

Biology is the science that studies all living things and their environments, all living things called living organisms.

In biology, a cell is the basic membrane-bound unit that contains the fundamental molecules of life* and forms the basis of all living things that maintain proper homeostasis.

The first time the word *cell* was used to refer to these tiny units of life was in 1665 by a British scientist named **Robert Hooke**. By the early 1800s, scientists had observed the cells of many different organisms. These observations led two German scientists to propose that cells are the basic building blocks of all living things. Around 1850, a German doctor was studying cells under a microscope when he happened to see them dividing and forming new cells. He realized that living cells produce new cells through division. The ideas of all three scientists **Schwann**, **Schleiden**, and **Virchow** led to cell theory, which is one of the fundamental theories unifying all of biology.

Cell theory states that:

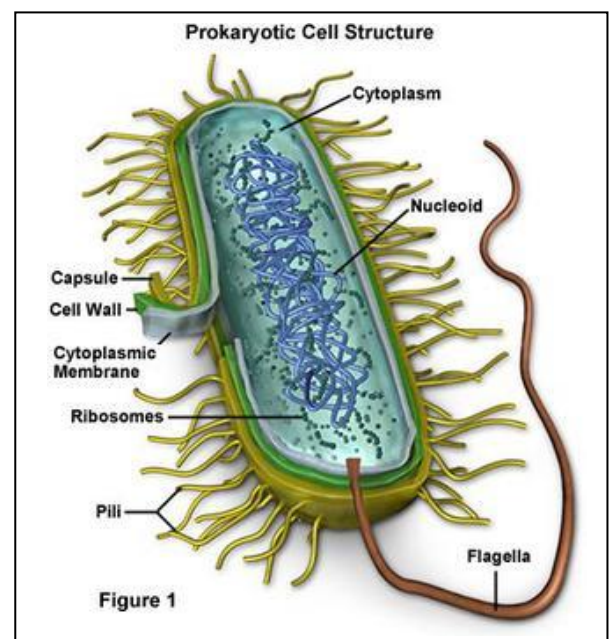
- All organisms are made of one or more cells.
- All the life functions of organisms occur within cells.
- All cells come from already existing cells.

The scientist classifies living organisms according to the number of cells to

A single cell is often a complete organism in itself, a “**unicellular organism**,” such as a bacterium or yeast. Other cells acquire specialized functions as they mature. These cells cooperate with other specialized cells and become the building blocks of large **multicellular organisms**, such as humans and other animals.

Also, biologists classify the living organism according to the presence of a nucleus to:

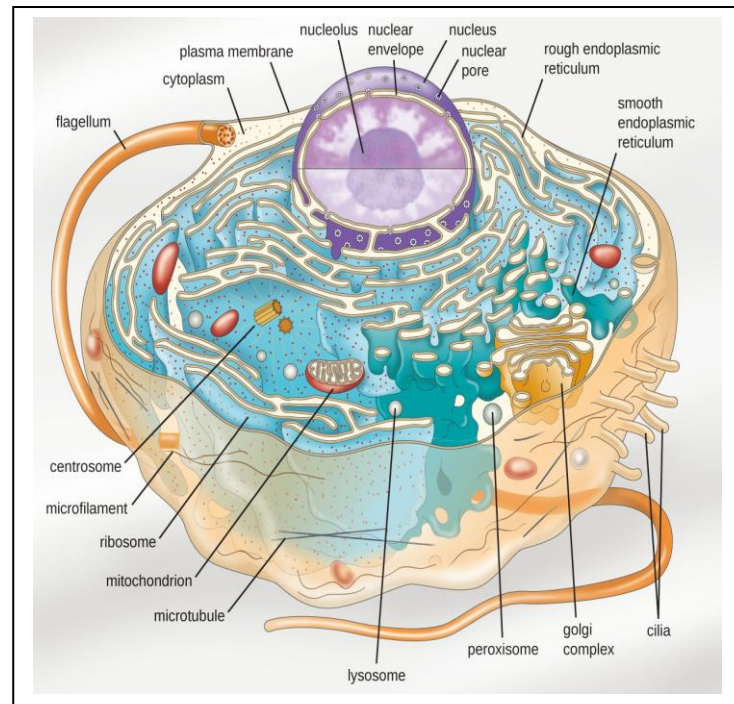
1. **Prokaryotic organisms** are cells that do not have a true nucleus or membrane-bound organelles. Characterized as:
 - Small size (1-5 μm).
 - Have a cell wall outside the cell membrane.
 - Lack a nuclear envelope separating the genetic material (DNA) from other cellular constituents.
 - Have no histon (specific basic proteins) bound to their DNA.
 - Have no organelles except ribosome.
 - Prokaryotic cells divide by binary fission.
 - Include: Bacteria (bacterium, singular), Cyanophyta, and Archaea (archaeon, singular).



