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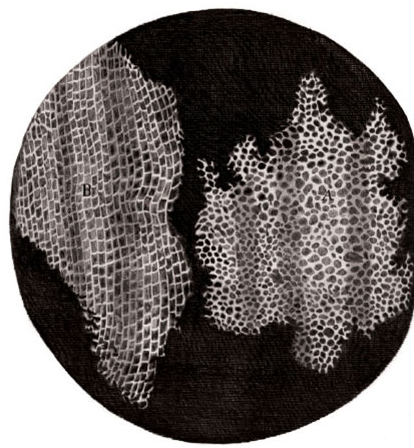
Cells #1: Cell Theory, Cell Organelles and Cell Membrane

*For additional support and information: Read and reference Chapter 8 in your Biology Book*

**Section 1 = Cell Theory**

* Cells:
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Enable scientist to view and study cells
  + **Early studies led to the development of the cell the cell theory:**
    - **Robert Hooke**:

      * Looking at a piece of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(tree bark).



* + - * Used a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_microscope
      * Though its crude lenses severely limited the amount of detail that he could see.
      * Saw the spaces that cells once occupied = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - **Anton van Leeuwenhoek**: (A Dutch tradesman that was born the son of a basket-maker. He was trained as a fabric merchant. He was accustomed to using magnifying lenses to examine threads. To make his job easier he worked on making his lenses stronger. Eventually he succeeded and one of his single lenses was actually stronger than Hooke’s compound light microscope.
      * In 1674 Leeuwenhoek became the 1st to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Saw numerous single celled organisms swimming in\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\*\*\*\*\* Due to these two discoveries, scientists began to ask: Are all living things made of cells? And where do cells come from?

* + **Cell Theory**:
    - Mostly developed by three German scientists
      * + **Has** **3 major parts**.
    - Your body contains trillions of cells of many different shapes and sizes.
      * In general, cells…..
        + Tend to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in size and have similar building blocks.
        + Enclosed by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that controls what \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the cell.
        + Contain cytoplasm:

In SOME cells the cytoplasm contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Organ like structures that are specialized to do certain jobs.

* + - * We can put cells in two different groups: Prokaryotic and Eukaryotic
        + Prokaryotic Cells:
        + Eukaryotic Cells:

Nucleus =

Can be….

**Summarize:**

* **Explain the three major principles of cell theory in your own words.**
* **What characteristics are shared by most cells?**

**----------------------------------------------------------------------------------------------------**

**Section 2 - Organelles**

* + Cells have an internal structure:
    - Cells are highly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structures.
      * Organelles and molecules are anchored to specific sites, which vary by types.
      * And it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_keeps all of the cells content from oozing out.
    - Framework of the cell:
      * Eukaryotes contain a cytoskeleton:
        + Network of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that constantly change to meet the need of the cell.
        + Protein \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that crisscross the entire cell.

3 main types of protein fibers:

* + - * + Cytoplasm also helps when it comes to cell structure.

In eukaryotes, it fills the space between the nucleus and the cell membrane. The fluid portion is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and consists mostly of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This is why \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is necessary for maintaining cell structure.

The water also acts as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the many chemical reactions that occur in cytoplasm.

* + - Plant cells vs. Animal Cells
      * Both use many of the same type of organelles that carry out basic functions.
      * But both cell types also have organelles that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Several organelles are involved in making and processing proteins:
  + **Main job of the cell**:
    - Proteins are made from \_\_\_\_\_\_\_\_\_\_ types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Proteins carry out many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and it is important to make them correctly.
  + Organelles of the Cell
    - Nucleus: The Brain of the cell
      * Stores \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_called DNA.
      * DNA contains the instructions for making \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * The DNA in the nucleus is enclosed in a double membrane called the nuclear membrane.
      * The nucleus also contains the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
        + This is where the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are assembled.
    - Endoplasmic Reticulum (The ER)
      * Fills a large part of the cytoplasm
      * **Site of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
      * An interconnected network of thin folded membranes.
        + Interior portion of this maze = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        + Production of proteins and lipids occur both on the surface of the ER and in the Lumen
        + Highly folded =
        + Some parts contain ribosomes:

Actually made of proteins and RNA. After they are made in the nucleolus, they pass through the nuclear pores into the cytoplasm where more of the protein synthesis occurs.

