Deference between Eukaryotic and Prokaryotic cells

Lecture 3

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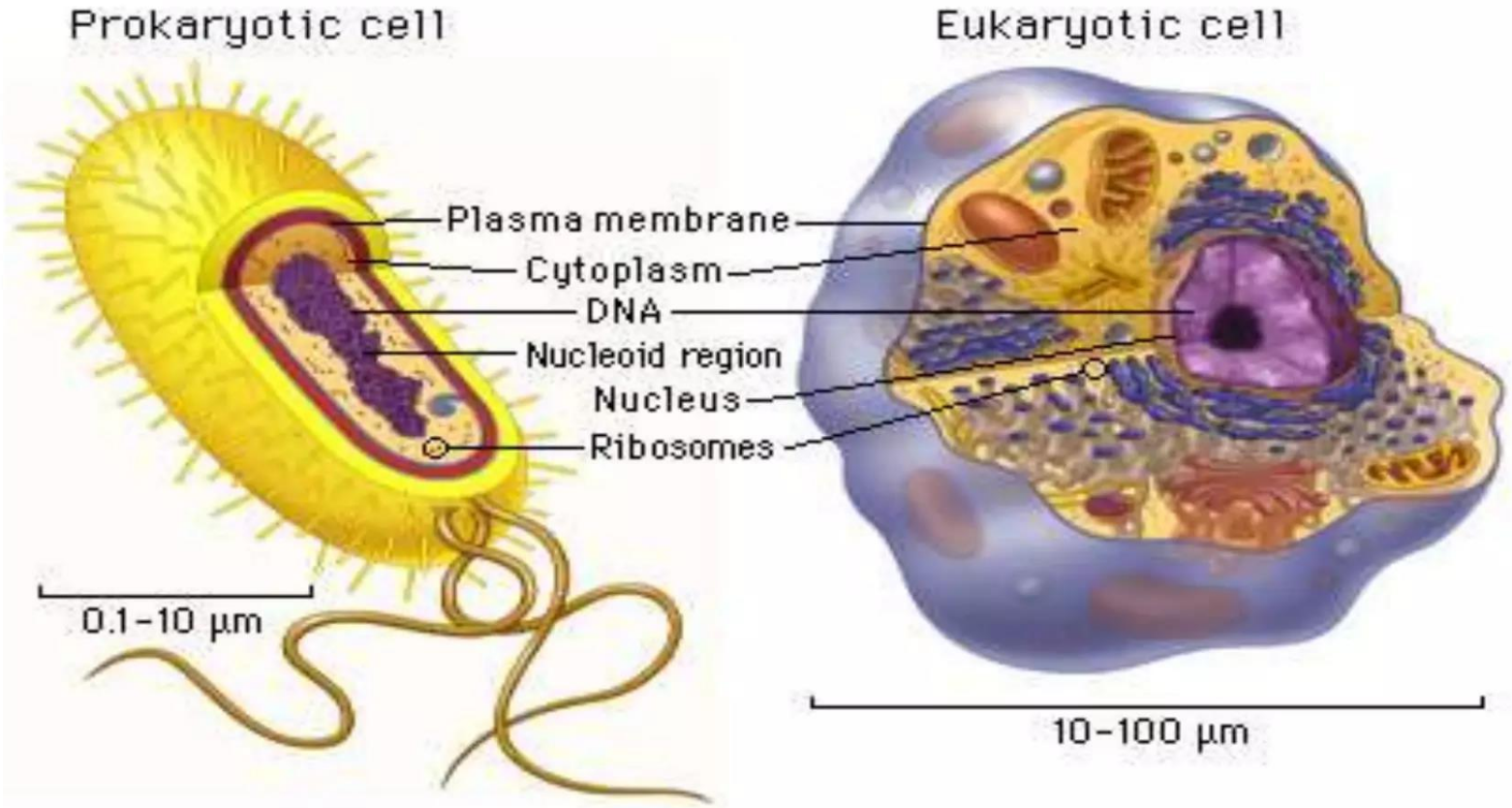
Cells: Prokaryote vs Eukaryote



Cells have evolved two different architectures:

- Prokaryote “style”
- Eukaryote “style”

