***CELL THEORY***

**Cells** are the basic unit of life.

**The Cell Theory** states that:

1) All organisms are made up of one or more cells and the products of  those cells.

2) All cells carry out life activities ( require energy, grow, have a limited size).

3) New cells arise only from other living cells by the process of cell division.

 ***THE THREE MAIN COMPONENTS OF ANY PLANT OR ANIMAL CELL ARE:***

**1. PLASMA MEMBRANE/ CELL MEMBRANE**

Structure- a bilipid membraneous layer composed of proteins and carbohydrates.  It is fluid like.

Function - the cell membrane separates the cell from its external environment, and is selectively permeable (controls what gets in and out).  It protects the cell and provides stability.

Proteins are found embedded within the plasma membrane, with some extending all the way through in order to transport materials.

Carbohydrates are attached to proteins and lipids on the outer lipid layer.

**2. CYTOPLASM**

Structure - The jelly-like substance composed of mainly water and found between the cell membrane and nucleus.  The cytoplasm makes up most of the "body" of a cell and is constantly streaming.

Function - Organelles are found here and substances like salts may be dissolved in the cytoplasm.

**3. NUCLEUS**

Structure - The largest organelle in the cell. It is dark and round, and is surrounded by a double membrane called the **nuclear envelope/membrane**.  In spots the nuclear envelope fuses to form pores which are selectively permeable.  The nucleus contains genetic information (DNA) on special strands called **chromosomes**.

Function - The nucleus is the "control center" of the cell, for cell metabolism and reproduction.

*THE FOLLOWING ORGANELLES ARE FOUND IN BOTH PLANT AND ANIMAL CELLS.*

**1. "ER" OR ENDOPLASMIC RETICULUM**

The Endoplasmic Reticulum is a network of membranous canals filled with fluid.  They carry materials throughout the cell.  The ER is the "transport system" of the cell.

There are two types of ER: rough ER and smooth ER.

Rough Endoplasmic Reticulum is lined with ribosomes and is rough in appearance and smooth endoplasmic reticulum contains no ribosomes and is smooth in appearance.

**2. RIBOSOMES**

Ribosomes are small particles which are found individually in the cytoplasm and also line the membranes of the rough endoplasmic reticulum.  Ribosomes produce protein.  They could be thought of as "factories"  in the cell.

**3. GOLGI BODY / APPARATUS**

Golgi bodies are stacks of flattened membranous stacks (they look like pancakes!).  The Golgi Body temporarily stores protein which can then leave the cell via vesiciles pinching off from the Golgi.

**4. LYSOSOMES**

Lysosomes are small sac-like structures surrounded by a single membrane and containing strong digestive enzymes which when released can break down worn out organelles or food.  The lysosome is also known as a suicide sac.

**5. MITOCHONDRIA**

The mitochondria are round "tube-like" organelles that are surrounded by a double membrane, with the inner membrane being highly folded.  the mitochondria are often referred to as the "powerhouse" of the cell.  the mitochondria releases food energy from food molecules to be used by the cell.  This process is called respiration.  Some cells( muscle cells)  require more energy than other cells and so would have many more mitochondria.

**6. VACUOLES**

Vacuoles are fluid filled organelles enclosed by a membrane.  They can store materials such as food, water, sugar, minerals andwaste products.

***ANIMAL CELLS ORGANELLES NOT FOUND IN PLANT CELLS:***

**CILIA AND FLAGELLA**

Both cilia and flagella are hair-like organelles which extend from the surface of many animal cells.  the structure is identical in both, except that flagella are longer and whiplike and cilia are shorter.  There are usually only a few flagella on a cell, while cilia may cover the entire surface of a cell. The function of cilia and flagella ionclude locomotion for one-celled organisms and to move substances over cell surfaces in multi-celled organisms.

***ORGANELLES AND OTHER FEATURES FOUND ONLY IN PLANT CELLS:***

**1. CELL WALL**

The cell wall is a rigid organelle composed of cellulose and lying just outside the cell membrane.  The cell wall gives the plant cell it's box-like shape.  it also protects the cell.  The cell wall contains pores which allow materials to pass to and from the cell membrane.

**2. PLASTIDS**

Plastids are double membrane bound organelles.  It is in plastids that plants make and store food. Plastids are found in the cytoplasm and there are two main types:

   **Leucoplasts** - colorless organelles which store starch or other plant nutrients.  ( example - starch stored in a potato)

    **Chromoplasts** - contain different colored pigments. The most important type of chromoplast is the **chloroplast**, which contains the green pigment chlorophyll.  This is important in the process of photosynthesis.

**3. CENTRAL VACUOLE**

The central vacuole is a large fluid-filled vacuole found in plants.