CHAPTER 1

THE LIVING WORLD

Topics Discussed

- Introduction
- What is 'Living'?
- Characteristic of Living Beings
- Diversity in the Living World
- Taxonomy and Systematics
- Nomenclature
- Taxonomic Categories
- Taxonomical Aids

1. Introduction

Living: As soon as the name strikes we have a number of organisms floating in our imagination. How wonderful the nature is to show such a huge diversity on one planet! The variety in living world is unique and interesting to study. Living organisms are present all over the earth in oceans, forests, sea, river, mountains, underground soil, damp places etc. some of the areas where they live is common and obvious habitat, however we find them in extreme conditions also ranging from high temperatures, hot springs and volcanos to ice and glaciers.

Figure 1.1: Jelly fish in ocean

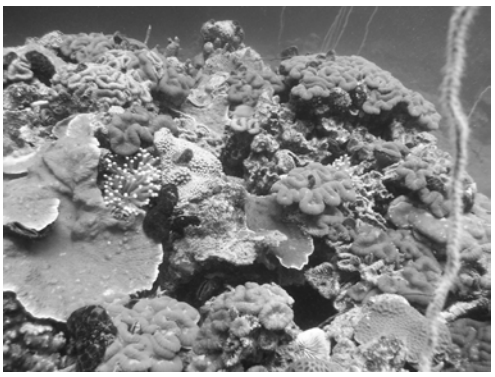
A  B 

Figure 1.2: Microorganisms on volcano and inside the ocean. A - Volcano and B - Ocean

All these organisms together contribute to make the world a beautiful and active place to dwell for e.g., in a garden the herbs, plants, shrubs and trees along with butterflies, honey bees, birds make a best relaxing place.

The ecological conflict and understanding between the members of one society and members of different society or even the molecular world in a cell indicate the unique creation – what the actual life is? This question further arises two questions. The first is a technical one which seeks answer to what is living against the non-living, and the second is a philosophical one, which seeks answer to what is the purpose or reasonfor that life. Our major concern will be on what is living and least on why is one living?

Figure 1.3: Honey bee on a flower collecting nectar in a garden

The world of organisms is so very big that some of the places are termed as over populated with high number and kind of organisms. These organisms include plants, animals, insects, birds, shrubs and microbes. We have thousands of plants and animals that we are dependent on and we use them very often. All these plants and animals are not of the same structure and shape. Even their internal body structure is different. As we are dependent on almost all of the organisms directly or indirectly, we need to group them together so that just a bunch includes several similar organisms. This will make easy for the study of all the organisms in short.

Objectives of this Chapter

At the end of this chapter, you will be able to:

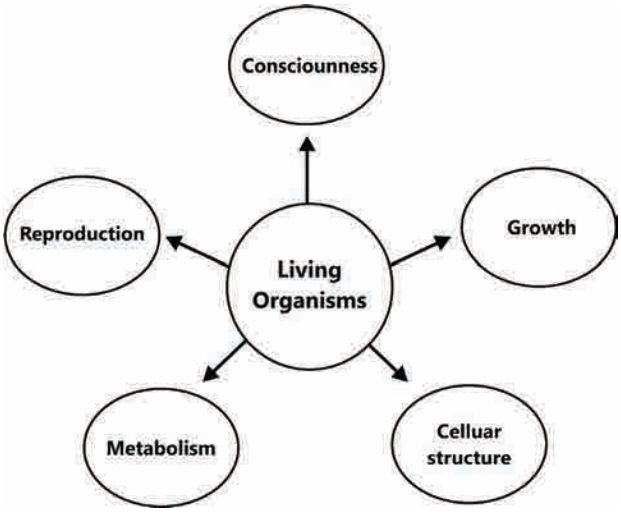
- Evaluate the reason behind classification.
- Identify the taxonomical systematics.
- Describe the hierarchy.
- Explore taxonomical aids.

