chapter 1 The Study of Life

section 1 Introduction to Biology

Before You Read

What does it mean to be alive? On the lines below, list characteristics that you think living things have. Then read the section to learn what you have in common with other living things.

MAIN Idea

All living things share the characteristics of life.

What You'll Learn

- the definition of biology
- possible benefits from studying biology
- characteristics of living things

Read to Learn

The Science of Life

Biology is the science of life. In biology, you will learn the origins and history of life and once-living things. You will also learn structures, functions, and interactions of living things.

What do biologists do?

Biologists make discoveries and look for explanations by performing laboratory and field studies. Some biologists study animals in their natural environment. For example, Jane Goodall's observations helped scientists know how best to protect chimpanzees.

Other biologists research diseases to develop new medicines. Many biologists work to develop new technology. Technology is the application of scientific knowledge to solve human needs and to extend human capabilities. For example, Dr. Charles Drew developed methods to separate blood plasma for transfusions. His research led to blood banks.

Some biologists study genetic engineering of plants. They try to develop plants that can grow in poor soils and resist insects and disease. Environmental biologists try to protect animals and plants from extinction by developing ways to protect them.

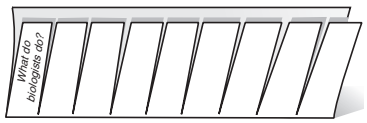
Study Coach

Make Flash Cards Make a flash card for each key term in this section. Write the term on one side of the card. Write the definition on the other side. Use the flash cards to review what you have learned.

FOLDABLES™

Summarize Information

Make an eight-tab Foldable from a sheet of paper. Label the tabs with the question heads in this section. As you read, summarize the answers under the tabs.



Picture This

1. **Highlight** each characteristic of life in the table as you read about it in the section. Use the descriptions in the table to review what you have learned.

The Characteristics of Life

From many observations, biologists concluded that all living things have certain characteristics. The characteristics of life are listed in the table below. An **organism** is anything that has or once had all these characteristics.

Characteristic of Life	Description
Made of one or more cells	The cell is the basic unit of life. Some organisms have one cell only. Others have many cells.
Displays organization	The organization of a biological system begins with atoms and molecules. Each organized structure in an organism has a specific function. For example, an anteater's snout is long because it functions as a container for the long tongue.
Grows and develops	Growth results in an increase in mass. Development results in different abilities. For example, a tadpole grows larger and develops into an adult frog.
Reproduces	Organisms reproduce and pass on traits to the next generation. Reproduction must occur for a species to continue to exist.
Responds to stimuli	Reactions to stimuli from inside and outside the body are called responses. For example, a cheetah responds to the need for food by chasing a gazelle. The gazelle responds by running away.
Requires energy	Energy is needed for life processes. Many organisms get energy by taking in food. Other organisms make their own food.
Maintains homeostasis	Homeostasis is the process that keeps conditions inside the bodies of all organisms stable. For example, humans perspire when hot to lower body temperature.
Adaptations evolve over time	Adaptations are inherited changes that occur over time and help the species survive.

What determines a cell's structure?

Cells are the basic units of structure and function in all living things. Some organisms, such as bacteria, are unicellular—they have just one cell. Humans and plants are multicellular—they have many cells. The structure of a cell is related to its function. For example, each cell in a tree's roots has a structure that enables it to take in water from soil.

Reading Check

2. **Sequence** the levels of organization, from least complex to most complex.

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How are living things organized?

Living things display **organization**. This means they are arranged in an orderly way. Each cell is made up of atoms and molecules. Tissues are groups of specialized cells that work together. Tissues are organized into organs, which perform functions such as digestion. Organ systems work together to support an organism.

How does development differ from growth?

Growth adds mass to an organism. Many organisms form new cells and new structures as they grow. **Development** is the process of natural changes that take place during the life of an organism. For example, after baby birds hatch they cannot fly for a few weeks. As they grow, they develop structures that give them the ability to fly.

Why is reproduction important to a species?

Reproduction is the production of offspring. If a species is to continue to exist, some members of the species must reproduce. A **species** is a group of organisms that can breed with one another and produce fertile offspring. Without reproduction, a species will become extinct.

Why is the ability to respond to stimuli critical?

An organism's external environment includes all things that surround it, such as air, water, soil, rocks, and other organisms. An organism's internal environment includes all things inside it. A **stimulus** (plural, stimuli) is anything that is part of either environment that causes some reaction by the organism. The reaction to a stimulus is a **response**. For example, a houseplant responds to the sunlight coming through a window by growing toward it. The ability to respond to stimuli is important for survival.

How do organisms obtain energy?

Living things need energy to fuel their life functions. Living things get their energy from food. Most plants and some unicellular organisms use light energy from the Sun to make their own food. Organisms that cannot make their own food get energy by consuming other organisms.

Why must an organism maintain homeostasis?

Homeostasis (hoh mee oh STAY sus) is the regulation of an organism's internal conditions to maintain life. If anything upsets an organism's normal state, processes to restore the normal state begin. If homeostasis is not restored, the organism might die.

How do adaptations benefit a species?

An **adaptation** is any inherited characteristic that results from changes to a species over time. Adaptations make the members of a species better able to survive and, therefore, better able to pass their genes to their offspring.

Think it Over

3. Apply Give an example of an internal stimulus for a rabbit. Describe an appropriate response to the stimulus.

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Reading Check

4. Summarize the importance of homeostasis.

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