

## CORNELL NOTES

Directions: You must create a minimum of 5 questions in this column per page (average). Use these to study your notes and prepare for tests and quizzes. Notes will be stamped after each assigned sections (if completed) and turned in to your teacher at the end of the Unit for scoring.

# UNIT 2: Cells

## Chapter 3: Cell Structure and Function

### I. Cell Theory (3.1)

#### A. Early studies led to the development of the **cell theory**

##### 1. Discovery of Cells

a. **Robert** \_\_\_\_\_ (1665)-Used compound microscope to look at cork cells. Gave name "**cells**"

b. **Anton van** \_\_\_\_\_ (1674)- made powerful single lens microscope. One of first to look at and describe living cells

2. More was learned as \_\_\_\_\_ were improved

#### B. Development of Cell Theory

1. **Matthias Schleiden** (1838)- proposed all \_\_\_\_\_  
made of cells

2. **Theodor Schwann** (1839)- after talking with Schleiden, concluded that all \_\_\_\_\_ were also composed of cells

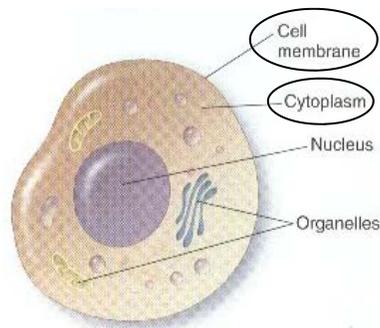
3. **Rudolf Virchow** (1855)- Proposed that all cells come from \_\_\_\_\_ cells

4. Accumulated research summarized as **Cell Theory** (one of first unifying concepts in biology)

a. **All organisms are made of** \_\_\_\_\_

b. **All** \_\_\_\_\_ **cells are produced by other living cells**

c. **The cell is the most** \_\_\_\_\_ **unit of life**



#### C. All cells share certain **characteristics**

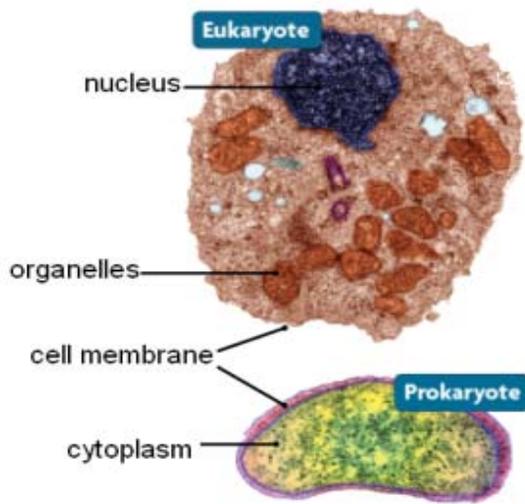
1. Cells tend to be \_\_\_\_\_

2. All cells are enclosed by a \_\_\_\_\_

3. All cells are filled with \_\_\_\_\_

#### D. Cells can be separated into two broad categories

1. **Prokaryotic** cells- \_\_\_\_\_ **have a nucleus** or



other **membrane-bound**

2. **Eukaryotic cells-** have a \_\_\_\_\_ and other **membrane bound organelles**. May be single or multicellular organisms

## II. Cell Organelles (3.2)

### A. Cells have an **internal structure**

1. Each eukaryotic cell has a \_\_\_\_\_

a. Supports and shapes the cell and helps position and transport organelles (\_\_\_\_\_)

b. Provides strength (**intermediate** \_\_\_\_\_)

c. Helps cells move and divide (\_\_\_\_\_)