2. What is 'Living'?

Living has many definitions depending on the organism's use and body structure. We have some check list for classifying the organism as living. Some of the most important are Growth, reproduction, sense ability towards environment and response production ability in regards to that environment factor. All these features strike our thought immediately as these are the unique features of almost all the living organisms. Some important characteristics in respect to the living world are metabolism, replication or cloning, well managed and organised, respond towards environment and habitat and act accordingly. We will understand all of this.

3. Characteristic of Living Beings

What do you mean by characteristic of the living beings? There is a line between living and non-living which includes special features for each of them. Living organisms as a whole have certain unique and basic characteristic that sets them apart from non-living world.

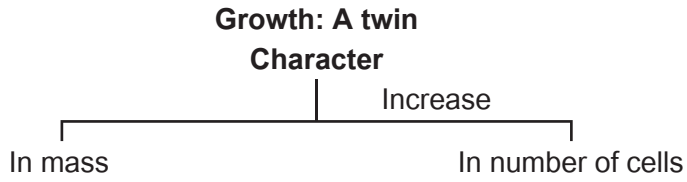


Flowchart 1.1: Characteristics of Living organisms

Figure 1.4: Various Living organisms

3.1. Growth

This is a common and unique feature of all the living organisms.Growth is observed in twin characters of increase in mass and increase in number of individuals.



Flowchart 1.2: Growth and its features

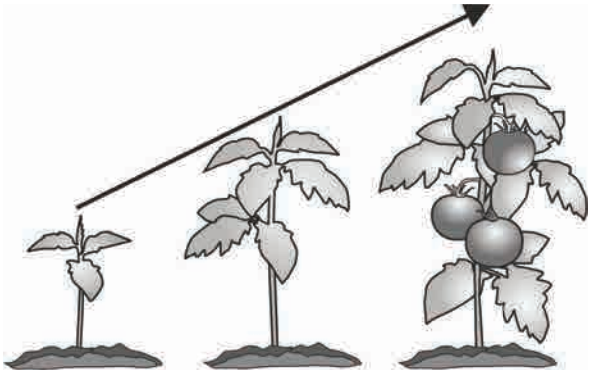


Figure 1.5: Growth of a plant in terms of its size

Any multicellular organism will grow by cell division of parent cell. Plants grow continuously throughout their life by cell division. Even animals grow with cell division till a certain age, then cell division is just to repair the wear and tear of the body. Cell division is growth as well as multiplication factor in unicellular organisms. This cell division as growth factor is visible in in-vitro culturing of tissues. Higher multicellular organisms grow and multiply mutually. Growth of an organism is clearly visible from its body mass. Mountains, boulders and sand mounds do grow which indicates that non-living world also increase in mass. However, this kind of growth which is exhibited by non-living objects does not classify them in living and this is by accumulation of similar material on their surface. Living organisms grow from inside their body. Growth property alone cannot define living organisms. To understand growth as a feature of living organisms the conditions under which growth is observed has to be clear.Then we understand that growth is a characteristic of living world. Simply, an organism which is now dead does not grow.

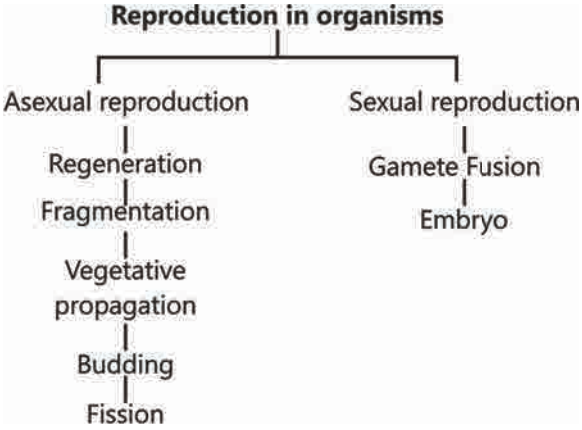
Growth in cells occurs due to synthetic property of cell to produce protoplasmic and non-protoplasmic or apoplasmic substances. Protoplasmic substances are living components used by the cell like – cytoplasm, nucleus, organelles, etc. while apoplasmic substances are non-living parts like chemicals, gases which are used by cell and then thrown out of the cell.

