Read to Learn

Main Idea **All living things are made of cells, the basic unit of life.**

What Is the Basic Unit of Life?

Do you know what all living things have in common? From the smallest **organism**, or living thing, to the largest, we are all made of cells. A **cell** is the smallest unit of an organism that is capable of life.

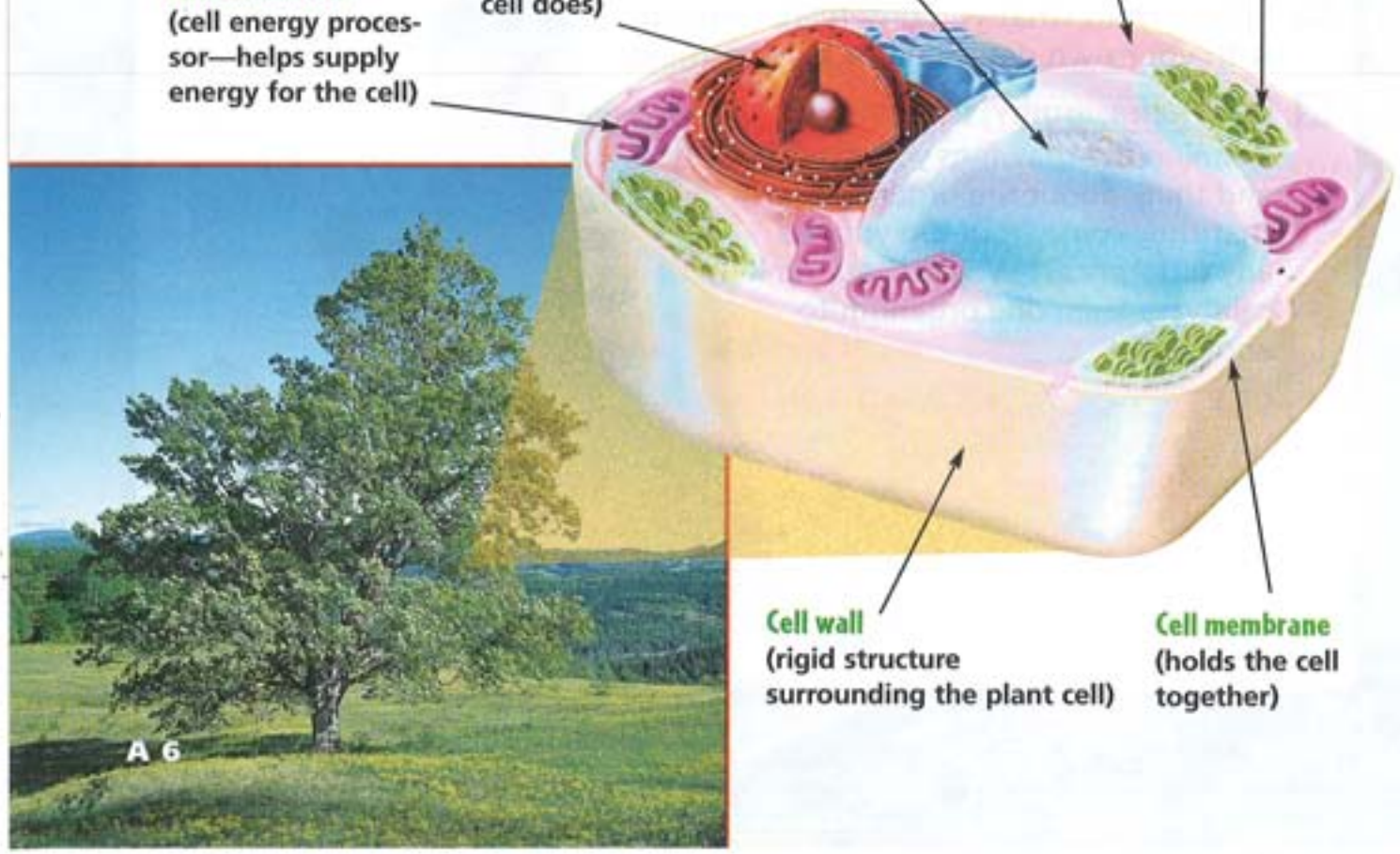
Since the cell is the smallest unit of living matter, the processes of life must be carried out by the cells. To do this, cells have structures that work together to maintain the life of the cell. Some of these structures make food, some release energy for the cell to use, and some transport materials.

