Biology

(Chapter – 1) (The Living World)

(Class – XI)

Exercises

Question 1:
Why are living organisms classified?

Answer 1:
A large variety of plants, animals, and microbes are found on earth. All these living organisms differ in size, shape, colour, habitat, and many other characteristics. As there are millions of living organisms on earth, studying each of them is impossible. Therefore, scientists have devised mechanisms to classify all living organisms. These methods of classification are based on rules and principles that allow identification, nomenclature, and finally classification of an organism.
For example, based on certain principles, once an organism is identified as an insect, it will be given a scientific name and then grouped with other similar organisms. Thus, various groups or taxon include organisms based on their similarity and differences.
Therefore, the biological classification helps in revealing the relationship between various organisms. It also helps in making study of organisms easy and organized.

Question 2:
Why are the classification systems changing every now and then?

Answer 2:
Millions of plants, animals, and microorganisms are found on earth. Many of these have been identified by the scientists while many new species are still being discovered around the world. Therefore, to classify these newly discovered species, new systems of classification have to be devised every now and then. This creates the requirement to change the existing systems of classification.

Question 3:
What different criteria would you choose to classify people that you meet often?

Answer 3:
To classify a class of forty students, let us start the classification on the basis of sexes of the students. This classification will result in the formation of two major groups- boys and girls.
Each of these two groups can be further classified on the basis of the names of the students falling in these groups.
Since it is possible that more than one student can have a particular name, these names can be further divided based on the surnames.
Since there is still some chance that more than one student can have the same surname, the final level of classification will be based on the roll numbers of each student.

Question 4:
What do we learn from identification of individuals and populations?
Answer 4:
The knowledge of characteristics of an individual or its entire population helps in the identification of similarities and dissimilarities among the individuals of same kind or between different types of organisms. It helps the scientists to classify organisms in various categories.

Question 5:
Given below is the scientific name of Mango. Identify the correctly written name.
Mangifera Indica
Mangifera indica
Answer 5:
In binomial system of nomenclature, the generic name of a species always starts with a capital letter whereas the specific name starts with a small letter. Therefore, the correct scientific name of Mango is *Mangifera indica.*

Question 6:
Define a taxon. Give some examples of taxa at different hierarchical levels.
Answer 6:
Each unit or category of classification is termed as a taxon. It represents a rank. For example, the basic level of classification is species, followed by genus, family, order, class, phylum or division, in ascending order. The highest level of classification is known as kingdom.

Question 7:
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 7:
The correct hierarchical arrangement of taxonomic categories in ascending order is
Species → Genus → Family → Order → Class → Phylum → Kingdom

Therefore, both (a) and (c) represent correct sequences of taxonomic categories. In sequence (b), species should be followed by genus. Therefore, it does not represent the correct sequence.

Question 8:
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 8:
In biological terms, species is the basic taxonomical rank. It can be defined as a group of similar organisms that are capable of interbreeding under natural conditions to produce fertile offspring.
Therefore, a group of similar individuals that are respectively isolated form a species.
Species can also be defined as group of individuals that share the same gene pool.

Question 9:
Define and understand the following terms:
(i) Phylum **(ii)** Class **(iii)** Family **(iv)** Order **(v)** Genus

Answer 9:
(i) Phylum
Phylum is the primary division of kingdom. It includes one or more related classes of animals. In plants, instead of phylum, the term 'division' is used.

(ii) Class
Class is a taxonomic group consisting of one or more related orders.
For example, the class, Mammalia, includes many orders.

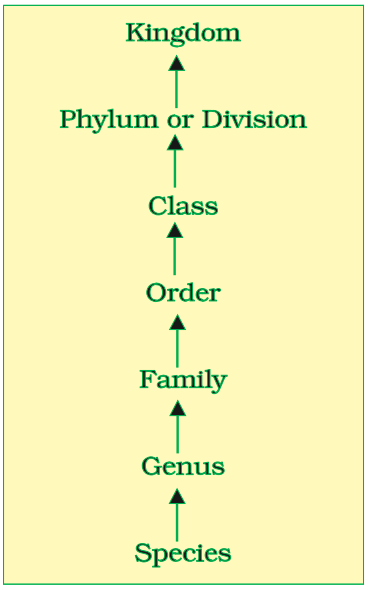
(iii) Family
Family is a taxonomic group containing one or more related genera. In plants, families are categorized on the basis of vegetative and reproductive features.

(iv) Order
Order is a taxonomic group containing one or more families.
For example, the order, carnivore, includes many families.

(v) Genus
Genus is a taxonomic group including closely related species.
For example, the genus, *Solanum*, includes many species such as *nigrum*, *melongena*, *tuberosum*, etc.

Question 10:
How is a key helpful in the identification and classification of an organism?
Answer 10:
Key is another taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities. The keys are based on the contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options. This results in acceptance of only one and rejection of the other. Each statement in the key is called a lead. Separate taxonomic keys are required for each taxonomic category such as family, genus and species for identification purposes. Keys are generally analytical in nature.
Flora, manuals, monographs and catalogues are some other means of recording descriptions. They also help in correct identification. Flora contains the actual account of habitat and distribution of plants of a given area. These provide the index to the plant species found in a particular area. Manuals are useful in providing information for identification of names of species found in an area. Monographs contain information on any one taxon.

Question 11:
Illustrate the taxonomical hierarchy with suitable examples of a plant and an animal.
Answer 11:
The arrangement of various taxa in a hierarchical order is called taxonomic hierarchy.
In this hierarchy, species is present at the lowest level whereas kingdom is present at the highest level.



Classification of a plant

As an example, let us classify S*olanum melongena* (Brinjal).

Kingdom – Plantae
Division – Angiospermae
Class – Dicotyledonae
Order – Solanales
Family – Solanaceae
Genus – *Solanum*
Species – *melongena*

Classification of an animal

As an example, let us classify *Columba livia* (Blue rock Dove).

Kingdom – Animalia
Phylum – Chordata
Class – Aves
Order – Columbiformes
Family – Columbidae
Genus – *Columba*
Species – *livia*