

Lecture 02

The Cell and Its Components

Cell is the basic unit of structure and development of all living organisms.

It is the smallest unit of an organism that is classified as living, and is often called the building brick of life.

The word *cell* comes from the Latin ***cellula***, meaning, **a small room**.

The descriptive name for the smallest living biological structure was chosen by **Robert Hooke in 1665** when he compared the cork cells to the small rooms monks lived in.



Cell Theory

Theodor Schwann,
Matthias Schleiden, and
Rudolph Virchow.

The cell theory consists of **three** basic points:

- All living things are made of cells. They may be unicellular or multicellular.
- The cell is the smallest living thing that can perform all the functions of life.
- All cells must come from pre-existing cells.

The modern version of the Cell Theory includes the ideas that:

Energy flow occurs within cells.

Heredity information (DNA) is passed on from cell to cell.

All cells have the same basic chemical composition.

There are two types of cells:

1. Prokaryotic cell : bacteria and archaea.
2. Eukaryotic cell : animal cells, plant cells, and fungus cells.

(1) Prokaryotic cell

The prokaryote cell is simpler than a eukaryote cell, lacking a nucleus and most of the other organelles of eukaryotes. There are two kinds of prokaryotes: bacteria and archaea (**single-celled microorganisms.**)

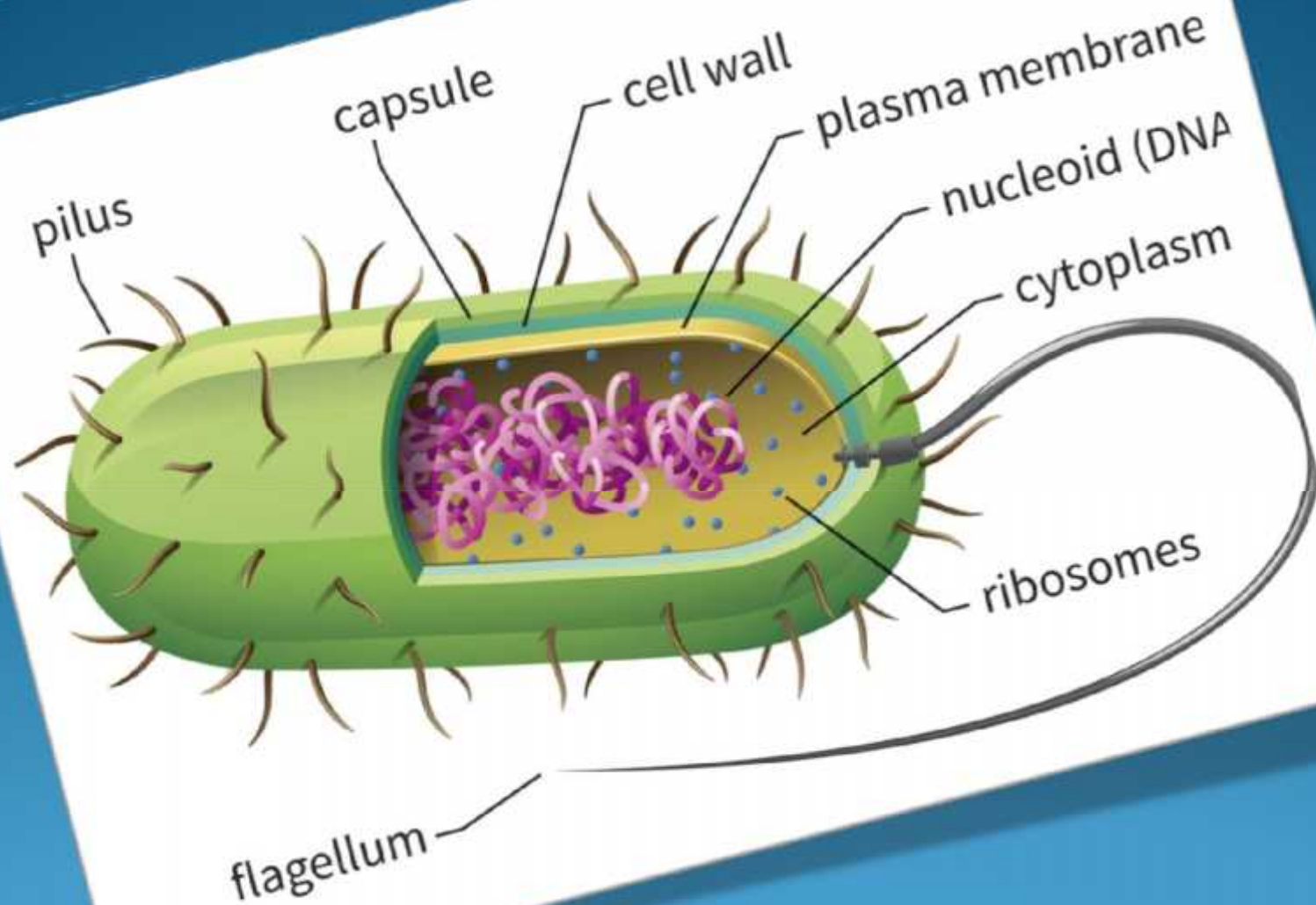


Figure: Prokaryotic bacterium cell

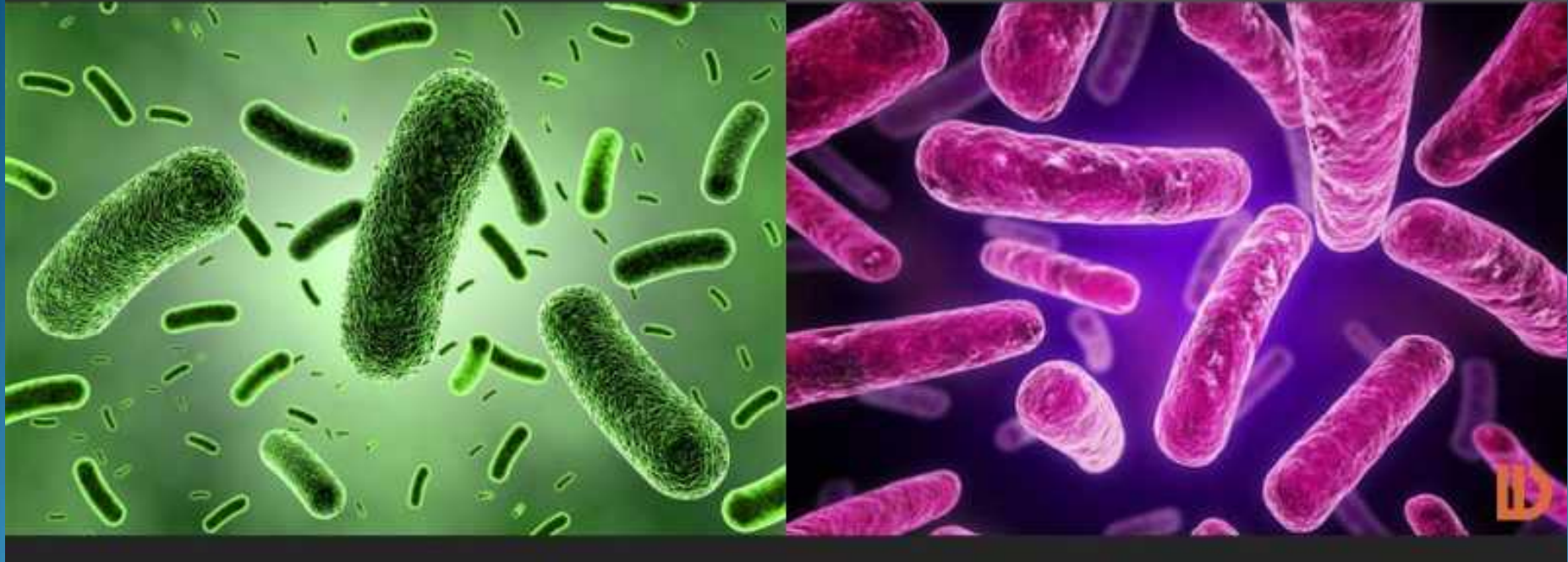
cell theory is a scientific **theory** which describes the properties of **cells**.

The *nucleoid* (meaning nucleus-like) is an irregularly shaped region within the cell of a prokaryote that contains all or most of the genetic material, called genophore. In contrast to the nucleus of a eukaryotic cell, it is not surrounded by a nuclear membrane.

