Prokaryotic and Eukaryotic Cells

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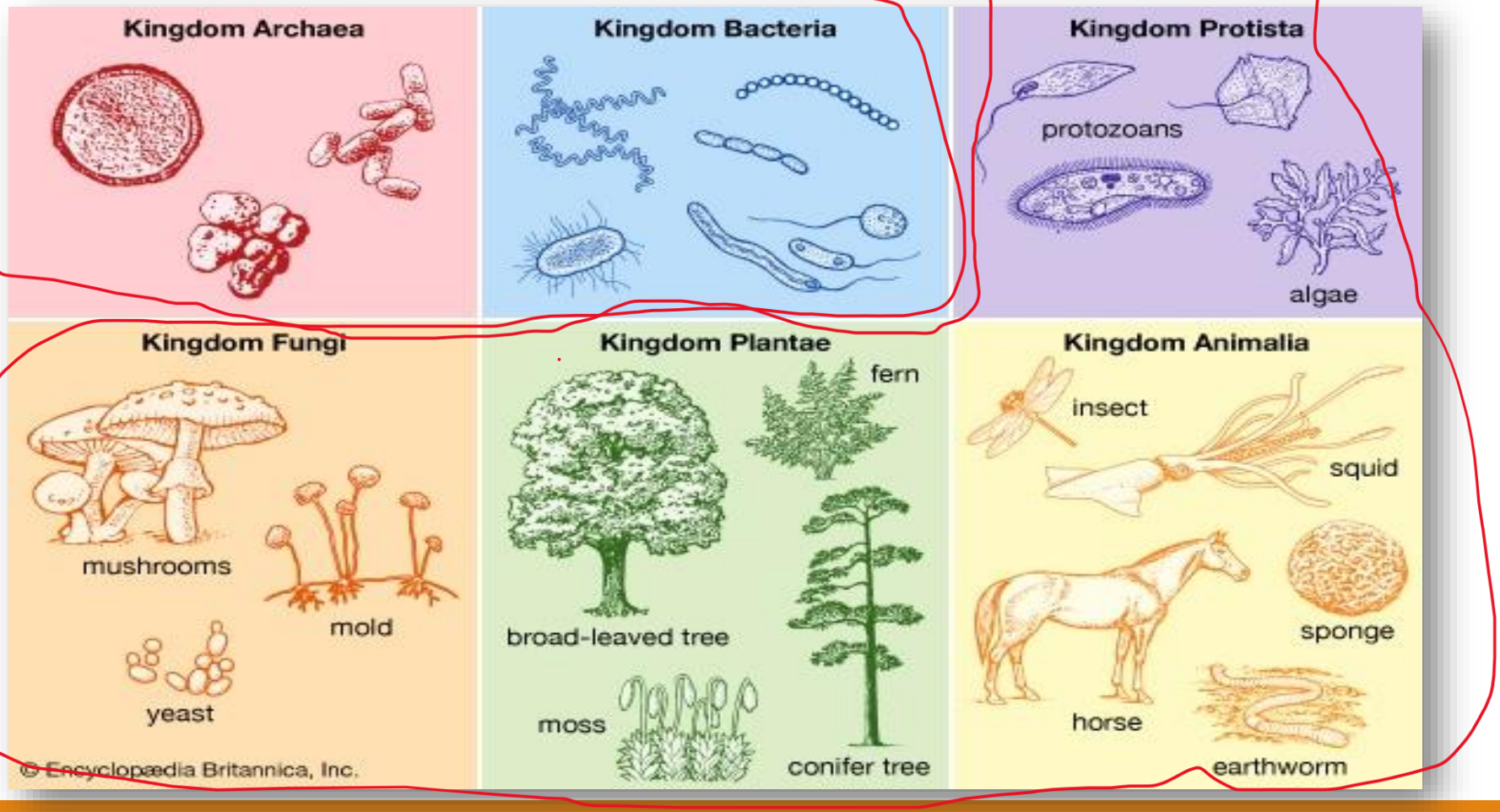
Let’s repeat the kingdoms of living things in Biology !!! - Important



Plants	Animals	Archaebacteria	Protists	Eubacteria	Fungi
					
Auto-trophs (make their own food)	Heterotrophs (eat other organisms)	Can survive in extreme environments (hot boiling water, thermal vents, no oxygen, high acidity	Include all microscopic organisms that are *not* bacteria, *not* animals, *not* plants, *not* fungi -Unlike bacteria, they are *complex cells*	Most are helpful (produce vitamins, aid digestion) but many are harmful e.g. *Streptococci*	Confused with plants Unlike plants they can't make their own food (obtain food from parts of decaying plants in soil)