* + - * + Rough ER = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Function = Makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and sends them to the lumen

* + - * + Smooth ER = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Function =

Responsible for breaking down drugs and alcohol

* + - Golgi Apparatus: **The Post Office**
      * Consists of Layered stacks of membrane-enclosed spaces that:
        + Proteins move from ER to the Golgi.
      * **It’s the Postal Service of the Cell:** 
        + Where does it send the proteins???

Some…..

* **Vesicles:**
  + The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Small membrane-bound sacs that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the rest of the cytoplasm.
    - After a protein has been made, part of the ER pinches off to form a vesicle surrounding the protein.
      * This allows for the protein to be safely \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the Golgi apparatus.
        + Once a protein reaches the Golgi apparatus, it is then……
* **Mitochondria:**
  + It supplies cellular \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the cell.
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organelle.
  + Contains its own ribosomes and DNA.
    - These are thought to have once been free-living prokaryotes that were taken in by larger cells.
    - If so…. This must have been a relationship that helped both organisms survive.
* **Vacuole:**
  + - Stores water, food molecules, inorganic ions and enzymes
  + In Animal Cells…
    - ­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vacuoles (if any).
  + Plant Cells
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vacuoles
* **Lysosomes:**
  + The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Membrane bound organelle that contains\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
      * What is an enzyme???
      * A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that causes chemical reactions to start, stop, speed up, or slow down.
        + Hmmmmmmm…….

If enzymes are proteins, where do you think they are made?

* + - They…..
      * Think about this….
        + If lysosomes can destroy worn out cells parts, what prevents them from destroying functioning cell parts?

Lysosomes are surrounded by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that prevents the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Centrioles:
  + - Microtubules……… what other cell part contains these?
      * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + The Centrioles help form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Both of these structures aid in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Cilia: Flagella:

* **Cell Wall:** 
  + Found only in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - It is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that gives \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the cell.
    - In plants, the cell wall is made up of\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a polysaccharide.
      * What is a polysaccharide?
        + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **Chloroplasts:**
  + Chlorophyll is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that is found on the inside of the chloroplasts.
    - Chlorophyll is responsible for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**3.2 Questions:**

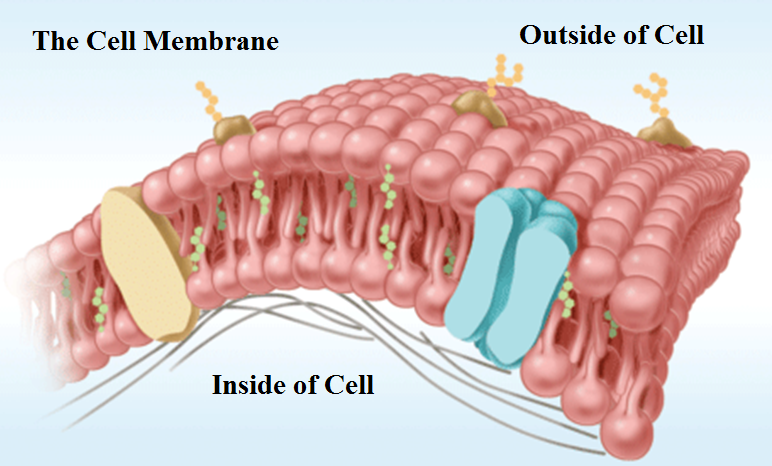
1. What problems might a cell experience if it had no cytoskeleton?