BACTERIA

VS

ARCHAEA



Cell wall composition ; Ribosome; Living area

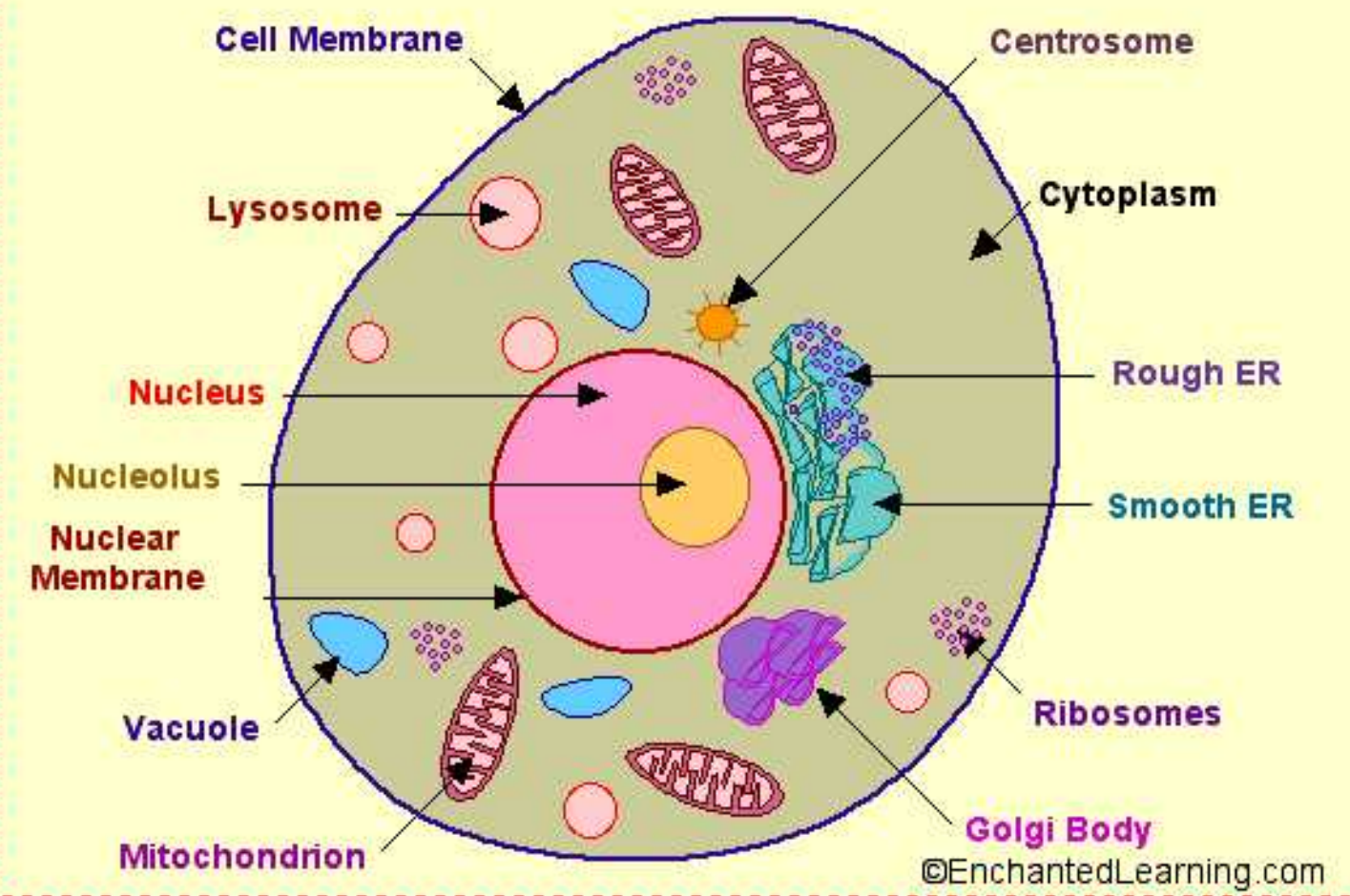
(2) Eukaryotic cell

Organism whose cells contain complex structures enclosed within membranes . The defining membrane-bound structure that differentiates eukaryotic cells from prokaryotic cells is the nucleus. Most living organisms, including all animals, plants, fungi, and protists, are eukaryotes.

