

CLASS XI BIOLOGY NOTES

CHAPTER – 1: LIVING WORLD

Biology is the science of life forms and living processes. The living world comprises an amazing diversity of living organisms. In order to facilitate the study of kinds and diversity of organisms, biologists have evolved certain rules and principles for identification, nomenclature and classification of organisms. The branch of biology dealing with these aspects is referred to as Taxonomy.

Life is a characteristic that distinguishes objects that have signaling and self-sustaining processes from those that do not, either because such functions have ceased (death), or else because they lack such functions and are classified as inanimate. Biology is the science concerned with the study of life.

Characteristics features of Living things / Differences between living and non-living things:

- a) **Growth**- Living organisms grow in mass and number. Living organisms show internal growth due to addition of materials and formation of cells inside the body. Non living organism like mountains, boulders, crystals also grow but due to addition of similar materials to their outer surface. Growth, therefore, cannot be taken as a defining property of living organisms.
- b) **Reproduction** - Many organisms like mules, sterile worker bees, infertile human couples do not reproduce. Therefore, reproduction is not an all-inclusive characteristic of living organism. However, no nonliving object has the power to reproduce or replicate.
- c) **Metabolism**- The sum total of all types of chemical reactions occurring in an individual due to specific interactions amongst different types of molecules in the interior of cells is called metabolism. All activities of an organism including growth, movements, development, reproduction etc. are due to metabolism. There are two types of metabolism- Catabolism and Anabolism. Anabolism includes all the building up reactions to increase the mass of the organism like photosynthesis. In catabolism breakdown reactions are involved, such as respiration, digestion etc. no nonliving object show metabolism. An isolated metabolic reaction(s) outside the body of an organism, performed in a test tube is neither living nor non-living. Hence, while metabolism is a defining feature of all living organisms without exception, isolated metabolic reactions in vitro are not living things but surely living reactions. Hence, cellular organisation of the body is the defining feature of life forms.
- d) **Response to stimuli**- It is the awareness of the surroundings and responding to external stimuli. External stimuli may be physical, chemical or biological. Plants also responds to stimuli like light, water, gravitation, pollution etc. All living organisms prokaryotic to eukaryotic responds to different kinds of stimuli. Human being is only organism who is aware of himself. Consciousness therefore, becomes the defining property of living organisms.

Biodiversity: is the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.

Range of organisms present on earth (1.7 – 1.8 million)

Identification: Comparing similarities and differences with already known ones.

Nomenclature: Naming of organisms. The names are unique and universal.

Rules for nomenclature are provided by;

- a) ICBN – International Code for Botanical Nomenclature
- b) ICZN – International Code for Zoological Nomenclature

Binomial Nomenclature:

Carolus Linnaeus – Father of Taxonomy

Name with two parts: - Generic name (**Genus**) & Specific epithet (**Species**)

Guidelines and Principles for Nomenclature:

- a) It should be in Latin / derived from Latin.
- b) If it is written in Italics when types and underlined when handwritten.
- c) It contains two parts, first word is Genus ; second word is Species.
- d) Genus name starts with Capital while species name starts with small letters.
- e) Name should be short, precise & easy to pronounce.
- f) Name of the author is written in an abbreviated form after the species name. Ex.
Mangifera indica Linn.

Example:

Mangifera indica (Mango)
Homo sapiens (Human)
Panthera pardus (Leopard)
Felis domestica (Cat)

Classification – It is the process by which anything is grouped into convenient categories based on some easily observable characteristics. Classification makes the study of organisms convenient. (Category – taxa).

Taxonomy - The process of classification on the basis of external and internal structure along with internal structure of cell, development process and ecological information is known as taxonomy.

Systematics- Different kinds of organisms and their relationships Linnaeus – *Systema Naturae* (evolutionary relationships among organisms).

Taxonomical Hierarchy– Similarities decreases/ Differences increases.

1. **Species** -Species are the natural population of individuals or a group of population which resemble one another in all essential morphological and reproductive characters so that they are able to interbreed freely and produce fertile offspring.
Ex. - *Panthera leo*, *Panthera pardus*, *Panthera tigris*.
2. **Genus**-it is a group of related species which resemble one another in certain correlated

characters. All species of genus presumed to have evolved from a common ancestor. Lion, Tiger, Leopard are closely related species and placed in same genus
Ex. - Panther. Panthera (Lion, Leopard, Tiger)

3. **Family**- is a taxonomic category which contains one or more related genera. All genera of a family have some common features or correlated characters. Family Solanaceae contains a number of genera like Solanum, Withania, Datura etc
Ex.-Panthera and Felis together into Felidae
4. **Order** - This category includes one or more related families. Families felidae and canidae are included in same order carnivore, Felidae (cat family), Canidae (dog family) - Carnivora
5. **Class** - A class is made of one or more related orders. Carnivora (tiger, cat, dog), Primates (monkeys) - Mammalian
6. **Phylum/Division** - The term phylum is used for animals while division is used for plants Pisces, Amphibian, Reptilian, Aves & Mammals
7. **Kingdom** - It is the highest taxonomic category. All plants are included in the kingdom Plantae while all animals belong to kingdom Animalia.

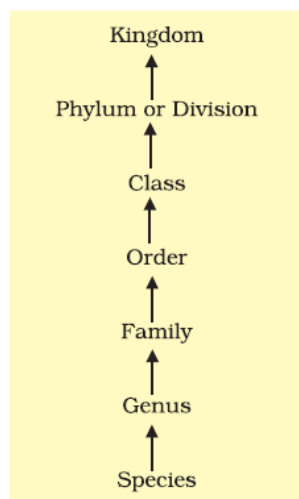


TABLE 1. Organisms with their Taxonomic Categories

Common Name	Biological Name	Genus	Family	Order	Class	Phylum/ Division
Man	<i>Homo sapiens</i>	<i>Homo</i>	Hominidae	Primata	Mammalia	Chordata
Housefly	<i>Musca domestica</i>	<i>Musca</i>	Muscidae	Diptera	Insecta	Arthropoda
Mango	<i>Mangifera indica</i>	<i>Mangifera</i>	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae
Wheat	<i>Triticum aestivum</i>	<i>Triticum</i>	Poaceae	Poales	Monocotyledonae	Angiospermae
