

CONCEPT 1

Living things are made of cells, take in nutrients, use energy, and produce waste.

Activity

Hands-On with a Hand Lens

Obtain a hand lens and start observing objects in the places around you. For each, record and share what you see with and without the hand lens.



Why are ocean waves or rock formations considered to be non-living, but a bacterium and a plant are living? Throughout history, scientists have collected data and continued to define the characteristics of living things. Four of these characteristics are discussed below.

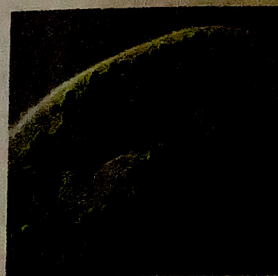
Living Things Are Made of Cells

All living things are made of one or more cells. Scientists consider the **cell** to be the basic unit of life. Cells have structures that enable them to carry out life processes. Life processes include all of the chemical reactions that help a living thing obtain and use energy, break down nutrients, build molecules, and grow. Life processes also enable a living thing to copy its genetic material, repair injuries, and excrete wastes.

As shown in **Figure 1.1**, some living things are only one cell. Examples of single-celled or unicellular organisms are bacteria and some protists, such as *Euglena* and *Paramecium*. **Figure 1.1** also shows multicellular organisms, which are made up of many cells. (The word “organism” means the same thing as “living thing.”) You and many other living things are multicellular organisms.

cell the basic structural and functional unit of life

Figure 1.1 Whether they are one-celled or many-celled, the cells of all organisms carry out life processes. What is the significance of the Spirit Bear to First Peoples? How do First Peoples use the Pacific Dogwood?



Paramecium



Pacific Dogwood



Spirit Bear

Living Things Take in Nutrients

All living things take in nutrients. These are substances that living things need but cannot make for themselves. Most organisms get the nutrients they need by eating food. Living things such as those shown in **Figure 1.2** are consumers. They eat (consume) other organisms for food. Other kinds of living things, such as plants, are called producers, because they can produce their own food using the Sun's energy and nutrients from their surroundings.



Figure 1.2 Squirrels, sea otters, and humans are all consumers. They get their nutrients from eating food. The grass the squirrel is eating is an example of a producer.

Living Things Use Energy

All living things use energy to carry out life processes (**Figure 1.3**). Producers use the food they make as a source of energy. Consumers get energy from the food they eat. The energy in food is released through a process called cellular respiration. The energy from food is used for many purposes, such as growth, responding to changes in the environment, movement, and even sleep.

Living Things Produce Waste That Must Be Removed

Through their life processes, living things produce waste substances that are harmful if they are not removed. All cells have structures that store and remove waste. Unicellular organisms have different ways to do this. For example, some waste passes naturally across the outer membrane of a cell into the surrounding environment. Other waste is expelled from the cell through a structure called a vesicle.

Multicellular organisms have structures or systems that collect and remove waste from the body. For example, humans have structures called kidneys that filter waste from the blood. The waste is removed from the body when a person urinates.

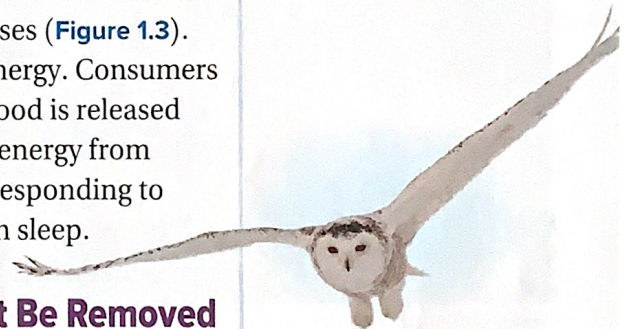


Figure 1.3 The snowy owl visits southern parts of B.C. from the Arctic in late fall and winter. Mice are among its sources of food energy. Snowy owl is sacred to many First Peoples. What stories can you learn about snowy owl?



Before you leave this page . . .

1. How are unicellular and multicellular living things similar and different?
2. Why do living things need energy, and where do they get it?

CONCEPT 2

Living things respond to stimuli, grow, and reproduce.

Activity

Investigating the Characteristics of Life

Choose three organisms that you are familiar with in the places you live and visit. Explain how each organism has all of the characteristics of living things that you have explored so far.

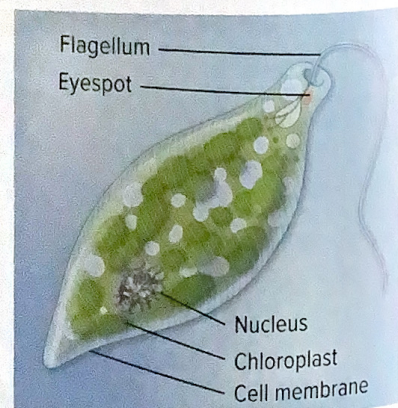


Living Things Respond to Stimuli

A stimulus is anything that causes a living thing to react (respond) in a certain way. The plural of stimulus is stimuli. Living things respond to internal stimuli—things that occur inside their bodies. For example, when your stomach growls, you know you are hungry and you respond to this internal stimulus by eating. Feeling thirsty is another example of an internal stimulus. When animals, such as the caribou in **Figure 1.4**, are thirsty, they find water to drink.

Living things also respond to external stimuli—things that occur outside their bodies, in their surroundings. For example, if you have a dog or a cat, you may have seen its ears flick up in response to a noise at the door. The plant in **Figure 1.4** is responding to the light by growing toward it. Multicellular animals have sense organs and/or a nervous system to respond to stimuli. Unicellular organisms, such as *Euglena*, have structures that allow them to sense and respond to changes in their environment.

Figure 1.4 Organisms respond to internal and external stimuli. The caribou drinks in response to an internal stimulus. A plant growing toward the light is responding to an external stimulus. *Euglena* have a structure called an eyespot that allows them to sense the external stimulus of light.



Living Things Grow

All living things grow by increasing in size, or in the number of their cells, or both. Unicellular organisms grow by increasing in cell size, up to a certain point. Multicellular organisms grow by increasing the number of cells in their body.

Living Things Reproduce

All living things reproduce, which means that they produce more of their own kind (species). Organisms reproduce in different ways. Many unicellular organisms, such as the bacteria in **Figure 1.5**, reproduce by dividing into two cells. Each new cell is the same as the original cell, because it has the same genetic material. Other organisms must have a mate to reproduce.

As shown in **Figure 1.5**, when organisms mate, their offspring are not identical to their parents. The offspring differ because each parent provides different genetic information.

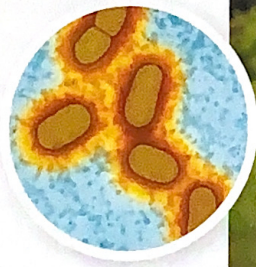


Figure 1.5 Some living things reproduce by dividing into two cells that are identical. Other organisms produce offspring with a mate.

Extending the Connections

Comparing How Different Peoples Define “Life”

Scientists have agreed on a set of characteristics to separate living and non-living things. However, science is just one of many different ways of knowing about and understanding ourselves and the world. Reflect on your own cultural background, and collaborate with your classmates to share the many ways that people think about and understand life.

Before you leave this page . . .

1. Create a scenario that includes six stimuli (three external and three internal). Your scenario must demonstrate your understanding without defining the words stimulus, external, and internal.
Your scenario could take the form of a paragraph, a comic strip, a song, or another format of your choice.
2. Explain how growing is different from reproducing.