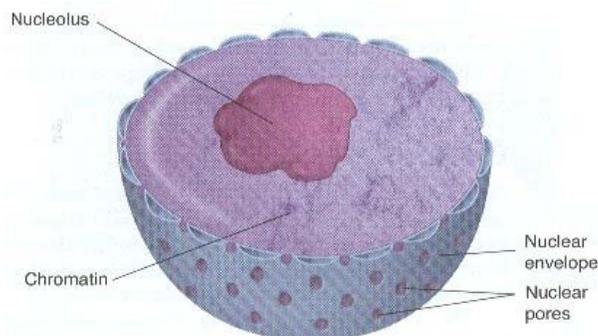
2. **cytoplasm-** important contributor to cell structure

a. In eukaryotes, it fills space between \_\_\_\_\_ and cell \_\_\_\_\_

b. Made up mostly of \_\_\_\_\_

c. Many chemical reactions occur in cytoplasm

### B. **Nucleus-** storehouse for \_\_\_\_\_ **material**



1. Two major demands on nucleus

a. Protects \_\_\_\_\_

b. DNA must be available for use at proper time

2. Nucleus surrounded by double membrane called \_\_\_\_\_

a. Nuclear membrane pierced with holes called

\_\_\_\_\_.

b. Allows large molecules to pass between nucleus and cytoplasm

3. Contains \_\_\_\_\_ - makes **ribosomes**

### C. Endoplasmic Reticulum (ER)



1. Interconnected network of thin **folded membranes**

2. \_\_\_\_\_ and \_\_\_\_\_ are produced in ER

3. Two types of Endoplasmic Reticulum

a. **Rough ER**- studded with \_\_\_\_\_ - makes proteins and lipids

b. **Smooth ER**- \_\_\_\_\_ ribosomes on surface. Makes lipids and helps break down drugs and alcohol

D. **Ribosomes** -composed of \_\_\_\_\_ and \_\_\_\_\_

1. Site of \_\_\_\_\_ **production**

2. Some bound to Rough ER and others suspended in cytoplasm

E. **Golgi Apparatus**- cells “post office”

1. Closely layered stacks of **membrane-enclosed spaces**

2. \_\_\_\_\_ proteins (some stored for later use)

3. \_\_\_\_\_ and \_\_\_\_\_ **proteins**

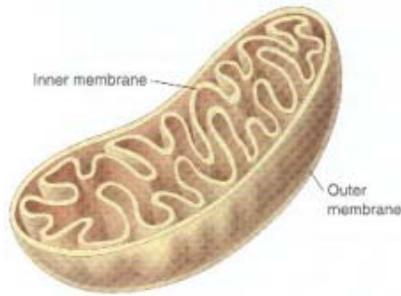
F. \_\_\_\_\_ - stores separate reactants for various chemical reactions

1. Membrane bound sacs

2. \_\_\_\_\_ materials from place to place (or for secretion)

3. Generally short lived and formed and recycled as needed

### G. Mitochondria- cells “ \_\_\_\_\_ ”



1. Supply \_\_\_\_\_ to cell
2. Bean-shaped with \_\_\_\_\_ membranes
3. Series of chemical reactions inside folded inner folds converts \_\_\_\_\_ into usable \_\_\_\_\_ for cell
4. Thought to have been originally free-living prokaryote because contain their own \_\_\_\_\_ and \_\_\_\_\_

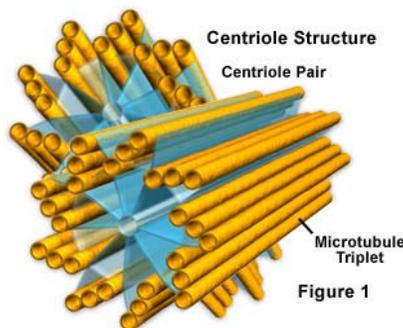
### H. \_\_\_\_\_ - fluid-filled storage sac

1. Stores water, food molecules, inorganic ions, and enzymes.
2. **Plants** contain large, \_\_\_\_\_ **vacuole**
  - a. Takes up most of space in plant cell
  - b. Filled with \_\_\_\_\_ and strengthens the cell and helps to \_\_\_\_\_ plant
3. Animal cells contain many \_\_\_\_\_ vacuoles

### I. Lysosome- “suicide sacs”

- a. membrane organelle containing \_\_\_\_\_
- b. **Defend cell** from invading \_\_\_\_\_ and \_\_\_\_\_
- c. Break down damaged and worn-out \_\_\_\_\_
- d. Not found in \_\_\_\_\_ cells

