

# Chapter 7 – Cellular Structure and Function

## ~Cell Scientist and Theory Notes~

The invention of the microscope led to the discovery of cells

Cell: basic structural & functional unit of all living matter

Organelle: specialized structure that carry out specific cell functions (page 196)

### The Cell Theory:

Cell Theory Part	Who found this part?
All <u>living</u> things are made up of <u>cells</u>	<u>Schleidan</u>
Cells are the <u>basic</u> unit of structure and <u>function</u> in <u>living</u> things.	<u>Schwann</u>
New <u>cells</u> are produced from <u>existing</u> cells.	<u>Virchow</u>

### 2 Main Cell Types

Prokaryotes	Eukaryotes
<u>no nucleus</u>	<u>nucleus (DNA in it)</u>
<u>no organelles (few)</u>	<u>many organelles</u>
<u>1-10 um in size</u>	<u>2-1000 um in size</u>
<u>evolved 3.5 bil y/o</u>	<u>evolved 1.5 bil y/o</u>
<u>Ex = Bacteria</u>	<u>Ex: plant cell, animal cell, fungi cell, protist cell</u>

List differences between a plant cell and an animal cell

1. plant cells have cell walls
2. " " " chloroplasts
3. " " are square
4. " " " round

Multicellular Organisms: 1 or more cells

Unicellular Organisms: only 1 cell

# ~Cell Structure and Organelles Notes~

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Organelle Name	Function	Present in Prokaryote cells	Present in Animal cells	Present in Plant cells	Visible under the light microscope
Cytoplasm	everything outside of the nucleus holds all organelles in place	✓	✓	✓	Y
Nucleus	Contains DNA; Control Center <small>Chromosomes</small>	NO	Yes	Yes	Yes
Nuclear membrane	allows materials to move in & out of the nucleus thru nuclear pores	N	✓	✓	N
Nucleolus	inside nucleus - making of ribosomes	N	✓	✓	N
Vacuoles & Vesicles	store materials Very large in plants (gives support)	NO	✓	✓	Y
Lysosomes	break down & recycle macromolecules "janitor" of cell	NO	✓	✓ rare	N
Cytoskeleton	maintains cell shape moves cell parts, helps cell move Give 3D shape microtubules microfilaments	similar	✓	✓	N
Centrioles	organize cell division during mitosis & meiosis	NO	✓	NO	Y
Ribosomes	make proteins	✓	✓	✓	N
Endoplasmic Reticulum	assembles proteins; helps to break down And lipids drugs in cell	N	✓	✓	N
Golgi Apparatus	modifies, sorts & packages proteins & lipids for storage or transport out of cell	N	✓	✓	N
Chloroplasts	convert solar energy to chemical energy stored in food (photosynthesis)	some	N	✓	Y
Mitochondria	convert chemical energy in food to usable compounds "power/house"	N	✓	✓	N
Cell Wall	shapes supports and protects the cell (inflexible)	✓	N	✓	✓
Cell Membrane	regulates materials entering and leaving cell; protects & supports cell (flexible)	✓	✓	✓	✓
Cilia	short-hair-like projection producing movement	✓	✓	N	N
Flagella	used for movement (long-hair-like structure)	✓	✓	N	N

This will be given to you  
**Bacteria & Virus Notes**

Domain Archea  
 Kingdom Archaea : found in extreme habitats

Examples: thermophiles, methanogens

Domain Bacteria  
 Kingdom Bacteria : found everywhere

Examples: E. coli

Most bacteria require oxygen for respiration – thus called aerobes (aerobic bacteria)

Others will be killed in the presence of oxygen and are called anaerobes or anaerobic bacteria

Bacteria are classified in 2 major ways: Shape and Arrangement

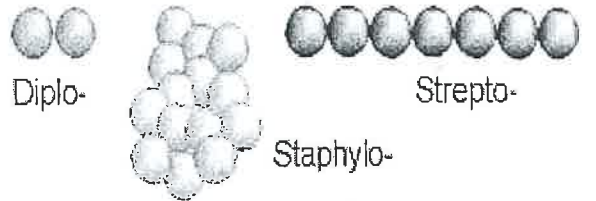
3 types of shapes:

- Coccus : round shaped
- Spirillum : spiral shaped
- bacillus : rod shaped



3 types of arrangement

- diplo : paired (2 of them)
- staphylo : clustered together (clumped)
- strepto : long chain (filament)



Osmosis is important in treatment of bacterial diseases – because they have a cell wall that is very strong to prevent rupture. Penicillin kills bacteria by interfering with the cell wall – it is like drilling a hole in the wall

2 types of cell walls

- Gram stain + : turns purple and has a layered cell wall Example: *Streptococcus pneumoniae*
- Gram stain - : turns pink and has a thick cell wall Example: *E. coli*

Reproduction is asexual

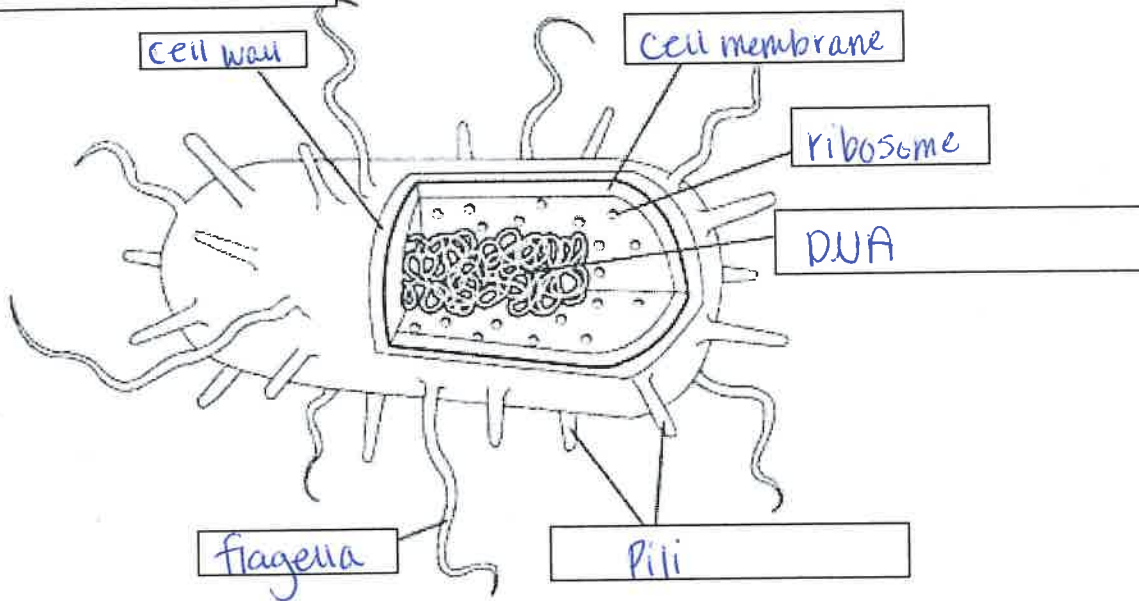
- Binary Fission
- Conjugation

**Virus Notes**

- A virus is a disease causing non-living particle that can reproduce only in living cells.
- A virus is considered not-living because it cannot respire, grow or move and they cannot reproduce on their own
- The living cell that a virus reproduces inside of is called a host
- Before a virus can enter and reproduce in a cell, it must recognize and attach to a specific site ... therefore most viruses can only enter & reproduce in a few cells
- Once inside a host cell a virus takes over that cell's metabolism
- A protein coat that holds the genetic material is called the capsid
- envelope : a membrane that surrounds the capsid for added protection
- Genetic material: can be either DNA or RNA  
 RNA: HIV, AIDS, influenza, rabies

Virus	Bacteria
1) <u>NOT</u> alive	1) <u>IS</u> alive
2) Cannot function until <u>IN</u> a host	2) Contains <u>some organelles</u> such as cytoplasm, cell wall, and ribosomes
3) Genetic material is <u>DNA or RNA</u>	3) Genetic material is <u>DNA</u>
4) Does not go thru <u>metabolism</u>	4) Does go thru <u>metabolism</u>
5) No <u>cytoplasm</u> thus no <u>chemical reactions</u>	5) Has <u>cytoplasm</u> thus it can go thru <u>chemical reactions</u>
	6) Mobile on own using <u>flagella</u>

**Bacteria Cell Diagram**



**Virus Diagram**