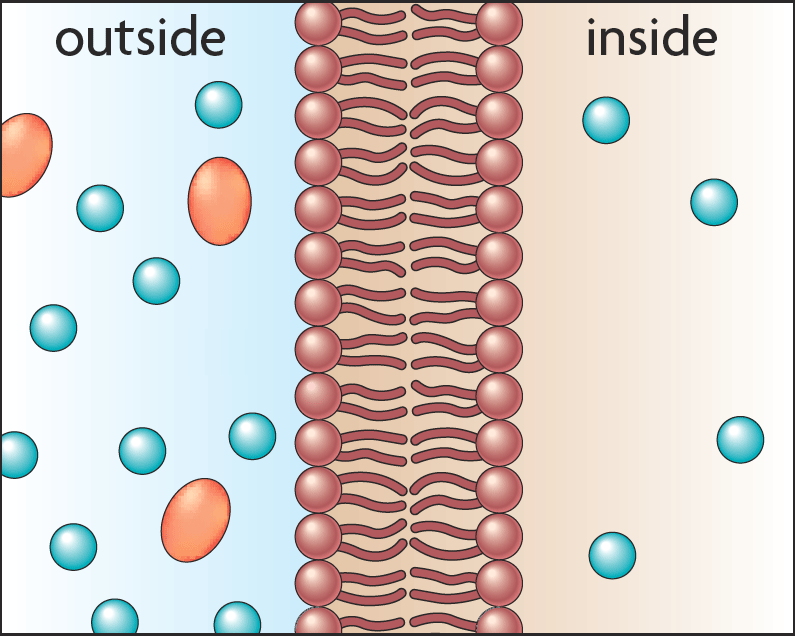
2. How are the nucleus and a vesicle similar and different in structure and function?

3. In what ways are lysosomes, vesicles and the central vacuole similar?

4. Would it be accurate to say that a chloroplast makes energy for a plant cell? Explain your answer.

**Section 3 -** **Cell Membrane**

* Cell Membrane = AKA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Controls what \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the cell.
  + 
  + It has a double layer of phospholipids, this is why they call it a : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Phospholipid:
      * Polar Vs Non-Polar:
        + Heads =
        + Tails =
* Fluid Mosaic Model:
  + Describes the arrangement of the molecules that make up a cell membrane.
    - It is = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Phospholipids can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ past each other in a “\_\_\_\_\_\_\_\_\_\_\_\_\_\_” motion.
* Other Molecules of the Cell Membrane:
  + Cholesterol =
  + Proteins =
  + Carbohydrates =
* The Cell membrane is…….
* Some things can cross but not all.
  + Diagram of Cell Membrane:



* Selective Permeability = Semi- Permeable
  + Allows the cell to maintain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Allows some but not all molecules to pass
    - Molecules cross in several ways
      * Some use energy = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Others do not = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Being Semi-permeable
* Allows the cell to…..\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Must be maintained because many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_can occur \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Chemical signals are transmitted across the cell membrane.
  + Receptor

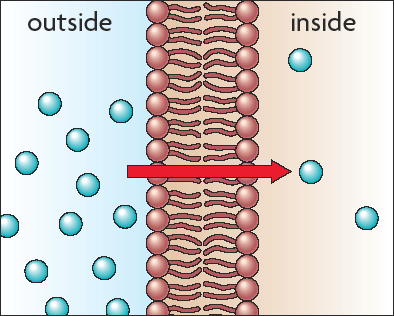
**Chapter 3.3 Questions:**

* Compare and describe a semipermeable membrane with something that you are already familiar with:

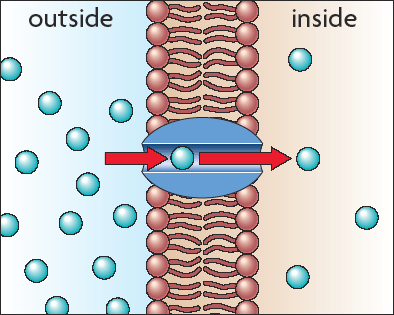
**Chapter 3.4 – 3.5 Power Notes -** **Cell Structure and Function**

**Chapter 3.4 Diffusion and Osmosis**

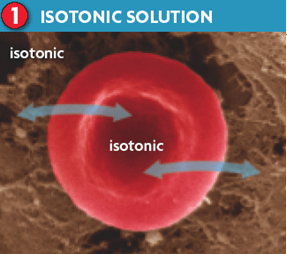
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ =The movement of molecules across a cell membrane without energy input from the cell.
  + Examples of Passive Transport:
  + **Diffusion** =
    - Air Freshener Demo.
  + **Osmosis =** A special type of diffusion.
    - Particles will move from areas of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to areas of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + **Diffusion and Osmosis:**
    - Both work due to a concentration gradient.
    - Concentration gradient =



