Prokaryotes Cells:

Prokaryotic cells are cells that do not have a true nucleus or membrane-bound organelles. However, organisms with prokaryotic cells are abundant and make up much of Earth's biomass.

Unlike eukaryotic cells, prokaryotic cells have no distinct organelles bound by membranes. Instead, many reactions happen within the cytoplasm of the cell. There are 2 main components present within all prokaryotic cells.

The first is a cell membrane. It is a layer of phospholipid molecules which separate the inside of the cell from the outside. While not present in all prokaryotes, many secrete a cell wall, used to protect and house the cell in an extra layer of proteins.

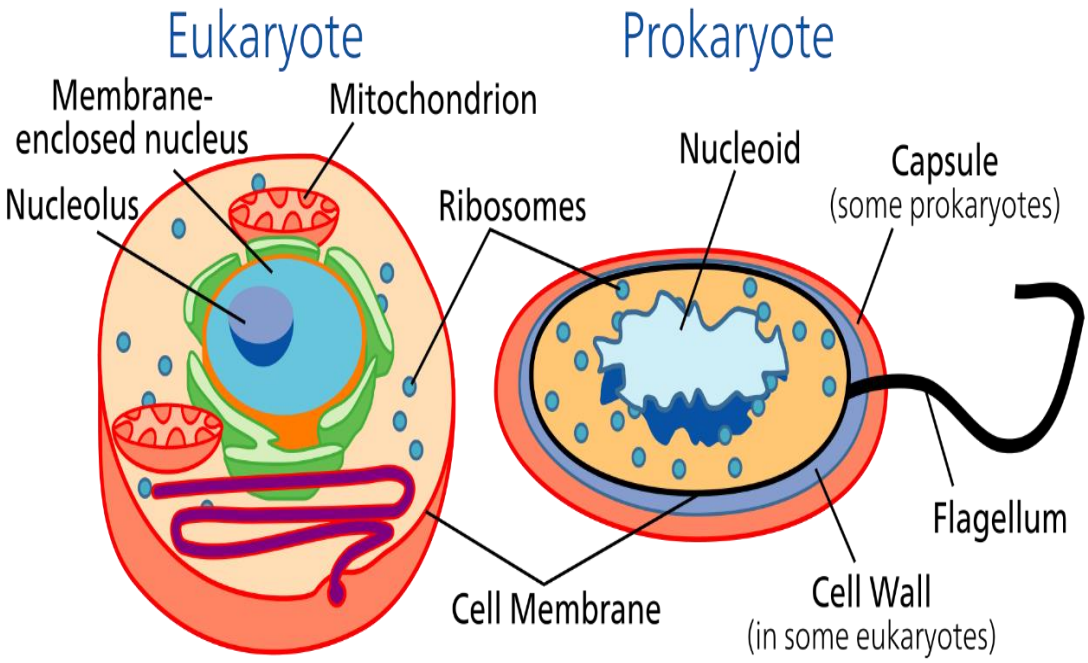
The second part found in all prokaryotic cells is DNA. DNA is the basic for all life and is found within all cells. In prokaryotes, the DNA often takes the form of a large circular genome. This large circle of DNA directs the cell creates of proteins, and regulates the actions of the cell.

A **prokaryote** is a unicellular organism that lacks a membrane-bound nucleus, mitochondria, or any other membrane-bound organelle. The word *prokaryote* comes from the Greek (*pro*,

'before') and (*karyon*, 'kernel'). Prokaryotes are divided into two domains, Archaea and Bacteria. Species with nuclei and organelles are placed in the third domain, Eukaryota. Prokaryotes are asexual, reproducing without fusion of gametes. The first living organisms are thought to have been prokaryotes. In the prokaryotes, all the intracellular water-soluble components (proteins, DNA and metabolites) are located together in the cytoplasm enclosed by the cell membrane. Some prokaryotes, such as cyanobacteria, may form large colonies. Others, such as mycobacteria, have multicellular stages in their life cycles.

Eukaryotes Cells:

Eukaryotic cells are **cells** that contain a nucleus and organelles, and are enclosed by a plasma membrane. **Eukaryotic cells** are larger and more complex than prokaryotic **cells**.



Eukaryotes are organisms whose cells have a nucleus enclosed within membranes, unlike prokaryotes (Bacteria and Archaea), which have no membrane-bound organelles. Eukaryotes belong to the domain Eukaryota or Eukarya. Their name comes from the Greek (eu, "true") and (karyon, "kernel"). Eukaryotic cells also contain other membrane-bound organelles such as mitochondria and the Golgi apparatus, and in addition, some cells of plants and algae contain chloroplasts. Unlike unicellular archaea and bacteria, eukaryotes may also be multicellular and include organisms consisting of many cell types forming different kinds of tissue. Animals and plants are the most familiar eukaryotes.

Eukaryotes can reproduce in both asexually through mitosis and sexually through meiosis and gamete fusion. In mitosis, one cell divides to produce two genetically identical cells. In meiosis, DNA replication is followed by two rounds of cell division to produce four haploid daughter cells, these act as sex cells (gametes). Each gamete has just one set of chromosomes.

The Difference between Eukaryotes and prokaryotic cells:

Eukaryotic cells contain membrane-bound organelles, such as the nucleus, while prokaryotic cells do not. Differences in cellular structure of prokaryotes and eukaryotes include the presence of mitochondria and chloroplasts, the cell wall, and the structure of chromosomal DNA.

Eukaryotes Cells	**Prokaryotic Cell**
Have membrane-bound organelles	Absent
Have Nucleus	Absent
Cell size is large (10-100 um)	Cell size is small (0.1-5 um)
Usually multicellular	Usually unicellular
Have circular DNA	Have linear DNA
Mitochondrial, Endoplasmic reticulum present	Absent
Have more than one chromosome	Only one chromosome
Sexual reproduction	A sexual reproduction
Cell wall present	Absent
Like Animals and plants	Like Archaea and bacteria

Characteristics of prokaryotic cells:

The cells are the most primitive cells from morphological view. They occur in bacteria and blue green algae. Prokaryotes are small, single cell organisms, usually less than a micrometer (1000µm= 1 millimeter) are generally not longer than 3µm. Some of the most important characteristics of prokaryotic cells are as follows:

1- Absence of a membrane around nuclear material.

2- Absence of membrane-bound organelles like mitochondria, and other.

3- Genetic material is located on a single chromosome which consists of a circular double strand of DNA.

4- The basic protein-histones, which are one of the most important constituents of chromosomes of eukaryotic cells, are absent in prokaryotic chromosomes.

5- Absence of nucleolus and mitotic apparatus.

6- Cell wall is non-cellulosic but formed of carbohydrates and amino acids.

7- Plasma membrane is produced into the cytoplasm and carrying respiratory enzymes.

Characteristics of Eukaryotes cells:

The features of eukaryotic cells are as follows:

1. Have the nucleus enclosed within nuclear membrane.
2. The cell has mitochondria.
3. Flagella and cilia are the locomotory organs in a eukaryotic cell.
4. A cell wall is the outer layer of the eukaryotic cells.
5. Sexual reproduction by (meiosis and mitosis).
6. The eukaryotic cells contain a cytoskeletal structure.
7. Nucleus contains a single DNA, which carries all the genetic information.