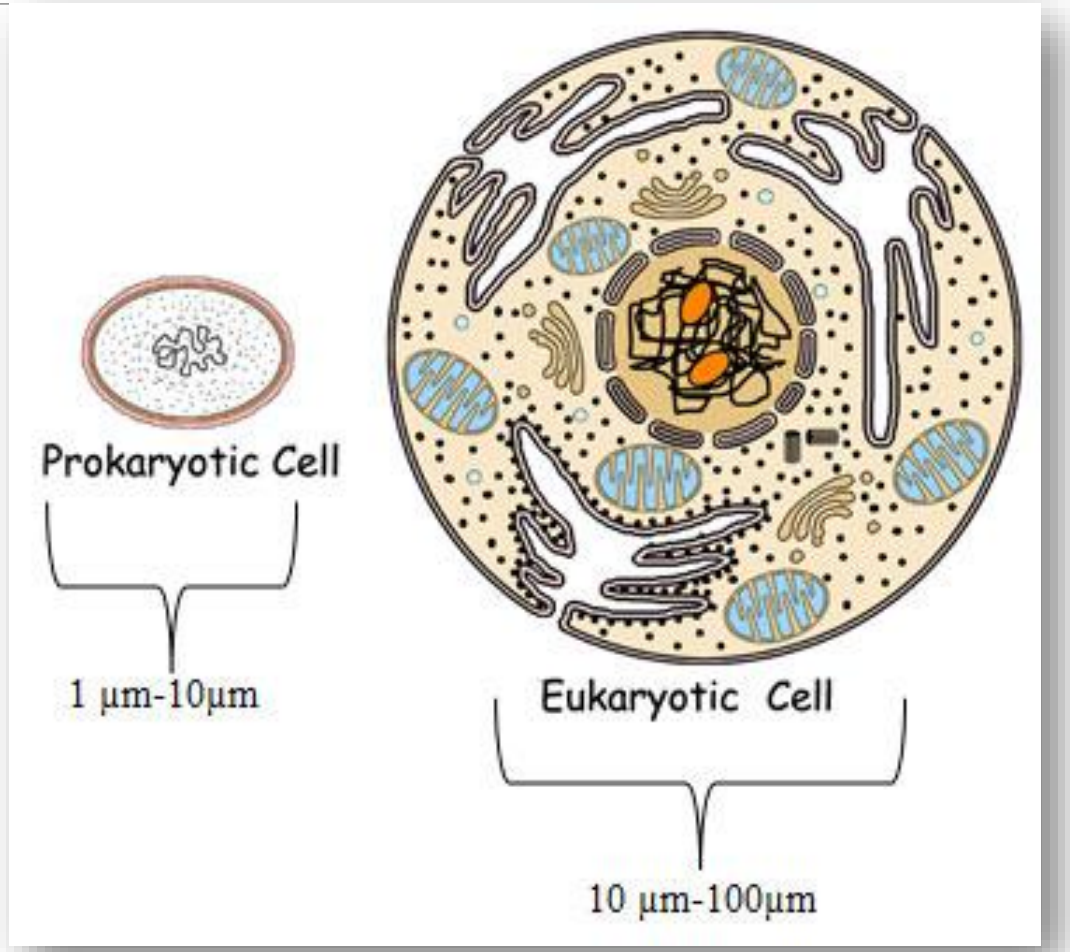
Prokaryotic cells' main characteristics

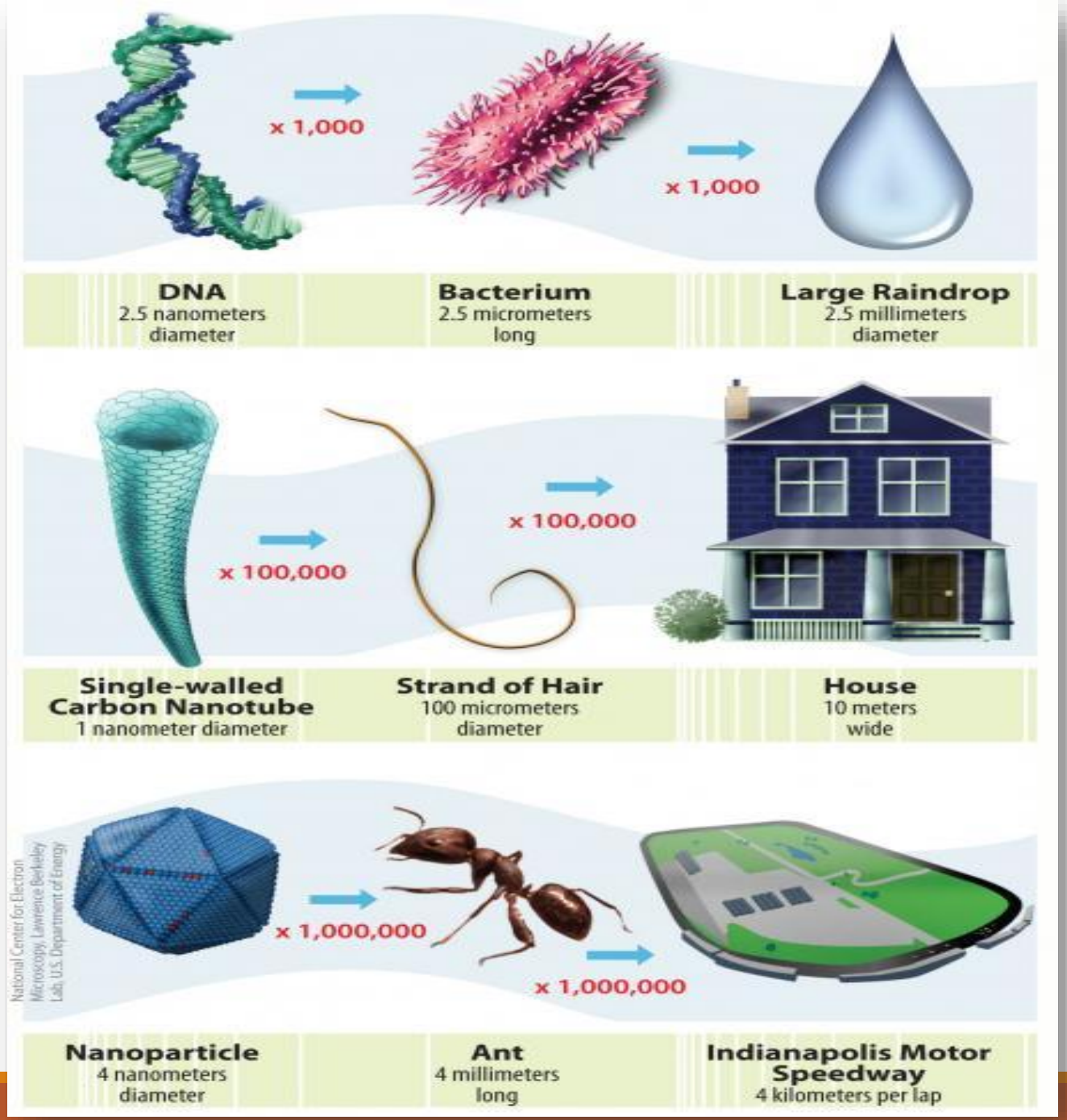
They are **smaller** than eukaryotic cells.

The term prokaryote is derived from the Greek word "prokaryote" meaning before the nuclei. **In the history of life prokaryotes evolved before eukaryotes.**

Prokaryotic cells don't contain **membrane-bound organelles.**

Prokaryotic cells are **unicellular organisms** and they reproduce by **binary fission.**




x 1,000
x 1,000
DNA
2.5 nanometers
diameter
Bacterium
2.5 micrometers
long
Large Raindrop
2.5 millimeters
diameter
x 100,000
x 100,000
Single-walled
Carbon Nanotube
1 nanometer diameter
Strand of Hair
100 micrometers
diameter
House
10 meters
wide
x 1,000,000
x 1,000,000
National Center for Electron Microscopy, Lawrence Berkeley Lab, U.S. Department of Energy
Nanoparticle
4 nanometers
diameter
Ant
4 millimeters
long
Indianapolis Motor Speedway
4 kilometers per lap

Examples of prokaryotic living things

1. Bacteria

   Are found everywhere: soil, water, rock etc.

   Ex: E.coli, H.pylori, Salmonella, Shigella.

2. Cyanobacteria

   Are a special group of **bacteria that contain chlorophyll** and obtain energy via photosynthesis.

