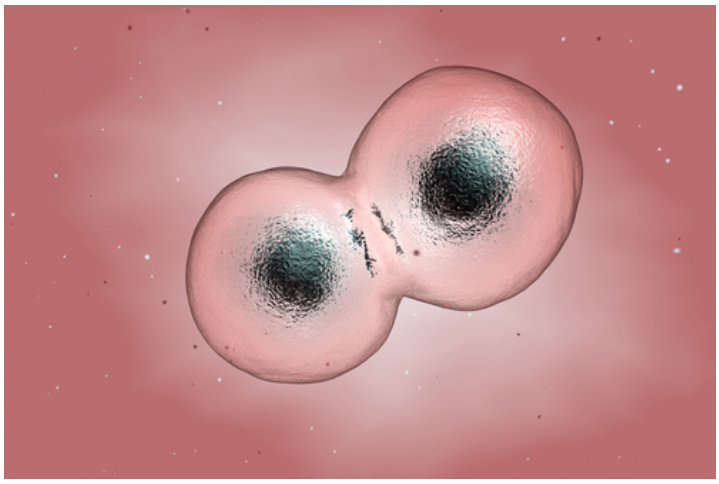
The Cell Theory



Where do cells come from?

All cells come from other cells. It was the advent of the microscope that allowed this discovery to be made. And it is one of the three basic points of the Cell Theory. This picture represents cell division, the process of one cell dividing into two cells.

The Cell Theory

Over the next two centuries after the discoveries of Hooke and Leeuwenhoek, biologists found cells everywhere. Biologists in the early part of the 19th century suggested that all living things were made of **cells**, but the role of cells as the primary building block of life was not discovered until 1839 when two German scientists, Theodor Schwann, a **zoologist**, and Matthias Jakob Schleiden, a **botanist**, suggested that cells were the basic unit of structure and function of all living things. Later, in 1858, the German doctor Rudolf Virchow observed that cells divide to produce more cells. He proposed that all cells arise only from other cells. The collective observations of all three scientists form the **Cell Theory**, which states that:

- all organisms are made up of one or more cells,
- all the life functions of an organism occur within cells,
- all cells come from preexisting cells.

Though no one point of the Cell Theory is more important than another, the theory clearly states that the functions necessary for life occur in the cell. Findings since the time of the original Cell Theory have enabled scientists to "modernize" the theory, including points related to **biochemistry** and **molecular biology**. The modern version of the Cell Theory includes:

- all known living things are made up of one or more cells,
- all living cells arise from pre-existing cells by division,
- the cell is the fundamental unit of structure and function in all living organisms,
- the activity of an organism depends on the total activity of independent cells,
- energy flow (**metabolism** and biochemistry) occurs within cells,
- cells contain hereditary information (**DNA**) which is passed from cell to cell during **cell division**,
- all cells are basically the same in chemical composition in organisms of similar species.

The Cell Theory is one of the main principles of biology. The points of the theory have been found to be true for all life. As with any scientific theory, the Cell Theory is based on observations that over many years upheld the basic conclusions of Schwann's 1839 paper. However, one of Schwann's original conclusions stated that cells formed in a similar way to crystals. This observation, which refers to **spontaneous generation** of life, was discounted when Virchow proposed that all cells arise only from other cells. The Cell Theory has withstood intense examination of cells by modern powerful microscopes and other instruments. Scientists continue to use new techniques and equipment to look into cells to discover additional explanations for how they work.