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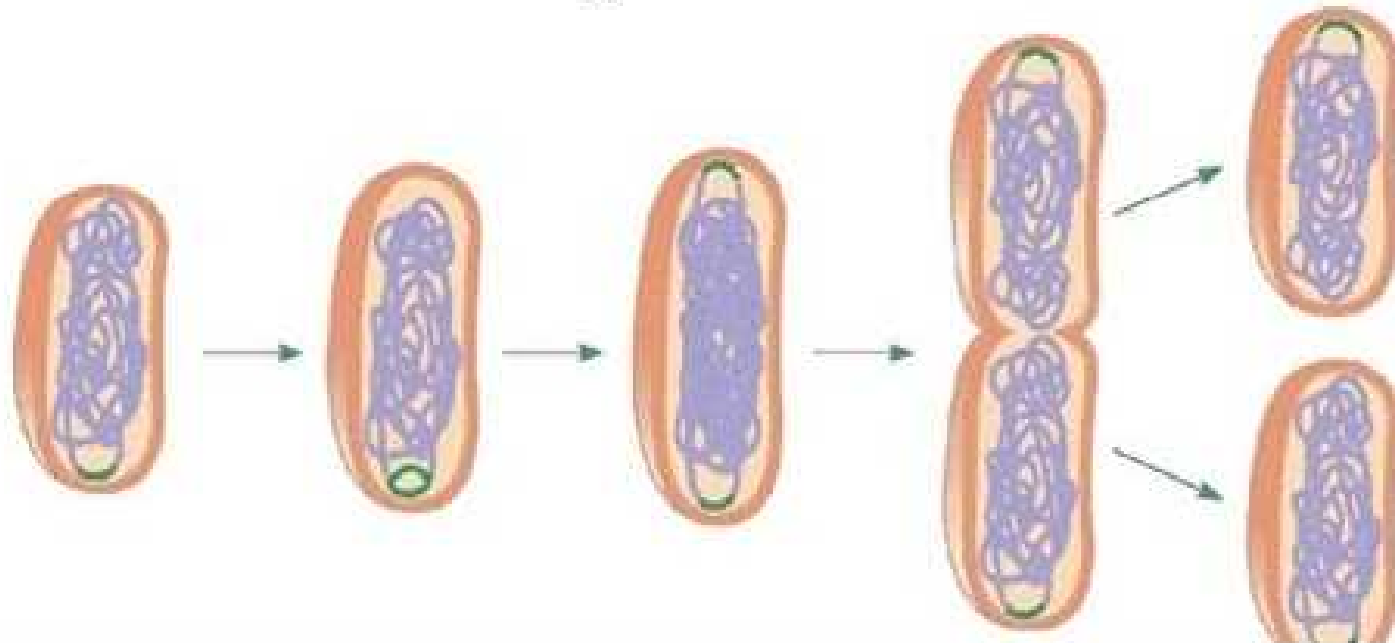
Cross-Section of an Animal Cell



Comparison of features of prokaryotic and eukaryotic cells

	Prokaryotes	Eukaryotes
Typical organisms	bacteria, archaea	fungi, plants, animals
Typical size	~ 1-10 μm	~ 10-100 μm
Type of nucleus	no real nucleus	real nucleus with double membrane
DNA	circular (usually)	linear molecules (chromosomes)
Cytoplasmatic structure	very few structures	highly structured by endomembrane and a cytoskeleton
Mitochondria	none	one to several thousand
Chloroplasts	none	Present in algae and plants
Organization	usually single cells	single cells, colonies, higher multicellular organisms with specialized cells
Cell division	Binary fission (simple division)	Mitosis (fission or budding) Meiosis