3.2 Reproduction

Reproduction is a major distinguishing characteristic of living organisms. Multicellular organisms reproduce to generate progeny having similar features of parents. Specifically and implicitly we are discussing about sexual reproduction though organisms reproduce by asexual methods also. Fungi produce asexual spores which spread nearby and give rise to new fungi. Yeast and *Hydra* multiply by separation of their new bud from themselves which grows into new organism called as budding. *Planaria* (flat worms) have special characteristics of regenerating lost parts of the body by fragmentation and the process is called as true

regeneration. The fungi, the filamentous algae, the protonema of mosses, use fragmentation as reproductive feature. Unicellular organisms like bacteria, algae or *Amoeba* reproduce and grow synonymously, i.e., increase in number of cells is indication of growth as well as reproduction. Hence, single-celled organisms have growth and reproduction at the same time and is a combined feature.

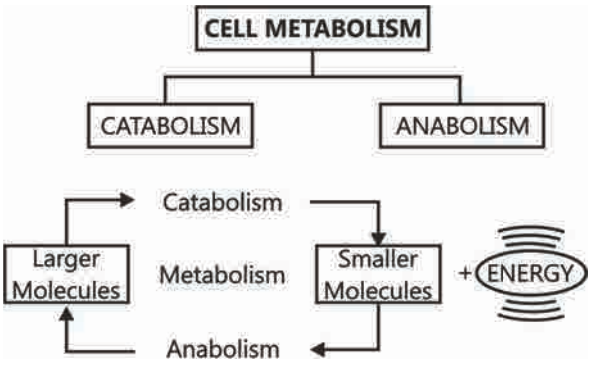
Reproduction is not the fixed feature of organisms as there are organisms that do not multiply (mules, sterile worker bees, infertile human couples, etc.). Non-living things do not reproduce though reproduction alone cannot be used to define an organism as living.



Flowchart 1.3: Various modes of reproduction

3.3 Metabolism

Life shows metabolism inside the organism's body. All living organisms are made of organic components called as biomolecules. These chemicals, can be small or big, classified in various classes, sizes, functions, etc. These chemicals are constantly produced and modified in the cell. The modification is due to number of reasons and help of other chemicals resulting in a metabolic reaction or biochemical reaction. There are several metabolic reactions which occur simultaneously in a cell in all living organisms, including all unicellular and multicellular ones. The sum total of all the chemical reactions that occur in our body is called as metabolism. Metabolism is not observed in non-living world. This does not mean that metabolism is observed in body of the organisms. This metabolic reactions can be forced to take place in systems similar to body but outside the body in cell-free systems. Such a forced metabolic reaction(s) outside the body of an organism, is carried in a test tube which creates body environments and 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.



Flowchart 1.4: Types of Cell metabolism

3.4 Cellular Structure

Cellular organisation of the body is the characteristic which can be defining feature of life forms. Conceivably, the most obvious and scientifically complicated feature of all the living organisms is the presence of cell in their body. Unicellular body is made of single cell that performs all the functions of the organism. Multicellular organisms are made of many cells which are differentiated into specific group performing their defined functions. Cells as a whole are made of simple common organelles and chemicals. These cells unite to form and perform organism and its functions respectively.

3.5 Consciousness

The ability of living organisms to sense their surroundings or environment and respond to these environmental stimuli (physical, chemical or biological) is called consciousness. The sense of our environment is through our sense organs in the body and response type changes from organism to organism. Plants respond through their growth pattern and locomotory movements to external factors like light, water, temperature, other organisms, pollutants, etc. All organisms on the planet, be it prokaryotes or the most complex eukaryotes, sense and respond to environmental stimuli. All organisms have their body structure in a way to deal with the chemicals that enter their bodies. Living organisms therefore, are 'aware' of their surroundings. Consciousness thus is the defining property of living organisms. Human beings have more difficultly to define the living state. For e.g., there are patients in coma lying in hospitals which are supported by machines that replace heart and lungs as the patient is brain-dead. Thus he lacks no self-consciousness and response to stimuli. There are patients who never turn up to lead a normal life.