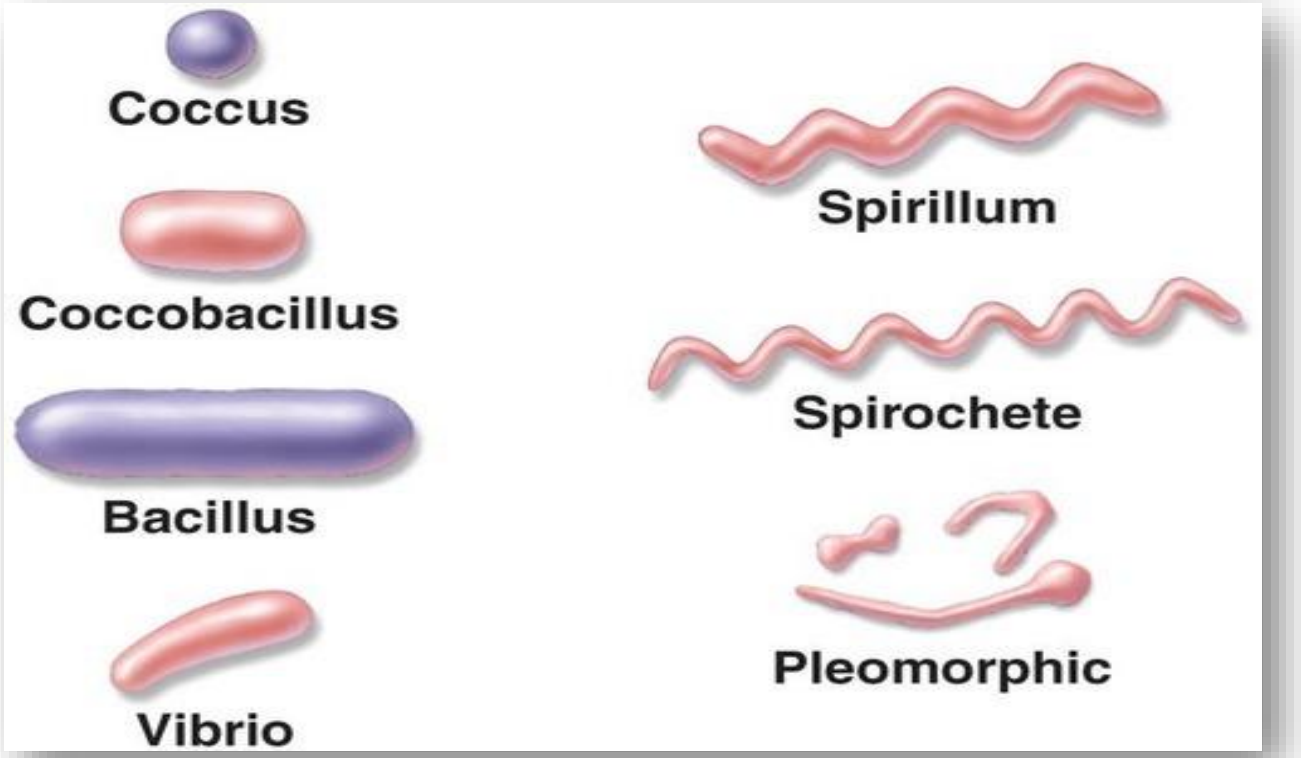
1. Bacteria

E.coli – it can cause diarrhea, stomach muscle spasms, fever and vomiting.

2. Cyanobacteria

- Cyanobacteria played an important role in the evolution of Early Earth and the biosphere. **They are responsible for the oxygenation of the atmosphere and oceans** since the Great Oxidation Event around 2.4 Ga, debatably earlier.
- By producing and releasing oxygen as a byproduct of photosynthesis, cyanobacteria are thought to have converted the early oxygen-poor, reducing atmosphere into an oxidizing one, causing the Great Oxidation Event and the "rusting of the Earth", which dramatically changed the composition of life forms on Earth.

Prokaryotic cells' shapes



Prokaryotic cells' structure

Plasma Membrane (Cell Membrane) - It is the inner membrane in prokaryotes, separating the cytoplasm from the Nucleoid.