The cells of different organisms are different. For example, plant cells are different from animal cells. Plants have needs that animals don't have and cell parts that meet these needs.

You don't need a microscope to discover that plants are green. That's because their cells contain a green chemical called **chlorophyll** (KLAWR·uh·fil). It allows plants to use the Sun's energy to make their

Plant Cell

Plant cells have rigid walls and contain chlorophyll.



own food. This chemical is found in chloroplasts (KLAWR·uh·plasts).

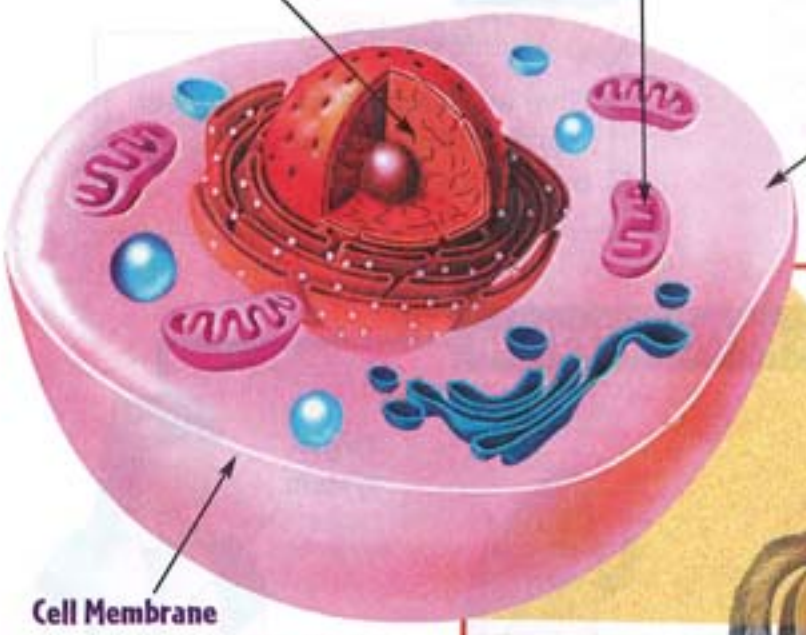
Plant cells also have a cell wall. Let's look at a tree to find out why plants need cell walls. A tree rises up from the ground. Its rigid trunk supports all its weight. The tree must be made of rigid building blocks—rigid cells that support it. The cell walls of the plant cells keep the tree from collapsing.

Animal cells don't have chloroplasts or a cell wall. However, plant and animal cells share many characteristics because they have many of the same needs. For example, plant and animal cells have a nucleus, cytoplasm, mitochondria, and a cell membrane.

The nucleus of plant and animal cells directs everything the cells do. The cytoplasm is a fluid where all parts of the cell float. The mitochondria release energy the cell needs. Plant vacuoles are used for storing food, water and wastes. The cell membrane holds the cell together.

READING Draw Conclusions

What is one of the things plant and animal cells have in common?



Animal Cell

Animal cells do not have a cell wall or chlorophyll.

READING Diagrams

Write a paragraph describing the differences between plant and animal cells.

What Are Living Things Made Of?

Some organisms, such as bacteria and some fungi, are made of just one cell. Other organisms, such as some algae, are made of many similar cells that benefit from cooperating. They do this by forming colonies of hundreds of cells that move and find food together.

Many-celled living things, such as complex plants and animals, are made of different kinds of cells. The cells of a many-celled organism work together to keep the organism alive. Different kinds of cells do different kinds of jobs. Each cell contributes to the health and survival of the organism in a different way.

For example, in a tree, cells in leaves make the plant's food. Cells in roots, trunk, stems, and branches form tubes through which the food or water is moved, or transported (trans·PAWRT·uhd). Other cells form flowers, fruits, and seeds that allow the tree to reproduce.

