

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

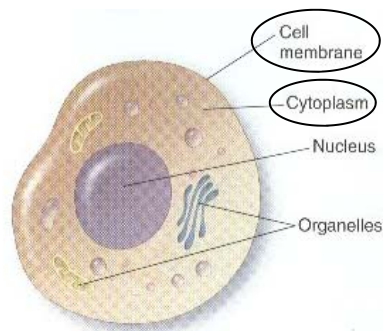
3. **Rudolf Virchow** (1855)- Proposed that all cells come from _____ cells

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**

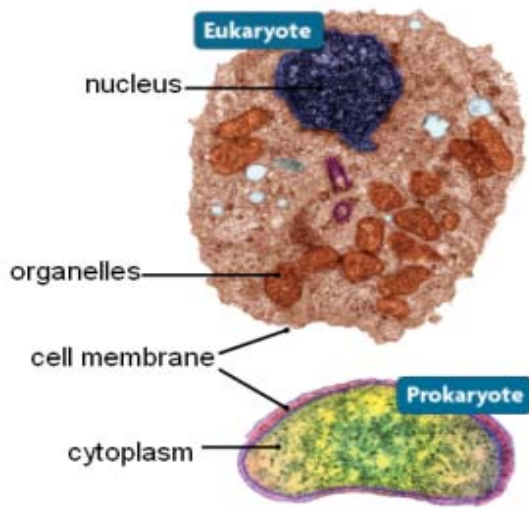
1. Cells tend to be _____

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 (_____)

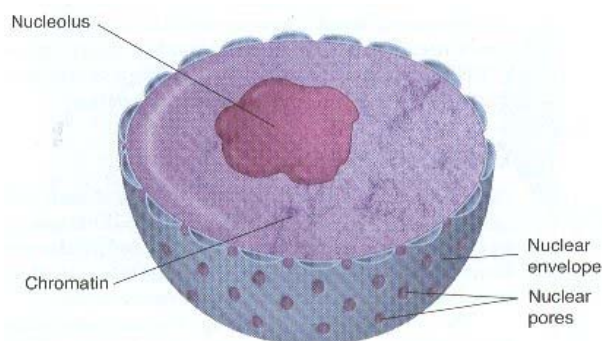
2. **cytoplasm-** important contributor to cell structure

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**

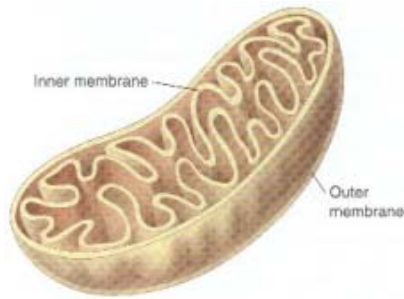
F. _____ - stores separate reactants for various chemical reactions

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”

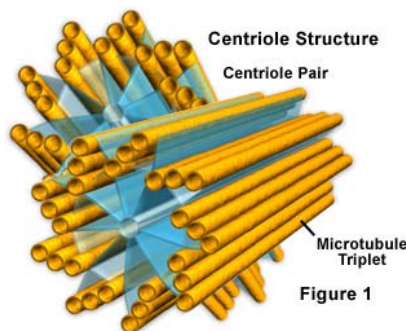
a. membrane organelle containing _____

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.

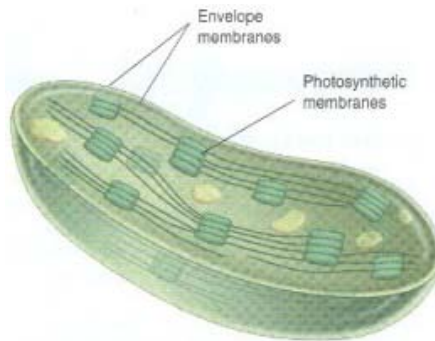
b. Help in **cell** _____ in animal cells

c. Form _____ and _____

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

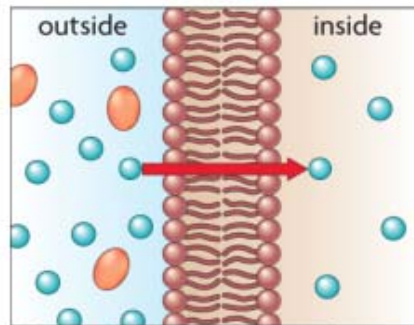
1. Strong rigid layer that _____ **cell membrane**
2. Provides **protection, support,** and _____ to cell
3. Cell wall composition varies (plants- cellulose, fungi-chitin, bacteria-peptidoglycan)

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)