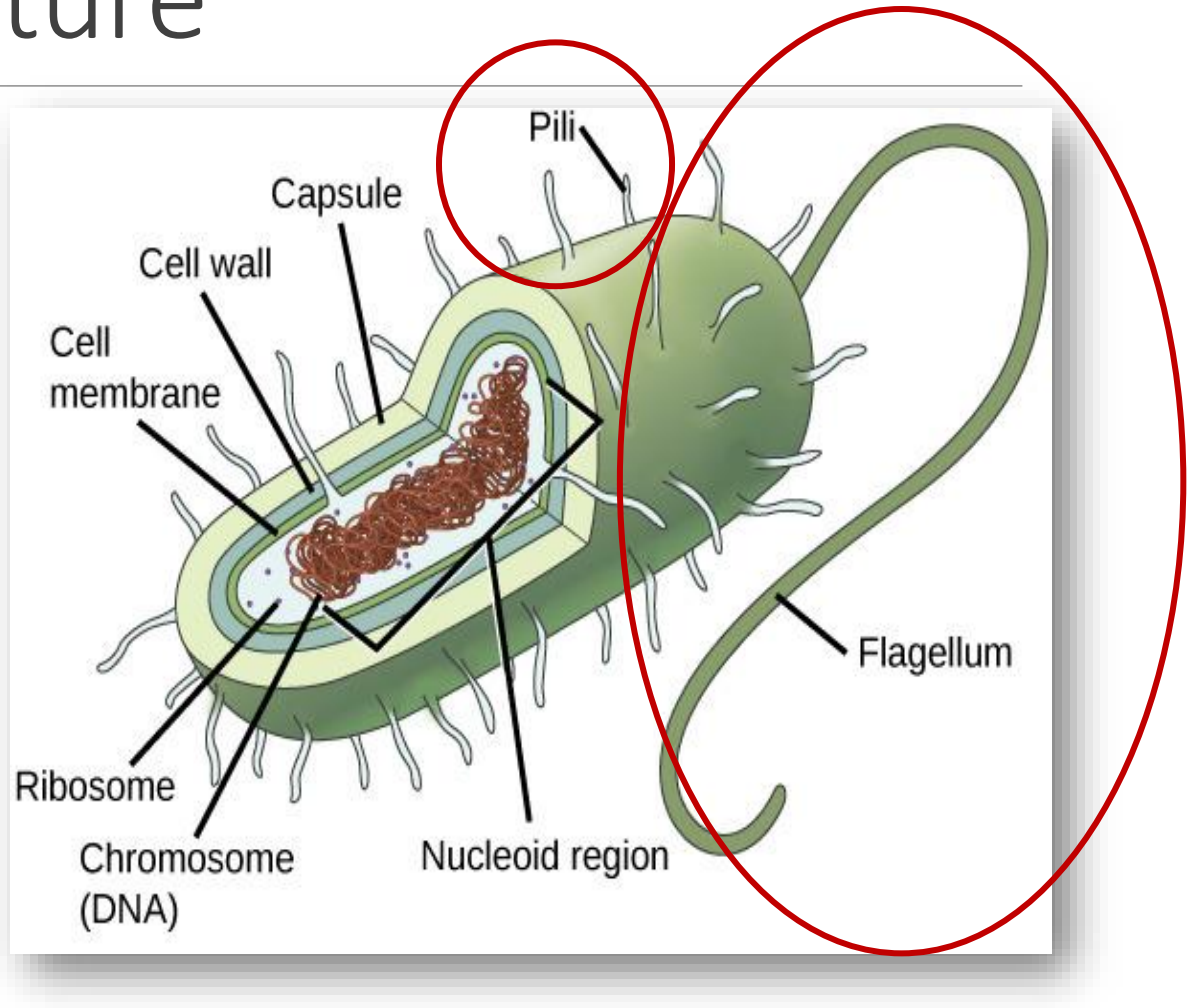
Cell Wall - This layer surrounds the plasma membrane and serves a protective function.

Capsule - An additional layer of organic molecules that can influence bacterial virulence.

Nucleoid - The region where DNA resides, with no specific location.

Ribosomes - Spread throughout the cytoplasm, they are responsible for protein synthesis.

Cytoplasm - The fluid portion of the cell containing enzymes, salts, and other components.