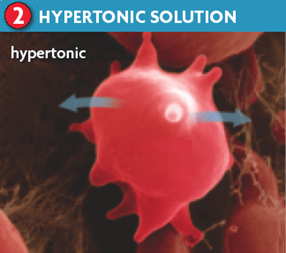
* + **Facilitated Diffusion:**
    - Is also a special type of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - It is the diffusion of molecules cross a cell membrane with the use of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



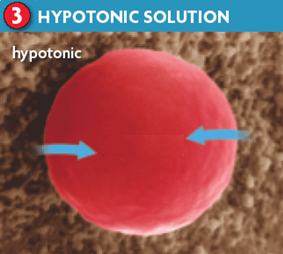
* **Types of solutions that cause Osmosis to occur:**
  + A solution may be described as isotonic, hypertonic, or hypotonic relative to another solution.
  + **Isotonic Solution:**
    - Water and particles move \_\_\_\_\_\_\_\_\_\_\_\_ the cell at the SAME rate as they move out of the cell.
    - If equal parts of water are entering and leaving the cell, the cell stays\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



* + **Hypertonic Solution:**
    - A solution that has a higher concentration of dissolved particles than a cell.
    - This means that water from inside the cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the cell in order to try to\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - If water is rushing out of the cell, the cell will start to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



* + **Hypotonic Solution:**
    - A solution that has a…..
    - This means that water from the outside of the cell will rush \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the cell in an attempt to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the dissolved particles.
    - If water is rushing into the cell, what will happen to the cell?? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Review Questions:**

1. **What will happen to a houseplant of you water it with salt water (a hypertonic solution)?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. **Explain why transport proteins are needed in the cell membrane.**

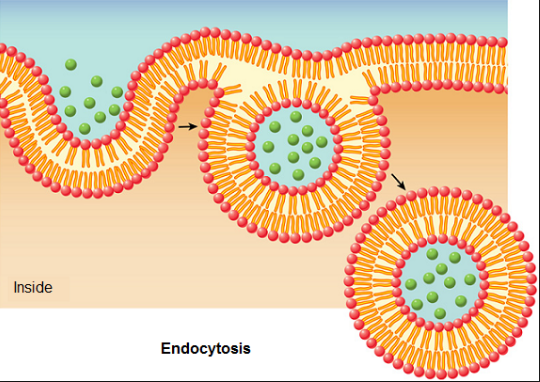
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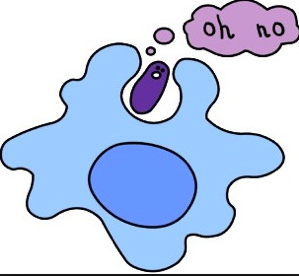
**Chapter 3 Lesson 5:**

* Active Transport
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Cells can use energy to move molecules from an area of lower concentration to an area of higher concentration. (Moving against the flow!)
  + Examples of Active Transport
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - **Endocytosis:**
      * The prefix “endo-” means “\_\_\_\_\_\_\_”
      * The cell membrane starts to fold in, forming a pocket around a substance. The pocket breaks off inside the cell, making a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?
        + Hmmm…. What is a vesicle?

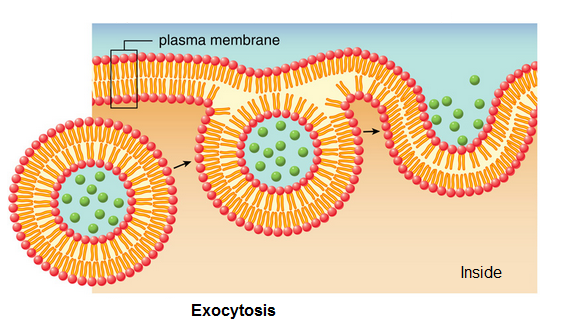
Small sacs that carry proteins and other molecules to where they are needed.



* + - * **Phagocytosis:** 
        + A special type of ­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in which the cell membrane grows out to surround large particles.



* + - * **Exocytosis:** 
        + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        + The prefix “exo-” means “­\_\_\_\_\_\_\_”
        + A vesicle surrounds materials that need to be\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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**Review Questions:**

1. **In what ways are active transport proteins similar to enzymes?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. **What might happen if a vesicles in your neurons were suddenly unable to fuse with the cell membrane?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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