- **Prokaryotic cells** were here first and for billions of years were the only form of life on Earth. All **prokaryotic** organisms are **unicellular**

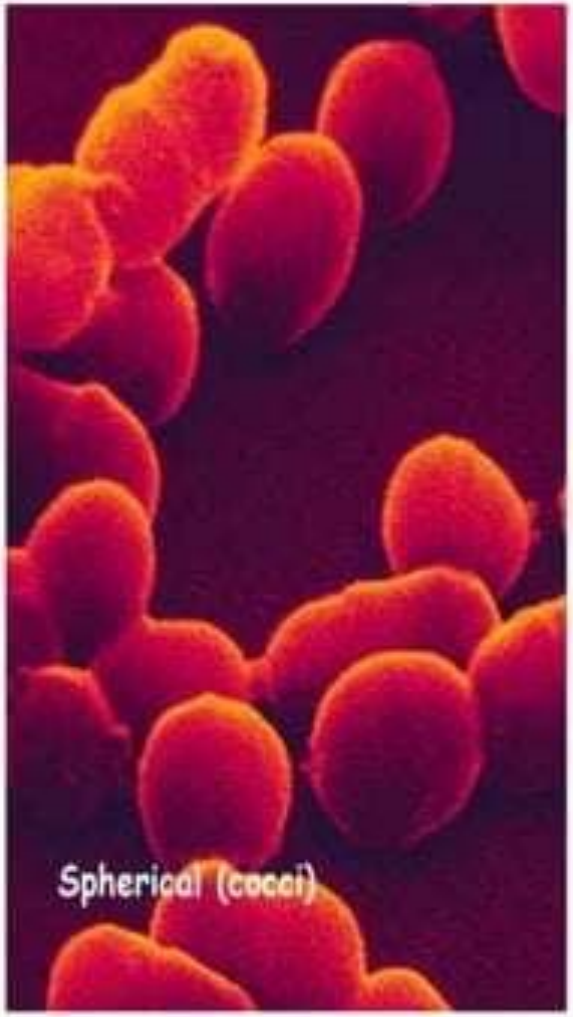
- **Eukaryotic cells** appeared on earth long after **prokaryotic cells** but they are much more advanced. **Eukaryotic** organisms unlike **prokaryotic** can be **unicellular** or **multicellular**.

