

movement: a change in the shape or figure of all or part of an organism; a characteristic of all living things

locomotion: movement that takes an object from one place in its environment to another; a characteristic of animals, animal-like protists, and some bacteria, but not plants or fungi

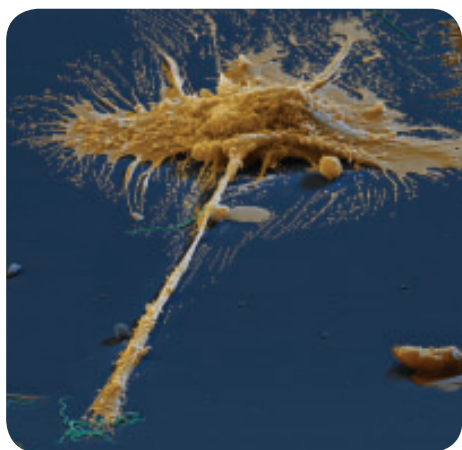


Figure 5 A disease-fighting cell in the human body uses pseudopods to trap infecting bacteria.

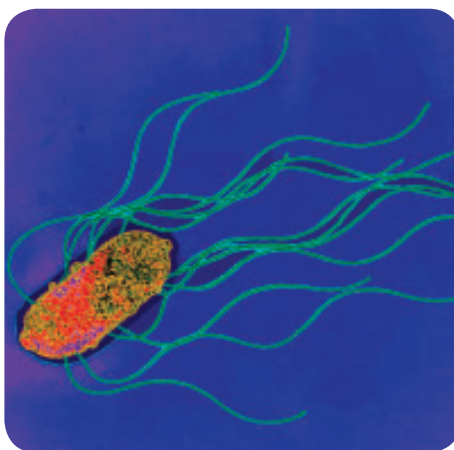



Figure 6 A bacterium uses its flagella for locomotion.

Unicellular organisms generally live in watery fluids, so they depend on cilia, flagella, and pseudopods for survival. 

To watch a short video clip showing how bacteria swim,

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Unit Task

Now that you have learned some of the ways that unicellular organisms carry out the functions of life, how will you apply this knowledge to the Unit Task?



CHECK YOUR LEARNING

1. What basic life processes must all unicellular organisms perform in order to survive?
2. In your own words, describe how an amoeba feeds. You may also use a diagram.
3. Explain how a unicellular organism, such as a paramecium, uses cilia to help with nutrition.
4. How do unicellular organisms respond to their environment?
5. Distinguish between locomotion and movement. How do unicellular organisms use these methods to respond to their environment? Provide one example for each.