

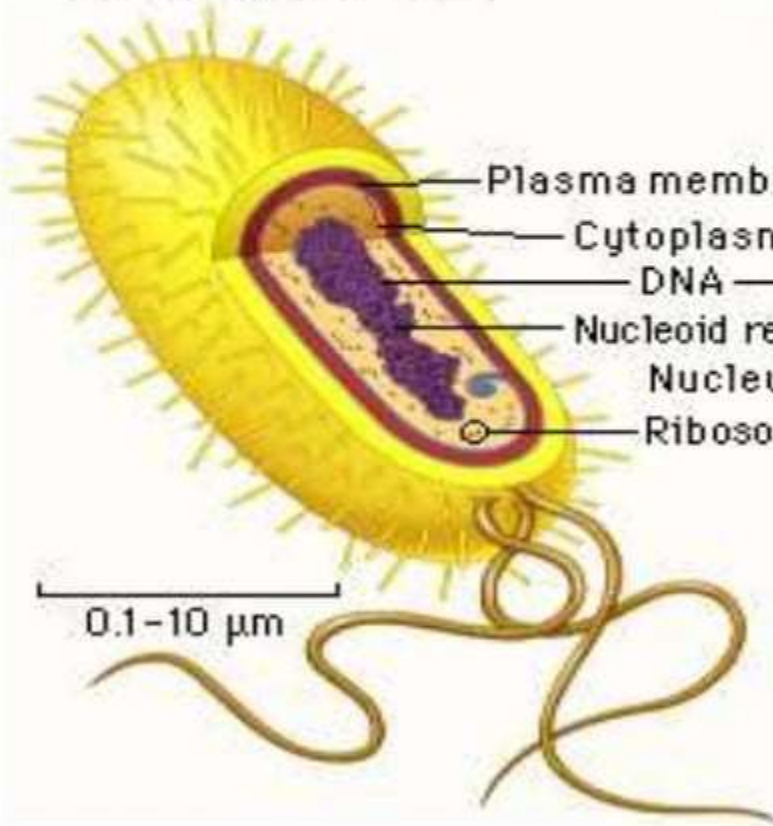
Medical Biology

Lecture Two

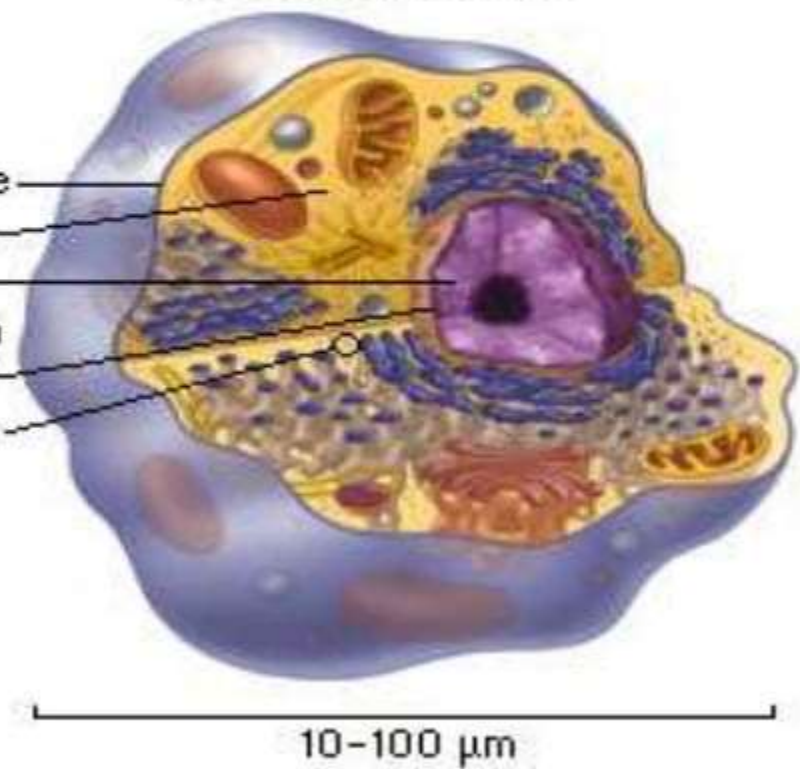
Prokaryotes and Eukaryotes

Cells: Prokaryote vs Eukaryote

Prokaryotic cell



Eukaryotic cell



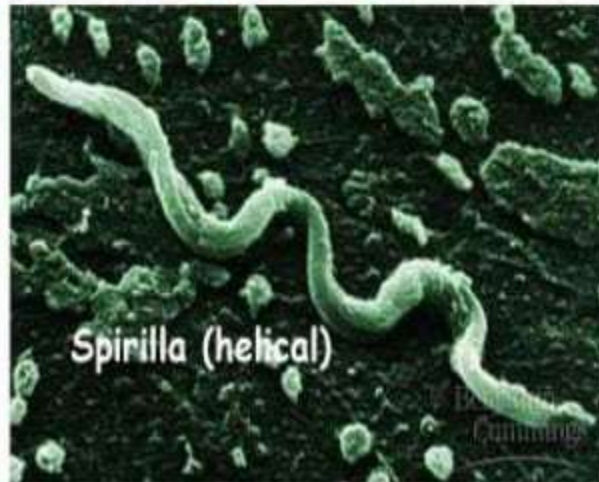
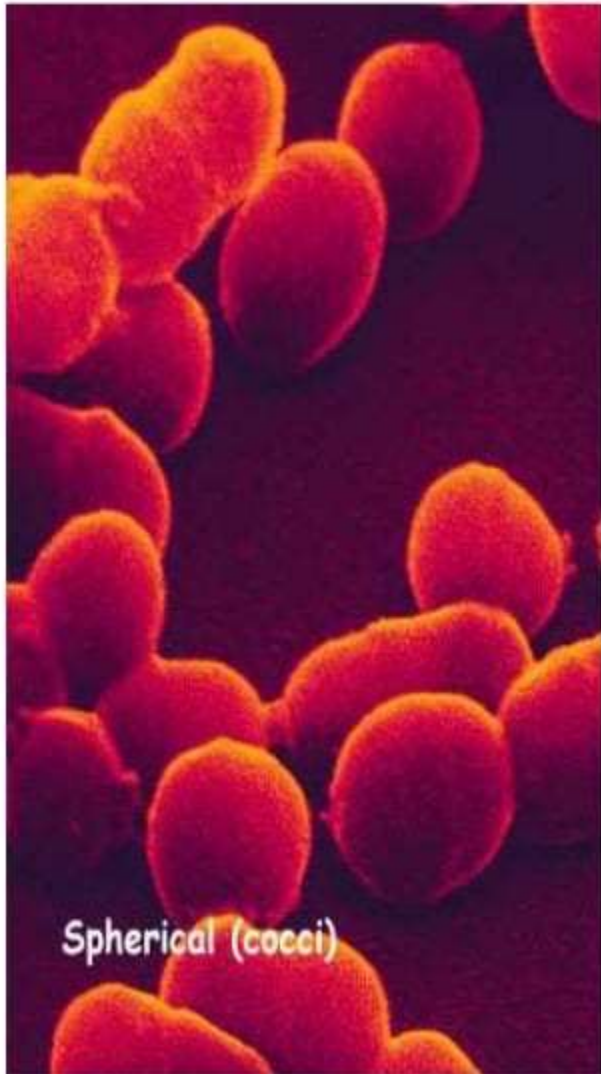
- **Prokaryotic cells** were here first and for billions of years were the only form of life on Earth. All **prokaryotic** organisms are **unicellular**
- **Eukaryotic cells** appeared on earth long after **prokaryotic cells** but they are much more advanced. **Eukaryotic** organisms unlike **prokaryotic** can be **unicellular** or **multicellular**.