Characteristics of Prokaryotes

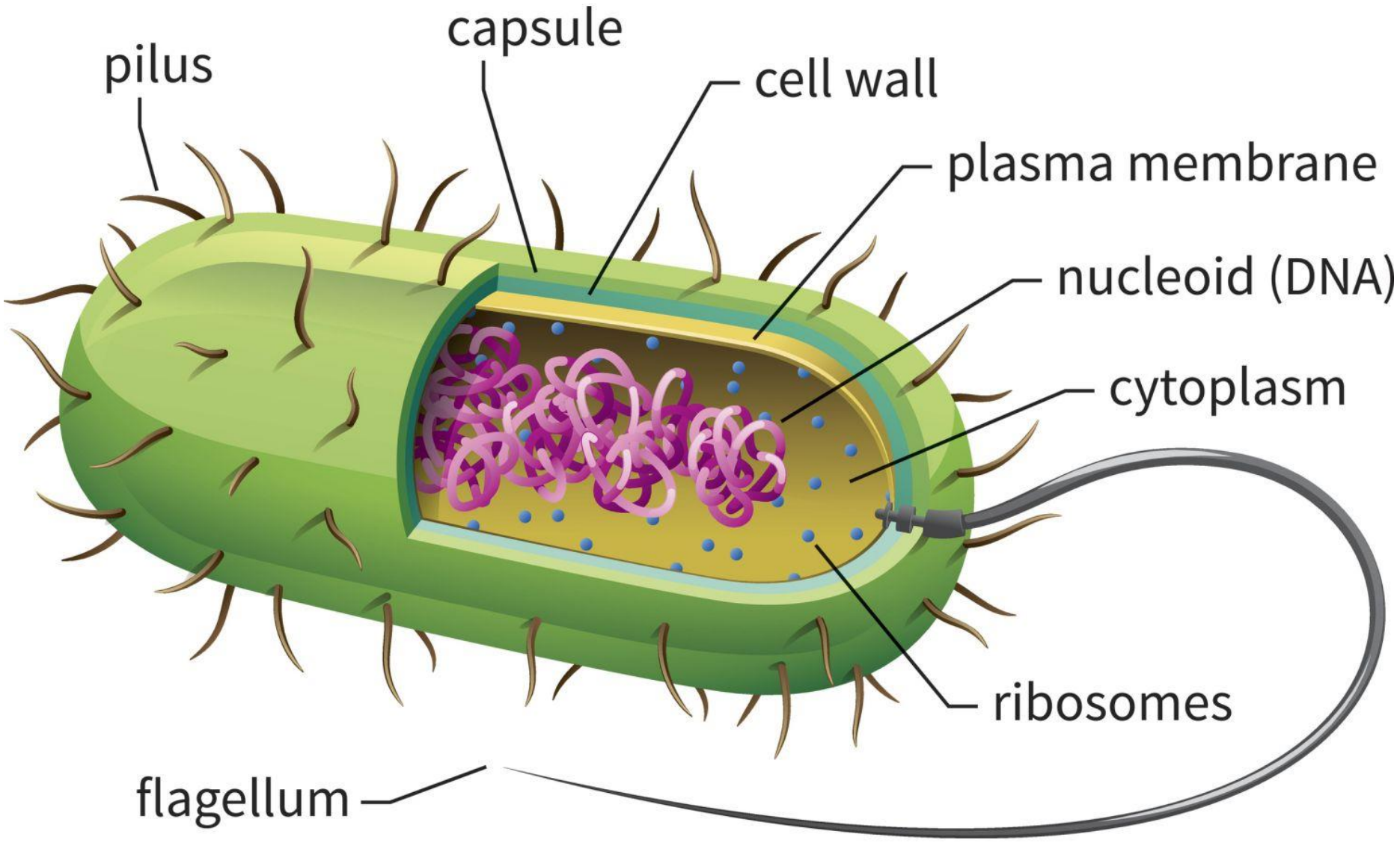
- Prokaryotes are the simplest type of cell.
- Oldest type of cell appeared about four billion years ago.
- Prokaryotes are the largest group of organisms
- Prokaryotes unicellular organisms that are found in all environments.

- Prokaryotes do not have a nuclear membrane. Their circular shaped genetic material dispersed throughout cytoplasm.
- Prokaryotes do not have membrane-bound organelles.
- Prokaryotes have a simple internal structure.
- Prokaryotes are smaller in size when compared to Eukaryotes.