Binary fission



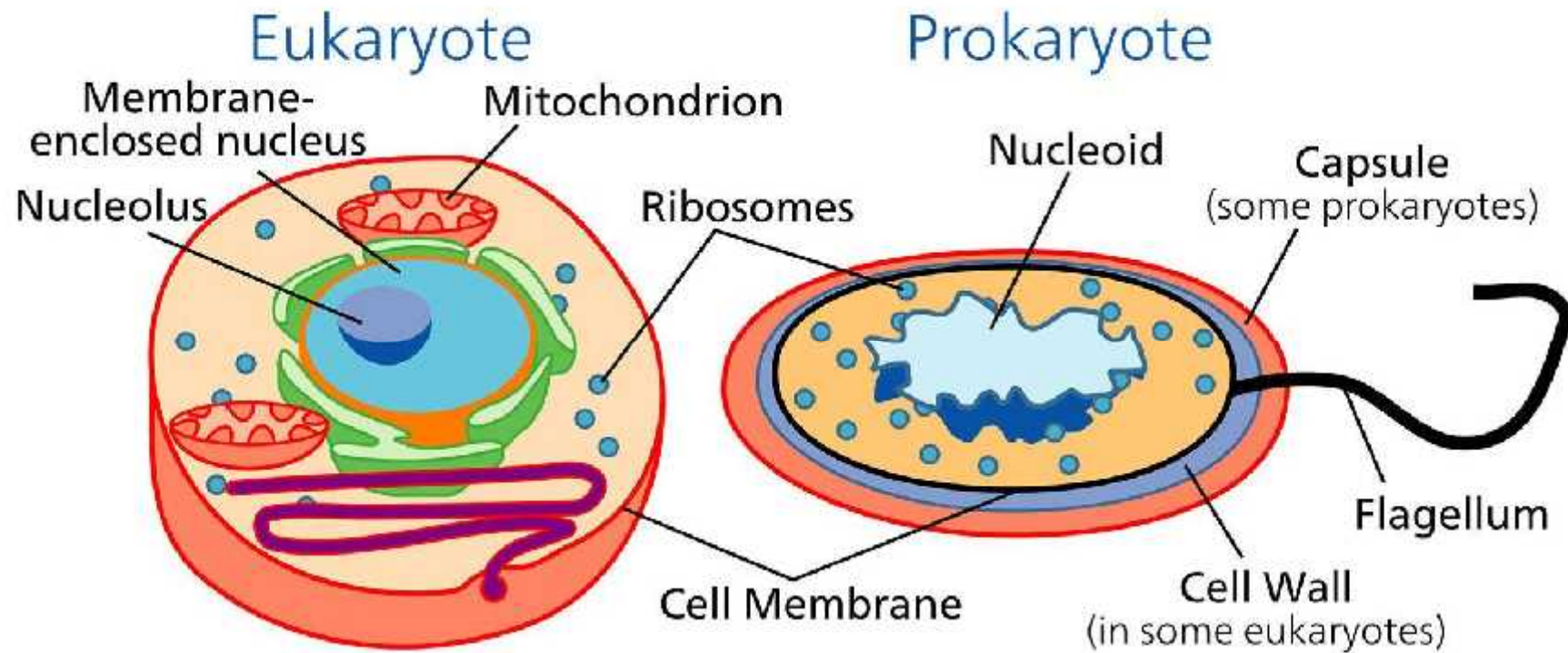


Figure: Showing Eukaryotic and Prokaryotic cells

COMPONENTS OF A CELL

Cell Membrane

Cytoplasm

Nucleus

Cell Organelles

Cell Inclusions

Membrane Bound

- Endoplasmic Reticulum
- Golgi Complex
- Mitochondria
- Plastids **
- Lysosomes *