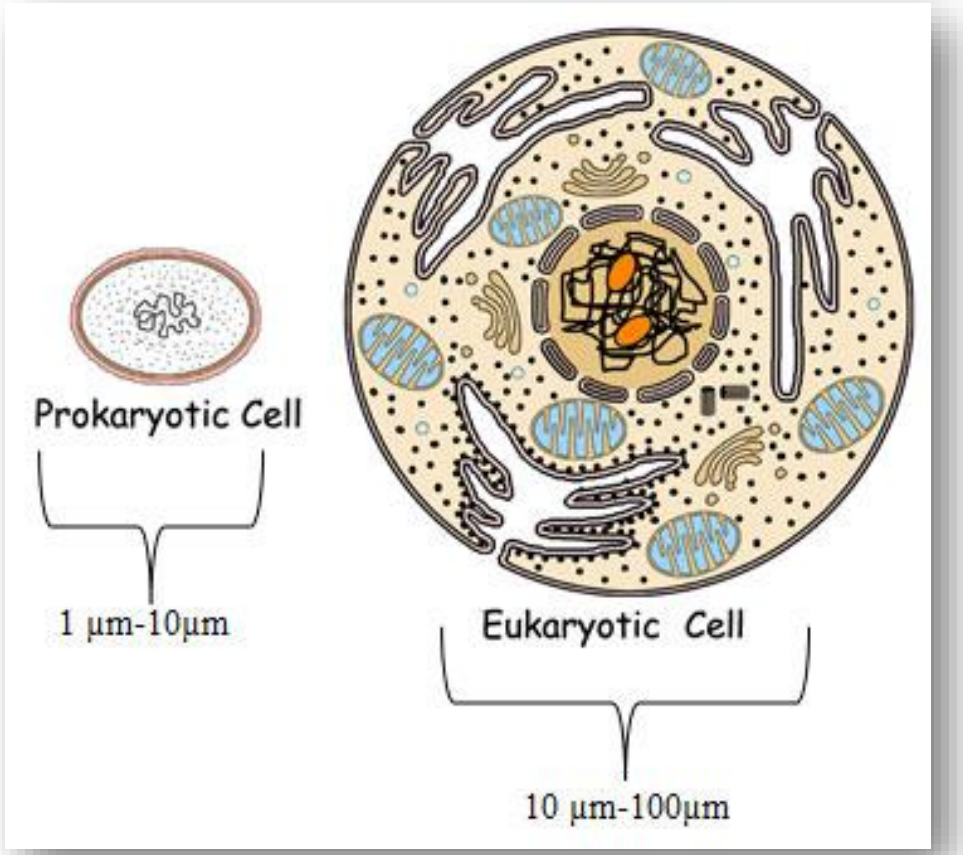
Eukaryotic cells' main characteristics

They are **bigger** than prokaryotic cells.

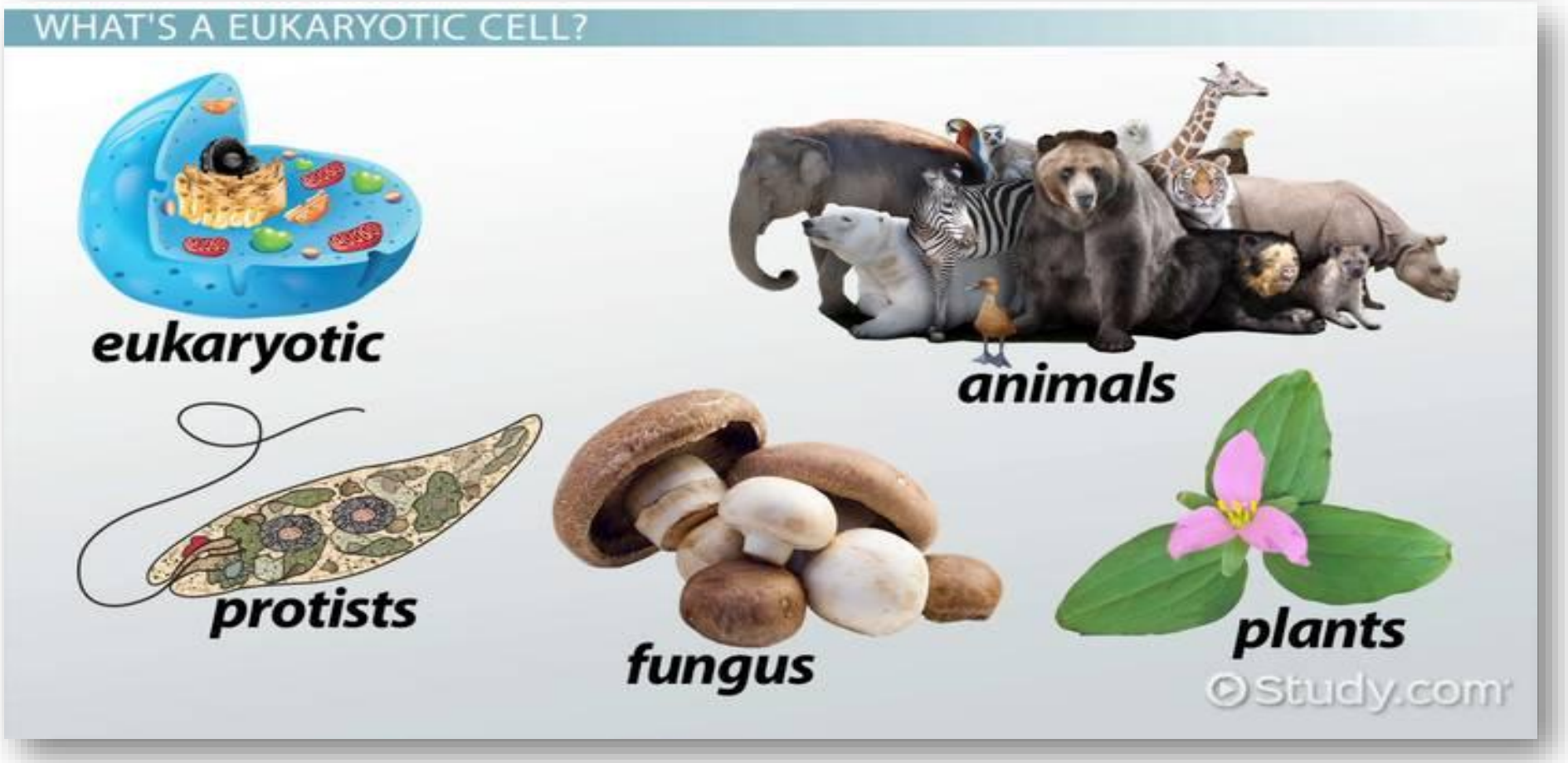
The term "eu" means "true", and "karyo" means "nut". So, basically that means **"true nucleus"**. They are called so because they contain nucleus.

