Lesson 1: The History of Cell Theory

Introduction

During the Middle Ages people thought they got sick because somebody had cast a spell on them or an evil spirit was mad at them. Today we understand that disease is caused by organisms.

We are going to see how the microscope opened up a whole new world and helped scientists to write the cell theory. We will also see how the cell theory led to amazing applications such as stem cell therapy and tissue engineering.

.Objectives

After completing this lesson you will know what is:

- Explain the work of Antonie van Leeuwenhoek and Robert Hooke
- Understand how Schleiden and Schwann came to write the cell theory
- Define what biogenesis is
- Explain the experiments of Louis Pasteur
- List the three laws of the classic cell theory
- Explain why the electron microscope changed the cell theory
- Explain how the cell theory led to applications such as stem cell therapy

List of Sections

This lesson includes the following sections:

- The Microscope
- The First Cell Theory
- Biogenesis
- Modern Cell Theory
- Significance of the Cell Theory
- Think About It

Lesson 2: Structure and Function of Eukaryotes and Prokaryotes

Introduction

Do you know which type of cells are the most numerous in our bodies? Perhaps it's the skin cells? Maybe the brain or fat cells?

As a matter of fact, the most numerous cells in our bodies are not even human cells! There are more bacterial cells in our bodies than any other type of cell. We are now going to look at the basic structure of cells, the two main types of cells, and some of their functions.

Objectives

After completing this lesson you will be able to:

- Describe the basic structure of every cell.
- Explain what a prokaryote is.
- Explain what a eukaryote is.
- Know the difference between a prokaryotic and eukaryotic cell.
- Describe how the first cells evolved.
- Know the correct hierarchy of cellular organization.
- Name some of functions of cells.

List of Sections

This lesson includes the following sections:

- The Basic Cell
- Two Basic Cell Types
- Prokaryotes vs. Eukaryotes
- Evolution of Cells
- Functions of Cells

Lesson 3: Organelles of the Eukaryotic Cells – Part 1

Introduction

We know that we are made up of trillions of cells and that every single cell has a specific function.But how do the cells manage to do all the work that a human body needs?

Who or what is slaving away so that we can go for a swim, have children or just eat an ice-cream cone? The actual 'workers' are the organelles inside the cells. In this lesson and the next, we will learn about organelles.

Objectives

After completing this lesson you will be able to:

- Describe what is found in the nucleus.
- Distinguish between the rough and smooth endoplasmic reticulum (ER).
- Describe how ribosomes work with the ER.
- Describe the structure and function of the ER.
- Describe the structure and function of the Golgi apparatus.
- Explain what vesicles and lysosomes are.
- Understand how an electron microscope is used in cellular studies.
- Distinguish between transmission and scanning electron microscopes

List of Sections

This lesson includes the following sections:

Lesson 4: Organelles of Eucaryotic cells - Part 2

Introduction

In the previous lesson we saw that the endoplasmic reticulum and Golgi apparatus act as the 'shipping and distribution plant' of the cell. But where do they get the energy to carry out all of their functions? Which organelle is the 'power plant' of the cell? In this lesson we will start off by looking at the mitochondria, the cell's power plants.

We will then learn more about the organelles found in plants, the plant cell's skeleton and the structures that help cells move around. Finally, we will compare plant and animal cells

Objectives

After completing this lesson you will be able to:

- Describe the function and structure of the mitochondria.
- Review the process of photosynthesis.
- Review the structure of chloroplasts.
- Outline the function of the vacuole and explain why they are bigger in plant cells than in animal cells.
- Describe the difference between the cytosol and cytoskeleton.
- Make a list of the differences between animal and plant cells.

List of Sections

This lesson includes the following sections:

- Mitochondria
- Plant Organelles
- Plant Organelles
- Cytoplasm
- Flagella and Cilia
- Plant cells vs. Animal cells

Lesson 5: Cell membrane and cell wall

Introduction

The cell membrane is like a bouncer at a club. All the wanted guests (molecules) are allowed to come inside but the unwanted quests have to stay outside.

We are now going to learn about the structure of the cell membrane and cell wall. We will see how certain molecules are allowed to enter the cell while others have to stay outside. We will also see which kinds of molecules are wanted and how they are moved into the cell.

Objectives

After completing this lesson you will be able to:

- Describe the structure of the cell membrane.
- Understand how large and small molecules are moved over the cell membrane.
- Define terms such as active transport, passive transport and concentration gradient.
- Describe how endocytosis and exocytosis work.
- Name the components of cell walls.
- Explain the difference between cell walls and cell membranes.

List of Sections

This lesson includes the following sections:

- Structure of the Cell Membrane
- Passive Transport
- Active Transport
- Endocytosis and Exocytosis
- Cell Walls