KNOWLEDGE BUILDER

Misconception

Photoperiod affects reproduction in seasonal breeders, both plants and animals.

Human being is the only organism who is aware of himself, i.e., has self-consciousness.

Later in the education, you will learn about underlying interactions between all living phenomena. Tissue properties are a result of the interactions among the constituent cells and not present in the individual cell. Similarly, cellular organelles work together due to the interactions between them and are not present in the molecular constituents of the organelle. These interactions give rise to emergent properties at a level higher than tissues and cells. This phenomenon is true and valid in all the hierarchy of organisational complexity of the organism. Therefore, we can say that living organisms are self-replicating, evolving and self-regulating interactive systems capable of responding to external stimuli from the environment. All living organisms – present, past and future, are linked to one another by the sharing of the common genetic material, but with varying degrees.

4. Diversity in the Living World

We find a huge degree of variety in living organisms around ourselves, ranging from potted plants to insects, birds, the pets or other animals and plants, huge trees. There is a world of organism which is left unseen with naked eyes but are omnipresent. As we increase the area of our study, the range and variety of organisms that you observe will also increase. The dense forest will have a much greater amount and variety of living organisms in it. Every organism that we observe in the surrounding belongs to a particular species and genus. The number of species that are studied and described range anywhere between 1.7-1.8 million. This indicates the biodiversity or the variety of organisms that are present on earth. Every time a new area is explored, new and even old organisms are being identified and studied.

4.1 Need for Classification of Organisms

We know that there are millions of plants and animals around us out of which we only know the plants and animals in our own area and call them by their local names. As the language changes so does these local names vary from place to place also within a country and state. This creates chaos when scientist or doctors or any biologist talks or studies about a particular organism in one area of the world and collects information from another area. Also the scientist when took any random organism to study, the difficulty that arose in the study was the ungrouping part of the organism. They had to find the organisms feature in a crowd of more than 1.7 million documents of the organisms studied till then. Thus scientist then decided to make a fixed universal solution for the same and then started working on the grouping and naming task of the organism.

This was done to make it easier for the study of organism's possible scientist have divided organisms into different levels and groups. The basis for differentiation was similarities and differences. This made it possible to bring all organisms in one single table or ground to study. The similarity is common in species placed in one group and decreases as it goes up. For e.g. the book in a library if arranged randomly makes it difficult for one to find his book of interest similarly organisms arranging in a system makes it simpler for the study.

Why the need to classify?

It will help to learn:

- Importance to estimate the inter-relationship between the organisms.
- The basics of the development of organisms and thus develop base for other science streams.
- Variety of biological studies are dependent on the identification and classification of the organism.

Three Domains of Life

Woese is a famous microbiologist and biophysicist who became more famous for introducing Archae kingdom to already existing five kingdom classification. He introduced Archae on the basis of the sequence of 16 S ribosomal RNA genes.This basis of 16 S ribosome sequence helped microbiology science to achieve many new heights.Woese found that the six kingdoms naturally join into three major domains of Archae, Bacteria and Eukarya. The domains belong to the common ancestor called Progenate is still a belief among scientist. Domain is a category which is level up from kingdom.

5. Taxonomy and Systematics

Taxonomy: The branch of science dealing with the study of principles and procedures of classification is called taxonomy. The term taxonomy was coined by A.P. de Candolle. Father of taxonomy is Linnaeus as he classified organisms on a broader perspective. Santapau is called as father of Indian Taxonomy. The fundamental sections of taxonomy are as follows:

- Characterisation and identification: It deals with the determination of the similarities of a new organism with an already known organism, based upon specific characters.
- Nomenclature: It involves naming of the organism with binomial criteria according to established universal rules.
- Classification: It is arranging organisms into convenient categories on the basis of visible and easy to study character.

