

Lesson 1

The Basic Unit of Life

Before Reading

Go outside and observe the living things around you. There will be trees, birds, bushes, ants, or flowers. These are all living things and they may seem different. But they all share some characteristics. Can you tell what characteristics all living things have in common?

Vocabulary

cell
chlorophyll
tissue
organ
organ system



Science Inquiry Skill



Define Based on Observation

This is when you create a description that is based on your observations and experiences.

The Basic Unit of Life — What is it?

All living things — called organisms — have something in common. All organisms, from the smallest to the largest, are all made of cells. A cell is the basic unit of life. It is the smallest unit (or building block) of a living organism that is capable of life.

A cell is the smallest unit of living matter there is and each one must be able to carry out the processes of life. Within cells, there are structures that work together to allow the cell to live. Some structures transport materials throughout the cell. Other structures make food and others release energy for the cell to use.

Different organisms have different kinds of cells. For example, animal cells are different from plant cells. They are different because plants have needs that animals don't have such as the need to grow up from the ground. Plant cells have parts that meet those needs.

Reading for Learning

Main Idea

All living things are made of the basic unit of life — cells.



Nucleus

(cell control center that directs everything the cell does)

Vacuole

(storage space that stores food, water, and wastes)

Cytoplasm

(material that suspends cell parts)

Chloroplast

(cell part that contains chlorophyll)

Mitochondrion

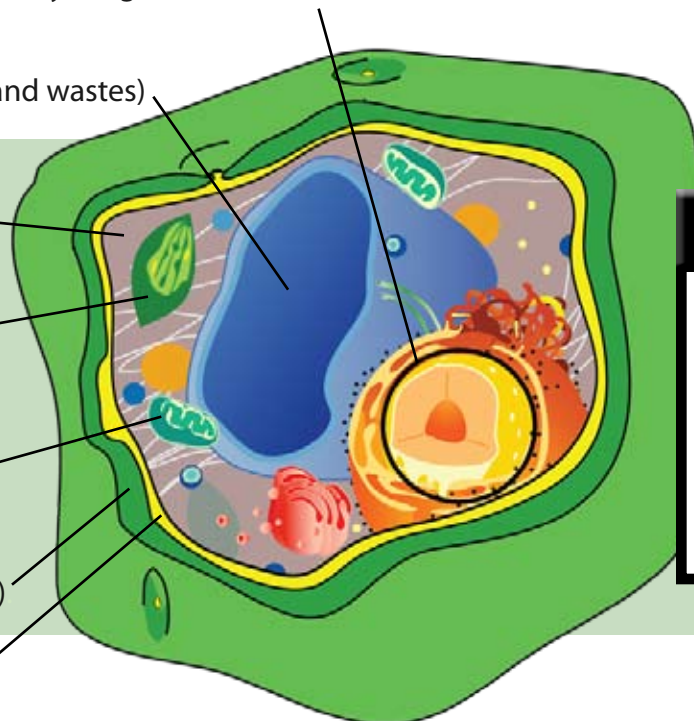
(cell energy processor that helps supply energy for the cell)

Cell Wall

(rigid wall that surrounds the plant cell)

Cell membrane

(holds cell together)



Plant Cell

Plant cells contain chlorophyll and have a cell wall that is rigid.

When you look at a plant, you see that it is green. The reason is because inside a plant cell, there is a green chemical called **chlorophyll** (KLAWR-uh-fil). This chemical enables plants to use the Sun's energy to make food for themselves. This chemical is found in the cell part called the chloroplast (KLAWR-uh-plast).

The cell wall is another part of a plant cell. When you look at a tree, you can see that it grows from the ground and has a rigid trunk that supports all its weight. You may realize that the tree must be made of rigid material to support itself. Its cells have rigid cell walls. Without the rigid cell walls, the tree could not stand up.

Animal cells do not have chloroplasts or cell walls. However, there are many characteristics that animal cells and plant cells do share. This is because they have many of the same needs. For example, both plant and animal cells have a cell membrane, mitochondria, cytoplasm, and a nucleus.

