

# CHAPTER – 1

## THE LIVING WORLD

### EXERCISES

#### 2 Mark Questions

**Q1: What different criteria would you choose to classify people that you meet often?**

**Answer:** The various criteria that may be chosen to classify people whom we meet often include behavior, geographical location, morphology, family members, relatives, friends etc.

**Q2: What do we learn from identification of individuals and populations?**

**Answer:** The knowledge of characteristic of an individual or its whole population helps in identification of similarities and dissimilarities among the individuals of same kind or between different types of organisms. It helps us to classify the organisms in various categories depending upon these similarities and dissimilarities.

**Q3: Given below is the scientific name of mango. Identify the correctly written name.**

**Mangifera Indica Mangifera indica**

**Answer:** The correctly written scientific name of mango is Mangifera indica.

**Q4: What is Biology?**

**Answer:** Biology is a natural science, which is concerned with the study of principles of governing life processes and also explores the living world, diversity of living organisms, relationships between the living and nonliving, and a lot more.

### **Q5: What is Biodiversity?**

**Answer:** Biodiversity can be defined as the variation among living organisms from different sources, including terrestrial, marine and desert ecosystems, and other ecological complexes.

### **Q6: What is DNA?**

**Answer:** DNA – Deoxyribonucleic acid is the double-helical structure, which contains the unique genetic code, which is inherited from our parents. It is found in every single living creature and is composed of molecules called nucleotides.

### **Q7: What is Carbohydrates?**

**Answer:** Carbohydrates is a group of organic molecules or the macromolecules, which are composed of carbon, hydrogen and oxygen atoms. These biomolecules are primary food groups and are an essential source of energy. The most common and abundant forms of Carbohydrates are sugars, fibers, and starches.

### **Q8: What is Cellular organization?**

**Answer:** The cellular organization is defined as the components that make up the cell, tissues, organs and the organ system.

## **4 Mark Questions**

### **Q1: Why are living organisms classified?**

**Answer:** Living organisms are classified because of the following reasons:

- (i) Easy identification.
- (ii) Study of organisms of other places.
- (iii) Study of fossils
- (iv) Grouping helps in study of all types of organisms while it is impossible to study individually all of them.
- (v) It brings out similarities and dissimilarities. They help in knowing relationships among different groups.
- (vi) Evolution of various taxa can be known.

**Q2: Why are the classification systems changing every now and then?**

**Answer:** From very early days till now biologists use several characters for classification system. These are morphology, anatomy, cytology, physiology, ontogeny, phylogeny, reproduction, biochemistry, etc. But day by day biologists are learning something new about organisms from their fossil records and using advanced study techniques such as molecular phylogeny, etc. So their point of view about classification keeps changing. Thus the system of classification is modified every now and then.

**Q3: Define a taxon. Give some example of taxa at different hierarchical levels.**

**Answer:** A taxonomic unit in the biological system of classification of organism is called taxon (plural taxa). For example a phylum, order, family, genus or species represents taxon. It represents a rank. For example, all the insects form a taxon. Taxon of class category for birds is Aves and taxon of Phylum category for birds is Chordata. The degree of relationship and degree of similarity varies with the rank of the taxon. Individuals of a higher rank, say Order or Family, are less closely related than those of a lower rank, such as Genus or Species.

**Q4: Can you identify the correct sequence of taxonomical categories?**

- (a) Species → Order → Phylum → Kingdom
- (b) Genus → Species → Order Kingdom
- (c) Species → Genus → Order → Phylum

**Answer:** The correct sequence of taxonomical categories is (c) i.e., Species → Genus → Order → Phylum.

**Q5: How is a key helpful in the identification and classification of an organism?**

**Answer:** Key is an artificial analytic device having a list of statements with dichotomic table of alternate characteristics. Taxonomic keys are aids for rapid identification of unknown plants and animals based on the similarities and dissimilarities. Keys are primarily based on stable and reliable characters. The keys are helpful in a faster preliminary identification which can be backed up by confirmation through comparison with detailed description of the

taxon provisionally identified with. Separate taxonomic keys are used for each taxonomic category like Family, Genus and Species.

**Q6: Write the full form for the following code – ICVN, ICBN, ICZN, and ICNB.**

**Answer:**

**ICVN**– The International Code of Viral Nomenclature.

**ICBN**–The International Code of Botanical Nomenclature.

**ICZN**– The International Commission on Zoological Nomenclature.

**ICNB**– The Institute for Nature Conservation and Biodiversity.

**Q7: Define the following terms- Metabolism, Growth and Development.**

**Answer:**

**Metabolism**– It refers to a series of chemical reactions, which takes place in all living organisms to sustain life.

**Growth**– It is defined as an irreversible and constant increase in the mass and size of a body.

**Development**–It is the process, where a particular organism grows physically and acquires both the mental and physiological growth as well.

