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ملخص وشرح الدرس الأول Life Exploring المسار المتقدم

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التواصل الاجتماعي بحسب الصف السادس



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Cells and Life

Exploring Life

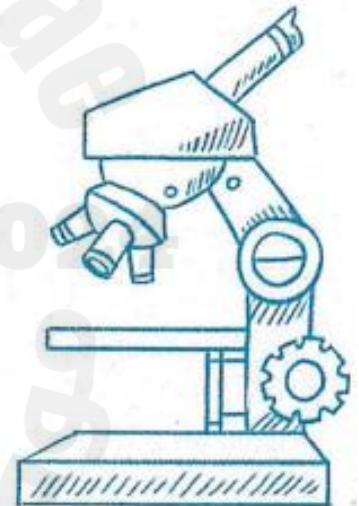
Inspire Science

What are living things?

How can you tell if something is living or nonliving? What is the difference between living things and nonliving things?

Building Blocks of Life All living things share seven characteristics of life. The first characteristic that living things have in common is what they are made of. Let's take a closer look at the building blocks of life.

Technology Leads to Discovery You just used a microscope to observe what living things are made of—**cells**. Have you ever looked up at the night sky and tried to find other planets in our solar system? It is hard to see them without using a telescope because other planets are millions of kilometers away. Just like we can use telescopes to see other planets, we can use microscopes to see cells. But people didn't always know about cells. Because cells are so small, early scientists had no tools to study them. It took hundreds of years for scientists to learn about cells.



Have you ever used a magnifying lens to see details of an object? If so, then you have used a tool similar to the first microscope. The invention of microscopes enabled people to see details of living things that they could not see with the unaided eye. The microscope was an advance in engineering that enabled people to make important discoveries about living things.



HISTORY Connection More than 300 years ago, an English scientist named Robert Hooke built a microscope. He used that microscope to discover cells. How did he do it, and what conclusions did he come to? Read his original writings on observations of his discovery below.



Take a look at this photo of one of Robert Hooke's drawings!

HISTORY Connection In the late 1600s, the Dutch merchant Anton van Leeuwenhoek (LAY vun hook) made improvements to the first microscopes. His microscope, similar to the one shown in the image, had one lens and could magnify an image about 270 times its original size. This made it easier to view organisms.

After Hooke's discovery, other scientists began making better microscopes and looking for cells in many other places, such as pond water and blood. The newer microscopes enabled scientists to see different structures inside cells. Three important observations about cells made by three different scientists were combined into one theory called the **cell theory**.

Anton van Leeuwenhoek observed pond water and insects using a microscope like the one shown below.

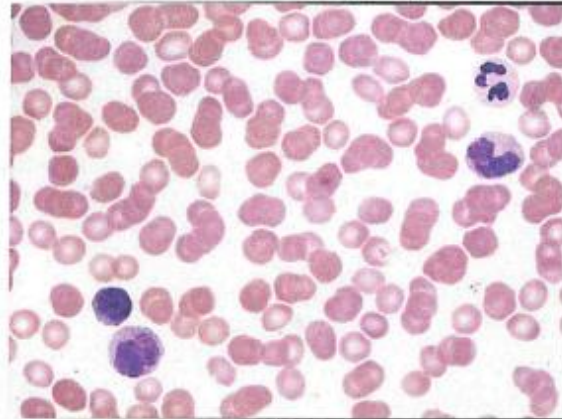


Principles of the Cell Theory You might recall that all matter is made of atoms and that atoms combine and form molecules. Molecules make up cells. All living things are made up of cells, which are the smallest unit of life. Cells perform different functions to keep organisms alive. All cells come from preexisting cells through the process of cell division.

**ENGINEERING Connection**

Since the development of the cell theory in the 1830s, microscopes have continued to become more advanced. If you have used a microscope in school, then you have probably used a light microscope. **Light microscopes** use light and lenses to enlarge an image of an object. Light microscopes can enlarge images up to 1,500 times their original size. In some cases the object, such as the blood cells in the photo on the right, must be stained with a dye in order to see any details.