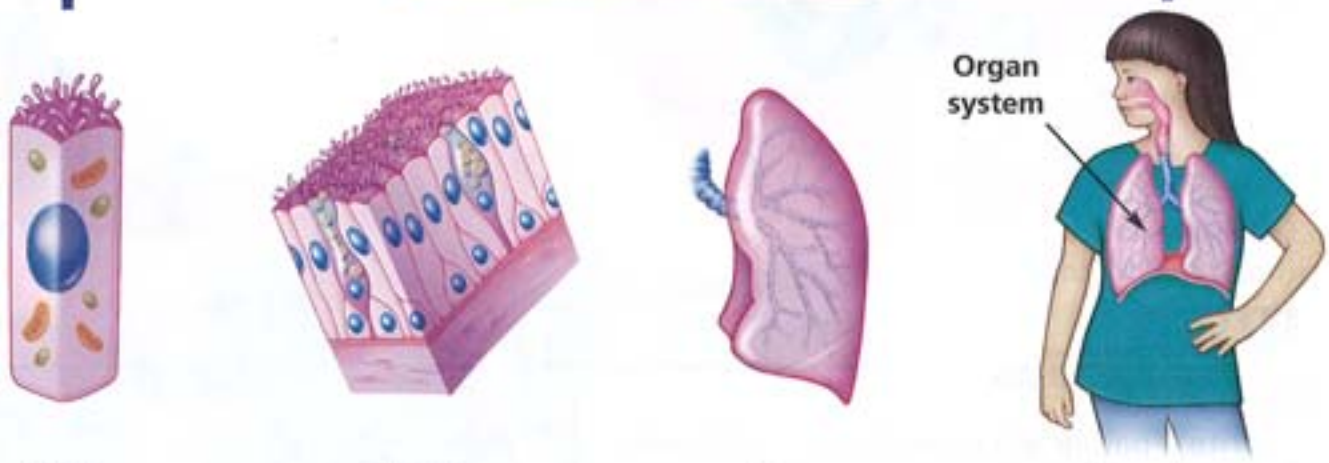
Similarly, the cells of animals, including humans, have different functions. Skin cells are flat and wide to protect the cells beneath them, muscle cells are long threadlike cells that allow body movement, nerve cells are long because they transport messages from one part of the body to another.

Similar cells that have the same job or function come together to make a **tissue** (TISH·ew). The "strings" in celery stalks are examples of plant tissues. These tissues carry water and

READING
Charts

Give an example of each level organization in many-celled organisms.

Levels of Organization



minerals from the roots to the leaves of the plant. Another example of a plant tissue is the flesh of fruits. This tissue's function is to protect the plant's seeds.

Examples of animal tissue are the muscles that allow you to move your arms or to walk. The muscles in your body are tissue made of muscle cells. Different kinds of tissue in an animal's body include muscle, bone, skin, nerve, and blood.

Tissues of different kinds come together to make an **organ**. Stems and fruits are examples of plant organs. The heart, the lungs, and the brain are examples of animal organs.

Finally, a group of organs that work together to do a certain job makes up an **organ system**. For example, a fox's digestive system includes its mouth, stomach, and intestines. The roots of a plant are the main organ in the root system of a plant. The stems and leaves are organs of the shoot system.

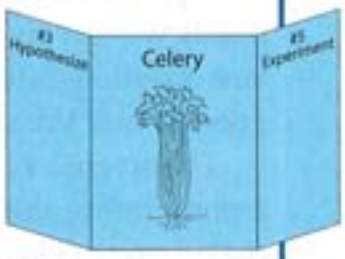
Organs systems work together so that life processes like breathing and digestion can be carried out. These are the processes that keep many-celled organisms, like you, healthy and alive.

What are the levels of organization of many-celled organisms?

QUICK LAB

Plant Parts

FOLDABLES Make a Shutter Fold. (See p. R 42.) Label the tabs as shown.



1. **Observe** Use a hand lens to observe the parts of a celery plant.
2. Draw what you see in your Shutter Fold.
3. **Hypothesize** Make a guess about the function of the stem of the celery plant. Write your hypothesis in the left shutter of your Shutter Fold.
4. Label the plant organs you see on your drawing. What levels of organization does your drawing show? Record your answer below your diagram in your Shutter Fold.
5. **Experiment** Add water to a bottle so the water is about 1 inch deep. Add a few drops of food coloring to the water. Cut a piece of stalk and place it in the colored water. Observe it after a few minutes. Record what you see on the right shutter of your Shutter Fold.
6. **Communicate** Explain to the class why your observation supports or doesn't support your guess.

