

## CHAPTER 1 STUDY GUIDE

### History of Cell Research and the Cell Theory

Robert Hooke looked at a cork sample under a microscope and called what he saw “cells”

Anton van Leeuwenhoek looked at the first LIVING cells. He called them “wee animalcules”

Schleiden first said that all plants are made of cells.

Schwann first said that all animals are made of cells.

Virchow stated that cells come ONLY from other cells.

The CELL THEORY today:

*1. All living things are made of one or more cells*

*2. Cells only come from other cells*

*3. The cell is the basic unit of structure and function in all living things.* In other words, cells are not part of you, they ARE you. Whatever you do: eat, drink, breathe, go to the bathroom....You do it FOR your cells. You are alive BECAUSE your cells are alive.

### Cell Parts

Cell membrane – a flexible, selectively permeable (partly pass-through-able), covering of the cell that controls what gets in and out.

Mitochondria – the powerhouse of the cell, where the energy in glucose is released for the cell to use.

Ribosomes – The protein factories of the cell. They get instructions from the DNA carried by RNA from the nucleus into the cytoplasm

Nucleus – The control center of the cell. Contains chromosomes made of DNA (the big book of knowledge in cells) RNA carries the message from inside the nucleus to the cytoplasm

Vacuoles – The storage containers of cells. These are very large in plants and help the plant stand upright. Plants wilt when their vacuoles get emptied of water.

Cytoplasm – The gel-like substance that fills up the cell. Everything else “floats” in this. Most chemical reactions happen within the cytoplasm.

#### *PARTS FOUND IN PLANT CELLS ONLY!*

**Chloroplast** – contain chlorophyll and are the site of photosynthesis. These collect the energy from sunlight and make glucose from carbon dioxide and water

**Cell Wall** – This tough rigid structure surrounds the cell membrane. Made of cellulose, gives shape and support to the cell.

## Chemical Compounds in Cells

Cells are made up of a variety of elements and compounds. All of the following are true statements:

- Cells are made of atoms.
- Cells are made of elements.
- Cells are made of compounds.
- Cells are made of molecules.

Compounds in cells are either organic (containing carbon) or inorganic (not containing carbon).

The most important inorganic compound in cells is water. Most chemical reactions in cells only happen when stuff is dissolved in water.

### ORGANIC COMPOUNDS in Cells

CARBOHYDRATES provide energy for cells, including starches and sugars. Glucose is the main fuel for cells. Most carb's can be broken down into glucose.

PROTEINS are made of amino acids. They are building blocks for the cell. Active transport is done by transport proteins. Enzymes are proteins which speed up chemical reactions.

All LIPIDS contain lots of energy. Fats, oils, and waxes are all types of lipids. Meats, eggs, and cheeses are high in CHOLESTEROL, a lipids that makes up part of animal cell membranes.

NUCLEIC ACIDS are also organic molecules. DNA in the nucleus contains information needed to build and run a cell. It is the language of the "big book of knowledge" in cells. DNA does nothing by itself. It must be read by the "reading" nucleic acid, RNA (ribonucleic acid). RNA takes the information from the DNA in the nucleus to where it is used by the ribosomes in the cytoplasm.

### Getting in and out of cells

#### Passive Transport

Does not require energy from the cell

**Diffusion** – a substance will move from where there is more to where there is less. (like a skunk smell into your house)

**Osmosis** is the diffusion of WATER across a cell membrane. Water moves from higher to lower concentrations (think about the potato lab, in the salt water, the potato got soft and mushy because the water moved OUT of the cells)

#### Active Transport

Requires energy from the cell

Transport proteins within the cell membrane carry larger molecules into the cell

Some cells wrap themselves around an object to engulf it and take it into the cell