Light Microscope



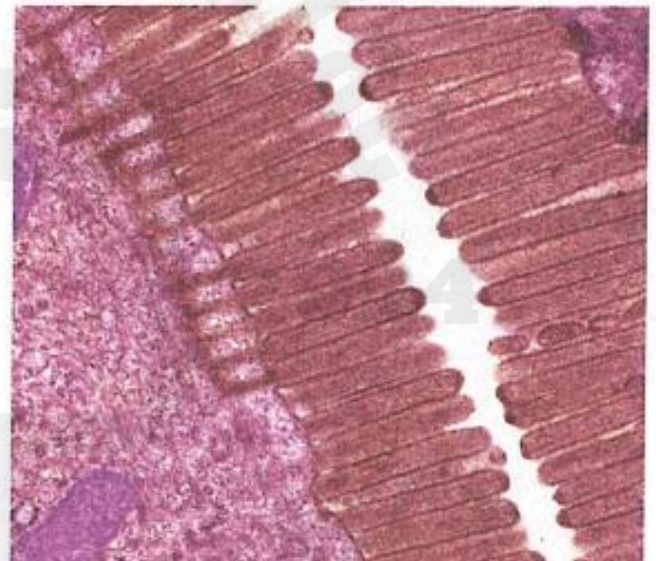
Stained LM Magnification: 640×

You might know that electrons are tiny particles inside atoms. **Electron microscopes** use a magnetic field to focus a beam of electrons through an object or onto an object's surface. An electron microscope can magnify an image 100,000 times or more. The two main types of electron microscopes are transmission electron microscopes (TEMs) and scanning electron microscopes (SEMs).

TEMs are usually used to study extremely small things such as cell structures. In a TEM, electrons pass through the object and a computer produces an image of the object. A TEM image of an intestinal microvilli is shown on the right.

SEMs are usually used to study an object's surface. In an SEM, electrons bounce off the object and a computer produces a three-dimensional image of the object. An image of blood cells from an SEM is shown. Note the difference in detail in this image compared to the image of blood cells from a light microscope.

Transmission Electron Microscope





How many cells do living things have?

Organisms are organized in different ways. Living things that are made of only one cell are called **unicellular organisms**. Living things that are made of two or more cells are called multicellular organisms.

Common Characteristics You now know that all living things are made of cells. What are the other six characteristics that all living things have in common? These include organization, growth and development, reproduction, response to stimuli, maintaining internal conditions, and using energy.

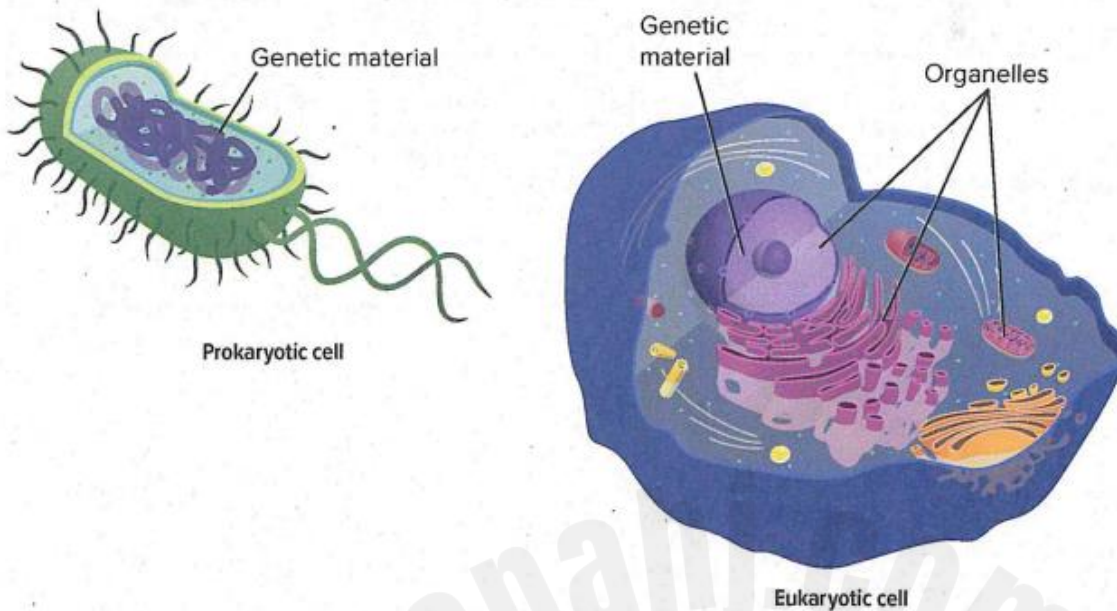
Characteristics of Life All living things are organized according to different structures that perform different functions. Living things grow and develop meaning they increase in size and go through changes during their lifespans. Living things create new living things through the process of **reproduction**. They also respond to changes in their environments called stimuli. Another characteristic of organisms is that they maintain **homeostasis**, the ability to keep steady internal conditions when outside conditions change. All organisms require energy for everything they do. If something doesn't display each of these characteristics, it is not a living thing.

