

The Cell Theory

KEY CONCEPT: Cells are the basic unit of life. The invention of the microscope in the late 1500s revealed to early scientists a whole new world of tiny cells. Most cells are so small that they cannot be seen without a microscope. The discoveries of scientists from the 1600s through the 1800s led to the cell theory, which is a unifying concept of biology.



Both living and nonliving things are composed of molecules made from chemical elements such as carbon, hydrogen, oxygen, and nitrogen. The organization of these molecules into cells is one feature that distinguishes living things from all other matter. The cell is the smallest unit of matter that can carry on all the processes of life.

1. Every living thing - from the tiniest bacterium to the largest whale - is made of one or more cells.
2. Before the 17th century, no one knew that cells existed, since they are too small to be seen with the naked eye. The invention of the microscope enabled Robert Hooke, (1665) and Anton van Leeuwenhoek (1675) to see and draw the first 'cells', a word coined by Hooke to describe the cells in a thin slice of cork, which reminded him of the rooms where monks lived.
3. The idea that all living things are made of cells was put forward in about 1840 and in 1858 came 'Cell Theory' – i.e. 'cells only come from other cells' – contradicting the earlier theory of 'Spontaneous Generation'

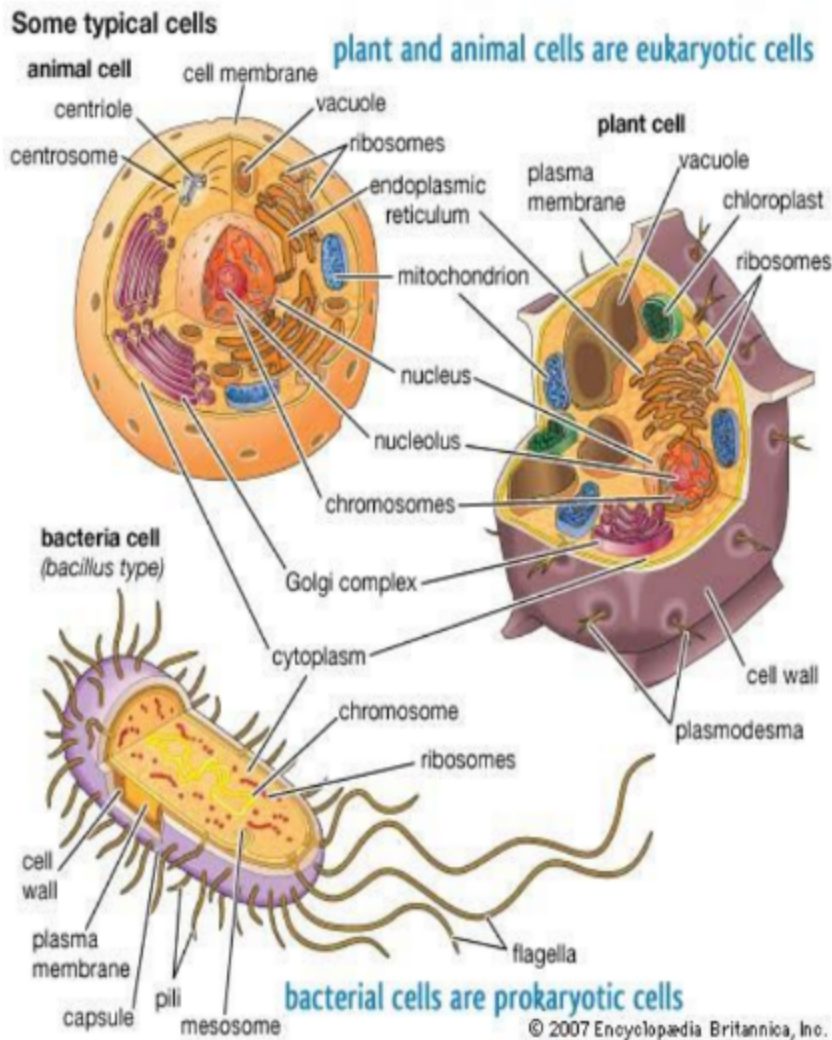
Recap: The Cell Theory consists of three principles:

- a. All living things are composed/made of one or more cells.
- b. Cells are the basic units of structure and function in an organism.
- c. Cells come only from the replication (mitosis/meiosis) of existing cells.

CELL DIVERSITY

Not all cells are alike. Even cells within the same organism show enormous diversity in size, shape, and internal organization. Remember, different cells have different functions/jobs within an organism. Each cell's job is important to ensuring the organisms can continue to live.

Prokaryotic vs. Eukaryotic



All cells can be divided into two major groups: prokaryotic cells or eukaryotic cells. The main differences between the two kinds of cells are in their structure:

- Eukaryotic cells have a nucleus defined by a membrane, while prokaryotic cells have no nucleus.
- In eukaryotic cells, the DNA, or genetic information, is found in the nucleus. In prokaryotic cells, the DNA is found in the cytoplasm, the jellylike substance that fills both types of cells.
- Eukaryotic cells have organelles, structures that perform jobs for a cell. Most organelles are surrounded by

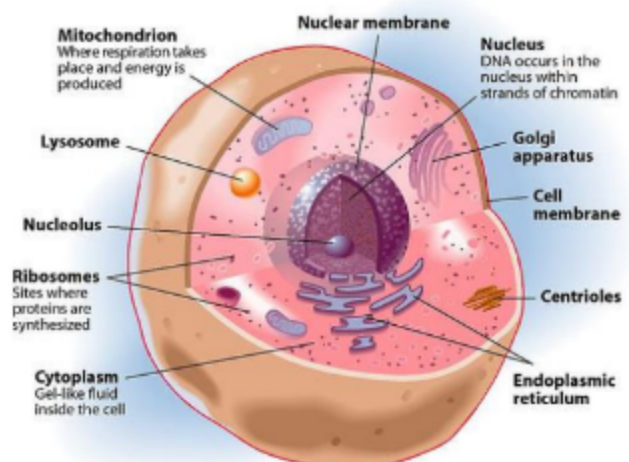
membranes. Prokaryotic cells do not have organelles surrounded by membranes.

Prokaryotic cells make up organisms called prokaryotes. All prokaryotes are tiny and consist of single cells. Bacteria are prokaryotic cells. Eukaryotic cells make up eukaryotes. You are a eukaryote, as are plants and some types of single-celled organisms. All multicellular organisms, or organisms that have many cells, are eukaryotes.

Examples of prokaryotic cells (single-celled organisms) include the streptococcus bacterium responsible for strep throat and the famous (or infamous) *Escherichia coli* or *E. coli*.

Examples of eukaryotic cells (multicellular organisms) include humans, animals, worms, insects, birds, fish, etc.

In terms of making or obtaining food, cells can be either an autotroph or a heterotroph. An autotroph can “automatically” make its own food through own processes (like photosynthesis). A heterotroph must consume, or eat, other organisms to obtain food.



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