Unit 1: Reproduction

Reproduction is the biological process by which a new organism is produced. Methods of reproduction are broadly grouped into two main types:

1. Asexual Reproduction
    - an individual reproduces without involving another individual

2. Sexual Reproduction
    - requires the involvement of two individuals

All varieties of reproduction depend on cells and cellular processes, so we will begin with a brief review of basic cell structure.

Cell Structure

All living organisms are composed of one or more cells. A typical cell consists of a **nucleus**, which directs the activities of the cell, and several **organelles**, which carry out all of the other functions (e.g. digestion, energy production). All of these structures float in a gel-like fluid called **cytoplasm**, surrounded by a **cell membrane**.

In this course, we are mostly concerned with the following structures:

1. Nucleus
    - the brain of the cell
    - contains the genetic material of the cell, called **DNA**
    - surrounded by a **nuclear membrane**

2. Cell Membrane
    - the outer covering of the cell
    - separates the contents of the cell from the environment
    - controls what can move into or out of the cell (e.g. food and waste products)

3. Cell Wall
    - only found in plant cells
    - a rigid outer covering, located outside the cell membrane
    - provides structure and support to the cell

4. Cytoplasm
    - a jelly-like fluid
    - all of the various organelles float in this material

Chromosomes and Genes

All of the genetic material in a cell is contained on our **chromosomes**. Each chromosome is a single long DNA molecule. Each molecule of DNA contains as many as a thousand **genes**. A gene is a segment of our DNA that provides the instructions for making proteins (these proteins, in turn, determine the various traits we have, like hair or eye color).

The Cell Cycle

Discussion questions:

1. How many cells do you think your body has?

2. Why does your body need to have lots of cells?

3. Each of us began as a single cell. How did that single cell develop into a body with more than a trillion cells?

The production of the trillions of cells that make up the human body is accomplished by many, many repetitions of a cycle called the **cell cycle**. In this cycle, one cell gives rise to two cells, each of which in turn gives rise to two cells, etc. (1, 2, 4, 8, 16…)

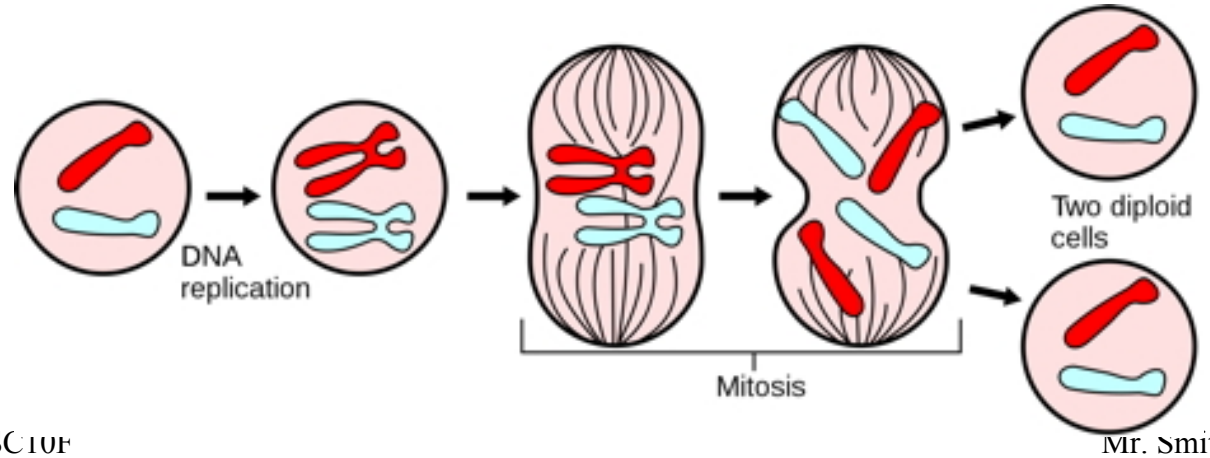
The cell cycle can be divided into two parts: **interphase**, during which the cell grows, and **mitosis**, during which the cell splits itself into two new cells.

The two new cells that come from the division of one cell are called **daughter cells**. Each of the daughter cells needs to have a complete set of chromosomes.

4. How does each daughter cell get a complete set of chromosomes?

In each repetition of the cell cycle, the cell first makes a copy of the long strand of DNA in each of the chromosomes. This is called **DNA replication**.

After the DNA strand in each chromosome has been copied, the cell undergoes a type of cell division called **mitosis**. Mitosis carefully separates the two copies of each chromosome to opposite ends of the dividing cell, so each daughter cell ends up with a complete set of chromosomes.



Homework
By referring to page 12 in your textbook, label the diagrams of plant and animal cells provided by your teacher. These diagrams will be handed in for marks next class.