



Introduction to the cell

The **cell** is the basic structural, functional, and biological unit of all known organisms. Cells are the smallest units of life, and hence are often referred to as the "building blocks of life. The study of cells is called cell biology, cellular biology, or cytology.

Most plant and animal cells are only visible under a light microscope, with dimensions between 1 and 100 micrometres. Electron microscopy gives a much higher resolution showing greatly detailed cell structure.

Organisms can be classified as

1. **unicellular** (consisting of a single cell such as bacteria)
2. **multicellular** (including plants and animals).

unicellular organisms are classed as microorganisms.

The number of cells in plants and animals varies from species to species; it has been estimated that humans contain somewhere around **40 trillion** (4×10^{13}) cells, The human brain accounts for around 80 billion of these cells.

Cells were discovered by **Robert Hooke** in **1665**, who named them for their resemblance to cells inhabited by Christian monks in a monastery.

Cell theory, first developed in 1839 by **Matthias Jakob Schleiden** and **Theodor Schwann**, states that all organisms are composed of one or more cells, that cells are the fundamental unit of structure and function in all living organisms, and that all cells come from pre-existing cells. Cells emerged on Earth at least 3.5 billion years ago.

Cell types

Cells are of two types:

- 1- **eukaryotic**, which contain a nucleus,
- 2- **prokaryotic**, which do not.

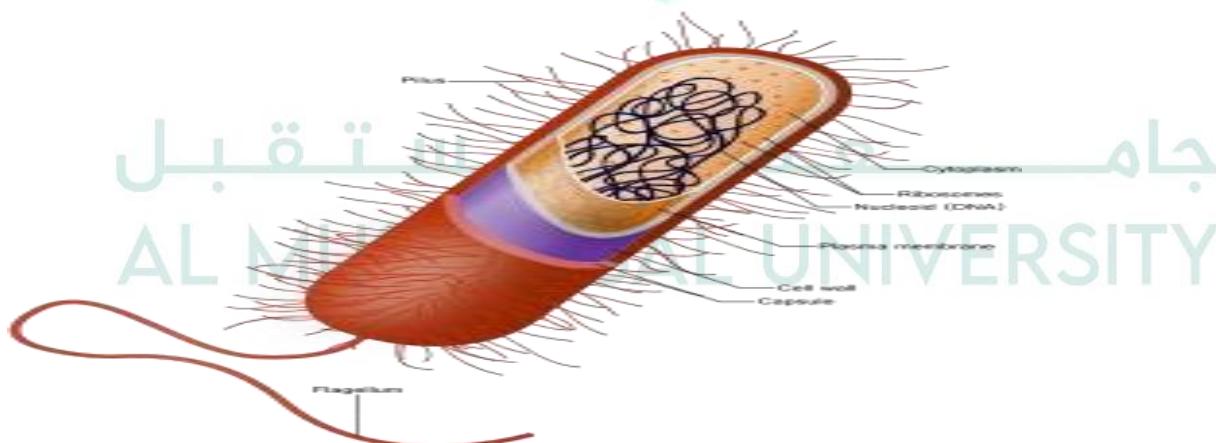
Prokaryotes are single-celled organisms, while **eukaryotes** can be either single-celled or multicellular.

Prokaryotic cells

Main article: Prokaryote

Prokaryotes include **bacteria** and **archaea**, two of the three domains of life. **Prokaryotic** cells were the first form of life on Earth, characterized by having **vital biological processes** including **cell signalling**. They are simpler and smaller than eukaryotic cells, and **lack a nucleus**, and other **membrane-bound organelles**.

The **DNA** of a prokaryotic cell consists of a single **circular chromosome** that is in direct contact with the cytoplasm. The nuclear region in the cytoplasm is called the **nucleoid**. Most prokaryotes are the smallest of all organisms ranging from 0.5 to 2.0 μm in diameter.



Structure of a typical prokaryotic cell

Eukaryotic cells

Main article: Eukaryote

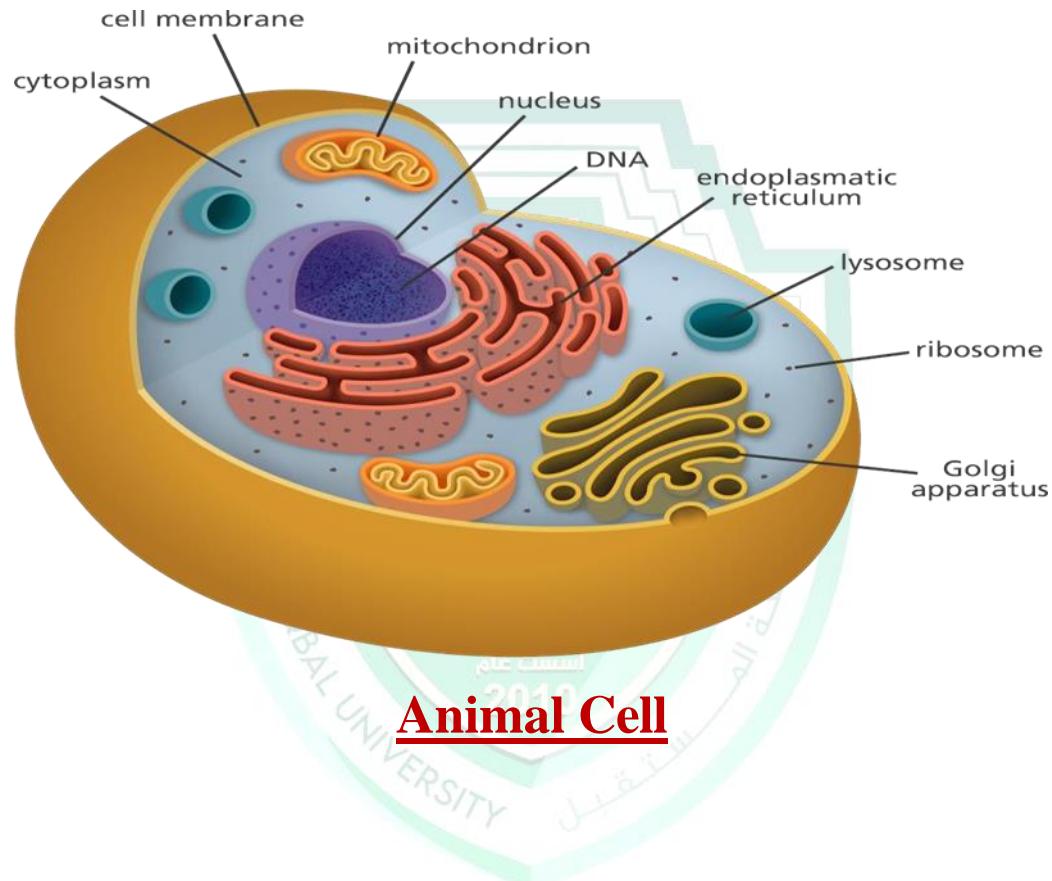
1. Plants
2. animals
3. fungi
4. slime moulds
5. protozoa
6. algae