The classical taxonomy is based on clearly visible morphological characters, however the modern taxonomy deals with several characters for the classification of organisms like:

- External and internal structure of the organism along with the structure of cell in it.
- Development process of the organism.
- Ecological information of all the organisms.

Systematics: The word “systematics” is systema meaning systematic arrangement of organisms according to Latin language. The word was first used by Carolus Linnaeus. He stated that, “systematics is the relationships amongst the organisms”.

Generally, the terms like classification, systematics and taxonomy are interchangeably used by taxonomist, but some exceptions like taxonomist Simpson (1961) relate all of them to a separate field. He defined systematics as “The study of diversity of organisms and all their comparative and evolutionary relationships based on comparative anatomy, comparative ecology, comparative physiology and comparative biochemistry”.

The main uses of systematics are as given below:

- It helps in providing knowledge of great diversity of animals and plants. It provides information regarding evolution which took place among plants and animals by knowing the distinction, relationship, habitat and habits. It thus, a vivid picture of entire organic diversity.
- It makes easy for identification which gives useful information about the phylogeny of organisms.
- It helps to identify newly discovered organisms through systematics.

Knowledge Builder

- There are large scale of biodiversity amongst all the living beings and it has few reasons which are as follows:
  - Adaptations of the organisms to diverse habitat in order to reduce competition among the species of same habitat.
  - Change in genetic constitution of the organism that helps them to survive.
  - Isolation of a species from the identical species and thus avoiding competition.
- Ontogeny is the life of organisms which involves the origination and development right from the fertilisation of the egg and zygote formation till the end of its life. The term ontogeny is common to study the life and its development of the organism. Phylogeny is the evolutionary history of organisms and this is specifically in regards with the evolution of a species from the descendant and their relationship with other groups.
- Systematics is taxonomy of that organism along with phylogeny of the species.
- Classical / old / descriptive systematics is based on the morphological characters of the organism. According to it, basic unit of classification is species and not genus. Pioneer workers in classification of organisms are Aristotle and Linnaeus.
- New systematics / Biosystematics / Neosystematics is based upon all characters, i.e., morphological, cytological, biochemical, genetical etc. The term Biosystematics or neosystematics was coined by Julian Huxley in 1940. Basic unit of classification is population or sub-species for the new systematics unlike old or classical systematics where it was species.

Did You Know

- **Taxonomy** is the world of naming, identifying, classifying, describing an organism and also linking it with the earlier known organisms.
- Linnaean taxonomy is based on ranking of the organism based on scientific classification.
- Evolutionary taxonomy is the traditional taxonomy that came into existence after Darwin's hierarchical taxonomy.
- Founder of taxonomy / father of biology / Zoology - Aristotle
- Father of Botany – Theophrastus
- Father of Indian Botany/India herbaria – William Rouxburgh.
- Around 5-30 million species in the world of living organisms exist in present day.
- Taxonomically or scientifically only 1.7 million or 13 percent number of species is known and studied by us.

TRY IT YOURSELF

1. Reproduction is synonymous with growth for which group of organisms? (Choose correct option)

(A) Multicellular filamentous organisms

(B) Colonial organisms

(C) Unicellular organisms

(D) All of these

2. Find correct match from Column – I and Column – II

	Column - I		**Column – II**
(A)	Protonema of moss	(i)	Consciousness
(B)	Metabolic reactions in vitro	(ii)	Living reactions
(C)	Defining property of living beings	(iii)	Fragmentation
(D)	Taxonomy term	(iv)	C. Linnaeus
(E)	Father of taxonomy	(v)	A.P. de. Candolle

3.Choose the correct statement

(A) A multicellular organism grows by increase in mass only

(B) Extrinsic growth is characteristics of non-living objects

(C) Metabolic reactions cannot be demonstrated in a cell-free system

(D) First step of taxonomy is classification

6. Nomenclature

Nomenclature means the method of naming the organism scientifically and universally.