The nucleus of plant and animal cells is the control center of the cells. It directs everything a cell does. The cytoplasm is a fluid inside the cell and the cell parts float in it. The mitochondria release energy for the cell. Holding the cell together is the cell membrane.

Reading Check

Can you name one thing that animal and plant cells have in common?

Using Diagrams for Understanding

Demonstrate your understanding of differences between plant and animal cells. Write a short paragraph.

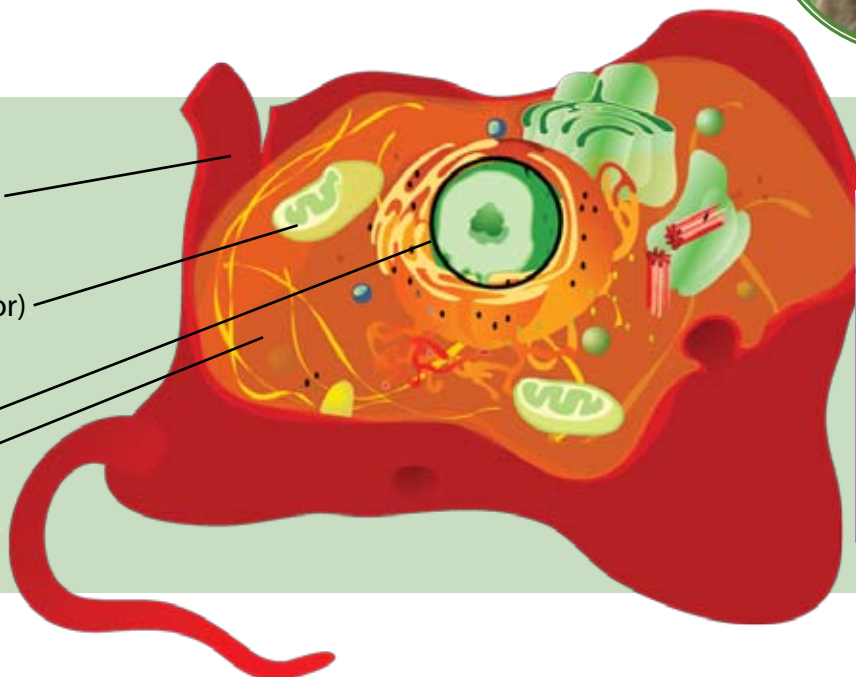


Cell membrane
(holds cell together)

Mitochondrion
(cell energy processor)

Nucleus
(cell control center)

Cytoplasm
(suspends cell parts)



Animal Cell

Animal cells do not contain chlorophyll nor do they have a cell wall.

Living things — What are they made of?

There are some organisms that are made of just one cell. For example, some fungi and bacteria have only one cell. Other organisms are made of many similar cells that benefit from cooperating with each other. Hundreds of similar cells form colonies and move and find food together. Some types of algae are an example of this type of organism.

Complex plants and animals are many-celled living things. They are made of many different kinds of cells. Cells in a many-celled organism work together to keep the organism alive. There are many different kinds of jobs and different kinds of cells do them. Each cell contributes to the health and survival of the organism in its own way.

For example, cells in the leaves of the tree make the plant's food. Cells in branches, stems, trunk and roots form tubes. Food and water is transported (trans-PAWRT-uhd) through the tubes. Flowers, fruits and seeds are formed by other cells that allow the tree to reproduce.

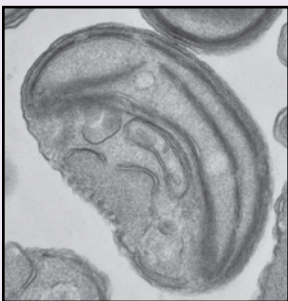
Similarly, there are different kinds of cells in animals, including humans, that have different kinds of functions. For example, skin cells are flat and wide to protect other cells that are underneath them. Muscles are made of long, thread-like cells that let the body move. Nerve cells transport messages from one part of the body to another so they are very long.