**Q8: What are the different defining properties of a living organism?**

**Answer:**

- A living organism can grow.
- All living organisms can reproduce.
- Metabolism is another defining property of a living organism.
- Cellular organization of living organisms.
- Consciousness

### **Q9: What are the Building blocks of the living system?**

**Answer:**

The basic building blocks of the living system includes both the organic and inorganic biomolecular and they include:

1. Water.
2. Lipids.
3. Oxygen.
4. Proteins.
5. Nucleic Acids.
6. Carbohydrates.
7. Sodium chloride.

### **Q10: What is binomial nomenclature?**

**Answer:**

Binomial nomenclature is a formal and biological system of naming all the living organisms. Carolus Linnaeus was the first person to introduce the binomial nomenclature system for naming organisms in a scientific way.

## **7 Mark Questions**

**Q1: Try to collect all the currently accepted meanings for the word ‘species’. Discuss with your teacher the meaning of species in case of higher plants and animals on one hand and bacteria on the other hand.**

**Answer:**

Species occupies a key position in classification. It is the lowest taxonomic category. It is a natural population of individuals or group of populations which resemble one another in all essential morphological and reproductive characters so that they are able to interbreed freely and produce fertile offsprings. Each species is also called genetically distinct and reproductively isolated natural population. Mayr (1964) has defined species as “a group of actually or potentially interbreeding populations that are reproductively isolated from other such groups”.

In higher plants and animals the term ‘species’ refers to a group of individuals that are able to interbreed freely and produce fertile offsprings. But, in case of bacteria interbreeding cannot serve as the best criteria for delimiting species because bacteria usually reproduce asexually. Conjugation, transformation and transduction, which are termed as sexual reproduction methods in bacteria, also do not correspond to true interbreeding. Thus, for bacteria many other characters such as molecular homology, biochemical, physiological, ecological and morphological characters are taken into consideration while classifying them.

**Q2: Define and understand the following terms:**

- (i) Phylum (ii) Class (iii) Family  
(iv) Order (v) Genus**

**Answer:**

(i) Phylum – Phylum is a category higher than that of Class. The term Phylum is used for animals. A Phylum is formed of one or more classes, e.g., the Phylum Chordata of animals contains not only the class Mammalia but also Aves (birds), Reptilia (reptiles), Amphibia (amphibians), etc. In plants the term Division is used in place of Phylum.

(ii) Class – A Class is made of one or more related Orders. For example, the Class Dicotyledoneae of flowering plants contains all dicots which are grouped into several orders (e.g., Rosales, Sapindales, Ranales, etc.).

(iii) Family, – It is a taxonomic category which contains one or more related genera. All the genera of a family have some common features or correlated characters. They are separable from genera of a related family by important and characteristic differences in both vegetative and reproductive features. E.g., the genera of cats (Fells) and leopard (Panthera) are included in the Family Felidae. The members of Family Felidae are quite distinct from those of Family Canidae (dogs, foxes, wolves).

Similarly, the family Solanaceae contains a number of genera like Solanum, Datura, Petunia and Nicotiana. They are distinguishable from the genera of the related family Convolvulaceae (Convolvulus, Ipomoea).

(iv) Order – The category includes one or more related families. E.g., the plant Family Solanaceae is placed in the Order Polemoniales alongwith four other related families (Convolvulaceae, Boraginaceous, Hydrophyllaceae and

Polemoniaceae). Similarly, the animal families Felidae and Canidae are included under the Order Carnivora alongwith Hyaenidae (hyaenas) and Ursidae (bears).

(v) Genus – It is a group or assemblage of related species which resemble one another in certain correlated characters. Correlated characters are those similar or common features which are used in delimitation of a taxon above the rank of species. All the species of genus are presumed to have evolved from a common ancestor. A genus may have a single living species e.g., Genus Homo. Its species is Homo sapiens – the living or modern man. The Genus Felis has many species, e.g., F. domestica – common cat, F. chaus (jungle cat) etc.

**Q3: Illustrate the taxonomical hierarchy with suitable examples of a plant and an animal.**

**Answer:**

The arrangement of various taxa in a hierarchical order is called taxonomic hierarchy. The hierarchy indicates the various levels of kinship. The number of similar characters of categories decreases from lowest rank to highest rank. The hierarchical system of classification was introduced by Linnaeus.

The hierarchy of major categories is:

Species —► Genus—► Family —► Order—► Class

Kingdom -4— Phylum or Division

Increasing specificity – ► Decreasing specificity

Classification of a plant (Wheat):

Kingdom – Plantae

Division – Angiospermae

Class – Monocotyledonae

Order – Poales

Family – Poaceae

Genus – Triticum

Species – aestivum

Classification of an animal (Housefly):

Kingdom – Animalia

Phylum – Chordata

Class – Insecta

Order – Diptera

Family – Muscidae

Genus – Musca  
Species – domestica

**Q4: What do you mean by living? Explain the defining characteristics of living organisms.**

Answer:

Living means a thing that can grow, reproduce, has a cellular organization and is aware of its surroundings. Following are the defining characteristics of a living organism:

1. **Growth**– All living organisms have the ability to grow. Growth refers to the increase in the number and size of an organism.
2. **Reproduction**– All living organisms have the property of giving rise to a new individual. Reproduction can occur through sexual and/or asexual means.
3. **Metabolism**– All living organisms exhibit the process of metabolism. It is a series of chemical reactions which converts food into energy.
4. **Cellular organization**– Cell is the structural and functional unit of life. All living organisms are made up of one or more cells.