What Traits Are Used to Classify Organisms?

People have always tried to make sense of their surroundings. One way to do this is to look for patterns. For example, if we find patterns among plants we can answer some very important questions, such as: What plants are good to eat? What plants are poisonous?

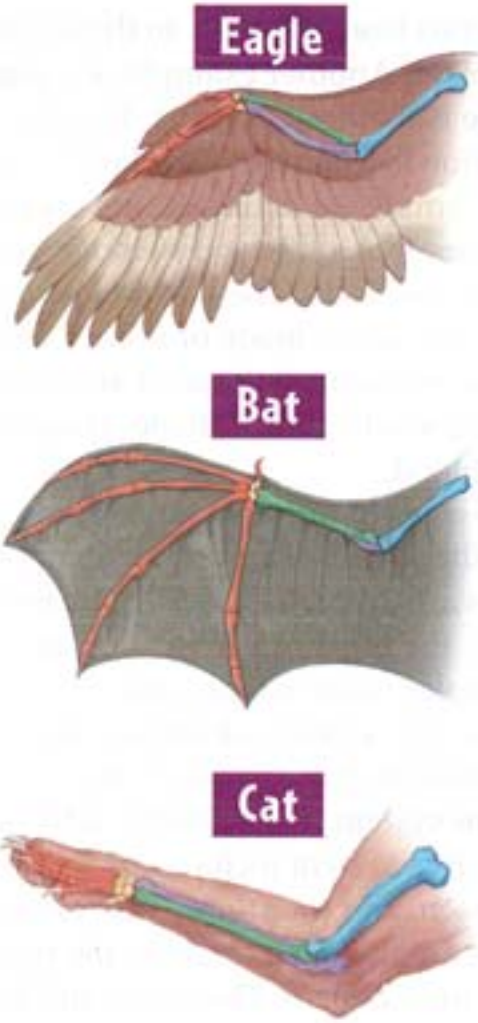
The science of finding patterns among living things is called *classification* (klas·uh·fi·KAY·shuhn). Cells are used in classification because cells from different organisms are different. Whether an animal grows hair or feathers depends on the kinds of cells it has.

Ancient scientists came up with very simple classification systems. These were based on characteristics that anyone could see. In 350 B.C. the Greek scientist Aristotle classified plants into three large groups—herbs (little plants), shrubs (bigger plants), and trees (the biggest plants).

This made sense at the time. However, as scientists learned more about plants, they realized that size was not the best way to classify them. For example, today we know that a tiny blade of grass is more like a stalk of corn than a dandelion that grows close to the ground.

When it comes to classifying organisms, cells, tissues, organs, and systems all have to be compared carefully. For example, bats and birds have wings and fly. However, if you were to take a close look at the wing of a bat, you would find that it is more like the front leg of a cat than like the wing of an eagle.

So bats and cats are in fact more alike than bats and eagles.



The bones in the diagram above have been color-coded to show similar bones in each animal.

READING Diagrams

How are the bat's wing and the cat's front leg alike?

What parts should be analyzed when classifying an organism?

Why It Matters

All living things are made of cells. The cell is the basic unit of life because it can carry out all life processes. Some organisms are made of one cell and some are many-celled. Many-celled organisms are organized internally from cells to tissues to organs to organ systems.

Similarities among organisms are found in cells, tissues, organs, and organ systems. All these levels of organization are used to classify organisms.

e-Journal Visit our Web site **www.science.mmhschool.com** to do a research project on the levels of organization of a many-celled organism of your choice.

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 in plants?
5. **Critical Thinking** How can cell classification be useful in identifying organisms?

L·I·N·K·S

WRITING LINK

Writing That Compares How are plant and animal cells similar? How are they different? Use a Venn diagram to organize your ideas. Write an essay to present your findings.

MATH LINK

10 cells

Solve this problem. Use a benchmark number to estimate the number of cells in the slide.

ART LINK

Make a poster. Choose a plant and an animal. Make a poster using drawings and/or photographs to show the levels of organization in the plant and the animal you selected. Research the structure of these organisms so you can complete your poster accurately.

TECHNOLOGY LINK

LOG ON Visit **www.science.mmhschool.com** for more links.