Characteristics of Prokaryotes

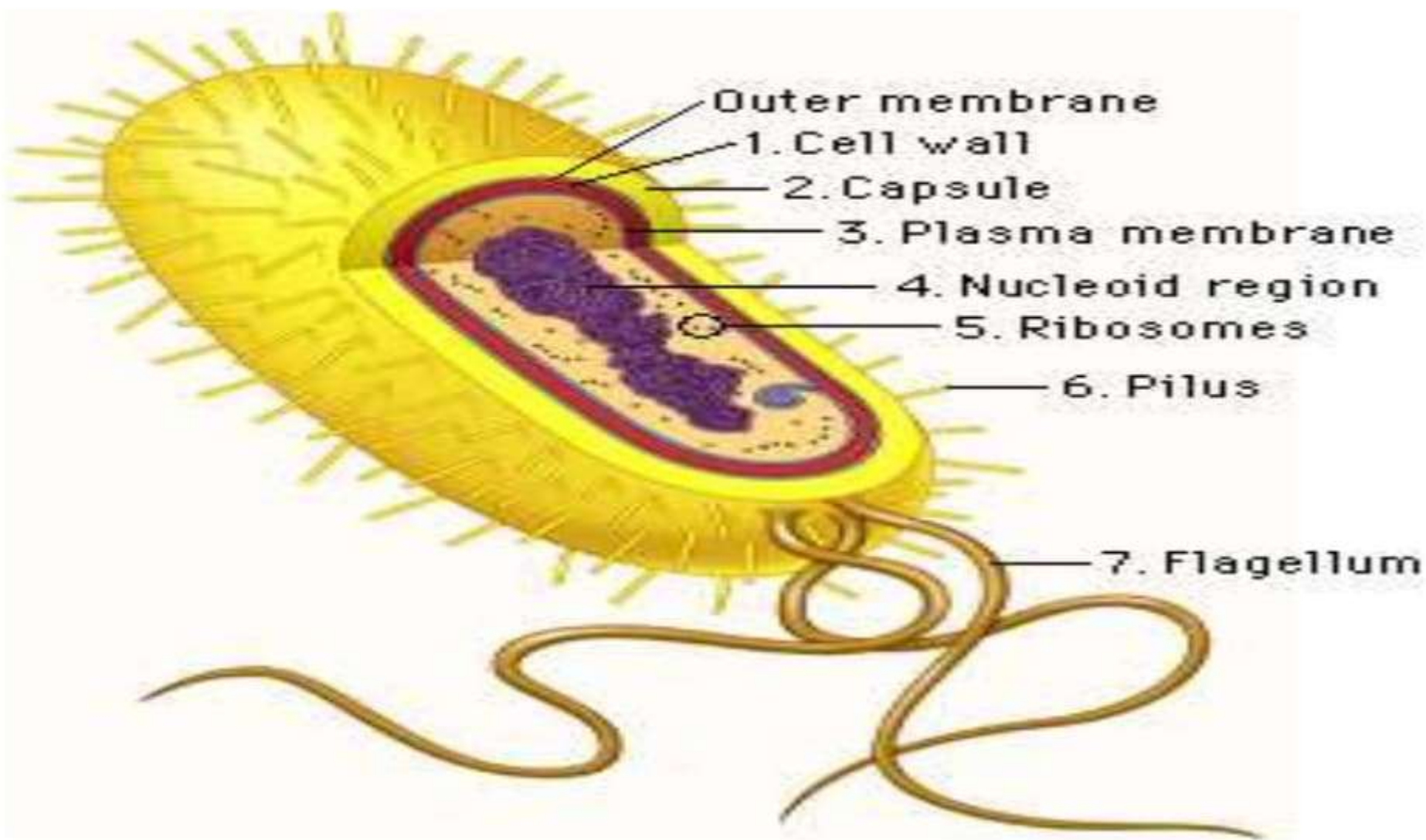
- Prokaryotes are the simplest type of cell.
- Oldest type of cell appeared about four billion years ago.
- Prokaryotes are the largest group of organisms
- Prokaryotes unicellular organisms that are found in all environments.

