

BSCS Biology - An Ecological Approach

Chapter 5 - The Cell

Introduction

All living things are composed of small units of life called **cells**. Cells are complex active and reproducing units of life. The concept that cells are the basic unit of life is known as the cell **theory**. There are two basic groups of cells. They include **karyotic** (bacteria) and **eukaryotic** (the vast majority of all living things).

The Microscope and Cell Discovery and Description

The invention and development of the light microscope led to the discovery, description and ongoing understanding of the cell. Microscope improvements and refinements, including the powerful electron microscope are still used to study cells and cell systems in living organisms.

The Makeup of Cells

Individual cells are made up of many smaller parts called **organelles**, each with a specific function as follows:

- **nucleus** - serves as the “brain” of the cell and contains genetic material including DNA
- **ribosomes** - serve to manufacture proteins
- **chloroplasts** - (plants only) contain chlorophyll necessary for photosynthesis
- **cell membrane** - controls the movement of substances in and out of cells
- **cell wall** - (plants only) provides support

The Cell Cycle

Cells live and reproduce in a continuous cycle. The majority of time is spent in **interphase** between **mitosis** (the division process). All cells come from preexisting cells through the replication process known as **cell division**.

Cell Activities

All cell activities require energy to carry on the life processes. **Energy** is transferred, stored, and released. Substances enter and leave the cell through the cell membrane in the process of **diffusion** and/or **active transport**. Materials move from an area of greater to lesser concentration through the cell membrane (diffusion). Often energy is needed to “force” movement of materials (active transport). Cells reproduce through a continuous duplication process called **mitosis**. These are the steps of mitosis in the cell:

- **prophase** (pro=first) Chromosomes rearrange themselves and become more visible.
- **metaphase** (meta=change) Chromosomes move to the center of the cell and line up.
- **anaphase** (ana=up) Chromosomes move to the opposite ends of the cell.
- **telophase** (telo=end) Chromosomes reach opposite ends of the cell while organelles duplicate as two new cells form.

Cell Specialization

The complexity of life is due to the **specialization** of cells. As organisms reproduce and grow, individual cells become specialized through a **predetermined** process. **Cancer** is a term given to cells in which this process is disrupted or and cells undergo **abnormal**, often harmful, growth. This can often result in cell and organism death.