### J. Centrosome and Centrioles



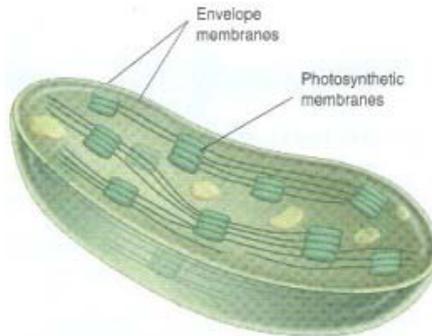
1. Small region of cytoplasm that produces \_\_\_\_\_.
2. In animal cells, contains two small structures called \_\_\_\_\_.
  - a. cylinder-shaped organelles made of short microtubules.
  - b. Help in **cell** \_\_\_\_\_ in animal cells

c. Form \_\_\_\_\_ and \_\_\_\_\_

K. **Cell Walls**- found in plants, algae, fungi, and most bacteria

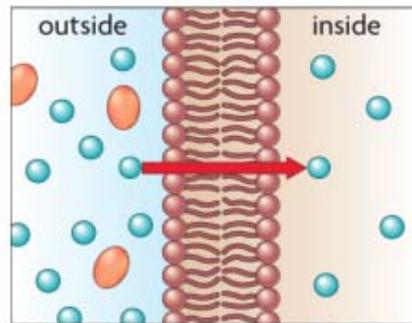
1. Strong rigid layer that \_\_\_\_\_ **cell membrane**
2. Provides **protection, support,** and \_\_\_\_\_ to cell
3. Cell wall composition varies (plants- cellulose, fungi-chitin, bacteria-peptidoglycan)

L. **Chloroplasts**- carries out \_\_\_\_\_



1. Highly compartmentalized organelle with outer and inner membranes.
2. Contain \_\_\_\_\_ (disc-shaped sacs) with light-absorbing **chlorophyll** for photosynthesis. (give plants green color)
3. Also thought to be free-living prokaryote originally because also contain own \_\_\_\_\_ and \_\_\_\_\_

### III. Cell Membrane (3.3)

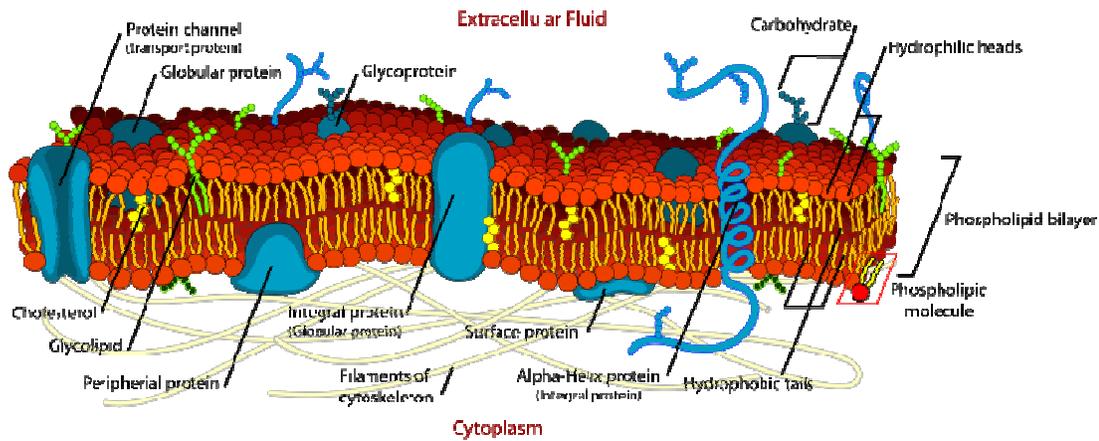


Some molecules can cross the membrane while others cannot.