They contain **membrane-bound organelles.**

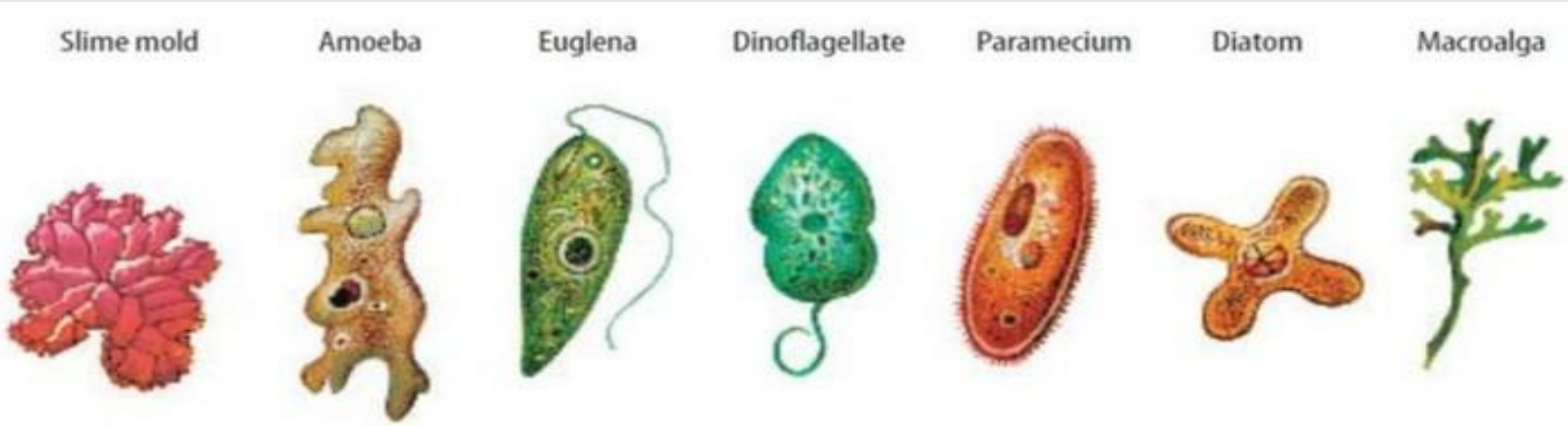
They can be **unicellular and multicellular organisms.**