- 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



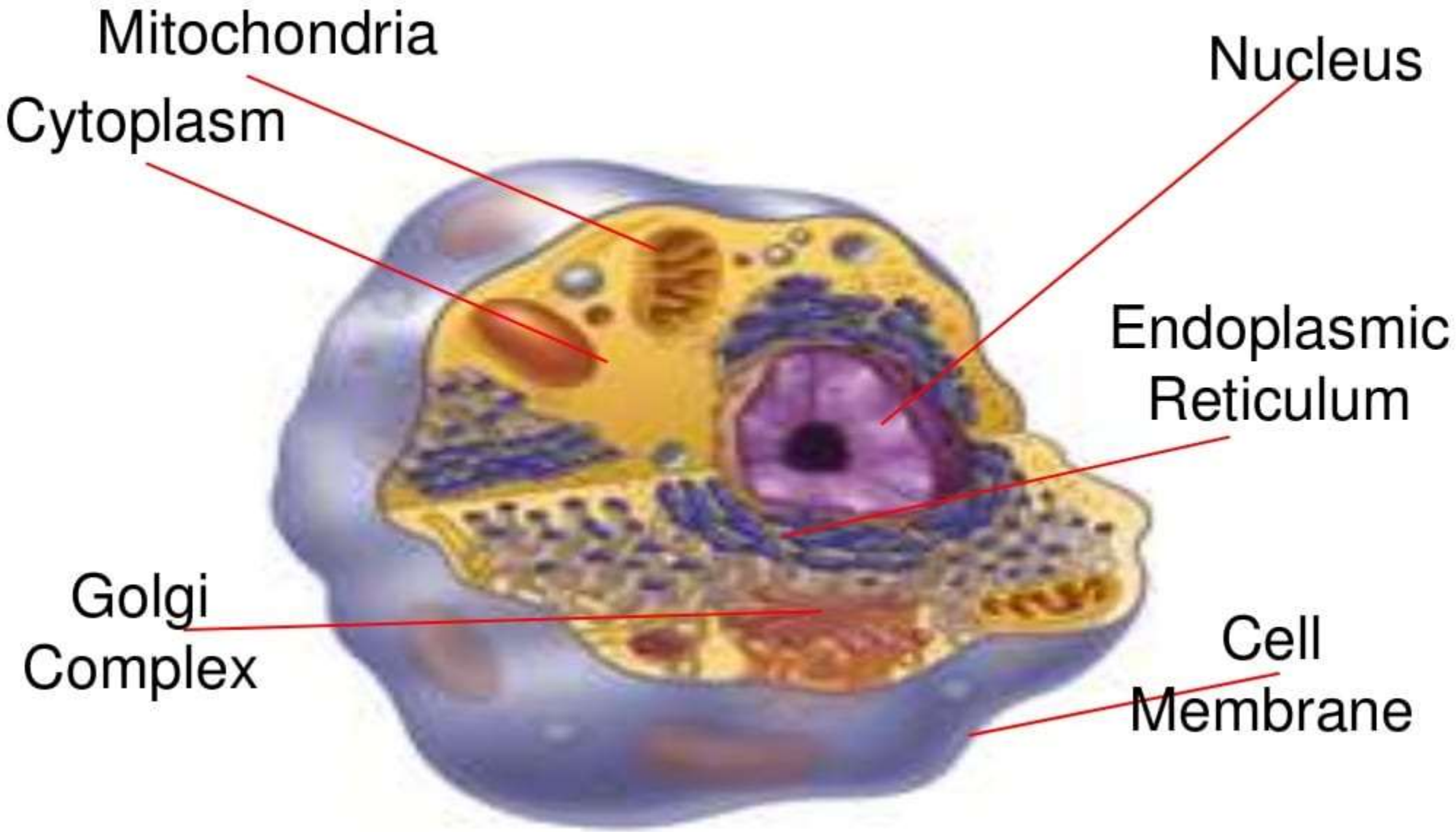
- Cocci = spherical (round)
- Bacillus = (rod shaped)
- Spirilla = helical (spiral)



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 .