Non-Membranous

- Ribosomes
- Cytoskeleton
- Centrioles *

Storage Products

- Starch
- Fats and Oils
- Proteins

Secretory Products

- Enzymes
- Hormones
- Pigments **
- Alkaloids **
- Resins **
- Gums **

Excretory Products **

- Inorganic Salts
- Latex
- Tannin
- Essential Oils

NOTE : * Only in animal cells
** Only in plant cells

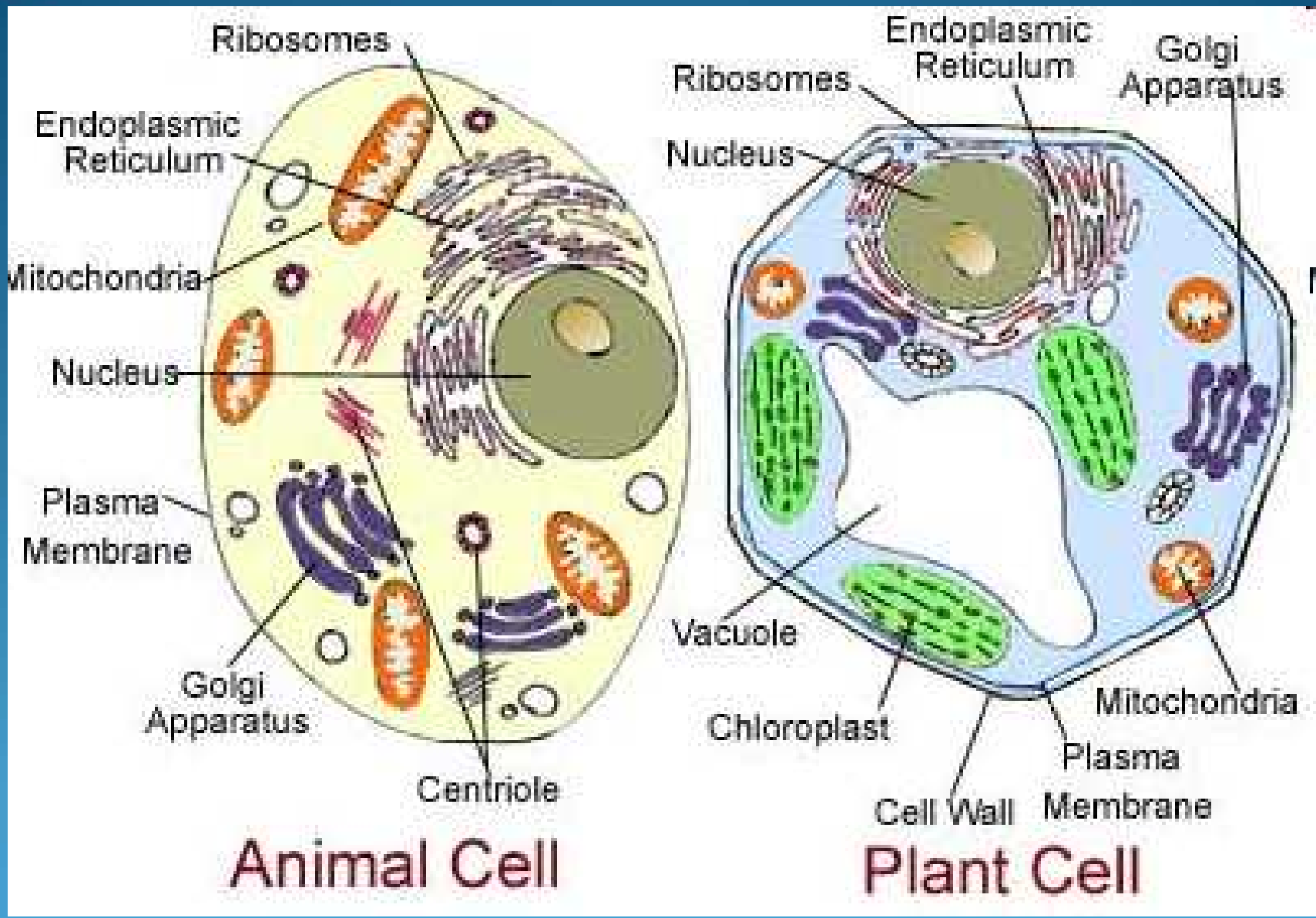
How plant cells differ from animal cells ??