Shapes of Prokaryotes



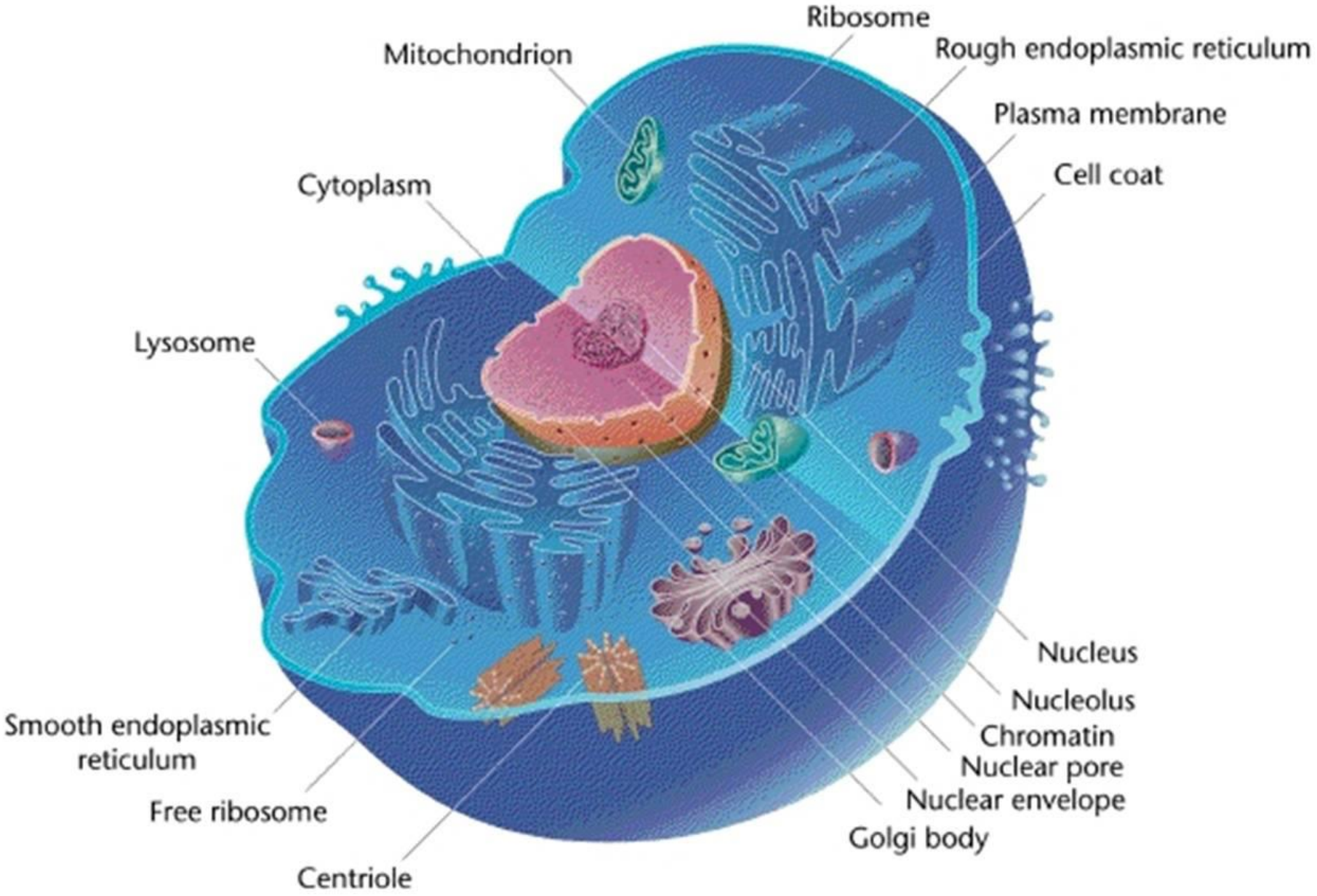
- Cocci = spherical (round)
- Bacillus = (rod shaped)
- Spirilla = helical (spiral)


pilus
capsule
cell wall
plasma membrane
nucleoid (DNA)
cytoplasm
ribosomes
flagellum

Characteristics of eukaryotes

- Eukaryotic cells appeared approximately one billion years ago
- Eukaryotes are generally more advanced than prokaryotes
- Nuclear membrane surrounds linear genetic material (DNA)

- Unlike prokaryotes, eukaryotes have several different parts.
- Prokaryote's organelles have coverings known as membranes.
- **Eukaryotes** have a complex internal structure.
- Eukaryotes are larger than prokaryotes in size .


Ribosome
Mitochondrion
Rough endoplasmic reticulum
Plasma membrane
Cytoplasm
Cell coat
Lysosome
Nucleus
Nucleolus
Chromatin
Nuclear pore
Nuclear envelope
Golgi body
Smooth endoplasmic reticulum
Free ribosome
Centriole

Differences

Prokaryotes

- Organelles lack a membrane
- Ribosomes are the only organelles
- Genetic material floats in the cytoplasm (DNA and RNA)

Eukaryotes

- Organelles covered by a membrane
- Multiple organelles including ribosomes
- Membrane covered Genetic material

Prokaryotes

- Circular DNA
- Unicellular
- Cells are smaller in size
- Has larger number of organisms
- Appeared 4 billion years ago

Eukaryotes

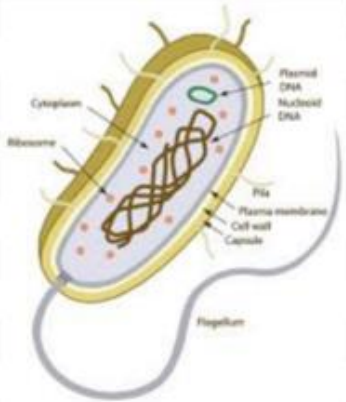
- Linear DNA
- May be multicellular or unicellular
- Cells are larger in size
- Has smaller number of organisms
- Appeared 1 billion years ago

LIFE STARTS AT THE CELL!!