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

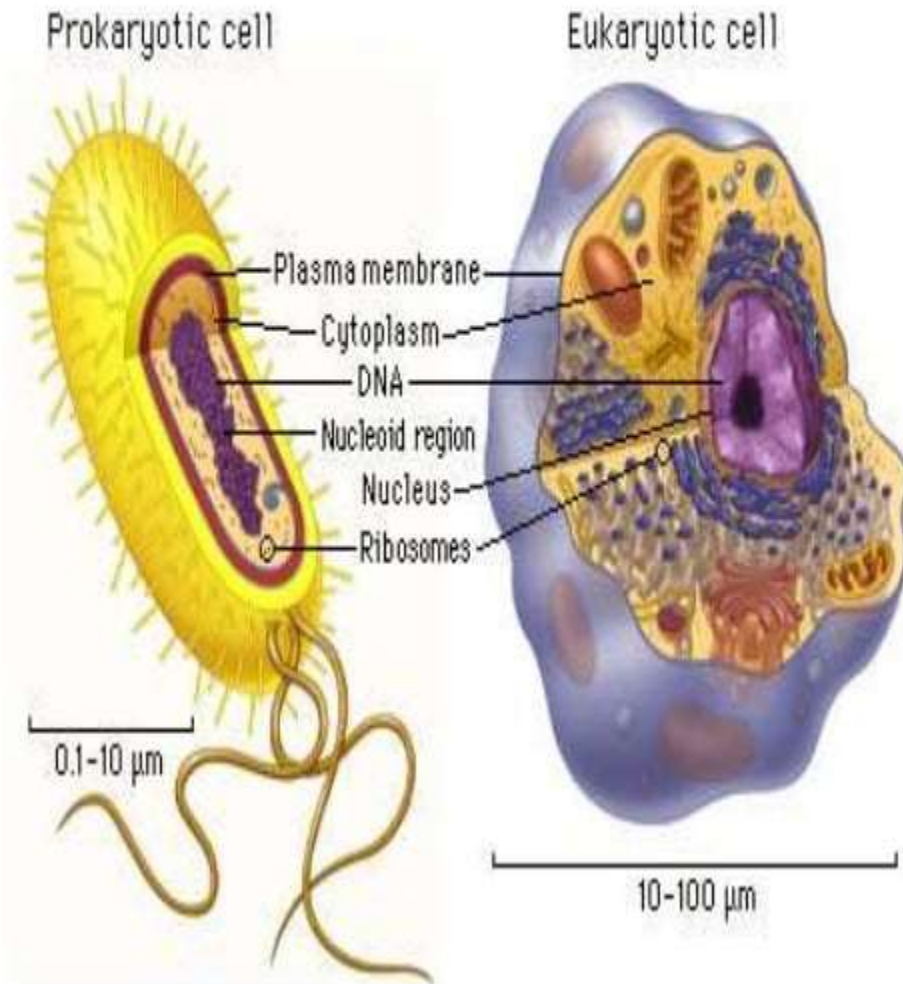
Prokaryotes

- 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

Similarities



- Both types of cells have cell membranes (outer covering of the cell)
- Both types of cells have ribosomes
- Both types of cells have DNA
- Both types of cells have a liquid environment known as the cytoplasm

