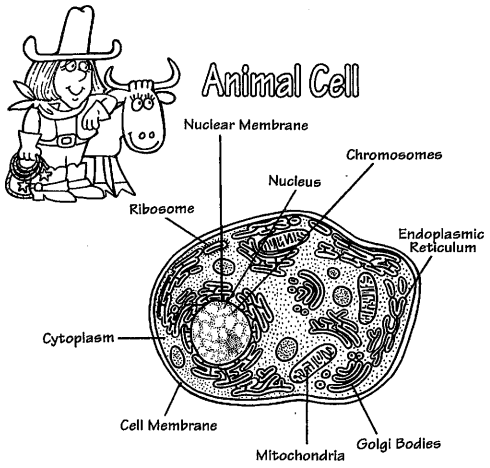
Cells: The Basis Of Life



All living matter is composed of cells. The cell is the basic structural unit of all life. All organisms are made up of cells, and all the substances of an organism are products of the cell. More than three hundred years ago an English scientist by the name of Robert Hooke (1635-1703) observed some thin slices of cork. In Hooke's report, *Micrographia*, he described what he had seen through his microscope. Hooke said that cork was a mass of "tiny cavities." Each cavity was surrounded by walls which reminded him of a bee's honeycomb, so he called these structures cells.

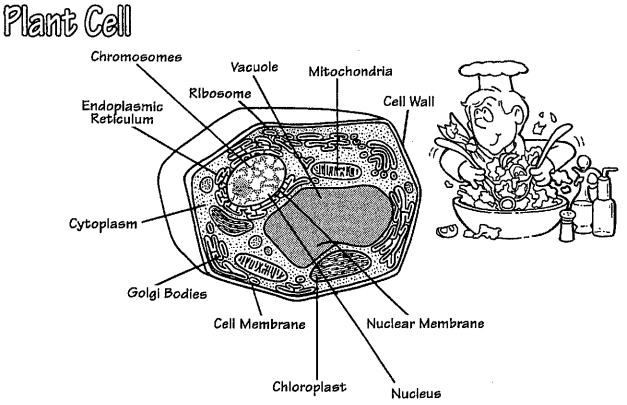
It was not until the early 1800s that the first specific ideas about cells were presented. In 1831, a British botanist, Robert Brown, observed a cell structure he called the nucleus. In 1835, a French biologist, Dujardin (Doo-Zhar-Dan), was observing living cells and found the substance we now call protoplasm. In 1839, two German biologists, Matthias Schleiden (Shly'-den) and Theodore Schwann (Shvåhn), along with the help of many other scientists, developed what we now call the "Cell Theory."

Cell Theory

1. All plants and animals are composed of cells and cell products.
2. All life functions are performed by individual cells or groups of cells. Cells are organized into *tissues* and *organs*.
3. Cells come from other cells by reproduction. All life processes require energy changes, and these changes take place at the cell level. The following are the processes that occur in living cells.

Processes of Living Cells

- ***Nutrition:*** Cells need food for energy and use it as building materials within the cells. Some cells produce their own food while others take food from the environment.
- ***Digestion:*** Foods must be broken down into simpler substances in order for the cells to use them.
- ***Absorption:*** Cells absorb water, food materials, and other materials from the environment.
- ***Biosynthesis:*** The process by which cells organize substances. Biosynthesis is necessary for growth and for the production of special substances, called enzymes, that control cell activity.
- ***Respiration:*** Chemical energy is released when certain substances in the cell are broken apart. This energy is necessary for all cell activities.
- ***Excretion:*** The process by which waste materials are passed from inside the cell to the surrounding environment.
- ***Secretion:*** When cells pass off certain substances, these substances affect the activities of other cells.
- ***Response:*** Cells respond to changes in their environment such as heat, light, and pressure.
- ***Reproduction:*** Cells split into two identical parts from time to time to produce more cells within an organism or to produce new organisms.