Prokaryotic cells

- no nucleus or membrane-bound organelles
- first to evolve
- smaller
- simpler

EX. Archaea, Bacteria



- have DNA
- alive
- Cell membrane
- cytoplasm

Eukaryotic Cells

- nucleus/ membrane-bound organelles
- evolved from prokaryotic cells
- larger
- complex

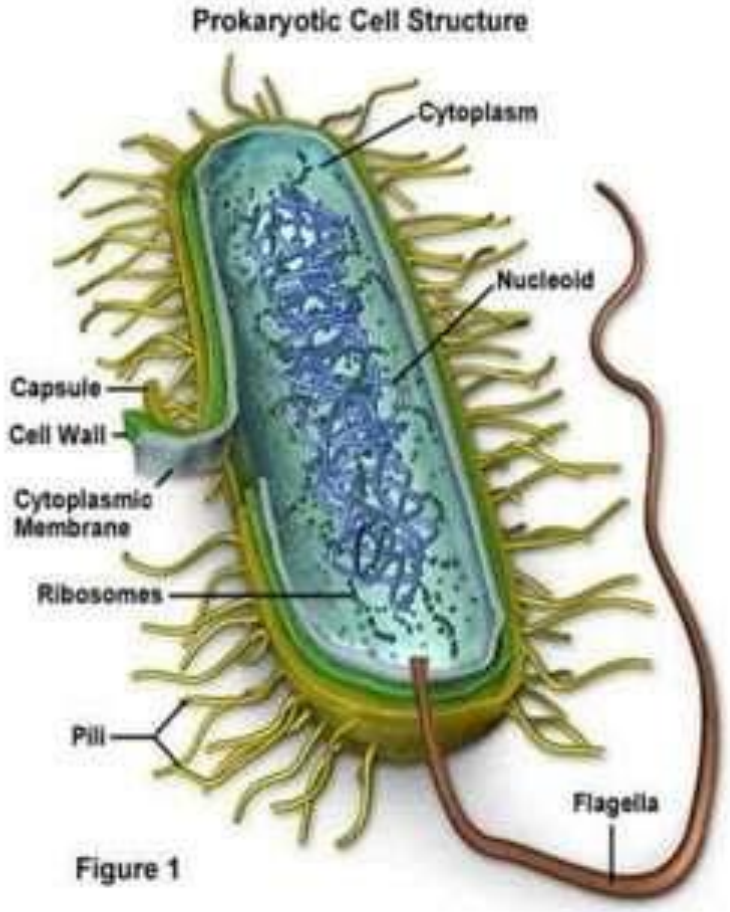
EX. animals, plants, fungi, protists

Prokaryote cells are smaller and simpler

- Commonly known as bacteria
- 10-100 microns in size
- Single-celled (unicellular) or
- Filamentous (strings of single cells)

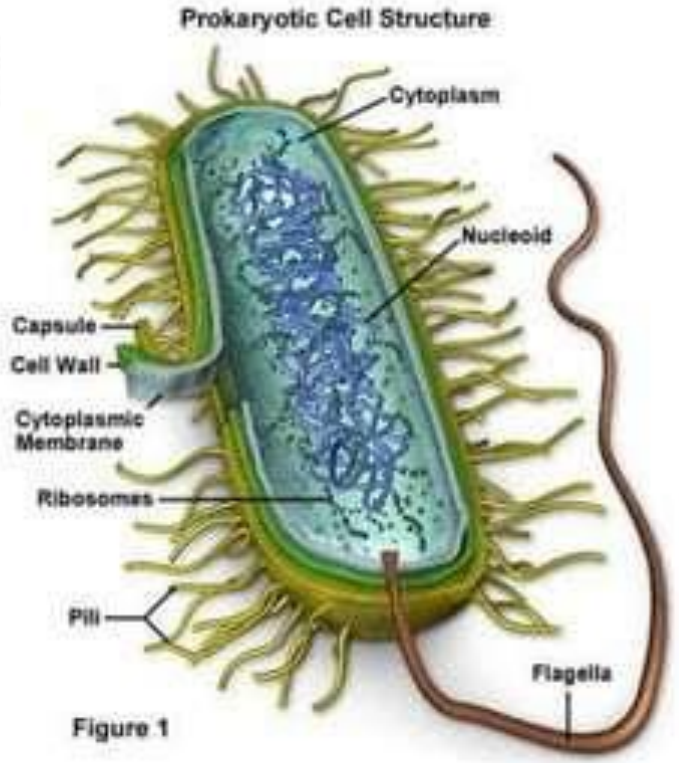
Prokaryote cells are simply built (example: E. coli)