Examples of eukaryotic cells



Protists

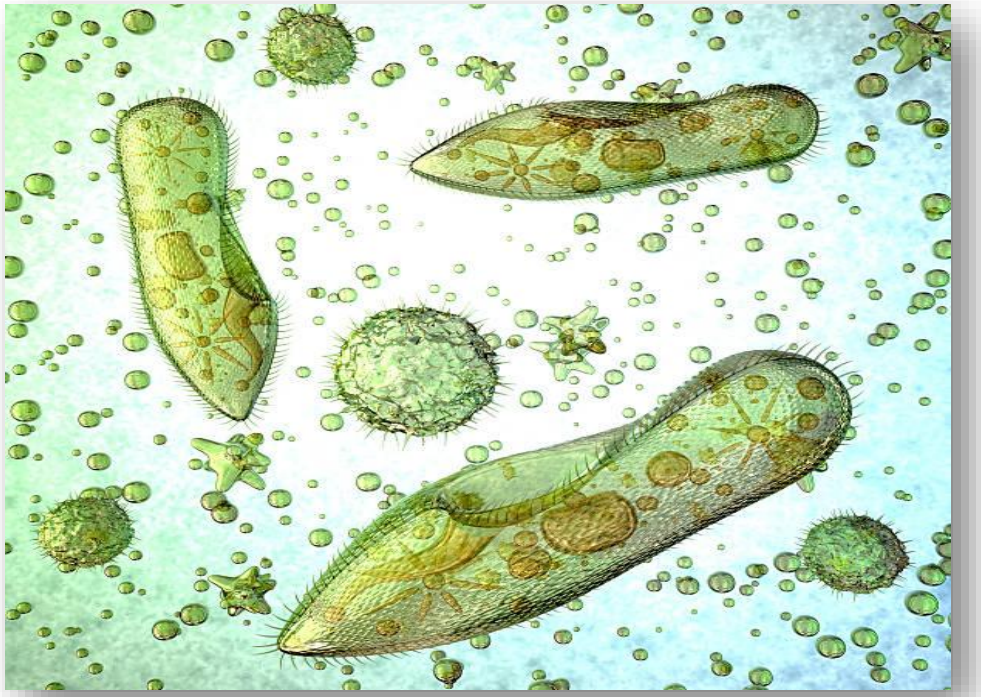


Kingdom: PROTISTA

Remember, protists are

EUKARYOTIC **UNICELLULAR**

Protists under microscope

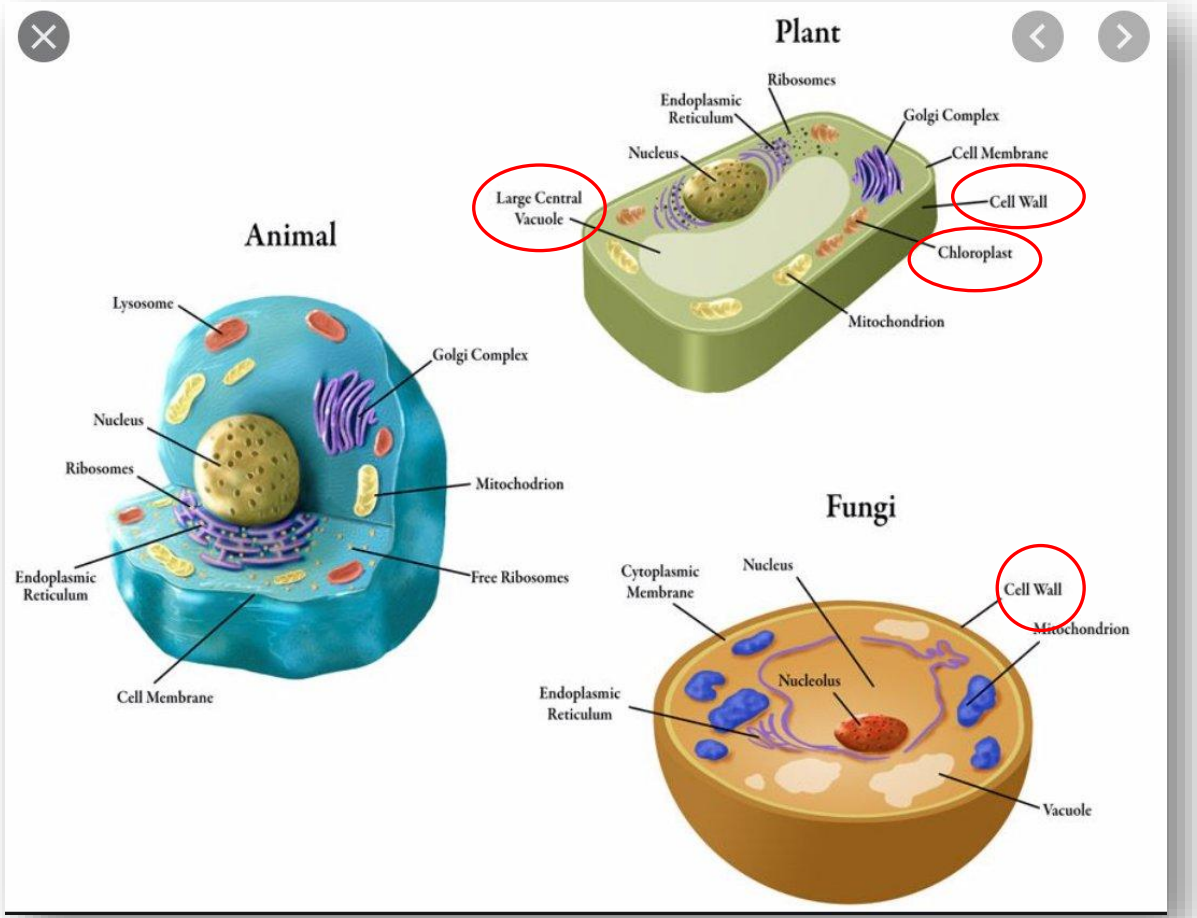


Types of eukaryotic cells

Generally:

1. Animal cells - they don't contain a cell wall, chlorophyll and big vacuole.

2. Plant cells - They contain a cell wall, chlorophyll and big vacuole.



Structure of eukaryotic cells