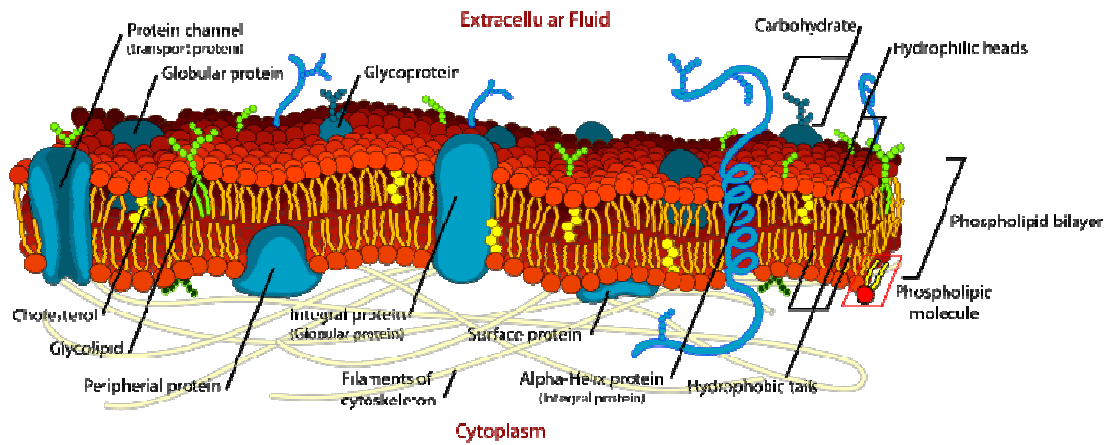


Some molecules can cross the membrane while others cannot.

- 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”

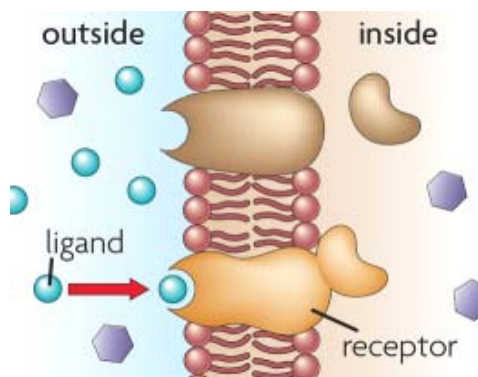
4. **Fluid Mosaic Model**- describes arrangement of molecules in cell membrane. Flexible “fluid like” lipid embedded with “**mosaic**” of other _____.

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)

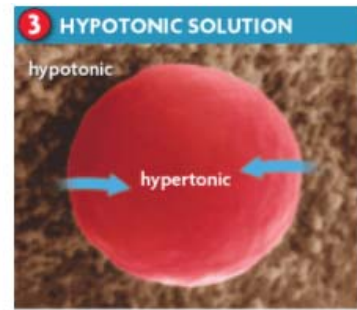
3). **Hypotonic**- Solution has _____ concentration of dissolved materials (water moves _____ the cell)



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.

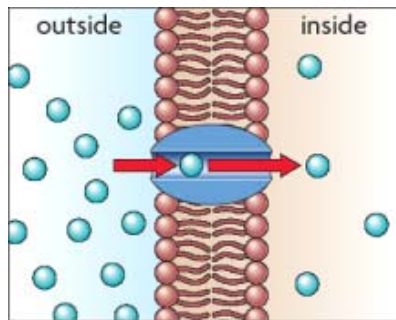


A hypertonic solution has more solutes than a cell. Overall, more water exits a cell in hypertonic solution, causing the cell to shrivel or even die.



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.

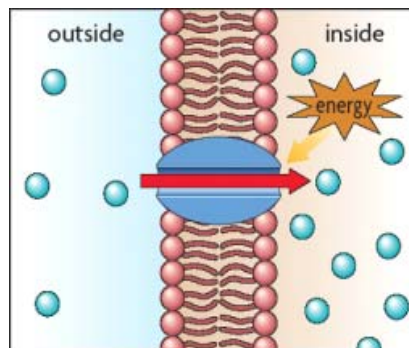
B. Facilitated diffusion- larger molecules can still diffuse through openings formed by _____



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

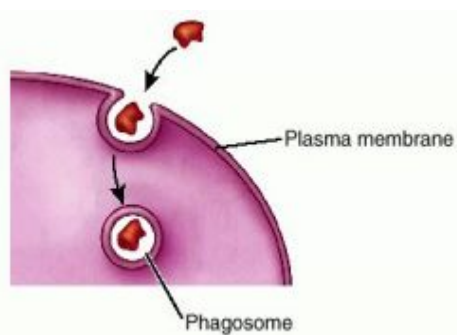
V. Active Transport, Endocytosis, and Exocytosis (3.5)

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)

