

## **Definition of Biology:**

Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution, and taxonomy. The word biology is derived from Greek origin: Bios means life and logos means science or the study of living things.

## **Importance of Biology:**

The many branches of biology have much to tell us about what the human body is made up of, how it works, and how it's affected by what we eat, the air we breath, and every other aspect of the world around us. It can help us prevent, cure, and even eliminate disease.

## **The importance of biology:**

- Improved understanding on functions of organisms.
- Improved understanding on causes of disease.
- Finding treatment for diseases.
- Improved understanding on ecology.
- Better management on environment problems.
- Improved quality and production of food.

## **The Seven Characteristics of Living Things:**

- living things : All animals , plants, bacterium, Protista, fungus are living things. If something is living it will carry out all of the seven activities.
- Non-living things: Sand, wood and glass are all non-living things.

1. Feeding: All living organisms need to take substances from their environment to obtain energy, to grow and to stay healthy.

## **Lect. 1 Medical and Oral Biology Assist. Lecturer: Baneen Hayder**

2. Movement: All living organisms show movement of one kind or another. All living organisms have internal movement, which means that they have the ability of moving substances from one part of their body to another.
3. Breathing or Respiration: All living things exchange gases with their environment. Animals take in oxygen and breathe out carbon dioxide.
4. Excretion: Excretion is the removal of waste from the body. If this waste was allowed to remain in the body it could be poisonous. Humans produce a liquid waste called urine. We also excrete waste when we breathe out. All living things need to remove waste from their bodies.
5. Growth: When living things feed they gain energy. Some of this energy is used in growth. Living things become larger and more complicated as they grow.
6. Sensitivity: Living things react to changes around them. We react to touch, light, heat, cold and sound, as do other living things.
7. Reproduction: All living things produce young. Humans make babies, cats produce kittens and pigeons lay eggs. Plants also reproduce. Many make seeds which can germinate and grow into new plants.

### **All these characters can be Summarized in:**

- 1) Degree of orderliness.
- 2) Ability to respond to stimuli.
- 3) Capacity to grow, develop and reproduce by using hereditary molecules.
- 4) Possession of regulatory processes, which control and coordinate life functions.

## **Branches of Biology**

■ Biology can be divided into two major fields: zoology and botany. Zoology deals with animals, while botany deals with plants. Each of these major fields includes different life sciences, such as:

- **Morphology:** A branch of biology that deals with form and structure of animals and plants. Such study on the cellular level is known as cytology. On tissue level, it is known as histology.
- **Embryology:** The study of formation and development of embryo.
- **Anatomy:** study of the animal form, particularly human body.
- **Biotechnology:** applied science that is concerned with biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.
- **Cell biology:** the study of cells at the microscopic or at the molecular level. It includes studying the cells' physiological properties, structures, organelles, interactions with their environment, life cycle, division and apoptosis.
- **Ecology:** the scientific study of the relationships between plants, animals, and their environment.
- **Immunobiology:** a study of the structure and function of the immune system, innate and acquired immunity, the bodily distinction of self from non self, and laboratory techniques involving the interaction of antigens with specific antibodies.
- **Microbiology:** the branch of biology that deals with microorganisms and their effects on other living organisms.
- **Molecular Biology:** the branch of biology that deals with the formation, structure, and function of macromolecules essential to life, such as nucleic

acids and proteins, and especially with their role in cell replication and the transmission of genetic information.

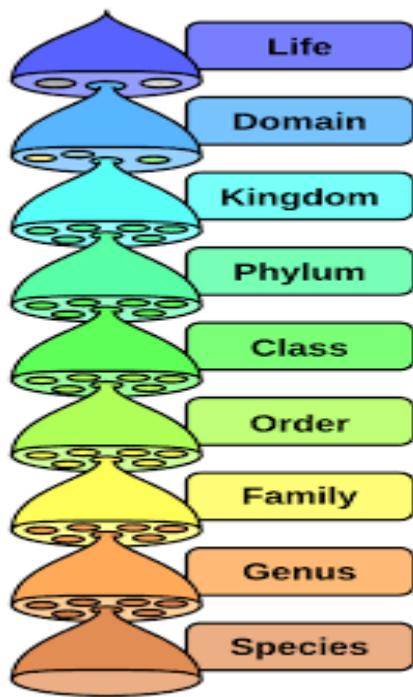
- **Mycology:** the study of fungi.
- **Parasitology:** the study of parasites and parasitism.
- **Pathology:** the study of the nature of disease and its causes, processes, development, and consequences.
- **Pharmacology:** the study of preparation and use of drugs and synthetic medicines.
- **Physiology:** the biological study of the functions of living organisms and their parts.
- **Toxicology:** the study of how natural or man- made poisons cause undesirable effects in living organisms.
- **Virology:** study of viruses.
- **Zoology:** The branch of biology that deals with animals and animal life, including the study of the structure, physiology, development, and classification of animals.
- **Genetics:** A branch of biology that deals with the heredity and variation of organisms.