When similar cells have come together and do the same

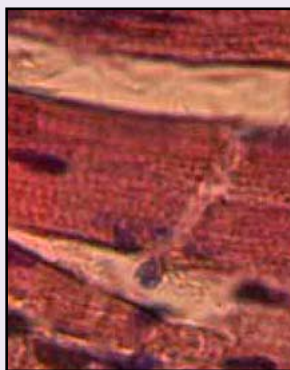
Using Charts for Understanding

Think of a many-celled organism. Name an example of each level of organization.

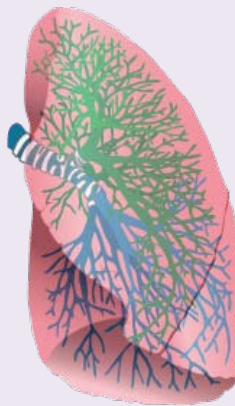
Levels of Organization of Organisms



Cell



Tissue



Organ



Organ System



Many-celled Organism

job or function, they create a **tissue** (TISH-ew). For example, the "strings" of a celery stalk are a plant tissue. This tissue's job or function is to carry water and nutrients from the roots, up the stalk and to the leaves of the plant. The flesh of a fruit is another example of a plant tissue. Protecting the plant seeds is this tissue function.

An example of an animal tissue would be the muscles in your body that let you walk or move your arms. Muscles are animal tissue made of muscle cells. Other kinds of animal tissue in an animal's body include bone, hair, teeth, blood and nerve.

Tissues of different kinds come together to make an **organ**. Examples of plant organs are stems, fruit and roots. Examples of animal organs are lungs, skin, heart and brain.

Finally, a group of organs that work together to do a specific job is called an **organ system**. A dog's digestive system includes its mouth, stomach and intestines. This is an example of an animal organ system. An example of a plant organ system is the shoot system. Stems and leaves are organs of the shoot system. Roots are the main organ of the plant's root system.

Organ systems work together. They carry out life processes such as breathing and digestion. These processes keep many-cell organisms healthy and alive. Remember, you are a many-celled organism.

Question —
What is required for an organ system?



Make a Model: Plant Cells

Make a model cell out of gelatin as cytoplasm with candies, fruits and vegetables as structures in the cell.

1. Select fruits, candies and vegetables for parts of the cells.

Examples:

Chopped Celery = Mitochondrion

Shredded Carrots = other cell parts

Grape halves = other cell parts

Diced peaches = Chloroplast

Whole cherry = Nucleus

Marshmallow = Vacuole

2. Select a light-colored gelatin
Example: lemon or clear
3. Select a low-walled mold to represent the cell wall.
4. Gather the fruits, candies and vegetables
5. Prepare the gelatin according to package directions.
6. Pour into the mold.
7. Stir in the "cell parts" and allow to set.
8. When set, observe the model and discuss how the model is like and unlike an actual plant cell.

In Review

What's Important

All living things are made of cells. The cell is the basic unit of life. Cells have systems that allow them to carry out all life processes. Some organisms have one cell and some have many cells. Many-celled organisms have cells that organize internally from cells to tissues to organs to organ systems.

There are similarities among organisms. All many-celled organisms are organized in cells, tissues, organs and organ systems. All these levels of organization are used to classify organisms.

Think and Write

1. What do all living things have in common?
2. What does the cell wall in plant cells do for plants?
3. What are some examples of animal tissue?
4. What are the two main organ systems of plants?

Critical thinking —

Why are cells called the building blocks of life?

CONNECTIONS



Writing Connection

Compare and Contrast

Write a short essay about cells.

Use a VENN diagram to organize your thoughts. How are animal and plant cells different? How are they the same?



Math Connection

Big Numbers

Some many-celled organisms, such as humans, have trillions of cells. Write out the number a trillion. (It is the number 1 with 12 zeros.) If there are a trillion cells in an organism, how many cells do you estimate are in $\frac{1}{2}$ of that organism?



Art Connection

Make a Poster

Demonstrate your knowledge of how cells organize. Remember that cells are the basic unit of life. They come together to form tissues and they form organs. Several organs work together in organ systems. Select a plant or animal and make a poster using drawings or photographs.



Technology Connection

On the Web

There are many science sites for students. One to try is: www.biology4kids.com