CELLS - Chapter 7

7-1 Life is Cellular

1. Cell Theory

* All living things are made of \_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_ are the basic units of structure and function in living things
* New \_\_\_\_\_\_\_\_\_\_ are produced from existing \_\_\_\_\_\_\_\_\_\_\_

1. Microscopes
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ microscope** – allows light to pass through a specimen and uses two lenses to form an image
   * Magnifies to 1000x
   * Stains or dyes are used to show specific features
   * Fluorescent dies are used to tag molecules produced by cells
3. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ microscopes** – use beams of electrons that are focused by magnetic fields – can be used to see objects one billionth of a meter
   * Transmission electron microscopes – thin slices , electrons pass through the specimen - 2D image
   * Scanning electron microscopes – a pencil-like beam is scanned over the surface – makes a 3D image
4. Prokaryotes and Eukaryotes

* All cells have a **cell membrane** - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Not all cells have a **nucleus** – a large membrane-enclosed structure that contains genetic material in the form of DNA and controls many of the cells activities

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - do not have a nucleus - Typically smaller and more simple

**2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**= have a nucleus - Typically larger and more complex

- Can be unicellular or multicellular

7.2 Cell Structure – Eukaryotic Cells

- The **cytoplasm** is the fluid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

- Many cellular structures act as if they are specialized organs. These structures are known as **organelles**, literally “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.”

- The eukaryotic cell is much like a living version of a modern factory.

- The specialized machines and assembly lines of the factory can be compared to the different organelles of the cell.

- Cells, like factories, follow instructions and produce products.

A. The nucleus

1. The **nucleus** = the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * It contains most of the cell’s \_\_\_\_\_\_\_\_\_\_, the instructions for making proteins and other important molecules
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** = surrounds the nucleus
   * contains pores (holes) that allow material to go in and out of the nucleus
3. **Chromosomes** – carry the cell’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (DNA) - Found in the nucleus
4. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**– a small dense region in the nucleus
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are assembled here

B. Organelles that store, clean up, and support

**1) Vacuoles** –large saclike \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- Store water, salt, proteins, and carbohydrates

- In plants there is often 1 vacuole filled with liquid

- Also found in unicellular organisms and animals for storing and moving materials

2) **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – small organelles filled with enzymes

- Break down lipids (fats) , carbohydrates, and proteins

- Help break down \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - removes “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” from the cell

- Found in animal cells and some plant cells

3) **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – a network of protein filaments that give cells shape and internal organization

- Helps maintain cell shape and involved in movement

**4) Microfilaments** – form a framework that supports the cell and help them move

**5) Microtubules** – hollow structures made of proteins called tubulins

- are involved in maintaining cell shape and in cell division

- Also form cilia and flagella

**6) Centrioles** – located near the nucleus and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in animals (made of tubulins)

C. Organelles that build protein

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – the “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” - where proteins are assembled

* small particles of RNA and protein found throughout the cytoplasm in all cells.
* produce proteins by following coded instructions that come from DNA.
* Each ribosome is like a small machine in a factory, turning out proteins on orders that come from its DNA “boss.”

1. **Endoplasmic reticulum (\_\_\_\_\_\_\_\_)** – an internal membrane system where lipids are assembled and proteins and other materials are exported from the cell.
2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ endoplasmic reticulum (rough ER)** – the ER where \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occurs

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on its surface
* Proteins made in the rough ER can be exported out of the cell or transported to other places in the cell

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ endoplasmic reticulum (smooth ER)** – the ER where no ribosomes are found

* Contains enzymes to do tasks like making \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or detoxification of drugs

1. **Golgi Apparatus** - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ proteins and other materials from the ER for storage in the cell or transport out of the cell.

* Looks like a stack of flattened membranes
* “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” proteins to their final destination

D. Organelles that capture and release energy

1. **Chloroplasts** – capture the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and convert it into food (photosynthesis)

* Found in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and some other organisms
* “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”

1. **Mitochondria** – “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”

* convert the chemical energy stored in food into compounds easier for the cell to use
* In humans, you inherit most of your mitochondria from your \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Contain small DNA molecules which suggest they may have been descended from independent microorganisms.

E. Cellular Boundaries

1. **Cell Wall** – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Allow water, oxygen, carbon dioxide to pass through
* Found in prokaryotes and eukaryotes (NOT ANIMALS)
* Provides \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in plants (wood is made of mostly cell walls)

1. **Cell Membrane** – controls what \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and supports

* Made of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (see the next slide)
* The cell membrane is made of a double layered sheet with lipids and proteins
* The cell membrane is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – some substances are allowed to pass and some are not.

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7.3 Cell Transport

A. Passive Transport = The movement of materials across the cell membrane without using cellular energy

1) Diffusion - The process by which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from an area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to an area of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Diffusion – the process where molecules that cannot directly diffuse across the membrane pass through special \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3) Osmosis –the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ membrane

- Water moves across a membrane until equilibrium is reached

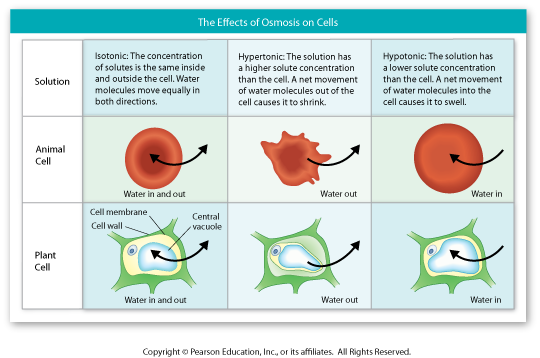
Types of Solutions

Isotonic = When the concentration is the \_\_\_\_\_\_\_\_\_\_\_ on both sides of the membrane

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = The more concentrated solution

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = The dilute solution

Osmotic pressure = the net movement of water out of or into a cell exerts a force



B. Active transport = movement of materials \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ difference (requires \_\_\_\_\_\_\_\_\_\_\_

Movement of large molecules