## **Importance of biology:**

- **Taxonomy:**

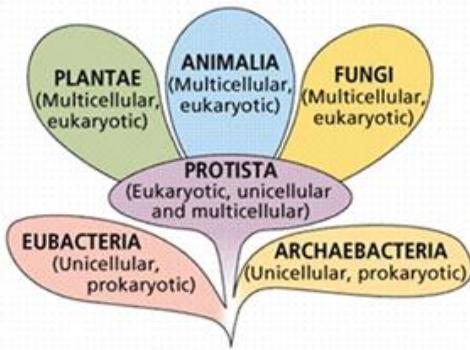
Is the science of defining groups of biological organisms on the basis of shared characteristics and giving names to those groups. Organisms are grouped together into taxa (singular: taxon) and given a taxonomic rank; groups of a given rank can be aggregated to form a super group of higher rank and thus

create a taxonomic hierarchy. Species are arranged in a hierarchical system in which genera are grouped into families, families into orders, orders into classes, classes into phylum (alternatively called division in plants, fungi and bacteria), phyla into kingdoms, kingdom into domain. The following figure shows the hierarchical system used in classifying organisms.



The earliest classification system recognized only two kingdoms (plants and animals). As biologists discovered microorganisms and learned more about other organisms, the number of kingdoms increased. Biologists now use their, six- kingdom system, which included two of prokaryotes and four kingdoms of eukaryotes.

### 6 Kingdom Classification

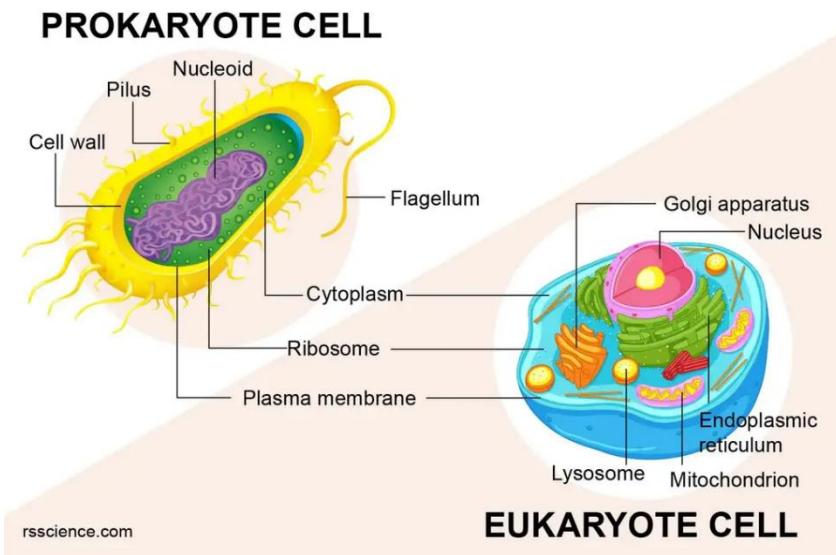


- **Prokaryotes**

Are organisms without a cell nucleus or any other membrane-bound organelles. Most are unicellular, but some prokaryotes are multicellular.

- **Eukaryotes**

Are organisms whose cells are organized into complex structures by internal membranes and a cytoskeleton. The most characteristic membrane bound structure is the nucleus.



**Comparative between prokaryotic cell and eukaryotic cell**

| <b>Prokaryotic cell</b>                     | <b>Eukaryote</b>   |
|---|--|
| Small cell                                  | Larger cell  |
| Always unicellular                          | Often multicellular  |
| No nucleus or any membrane bound organelles | Always have nucleus or any membrane bound organelles         |
| DNA circular , without proteins             | DNA is linear and associated with proteins to form chromatin |
| Ribosomes are small 70s                     | Ribosomes are large 80s                                      |
| No cytoskeleton                             | Always have cytoskeleton                                     |
| Cell division is by binary fission          | Cell division is by meiosis and mitosis                      |
| Reproduction is always asexual              | Reproduction is sexual and asexual                           |