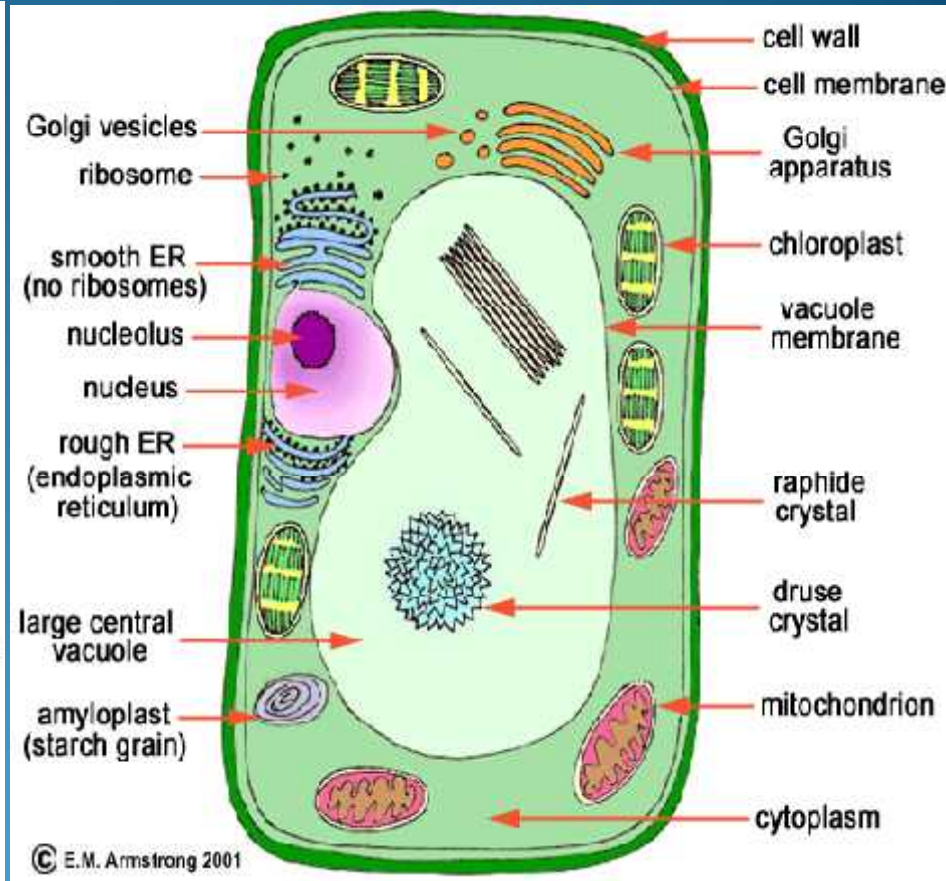
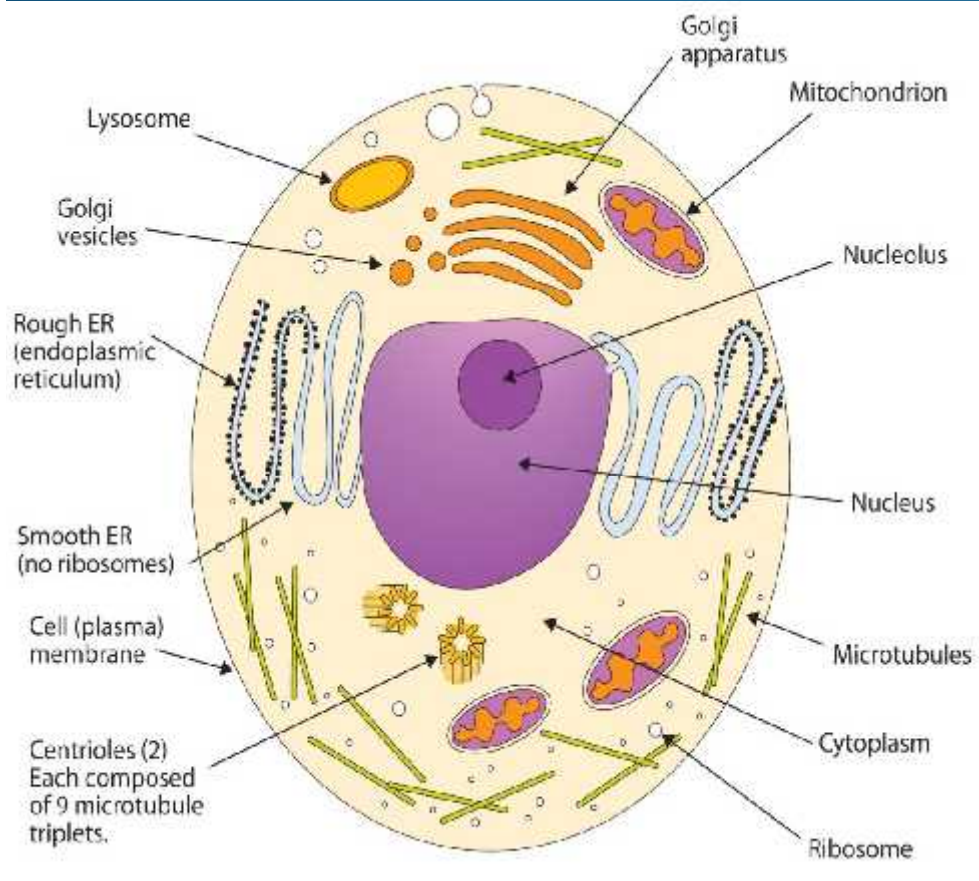
in lacking:

Centrioles
Lysosomes
Intermediate filaments

and having:

A cell wall
Plastids
Large vacuoles







“Mistakes are proof that you are trying”

Thank you