**Development of the Cell Theory**

Before 330+ years ago, there was no awareness of cells. Cells were too small to be seen. But with the invention of the microscope, a completely new world was discovered. The discoveries of scientists from the 1600s through the 1800s, using the magnificent microscope, led to the development of the cell theory, which is a unifying concept of biology.

The Cell Theory states that:

1. All living things are made up of cells.

2. Cells are the basic units of structure and function in living things.

3. Living cells come only from other living cells.

During 1595 Zacharias Janssen a Dutch lens grinder, produced the first compound microscope by combining two convex lenses.

The first description of the cell is generally attributed to Robert Hooke, an English physicist. Hooke examined very thin slices of cork under a compound microscope. He described the tiny units that make up the structure of a slice of cork and coined the term “cells” or pores. Cella is a Latin term meaning small room. He documented his work in Micrographia, written in 1665.

Anton van Leeuwenhoek, a Dutch lens maker, used a handmade microscope to observe pond scum and was therefore the first man to observe living things under a microscope. Leeuwenhoek called these tiny creatures “animalcules” and went on to conclude in a letter to the Royal Society in 1676 that these particles were living organisms. He also observed blood cells from fish, birds, frogs, dogs, and humans.

The French scientist Rene Dutrichet performed microscopic studies and concluded in 1824 that both plant and animal tissue was composed of cells.

Scientists first thought cells had only three parts: the cell membrane, the cytoplasm, and a nucleus. In 1831, the Scottish botanist Robert Brown was the first to recognize the nucleus as a crucial part of living cells.

In 1838 the German botanist Matthias Schleiden discovered that all plants were composed of cells. Then only a year later in 1839 a German zoologist, Theodor Schwann, discovered that all animals were composed of cells.

Later in 1855 a German physician named Rudolph Virchow was doing experiments with diseases when he changed the thought of cellular biology with his statement that “every cell comes from a cell.”

**Cell Theory Theater**

**Robert Hooke**

 Well hello there! My name is Robert Hooke. I was born in 1635 in England. Like many folk, I know what it is like to be poor, not having enough money to buy food, never mind go out and enjoy myself in the local pubs at night. As a young man I loved science! I had lots of questions about science, but without any proof, nobody would pay me for my ideas. Due to my passion to discover and create… not that I am bragging or anything… I left behind many contributions to science from physics and astronomy, to chemistry, biology, and geology, to architecture. Oh! And don’t forget about naval technology.

 Some of my inventions…maybe you have heard of some… include the telescope, the early microscope, an early prototype of the respirator for breathing under water, and a balance spring found in watches and clocks. I also invented equations for laws of physics and instruments related to studying the weather, such as the barometer, sometimes on my own and sometimes with other scientists. Needless to say, by the time my inventions were finally being recognized and used by others, I did not have to worry about money any more.

 To summarize a lot of my findings, I wrote a book which included some extremely detailed drawings of the flea. One important finding was about what I saw in a piece of cork when I put it under my microscope. I saw thousands of tiny, empty chambers, which looked like rooms I had seen in a monastery…you know… where monks live. Well, these rooms were called cells so I decided to use the same word to describe the small units that make up living things. Scientists after me did much more research about these ‘cells.’

**Anton van Leeuwenhoek**

 Good day! My name is Anton van Leeuwenhoeke. I was born in Holland in 1632. I began working as a tradesman, just as my parents were. They made baskets and some family members even made beer. I decided to work on making linens at first. I then decided to focus on studying science, specifically working on understanding the microscope. I made my own version of a microscope as I was curious about what was around us that I could not see with my eye. I took a sample of pond water, used my microscope and noticed many little creatures. I called them “animal-cules.” People after me apparently did not like this name so they called them single-celled organisms, which we now call microorganisms.

 After exploring pond water I was curious about other microscopic things. I was the first to record microscopic documentation of muscle fibers, bacteria, and blood vessels. Because of my hard work and my discoveries, people called me the “Father of Microbiology.” The study of cells did not stop here. More scientists came after me and further developed my findings.

**Matthias Schleiden**

 Hello! My name is Matthias Schleiden, and I was born in Germany in 1804. I first studied law when I was in my twenties. After five years of being a lawyer and got bored, so I decided to switch careers and become a botanist because I loved plants!

 Not only did I study botany, I became a professor at a university and taught about botany. While teaching was fun, I still was curious about plants, so I did research on my own as well. I enjoyed learning new things about plants that were not yet explained or discovered. Seven years passed by and I decided to share my findings from my research with other scientists. In 1838 I concluded that the different parts of plants are composed of cells. This finding became very important in the explanation of cells, known as the cell theory.

**Theodor Schwann**

 Hello, and good day to all of you. My name is Theodor Schwann, and I was born in 1810 in Germany. I studied biology and also was interested in cells. Unlike my friend Matthias Schleiden, I studied animal cells. I realized that animal cells had different properties than the plant cells that he was studying. We were having dinner one fine evening when we started to discuss our work with cells. We then realized that instead of competing with each other, if we put our ideas together about plant and animal cells, our research made more sense. Together we both recognized that membranes, nuclei, and cell bodies were common features found in both plant and animal cells.

 I had a particular interest in figuring out how digestion worked and discovered enzymes that ultimately are responsible for digestion. I discovered other muscle cells found in the esophagus which, not to brag, but are named after me.

**Rudolph Virchow**

 Hello there! Like many of you, I have a very long name, which is Rudolph Ludwig Karl Virchow, however I normally just go by Rudolf Virchow. I was born in 1821 in Germany. I too decided to try out many careers ranging from anthropology, pathology, history, biology and even politics. Despite my many career paths, I am best known for my advances in medicine and because of this, people decided to call me the “father of modern pathology.” If you were not sure, pathology means the study and diagnosis of disease.

I looked at the findings of Theodor Schwann and also the findings of another scientist and decided to take their research a step further. Ok, so between you and me, I kind of stole my friend’s ideas and beat him to publishing the findings that said that every cell originates from another existing cell like it, but let’s keep that between you and me. Oh, and if you were wondering, we are not friends anymore after he found out what I did.

What is important is that I…concluded that new cells could be produced only from the division of existing cells.