Are all **eukaryotic**, These cells are about fifteen times wider than a typical prokaryote and can be as much as a thousand times greater in volume. The main distinguishing feature of eukaryotes as compared to prokaryotes is compartmentalization: the presence of membrane-bound organelles (compartments) in which specific activities take place.

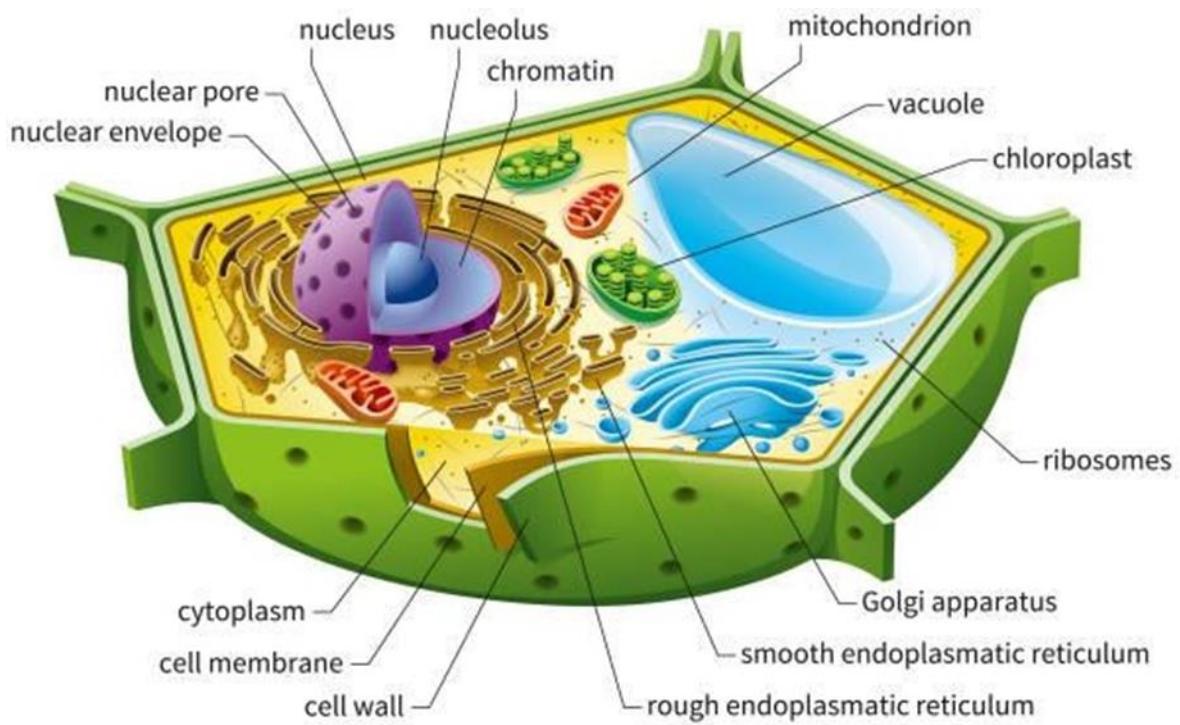
Most important among these is a cell nucleus, an organelle that houses the cell's DNA. This nucleus gives the eukaryote its name, Other differences include:

- The plasma membrane resembles that of prokaryotes in function, with minor differences in the setup. Cell walls may or may not be present.
- The eukaryotic DNA is organized in one or more linear molecules, called chromosomes, which are associated with histone proteins. All chromosomal DNA is stored in the cell nucleus, separated from the cytoplasm by a membrane. Some eukaryotic organelles such as mitochondria also contain some DNA.
- Many eukaryotic cells are ciliated with primary cilia. Primary cilia play important roles in chemosensation, mechanosensation, and thermosensation.

- Motile eukaryotes can move using **motile cilia** or **flagella**. Motile cells are absent in conifers and flowering plants. Eukaryotic flagella are more complex than those of prokaryotes



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Plant Cell