- A. Forms \_\_\_\_\_ between cell and outside environment.
- B. Controls passage of materials into and out of cell. Is \_\_\_\_\_ (allows some things but not others) Helps to maintain the cells homeostasis

C. Consists of **double layer** of \_\_\_\_\_ interspersed with other molecules (proteins and carbohydrates)

1. **Phospholipid**- molecule composed of \_\_\_\_\_ basic parts
  - a. **phosphate** and **glycerol** form “\_\_\_\_\_”
  - b. **fatty acid** forms “\_\_\_\_\_”
  - c. forms \_\_\_\_\_ molecule (“head” hydrogen bonds to water molecules, and “tail” does not)



d. **Double layered** membrane had “heads” on \_\_\_\_\_ and “tails” on \_\_\_\_\_.

2. Forms **double layer** because of water on inside and outside of cell.

E. Other molecules are embedded with the phospholipid layers

1. **Cholesterol** molecules \_\_\_\_\_ cell membrane

2. \_\_\_\_\_ extend through membrane and form channels

3. **Carbohydrates** attached to proteins act like “\_\_\_\_\_ tags”

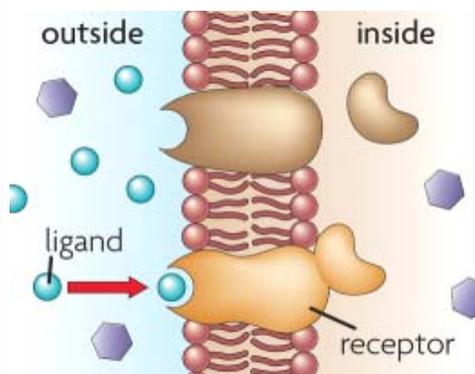
4. **Fluid Mosaic Model**- describes arrangement of molecules in cell membrane. Flexible “fluid like” lipid embedded with “**mosaic**” of other \_\_\_\_\_.

F. Molecules cross membrane in several ways

1. Some methods of transport require \_\_\_\_\_ and some do not.

2. Depends molecules **size**, **polarity**, and **concentration** inside versus outside.

G. Cell membrane contains \_\_\_\_\_ that help transmit **signals** across membrane



1. Made of \_\_\_\_\_

2. It detects a **signal** molecule and performs an \_\_\_\_\_ in response

3. **Receptors** bind to molecules called \_\_\_\_\_.

a. When bind, they change \_\_\_\_\_

b. This **changed shape** affects how receptor \_\_\_\_\_ with other molecules

#### 4. Two types of receptors

a. \_\_\_\_\_ **receptors**- (means "within" cell)- can interact with **DNA** and start production of certain **proteins**

b. \_\_\_\_\_ **receptor**- Molecules that cannot cross membrane can send message to inside of cell. Causes molecules inside cell to respond

### IV. **Diffusion and Osmosis** (3.4)

A. \_\_\_\_\_ **transport**- allows cell to move materials across cell membrane without using energy

1. **Diffusion**- Movement of materials (fluid or gas) from region of \_\_\_\_\_ concentration to region of \_\_\_\_\_ concentration

a. **Concentration** \_\_\_\_\_ - used to describe areas of high and low concentration.

b. When movement makes concentration **equal**- reaches **dynamic** \_\_\_\_\_ (Molecules still continue to move- \_\_\_\_\_)

c. Diffusion plays important role in movement of \_\_\_\_\_ and \_\_\_\_\_ molecules

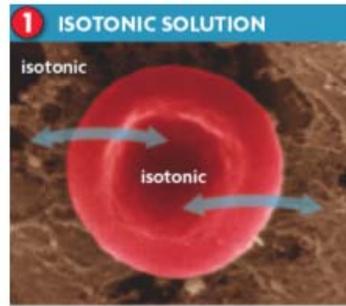
2. **Osmosis**- Diffusion of \_\_\_\_\_ molecules

a. Three terms used to describe the amount of dissolved particles in cell compared to amount of water (terms are \_\_\_\_\_)

