

## **Eukaryotes and Prokaryotes**

With the development of better microscopes, scientists observed that all cells contain small, specialized structures called organelles. Many, but not all, organelles are surrounded by membranes. Each organelle has a specific function in the cell.

Cells: are the basic units of all living things.

All living organisms can be sorted into one of two groups depending on the fundamental structure of their cells: the prokaryotes and the eukaryotes.

1- Prokaryotes are organisms made up of cells that lack a cell nucleus or any membrane-encased organelles.

2- Eukaryotes are organisms made up of cells that possess a membrane-bound nucleus that holds genetic material as well as membrane-bound organelles.

### **Prokaryotes**

Prokaryotes are organisms made up of cells that lack a cell nucleus or any membrane-encased organelles. This means the genetic material DNA in prokaryotes is not bound within a nucleus.

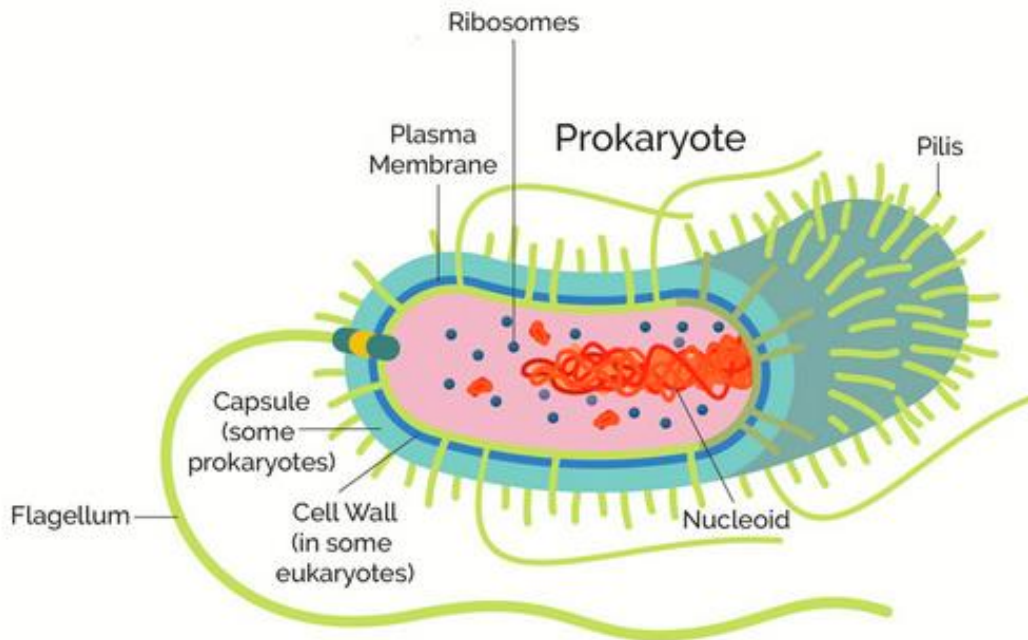
In addition, the DNA is less structured in prokaryotes than in eukaryotes: in prokaryotes, DNA is a single loop while in Eukaryotes DNA is organized into chromosomes.

Most prokaryotes are made up of just a single cell (unicellular) (bacteria) but there are a few that are made of collections of cells (multicellular) (cyanobacteria).

Scientists have divided the prokaryotes into two groups, the Bacteria, and the Archaea.

1- Some bacteria, including E Coli, Salmonella, and Listeria, are found in foods and can cause disease; others are actually helpful to human digestion and other functions.

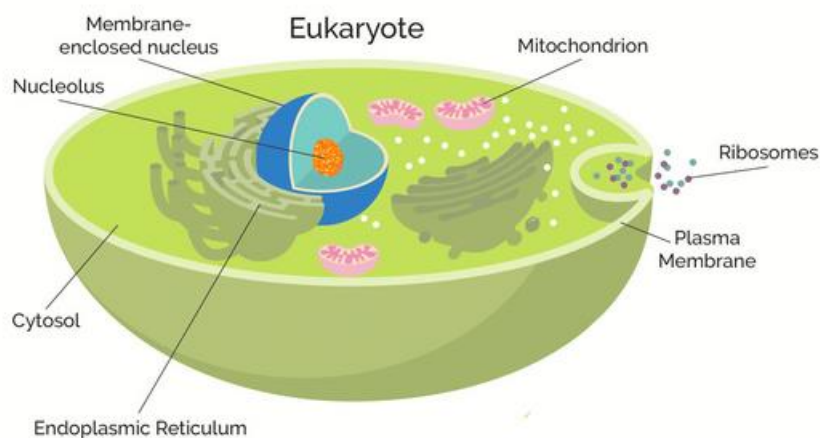
2- Archaea were discovered to be a unique life form which is capable of living indefinitely in extreme environments such as hydrothermal vents or arctic ice.



## Eukaryotes

Eukaryotes are organisms made up of cells that possess a membrane-bound nucleus (that holds DNA in the form of chromosomes) as well as membrane-bound organelles. Eukaryotic organisms may be multicellular or single-celled organisms (Algae or Protozoa). All animals are eukaryotes. Other eukaryotes include plants, fungi, and protists.

A typical eukaryotic cell is surrounded by a plasma membrane and contains many different structures and organelles with a variety of functions. Examples include the chromosomes (a structure of nucleic acids and protein which carry genetic information in the form of genes), and the mitochondria (often described as the "powerhouse of the cell").



## Comparison Table

	<b>Eukaryotic Cell</b>	<b>Prokaryotic Cell</b>
<b>Cell size</b>	10-100um	1-10um
<b>Nucleus</b>	Present	Absent
<b>Number of chromosomes</b>	More than one	One, but not true chromosome: Plasmids
<b>Cell Type</b>	Multicellular	Unicellular
<b>Lysosomes</b>	Present	Absent
<b>Endoplasmic reticulum</b>	Present	Absent
<b>Mitochondria</b>	Present	Absent
<b>Cytoskeleton</b>	Present	May be absent
<b>Ribosomes</b>	larger	smaller
<b>Vesicles</b>	Present	Present
<b>Golgi apparatus</b>	Present	Absent
<b>Chloroplasts</b>	Present (in plants)	Absent; chlorophyll scattered in the cytoplasm
<b>Vacuoles</b>	Present	Present
<b>Example</b>	Animals and Plants	Bacteria