The point arises for the need of nomenclature. There is a common name of the organism in its local language and this name keeps changing with change in language. Thus there is a need to standardise the names of all the living organisms, such that a particular organism has the same name all over the world. A list of nomenclature methods necessary for assigning a name to the organism are described below:

- **Vernacular name:** Names in local or regional language are called vernacular names. There are many vernacular names that exist in the world for an organism. These names vary from place to place in a country and even in a state.

- **Scientific names:** These names are assigned to the organism from scientist based on definite rules and criteria. These are of following types:
    - Polynomial nomenclature
    - Trinomial nomenclature
    - Binomial system of nomenclature: Swedish botanist Carolus Linnaeus established binomial nomenclature, which was first proposed by Caper Bauhin expressed in his book PINAX. In binomial nomenclature, the first word is a generic name having first letter capital and second word is a specific epithet having first letter small like *Mangifera indica* Linn. After end of biological name, the name of author is written in abbreviated form who gave the name to that organism.

Scientific names are in Latin, as Latin was the language known to all the scholars and also called as Language of scholars. Linnaeus was among several scientist who used Latin words and no change can be made in the language. This is because the Latin language lacks synonyms. Linnaeus gave some principles of the binomial nomenclature for around 5900 species of plants with their descriptive briefing in the book "Species Plantarum" (1753). Later he also a book for animals including 4326 species with their respective detailed studyand published the book as "Systema Naturae" (1758).

6.1 International Code of Nomenclature

Scientific names have been standardised through some international agencies, viz., International Code of Botanical Nomenclature (ICBN, 1961) and International Code of Zoological Nomenclature (ICZN, 1964), International Code for Nomenclature of Bacteria (ICBN), International Code of Nomenclature for Cultivated Plants (ICNCP) and currently being developed is International Committee for the Taxonomy of Viruses (ICTV).

6.2 Rules for Binomial Nomenclature

ICBN and ICZN formulated certain rules and regulations for giving scientific names to all organism. These rules are as follows:

- The scientific and universal name of an organism contains two components, a generic name and a specific epithet. The generic name should begin with a capital letter and species name should begin with a small letter.
- Both the words of a biological name when handwritten are separately underlined and when printed are typed in italics to indicate their Latin origin and also give respect to the name.
- The name of the author is also to be mentioned post scientific name in Roman type with capital letter without any comma in between and is written in an abbreviated form, e.g., *Homo sapiens* Linn is the complete scientific name for modern man. This shows that Linnaeus was the first scientist who named man as Homo sapiens.
- Scientific names should not be as small as three letters or as long as twelve letters.
- Principle of priority: It is the most important of all the rules of ICBN. If initial name given to the organism is valid and right (in terms of rules), that name will be considered as the name of that organism. Any

other valid and right name given later than the initial name will be considered as a synonym. No names are recognised before the namesthat were used by Linnaeus in 1758 in the 10th edition of Systema Naturae for animals and 1753 for the plants.

- All the three words (generic name, species epithet and author citation) together form binomial epithet or name of the organism.
- If a species name has two or more words in its name, a hyphen is put between these words to separate them and yet link them as a single name of that organism. Such names are compound specific names (e.g., *Hibiscus rosa – sinensis* for shoe flower)

KNOWLEDGE BUILDER

Other scientific Methods of Nomenclature and additional Rules:

- Polynomial nomenclature: This system is an old system used before 1750. The names of the plants in this system are based upon morphological characters, e.g., *Caryophyllum*. The name given was *"Caryophyllum saxatils foils gramineus umbellatis corymbis"* meeting it is caryophyllum growing on rocks having grass like leaves and umbellate corymb arrangement of flowers. Though these names were completely descriptive in regards to the organism, the problem with these names were their length which made it difficult to remember.
- Trinomial nomenclature: This naming system was proposed by Lamarck which involves the use of three words for a name so that the names of subspecies (animals) or varieties (plants) can also be incorporated avoiding all the confusion related to that organism.
- For example names of subspecies and varieties are given below:
  - *Corvus splendens splendens* - Indian crow
  - *Gorilla gorilla gorilla* - Gorilla (animal)
  - *Brassica oleracea var. capitata* - Cabbage
  - *Acacia nilotica var. indica* - Indian Babul
- Synonyms: In case two or more names are given, the oldest given first is recognised as valid name and all other names are called synonyms for the same organism. E.g., *Albugo candida (= Cystopus candidus)* for *Candida* fungus.
- Tautonyms: This system gives names to the organism involving generic and specific name are same, e.g., *Rattus rattus*. Tautonyms are not recognised by botanists.
- Autonyms: This system involves species and subspecies or variety names for the same organism which are same names, e.g., *Corvus splendens splendens, Acacia nilotica nilotica.*
- Homonyms: This system assigns same name to two different plants. E.g., *Prunus dulsi,* (For both almond and plum)

7. Taxonomic Categories

Classification involves hierarchy of steps and levels in which every step represents a rank or a category. Classification of the organism is not a simple process of one step.The category is a part of overall taxonomic arrangement and it is called the taxonomic category and all categories together constitute the taxonomic hierarchy. Each category is referred as a unit of classification that represents a rank, commonly termed as the taxon (pl.: taxa). Taxonomic categories and hierarchy is well illustrated with the help of an example.

Insects have three pairs of jointed legs as common which represents a group of organisms that share common features. This indicates that insects are recognisable separate creatures which can be classified into a different group, and thus were assigned a special rank or category. Is there anymore similar organisms that can be grouped together? Remember, group simple means a category and even a rank. Each rank or taxon, in turn, represents a unit or level of classification. These taxonomic groups or categories are distinct biological entities and not just the morphological aggregates. Taxonomical studies of all known organisms have led to the development of grouping the taxons on the larger scale with common categories such as kingdom, phylum or division (for plants), class, order, family, genus and species. All organisms, including those in the plant and animal kingdoms end in species which is the lowest category of classification. The question arising here is that how and where can one place an organism in the classification? The basic necessity in classifying the organism is the knowledge of the characters of an individual or group of organisms. This knowledge helps to identify the similarities and dissimilarities among the individuals of the similar kind and dissimilar organisms.

7.1 Species

Taxonomic studies consider a group of individual organisms with fundamental similarities as a species. One should be able to distinguish one species from the other closely related species based on the distinct morphological differences. Let us consider *Mangifera indica* (mango)*, Solanum tuberosum* (potato) and *Panthera leo* (lion). All the three names, *indica*, *tuberosum* and *leo*, represent the specific epithets, while the first words *Mangifera*, *Solanum* and *Panthera* are genera and represents another higher level of taxon or category. Each genus may have one or more than one specific epithets representing different organisms, but having morphological similarities. For example, *Panthera* has another specific epithet called *tigris* and *Solanum* includes species like *nigrum* and *melongena*. Human beings belong to the species *sapiens* which is grouped in genus *Homo*. The scientific name thus, for human being, is written as *Homo sapiens*.

7.2 Genus

Genus comprises a group of related species which has more characters in common in comparison to species of other genera. We can say that genera are aggregates of closely related species. For example, potato, tomato and brinjal are three different species but all belong to the genus

Solanum. Lion *(Panthera leo),* leopard *(P. pardus)* and tiger *(P. tigris)* with several common features, are all species of the genus *Panthera*. This genus differs from another genus *Felis* which includes cats.

7.3 Family

The next category, Family, has a group of related genera with still less number of similarities as compared to genus and species. Families are characterised on the basis of both vegetative and reproductive features of plant species. Among plants for example, three different genera *Solanum*, *Petunia* and *Datura* are placed in the family Solanaceae. Among animals for example, genus Panthera, comprising lion, tiger, and leopard is put along with genus, *Felis* (cats) in the family Felidae. Similarly, if you observe the features of a cat and a dog, you will find some similarities and some differences as well. They are separated into two different families – Felidae and Cancidae, respectively.