- capsule: slimy outer coating
- cell wall: tougher middle layer
- cell membrane: delicate inner skin



Prokaryote cells are simply built (example: E. coli)

- cytoplasm: inner liquid filling
- DNA in one big loop
- pilli: for sticking to things
- flagella: for swimming
- ribosomes: for building proteins



Prokaryote lifestyle

- unicellular: all alone
- colony: forms a film
- filamentous: forms a chain of cells

Prokaryote Feeding

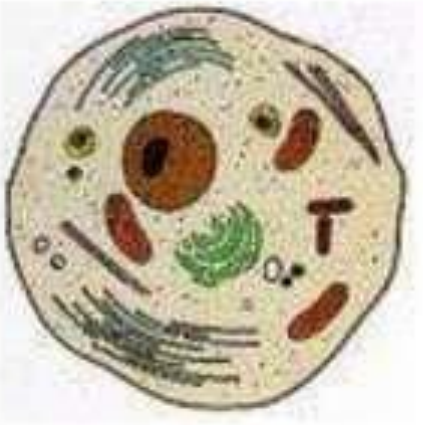
- Photosynthetic: energy from sunlight
- Disease-causing: feed on living things
- Decomposers: feed on dead things

Eukaryotes are bigger and more complicated

- Have **organelles**
- Have **chromosomes**
- can be **multi-cellular**
- include **animal** and **plant** cells

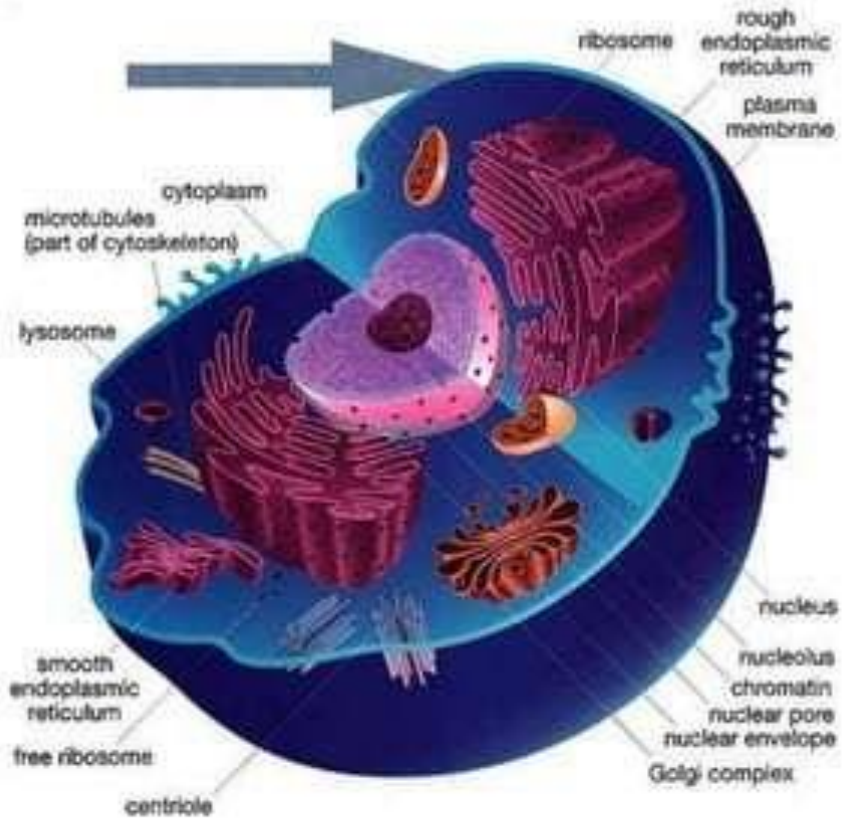
Organelles are membrane-bound cell parts