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2. **Eukaryotic organisms** are cells that contain a nucleus and organelles and are enclosed by a plasma membrane. Organisms that have eukaryotic cells include protozoa, fungi, plants, and animals. Characterized by:

- Larger than prokaryotic cells (10-100 μm).
- Have a distinct nucleus surrounded by a nuclear envelope.
- Histones are associated with the genetic material.
- Numerous membrane-limited organelles are found in the cytoplasm.
- Eukaryotic cells are divided by mitosis and meiosis.

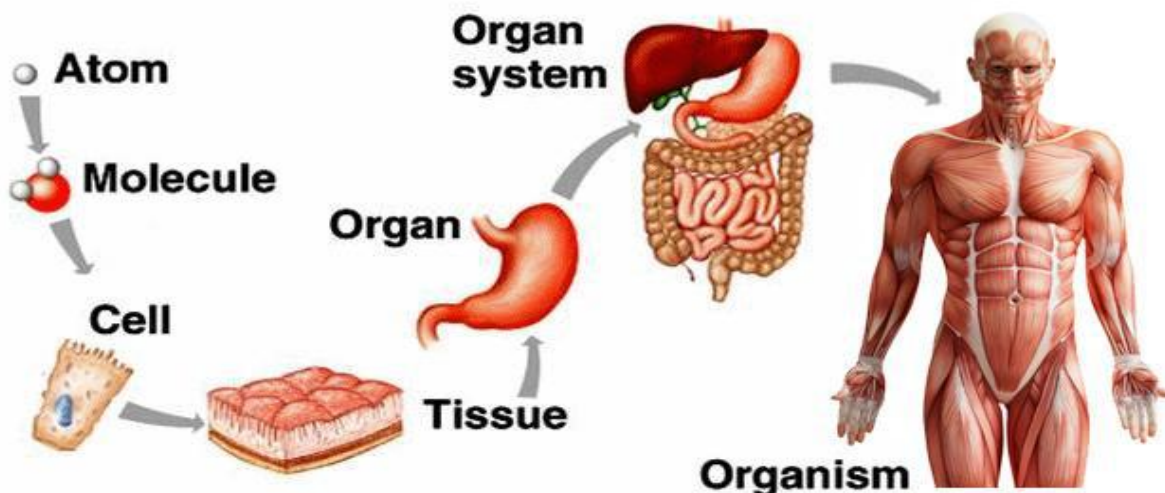


All living organisms share common characteristics:

(characteristics of the life)

1. Acquire materials and energy from the environment.
2. Reproduce and develop.
3. Maintain homeostasis.
4. Respond to stimuli.
5. Have an evolutionary history and are adapted to a way of life.

Humans are eukaryotic organisms from the animal kingdom and have the same characters as all living organisms and have levels of organization. Figure below illustrates that atoms join together to form the molecules that make up a cell. A cell is the smallest structural and functional unit of an organism. Humans are multicellular organisms because they are composed of many different types of cells, each group of similar cells that perform a particular function called tissue. Several types of tissues make up an organ, and each organ belongs to an organ system. The organs of an organ system work together to accomplish a common purpose. Organisms, such as humans, are a collection of organ systems.



The human body contains around **50-100 trillion cells**; they widely vary in shape, size, structure, number, and function.

Estimates are that more than **200 different types of cells** with a unique function are present in an adult human, including stem cells, muscle cells, bone cells, cartilage cells, blood cells, sex cells, nervous cells, fat cells, cancer cells, ect.

Most cells are small and can be seen only under a microscope. Most human cells are about **100 μm in diameter**, about the width of a human hair. The internal contents of a cell are even smaller and, in most cases, may only be viewed using powerful microscopes (electron microscopes). The science that studies the microscopic appearance of cells is known as cytology.

Certain structural features are common to all human cells, but there are some differences between cells according to cell type and cell function.

In general, the basic human cell components are:

1. Plasma membrane (plasmalemma, cell membrane).
2. Cytoplasm: that includes cytosol, cell organelles, and inclusions.
3. Nuclius
4. Cytoskeleton

** The four fundamental molecules of life are proteins, carbohydrates, lipids, and nucleic acids, with each of the four groups vital for every single living organism.*

***prokaryote: pro mean before, kary mean nucleus*

****eukaryote: eu mean true, kary mean nucleus*

References

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3. *Mader Human Biology, 12th edition*