

Structural organization of prokaryotic and eukaryotic cell

What is a cell?!

Cells are smallest unit of life.
Discovered by Robert Hooke in 1665 using microscope.
Every thing we know about cells we call "cell theory".
Developed in 1838 by observations of Schleiden and Schwann



By the Council of the ROYAL SOCIETY of London for Improving of Natural Knowledge.

Ordered, That the Book written by Robert Hooke, M.A. Fellow of this Society, Entituled, Micrographia, or fome Phyfiological Deferiptions of Minute Bodies, made by Magnifying Glaffes, with Obfervations and Inquiries thereupon, Be printed by John Martyn, and James Alleftry, Printers to the faid Society.

Novem. 23. 1664.

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LONDON, Printed by Jo. Martyn, and Jo. Alleftry, Printers to the ROYAL SOCIETY, and are to be fold at their Shop at the nell in S. Paul's Church-yard. M DC LX V.

Cell Theory

- 1. All organisms are made up of cells
- 2. Cells are the basic unit of structure and function in all organisms
- 3. All cells come from cells that already exist.



Definition of Cell

A cell is the smallest unit that is capable of performing life functions.

Compound Light Microscopes

use light and lenses to magnify objects. Limited magnification capacity. Up to 1500x



Electron Microscopes

use a beam of e- instead of light. The images are typically seen in more a 3-D picture and can be very detailed.

This is what we use to look at viruses



Characteristics of All Cells

A surrounding membrane Cytoplasm – cell contents in thick fluid Organelles – structures for cell function Control center with DNA



Classification of Life



Examples of Cells



Two Types of Cells

Prokaryotic
 Eukaryotic



Prokaryotic

Do not have structures surrounded by membranes
 Few internal structures
 One-celled organisms, Bacteria



The 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.

The Characteristics of Prokaryotes

- 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.

Prokaryote Cells Parts

capsule: slimy outer coating

cell wall: tougher middle layer

<mark>cell membrane</mark>: delicate inner skin



Prokaryote cells are simply built

cytoplasm: inner liquid filling DNA in one big loop flagella: for swimming ribosomes: for building proteins



The Structure of Bacteria

Extremely small - 1–1.5 µm wide and 2–6 µm long Occur in three basic shapes:

Spherical coccus, Rod-shaped bacillus, Spiral spirillum (if rigid) or spirochete (if flexible).



Shapes of Prokaryotes



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

Eukaryotic

Contain <u>organelles</u> surrounded by membranes Most living organisms



The 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)

Is there more? Yes!!!

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

The 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

What's the difference between prokaryotes and eukaryotes?

- 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.

Complex Eukaryotes

Complex organisms have a body system that is arranged into a certain order called a hierarchy.



Summary of differences!

Prokaryotic Cells	Eukaryotic cells
small cells (< 5 mm)	larger cells (> 10 mm)
always unicellular	often multicellular
no nucleus or any membrane-bound organelles	always have nucleus and other membrane-bound organelles
DNA is circular, without proteins	DNA is linear and associated with proteins to form chromatin
ribosomes are small (70S)	ribosomes are large (80S)
no cytoskeleton	always has a cytoskeleton
cell division is by binary fission	cell division is by mitosis or meiosis
reproduction is always asexual	reproduction is asexual or sexual

Plant and Animal Cells

Animal Cells

- Can not make their own food so they have to eat food
- Do not go through photosynthesis
- Animal cells are more round shaped
- Animal cells have lysosomes
- Animal cells can not make sugar
- Animal cells use mitochondria to release energy

Animal cells cont.

Animal cells do not have a cell wall
We are all made of animal cells
Animal cells do not have a large vacuole
They do not have chloroplast

Plant Cells

- Plant cells have a cell wall
- Plant cells have a large vacuole unlike the animal cell
- Plant cells have mitochondria
- They also have lysosome's
- Plant cells are in the shape of a rectangle
- Plant cells go through photosynthesis

Plant Cells cont.

- Plant cells have chloroplast
- Plant cells use chloroplast to store energy
- They also have **cell membranes**

Similarities of Animal and Plant Cells

- They both have a nucleus
- They both have ribosome's that make protein
- Animal and plant cells both have Golgi bodies

They both have cytoplasm
They both have vacuoles that store food, water and waste products.