

01: The Science of Biology

Key Terms

- **Science:** the investigation, explanation, and prediction of nature.
- **Biology:** the science of life.
- **Cell:** the building unit for all living organisms, performing basic metabolism functions.
- **Reproduction:** the process of producing offspring.
- **Homeostasis:** the state of keeping a stable, internal environment.
- **Genetic Code:** the largest group of living organisms that share: Monera, Protista, Fungi, Plantae and Animalia.
- **Hypothesis:** a testable explanation of natural events.
- **Experiment:** a test of a hypothesis.
- **Control:** a group in an experiment which is the normal situation.
- **Data:** recorded observations.
- **Conclusion:** a decision of whether a hypothesis is correct or wrong.
- **Theory:** a hypothesis that has been proven many times.
- **Metric System:** a standardized measurement system.
- **Light Microscope:** a microscope which uses light beams for magnification.
- **Specimen:** an object of interest for a microscope.
- **Ocular Lens:** the eyepiece of a light microscope.
- **Objective Lens:** the magnification lens directly above the specimen in a light microscope.
- **Electron Microscope:** a microscope which uses electron beams for magnification.
- **Transmission Electron Microscope:** an electron microscope which gives magnified images.
- **Scanning Electron Microscope:** an electron microscope which can produce three-dimensional images.

The Scientific Method

Asking A Question:

- Observations
- Interest in the what, when, where, why/how

Developing A Hypothesis:

- Observations
- Educated Guessing

Designing An Experiment:

- Using controls.
- Testing a hypothesis

Collecting Data:

- Recording Observations

Forming A Conclusion:

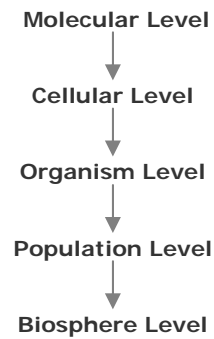
- Determining if data support hypothesis
- Forming new hypotheses/experiments

What Is Life

Characteristics of living things:

- **Organization:** all living things are organized into cells.
- **Energy use:** all living things need energy for support.
- **Growth:** all living things grow and develop.
- **Reproduction:** all living things should be able to reproduce.
- **Response to stimuli:** all living things can respond to internal or external stimuli.
- **Homeostasis:** all living things have the ability to maintain a relatively stable internal environment—self-regulation.
- **Genetic Code:** all living things are based on a universal genetic code.

Studying Biology At Various Levels



Branches of Biology

- **Anatomy:** The study of the structure and organization of lives.
- **Biochemistry:** The study of the chemical basis of life.
- **Botany:** The study of plant life.
- **Cell Biology:** The study of cell structure, cell cycle, cell function etc.
- **Community Ecology:** The study of populations of organisms interacting with the environment.
- **Development Biology:** The study of how an individual organism grows and develops.
- **Ecosystem Ecology:** The study of the flow of energy and matter through ecosystems.
- **Evolution:** The study of how organisms acquire and inherit traits from their ancestors.
- **Genetics:** The study of the inheritance at various levels (molecular, cellular, individual, population, etc).
- **Histology:** The study of the thin sections of tissues under a microscope.
- **Marine Biology:** The study of ocean life.
- **Microbiology:** The study of microorganisms including virus, bacteria and some simple fungi.
- **Molecular Biology:** The study of how bio-molecules interact with each other, particularly the molecules involved in transmission and translation of genetic information.
- **Population Ecology:** The study of a group of organisms interacting with each other.
- **Physiology:** The study of the mechanical, physical, and biochemical functions of living organisms.
- **Population genetics:** The study of gene variations and ratios among populations.
- **Taxonomy:** The study of classification of all living things.
- **Zoology:** The study of animal life.

Tools Of Biological Study

The Metric System:

- Standardized measurements
- Kilograms, meters, seconds, Celsius, Joules.

Microscopes:

- Light Microscopes
- Electron Microscopes

Laboratory Tools:

- Centrifugation: separation of a mixture by spinning.
- Antibiotic Plates: testing for sensitivity.
- Sterile Technique: prevention of contamination