**Q5: Differentiate between “whole moong daal” and “broken moong daal” in terms of respiration and growth?**

Answer:

Whole Moong Daal	Broken Moong Daal
It is an intact seed of the plant.	It is not an intact seed.
It germinates under appropriate conditions.	It does not germinate because the embryo and cotyledons are destroyed.
It resumes the metabolic activity on germination.	It cannot resume the metabolic activity.
The stored food in the cotyledons is	The enzyme gets activated when the broken



hydrolyzed by the activated enzymes due to metabolism.	seed imbibes water, but will not facilitate growth.
It respire and emits CO <sub>2</sub> .	The embryo is destroyed, so no respiration and no CO <sub>2</sub> emission.
The embryo gives rise to root and shoot as the seed resumes active metabolism.	The cotyledons of broken moon daal have stored food rich in proteins but do not show any root and shoot growth.

## Multiple Choice Questions

**1. A group of plants and animals with similar traits of any rank is**

- a. Taxon
- b. Species
- c. Genus
- d. Order

**Answer:** Taxon

**2. Which is less general in characters as compared to genus?**

- a. Family
- b. Division
- c. Class
- d. Species

**Answer:** Species

**3. What is the correct sequence?**

- a. Genus-species-order-kingdom
- b. Species-order-phylum-kingdom
- c. Species-genus-order-phylum
- d. Kingdom-phylum-class-order

**Answer:** kingdom-phylum-class-order

**4. Metabolism refers to**

- a. Release of energy
- b. Gain of energy
- c. Catabolism
- d. Gain or release of energy

**Answer:** gain or release of energy

**5. What is nomenclature?**

- a. Genus name is written after species
- b. Genus and species names are written in italics
- c. Genus and species have the same name
- d. The first letter of genus and species name is capital

**Answer:** Genus and species names are written in italics

**6. The term phylum was coined by**

- a. Linnaeus
- b. Cuvier
- c. Haeckel
- d. Theophrastus

**Answer:** Haeckel

**7. Binomial nomenclature was given by**

- a. Linnaeus
- b. Hugo De Varies
- c. John Ray
- d. Huxley

**Answer:** Linnaeus

**8. Species found in different geographical locations are called**

- a. Sympatric species

- b. Allopatric species
- c. Sibling species
- d. Morphospecies

**Answer:** Allopathic species

**9. What is a homonym?**

- a. Identical name of two different taxa
- b. Two or more names of same taxon
- c. Name given to a taxon in local language
- d. Species name repeats the generic name

**Answer:** Identical name of two different taxa

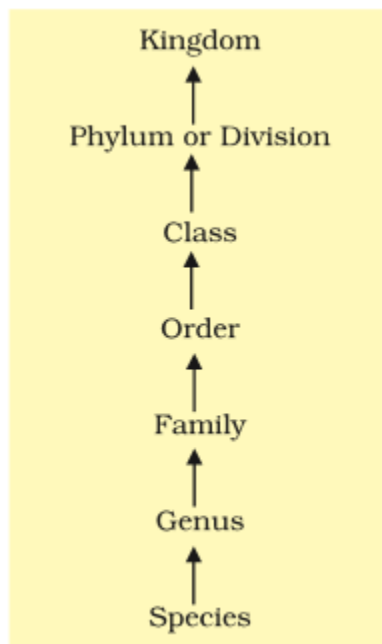
**10. The biologically cohesive unit of taxa is**

- a. Phylum
- b. Order
- c. Genus
- d. Species

**Answer:** Identical name of two different taxa

## Flow Chart

**Flow chart of Taxonomic categories showing hierarchical arrangement in ascending order**



## SUMMARY

The living world is rich in variety. Millions of plants and animals have been identified and described but large number still remains unknown. The very range of organisms in terms of size, color, habitat, physiological and morphological features make us seek the defining characteristics 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 knowledge dealing with these aspects is referred to as taxonomy. The taxonomic studies of various species of plants and animals are useful in agriculture, forestry, industry and in general for knowing our bio-resources and their diversity. The basics of taxonomy like identification, naming and classification of organisms are universally evolved under international codes. Based on the resemblances and distinct differences, each organism is identified and assigned a correct scientific/biological name comprising two words as per the binomial system of nomenclature. An organism represents/occupies a place or position in the system of classification. There are many categories/ ranks and are

generally referred to as taxonomic categories or taxa. All the categories constitute a taxonomic hierarchy.

stimulates erythropoiesis. The gastrointestinal tract secretes gastrin, secretin, cholecystokinin and gastric inhibitory peptide. These hormones regulate the secretion of digestive juices and help in digestion.