CELL THEORY

Cell Membrane
Location: Surrounds the animal cell and is the inside wall of the plant cell
Function: Controls movement and is a boundary that provides a limited amount of support

Cell Wall
Location: Surrounds the plant cell; does not exist in an animal cell
Function: Gives support and shape to cell

Chloroplasts
Location: Distributed throughout the cytoplasm; found only in plant cells
Function: Manufacture food in the cell by photosynthesis

Chromosomes
Location: In the nucleus
Function: Contain the code that controls the cell and they transmit heredity characteristics

Cytoplasm
Location: A jellylike material found throughout the cell
Function: Chemical reactions within the cell take place in the cytoplasm

Endoplasmic Reticulum *
Location: Distributed throughout the cytoplasm
Function: Synthesizes enzymes involved in the process of respiration

Golgi Bodies *
Location: In the cytoplasm
Function: Stores and releases chemicals in the cell

Mitrochondria *
Location: In the cytoplasm
Function: Releases most of the energy from digested foods required by the cell

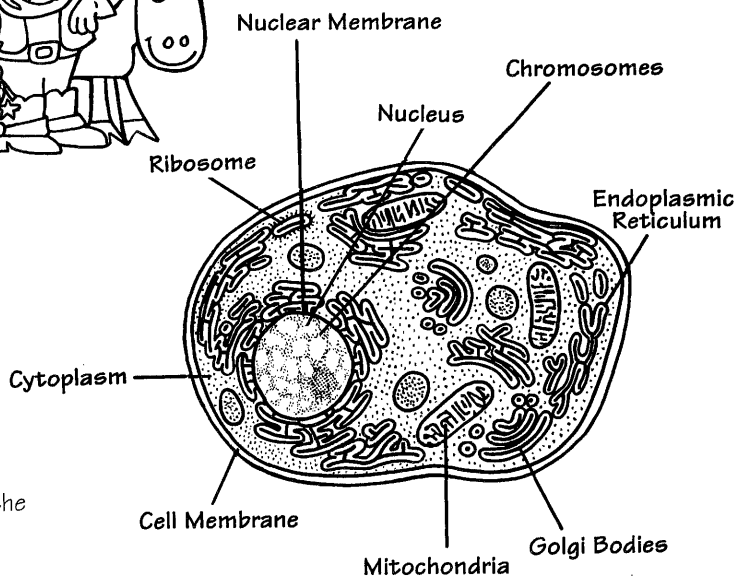
Nuclear Membrane
Location: Surrounds nucleus
Function: Allows certain substances to pass between the nucleus and the rest of the cell

Nucleus
Location: Found near the center of the cell
Function: Controls cell activities

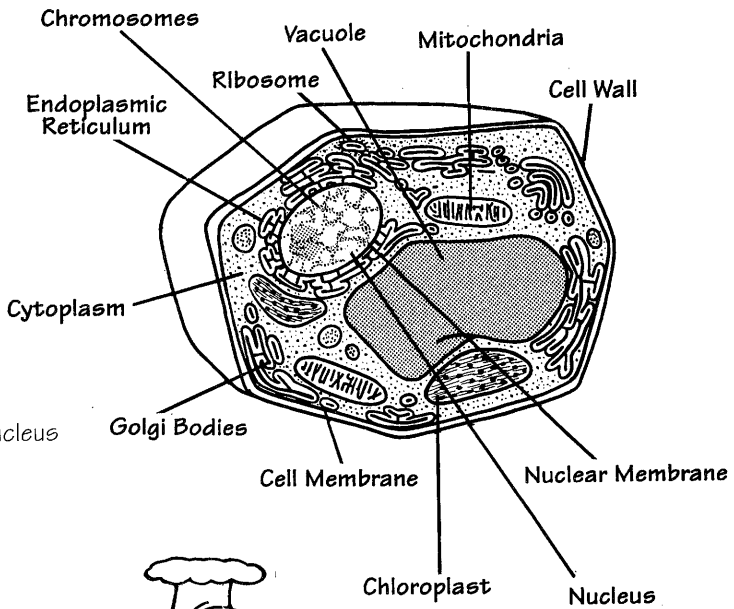
Ribosomes *
Location: On endoplasmic reticulum and in the cytoplasm
Function: Produce protein within the cell

Vacuole
Location: Distributed in the cytoplasm
Function: Stores water and other substances

Animal Cell



Plant Cell



* Do not expect to see this unless you have an electronic microscope.