Prokaryote cells are smaller and simpler

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

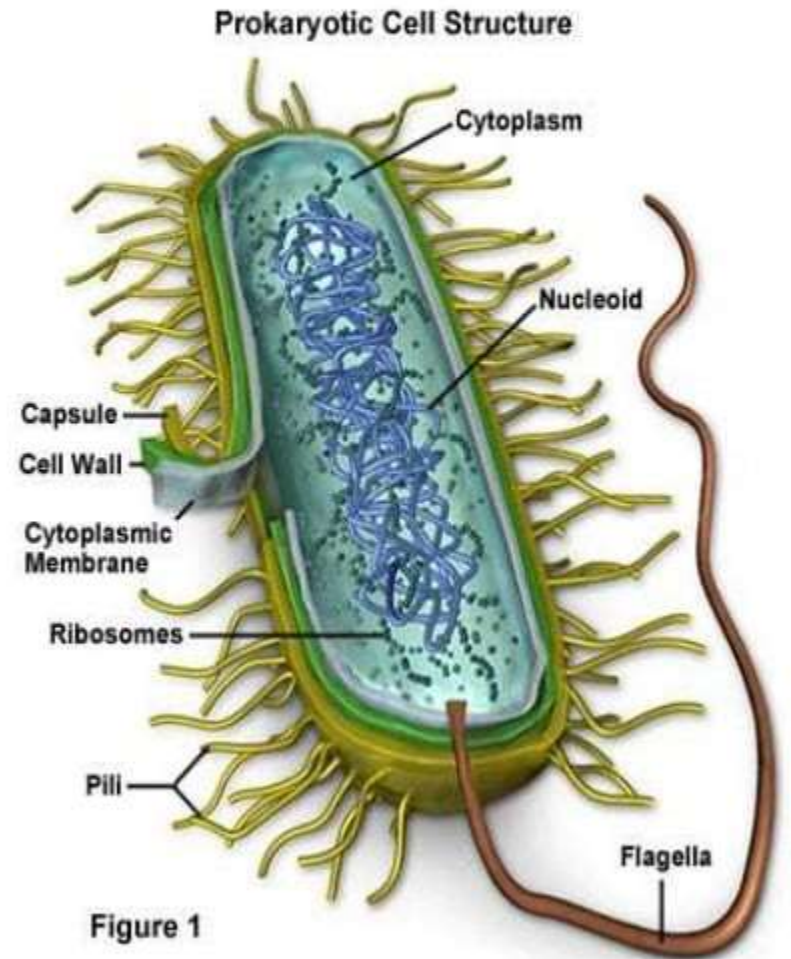


These are
prokaryote
E. coli bacteria on
the head of a steel
pin.



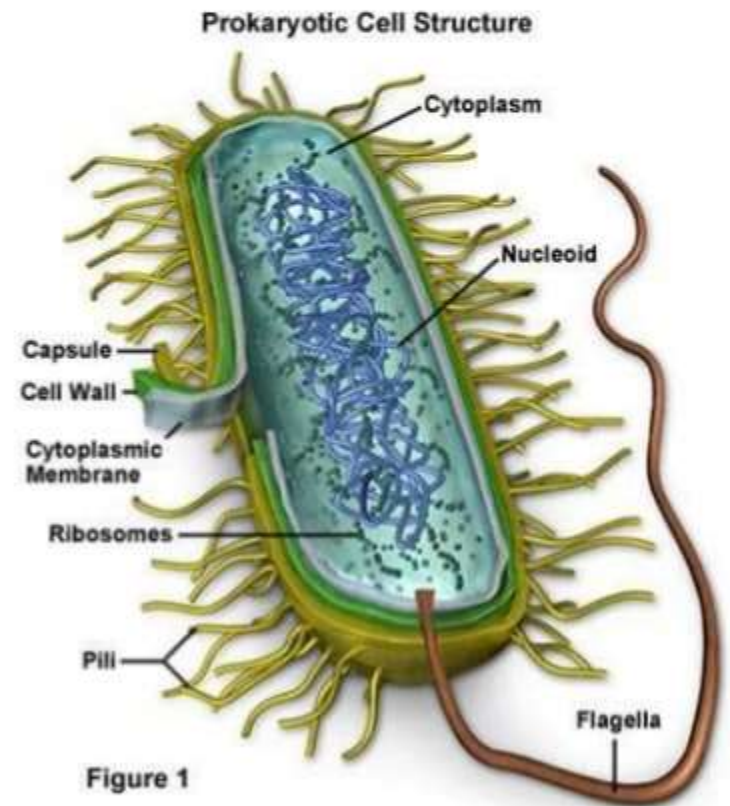
Prokaryote cells are simply built (example: E. coli)

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



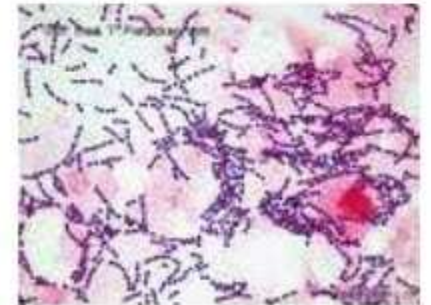
Prokaryote cells are simply built (example: E. coli)

- **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

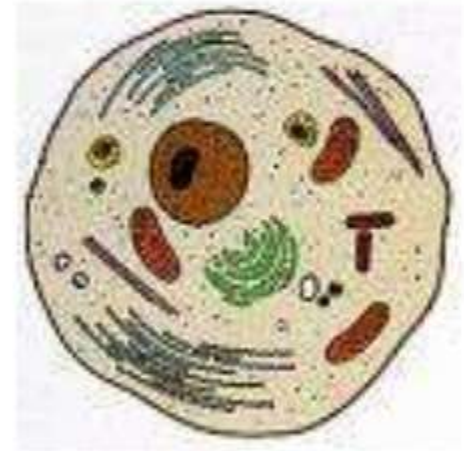
- **Photosynthetic:** energy from sunlight
- **Disease-causing:** feed on living things
- **Decomposers:** feed on dead things

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



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**