- Mini "organs" that have unique structures and functions
- Located in cytoplasm

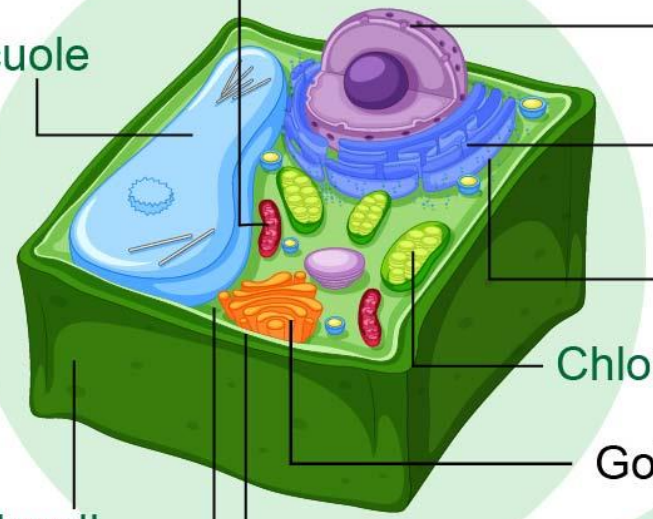


Cell Structures

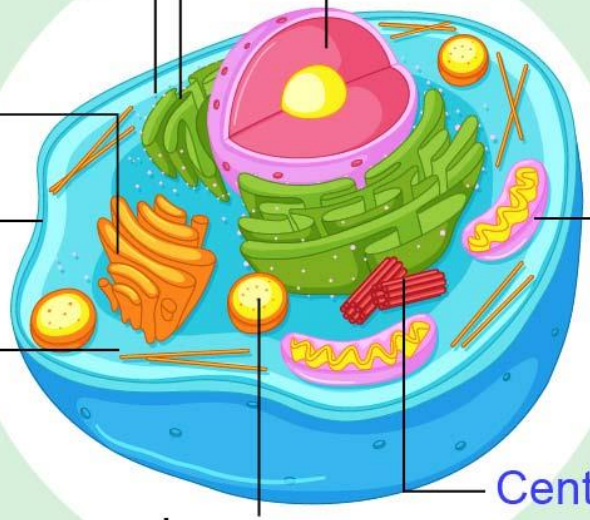
- Cell membrane
  - delicate lipid and protein skin around cytoplasm
  - found in all cells



PLANT CELL



Mitochondrion
Vacuole
Nucleus
Endoplasmic reticulum
Ribosome
Chloroplast
Golgi apparatus
Cell wall
Plasma membrane
Cytoplasm



Mitochondrion
Centriole
Lysosome

ANIMAL CELL

Structure	Animal cells	Plant cells
cell membrane	Yes	yes
nucleus	Yes	yes
nucleolus	yes	yes
ribosomes	yes	yes
ER	yes	yes
Golgi	yes	yes
centrioles	yes	no
cell wall	no	yes
mitochondria	yes	yes
cholorplasts	no	yes
One big vacuole	no	yes
cytoskeleton	yes	Yes

Eukaryote cells can be multicellular

- The whole cell can be specialized for one job
- cells can work together as tissues
- Tissues can work together as organs

Advantages of each kind of cell architecture

Prokaryotes	Eukaryotes
simple and easy to grow	can specialize
fast reproduction	Multi-cellularity
all the same	can build large bodies

Drag the words into the correct boxes to complete the statements.

Prokaryotic cells are surrounded by a _____ membrane and have _____, _____, and _____, like eukaryotic cells.
They also have _____ walls and may have a cell _____ . Prokaryotes have a _____ large chromosome that is not surrounded by a _____ membrane.
Prokaryotes may have _____ for motility, _____ for conjugation, and _____

DNA, Plasma, flagella, Pilli, Single, Capsule, Cytoplasm, Cell, Ribosomes, Nuclear