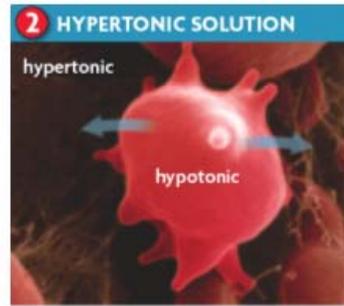
1). **Isotonic**- \_\_\_\_\_ concentration of dissolved materials (water moves in and out at \_\_\_\_\_ rate)

2). **Hypertonic**- solution has \_\_\_\_\_ concentration of dissolved materials (Water concentration higher in cell than outside- water moves \_\_\_\_\_ of cell)

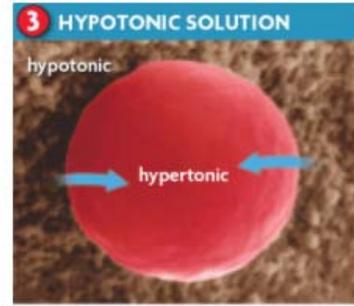
3). **Hypotonic**- Solution has \_\_\_\_\_ concentration of dissolved materials (water moves \_\_\_\_\_ the cell)



A solution is isotonic to a cell if it has the same concentration of solutes as the cell. Equal amounts of water enter and exit the cell, so its size stays constant.

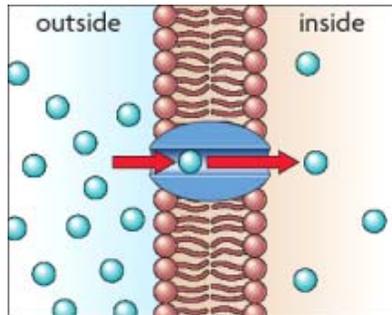


A hypertonic solution has more solutes than a cell. Overall, more water exits a cell in hypertonic solution, causing the cell to shrivel or even die.



A hypotonic solution has fewer solutes than a cell. Overall, more water enters a cell in hypotonic solution, causing the cell to expand or even burst.

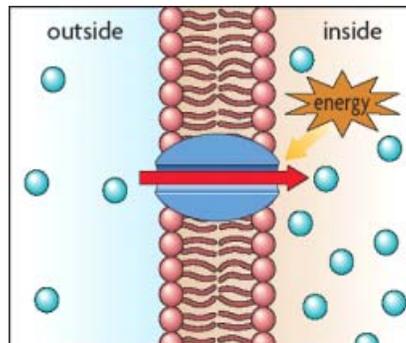
**B. Facilitated diffusion**- larger molecules can still diffuse through openings formed by \_\_\_\_\_



1. Still form of \_\_\_\_\_ **transport**
2. Many types of transport proteins- most allow only certain molecules to travel into cell

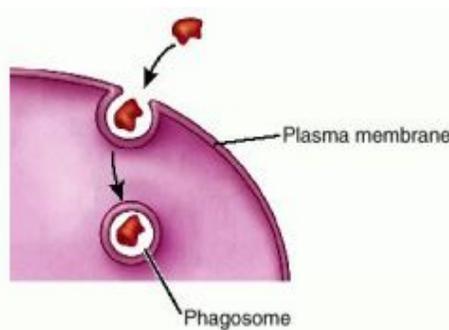
**V. Active Transport, Endocytosis, and Exocytosis (3.5)**

**A. Active Transport**- requires \_\_\_\_\_ by cell to move materials in or out of cell.



1. Can use transport proteins to move molecules against concentration (from **low to high**)
2. Use energy from \_\_\_\_\_ molecule

**B. Endocytosis**- Movement of liquids or large molecules \_\_\_\_\_ a cell by engulfing them in a membrane



1. **Phagocytosis**- "cell \_\_\_\_\_"
  - a. Key role in \_\_\_\_\_ system (white blood cells)
  - b. Cell membrane make " \_\_\_\_\_ " around material

2. \_\_\_\_\_ - opposite of endocytosis

a. \_\_\_\_\_ of substances from cell

b. vesicle moves to cell membrane, fuses, and then lets go of its contents out of the cell.

c. Occurs constantly in your body (release of \_\_\_\_\_ during nerve impulse)