7.4 Order

You have seen earlier that categories like species, genus and families are based on a number of similar characters. Generally, order and other higher taxonomic categories are identified based on the aggregates of characters. Order being a higher category, is the assemblage of families which exhibit a few similar characters. The similar characters are less in number as compared to different genera included in a family. Plant families like Convolvulaceae, Solanaceae are included in the order Polymoniales mainly based on the floral characters. The animal order, Carnivora, includes families like Felidae and Cancidae.

7.5 Class

This category includes related orders. For example, order Primata comprising monkey, gorilla and gibbon is placed in class Mammalia along with order Carnivora that includes animals like tiger, cat and dog. Class Mammalia has other orders also.

7.6 Phylum

Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals constitute the next higher category called Phylum. All these, based on the common features like presence of notochord and dorsal hollow neural system, are included in phylum Chordata. In case of plants, classes with a few similar characters are assigned to a higher category called Division.

7.7 Kingdom

All animals belonging to various phyla are assigned to the highest category called Kingdom Animalia in the classification system of animals. The Kingdom Plantae, on the other hand, is distinct, and comprises all plants from various divisions. Henceforth, we will refer to these two groups as animal and plant kingdoms. The taxonomic categories from species to kingdom have been shown in ascending order starting with species. These are broad categories. However, taxonomists have also developed sub-categories in this hierarchy to facilitate more sound and scientific placement of various taxa. Look at the hierarchy, can you recall the basis of arrangement? Say, for example, as we go higher from species to kingdom, the number of common characteristics goes on decreasing. Lower the taxa, more are the characteristics that the members within the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level. Hence, the problem of classification becomes more complex.

Q.8 First life on earth was ***(AIPMT 2001)***

(A) Cyanobacteria (B) Chemoheterotrophs

(C) Autotrophs (D) Photoautotrophs

Q.9 Reason for diversity among living beings is ***(AIPMT 2001)***

(A) Mutation (B) Gradual change

(C) Long term evolutionary change (D) Short term evolutionary change

Q.10 The living organisms can be unexceptionally distinguished from non-living things on basis of their ability for ***(AIPMT 2007)***

(A) Responsiveness to touch

(B) Interaction with environment and progressive evolution

(C) Reproduction

(D) Growth and movement

ANSWER KEY

Objective Questions

Q.1 C	**Q.2** D	**Q.3** B	**Q.4** C	**Q.5** B	**Q.6** B
Q.7 A	**Q.8** C	**Q.9** C	**Q.10** D	**Q.11** C	**Q.12** D
Q.13 B	**Q.4** D	**Q.15** D	**Q.16** D	**Q.17** C	**Q.18** D
Q.19 A	**Q.20** D	**Q.21** B	**Q.22** C	**Q.23** A	**Q.24** D
Q.25 B	**Q.26** A	**Q.27** B	**Q.28** D	**Q.29** D	**Q.30** B
Q.31 C	**Q.32** B	**Q.33** B	**Q.34** B	**Q.35** B	**Q.36** A
Q.37 C	**Q.38** B	**Q.39** A	**Q.40** B	**Q.41** B	**Q.42** B
Q.43 B	**Q.44** C	**Q.45** A	**Q.46** D	**Q.47** A	**Q.48** A
Q.49 C	**Q.50** B	**Q.51** B	**Q.52** C	**Q.53** A	**Q.54** D
Q.55 A	**Q.56** C	**Q.57** B	**Q.58** D	**Q.59** B	**Q.60** C
Q.61 A	**Q.62** D	**Q.63** D	**Q.64** D	**Q.65** D	

Previous Years' Questions

Q.1 A	**Q.2** D	**Q.3** C	**Q.4** D	**Q.5** A	**Q.6** C
Q.7 B	**Q.8** B	**Q.9** C	**Q.10** C		