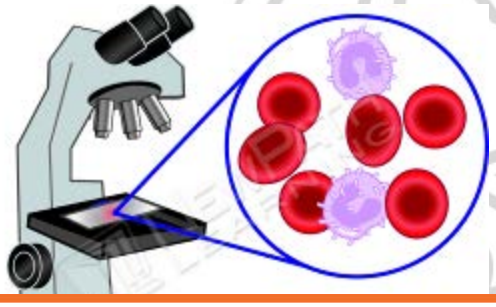
CELLS: THE BASIC UNITS OF STRUCTURE

Discovering Cells

For the majority of human history we have not been able to see things that are on a small scale. In the late 16th century, that all changed with the invention of the **microscope**.

It wasn't until almost 100 years after the invention of the microscope that Robert Hooke discovered and named the cell by looking at a thin slice of cork.



The scienti ry of cells and advan he world.

A Series of Important Discoveries

Anton van Leeuwenhoek discovered single celled organisms which he appropriately named animalcules.

Matthias Schleiden concluded that all plants were made up of cells and Theodor Schwann concluded that all animals were made up of cells. Both discoveries lead to the development of the cell theory.

The Cell Theory

The cell theory was developed in response to the discoveries of Schleiden and Schwann.

The cell theory declares that:

- Cells are produced from other living cells
- All living organisms are made up of cells, and that
- Cells are the basic building blocks of all living organisms.

Important Technologies

The **light microscope** not only makes things look larger, but it also shows the object in detail. Without good magnification and sharp resolution, the light microscope would have been useless.

Magnification is when an object is made to look bigger. **Resolution** is when an object is made to appear more clearly. An image that has sharp or high resolution is not blurry and details of the image are very clear. This is very important in scientific research.

Electron Microscope

The electron microscope was first developed in the 1930's.
An electron microscope uses a beam of incredibly small particles called electrons that bounce off of the object being magnified. The electron microscope made it possible for scientists to see very fine details at very high magnification.

Cell Str

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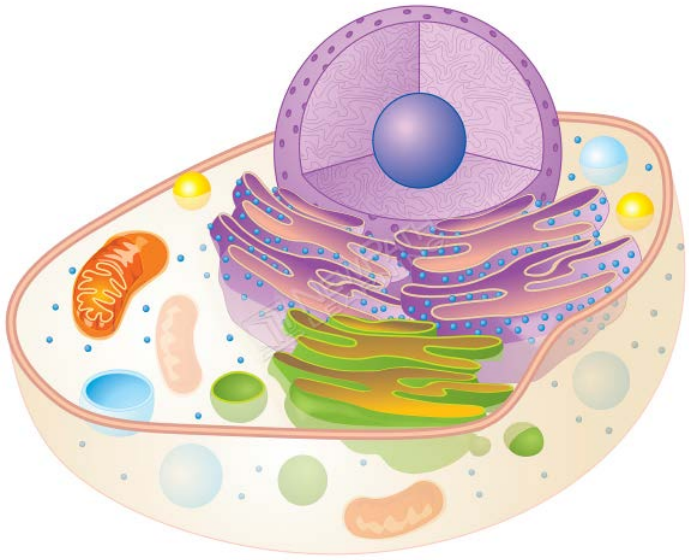
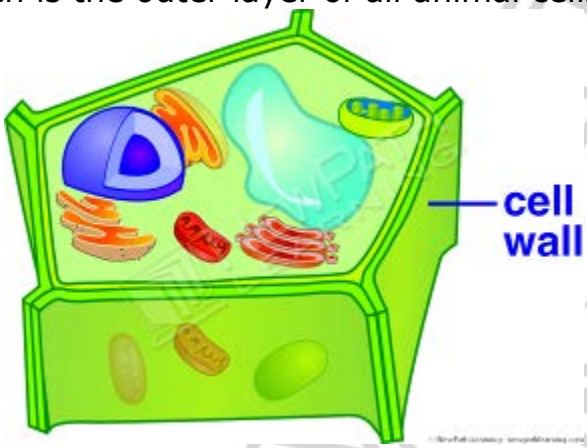
The structures within the cell are known as **organelles**, which are all of the structures within the cell that carry out specific functions.



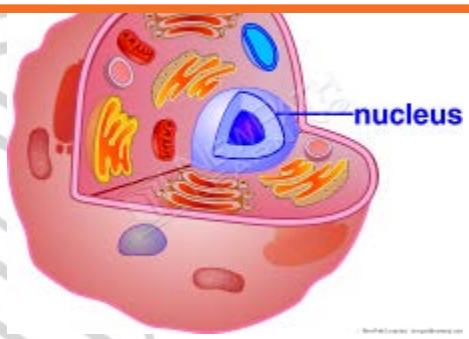
The cell's organelles

The **cell wall** is a rigid outer layer of plant cells and certain other living organisms. Inside the cell wall is a layer called the **cell membrane**, which is the outer layer of all animal cells.



There are pores all over the cell membrane where materials are brought in be looked at as the g

The **nucle** in the cell. The nucleu h houses the nucleo e genetic material th



The **cytoplasm** is a substance outside the nucleus where the cell's organelles are held. It is made almost entirely of water.

The organelles that are located in the cytoplasm are:

- The **chloroplast** captures energy from the sun and converts it into food and is only found in plant cells.
- The **endoplasmic reticulum** is the transport system that takes different materials around the cell.

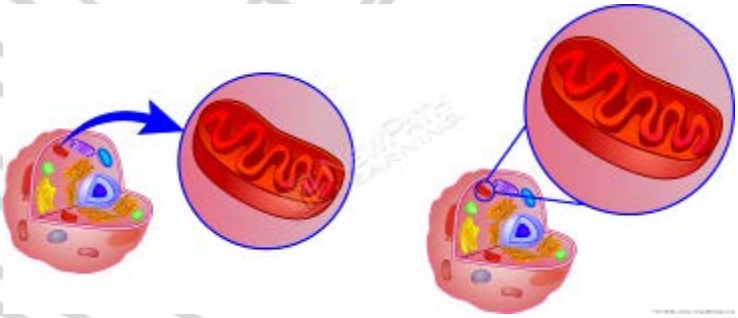
- The **Golgi bodies** direct the different materials made in the cell to where they need to go.
- The **lysosomes** break down food molecules and old cell parts to be used for energy production.
- The **mitochondria** is a rod-like structure that produces most of the energy that is used by the cell.
- The **ribosome** is an organelle that produces proteins.
- The **vacuoles** are used for storing materials from the cell.

Plant and Animal Cell Differences

Plant and animal cells are very similar with cellular structures, but vary in two major aspects.

Plant cells contain **chloroplasts** that give the cells their green color. Chloroplasts are the organelles that capture energy from the sun and convert it into food and oxygen in a process known as photosynthesis. This process is the opposite of what animal cells use. Plant cells also have a rigid cell wall.

In animal cells the **mitochondria** uses food and combines it with oxygen to produce energy and carbon dioxide. This process is known as aerobic respiration.



Lesson Checkpoint:
What are the two key differences between plant and animal cells?