What are the different types of cells?







Recall that the use of microscopes enabled scientists to discover cells. With more advanced microscopes, scientists discovered that all cells can be grouped into two categories—prokaryotic (proh ka ree AH tihk) cells and eukaryotic (yew ker ee AH tihk) cells.

All cells contain genetic material—the means by which information is transmitted from one generation to the next. In some cells this genetic material is surrounded by a lining. In **prokaryotic** cells, the genetic material is not surrounded by a lining. This is the most important feature of a prokaryotic cell. In general, prokaryotic cells are smaller than eukaryotic cells and have fewer parts to their cells. Most prokaryotic cells are unicellular organisms and are called prokaryotes. Some prokaryotes live in small groups called colonies. Some can also live in extreme environments.

Plants, animals, fungi, and organisms called protists are all made of eukaryotic cells and are called eukaryotes. With few exceptions, each **eukaryotic** cell has genetic material that is surrounded by a lining. Every eukaryotic cell also has other structures called **organelles** which have specialized functions. Most organelles are surrounded by linings. Eukaryotic cells are usually larger than prokaryotic cells. About ten prokaryotic cells would fit inside one eukaryotic cell.



Classification Organisms are classified according to their cell type, prokaryotic or eukaryotic, as well as other characteristics. All organisms are classified into one of three domains—Bacteria, Archaea, or Eukarya (yew KER ee uh)—and then into one of six kingdoms. Organisms in the Bacteria and Archaea domains are unicellular prokaryotes, while organisms in the Eukarya domain are eukaryotes. The classification system of living things is still changing. The current classification method uses all the evidence that is known about organisms to classify them. This evidence includes an organism's cell type, habitat, the way it obtains food and energy, the structure and function of its features, and its common ancestry.

Domains and Kingdoms						
Domain	Bacteria	Archaea	Eukarya			
Kingdom	Bacteria	Archaea	Protista	Fungi	Plantae	Animalia
Example						
Characteristics	Bacteria are simple unicellular organisms.	Archaea are simple unicellular organisms that often live in extreme environments.	Protists are unicellular or multicellular and are more complex than bacteria and archaea.	Fungi are unicellular or multicellular and absorb food.	Plants are multicellular and make their own food.	Animals are multicellular and take in their food.



2. If a living organism contains a cell with the structures seen in the diagram, which of the following can you conclude about the organism?

- A The organism is a eukaryote.
- B The organism is unicellular.
- C The organism's cells do not contain organelles.
- D The organism's cells do not contain genetic information.



3. If you were to conduct an investigation to determine if an organism is a plant or an animal, which characteristic could be used to distinguish between the two?

- A whether the organism is unicellular or multicellular
- B whether or not the organism is made of cells
- C whether or not the organism responds to its environment
- D whether the organism makes its own food or takes in food

4. Which should NOT be included in a model developed to show differences between unicellular and multicellular organisms?

- A Unicellular organisms have fewer cells than multicellular organisms.
- B Unicellular organisms are larger than multicellular organisms.
- C Unicellular organisms are organized differently than multicellular organisms.
- D Unicellular organisms are smaller than multicellular organisms.



Lesson Summery & Review

A. All living things have **seven characteristics** in common.

1. Made of cells
2. Organization
3. Growth and development
4. Reproduction
5. Response to stimuli
6. Maintaining internal conditions
7. Using energy

B. The first characteristic that living things have in common is what they are **made of**.

C. **Cells** are called the "building blocks of life" because all living things are made up of cells.

D. Principles of cell theory

- All living things are made of one or more cells.
- The cell is the smallest unit of life.
- All new cells come from preexisting cells.

Types of microscopes:

1- Light microscopes:

- It uses light and lenses to enlarge an image of an object.
- It can enlarge images up to 1,500 times its original size.
- It is used in school.

2- Electron microscopes:

- It uses a **magnetic field** to focus a beam of **electrons** through an object or onto an object's surface.
- It can **magnify** an image up to 100,000 times or more.
- There are **two main types** of electron microscope:

A. Transmission electron microscopes (TEMs)

- TEMs are usually used to study extremely small things such as cell structures. In a TEM, electrons pass through the object and a computer produces an image of the object

B. Scanning electron microscopes (SEMs)

- SEMs are usually used to study an object's surface. (outside)
In an SEM, electrons bounce off the object and a computer produces a three-dimensional image of the object

How many cells do living things have?







- Living things that are made of only one cell are called **unicellular organisms**.
- Living things that are made of two or more cells are called **multicellular organisms**.

There are two main types of cells:

1. Prokaryotic cells
2. Eukaryotic cells

<u>Prokaryotic cells</u>	<u>Eukaryotic cells</u>
unicellular organisms	multicellular organisms
Contain genetic materials - how information is transmitted from one generation to the next	Contain genetic materials - how information is transmitted from one generation to the next
Not surrounded by a lining.	surrounded by a lining.
Small	large
Have fewer parts to their cells	Have many parts to their cells (called organelles)
Example: Bacteria	Example: plants, animals, and humans
Some prokaryotes live in small groups called colonies. Some live in extreme climates	

Classifications

Domains and Kingdoms						
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Kingdom	Bacteria	Archaea	Protista	Fungi	Plantae	Animalia
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- C Unicellular organisms are organized differently than multicellular organisms.
- D Unicellular organisms are smaller than multicellular organisms.

1) The smallest unit of life is the _____.

- A) cell
- B) homeostasis
- C) organism
- D) protein

2) Which of the following is **NOT** a necessary characteristic of a living thing?

- A) It is made up of cells.
- B) It eats food to get energy.
- C) It grows and develops.
- D) It responds to stimuli.



3) Which of the following is a multicellular organism?

- A) bacterium
- B) amoeba
- C) mouse
- D) paramecium

4) Which statement is true?

- A) Cells come in different shapes, but are all about the same size—very, very small.
- B) Cells come in different shapes and sizes.
- C) Cells all have the same shape, but come in different sizes.
- D) Cells are all the same shape and size—small and rounded.

5) Animals are multicellular.

- True
- False

6) _____ cells have genetic material that is not surrounded by a lining.

7) The cell theory is the result of the hypothesis and observation of one person.

- True
- False

8) The cell theory states that all cells come from cells that already exist.

- True
- False

9) Which correctly describes a difference between prokaryotic and eukaryotic cells?

- A) Only prokaryotic cells have vacuoles.
- B) Eukaryotic cells are smaller than prokaryotic cells.
- C) Prokaryotic cells have many organelles, each with their own specialized functions.
- D) Only eukaryotic cells have their genetic material surrounded by a lining.
